

Application: 21-06-021
(U 39 M)
Exhibit No.: (PG&E-5)
Date: February 28, 2022
Witness(es): Various

PACIFIC GAS AND ELECTRIC COMPANY

2023 GENERAL RATE CASE

EXHIBIT (PG&E-5)

ENERGY SUPPLY

WORKPAPERS SUPPORTING

CHAPTERS 2-4

[INCLUDES ERRATA THROUGH

FEBRUARY 28, 2022]

VOLUME 1 OF 2

(PUBLIC)



PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-5)
ENERGY SUPPLY

TABLE OF CONTENTS

Chapter	Title	Witness
2	ENERGY SUPPLY RISK MANAGEMENT [INCLUDES ERRATA THROUGH FEBRUARY 28, 2022]	Eric Van Deuren Russell A. Prentice
3	NUCLEAR OPERATIONS COSTS	Thomas R. Baldwin
4	HYDRO OPERATIONS COSTS	Eric Van Deuren
5	NATURAL GAS AND SOLAR GENERATION OPERATIONS COSTS [INCLUDES ERRATA THROUGH FEBRUARY 28, 2022]	Steve Royall
6	ENERGY PROCUREMENT ADMINISTRATION COSTS	Candice K. Chan
7	ENERGY SUPPLY TECHNOLOGY PROGRAMS	Dana Longmire
8	ENERGY SUPPLY RATEMAKING	Rebecca R. Doidge

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-5) ENERGY SUPPLY

WORKPAPERS SUPPORTING
CHAPTER 2, ENERGY SUPPLY RISK MANAGEMENT

TABLE OF CONTENTS

Subject	WP No.
Energy Supply Risk Placemat	WP 2-1
Recorded and Forecast Mitigation and Control Costs (2020-2026)	
Large Uncontrolled Water Release – Mitigations and Control, Capital and Expense	WP 2-2
Extended Unplanned Shutdown of a Critical Power Generation Asset – Mitigations, Capital (2020-2026)	WP 2-3
Extended Unplanned Shutdown of a Critical Power Generation Asset – Mitigations, Expense (2020-2026)	WP 2-4
Extended Unplanned Shutdown of a Critical Power Generation Asset – Controls, Expense (2020-2026)	WP 2-5
Nuclear Core Damaging Event – Controls, Expense	WP 2-6
Nuclear Extended Shutdown – Controls, Expense	WP 2-7
Risk Model Bowtie	
Extended Unplanned Shutdown of a Critical Power Generation Asset	WP 2-8
Nuclear Core Damaging Event	WP 2-9
Nuclear Extended Shutdown	WP 2-10
Large Uncontrolled Water Release	WP 2-11
Other Supporting Workpapers	
Results of the Safety Model Assessment Proceeding (S-MAP) Step-3 Supplemental Analysis – Extended Unplanned Shutdown of a Critical Power Generation Asset, Nuclear Core Damaging Event and Nuclear Extended Shutdown	WP 2-12
Comparing Estimated Risk Costs in the RAMP Report to Forecast Costs in the GRC	WP 2-13

Workpaper 2-1
 2023 General Rate Case
 Risk Placemat - Forecast Control and Mitigation Costs (2023-2026)
 ENERGY SUPPLY
 (Thousands of Nominal Dollars)

Line No.	Exh_Ch No.	Chapter	RISK MITIGATIONS				RISK MITIGATIONS						
			EXPENSE: 2023-2026 Forecast by Risk (\$000s)		CAPITAL: 2023-2026 Forecast by Risk (\$000s)		EXPENSE: 2023-2026 Forecast by Risk (\$000s)		CAPITAL: 2023-2026 Forecast by Risk (\$000s)				
1	5_3	Nuclear Operations Costs											
2	5_4	Hydro Operations Costs											
3	5_5	Natural Gas and Solar Operations Costs											
4		Total											
5													
6													
7													
8													
9													

Line No.	Exh_Ch No.	Chapter	RISK CONTROLS				RISK CONTROLS						
			EXPENSE: 2023-2026 Forecast by Risk (\$000s)		CAPITAL: 2023-2026 Forecast by Risk (\$000s)		EXPENSE: 2023-2026 Forecast by Risk (\$000s)		CAPITAL: 2023-2026 Forecast by Risk (\$000s)				
10	5_3	Nuclear Operations Costs											
11	5_4	Hydro Operations Costs											
12	5_5	Natural Gas and Solar Operations Costs											
13		Total											
14													

Worksheet 2-2
 2023 General Rate Case
 Risk Forecasts in the GRC by Exhibit
 LARGE UNCONTROLLED WATER RELEASE

Recorded and Forecast Mitigation Costs - Capital (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
1	LGUWR-M001	Internal Erosion Mitigations	4	2L	\$ 3,162,850	\$ 20,398,775	\$ 20,400,000	\$ 21,700,000	\$ 13,000,000	\$ 4,500,000	\$ 500,000	\$ 83,661,625	\$ 39,700,000	0.141
2	LGUWR-M001	Internal Erosion Mitigations	4	2N	\$ 70,615	\$ 659,377	\$ 360,000	\$ 360,000	\$ 2,173,500	\$ 3,150,000	\$ 4,500,000	\$ 11,273,492	\$ 10,183,500	0.141
3	LGUWR-M002	Spillway Remediations	4	2L	\$ -	\$ -	\$ 91,321	\$ 3,652,822	\$ -	\$ -	\$ -	\$ 3,744,143	\$ 3,652,822	0.516
4	LGUWR-M002	Spillway Remediations	4	2N	\$ -	\$ -	\$ 50,000	\$ 150,000	\$ -	\$ -	\$ -	\$ 200,000	\$ 150,000	0.516
5	LGUWR-M002	Spillway Remediations	4	3H	\$ 2,027,930	\$ 9,645,000	\$ 20,714,460	\$ 65,790,000	\$ 67,500,000	\$ 54,432,000	\$ 49,500,000	\$ 269,609,390	\$ 237,222,000	0.516
6	LGUWR-M003	Seismic Retrofits	4	2L	\$ 14,235,469	\$ 2,276,105	\$ 5,127,370	\$ 23,288,173	\$ 23,176,071	\$ 14,239,053	\$ 12,384,827	\$ 94,727,068	\$ 73,088,124	0.010
7	LGUWR-M003	Seismic Retrofits	4	2N	\$ -	\$ -	\$ -	\$ -	\$ 1,800,000	\$ 3,150,000	\$ 4,500,000	\$ 9,450,000	\$ 9,450,000	0.010
8	LGUWR-M004	LLO Refurbishments	4	2L	\$ 505,259	\$ 1,350,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,855,259	\$ -	0.016
9	LGUWR-M004	LLO Refurbishments	4	2N	\$ 9,695,125	\$ 3,879,344	\$ 3,921,203	\$ 7,629,728	\$ 6,774,549	\$ 292,312	\$ -	\$ 32,192,261	\$ 14,696,589	0.016
10		Total			\$ 29,697,248	\$ 38,208,601	\$ 50,664,353	\$ 122,570,724	\$ 114,424,120	\$ 79,763,365	\$ 71,384,827	\$ 506,713,237	\$ 388,143,036	

Recorded and Forecast Mitigation Costs - Expense (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
17	LGUWR-M001	Internal Erosion Mitigations	4	AX	\$ 1,129,872	\$ 282,300	\$ 610,000	\$ -	\$ -	\$ -	\$ -	\$ 2,022,172	\$ -	0.141
18	LGUWR-M002	Spillway Remediations	4	IG	\$ 2,368,593	\$ 8,413,714	\$ 2,401,997	\$ 555,269	\$ -	\$ -	\$ -	\$ 13,739,573	\$ 555,269	0.516
19	LGUWR-M004	LLO Refurbishments	4	AX	\$ 27,531	\$ 225,000	\$ 1,612,800	\$ 4,500,000	\$ 2,250,000	\$ -	\$ -	\$ 8,615,331	\$ 6,750,000	0.016
20		Total			\$ 3,525,995	\$ 8,921,014	\$ 4,624,797	\$ 5,055,269	\$ 2,250,000	\$ -	\$ -	\$ 24,377,075	\$ 7,305,269	

Recorded and Forecast Control Costs - Expense (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
28	LGUWR-C001	Dam Safety Program	4	AX	\$ 86,144	\$ 145,260	\$ 129,276	\$ 175,280	\$ 158,955	\$ 163,640	\$ 168,464	\$ 1,027,019	\$ 666,339	25.817
29	LGUWR-C001	Dam Safety Program	4	IG	\$ 587,688	\$ 500,000	\$ 431,250	\$ 568,750	\$ 500,000	\$ 500,000	\$ 500,000	\$ 3,587,688	\$ 2,068,750	25.817
30	LGUWR-C001	Dam Safety Program	4	KJ	\$ 7,568,970	\$ 6,782,096	\$ 7,374,044	\$ 8,528,024	\$ 7,548,832	\$ 8,156,705	\$ 7,992,608	\$ 53,951,278	\$ 32,226,168	25.817
31		Total			\$ 8,242,801	\$ 7,427,356	\$ 7,934,570	\$ 9,272,054	\$ 8,207,787	\$ 8,820,345	\$ 8,661,072	\$ 58,565,985	\$ 34,961,257	

Worksheet 2-3
 2023 General Rate Case
 Risk Forecasts in the GRC by Exhibit
 EXTENDED UNPLANNED SHUTDOWN OF A CRITICAL POWER GENERATION ASSET

Recorded and Forecast Mitigation Costs - Capital (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
1	GSHUT-M001	Component Replacement or Repair Civil	4	2L	\$ 1,975	\$ 2,865	\$ 2,070	\$ 1,706	\$ 1,150	\$ -	\$ -	\$ 9,766	\$ 2,856	-
2	GSHUT-M001	Component Replacement or Repair Civil	4	2M	\$ 295	\$ 1,304	\$ 4,970	\$ 1,844	\$ 450	\$ 2,672	\$ 985	\$ 12,520	\$ 5,951	-
3	GSHUT-M001	Component Replacement or Repair Civil	4	2N	\$ 10,482	\$ 13,018	\$ 12,273	\$ 19,646	\$ 1,667	\$ 1,438	\$ 1,750	\$ 60,275	\$ 24,501	-
4	GSHUT-M001	Component Replacement or Repair Civil	4	2P	\$ 6,324	\$ 6,790	\$ 6,157	\$ 11,613	\$ 855	\$ 51	\$ 1,100	\$ 32,889	\$ 13,619	-
5	GSHUT-M001	Component Replacement or Repair Civil	4	3H	\$ 158	\$ 1,040	\$ 2,285	\$ 7,310	\$ 7,500	\$ 6,048	\$ 5,500	\$ 29,841	\$ 26,358	-
6	GSHUT-M002	Component Replacement or Repair Electrical	4	2L	\$ 16	\$ 959	\$ 870	\$ 2,000	\$ 300	\$ 700	\$ 1,000	\$ 5,845	\$ 4,000	0.033
7	GSHUT-M002	Component Replacement or Repair Electrical	4	2M	\$ 40,378	\$ 43,364	\$ 33,441	\$ 44,723	\$ 39,515	\$ 51,817	\$ 51,255	\$ 304,493	\$ 187,309	0.033
8	GSHUT-M002	Component Replacement or Repair Electrical	4	2N	\$ 570	\$ 4,855	\$ 2,664	\$ 3,185	\$ 3,018	\$ 2,500	\$ 2,500	\$ 19,291	\$ 11,202	0.033
9	GSHUT-M002	Component Replacement or Repair Electrical	4	2P	\$ 1,154	\$ 4,642	\$ 1,336	\$ 8,097	\$ 7,017	\$ 1,000	\$ -	\$ 23,247	\$ 16,115	0.033
10	GSHUT-M002	Component Replacement or Repair Electrical	4	2S	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0.033
11	GSHUT-M002	Component Replacement or Repair Electrical	5	2S	\$ 1,560	\$ 3,795	\$ 1,860	\$ 945	\$ -	\$ -	\$ -	\$ 8,160	\$ 945	0.033
12	GSHUT-M003	Component Replacement or Repair Mechanical	4	12	\$ -	\$ -	\$ -	\$ -	\$ 1,000	\$ 500	\$ 1,000	\$ 2,500	\$ 2,500	0.039
13	GSHUT-M003	Component Replacement or Repair Mechanical	4	2L	\$ 205	\$ 1,329	\$ 1,239	\$ 2,293	\$ 1,986	\$ 2,269	\$ 1,413	\$ 10,734	\$ 7,961	0.039
14	GSHUT-M003	Component Replacement or Repair Mechanical	4	2M	\$ 18,759	\$ 30,567	\$ 20,076	\$ 23,863	\$ 33,593	\$ 61,890	\$ 48,727	\$ 237,475	\$ 168,073	0.039
15	GSHUT-M003	Component Replacement or Repair Mechanical	4	2N	\$ 1,900	\$ 4,637	\$ 1,947	\$ 3,655	\$ 2,148	\$ 1,071	\$ 500	\$ 15,859	\$ 7,375	0.039
16	GSHUT-M003	Component Replacement or Repair Mechanical	4	2P	\$ 55	\$ 687	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 741	\$ -	0.039
17	GSHUT-M003	Component Replacement or Repair Mechanical	4	2S	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0.039
18	GSHUT-M003	Component Replacement or Repair Mechanical	5	2S	\$ 2,399	\$ 7,917	\$ 5,315	\$ 5,537	\$ 7,929	\$ 8,568	\$ 6,196	\$ 43,861	\$ 28,230	0.039
19	GSHUT-M004	External Event Mitigation	4	2L	\$ 90	\$ 1,246	\$ 500	\$ 1,220	\$ 1,220	\$ 220	\$ 120	\$ 4,616	\$ 2,780	0.310
20	GSHUT-M004	External Event Mitigation	4	2M	\$ -	\$ 100	\$ -	\$ 200	\$ 300	\$ -	\$ -	\$ 600	\$ 500	0.310
21	GSHUT-M004	External Event Mitigation	4	2N	\$ -	\$ 114	\$ 658	\$ 394	\$ 2,987	\$ 3,793	\$ 3,087	\$ 11,033	\$ 10,262	0.310
22	GSHUT-M004	External Event Mitigation	4	2T	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0.310
23	GSHUT-M004	External Event Mitigation	5	2T	\$ -	\$ -	\$ -	\$ 207	\$ -	\$ -	\$ -	\$ 207	\$ 207	0.310
24		Total			\$ 86,323	\$ 129,228	\$ 97,661	\$ 138,438	\$ 112,636	\$ 144,537	\$ 125,133	\$ 833,956	\$ 520,744	
25														
26		Total Chapter 4			\$ 82,363	\$ 117,516	\$ 90,486	\$ 131,749	\$ 104,707	\$ 135,969	\$ 118,937	\$ 781,727	\$ 491,361	
27		Total Chapter 5			\$ 3,960	\$ 11,711	\$ 7,175	\$ 6,689	\$ 7,929	\$ 8,568	\$ 6,196	\$ 52,229	\$ 29,382	
28		Total			\$ 86,323	\$ 129,228	\$ 97,661	\$ 138,438	\$ 112,636	\$ 144,537	\$ 125,133	\$ 833,956	\$ 520,744	

Workpaper 2-4
 2023 General Rate Case
 Risk Forecasts in the GRC by Exhibit
 EXTENDED UNPLANNED SHUTDOWN OF A CRITICAL POWER GENERATION ASSET

Recorded and Forecast Mitigation Costs - Expense (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
1	GSHUT-M001	Component Replacement or Repair Civil	4	AX	\$ 3,619	\$ 3,507	\$ 7,571	\$ 4,715	\$ 3,227	\$ 6,102	\$ 1,077	\$ 29,818	\$ 15,121	-
2	GSHUT-M001	Component Replacement or Repair Civil	4	IG	\$ 229	\$ 713	\$ 200	\$ 48	\$ -	\$ -	\$ -	\$ 1,190	\$ 48	-
3	GSHUT-M001	Component Replacement or Repair Civil	4	KH	\$ 118	\$ 830	\$ 250	\$ 500	\$ 7,500	\$ -	\$ -	\$ 9,198	\$ 8,000	-
4	GSHUT-M001	Component Replacement or Repair Civil	4	KI	\$ -	\$ 200	\$ -	\$ 210	\$ 286	\$ 380	\$ 100	\$ 1,176	\$ 976	-
5	GSHUT-M001	Component Replacement or Repair Civil	4	KJ	\$ 50	\$ 2,468	\$ 2,550	\$ 750	\$ 88	\$ 950	\$ 950	\$ 7,805	\$ 2,738	-
6	GSHUT-M002	Component Replacement or Repair Electrical	4	AX	\$ -	\$ -	\$ -	\$ -	\$ 50	\$ -	\$ -	\$ 50	\$ 50	0.033
7	GSHUT-M002	Component Replacement or Repair Electrical	4	KH	\$ -	\$ 996	\$ 770	\$ 400	\$ 800	\$ 400	\$ 200	\$ 3,566	\$ 1,800	0.033
8	GSHUT-M003	Component Replacement or Repair Mechanical	4	AX	\$ -	\$ -	\$ 50	\$ 1,000	\$ 100	\$ -	\$ -	\$ 1,150	\$ 1,100	0.039
9	GSHUT-M003	Component Replacement or Repair Mechanical	4	KH	\$ 85	\$ 1,597	\$ 1,535	\$ 990	\$ 1,180	\$ 15,905	\$ 3,270	\$ 24,562	\$ 21,345	0.039
10	GSHUT-M003	Component Replacement or Repair Mechanical	5	KL	\$ 15,803	\$ 15,384	\$ 15,858	\$ 17,033	\$ 16,630	\$ 16,942	\$ 17,266	\$ 114,915	\$ 67,870	0.039
11	GSHUT-M004	External Event Mitigation	4	AX	\$ -	\$ 2,621	\$ 1,771	\$ 647	\$ 5,069	\$ 9,889	\$ 7,011	\$ 27,008	\$ 22,616	0.310
12	GSHUT-M004	External Event Mitigation	4	KJ	\$ -	\$ 174	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 174	\$ -	0.310
13		Total			\$ 19,905	\$ 28,489	\$ 30,555	\$ 26,293	\$ 34,929	\$ 50,568	\$ 29,874	\$ 220,612	\$ 141,664	
14		Total Chapter 4			\$ 4,102	\$ 13,106	\$ 14,697	\$ 9,260	\$ 18,300	\$ 33,626	\$ 12,608	\$ 105,698	\$ 73,793	
15		Total Chapter 5			\$ 15,803	\$ 15,384	\$ 15,858	\$ 17,033	\$ 16,630	\$ 16,942	\$ 17,266	\$ 114,915	\$ 67,870	
16		Total			\$ 19,905	\$ 28,489	\$ 30,555	\$ 26,293	\$ 34,929	\$ 50,568	\$ 29,874	\$ 220,612	\$ 141,664	

Worksheet 2-5
2023 General Rate Case
Risk Forecasts in the GRC by Exhibit
EXTENDED UNPLANNED SHUTDOWN OF A CRITICAL POWER GENERATION ASSET

Recorded and Forecast Control Costs - Expense (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total		RSE
					\$	\$	\$	\$	\$	\$	\$	(2020-2026)	(2022-2026)	
1	GSHUT-C001	Administrative Controls	4	AB	750	1,983	2,044	490	490	490	490	6,737	1,960	0.021
2	GSHUT-C001	Administrative Controls	4	KG	3,126	2,963	3,052	3,446	3,236	3,236	3,419	22,269	13,128	0.021
3	GSHUT-C001	Administrative Controls	4	KH	473	286	254	345	313	332	322	2,325	1,311	0.021
4	GSHUT-C002	Ancillary Support to Operate and Maintain Plants	4	AB	318	162	167	173	178	183	189	1,371	724	0.010
5	GSHUT-C002	Ancillary Support to Operate and Maintain Plants	4	KG	2,481	2,205	2,276	2,352	2,422	2,494	2,567	16,798	9,835	0.010
6	GSHUT-C002	Ancillary Support to Operate and Maintain Plants	4	KH	1,236	881	909	940	968	996	1,026	6,955	3,929	0.010
7	GSHUT-C002	Ancillary Support to Operate and Maintain Plants	4	KI	1,290	1,224	1,264	1,306	1,345	1,384	1,425	9,238	5,460	0.010
8	GSHUT-C003	Assessment or Inspections of System	4	AX	2,926	2,563	2,547	2,752	2,835	2,918	3,004	19,546	11,510	0.004
9	GSHUT-C003	Assessment or Inspections of System	4	KG	468	457	456	474	478	481	485	3,298	1,918	0.004
10	GSHUT-C003	Assessment or Inspections of System	4	KH	1,459	1,432	1,425	1,422	1,464	1,508	1,552	10,262	5,946	0.004
11	GSHUT-C003	Assessment or Inspections of System	4	KI	246	233	1,306	1,379	1,532	1,577	1,624	7,898	6,113	0.004
12	GSHUT-C003	Assessment or Inspections of System	5	KL	267	109	112	116	119	122	125	969	481	0.004
13	GSHUT-C004	Controls Related to External Events	4	KG	983	954	983	1,014	1,085	1,246	1,639	7,914	4,984	-
14	GSHUT-C004	Controls Related to External Events	4	KJ	-	45	39	52	48	49	50	283	200	-
15	GSHUT-C005	Maintaining the Systems	4	AK	364	312	322	333	343	353	363	2,391	1,393	0.002
16	GSHUT-C005	Maintaining the Systems	4	AX	7,009	5,223	5,388	5,572	5,736	5,906	6,080	40,913	23,294	0.002
17	GSHUT-C005	Maintaining the Systems	4	KG	6,227	6,015	6,208	6,415	6,607	6,801	7,002	45,274	26,925	0.002
18	GSHUT-C005	Maintaining the Systems	4	KH	18,015	16,940	17,436	18,019	18,558	19,106	19,668	127,743	75,351	0.002
19	GSHUT-C005	Maintaining the Systems	4	KI	4,394	4,452	5,181	5,354	5,514	5,677	5,844	36,415	22,899	0.002
20	GSHUT-C005	Maintaining the Systems	4	KJ	780	642	711	820	701	767	760	5,181	3,048	0.002
21	GSHUT-C005	Maintaining the Systems	5	KK	676	1,025	1,053	1,085	1,115	1,144	1,175	7,273	4,519	0.002
22	GSHUT-C005	Maintaining the Systems	5	KL	11,715	11,715	12,032	12,395	12,738	13,075	13,429	87,098	51,686	0.002
23	GSHUT-C005	Maintaining the Systems	5	KM	2,238	2,878	2,956	3,045	3,130	3,212	3,299	20,758	12,886	0.002
24	GSHUT-C006	Operating the Facility Within Requirements	4	AK	588	572	590	610	628	646	665	4,308	2,549	0.002
25	GSHUT-C006	Operating the Facility Within Requirements	5	AK	2,400	2,653	2,724	2,807	2,884	2,961	3,041	19,469	11,692	0.002
26	GSHUT-C006	Operating the Facility Within Requirements	4	KG	16,142	15,179	15,666	16,189	16,673	17,164	17,670	114,883	67,697	0.002
27	GSHUT-C006	Operating the Facility Within Requirements	5	KG	-	-	-	-	-	-	-	-	-	0.002
28	GSHUT-C006	Operating the Facility Within Requirements	4	KH	154	268	276	285	294	303	312	1,892	1,194	0.002
29	GSHUT-C006	Operating the Facility Within Requirements	5	KH	-	-	-	-	-	-	-	-	-	0.002
30	GSHUT-C006	Operating the Facility Within Requirements	5	KK	12,667	12,458	12,795	13,181	13,546	13,904	14,280	92,831	54,911	0.002
31	GSHUT-C006	Operating the Facility Within Requirements	4	OM	857	2,647	2,732	3,180	3,276	3,374	3,474	19,539	13,304	0.002
32	GSHUT-C006	Operating the Facility Within Requirements	5	OM	68	277	284	293	301	309	317	1,849	1,220	0.002
33	GSHUT-C006	Operating the Facility Within Requirements	4	OS	2,516	3,794	3,916	4,047	4,168	4,291	4,417	27,148	16,922	0.002
34		Total			102,850	102,546	107,106	109,590	112,723	116,090	119,724	770,629	458,127	
35		Total Chapter 4			72,820	71,431	75,149	76,670	78,891	81,364	84,057	540,381	320,982	
36		Total Chapter 5			30,030	31,115	31,957	32,920	33,832	34,727	35,667	230,248	137,145	
37		Total			102,850	102,546	107,106	109,590	112,723	116,090	119,724	770,629	458,127	
38														
39														

Workpaper 2-6
 2023 General Rate Case
 Risk Forecasts in the GRC by Exhibit
 NUCLEAR CORE DAMAGING EVENT

Recorded and Forecast Control Costs – Expense (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
1	NCORE-C001	Maintaining the Systems	3	BS	\$ 91,456,984	\$ 84,843,731	\$ 102,210,139	\$ 78,094,035	\$ 76,917,346	\$ 33,685,376	\$ -	\$ 467,207,612	\$ 188,696,757	0.003
2	NCORE-C002	Operating the Facility Within Requirements	3	BR	\$ 50,936,122	\$ 49,576,827	\$ 52,773,585	\$ 51,019,798	\$ 52,632,572	\$ 27,933,801	\$ -	\$ 284,872,704	\$ 131,586,171	0.305
3	NCORE-C003	Plant and System Configuration Control	3	BV	\$ 25,046,990	\$ 24,665,280	\$ 27,005,994	\$ 24,080,095	\$ 24,002,152	\$ 10,797,285	\$ -	\$ 135,597,797	\$ 58,879,532	0.009
4	NCORE-C004	Security from External and Internal Threats, and Emergency Response	3	BQ	\$ 44,671,523	\$ 38,944,473	\$ 40,723,726	\$ 40,105,833	\$ 41,479,030	\$ 28,290,039	\$ -	\$ 234,214,624	\$ 109,874,901	0.005
5	NCORE-C005	Independent Oversight and Training	3	BT	\$ 3,498,500	\$ 2,596,662	\$ 2,690,553	\$ 2,421,421	\$ 2,094,647	\$ 1,299,807	\$ -	\$ 14,601,591	\$ 5,815,876	0.052
6	NCORE-C005	Independent Oversight and Training	3	OS	\$ 11,381,811	\$ 10,941,631	\$ 11,424,829	\$ 10,167,906	\$ 8,288,875	\$ 5,300,574	\$ -	\$ 57,505,627	\$ 23,757,355	0.052
7	NCORE-C006	Regulatory Required Improvements and Ongoing Seismic Evaluations	3	BT	\$ 10,813,533	\$ 11,243,651	\$ 11,524,750	\$ 11,835,905	\$ 11,871,507	\$ 4,387,469	\$ -	\$ 61,676,815	\$ 28,094,881	0.017
8	NCORE-C006	Regulatory Required Improvements and Ongoing Seismic Evaluations	3	OS	\$ 1,997,733	\$ 1,547,536	\$ 1,530,855	\$ 1,564,423	\$ 1,255,587	\$ 491,098	\$ -	\$ 8,387,232	\$ 3,311,107	0.017
9		Total			\$ 239,803,199	\$ 224,359,791	\$ 249,884,433	\$ 219,289,416	\$ 218,541,716	\$ 112,185,449	\$ -	\$ 1,264,064,002	\$ 550,016,580	

Worksheet 2-7
2023 General Rate Case
Risk Forecasts in the GRC by Exhibit
NUCLEAR EXTENDED SHUTDOWN

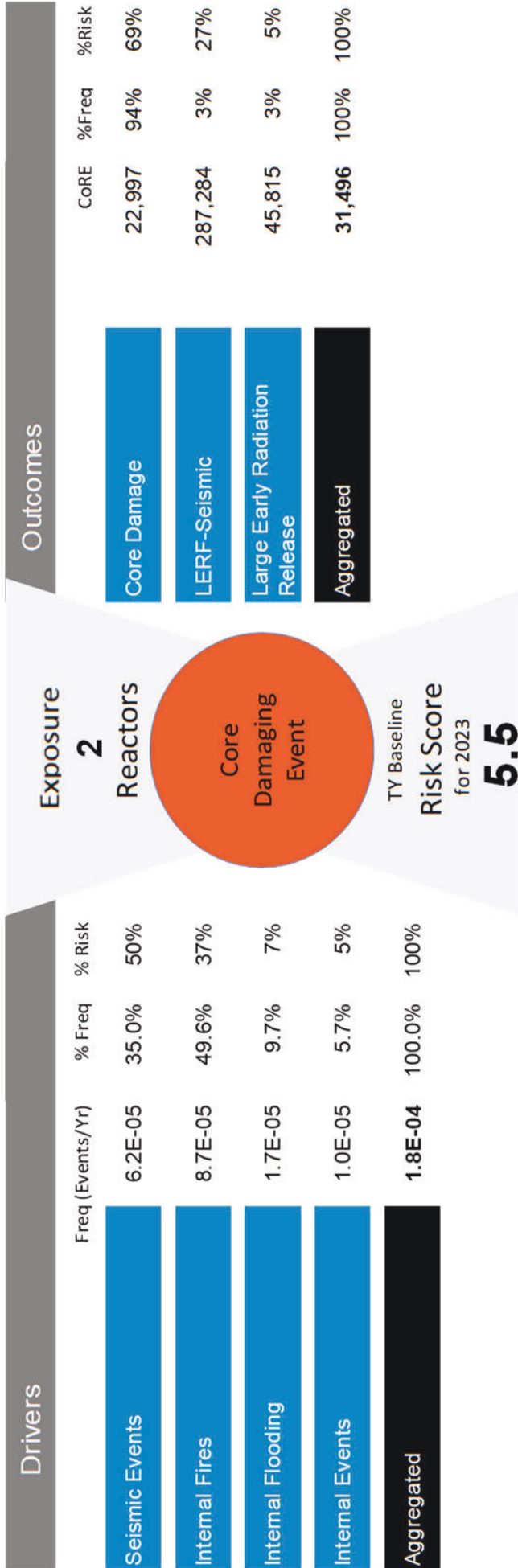
Recorded and Forecast Control Costs – Expense (Nominal Dollars)

Line No.	GRC RISK ID	GRC Program Name	Chapter	MWC	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	Total (2023-2026)	RSE
1	NSHUT-C001	Maintaining the Systems	3	BS	\$ 10,161,887	\$ 9,427,081	\$ 11,356,682	\$ 8,677,115	\$ 8,546,372	\$ 3,742,820	\$ -	\$ 51,911,957	\$ 20,966,306	0.424
2	NSHUT-C002	Operating the Facility Within Requirements	3	BR	\$ 5,659,569	\$ 5,508,536	\$ 5,863,732	\$ 5,668,866	\$ 5,848,064	\$ 3,103,756	\$ -	\$ 31,652,523	\$ 14,620,686	395.882
3	NSHUT-C003	Plant and System Configuration Control	3	BV	\$ 2,782,999	\$ 2,740,587	\$ 3,000,666	\$ 2,675,566	\$ 2,666,906	\$ 1,199,698	\$ -	\$ 15,066,422	\$ 6,542,170	1.212
4	NSHUT-C004	Security from External and Internal Threats, and Emergency Response	3	BQ	\$ 4,963,503	\$ 4,327,164	\$ 4,524,858	\$ 4,456,204	\$ 4,608,781	\$ 3,143,338	\$ -	\$ 26,023,847	\$ 12,208,322	0.655
5	NSHUT-C005	Independent Oversight and Training	3	BT	\$ 388,722	\$ 288,518	\$ 298,950	\$ 269,047	\$ 232,739	\$ 144,423	\$ -	\$ 1,622,399	\$ 646,208	8.450
6	NSHUT-C005	Independent Oversight and Training	3	OS	\$ 1,264,646	\$ 1,215,737	\$ 1,269,425	\$ 1,129,767	\$ 920,986	\$ 588,953	\$ -	\$ 6,389,514	\$ 2,639,706	8.450
7	NSHUT-C006	Regulatory Required Improvements and Ongoing Seismic Evaluations	3	BT	\$ 1,201,504	\$ 1,249,295	\$ 1,280,528	\$ 1,315,101	\$ 1,319,056	\$ 487,497	\$ -	\$ 6,852,979	\$ 3,121,653	2.266
8	NSHUT-C006	Regulatory Required Improvements and Ongoing Seismic Evaluations	3	OS	\$ 221,970	\$ 171,948	\$ 170,095	\$ 173,825	\$ 139,510	\$ 54,566	\$ -	\$ 931,915	\$ 367,901	2.266
9		Total			\$ 26,644,800	\$ 24,928,866	\$ 27,764,937	\$ 24,365,491	\$ 24,282,413	\$ 12,465,050	\$ -	\$ 140,451,556	\$ 61,112,953	

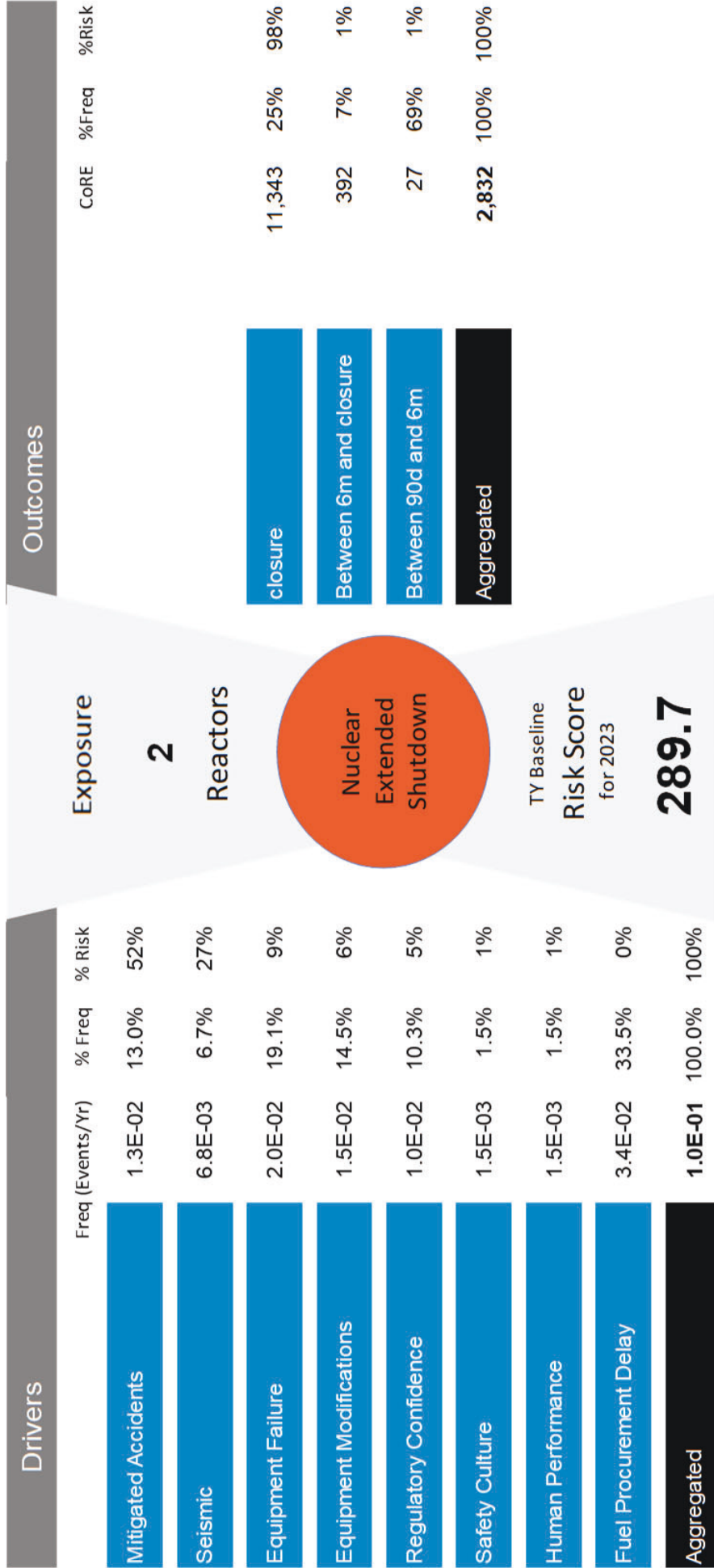
Workpaper 2-8
 2023 General Rate Case
 Bowtie - Extended Unplanned Shutdown of a Critical Power Generation Asset



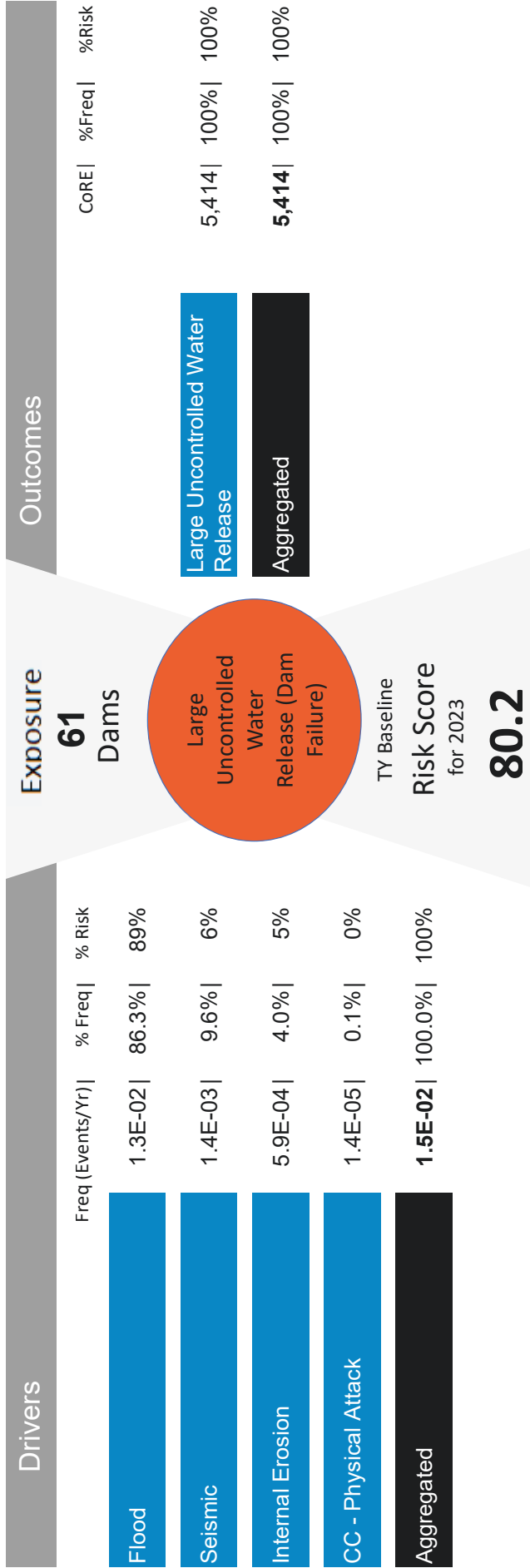
Workpaper 2-9
 2023 General Rate Case
 Bowtie - Nuclear Core Damaging Event



Workpaper 2-10
 2023 General Rate Case
 Bowtie - Nuclear Extended Shutdown



Workpaper 2-11
 2023 General Rate Case
 Bowtie - Large Uncontrolled Water Release



Workpaper 2-12
 2023 General Rate Case
 Results of the Safety Model Assessment Proceeding (S-MAP) Step-3 Supplemental Analysis
 EXTENDED UNPLANNED SHUTDOWN OF A CRITICAL POWER GENERATION ASSET, NUCLEAR CORE DAMAGING EVENT AND NUCLEAR EXTENDED SHUTDOWN

RISK ID (Hydro)	Sum of GRC 2023		RISK ID (Fossil)	Sum of GRC 2023		Total	Name	RSE Required?	WP Reference
	Exp.	Exp.		Exp.	Exp.				
GSHUT-C001	\$ 3,981	\$ -	GSHUT-C001	\$ 3,981	\$ -	Administrative Controls	Foundational - No RSE	WP 2-5, Lines 1-3	
GSHUT-C002	\$ 4,770	\$ -	GSHUT-C002	\$ 4,770	\$ -	Ancillary Support to Operate & Maintain Plants	Foundational - No RSE	WP 2-5, Lines 4-7	
GSHUT-C003	\$ 6,027	\$ 116	GSHUT-C003	\$ 6,143	\$ 116	Assessment or Inspection of Systems	No RSE - does not meet threshold	WP 2-5, Lines 8-12	
GSHUT-C004	\$ 1,066	\$ -	GSHUT-C004	\$ 1,066	\$ -	Controls related to External Events	No RSE - does not meet threshold	WP 2-5, Lines 13-14	
GSHUT-C005	\$ 36,514	\$ 16,525	GSHUT-C005	\$ 53,039	\$ 16,525	Maintaining the Systems	Requires RSE - meets threshold	WP 2-5, Lines 15-23	
GSHUT-C006	\$ 24,311	\$ 16,280	GSHUT-C006	\$ 40,591	\$ 16,280	Operating the Facility Within Requirements	Requires RSE - meets threshold	WP 2-5, Lines 24-33	
Sum of GRC 2023			Sum of GRC 2023			Total Sum of GRC			
Exp.			Exp.			2023 Exp.			
\$ 78,094,035			\$ 86,771,150						
NCORE/NSHUT-C001 (A)	\$ 51,019,798	\$ 5,668,866	NCORE/NSHUT-C001	\$ 56,688,664	\$ 5,668,866	Maintaining the systems	Requires RSE - meets threshold	WP 2-6, Line 1 & WP 2-7, Line 1	
NCORE/NSHUT-C002	\$ 24,080,095	\$ 2,675,566	NCORE/NSHUT-C002	\$ 26,755,661	\$ 2,675,566	Operating the Facility Within Requirements	Requires RSE - meets threshold	WP 2-6, Line 2 & WP 2-7, Line 2	
NCORE/NSHUT-C003	\$ 40,105,833	\$ 4,456,204	NCORE/NSHUT-C003	\$ 44,562,037	\$ 4,456,204	Plant and System Configuration Control	Requires RSE - meets threshold	WP 2-6, Line 3 & WP 2-7, Line 3	
NCORE/NSHUT-C004	\$ 12,589,328	\$ 1,398,814	NCORE/NSHUT-C004	\$ 13,988,142	\$ 1,398,814	Security from External and Internal Threats, and Emergency Response	Requires RSE - meets threshold	WP 2-6, Line 4 & WP 2-7, Line 4	
NCORE/NSHUT-C005	\$ 13,400,327	\$ 1,488,925	NCORE/NSHUT-C005	\$ 14,889,252	\$ 1,488,925	Independent Oversight and Training	No RSE - does not meet threshold	WP 2-6, Lines 5 and 6 & WP 2-7, Lines 5 and 6	
NCORE/NSHUT-C006			NCORE/NSHUT-C006			Regulatory Required Improvements and Ongoing Seismic Evaluations	No RSE - does not meet threshold	WP 2-6, Lines 7 and 8 & WP 2-7, Lines 7 and 8	
Sum of GRC 2023			Sum of GRC 2023			Total Sum of GRC			
Exp.			Exp.			2023 Exp.			
\$ 139,279,318			\$ 153,167,034						

Notes:
 (A) The same control applies to both the Nuclear Core Damaging Event and Nuclear Extended Shutdown risks.

Worksheet 2-13
 2020-2025
 Comparing Estimated Risk Costs in RAMP to Forecast Costs in P&G
 UNDER CONTROL WATER RELEASE

Line No.	MVC RAMP	MVC GRC	2020 RAMP Mitigation Name	2020 RAMP CH	2020 GRC										2025 GRC	Difference		
					2023 GRC Mitigation Name	2023 GRC CH	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)				
1	2L	2L	Internal Erosion Mitigation	M1	2023 GRC Mitigation Name	2023 GRC CH	2020	2021	2022	2023	2024	2025	2026	Total (2020-2026)	RAMP 2020-2025	GRC 2020-2025	Difference	
2	2N	2N	Internal Erosion Mitigation	M1	Internal Erosion Mitigation	13	\$ 3,673,921	\$ 15,862,735	\$ 172,281,211	\$ 202,141,867	\$ 1,500,000	\$ -	\$ -	\$ -	\$ 58,462,749	\$ 58,462,749	\$ 83,661,425	\$ 25,198,676
3	2N	2N	Internal Erosion Mitigation	M1	Internal Erosion Mitigation	13	\$ 500,000	\$ 1,100,000	\$ 400,000	\$ 400,000	\$ 400,000	\$ -	\$ -	\$ -	\$ 2,800,000	\$ 2,800,000	\$ 11,773,492	\$ 8,973,492
4	AK	AK	Substrate - Internal Erosion Mitigation	M1	Substrate - Internal Erosion Mitigation	13	\$ 1,252,924	\$ 17,723,020	\$ 132,628,211	\$ 201,651,866	\$ 1,800,000	\$ -	\$ -	\$ -	\$ 1,800,000	\$ 1,800,000	\$ 2,021,712	\$ 27,822,000
5																		
6	2L	2L	Spillway Remediation	M2	Spillway Remediation	13	\$ 548,096	\$ 101,867	\$ 4,038,691	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,708,255	\$ 4,708,255	\$ 3,744,143	\$ (964,112)
7	2N	2N	Spillway Remediation	M2	Spillway Remediation	13	\$ 3,484,465	\$ 19,700,034	\$ 38,000,000	\$ 78,500,000	\$ 1,077,000	\$ 40,000,000	\$ -	\$ -	\$ 20,000	\$ 37,734,519	\$ 20,000	\$ (17,734,519)
8	AK	AK	Substrate - Spillway Remediation	M2	Substrate - Spillway Remediation	13	\$ 5,714,200	\$ 6,285,820	\$ 2,144,740	\$ 300,000	\$ -	\$ -	\$ -	\$ -	\$ 6,439,760	\$ 6,439,760	\$ 14,684,900	\$ 8,245,140
9	AK	N/A	Spillway Remediation	M2	Spillway Remediation	13	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (14,684,900)
10	N/A	IG	Substrate - Spillway Mitigation	M2	Substrate - Spillway Mitigation	13	\$ 9,746,781	\$ 26,087,841	\$ 44,638,431	\$ 79,200,000	\$ 1,077,000	\$ 40,000,000	\$ -	\$ -	\$ 13,739,272	\$ 13,739,272	\$ 13,739,272	\$ -
11																		
12	2L	2L	Seismic Retrofit	M3	Seismic Retrofit	13	\$ 12,280,467	\$ 3,707,934	\$ 10,507,934	\$ 10,700,000	\$ 7,800,000	\$ 7,000,000	\$ 5,000,000	\$ -	\$ 66,492,325	\$ 66,492,325	\$ 94,777,068	\$ 28,284,743
13	2N	2N	Seismic Retrofit	M3	Seismic Retrofit	13	\$ 12,280,467	\$ 3,707,934	\$ 10,507,934	\$ 10,700,000	\$ 7,800,000	\$ 7,000,000	\$ 5,000,000	\$ -	\$ 66,492,325	\$ 66,492,325	\$ 94,777,068	\$ 28,284,743
14																		
15																		
16	2L	2L	Low Level Outlet Refurbishment	M4	Low Level Outlet Refurbishment	13	\$ 1,000,000	\$ 1,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ -
17	2N	2N	Low Level Outlet Refurbishment	M4	Low Level Outlet Refurbishment	13	\$ 8,833,007	\$ 3,002,100	\$ 6,792,300	\$ 1,301,500	\$ -	\$ -	\$ -	\$ -	\$ 10,100,000	\$ 10,100,000	\$ 10,100,000	\$ -
18	2N	2N	Low Level Outlet Refurbishment	M4	Low Level Outlet Refurbishment	13	\$ 9,868,087	\$ 4,002,100	\$ 6,792,300	\$ 1,301,500	\$ -	\$ -	\$ -	\$ -	\$ 11,193,900	\$ 11,193,900	\$ 11,193,900	\$ -
19	AK	AK	Substrate - Low Level Outlet Refurbishment	M4	Substrate - Low Level Outlet Refurbishment	13	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ (11,193,900)
20																		
21																		
22																		
23																		
TOTAL MITIGATIONS - CAPITAL							\$ 68,614,200	\$ 44,614,200	\$ 16,677,506	\$ 150,415,365	\$ 116,500,600	\$ 47,000,000	\$ -	\$ 481,556,246	\$ 481,556,246	\$ 586,763,307	\$ 105,207,061	
TOTAL MITIGATIONS - OPENSE							\$ 68,614,200	\$ 7,115,200	\$ 2,344,246	\$ 300,000	\$ -	\$ -	\$ -	\$ -	\$ 24,777,075	\$ 24,777,075	\$ 24,777,075	\$ -

**PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE**

Testimony: Workpapers: SOQ:
 Exhibit Number: 5 Chapter Number: 2
 Chapter Title: Energy Supply Risk Management
 Witness Name: Eric Van Deuren, Russell Prentice

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
WP 2-2	3	LGUWR-M002	0.515	0.516
WP 2-2	4	LGUWR-M002	0.515	0.516
WP 2-2	5	LGUWR-M002	0.515	0.516
WP 2-2	19	LGUWR-M002	0.515	0.516
WP 2-2	29	LGUWR-C001	24.340	25.786
WP 2-2	30	LGUWR-C001	24.340	25.786
WP 2-2	31	LGUWR-C001	24.340	25.786
WP 2-3	1	GSHUT-M001	0.622	–
WP 2-3	2	GSHUT-M001	0.622	–
WP 2-3	3	GSHUT-M001	0.622	–
WP 2-3	4	GSHUT-M001	0.622	–
WP 2-3	5	GSHUT-M001	0.622	–
WP 2-3	6	GSHUT-M002	0.455	0.033
WP 2-3	7	GSHUT-M002	0.455	0.033
WP 2-3	8	GSHUT-M002	0.455	0.033
WP 2-3	9	GSHUT-M002	0.455	0.033
WP 2-3	10	GSHUT-M002	0.455	0.033
WP 2-3	11	GSHUT-M002	0.455	0.033
WP 2-3	12	GSHUT-M003	0.729	0.039
WP 2-3	13	GSHUT-M003	0.729	0.039
WP 2-3	14	GSHUT-M003	0.729	0.039
WP 2-3	15	GSHUT-M003	0.729	0.039
WP 2-3	16	GSHUT-M003	0.729	0.039
WP 2-3	17	GSHUT-M003	0.729	0.039
WP 2-3	18	GSHUT-M003	0.729	0.039
WP 2-3	19	GSHUT-M004	3.154	0.310

Page No.	Line No.	Item	As Filed	As Corrected
WP 2-3	20	GSHUT-M004	3.154	0.310
WP 2-3	21	GSHUT-M004	3.154	0.310
WP 2-3	22	GSHUT-M004	3.154	0.310
WP 2-3	23	GSHUT-M004	3.154	0.310
WP 2-4	1	GSHUT-M001	0.622	–
WP 2-4	2	GSHUT-M001	0.622	–
WP 2-4	3	GSHUT-M001	0.622	–
WP 2-4	4	GSHUT-M001	0.622	–
WP 2-4	5	GSHUT-M001	0.622	–
WP 2-4	6	GSHUT-M002	0.455	0.033
WP 2-4	7	GSHUT-M002	0.455	0.033
WP 2-4	8	GSHUT-M003	0.729	0.039
WP 2-4	9	GSHUT-M003	0.729	0.039
WP 2-4	10	GSHUT-M003	0.729	0.039
WP 2-4	11	GSHUT-M004	3.154	0.310
WP 2-4	12	GSHUT-M004	3.154	0.310
WP 2-5	1	GSHUT-C001	0.035	0.021
WP 2-5	2	GSHUT-C001	0.035	0.021
WP 2-5	3	GSHUT-C001	0.035	0.021
WP 2-5	4	GSHUT-C002	0.017	0.010
WP 2-5	5	GSHUT-C002	0.017	0.010
WP 2-5	6	GSHUT-C002	0.017	0.010
WP 2-5	7	GSHUT-C002	0.017	0.010
WP 2-5	8	GSHUT-C003	0.007	0.004
WP 2-5	9	GSHUT-C003	0.007	0.004
WP 2-5	10	GSHUT-C003	0.007	0.004
WP 2-5	11	GSHUT-C003	0.007	0.004
WP 2-5	12	GSHUT-C003	0.007	0.004
WP 2-5	15	GSHUT-C005	0.004	0.002
WP 2-5	16	GSHUT-C005	0.004	0.002
WP 2-5	17	GSHUT-C005	0.004	0.002
WP 2-5	18	GSHUT-C005	0.004	0.002
WP 2-5	19	GSHUT-C005	0.004	0.002
WP 2-5	20	GSHUT-C005	0.004	0.002
WP 2-5	21	GSHUT-C005	0.004	0.002
WP 2-5	22	GSHUT-C005	0.004	0.002
WP 2-5	23	GSHUT-C005	0.004	0.002

Page No.	Line No.	Item	As Filed	As Corrected
WP 2-5	24	GSHUT-C006	0.003	0.002
WP 2-5	25	GSHUT-C006	0.003	0.002
WP 2-5	26	GSHUT-C006	0.003	0.002
WP 2-5	27	GSHUT-C006	0.003	0.002
WP 2-5	28	GSHUT-C006	0.003	0.002
WP 2-5	29	GSHUT-C006	0.003	0.002
WP 2-5	30	GSHUT-C006	0.003	0.002
WP 2-5	31	GSHUT-C006	0.003	0.002
WP 2-5	32	GSHUT-C006	0.003	0.002
WP 2-5	33	GSHUT-C006	0.003	0.002
WP 2-6	2	NCORE-C002	0.304	0.305
WP 2-7	1	NSHUT-C001	0.418	0.424
WP 2-7	2	NSHUT-C002	389.583	395.882
WP 2-7	3	NSHUT-C003	1.193	1.212
WP 2-7	4	NSHUT-C004	0.645	0.655
WP 2-7	5	NSHUT-C005	8.319	8.450
WP 2-7	6	NSHUT-C005	8.319	8.450
WP 2-7	7	NSHUT-C006	2.231	2.266
WP 2-7	8	NSHUT-C006	2.231	2.266
WP 2-8	Replaced in its Entirety	Bowtie – Extended Unplanned Shutdown of a Critical Power Generation Asset	Bowtie – Extended Unplanned Shutdown of a Critical Power Generation Asset	Replaced in its Entirety
WP 2-9	Replaced in its Entirety	Bowtie – Nuclear Core Damaging Event	Bowtie – Nuclear Core Damaging Event	Replaced in its Entirety
WP 2-10	Replaced in its Entirety	Bowtie – Nuclear Extended Shutdown	Bowtie – Nuclear Extended Shutdown	Replaced in its Entirety
WP 2-11	Replaced in its Entirety	Bowtie – Large Uncontrolled Water Release	Bowtie – Large Uncontrolled Water Release	Replaced in its Entirety
WP 2-13	1-23	Table Comparing Estimated Risk Costs in RAMP to Forecast Costs in the GRC for the Large Uncontrolled Water Release Risk	WP Table (page WP 2-13) is missing the last few rows (Lines 20-23)	WP Table now includes all lines (Lines 1-23)

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of February 28, 2022				
WP 2-11	Replaced in its Entirety	Bowtie – Large Uncontrolled Water Release	Bowtie – Large Uncontrolled Water Release	Replaced in its Entirety
WP 2-2	29	LGUWR-C001	25.786	25.817
WP 2-2	30	LGUWR-C001	25.786	25.817
WP 2-2	31	LGUWR-C001	25.786	25.817

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE

EXHIBIT (PG&E-5), ENERGY SUPPLY
WORKPAPERS SUPPORTING
CHAPTER 3, NUCLEAR OPERATIONS COSTS

TABLE OF CONTENTS

Subject	Page No.
Expense Workpapers	
Recorded & Forecast Expenses by Major Work Category (Nominal Dollars)	WP 3-1
Recorded & Forecast Expenses by Major Work Category (Base Year Dollars)	WP 3-2
Expense Walk from Recorded to Test Year Forecast by MWC	WP 3-3
Expense Walk by Year – Forecast by MWC	WP 3-17
Year-Over-Year Recorded Expense Variance Summary	WP 3-45
Major Project Summaries for Specific Expense Projects > \$1 Million	WP 3-49
Expense Hours Detail by MWC by Planning Order and by Resource	WP 3-50
Outage Cost Summary – All Years (Nominal and Base Year Dollars)	WP 3-51
Outage Cost Details	WP 3-53
Support Cost Shift from Capital to Expense	WP 3-54
Expense by MWC by Cost Type - Recorded and Test Year	WP 3-58
NEI Invoices	WP 3-59
Capital Workpapers	
Capital Expenditures by Major Work Category	WP 3-73
Forecast Capital Expenditures Summary	WP 3-74
Recorded CWIP and Forecast Capital Expenditures Details – Projects Over \$3 Million	WP 3-75
Recorded and Forecast Capital Expenditures Details – Other Work	WP 3-76
Major Project Summaries for Capital Projects > \$3 Million	WP 3-77
Capital Walk by Major Work Category - Forecast by MWC	WP 3-91
Year-Over-Year Recorded Capital Variance Summary	WP 3-95
Projects Cancelled through Affordability Initiative	WP 3-99
Other Workpapers	
Plant Description and Generation	WP 3-101
Materials and Supplies Inventory and Regulatory Asset	WP 3-102
Average Annual Headcount by MWC and by Organization	WP 3-106
DCPP Avoided Greenhouse Gas (GHG) Emissions	WP 3-108
Deferred Work Analysis Summary	WP 3-109
Department of Energy Litigation Proceeds	WP 3-110
Cost of controls by Risk Code	WP 3-111
Expense Projects Listing	WP 3-113

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expenses by Major Work Category
(Thousands of Nominal Dollars)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	AB	Misc Expense	17,313	13,904	13,810	(27,975)	14,673	14,711	(29,422)		
2	AK	Manage Environmental Oper	6,186	2,147	(2,630)	1,865	1,996	2,000	2,050	2,105	
3	BP	Manage DCPD Business	14,347	15,542	12,292	11,358	13,247	12,844	13,600	13,297	
4	BQ	DCPD Support Services	46,358	52,330	48,720	52,007	48,877	42,422	44,357	43,664	
5	BR	Operate DCPD Plant	68,372	76,220	82,940	83,476	78,523	75,992	83,742	77,743	
6	BS	Maintain DCPD Plant Assets	109,869	116,534	110,332	135,925	109,165	98,803	119,529	90,688	
7	BT	Nuclear Generation Fees	17,452	13,995	14,440	15,894	15,899	15,378	15,795	15,841	
8	BU	Procure DCPD Materials & Svcs	291	98	(1,389)	66	(1,111)				
9	BV	Maintain DCPD Plant Configurtn	47,174	42,430	36,016	39,321	38,770	35,870	39,294	35,018	
10	CR	Mnge Waste Disp & Transp	5								
11	EO	Provide Nuclear Support	(17)	(55)	(1)	(27)	(23)	9	9	10	
12	IG	Manage Var Bal Acct Processes	23,184	20,510	13,029	8,303	2,900	3,192	2,548	2,608	
13	OM	Operational Management	6,502	9,347	6,809	7,539	8,084	8,458	6,498	7,674	
14	OS	Operational Support	16,518	14,688	15,669	16,115	26,229	24,572	26,629	24,999	
15	Total		373,554	377,691	350,036	343,867	357,230	334,251	324,629	313,648	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expenses by Major Work Category
(Thousands of Base Year Dollars)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast
1	AB	Misc Expense	18,430	14,524	13,934	(27,642)	14,673	14,685	(28,663)	
2	AK	Manage Environmental Oper	6,612	2,265	(2,653)	1,843	1,996	1,995	1,996	1,996
3	BP	Manage DCPP Business	15,411	16,404	12,589	11,363	13,247	12,691	13,066	12,403
4	BQ	DCPP Support Services	52,079	56,981	51,602	53,361	48,877	41,342	41,820	39,812
5	BR	Operate DCPP Plant	76,884	83,102	87,216	85,497	78,523	74,183	79,136	71,085
6	BS	Maintain DCPP Plant Assets	120,900	125,389	115,014	137,617	109,165	97,049	113,915	83,776
7	BT	Nuclear Generation Fees	18,855	14,772	14,719	15,788	15,899	15,291	15,307	14,932
8	BU	Procure DCPP Materials & Svcs	364	143	(1,358)	111	(1,111)			
9	BV	Maintain DCPP Plant Configurtn	51,980	45,783	37,762	39,974	38,770	35,154	37,333	32,229
10	CR	Minge Waste Disp & Transp	5							
11	EO	Provide Nuclear Support	(16)	(52)	(1)	(27)	(23)	9	9	9
12	IG	Manage Var Bal Acct Processes	24,841	21,654	13,317	8,346	2,900	3,147	2,440	2,423
13	OM	Operational Management	7,200	10,237	7,206	7,743	8,084	8,228	6,112	6,978
14	OS	Operational Support	18,627	16,098	16,621	16,607	26,229	23,872	24,999	22,677
15	Total		412,173	407,301	365,969	350,581	357,230	327,648	307,471	288,320

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
Total DCP

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	357,230		
2		Labor Escalation	22,711	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(22,743)		
4		Labor Burden Rate	(9,644)		
5		Labor Outage	(7,904)		
6		Labor Other	(969)		
7		Material Escalation	1,026	Utilizing labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	142		
9		Contract Escalation	3,082	Utilizing labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	(8,777)		
11		Contract Other	752		
12		Miscellaneous	(12,497)	Other escalation of \$1,588 and end of 2020 2nd Outage levelization	
13		Unplanned Outages	(8,761)		
14					
15	2023	Forecast	313,648		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC AB

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	14,673		
2		Labor Escalation	11	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	0		
4		Labor Burden Rate	(20)		
5		Labor Outage	0		
6		Labor Other	(372)	Offset by Miscellaneous due to 2021 through 2026 cost category classification	
7		Material Escalation	0	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	0		
9		Contract Escalation	0	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	0		
11		Contract Other	0		
12		Miscellaneous	(14,292)	Change in 2nd Outage Levelization for 2022 2nd Outage is \$14,711.	
13		Unplanned Outages	0		
14					
15	2023	Forecast	0		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC AK

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	1,996		
2		Labor Escalation	1	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	0		
4		Labor Burden Rate	(1)		
5		Labor Outage	0		
6		Labor Other	(23)		
7		Material Escalation	0	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	0		
9		Contract Escalation	44	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	0		
11		Contract Other	(140)	Reduced environmental fees, consulting and repairs	
12		Miscellaneous	228	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
13		Unplanned Outages	0		
14					
15	2023	Forecast	2,105		

Pacific Gas and Electric Company 2023
 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)

MWC BP

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions
1	2020	Recorded Actual	13,247	
2		Labor Escalation	641	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively
3		Labor Headcount	(611)	AverageHeadcount reduction of 3
4		Labor Burden Rate	(148)	
5		Labor Outage	93	
6		Labor Other	(267)	Labor decrease due to overtime reduction
7		Material Escalation	0	
8		Material Other	(10)	
9		Contract Escalation	80	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively
10		Contract Outage	0	
11		Contract Other	(166)	
12		Miscellaneous	437	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively
13		Unplanned Outages	0	
14				
15	2023	Forecast	13,296	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BQ

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	48,877		
2		Labor Escalation	3,872	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(995)	Average Headcount reduction of 7	
4		Labor Burden Rate	(2,224)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	(533)	Labor decrease due to shorter outage duration	
6		Labor Other	(4,106)	Labor decrease due to implementation of Security Affordability initiatives	
7		Material Escalation	0		
8		Material Other	(46)		
9		Contract Escalation	67	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	16		
11		Contract Other	347	One time credits in 2020 plus miscellaneous	
12		Miscellaneous	(611)	Non-labor escalation less assumed reduction in OES and FEMA fees	
13		Unplanned Outages	(1,000)	Decrease in labor and contract costs from the 2020 unplanned outages	
14					
15	2023	Forecast	43,664		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BR

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	78,523		
2		Labor Escalation	6,250	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(2,137)	Average Headcount reduction of 10	
4		Labor Burden Rate	(3,252)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	(1,923)	Labor decrease due to shorter outage duration	
6		Labor Other	(970)	Labor decrease due to overtime reduction	
7		Material Escalation	95	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	(346)		
9		Contract Escalation	489	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	0		
11		Contract Other	383		
12		Miscellaneous	631	Non-labor escalation plus Once Through Cooling Fees based on through put	
13		Unplanned Outages	0		
14					
15	2023	Forecast	77,743		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BS

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	109,165		
2		Labor Escalation	5,407	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(10,117)	Average Headcount reduction of 43	
4		Labor Burden Rate	(2,615)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	(4,986)	Labor decrease due to shorter outage duration	
6		Labor Other	3,529	Increased labor shifting from capital labor due to the decreased capital projects portfolio and due to on-site contractor workforce reductions shifting to labor overtime	
7		Material Escalation	920	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	690	Turbine and Main Generator material classification versus contract and Facility Maint	
9		Contract Escalation	1,786	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	(5,651)	Turbine and Main Generator outage scope	
11		Contract Other	799	Tunnel Cleaning, and BHI Overheads	
12		Miscellaneous	(478)	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
13		Unplanned Outages	(7,761)	Decrease in labor and contract costs from the 2020 unplanned outages	
14					
15	2023	Forecast	90,688		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BT

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	15,899		
2		Labor Escalation	183	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(805)	Average Headcount reduction of 5	
4		Labor Burden Rate	(92)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	15		
6		Labor Other	(186)		
7		Material Escalation	0	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	0		
9		Contract Escalation	78	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	36		
11		Contract Other	(487)	Reduced Learning Services Staff Augmentation	
12		Miscellaneous	1,200	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
13		Unplanned Outages	0		
14					
15	2023	Forecast	15,841		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BU

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	(1,111)		
2		Labor Escalation	(40)	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	0		
4		Labor Burden Rate	72		
5		Labor Outage	0		
6		Labor Other	1,079	Elimination of 2020 Standard Cost Variance for Warehouse labor	
7		Material Escalation	0		
8		Material Other	0		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	0		
12		Miscellaneous	0		
13		Unplanned Outages	0		
14					
15	2023	Forecast	0		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BV

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	38,770		
2		Labor Escalation	2,643	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(2,206)	Average Headcount reduction of 14	
4		Labor Burden Rate	(1,296)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	(44)	Labor decrease due to shorter outage duration	
6		Labor Other	893	Increase included for a shift of outage labor temporary workforce from MWC BS	
7		Material Escalation	1	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	(309)		
9		Contract Escalation	485	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	(3,178)	No Steam Generator Inspections in 2023	
11		Contract Other	(12)		
12		Miscellaneous	(729)	Non-labor escalation offset by forecast classification change from 2020 for Seismic contracts versus Other costs	
13		Unplanned Outages	0		
14					
15	2023	Forecast	35,018		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC EO

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	(23)		
2		Labor Escalation	1	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	0		
4		Labor Burden Rate	0		
5		Labor Outage	0		
6		Labor Other	0		
7		Material Escalation	0		
8		Material Other	(1)		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	(8)		
12		Miscellaneous	41		
13		Unplanned Outages	0		
14					
15	2023	Forecast	10		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC OM

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	8,084		
2		Labor Escalation	777	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(1,536)	Average Headcount decrease of 8	
4		Labor Burden Rate	0		
5		Labor Outage	0		
6		Labor Other	61	Addition of Sr VP Generation (CNO) offset by Temporary Outage Labor in 2020 due to Forced Outage	
7		Material Escalation	0		
8		Material Other	1		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	0		
12		Miscellaneous	288	Increased expense due to less costs allocated to the decreasing capital portfolio	
13		Unplanned Outages	0		
14					
15	2023	Forecast	7,675		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC OS

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	26,229		
2		Labor Escalation	2,839	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	(4,336)	Average Headcount decrease of 27	
4		Labor Burden Rate	0		
5		Labor Outage	(526)	Labor decrease due to shorter outage duration	
6		Labor Other	(572)		
7		Material Escalation	0		
8		Material Other	15		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	5		
12		Miscellaneous	1,345		
13		Unplanned Outages	0		
14					
15	2023	Forecast	24,999		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC IG

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Actual	2,900		
2		Labor Escalation	126	Utilizing labor escalation rates of 3.02%, 3.52%, and 3.52%, respectively	
3		Labor Headcount	0		
4		Labor Burden Rate	(68)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	0		
6		Labor Other	(35)		
7		Material Escalation	10	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
8		Material Other	148		
9		Contract Escalation	53	Utilizing non-labor escalation rates of 0.20%, 2.50%, and 2.70%, respectively	
10		Contract Outage	0		
11		Contract Other	31		
12		Miscellaneous	(557)	Decreased NRC rulemaking costs	
13		Unplanned Outages	0		
14					
15	2023	Forecast	2,608		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
Total DCP

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	357,230		
2		Labor Escalation	6,942	Escalation Rate of 3.02%	
3		Labor Headcount	(12,196)		
4		Labor Burden Rate	(9,644)		
5		Labor Outage	(177)		
6		Labor Other	(1,839)	Labor decrease due to implementation of Security Affordability initiatives	
7		Material Escalation	35	Escalation Rate of 0.2%	
8		Material Other	491		
9		Contract Escalation	109	Escalation Rate of 0.2%	
10		Contract Outage	1,925	Increase in outage project scope	
11		Contract Other	(1,717)	Decrease included from reduced scope and costs for on-site contractor workforce	
12		Miscellaneous	1,853	Increased expense due to less OM and OS costs allocated to the decreasing capital portfolio as well as increased NRC rulemaking costs	
13		Unplanned Outages	(8,761)	Decrease in labor and contract costs from the 2020 unplanned outages	
14					
15	2021	Forecast	334,251		
16		Labor Escalation	8,356	Escalation Rate of 3.52%	
17		Labor Headcount	(9,034)		
18		Labor Burden Rate	0		
19		Labor Outage	17,848		
20		Labor Other	5,894	Labor increase due to a second planned outage this year as well as labor shifting from capital labor due to the decreased capital projects portfolio	
21		Material Escalation	444	Escalation Rate of 2.5%	
22		Material Other	2,033	Material increase due to a second planned outage this year	
23		Contract Escalation	1,329	Escalation Rate of 2.5%	
24		Contract Outage	4,027	Increase in outage project scope	
25		Contract Other	2,409		
26		Miscellaneous	(42,928)	Increased expense due to less OM and OS costs allocated to the decreasing capital portfolio as well as decreased NRC rulemaking costs. Additionally, the change in 2nd Outage Levelization for 2022 2nd Outage.	
27		Unplanned Outages	0		
28					
29	2022	Forecast	324,629		
30		Labor Escalation	7,413	Escalation Rate of 3.52%	
31		Labor Headcount	(1,513)		
32		Labor Burden Rate	0		
33		Labor Outage	(25,575)		
34		Labor Other	(5,024)	Labor decrease due to one planned outage this year	
35		Material Escalation	547	Escalation Rate of 2.7%	
36		Material Other	(2,382)	Material decrease due to one planned outage this year	
37		Contract Escalation	1,644	Escalation Rate of 2.7%	
38		Contract Outage	(14,729)	Contract and project decrease due to one planned outage this year	
39		Contract Other	60		
40		Miscellaneous	28,578	Increased expense due to less OM and OS costs allocated to the decreasing capital portfolio	
41		Unplanned Outages	0		
42					
43	2023	Forecast	313,648		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
Total DCP

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	7,492	Escalation Rate of 3.52%	
45		Labor Headcount	(11,664)		
46		Labor Burden Rate	0		
47		Labor Outage	(33)		
48		Labor Other	1,730	Increased overtime labor given headcount reductions	
49		Material Escalation	419	Escalation Rate of 2.7%	
50		Material Other	(13)		
51		Contract Escalation	1,031	Escalation Rate of 2.7%	
52		Contract Outage	534		
53		Contract Other	(193)		
54		Miscellaneous	1,534	Escalation Rate of 2.7% plus expense project cost changes	
55		Unplanned Outages	0		
56					

57 2024 Forecast 314,485

58		Labor Escalation	4,623	Escalation Rate of 3.52%	
59		Labor Headcount	(90,066)	Plant Closure in August 2025	
60		Labor Burden Rate	0		
61		Labor Outage	(11,223)	No refueling outage in 2025	
62		Labor Other	1,776	Increased overtime labor given headcount reductions	
63		Material Escalation	394	Escalation Rate of 2.7%	
64		Material Other	(6,457)	Plant Closure in August 2025	
65		Contract Escalation	990	Escalation Rate of 2.7%	
66		Contract Outage	(15,439)	No refueling outage in 2025	
67		Contract Other	(14,027)	Plant Closure in August 2025	
68		Miscellaneous	(18,864)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages	0		
70					

71 2025 Forecast 166,192

72		Labor Escalation	0		
73		Labor Headcount	0		
74		Labor Burden Rate	0		
75		Labor Outage	0		
76		Labor Other	0		
77		Material Escalation	0		
78		Material Other	0		
79		Contract Escalation	0		
80		Contract Outage	0		
81		Contract Other	0		
82		Miscellaneous	(166,192)	Plant Closure in August 2025	
83		Unplanned Outages	0		
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC AB

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	14,673	Added 2nd Outage Levelization for 2022 2nd Outage	
2		Labor Escalation	11	Escalation Rate of 3.02%	
3		Labor Headcount	0		
4		Labor Burden Rate	(20)		
5		Labor Outage	0		
6		Labor Other	(372)	Offset by Miscellaneous due to 2021 through 2026 cost category classification	
7		Material Escalation	0	Escalation Rate of 0.2%	
8		Material Other	0		
9		Contract Escalation	0	Escalation Rate of 0.2%	
10		Contract Outage	0		
11		Contract Other	0		
12		Miscellaneous	419	Offset by Labor due to 2021 through 2026 cost category classification	
13		Unplanned Outages	0		
14					
15	2021	Forecast	14,711		
16		Labor Escalation	0	Escalation Rate of 3.52%	
17		Labor Headcount	0		
18		Labor Burden Rate	0		
19		Labor Outage	0		
20		Labor Other	0		
21		Material Escalation	0	Escalation Rate of 2.5%	
22		Material Other	0		
23		Contract Escalation	0	Escalation Rate of 2.5%	
24		Contract Outage	0		
25		Contract Other	0		
26		Miscellaneous	(44,133)	Change in 2nd Outage Levelization for 2022 2nd Outage	
27		Unplanned Outages	0		
28			0		
29	2022	Forecast	(29,422)		
30		Labor Escalation	0	Escalation Rate of 3.52%	
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	0		
34		Labor Other	0		
35		Material Escalation	0	Escalation Rate of 2.7%	
36		Material Other	0		
37		Contract Escalation	0	Escalation Rate of 2.7%	
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	29,422	Change in 2nd Outage Levelization for 2022 2nd Outage	
41		Unplanned Outages	0		
42			0		
43	2023	Forecast	0		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC AB

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	0		
45		Labor Headcount	0		
46		Labor Burden Rate	0		
47		Labor Outage	0		
48		Labor Other	0		
49		Material Escalation	0		
50		Material Other	0		
51		Contract Escalation	0		
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	0		
55		Unplanned Outages	0		
56			0		
57	2024	Forecast	0		
58		Labor Escalation	0		
59		Labor Headcount	0		
60		Labor Burden Rate	0		
61		Labor Outage	0		
62		Labor Other	0		
63		Material Escalation	0		
64		Material Other	0		
65		Contract Escalation	0		
66		Contract Outage	0		
67		Contract Other	0		
68		Miscellaneous	0		
69		Unplanned Outages	0		
70			0		
71	2025	Forecast	0		
72		Labor Escalation	0		
73		Labor Headcount	0		
74		Labor Burden Rate	0		
75		Labor Outage	0		
76		Labor Other	0		
77		Material Escalation	0		
78		Material Other	0		
79		Contract Escalation	0		
80		Contract Outage	0		
81		Contract Other	0		
82		Miscellaneous	0		
83		Unplanned Outages	0		
84			0		
85	2026	Forecast	0		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC AK

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	1,996		
2		Labor Escalation	1	Escalation Rate of 3.02%	
3		Labor Headcount	0		
4		Labor Burden Rate	(1)		
5		Labor Outage	0		
6		Labor Other	(23)		
7		Material Escalation	0		
8		Material Other	0		
9		Contract Escalation	2	Escalation Rate of 0.2%	
10		Contract Outage	0		
11		Contract Other	(140)	Reduced environmental fees, consulting and repairs	
12		Miscellaneous	165	Escalation Rate of 0.2% plus other miscellaneous	
13		Unplanned Outages	0		
14					
15	2021	Forecast	2,000		
16		Labor Escalation	0		
17		Labor Headcount	0		
18		Labor Burden Rate	0		
19		Labor Outage	0		
20		Labor Other	0		
21		Material Escalation	0		
22		Material Other	0		
23		Contract Escalation	20	Escalation Rate of 2.5%	
24		Contract Outage	0		
25		Contract Other	0		
26		Miscellaneous	30	Escalation Rate of 2.5% plus other miscellaneous	
27		Unplanned Outages	0		
28					
29	2022	Forecast	2,050		
30		Labor Escalation	0		
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	0		
34		Labor Other	0		
35		Material Escalation	0		
36		Material Other	0		
37		Contract Escalation	22	Escalation Rate of 2.7%	
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	33	Escalation Rate of 2.7% plus other miscellaneous	
41		Unplanned Outages	0		
42					
43	2023	Forecast	2,105		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC AK

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	0		
45		Labor Headcount	0		
46		Labor Burden Rate	0		
47		Labor Outage	0		
48		Labor Other	0		
49		Material Escalation	0		
50		Material Other	0		
51		Contract Escalation	19	Escalation Rate of 2.7%	
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	29	Escalation Rate of 2.7% plus other miscellaneous	
55		Unplanned Outages	0		
56					
57	2024	Forecast	2,153		
58		Labor Escalation			
59		Labor Headcount			
60		Labor Burden Rate			
61		Labor Outage			
62		Labor Other			
63		Material Escalation			
64		Material Other			
65		Contract Escalation	18	Escalation Rate of 2.7%	
66		Contract Outage			
67		Contract Other	(292)	Plant Closure in August 2025	
68		Miscellaneous	(413)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					
71	2025	Forecast	1,466		
72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(1,466)	Plant Closure in August 2025	
83		Unplanned Outages			
84					
85	2026	Forecast	0		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC BP

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions
1	2020	Preliminary Forecast	13,247	
2		Labor Escalation	196	Escalation Rate of 3.02%
3		Labor Headcount	(398)	AverageHeadcount reduction of 2
4		Labor Burden Rate	(148)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19
5		Labor Outage	171	
6		Labor Other	(185)	Labor decrease due to overtime reduction
7		Material Escalation	0	
8		Material Other	(10)	
9		Contract Escalation	3	Escalation Rate of 0.2%
10		Contract Outage	0	
11		Contract Other	(169)	
12		Miscellaneous	137	Escalation Rate of 0.2% plus other miscellaneous
13		Unplanned Outages	0	
14				
15	2021	Forecast	12,844	
16		Labor Escalation	224	Escalation Rate of 3.52%
17		Labor Headcount	0	
18		Labor Burden Rate	0	
19		Labor Outage	176	Labor increase due to a second planned outage this year
20		Labor Other	(7)	
21		Material Escalation	0	
22		Material Other	0	
23		Contract Escalation	38	Escalation Rate of 2.5%
24		Contract Outage	0	
25		Contract Other	(100)	
26		Miscellaneous	425	Escalation Rate of 2.5% plus other miscellaneous
27		Unplanned Outages	0	
28				
29	2022	Forecast	13,600	
30		Labor Escalation	221	Escalation Rate of 3.52%
31		Labor Headcount	(213)	AverageHeadcount reduction of 1
32		Labor Burden Rate	0	
33		Labor Outage	(254)	Labor decrease due to one planned outage this year
34		Labor Other	(75)	
35		Material Escalation	0	
36		Material Other	0	
37		Contract Escalation	39	Escalation Rate of 2.7%
38		Contract Outage	0	
39		Contract Other	103	
40		Miscellaneous	(125)	Escalation Rate of 2.7% plus other miscellaneous
41		Unplanned Outages	0	
42				
43	2023	Forecast	13,296	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)

MWC BP

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions
44		Labor Escalation	218	Escalation Rate of 3.52%
45		Labor Headcount	(395)	AverageHeadcount reduction of 2
46		Labor Burden Rate	0	
47		Labor Outage	0	
48		Labor Other	(110)	
49		Material Escalation	0	
50		Material Other	1	
51		Contract Escalation	8	Escalation Rate of 2.7%
52		Contract Outage	0	
53		Contract Other	0	
54		Miscellaneous	475	Escalation Rate of 2.7% plus other miscellaneous
55		Unplanned Outages	0	
56				
57	2024	Forecast	13,493	
58		Labor Escalation	135	Escalation Rate of 3.52%
59		Labor Headcount	(2,201)	AverageHeadcount reduction of 11
60		Labor Burden Rate	0	
61		Labor Outage	(84)	No refueling outage in 2025
62		Labor Other	(145)	
63		Material Escalation	0	
64		Material Other	(3)	
65		Contract Escalation	27	Escalation Rate of 2.7%
66		Contract Outage	0	
67		Contract Other	(654)	Plant Closure in August 2025
68		Miscellaneous	(2,516)	Escalation Rate of 2.7% plus Plant Closure in August 2025
69		Unplanned Outages	0	
70				
71	2025	Forecast	8,052	
72		Labor Escalation		
73		Labor Headcount		
74		Labor Burden Rate		
75		Labor Outage		
76		Labor Other		
77		Material Escalation		
78		Material Other		
79		Contract Escalation		
80		Contract Outage		
81		Contract Other		
82		Miscellaneous	(8,052)	Plant Closure in August 2025
83		Unplanned Outages		
84				
85	2026	Forecast	0	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BQ

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	48,877		
2		Labor Escalation	1,236	Escalation Rate of 3.02%	
3		Labor Headcount	0	Average Headcount reduction of 0	
4		Labor Burden Rate	(2,224)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	(163)		
6		Labor Other	(3,781)	Labor decrease due to implementation of Security Affordability initiatives	
7		Material Escalation	0		
8		Material Other	(46)		
9		Contract Escalation	2	Escalation Rate of 2.5%	
10		Contract Outage	12		
11		Contract Other	349	One time credits in 2020 plus miscellaneous	
12		Miscellaneous	(840)	Escalation Rate of 0.2% less assumed reduction in OES and FEMA fees	
13		Unplanned Outages	(1,000)	Decrease in labor and contract costs from the 2020 unplanned outages	
14					
15	2021	Forecast	42,422		
16		Labor Escalation	1,332	Escalation Rate of 3.52%	
17		Labor Headcount	(995)	Average Headcount reduction of 7	
18		Labor Burden Rate	0		
19		Labor Outage	849	Labor increase due to a second planned outage this year	
20		Labor Other	517	Higher standard labor rate due to increased overtime with two refueling outages	
21		Material Escalation	0		
22		Material Other	0		
23		Contract Escalation	30	Escalation Rate of 2.5%	
24		Contract Outage	96	Contract increase due to a second planned outage this year	
25		Contract Other	0		
26		Miscellaneous	106	Escalation Rate of 2.5% plus other miscellaneous	
27		Unplanned Outages	0		
28					
29	2022	Forecast	44,357		
30		Labor Escalation	1,304	Escalation Rate of 3.52%	
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	(1,219)	Labor decrease due to one planned outage this year and shorter outage duration	
34		Labor Other	(842)	Lower standard labor rate due to decreased overtime with only one refueling outage	
35		Material Escalation	0		
36		Material Other	0		
37		Contract Escalation	35	Escalation Rate of 2.7%	
38		Contract Outage	(92)	Contract and project decrease due to one planned outage this year	
39		Contract Other	(2)		
40		Miscellaneous	123	Escalation Rate of 2.7% plus other miscellaneous	
41		Unplanned Outages	0		
42					
43	2023	Forecast	43,664		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BQ

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	1,329	Escalation Rate of 3.52%	
45		Labor Headcount	0		
46		Labor Burden Rate	0		
47		Labor Outage	(7)		
48		Labor Other	53		
49		Material Escalation	0		
50		Material Other	0		
51		Contract Escalation	29	Escalation Rate of 2.7%	
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	106	Escalation Rate of 2.7% plus other miscellaneous	
55		Unplanned Outages	0		
56					

57 2024 Forecast 45,174

58		Labor Escalation	903	Escalation Rate of 3.52%	
59		Labor Headcount	(14,985)	Average Headcount reduction of 89	
60		Labor Burden Rate	0		
61		Labor Outage	(552)	No refueling outage in 2025	
62		Labor Other	2,253		
63		Material Escalation	0		
64		Material Other	0		
65		Contract Escalation	27	Escalation Rate of 2.7%	
66		Contract Outage	(98)	No refueling outage in 2025	
67		Contract Other	(413)	Plant Closure in August 2025	
68		Miscellaneous	(1,521)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					

71 2025 Forecast 30,788

72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(30,788)	Plant Closure in August 2025	
83		Unplanned Outages			
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BR

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	78,523		
2		Labor Escalation	1,824	Escalation Rate of 3.02%	
3		Labor Headcount	(477)	Average Headcount reduction of 2	
4		Labor Burden Rate	(3,252)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	268		
6		Labor Other	(1,025)	Labor decrease due to overtime reduction	
7		Material Escalation	4	Escalation Rate of 0.2%	
8		Material Other	(421)		
9		Contract Escalation	17	Escalation Rate of 0.2%	
10		Contract Outage	0		
11		Contract Other	304		
12		Miscellaneous	227	Escalation Rate of 0.2% plus Once Through Cooling Fees based on through put	
13		Unplanned Outages	0		
14					
15	2021	Forecast	75,992		
16		Labor Escalation	2,343	Escalation Rate of 3.52%	
17		Labor Headcount	(1,382)	Average Headcount reduction of 7	
18		Labor Burden Rate	0		
19		Labor Outage	5,098	Labor increase due to a second planned outage this year	
20		Labor Other	1,390	Higher standard labor rate due to increased overtime with two refueling outages	
21		Material Escalation	43	Escalation Rate of 2.5%	
22		Material Other	12		
23		Contract Escalation	223	Escalation Rate of 2.5%	
24		Contract Outage	0		
25		Contract Other	79		
26		Miscellaneous	(56)	Escalation Rate of 2.5% plus other miscellaneous	
27		Unplanned Outages	0		
28					
29	2022	Forecast	83,742		
30		Labor Escalation	2,083	Escalation Rate of 3.52%	
31		Labor Headcount	(278)	Average Headcount reduction of 1	
32		Labor Burden Rate	0		
33		Labor Outage	(7,289)	Labor decrease due to one planned outage this year and shorter outage duration	
34		Labor Other	(1,335)	Lower standard labor rate due to decreased overtime with only one refueling outage	
35		Material Escalation	48	Escalation Rate of 2.7%	
36		Material Other	63		
37		Contract Escalation	249	Escalation Rate of 2.7%	
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	460	Escalation Rate of 2.7% plus Once Through Cooling Fees based on through put	
41		Unplanned Outages	0		
42					
43	2023	Forecast	77,743		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BR

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	2,150	Escalation Rate of 3.52%	
45		Labor Headcount	(795)	Average Headcount reduction of 4	
46		Labor Burden Rate	0		
47		Labor Outage	0		
48		Labor Other	668		
49		Material Escalation	44	Escalation Rate of 2.7%	
50		Material Other	0		
51		Contract Escalation	218	Escalation Rate of 2.7%	
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	(53)	Escalation Rate of 2.7% plus other miscellaneous	
55		Unplanned Outages			
56					

57 2024 Forecast 79,975

58		Labor Escalation	1,390	Escalation Rate of 3.52%	
59		Labor Headcount	(26,502)	Average Headcount reduction of 127	
60		Labor Burden Rate	0		
61		Labor Outage	(3,220)	No refueling outage in 2025	
62		Labor Other	(1,462)		
63		Material Escalation	40	Escalation Rate of 2.7%	
64		Material Other	(719)	Plant Closure in August 2025	
65		Contract Escalation	204	Escalation Rate of 2.7%	
66		Contract Outage	0		
67		Contract Other	(3,303)	Plant Closure in August 2025	
68		Miscellaneous	(3,205)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					

71 2025 Forecast 43,198

72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(43,198)	Plant Closure in August 2025	
83		Unplanned Outages			
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC BS

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	109,165		
2		Labor Escalation	1,719	Escalation Rate of 3.02%	
3		Labor Headcount	(7,347)	Average Headcount reduction of 30	
4		Labor Burden Rate	(2,615)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	(1,273)		
6		Labor Other	2,816	Increased labor shifting from capital labor due to the decreased capital projects portfolio and due to on-site contractor workforce reductions shifting to labor overtime	
7		Material Escalation	30	Escalation Rate of 0.2%	
8		Material Other	1,111	Turbine and Main Generator material classification versus contract and Facility Maint	
9		Contract Escalation	60	Escalation Rate of 0.2%	
10		Contract Outage	3,940	Increase in outage project scope, turbine/generator scope, and other maintenance	
11		Contract Other	(1,507)	Decrease included from reduced scope and costs for on-site contractor workforce	
12		Miscellaneous	465	Escalation Rate of 2.7% plus other miscellaneous	
13		Unplanned Outages	(7,761)	Decrease in labor and contract costs from the 2020 unplanned outages	
14					
15	2021	Forecast	98,803		
16		Labor Escalation	2,091	Escalation Rate of 3.52%	
17		Labor Headcount	(2,770)	Average Headcount reduction of 13	
18		Labor Burden Rate	0		
19		Labor Outage	8,621	Labor increase due to a second planned outage this year	
20		Labor Other	3,294	Higher standard labor rate due to increased overtime with two refueling outages	
21		Material Escalation	396	Escalation Rate of 2.5%	
22		Material Other	2,025	Material increase due to a second planned outage this year	
23		Contract Escalation	749	Escalation Rate of 2.5%	
24		Contract Outage	3,043	Contract increase due to a second planned outage this year	
25		Contract Other	2,419	Tunnel Cleaning, and BHI Overheads	
26		Miscellaneous	858	Escalation Rate of 2.5% plus expense project cost changes	
27		Unplanned Outages	0		
28					
29	2022	Forecast	119,529		
30		Labor Escalation	1,597	Escalation Rate of 3.52%	
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	(12,334)	Labor decrease due to one planned outage this year and shorter outage duration	
34		Labor Other	(2,581)	Lower standard labor rate due to decreased overtime with only one refueling outage	
35		Material Escalation	494	Escalation Rate of 2.7%	
36		Material Other	(2,446)	Material decrease due to one planned outage this year	
37		Contract Escalation	977	Escalation Rate of 2.7%	
38		Contract Outage	(12,634)	Contract and project decrease due to one planned outage this year	
39		Contract Other	(113)		
40		Miscellaneous	(1,801)	Escalation Rate of 2.7% plus expense project cost changes	
41		Unplanned Outages	0		
42					
43	2023	Forecast	90,688		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC BS

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	1,650	Escalation Rate of 3.52%	
45		Labor Headcount	(6,139)	Average Headcount reduction of 31	
46		Labor Burden Rate	0		
47		Labor Outage	0		
48		Labor Other	1,766	Increased overtime labor given headcount reductions	
49		Material Escalation	375	Escalation Rate of 2.7%	
50		Material Other	(14)		
51		Contract Escalation	562	Escalation Rate of 2.7%	
52		Contract Outage	335		
53		Contract Other	51		
54		Miscellaneous	10	Escalation Rate of 2.7% plus expense project cost changes	
55		Unplanned Outages			
56					

57 2024 Forecast 89,284

58		Labor Escalation	871	Escalation Rate of 3.52%	
59		Labor Headcount	(20,535)	Average Headcount reduction of 92	
60		Labor Burden Rate	0		
61		Labor Outage	(5,848)	No refueling outage in 2025	
62		Labor Other	2,105	Increased overtime labor given headcount reductions	
63		Material Escalation	350	Escalation Rate of 2.7%	
64		Material Other	(5,667)	Plant Closure in August 2025	
65		Contract Escalation	533	Escalation Rate of 2.7%	
66		Contract Outage	(13,591)	No refueling outage in 2025	
67		Contract Other	(6,037)	Plant Closure in August 2025	
68		Miscellaneous	(1,726)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					

71 2025 Forecast 39,739

72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(39,739)	Plant Closure in August 2025	
83		Unplanned Outages			
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC BT

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	15,899		
2		Labor Escalation	67	Escalation Rate of 3.02%	
3		Labor Headcount	(460)	Average Headcount reduction of 3	
4		Labor Burden Rate	(92)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	26		
6		Labor Other	(169)		
7		Material Escalation	0	Escalation Rate of 0.2%	
8		Material Other	0		
9		Contract Escalation	4	Escalation Rate of 0.2%	
10		Contract Outage	31		
11		Contract Other	(484)	Reduced Learning Services Staff Augmentation	
12		Miscellaneous	556	Escalation Rate of 2.7% plus other miscellaneous	
13		Unplanned Outages	0		
14					
15	2021	Forecast	15,378		
16		Labor Escalation	60	Escalation Rate of 3.52%	
17		Labor Headcount	(128)	Average Headcount reduction of 1	
18		Labor Burden Rate	0		
19		Labor Outage	27	Labor increase due to a second planned outage this year	
20		Labor Other	8		
21		Material Escalation	0	Escalation Rate of 2.5%	
22		Material Other	0		
23		Contract Escalation	34	Escalation Rate of 2.5%	
24		Contract Outage	113	Contract increase due to a second planned outage this year	
25		Contract Other	0		
26		Miscellaneous	303	Escalation Rate of 2.5% plus other miscellaneous	
27		Unplanned Outages	0		
28					
29	2022	Forecast	15,795		
30		Labor Escalation	56	Escalation Rate of 3.52%	
31		Labor Headcount	(217)	Average Headcount reduction of 1	
32		Labor Burden Rate	0		
33		Labor Outage	(38)	Labor decrease due to one planned outage this year	
34		Labor Other	(25)		
35		Material Escalation	0	Escalation Rate of 2.7%	
36		Material Other	0		
37		Contract Escalation	40	Escalation Rate of 2.7%	
38		Contract Outage	(108)	Contract and project decrease due to one planned outage this year	
39		Contract Other	(3)		
40		Miscellaneous	341	Escalation Rate of 2.7% plus other miscellaneous	
41		Unplanned Outages	0		
42					
43	2023	Forecast	15,841		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BT

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	49	Escalation Rate of 3.52%	
45		Labor Headcount	(433)	Average Headcount reduction of 3	
46		Labor Burden Rate	0		
47		Labor Outage	0		
48		Labor Other	(9)		
49		Material Escalation	0	Escalation Rate of 2.7%	
50		Material Other	0		
51		Contract Escalation	33	Escalation Rate of 2.7%	
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	37	Escalation Rate of 2.7% plus other miscellaneous	
55		Unplanned Outages			
56					
57	2024	Forecast	15,518		
58		Labor Escalation	23	Escalation Rate of 3.52%	
59		Labor Headcount	(338)	Average Headcount reduction of 2	
60		Labor Burden Rate	0		
61		Labor Outage	(15)	No refueling outage in 2025	
62		Labor Other	(3)		
63		Material Escalation	0	Escalation Rate of 2.7%	
64		Material Other	0		
65		Contract Escalation	31	Escalation Rate of 2.7%	
66		Contract Outage	(116)	No refueling outage in 2025	
67		Contract Other	(530)	Plant Closure in August 2025	
68		Miscellaneous	(8,251)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					
71	2025	Forecast	6,319		
72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(6,319)	Plant Closure in August 2025	
83		Unplanned Outages			
84					
85	2026	Forecast	0		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BU

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	(1,111)		
2		Labor Escalation	(40)	Escalation Rate of 3.02%	
3		Labor Headcount	0		
4		Labor Burden Rate	72		
5		Labor Outage	0		
6		Labor Other	1,079	Elimination of 2020 Standard Cost Variance for Warehouse labor	
7		Material Escalation	0		
8		Material Other	0		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	0		
12		Miscellaneous	0		
13		Unplanned Outages	0		
14					
15	2021	Forecast	0		
16		Labor Escalation	0		
17		Labor Headcount	0		
18		Labor Burden Rate	0		
19		Labor Outage	0		
20		Labor Other	0		
21		Material Escalation	0		
22		Material Other	0		
23		Contract Escalation	0		
24		Contract Outage	0		
25		Contract Other	0		
26		Miscellaneous	0		
27		Unplanned Outages	0		
28					
29	2022	Forecast	0		
30		Labor Escalation	0		
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	0		
34		Labor Other	0		
35		Material Escalation	0		
36		Material Other	0		
37		Contract Escalation	0		
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	0		
41		Unplanned Outages	0		
42					
43	2023	Forecast	0		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC BU

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation			
45		Labor Headcount			
46		Labor Burden Rate			
47		Labor Outage			
48		Labor Other			
49		Material Escalation			
50		Material Other			
51		Contract Escalation			
52		Contract Outage			
53		Contract Other			
54		Miscellaneous			
55		Unplanned Outages			
56					
57	2024	Forecast	0		
58		Labor Escalation			
59		Labor Headcount			
60		Labor Burden Rate			
61		Labor Outage			
62		Labor Other			
63		Material Escalation			
64		Material Other			
65		Contract Escalation			
66		Contract Outage			
67		Contract Other			
68		Miscellaneous			
69		Unplanned Outages			
70					
71	2025	Forecast	0		
72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous			
83		Unplanned Outages			
84					
85	2026	Forecast	0		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC BV

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	38,770		
2		Labor Escalation	769	Escalation Rate of 3.02%	
3		Labor Headcount	(1,344)	Average Headcount reduction of 9	
4		Labor Burden Rate	(1,296)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	794		
6		Labor Other	834	Increase included for a shift of outage labor temporary workforce from MWC BS	
7		Material Escalation	1	Escalation Rate of 0.2%	
8		Material Other	(309)		
9		Contract Escalation	19	Escalation Rate of 0.2%	
10		Contract Outage	(2,058)	No Steam Generator Inspections in 2021	
11		Contract Other	(98)		
12		Miscellaneous	(212)	Non-labor escalation offset by forecast classification change from 2020 for Seismic contracts versus Other costs	
13		Unplanned Outages	0		
14					
15	2021	Forecast	35,870		
16		Labor Escalation	984	Escalation Rate of 3.52%	
17		Labor Headcount	(689)	Average Headcount reduction of 4	
18		Labor Burden Rate	0		
19		Labor Outage	1,902	Labor increase due to a second planned outage this year	
20		Labor Other	677	Higher standard labor rate due to increased overtime with two refueling outages	
21		Material Escalation	0	Escalation Rate of 2.5%	
22		Material Other	0		
23		Contract Escalation	211	Escalation Rate of 2.5%	
24		Contract Outage	775	Contract increase due to a second planned outage this year	
25		Contract Other	11		
26		Miscellaneous	(447)	Escalation Rate of 2.7% plus other miscellaneous	
27		Unplanned Outages	0		
28					
29	2022	Forecast	39,294		
30		Labor Escalation	890	Escalation Rate of 3.52%	
31		Labor Headcount	(173)	Average Headcount reduction of 1	
32		Labor Burden Rate	0		
33		Labor Outage	(2,740)	Labor decrease due to one planned outage this year	
34		Labor Other	(618)	Lower standard labor rate due to decreased overtime with only one refueling outage	
35		Material Escalation	0	Escalation Rate of 2.7%	
36		Material Other	0		
37		Contract Escalation	255	Escalation Rate of 2.7%	
38		Contract Outage	(1,895)		
39		Contract Other	75		
40		Miscellaneous	(70)	Escalation Rate of 2.7% plus other miscellaneous	
41		Unplanned Outages	0		
42					
43	2023	Forecast	35,018		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC BV

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	882	Escalation Rate of 3.52%	
45		Labor Headcount	(1,223)	Average Headcount reduction of 6	
46		Labor Burden Rate	0		
47		Labor Outage	(16)		
48		Labor Other	(106)		
49		Material Escalation	0	Escalation Rate of 2.7%	
50		Material Other	0		
51		Contract Escalation	138	Escalation Rate of 2.7%	
52		Contract Outage	199		
53		Contract Other	(244)		
54		Miscellaneous	(247)	Escalation Rate of 2.7% plus other miscellaneous	
55		Unplanned Outages			
56					

57 2024 Forecast 34,401

58		Labor Escalation	552	Escalation Rate of 3.52%	
59		Labor Headcount	(12,134)	Average Headcount reduction of 68	
60		Labor Burden Rate	0		
61		Labor Outage	(934)	No refueling outage in 2025	
62		Labor Other	(556)		
63		Material Escalation	0	Escalation Rate of 2.7%	
64		Material Other	0		
65		Contract Escalation	128	Escalation Rate of 2.7%	
66		Contract Outage	(1,634)	No refueling outage in 2025	
67		Contract Other	(2,441)	Plant Closure in August 2025	
68		Miscellaneous	(1,006)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					

71 2025 Forecast 16,376

72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(16,376)	Plant Closure in August 2025	
83		Unplanned Outages			
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC EO

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	(23)		
2		Labor Escalation	0	Escalation Rate of 3.02%	
3		Labor Headcount	0		
4		Labor Burden Rate	0		
5		Labor Outage	0		
6		Labor Other	0		
7		Material Escalation	0		
8		Material Other	(1)		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	(8)		
12		Miscellaneous	41		
13		Unplanned Outages	0		
14					
15	2021	Forecast	9		
16		Labor Escalation	0	Escalation Rate of 3.52%	
17		Labor Headcount	0		
18		Labor Burden Rate	0		
19		Labor Outage	0		
20		Labor Other	0		
21		Material Escalation	0		
22		Material Other	0		
23		Contract Escalation	0		
24		Contract Outage	0		
25		Contract Other	0		
26		Miscellaneous	0		
27		Unplanned Outages	0		
28					
29	2022	Forecast	9		
30		Labor Escalation	1	Escalation Rate of 3.52%	
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	0		
34		Labor Other	0		
35		Material Escalation	0		
36		Material Other	0		
37		Contract Escalation	0		
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	0		
41		Unplanned Outages	0		
42					
43	2023	Forecast	10		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC EO

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation			
45		Labor Headcount			
46		Labor Burden Rate			
47		Labor Outage			
48		Labor Other			
49		Material Escalation			
50		Material Other			
51		Contract Escalation			
52		Contract Outage			
53		Contract Other			
54		Miscellaneous			
55		Unplanned Outages			
56					
57	2024	Forecast	10		
58		Labor Escalation			
59		Labor Headcount			
60		Labor Burden Rate			
61		Labor Outage			
62		Labor Other			
63		Material Escalation			
64		Material Other			
65		Contract Escalation			
66		Contract Outage			
67		Contract Other			
68		Miscellaneous	(3)		
69		Unplanned Outages			
70					
71	2025	Forecast	7		
72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(7)		
83		Unplanned Outages			
84					
85	2026	Forecast	0		

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC OM

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions
1	2020	Preliminary Forecast	8,084	
2		Labor Escalation	250	Escalation Rate of 3.02%
3		Labor Headcount	544	Average Headcount increase of 3
4		Labor Burden Rate	0	
5		Labor Outage	0	
6		Labor Other	(709)	Temporary Outage Labor in 2020 due to Forced Outages - PCC 12680
7		Material Escalation	0	
8		Material Other	1	
9		Contract Escalation	0	
10		Contract Outage	0	
11		Contract Other	0	
12		Miscellaneous	288	Increased expense due to less costs allocated to the decreasing capital portfolio
13		Unplanned Outages	0	
14				
15	2021	Forecast	8,458	
16		Labor Escalation	298	Escalation Rate of 3.52%
17		Labor Headcount	(2,499)	Average Headcount decrease of 13
18		Labor Burden Rate	0	
19		Labor Outage	0	
20		Labor Other	241	
21		Material Escalation	0	
22		Material Other	0	
23		Contract Escalation	0	
24		Contract Outage	0	
25		Contract Other	0	
26		Miscellaneous	0	
27		Unplanned Outages	0	
28				
29	2022	Forecast	6,498	
30		Labor Escalation	229	Escalation Rate of 3.52%
31		Labor Headcount	419	Average Headcount increase of 2
32		Labor Burden Rate	0	
33		Labor Outage	0	
34		Labor Other	529	Addition of Sr VP Generation (CNO)
35		Material Escalation	0	
36		Material Other	0	
37		Contract Escalation	0	
38		Contract Outage	0	
39		Contract Other	0	
40		Miscellaneous	0	
41		Unplanned Outages	0	
42				
43	2023	Forecast	7,675	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC OM

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions
44		Labor Escalation	248	Escalation Rate of 3.52%
45		Labor Headcount	(18)	
46		Labor Burden Rate	0	
47		Labor Outage	0	
48		Labor Other	(18)	
49		Material Escalation	0	
50		Material Other	0	
51		Contract Escalation	0	
52		Contract Outage	0	
53		Contract Other	0	
54		Miscellaneous	22	
55		Unplanned Outages	0	
56				
57	2024	Forecast	7,909	
58		Labor Escalation	170	Escalation Rate of 3.52%
59		Labor Headcount	(2,771)	
60		Labor Burden Rate		
61		Labor Outage		
62		Labor Other	(57)	
63		Material Escalation		
64		Material Other		
65		Contract Escalation		
66		Contract Outage		
67		Contract Other		
68		Miscellaneous	(205)	
69		Unplanned Outages		
70				
71	2025	Forecast	5,046	
72		Labor Escalation		
73		Labor Headcount		
74		Labor Burden Rate		
75		Labor Outage		
76		Labor Other		
77		Material Escalation		
78		Material Other		
79		Contract Escalation		
80		Contract Outage		
81		Contract Other		
82		Miscellaneous	(5,046)	
83		Unplanned Outages		
84				
85	2026	Forecast	0	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC OS

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	26,229		
2		Labor Escalation	871	Escalation Rate of 3.02%	
3		Labor Headcount	(2,714)	Average Headcount decrease of 17	
4		Labor Burden Rate	0		
5		Labor Outage	0		
6		Labor Other	(280)		
7		Material Escalation	0		
8		Material Other	15		
9		Contract Escalation	0		
10		Contract Outage	0		
11		Contract Other	5		
12		Miscellaneous	446	Increased expense due to less costs allocated to the decreasing capital portfolio	
13		Unplanned Outages	0		
14					
15	2021	Forecast	24,572		
16		Labor Escalation	981	Escalation Rate of 3.52%	
17		Labor Headcount	(571)	Average Headcount decrease of 4	
18		Labor Burden Rate	0		
19		Labor Outage	1,175	Labor increase due to a second planned outage this year	
20		Labor Other	(236)		
21		Material Escalation	0		
22		Material Other	0		
23		Contract Escalation	0		
24		Contract Outage	0		
25		Contract Other	0		
26		Miscellaneous	708	Increased expense due to less costs allocated to the decreasing capital portfolio	
27		Unplanned Outages	0		
28					
29	2022	Forecast	26,629		
30		Labor Escalation	987	Escalation Rate of 3.52%	
31		Labor Headcount	(1,051)	Average Headcount decrease of 6	
32		Labor Burden Rate	0		
33		Labor Outage	(1,701)	Labor decrease due to one planned outage this year	
34		Labor Other	(56)		
35		Material Escalation	0		
36		Material Other	0		
37		Contract Escalation	0		
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	191	Increased expense due to less costs allocated to the decreasing capital portfolio	
41		Unplanned Outages	0		
42					
43	2023	Forecast	24,999		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC OS

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	920	Escalation Rate of 3.52%	
45		Labor Headcount	(2,661)	Average Headcount decrease of 16	
46		Labor Burden Rate	0		
47		Labor Outage	(10)		
48		Labor Other	(495)		
49		Material Escalation	0		
50		Material Other	0		
51		Contract Escalation	0		
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	1,156	Increased expense due to less costs allocated to the decreasing capital portfolio	
55		Unplanned Outages			
56					

57 2024 Forecast 23,909

58		Labor Escalation	548	Escalation Rate of 3.52%	
59		Labor Headcount	(10,600)	Average Headcount decrease of 61	
60		Labor Burden Rate	0		
61		Labor Outage	(570)	No refueling outage in 2025	
62		Labor Other	91		
63		Material Escalation	0		
64		Material Other	0		
65		Contract Escalation	0		
66		Contract Outage	0		
67		Contract Other	0		
68		Miscellaneous	(1)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					

71 2025 Forecast 13,377

72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(13,377)	Plant Closure in August 2025	
83		Unplanned Outages			
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Expense Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC IG

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Preliminary Forecast	2,900		
2		Labor Escalation	38	Escalation Rate of 3.02%	
3		Labor Headcount	0		
4		Labor Burden Rate	(68)	Burden rate reduction of 6.5% due to higher rate in 2020 caused by COVID-19	
5		Labor Outage	0		
6		Labor Other	(24)		
7		Material Escalation	0	Escalation Rate of 0.2%	
8		Material Other	151		
9		Contract Escalation	2	Escalation Rate of 0.2%	
10		Contract Outage	0		
11		Contract Other	31		
12		Miscellaneous	162	Increased NRC rulemaking SECY-15 project costs	
13		Unplanned Outages	0		
14					
15	2021	Forecast	3,192		
16		Labor Escalation	43	Escalation Rate of 3.52%	
17		Labor Headcount	0		
18		Labor Burden Rate	0		
19		Labor Outage	0		
20		Labor Other	10		
21		Material Escalation	5	Escalation Rate of 2.5%	
22		Material Other	(4)		
23		Contract Escalation	24	Escalation Rate of 2.5%	
24		Contract Outage	0		
25		Contract Other	0		
26		Miscellaneous	(722)	Decreased NRC rulemaking costs	
27		Unplanned Outages	0		
28					
29	2022	Forecast	2,548		
30		Labor Escalation	45	Escalation Rate of 3.52%	
31		Labor Headcount	0		
32		Labor Burden Rate	0		
33		Labor Outage	0		
34		Labor Other	(21)		
35		Material Escalation	5	Escalation Rate of 2.7%	
36		Material Other	1		
37		Contract Escalation	27	Escalation Rate of 2.7%	
38		Contract Outage	0		
39		Contract Other	0		
40		Miscellaneous	3		
41		Unplanned Outages	0		
42					
43	2023	Forecast	2,608		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC IG

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
44		Labor Escalation	46	Escalation Rate of 3.52%	
45		Labor Headcount	0		
46		Labor Burden Rate	0		
47		Labor Outage	0		
48		Labor Other	(19)		
49		Material Escalation	0	Escalation Rate of 2.7%	
50		Material Other	0		
51		Contract Escalation	24	Escalation Rate of 2.7%	
52		Contract Outage	0		
53		Contract Other	0		
54		Miscellaneous	1	Escalation Rate of 2.7% plus other miscellaneous	
55		Unplanned Outages	0		
56					

57 2024 Forecast 2,660

58		Labor Escalation	31	Escalation Rate of 3.52%	
59		Labor Headcount	0		
60		Labor Burden Rate	0		
61		Labor Outage	0		
62		Labor Other	(450)		
63		Material Escalation	4	Escalation Rate of 2.7%	
64		Material Other	(68)		
65		Contract Escalation	22	Escalation Rate of 2.7%	
66		Contract Outage	0		
67		Contract Other	(357)	Plant Closure in August 2025	
68		Miscellaneous	(18)	Escalation Rate of 2.7% plus Plant Closure in August 2025	
69		Unplanned Outages			
70					

71 2025 Forecast 1,824

72		Labor Escalation			
73		Labor Headcount			
74		Labor Burden Rate			
75		Labor Outage			
76		Labor Other			
77		Material Escalation			
78		Material Other			
79		Contract Escalation			
80		Contract Outage			
81		Contract Other			
82		Miscellaneous	(1,824)	Plant Closure in August 2025	
83		Unplanned Outages			
84					

85 2026 Forecast 0

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-Over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2016 Recorded	2017 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	AB	Misc Expense	17,313	13,904	(3,409)	yes	-20%	yes	yes	yes	Decrease due to lower 2nd refueling outage levelization adjustment
2	5	3	AK	Manage Environmental Oper	6,186	2,147	(4,039)	yes	-65%	yes	yes	yes	Reduced Once through Cooling Fees
3	5	3	BP	Manage DCCP Business	14,347	15,542	1,195	yes	8%	yes	no	no	Support work on Access Road Landslide, License Renewal Suspension project, and additional facilities maintenance costs
4	5	3	BQ	DCCP Support Services	46,358	52,330	5,972	yes	13%	yes	yes	yes	Higher plant security cost due to increased regulatory requirements and accrual for wage dispute
5	5	3	BR	Operate DCCP Plant	68,372	76,220	7,848	yes	11%	yes	yes	yes	Increase due to Once through Cooling Fees, higher costs to support of plant radiation controls, increased cost to support the Used Fuel Storage facility and escalation
6	5	3	BS	Maintain DCCP Plant Assets	109,869	116,534	6,665	yes	6%	yes	no	no	Increase due to labor support for increased duration refueling outage for Baffle Bolt installation, higher maintenance materials, higher project costs and escalation
7	5	3	BT	Nuclear Generation Fees	17,452	13,995	(3,457)	yes	-20%	yes	yes	yes	Decrease due to lower Nuclear Regulatory Commission Fees, cost model adjustment to reclassify Learning Services labor to MWC OS
8	5	3	BU	Procure DCCP Materials & Svcs	291	98	(193)	no	-66%	yes	yes	yes	Over cleared material burden
9	5	3	BV	Maintain DCCP Plant Configuration	47,174	42,430	(4,744)	yes	-10%	yes	yes	yes	Decrease due to lower Reactor and Steam Generator Inspections
10	5	3	CR	Mnge Waste Disp & Transp	5	-	(5)	no	-100%	yes	yes	yes	Miscellaneous
11	5	3	EO	Provide Nuclear Support	(17)	(55)	(38)	no	224%	yes	yes	yes	Miscellaneous
12	5	3	IG	Manage Var Bal Acct Processes	23,184	20,510	(2,674)	yes	-12%	yes	yes	yes	Decrease due to lower Cyber Security implementation work
13	5	3	OM	Operational Management	6,502	9,347	2,845	yes	44%	yes	yes	yes	Increase due to escalation and decreased allocation to capital and balancing account work
14	5	3	OS	Operational Support	16,518	14,688	(1,830)	yes	-11%	yes	yes	yes	Increased allocation to capital

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-Over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2017 Recorded	2018 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	AB	Misc Expense	13,904	13,810	(94)	no	-1%	no	no	no	Miscellaneous
2	5	3	AK	Manage Environmental Oper	2,147	(2,630)	(4,777)	yes	-222%	yes	yes	yes	Reclassify Once through Cooling fees from MWC AK to MWC BR and Reversal of Once through Cooling fee accrual (2015)
3	5	3	BP	Manage DCCP Business	15,542	12,292	(3,250)	yes	-21%	yes	yes	yes	Reclassify facility maintenance contract costs to MWC BS to align with cost model reduction in facility maintenance costs and reduction in work for License Renewal Suspension project
4	5	3	BQ	DCCP Support Services	52,330	48,720	(3,610)	yes	-7%	yes	no	no	Reversal of accrual for wage dispute
5	5	3	BR	Operate DCCP Plant	76,220	82,940	6,720	yes	9%	yes	no	no	Increase due to reclassification of plant make-up water costs from MWC BV to MWC BR and reclassify Once through Cooling fees from MWC AK to MWC BR, and escalation
6	5	3	BS	Maintain DCCP Plant Assets	116,534	110,332	(6,202)	yes	-5%	yes	no	no	Decrease primarily due to lower maintenance materials, lower labor costs due to shorter duration outage.
7	5	3	BT	Nuclear Generation Fees	13,995	14,440	445	no	3%	no	no	no	Escalation
8	5	3	BU	Procure DCCP Materials & Svcs	98	(1,389)	(1,487)	yes	-1517%	yes	yes	yes	Over cleared material burden
9	5	3	BV	Maintain DCCP Plant Configuration	42,430	36,016	(6,414)	yes	-15%	yes	yes	yes	Decrease due to lower Reactor and Steam Generator inspections and reclassifying plant make-up water costs to MWC BR
10	5	3	CR	Mnge Waste Disp & Transp	-	-	0	no					
11	5	3	EO	Provide Nuclear Support	(65)	(1)	54	no	-98%	yes	yes	yes	Miscellaneous
12	5	3	IG	Manage Var Bal Acct Processes	20,510	13,029	(7,481)	yes	-36%	yes	yes	yes	Decrease due to lower Cyber Security implementation work.
13	5	3	OM	Operational Management	9,347	6,809	(2,539)	yes	-27%	yes	yes	yes	Decrease due to reclassifying operational management to other MWC
14	5	3	OS	Operational Support	14,688	15,669	981	no	7%	yes	no	yes	Escalation and decrease allocation to capital

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2018 Recorded	2019 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	AB	Misc Expense	13,810	(27,975)	(41,785)	yes	-303%	yes	yes	yes	Decrease due to 2nd refueling outage levelization adjustment
2	5	3	AK	Manage Environmental Oper	(2,630)	1,865	4,495	yes	-171%	yes	yes	yes	Reversal of Reclassification of Once through Cooling Fees
3	5	3	BP	Manage DCPP Business	12,292	11,358	(934)	no	-8%	yes	no	yes	Reduction in spend for communication support and work for License Renewal Suspension project
4	5	3	BQ	DCPP Support Services	48,720	52,007	3,287	yes	7%	yes	no	no	Increase due to incremental 2nd refueling outage support and escalation
5	5	3	BR	Operate DCPP Plant	82,940	83,476	536	no	1%	no	no	no	Increase due to incremental 2nd outage costs, and escalation. This is partially offset by decrease due to Once through Cooling fee accounting accrual adjustments
6	5	3	BS	Maintain DCPP Plant Assets	110,332	135,925	25,593	yes	23%	yes	yes	yes	Increase due to incremental 2nd Refueling outage costs and escalation.
7	5	3	BT	Nuclear Generation Fees	14,440	15,894	1,454	yes	10%	yes	yes	yes	Increase due to higher Nuclear Regulatory Commission Fees.
8	5	3	BU	Procure DCPP Materials & Svcs	(1,389)	66	1,455	yes	-105%	yes	yes	yes	Under cleared material burden
9	5	3	BV	Maintain DCPP Plant Configuration	36,016	39,321	3,305	yes	9%	yes	no	no	Increase due to incremental 2nd Refueling outage labor and contract support. Includes steam generator inspections.
10	5	3	CR	Mnge Waste Disp & Transp	-	-	0	no					
11	5	3	EO	Provide Nuclear Support	(1)	(27)	(26)	no	2600%	yes	yes	yes	Miscellaneous
12	5	3	IG	Manage Var Bal Acct Processes	13,029	8,303	(4,726)	yes	-36%	yes	yes	yes	Decrease due to lower Cyber Security and NRC Rulemaking SECY 15-0065 Ph 2 implementation costs
13	5	3	OM	Operational Management	6,809	7,539	731	no	11%	yes	yes	yes	Increase due to escalation and additional labor support reclassification
14	5	3	OS	Operational Support	15,669	16,115	447	no	3%	no	no	no	Increase due to incremental second refueling outage and escalation

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2019 Recorded	2020 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	AB	Misc Expense	(27,975)	14,673	42,648	yes	-152%	yes	yes	yes	Increase due to 2nd refueling outage levelization adjustment
2	5	3	AK	Manage Environmental Oper	1,865	1,996	131	no	7%	yes	no	yes	Miscellaneous
3	5	3	BP	Manage DCCP Business	11,358	13,247	1,889	yes	17%	yes	yes	yes	Increase cost for Risk and Compliance monitoring
4	5	3	BQ	DCCP Support Services	52,007	48,877	(3,130)	yes	-6%	yes	no	no	Decrease due to reversal of 2nd outage incremental costs and reduction of labor cost due to implementation of security affordability initiatives
5	5	3	BR	Operate DCCP Plant	83,476	78,523	(4,953)	yes	-6%	yes	no	no	Decrease is due to removal of incremental 2nd refueling outage costs and lower labor costs due to attrition.
6	5	3	BS	Maintain DCCP Plant Assets	135,925	109,165	(26,760)	yes	-20%	yes	yes	yes	Decrease due to reversal of incremental 2nd Refueling outage costs and lower project costs. This is offset by increased cost for unplanned outages and escalation.
7	5	3	BT	Nuclear Generation Fees	15,894	15,899	5	no	0%	no	no	no	
8	5	3	BU	Procure DCCP Materials & Svcs	66	(1,111)	(1,177)	yes	-1783%	yes	yes	yes	Over cleared material burden
9	5	3	BV	Maintain DCCP Plant Configuration	39,321	38,770	(551)	no	-1%	no	no	no	Decrease due to reversal of incremental 2nd Refueling outage labor and contracts. This is offset by higher labor to support unplanned outages and reactor vessel hot leg examinations
10	5	3	CR	Minge Waste Disp & Transp	-	-	0	no					
11	5	3	EO	Provide Nuclear Support	(27)	(23)	4	no	-15%	yes	yes	yes	Miscellaneous
12	5	3	IG	Manage Var Bal Acct Processes	8,303	2,900	(5,403)	yes	-65%	yes	yes	yes	Decrease due to lower Cyber Security and completion of 480v Switchgear Vent Gap Duct project
13	5	3	OM	Operational Management	7,539	8,084	545	no	7%	yes	no	yes	Escalation
14	5	3	OS	Operational Support	16,115	26,229	10,114	yes	63%	yes	yes	yes	Change in allocation methodology of operational support costs. Changed to provide a Nuclear only allocation prior to plant closure to align with lower capital work.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs

Major Project Summaries for Specific Expense Projects > \$1 Million

Project Title: Snubbers Repair and Maintenance Program

Major Work Categories: BS

Planning Orders: 5252302, 5252299, 5252303, 5252300, 5265252, 5265253, 5265254

Project Start Date: 4/1/2015

Project Completion Date: 6/30/2024

Operative Dates (only applies to Capital): N/A

Description

This is a yearly expense program to perform service life monitoring and snubber maintenance to improve snubber reliability and reduce the risk of snubber failures.

Justification

To improve snubber reliability and reduce the risk of snubber failures. Excessive test failures can result in scope expansion and impact online availability.

Cost

Major Project Spending Estimates

(Thousands of Nominal Dollars)

Total Expense	2020	2021	2022	2023	2024	2025	Total
Expenditures	\$610	\$833	\$1,782	\$868	\$878	\$-	\$4,971

Assumptions:

- No License Amendment Required
- No Design Required
- Graded Nuclear Safety Related Design & Procurement
- Refueling Outage required for installation
- Installation by contractor with station support at SAP standard hourly rates
- Expense work including standard overheads, burdens, and escalation

Alternatives Considered

Status Quo:

Failure to perform monitoring and snubber maintenance significantly increases risk of impacting refueling outage schedules.

Replacement of the Hydraulic Snubber Seals:

This is an aggressive strategy that would significantly impact cost and schedule to implement.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Labor Hours Detail by Planning Order and Resource
 GRC BASE Model - Type A Only

pce_title	mwc	item	item_active.title	resp_cc	2020	2021	2022	2023	2024	2025
Labor		AK	5010289 Environmental Operations	10565	175					
		AK Total			175					
		BP	5044274 Risk & Compliance	15857	26,560	22,664	22,785	22,661	22,982	12,837
			5051329 Fuel Procurement Base Expense (10540)	10540	14					
		BP Total			26,574	22,664	22,785	22,661	22,982	12,837
		BQ	5004737 SCV-10559-Security Services	10559	439,296	410,556	414,427	400,608	407,352	268,301
			5029631 SCV-14903-DCPP Security Sys & Compl	14903	36,388	28,426	22,954	22,934	23,381	15,575
			5029632 DCPP Security Training	14903	199					
			5034492 Site Access	10559	35,103	38,531	38,317	38,322	38,214	25,994
			5034493 SCV-14902-Access and Badging	14902	10,736	9,404	10,021	9,173	9,273	5,895
		BQ Total			521,721	486,918	485,719	471,037	478,221	315,766
		BR	5000983 SCV-10563-Radiation Protection	10563	158,218	157,816	187,110	142,952	140,528	69,208
			5001124 SCV-10565-Chemistry	10565	27,126	28,016	29,657	26,739	23,920	12,028
			5004729 SCV-10562-Operations	10562	375,362	373,799	382,852	354,545	358,390	179,735
			5029699 SCV-10564-Fire Protection	10564	39,906	42,439	46,444	43,037	43,504	27,825
			5040889 Operate & Maint Used Fuel Strg Facility	10559	9,835	12,250	12,182	12,183	12,149	8,264
			5032890 Director Operations Services Base Order	10562	12					
		BR Total			610,458	614,319	658,244	579,457	578,491	297,060
		BS	5001120 SCV-12725-12890-Maintenance Planning	12890	61,137	55,968	51,660	47,558	48,162	20,654
			5001123 SCV-10568-Project Services Base (10568)	10568	2,693	10,557	15,093	13,566	10,877	4,280
			5004730 SCV-10567-I&C Maintenance	10567	118,766	125,750	142,636	103,661	92,259	42,550
			5004731 SCV-10569-Electrical Maintenance	10569	93,963	92,623	110,609	72,824	62,543	25,986
			5004732 SCV-10922-Mechanical Maintenance	10922	147,744	146,092	156,847	103,896	95,006	37,762
			5004733 SCV-10923-Maintenance Support Teams	10923	145,981	105,729	149,284	141,351	131,138	74,351
			5029640 DCPP BHI Support Seconded Labor	13634	0					
			5224137 COM:Concrete Repairs Program	10568	567	715	707	670	460	
			5227994 U1:Repair Concrete CW Tunnels 11&12	10568		120				
			5234189 COM:Repair Discharge Structure Concrete	10568	80	780	720	60	60	
			5241200 U2:Restore FWH 2-4B & 2-4C Shell (FAC)	15500		1,885				
			5246157 OMD U1 Turbine Generator Maint Program	10922	3,624					
			5252300 U1:Repair/Swap Snubbers 1R23	10568		115	1,081			
			5252303 U2: Repair/Swap Snubbers 2R22	15500		1,005				
			5265252 U2: Repair/Swap Snubbers 2R23	15500			1,165			
			5265253 U1: Repair/Swap Snubbers 1R24	15500				1,230	480	
			5265254 U2: Repair/Swap Snubbers 2R24	15500				290	1,050	
			5252299 U1 Repair/Swap Snubbers 1R22	15500	860					
			5252302 U2: Repair/Swap Snubbers 2R21	15500	225					
			5260723 COM:Intake Reclassification LAR	15857	45					
			5261778 COM: Emergency Response 90 Minute LAR	15857	34					
			5271822 2Z22 Forced Outage	10923	30,274					
		BS Total			605,990	541,339	629,802	485,107	442,036	205,583
		BT	5004736 SCV-13564-Problem Prevention & Resolutio	13564	23,619	19,029	18,007	15,127	10,678	6,926
		BT Total			23,619	19,029	18,007	15,127	10,678	6,926
		BV	5000026 SCV-10543-Technical Support Engineering	10543	60,298	64,497	70,597	61,502	57,181	22,052
			5000028 SCV-10544-Mechanical Systems	10544	63,967	57,454	62,922	55,771	55,219	24,380
			5000029 SCV-10545-Design Engineering	10545	51,182	52,229	49,244	48,295	49,215	22,518
			5000030 SCV-10546-I&C Systems	10546	50,943	50,067	49,418	48,252	46,369	24,393
			5033303 SCV-15500-Facility Proj Base Exp	15500	15,433	16,799	24,916	13,605	12,127	4,810
			5034459 Field Drafting (10545)	10545	5,426	9,182	9,340	8,962	8,199	4,096
			5047390 DCPP- ISFIS Program Maintenance	10540	4,030	3,286	3,209	3,984	2,813	1,884
			5034559 SCV-15878 - Risk Management	15857	0					
		BV Total			251,278	253,514	269,646	240,371	231,123	104,133
Labor Total					2,039,814	1,937,784	2,084,204	1,813,759	1,763,530	942,306

Less 2nd Refueling Outage - for comparative purposes
 Normalized Hours

							(206,569)			
					2,039,814	1,937,784	1,877,635	1,813,759	1,763,530	942,306

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3, Nuclear Operations
 Nuclear Refueling Outage Cost
 (Thousands of Nominal Dollars)

Line Item	Item Description	2nd Outage										2nd Outage									
		Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast		
1	Labor	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022	2022	2022	2023	2023	2024	2024	2024		
2	Matl	2R17	1R18	1R19	2R19	1R20	2R20	1R21	1R22	2R22	1R23	2R23	1R24	2R24	1R25	2R25	1R26	2R26	1R27		
3	Contract	4,297	22,423	26,166	17,393	24,159	3,809	19,601	21,487	17,361	18,223	18,223	2,848	2,848	2,949	3,012	3,012	3,012	3,012		
4	Other	12,130	11,757	10,077	18,391	14,118	7,000	12,730	6,517	11,369	11,153	11,042	11,225	11,557	11,225	11,517	11,517	11,517	11,517		
5	Project	2,213	1,880	2,240	1,964	2,172	2,065	1,628	1,423	1,466	1,517	1,517	1,571	1,571	1,571	1,571	1,571	1,571	1,571		
6	Steam Generator Inspections	Included	Included	251	2,438	2,560	4,128	4,722	1,446	1,459	1,160	1,160	868	878	868	878	878	878	878		
7	Turbine/Generator Maintenance	0	0	4,450	0	0	0	0	3,026	0	0	0	0	0	0	0	0	0	0		
9	Reactor Inspections	1,979	3,019	3,957	7,501	10,463	4,136	1,168	2,107	9,328	12,993	3,500	3,560	3,760	3,560	3,760	3,760	3,760	3,760		
10	Total	\$45,451	\$45,166	\$52,333	\$55,810	\$60,584	\$46,101	\$42,059	\$39,869	\$44,982	\$48,233	\$38,401	\$38,401	\$31,426	\$31,426	\$32,334	\$32,334	\$32,334	\$32,334		

Estimate Assumptions

Labor- For calculation of direct labor use average labor hourly straight time and overtime rates times the planned incremental outage hours when available. Otherwise use historical cost basis.
 Material- For calculation of direct material costs use historical incremental refueling outage material as the basis
 Contracts- For calculation of outage contract estimate use the following when available ; purchase order estimates, contractor estimates or historical averages based on recently refueling outages.
 Other- For calculation of direct other costs use historical incremental other costs basis.
 Projects- For calculation use GRC projects forecast

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3, Nuclear Operations
 Nuclear Refueling Outage Cost
 (Thousands of 2020 Dollars)

Line Item	Item Description	Actual												2nd Outage			Forecast			2nd Outage			Forecast		
		2013	2014	2014	2014	2015	2016	2017	2018	2019	2019	2020	2021	2022	2022	2022	2022	2023	2023	2023	2023	2023	2024	2024	2024
1	Labor	30,038	26,618	25,532	19,318	25,901	26,709	20,581	24,135	21,487	17,104	17,590	17,590	17,590	17,590	17,590	10,656	10,656	10,656	10,656	10,656	10,770	10,770	10,770	
2	Matl	5,198	5,831	6,637	6,072	5,880	4,075	2,321	3,384	3,132	2,719	2,749	2,749	2,749	2,749	2,749	2,793	2,793	2,793	2,793	2,793	2,794	2,794	2,794	
3	Contract	14,673	13,957	9,689	11,786	20,427	15,136	7,490	6,349	6,517	11,201	10,765	10,765	10,765	10,765	10,658	10,630	10,630	10,630	10,630	10,721	10,721	10,721		
4	Other	17,067	18,935	17,552	0	31,900	28,617	20,161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	Project	2,677	2,232	2,536	2,620	2,181	2,209	1,709	1,086	1,423	1,444	1,464	1,464	1,464	1,464	1,464	822	822	822	822	822	1,407	1,407		
6	Steam Generator Inspections	0	0	Included	294	2,708	2,745	4,417	4,958	585	1,437	1,120	1,120	1,120	1,120	1,120	0	0	0	0	0	0	0	0	
7	Turbine/Generator Maintenance	2,394	3,584	2,804	4,628	8,331	11,217	4,425	1,226	9,328	12,801	3,378	3,378	3,378	3,378	3,486	3,371	3,371	3,371	3,371	3,488	3,488	3,488		
9	Reactor Inspections	0	1,395	0	0	3,142	2,264	0	0	0	813	0	0	0	0	0	0	0	0	0	0	0	0		
10	Total	\$54,980	\$53,616	\$52,257	\$61,206	\$61,987	\$64,951	\$49,326	\$44,162	\$44,982	\$47,520	\$37,067	\$37,067	\$37,067	\$37,067	\$37,067	\$29,759	\$29,759	\$29,759	\$29,759	\$29,994	\$29,994	\$29,994		
11	Outage Days (Breaker Open/Closed)	49	33	32	35	61	39	37	88	30	47	35	35	35	35	35	25	25	25	25	25	25	25		
12	Start	2/3/2013	2/9/2014	10/5/2014	10/5/2015	5/1/2016	4/23/2017	2/11/2018	2/10/2019	9/29/2019	10/4/2020	3/14/2021	3/27/2022	10/16/2022	10/16/2022	10/16/2022	10/1/2023	10/1/2023	10/1/2023	10/1/2023	10/1/2023	4/7/2024	4/7/2024	4/7/2024	
13	Plant	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 1	Unit 1	Unit 1	Unit 1	Unit 2	Unit 2		

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT 5, CHAPTER 3: NUCLEAR OPERATIONS
Refueling Outage Cost Detail

		2R22	1R23 / 2R23	1R24	2R24
pce_title	mwc	2021	2022	2023	2024
Labor	BP	\$175,681	\$363,729	\$113,115	\$115,469
	BQ	\$822,651	\$1,730,866	\$529,673	\$540,683
	BR	\$4,930,384	\$10,381,039	\$3,201,300	\$3,312,488
	BS	\$8,362,431	\$17,581,151	\$5,431,351	\$5,622,696
	BT	\$26,554	\$54,975	\$17,095	\$17,452
	BV	\$1,868,745	\$3,903,101	\$1,203,700	\$1,229,603
	OM	\$0	\$0	\$0	\$0
	OS	\$1,174,619	\$2,431,958	\$756,281	\$772,042
Labor Total		\$17,361,065	\$36,446,819	\$11,252,514	\$11,610,434
Material	BS	\$2,760,404	\$5,695,038	\$2,948,581	\$3,012,276
Material Total		\$2,760,404	\$5,695,038	\$2,948,581	\$3,012,276
Contract	BQ	\$89,495	\$183,465	\$94,209	\$96,376
	BS	\$22,317,278	\$25,285,766	\$12,984,042	\$13,311,264
	BT	\$105,210	\$215,681	\$110,752	\$113,299
	BV	\$2,494,467	\$3,250,732	\$1,405,718	\$1,600,313
Contract Total		\$25,006,450	\$28,935,644	\$14,594,721	\$15,121,252
Other	BP	\$180,937	\$370,920	\$190,467	\$194,848
Other Total		\$180,937	\$370,920	\$190,467	\$194,848
Grand Total		\$45,308,855	\$71,448,420	\$28,986,283	\$29,938,810

See Below	Projects - Outage - MWC BS	\$1,458,670	\$2,320,295	\$868,083	\$877,960
	Premium Pay - MWC Multiple	\$1,465,653	\$3,034,488	\$1,570,651	\$1,517,244
		\$48,233,178	\$76,803,204	\$31,425,018	\$32,334,014

Project - Outage Detail		2R22	1R23 / 2R23	1R24	2R24
item	item_active.title	2021	2022	2023	2024
5227994	U1:Repair Concrete CW Tunnels 11&'	\$11,654	\$538,631		
5241200	U2:Restore FWH 2-4B & 2-4C Shell (F	\$613,675			
5252300	U1:Repair/Swap Snubbers 1R23	\$11,167	\$922,138		
5252303	U2: Repair/Swap Snubbers 2R22	\$822,174			
5265252	U2: Repair/Swap Snubbers 2R23		\$859,527		
5265253	U1: Repair/Swap Snubbers 1R24			\$838,013	\$47,254
5265254	U2: Repair/Swap Snubbers 2R24			\$30,070	\$830,706
Grand Total		\$1,458,670	\$2,320,295	\$868,083	\$877,960

2021 Nuclear Generation OM-OS Study Allocation Tool

Number	Description	Type	2021 Forecast					Allocation percentage - using 2016-2018 Actuals					Adjusted Allocation percentage (Use DCPP Decommission Adjustment)					Adjusted 2021 Overhead Pool								
			Capital	Expense	Earnings	Non-Earnings	OBS	Total	Capital	Expense	Earnings	Non-Earnings	OBS	Total	Capital	Expense	Earnings	Non-Earnings	OBS	Total						
10541	DCPP VP Nuclear Services	D	1,630					8.5%	91.4%	0.0%	0.0%	0.0%	100%	2.5%	97.4%	0.0%	0.0%	0.0%	0.0%	0.1%	100.0%	41	1,588	0	1	1,630
10566	DCPP Director Maintenance Services	D	4,411					9.1%	90.8%	0.0%	0.0%	100.0%	100.0%	2.7%	97.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	119	4,292	0	0	4,411
12680	DCPP Station Director	D	1,186					6.7%	93.3%	0.0%	0.0%	100%	100%	2.0%	98.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	23	1,162	0	0	1,186
14886	Chief Nuclear Officer	D	941					7.4%	92.6%	0.0%	0.0%	100%	100%	2.2%	97.8%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	20	920	0	0	941
10558	DCPP Work Control / Scheduling	G	1,651					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	121	1,529	0	1	1,651
10560	DCPP General Services	G	4,340					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	317	4,020	1	1	4,340
12724	DCPP Outage Management	G	2,313					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	169	2,142	0	1	2,313
14141	DCPP Director Compliance Alliance & Risk	G	2,233					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	163	2,069	0	1	2,233
10533	DCPP Nuclear Quality Verification	G	3,023					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	221	2,801	1	1	3,023
10549	DCPP Regulatory Services	G	1,719					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	126	1,593	0	1	1,719
10606	DCPP Director Learning Services	G	8,938					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	654	8,280	2	3	8,938
10796	DCPP Emergency Planning	G	1,780					24.9%	75.1%	0.0%	0.0%	100%	100%	7.3%	92.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	130	1,649	0	1	1,780
14062	Diablo Canyon Business Finance	G	700					6.1%	93.9%	0.0%	0.0%	100%	100%	1.8%	98.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	13	687	0	-	700
Total			34,866																			2,116	32,733	5	11	34,866

DCPP Decommissioning Adjustment percentages (calculation based on reduction of capital labor support from 2016-2018 study period)		
Year	Capital	Expense
2021	29%	71%
2022	20%	80%
2023	17%	83%
2024	9%	91%
2025	2%	98%

2022 Nuclear Generation OM-OS Study Allocation Tool

PCC		2022 Forecast					Allocation percentage - using 2016-2018 Actuals					Adjusted Allocation percentage (Use DCPD Decommission Adjustment)					Adjusted 2022 Overhead Pool				
Number	Description	Type	Forecast	Capital	Expense	Non-Earnings	OBS	Total	Capital	Expense	Non-Earnings	OBS	Total	Capital	Expense	Non-Earnings	OBS	Total			
10541	DCPP VP Nuclear Services	D	1,709	8.5%	91.4%	0.0%	0.1%	100%	1.7%	98.2%	0.0%	0.1%	100.0%	29	1,678	0	1	1,709			
10566	DCPP Director/Maintenance Services	D	3,142	9.1%	90.8%	0.0%	0.0%	100.0%	1.8%	98.2%	0.0%	0.0%	100.0%	56	3,086	0	0	3,142			
12680	DCPP Station Director	D	1,243	6.7%	93.3%	0.0%	0.0%	100%	1.3%	98.7%	0.0%	0.0%	100.0%	16	1,227	0	0	1,243			
14886	Chief Nuclear Officer	D	987	7.4%	92.6%	0.0%	0.0%	100%	1.4%	98.5%	0.0%	0.0%	100.0%	14	972	0	0	987			
10558	DCPP Work Control / Scheduling	G	1,709	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	83	1,625	0	1	1,709			
10560	DCPP General Services	G	4,418	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	215	4,201	1	1	4,418			
12724	DCPP Outage Management	G	2,313	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	113	2,200	0	1	2,313			
14141	DCPP Director Compliance Alliance & Risk	G	2,161	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	105	2,055	0	1	2,161			
10533	DCPP Nuclear Quality Verification	G	2,914	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	142	2,771	1	1	2,914			
10549	DCPP Regulatory Services	G	1,716	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	84	1,631	0	1	1,716			
10606	DCPP Director Learning Services	G	9,097	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	443	8,650	2	3	9,097			
10796	DCPP Emergency Planning	G	2,019	24.9%	75.1%	0.0%	0.0%	100%	4.9%	95.1%	0.0%	0.0%	100.0%	98	1,920	0	1	2,019			
14052	Diablo Canyon Business Finance	G	700	6.1%	93.9%	0.0%	0.0%	100%	1.2%	98.8%	0.0%	0.0%	100.0%	8	692	0	-	700			
Total			34,129											1,406	32,707	5	11	34,129			

Year	Capital	Expense
2021	29%	71%
2022	20%	80%
2023	17%	83%
2024	9%	91%
2025	2%	98%

2023 Nuclear Generation OM-OS Study Allocation Tool

PCC		2023 Forecast		Allocation percentage - using 2016-2018 Actuals					Adjusted Allocation percentage (Use DCCP Decommission Adjustment)					Adjusted 2023 Overhead Pool				
Number	Description	Type		Capital	Expense	Earnings	OBS	Total	Capital	Expense	Earnings	OBS	Total	Capital	Expense	Earnings	OBS	Total
10541	DCCP VP Nuclear Services	D	1,731	8.5%	91.4%	0.0%	0.1%	100%	1.4%	98.5%	0.0%	0.1%	100.0%	25	1,705	0	1	1,731
10566	DCCP Director Maintenance Services	D	2,624	9.1%	90.8%	0.0%	0.0%	100.0%	1.5%	98.5%	0.0%	0.0%	100.0%	40	2,583	0	0	2,624
12680	DCCP Station Director	D	1,260	6.7%	93.3%	0.0%	0.0%	100%	1.1%	98.9%	0.0%	0.0%	100.0%	14	1,246	0	0	1,260
14886	Chief Nuclear Officer	D	1,000	7.4%	92.6%	0.0%	0.0%	100%	1.2%	98.7%	0.0%	0.0%	100.0%	12	987	0	0	1,000
10558	DCCP Work Control / Scheduling	G	1,763	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	73	1,689	0	1	1,763
10560	DCCP General Services	G	4,624	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	192	4,429	1	2	4,624
12724	DCCP Outage Management	G	2,437	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	101	2,335	0	1	2,437
14141	DCCP Director Compliance Alliance & Risk	G	2,190	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	91	2,098	0	1	2,190
10533	DCCP Nuclear Quality Verification	G	2,936	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	122	2,813	1	1	2,936
10549	DCCP Regulatory Services	G	1,410	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	59	1,351	0	0	1,410
10606	DCCP Director Learning Services	G	8,135	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	338	7,794	1	3	8,135
10796	DCCP Emergency Planning	G	1,981	24.9%	75.1%	0.0%	0.0%	100%	4.2%	95.8%	0.0%	0.0%	100.0%	82	1,898	0	1	1,981
14062	Diablo Canyon Business Finance	G	600	6.1%	93.9%	0.0%	0.0%	100%	1.0%	99.0%	0.0%	0.0%	100.0%	6	594	0	-	600
Total			32,692											1,155	31,521	5	11	32,692

DCCP Decommissioning Adjustment percentages (calculation based on reduction of capital labor support from 2016-2018 study period)

Year	Capital	Expense
2021	29%	71%
2022	20%	80%
2023	17%	83%
2024	9%	91%
2025	2%	98%

2024 Nuclear Generation OM-OS Study Allocation Tool

PCC		Allocation percentage - using 2016-2018 Actuals						2020 Overhead Pool						Adjusted Allocation percentage (Use DCPD Decommission Adjustment)						Adjusted 2024 Overhead Pool (Assumed all expense due to immaterial non-expense amounts)																	
Number	Description	2024 Forecast		Capital	Expense	Total	OBS	Non-Earnings	OBS	Capital	Expense	Total	OBS	Non-Earnings	OBS	Capital	Expense	Total	OBS	Non-Earnings	OBS	Capital	Expense	Total	OBS	Non-Earnings	OBS	Capital	Expense	Total							
		Type	Forecast																																		
1054 T	DCPP VP Nuclear Services	D	1,766	8.5%	91.4%	151	1,613	0.0%	0.1%	100%	100%	184	1,823	0.0%	0.0%	100%	100%	17	1,750	0.0%	0.1%	100%	100%	14	1,736	0.0%	0.0%	100%	100%	17	1,989	0.0%	0.0%	100%	0	2	1,766
10566	DCPP Director Maintenance Services	D	2,006	9.1%	90.8%	184	1,823	0.0%	0.0%	100%	100%	86	1,198	0.0%	0.0%	100%	100%	8	1,277	0.0%	0.0%	100%	100%	8	1,277	0.0%	0.0%	100%	100%	8	1,277	0.0%	0.0%	100%	0	0	2,006
12680	DCPP Station Director	D	1,285	6.7%	93.3%	86	1,198	0.0%	0.0%	100%	100%	75	944	0.0%	0.0%	100%	100%	7	1,012	0.0%	0.0%	100%	100%	7	1,012	0.0%	0.0%	100%	100%	7	1,012	0.0%	0.0%	100%	0	0	1,285
14886	Chief Nuclear Officer	D	1,020	7.4%	92.6%	433	1,304	0.0%	0.0%	100%	100%	433	1,304	0.0%	0.0%	100%	100%	40	1,696	0.0%	0.0%	100%	100%	40	1,696	0.0%	0.0%	100%	100%	40	1,696	0.0%	0.0%	100%	0	0	1,020
10558	DCPP Work Control / Scheduling	G	1,738	24.9%	75.1%	1,163	3,508	0.0%	0.0%	100%	100%	1,163	3,508	0.0%	0.0%	100%	100%	108	4,563	0.0%	0.0%	100%	100%	108	4,563	0.0%	0.0%	100%	100%	108	4,563	0.0%	0.0%	100%	1	2	1,738
10560	DCPP General Services	G	4,674	24.9%	75.1%	587	1,769	0.0%	0.0%	100%	100%	587	1,769	0.0%	0.0%	100%	100%	55	2,301	0.0%	0.0%	100%	100%	55	2,301	0.0%	0.0%	100%	100%	55	2,301	0.0%	0.0%	100%	1	2	4,674
12724	DCPP Outage Management	G	2,357	24.9%	75.1%	587	1,769	0.0%	0.0%	100%	100%	587	1,769	0.0%	0.0%	100%	100%	52	2,180	0.0%	0.0%	100%	100%	52	2,180	0.0%	0.0%	100%	100%	52	2,180	0.0%	0.0%	100%	0	1	2,357
1414 T	DCPP Director Compliance Alliance & Risk	G	2,233	24.9%	75.1%	708	2,134	0.0%	0.0%	100%	100%	708	2,134	0.0%	0.0%	100%	100%	66	2,776	0.0%	0.0%	100%	100%	66	2,776	0.0%	0.0%	100%	100%	66	2,776	0.0%	0.0%	100%	0	1	2,233
10533	DCPP Nuclear Quality Verification	G	2,843	24.9%	75.1%	708	2,134	0.0%	0.0%	100%	100%	708	2,134	0.0%	0.0%	100%	100%	18	769	0.0%	0.0%	100%	100%	18	769	0.0%	0.0%	100%	100%	18	769	0.0%	0.0%	100%	0	0	2,843
10549	DCPP Regulatory Services	G	788	24.9%	75.1%	196	591	0.0%	0.0%	100%	100%	196	591	0.0%	0.0%	100%	100%	137	5,787	0.0%	0.0%	100%	100%	137	5,787	0.0%	0.0%	100%	100%	137	5,787	0.0%	0.0%	100%	1	2	788
10606	DCPP Director Learning Services	G	5,928	24.9%	75.1%	1,476	4,449	0.0%	0.0%	100%	100%	1,476	4,449	0.0%	0.0%	100%	100%	39	1,630	0.0%	0.0%	100%	100%	39	1,630	0.0%	0.0%	100%	100%	39	1,630	0.0%	0.0%	100%	0	1	5,928
10796	DCPP Emergency Planning	G	1,669	24.9%	75.1%	416	1,253	0.0%	0.0%	100%	100%	416	1,253	0.0%	0.0%	100%	100%	3	597	0.0%	0.0%	100%	100%	3	597	0.0%	0.0%	100%	100%	3	597	0.0%	0.0%	100%	0	1	1,669
14062	Diablo Canyon Business Finance	G	600	6.1%	93.9%	37	563	0.0%	0.0%	100%	100%	37	563	0.0%	0.0%	100%	100%	0	0	0	0	0.0%	0.0%	100%	100%	0	0	0.0%	0.0%	100%	100%	0	0	0	600		
Total			28,906			6,066	22,826					6,066	22,826					565	28,327				565	28,327					4	10	28,906						

DCPP Decommissioning Adjustment percentages (calculation based on reduction of capital labor support from 2016-2018 study period)		
Year	Capital	Expense
2021	29%	71%
2022	20%	80%
2023	17%	83%
2024	9%	91%
2025	2%	98%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense by MWC by Cost Type - Recorded and Test Year
 (Thousands of Nominal Dollars)

mwc	2020				2020				2023				2023			
	Labor	Burden	Total Labor	Total	Labor	Burden	Total Labor	Total	Labor	Burden	Total Labor	Total	Contract	Material	Other	Total
AB	303	78	381	14,673	0	0	0	14,293	0	0	0	0	0	0	0	0
AK	18	5	23	1,996	935	0	935	1,038	0	0	0	839	0	0	1,266	2,105
BP	5,263	619	5,882	13,247	1,695	17	1,712	5,653	409	409	5,585	1,603	7	7	6,101	13,296
BQ	34,345	8,404	42,749	48,877	823	45	868	5,259	6,220	6,220	37,763	1,249	0	0	4,652	43,664
BR	50,181	13,085	63,266	78,523	8,603	2,147	10,750	4,506	10,223	10,223	61,233	9,476	1,897	1,897	5,137	77,743
BS	48,947	14,226	63,173	109,165	31,022	14,904	45,926	66	9,120	9,120	48,459	25,842	16,362	16,362	26	90,688
BT	1,850	441	2,292	15,899	1,803	0	1,803	11,804	232	232	1,406	1,425	0	0	13,011	15,841
BU	(1,111)	0	(1,111)	(1,111)	0	0	0	0	0	0	0	0	0	0	0	0
BV	20,471	5,338	25,809	38,770	9,634	308	10,342	3,018	4,154	4,154	25,797	7,883	0	0	1,339	35,018
EO	0	0	0	(23)	8	1	9	(32)	0	0	0	0	0	0	10	10
IG	1,059	263	1,322	2,900	1,362	44	1,406	171	233	233	1,325	1,026	204	53	53	2,608
OM	8,294	0	8,294	8,084	(0)	(1)	(1)	(209)	0	0	7,675	0	0	0	0	7,675
OS	28,826	0	28,826	26,229	(5)	(15)	(20)	(2,576)	0	0	26,154	0	0	0	(1,155)	24,999
Grand Total	198,447	42,460	240,907	357,230	55,881	17,451	73,332	42,991	30,590	30,590	215,397	49,343	18,470	30,438	313,648	

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3

(PG&E-5)

Nuclear Energy Institute Invoices 2015-2020

Nuclear Energy Institute

WIRE PAYMENT INFORMATION
ACH/WIRE
WELLS FARGO BANK
740 15th Street, N.W.
Washington, DC 20005
Routing # 121000248
Account # 2030000023990
Swift Code: WFBIUS6S

Invoice #: 00316- 15

Invoice Date : 11/19/14



Mr. John T. Conway
Senior Vice President, Energy Supply
Pacific Gas and Electric Company
77 Beale Street, B32
P.O. Box 63
San Francisco, CA 93424

Membership Dues: \$919,374.00

Foundation Contribution: _____

Amount Enclosed: _____

Detach and return top portion with your payment.

Invoice #	Terms	Purchase Order#	Invoice Date	Amount
00316-15	Net Due 01/31/15; otherwise interest will be charged at 7.5% per annum.	3500827467	11/19/14	
<p>2015 Annual Membership Dues</p> <p>Pursuant to section 6033(e) of the Internal Revenue Code of 1986, NEI has estimated that 4.25% of NEI's 2015 dues are attributable to lobbying expenses and, therefore, are not deductible as ordinary and necessary business expenses.</p> <p>Contributions or gifts to the Nuclear Energy Institute are not tax deductible as charitable contributions for federal income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses.</p>				\$919,374.00
<p>Voluntary Contribution to the Foundation for Nuclear Studies (FNS)</p> <p>Contributions to the Foundation for Nuclear Studies (FNS) are deductible as charitable contributions.</p> <p>If you do not wish to contribute to the FNS, simply deduct the FNS amount from the amount due.</p>				\$20,000.00
Amount Due				\$939,374.00

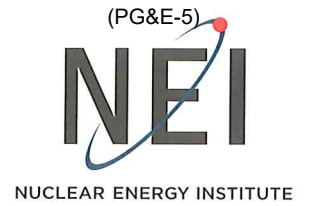
If mailing payment, note mailing address:

Nuclear Energy Institute
P.O. Box 759072
Baltimore, MD 21275-9072

WP 3-59

Nuclear Energy Institute, Inc.
Telephone (202) 739-8000
NEI T.I.N. 52-1209124

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020



**Pacific Gas and Electric Company
2015 NEI Dues Calculation Sheet**

Dues Calculation Method: 2015 dollar per megawatt charge is \$395.77 (2014 dollar per megawatt charge increased by 2%), as approved by the NEI Board of Directors. Individual utility dues are determined by multiplying the dollar per megawatt charge by the number of megawatts a utility is licensed to operate. The "megawatts licensed to operate" is based on nameplate rating (megawatts electric) reported by your company to the Energy Information Administration Form 860 for your nuclear unit.

Pacific Gas and Electric's dues were calculated as follows:

Units	Megawatts	2015 Dues
Diablo Canyon 1	1,159	\$458,697.43
Diablo Canyon 2	<u>1,164</u>	<u>\$460,676.28</u>
Total	2,323	\$919,373.71

2015 NEI Dues: \$919,374

Nameplate ratings were obtained from the Energy Information Administration's website on October 10, 2014. The website contains utility filings from Energy Information Administration's Form 860 for the latest date, July 2014.



WIRE PAYMENT INFORMATION
ACH/WIRE
WELLS FARGO BANK
740 15th Street, N.W.
Washington, DC 20005
Routing # 121000248
Account # 2030000023990
Swift Code: WFBIUS6S

Invoice #: 00316- 16

Invoice Date : 11/25/15

Mr. John T. Conway
Senior Vice President, Energy Supply
Pacific Gas and Electric Company
77 Beale Street, B32
P.O. Box 63
San Francisco, CA 93424

Membership Dues: \$937,772.00

Foundation Contribution: _____

Amount Enclosed: _____

Detach and return top portion with your payment.

Invoice #	Terms	Purchase Order#	Invoice Date	Amount
00316-16	Net Due 01/31/16; otherwise interest will be charged at 7.5% per annum.	3500827467	11/25/15	
<p>2016 Annual Membership Dues</p> <p>Pursuant to section 6033(e) of the Internal Revenue Code of 1986, NEI has estimated that 3.5% of NEI's 2016 dues are attributable to lobbying expenses and, therefore, are not deductible as ordinary and necessary business expenses.</p> <p>Contributions or gifts to the Nuclear Energy Institute are not tax deductible as charitable contributions for federal income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses.</p>				\$937,772.00
<p>Voluntary Contribution to the Foundation for Nuclear Studies (FNS)</p> <p>Contributions to the Foundation for Nuclear Studies (FNS) are deductible as charitable contributions.</p> <p>If you do not wish to contribute to the FNS, simply deduct the FNS amount from the amount due.</p>				\$20,000.00
Amount Due				\$957,772.00

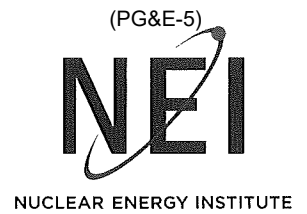
If mailing payment, note mailing address:

Nuclear Energy Institute
P.O. Box 759072
Baltimore, MD 21275-9072

WP 3-61

Nuclear Energy Institute, Inc.
Telephone (202) 739-8000
NEI T.I.N. 52-1209124

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020



**Pacific Gas and Electric Company
2016 NEI Dues Calculation Sheet**

Dues Calculation Method: 2016 dollar per megawatt charge is \$403.69 (2015 dollar per megawatt charge increased by 2%), as approved by the NEI Board of Directors. Individual utility dues are determined by multiplying the dollar per megawatt charge by the number of megawatts a utility is licensed to operate. The "megawatts licensed to operate" is based on nameplate rating (megawatts electric) reported by your company to the Energy Information Administration Form 860 for your nuclear unit.

Pacific Gas and Electric's dues were calculated as follows:

<u>Units</u>	<u>Megawatts</u>	<u>2016 Dues</u>
Diablo Canyon 1	1,159	\$467,876.71
Diablo Canyon 2	<u>1,164</u>	<u>\$469,895.16</u>
Total	2,323	\$937,771.87

2016 NEI Dues: \$937,772

Nameplate ratings were obtained from the Energy Information Administration's website on October 5, 2015. The website contains utility filings from Energy Information Administration's Form 860 for the latest date, July 2015.

Nuclear Energy Institute
Nuclear Energy Institute Invoices 2015-2020

Invoice #: 00316-17

Invoice Date: 11/18/16



NUCLEAR ENERGY INSTITUTE

WIRE PAYMENT INFORMATION
ACH/WIRE
WELLS FARGO BANK
740 15th Street, N.W.
Washington, DC 20005
Routing # 121000248
Account # 2030000023990
Swift Code: WFBUIUS6S

Mr. Anthony F. Earley, Jr.
Chairman, Chief Executive Officer and President
PG&E Corporation
77 Beale Street
32nd Floor (B32)
San Francisco, CA 94105

Membership Dues: \$970,596.00

Foundation Contribution: 20,000

Amount Enclosed: 990,596.

Detach and return top portion with your payment.

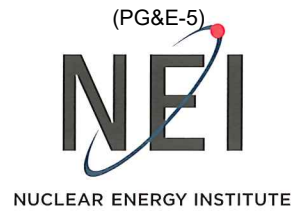
Invoice #	Terms	Purchase Order#	Invoice Date	Amount
00316-17	Net Due 01/31/17; otherwise interest will be charged at 7.5% per annum.	3500827467	11/18/16	
<p>2017 Annual Membership Dues</p> <p>Pursuant to section 6033(e) of the Internal Revenue Code of 1986, NEI has estimated that 3.25% of NEI's 2017 dues are attributable to lobbying expenses and, therefore, are not deductible as ordinary and necessary business expenses.</p> <p>Contributions or gifts to the Nuclear Energy Institute are not tax deductible as charitable contributions for federal income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses.</p> <p><i>VENDOR: 1041701</i> <i>GL: 5006060</i> <i>ORDER: 60082411 750% EA 485,298</i> <i>2038045</i></p>				\$970,596.00
<p>Voluntary Contribution to the Foundation for Nuclear Studies (FNS)</p> <p>Contributions to the Foundation for Nuclear Studies (FNS) are deductible as charitable contributions.</p> <p>If you do not wish to contribute to the FNS, simply deduct the FNS amount from the amount due.</p> <p><i>ORDER: 2038045</i></p>				\$20,000.00
Amount Due				\$990,596.00
0				

If mailing payment, note mailing address:

Nuclear Energy Institute
P.O. Box 759072
Baltimore, MD 21275-9072

Nuclear Energy Institute, Inc.
Telephone (202) 739-8000
NEI T.I.N. 52-1209124

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020



**Pacific Gas and Electric Company
2017 NEI Dues Calculation Sheet**

Dues Calculation Method: 2017 dollar per megawatt charge is \$417.82 (2016 dollar per megawatt charge increased by 2%), as approved by the NEI Board of Directors. Individual utility dues are determined by multiplying the dollar per megawatt charge by the number of megawatts a utility is licensed to operate. The "megawatts licensed to operate" is based on nameplate rating (megawatts electric) reported by your company to the Energy Information Administration Form 860 for your nuclear unit.

Pacific Gas and Electric's dues were calculated as follows:

<u>Units</u>	<u>Megawatts</u>	<u>2017 Dues</u>
Diablo Canyon 1	1,159	\$484,253.38
Diablo Canyon 2	<u>1,164</u>	<u>\$486,342.48</u>
Total	2,323	\$970,595.86

2017 NEI Dues: \$970,596

Nameplate ratings were obtained from the Energy Information Administration's website on October 13, 2016. The website contains utility filings from Energy Information Administration's Form 860 for the latest date, July 2016.



2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020

(PG&E-5)



NUCLEAR ENERGY INSTITUTE

MARIA G. KORSNICK

President and Chief Executive Officer Elect

1201 F Street, NW, Suite 1100
Washington, DC 20004
P: 202.739.8187
mgk@nei.org
nei.org

November 30, 2016

Mr. Anthony F. Earley, Jr.
Chairman, Chief Executive Officer and President
PG&E Corporation
77 Beale Street
32nd Floor (B32)
San Francisco, CA 94105

Dear Mr. Earley:

I want to first express my deep appreciation to you for your leadership in NEI as a member of the Board of Directors. Your involvement and commitment to our industry, and to NEI, has been invaluable to helping us achieve the industry's goals. I value your continued support to NEI and to working closely with you into the future.

As we prepare for 2017, I have enclosed the dues invoice for your company, which reflects the Board approved dues amount for 2017. A copy of the 2017 invoice has also been sent to Mr. Edward D. Halpin.

This invoice also includes a voluntary contribution request that benefits the Foundation for Nuclear Studies. As a 501(c) (3) nonprofit organization, the Foundation effectively promotes sound national policy through its programming, which includes a congressional briefing series on the Capitol Hill, educational site tours for congressional staff, and a series of roundtable discussions for thought leaders. Your contributions continue to help the Foundation achieve its goals, and we encourage your continued support in 2017.

This is a transformational year for our industry. We have a new President, Administration and a new Congress and we likely will see action on two or three U.S. NRC Commission vacancies. The economic, political and regulatory challenges facing us demand a unified industry voice more than ever.

Fortunately, we were working closely with the Trump team prior to the elections. These interactions fortified our relationships with key players on President-elect Trump's team. At NEI we have been assessing the impact of the election on our policy priorities and our strategies for achieving them. Our assessment has included discussions with NEI members, key players in the Congress and a number of our good contacts that we have on President-elect Trump's team. The next six to eighteen months will be dynamic and a bit uncertain as the new leadership and administration, the Congress and the states take positions and define priorities. We aim to stay nimble to take strategic advantage of this critical window.

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020

(PG&E-5)

Mr. Anthony F. Earley, Jr.
November 30, 2016
Page 2

In general, at this time, we don't see any significant changes to our policy priorities, but are beginning to see potential changes to some strategies and tactics for achieving these priorities. As these changes become clear, we will inform our membership of our direction. NEI's value to the industry will be more important than ever particularly during this period. Our ability to achieve the industry's policy priorities will require the full support of our industry. Your input on our strategies and tactics and on your direct engagement will be essential.

As you know, I am passionate about changing the trajectory for our industry. In the week following the election, I have met with two of our most significant supporters in the Congress, Senator Alexander and Representative Simpson, the chairmen of our most important Senate and House Appropriations Subcommittees. I have been doing a number of key media interviews and am reaching out to our industry leaders to ensure we are positioning our industry within this new political environment.

But to be successful, NEI needs you – our members. To achieve the results defined in NEI's 2017 Business Plan, which you approved in October and included as an attachment to this letter, your leadership and support is more important than ever given the challenges the industry faces. I look forward to working with you and your company to continue to establish a solid regulatory, policy and public environment to maximize the value of our industry's existing assets, strengthen our domestic infrastructure, and develop new nuclear energy facilities here and internationally.

My best wishes for a happy and healthy holiday season. As always, please don't hesitate to call me with your suggestions or advice.

Best regards,

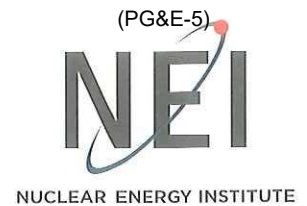


Maria G. Korsnick

Enclosures

c: Mr. Edward D. Halpin

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020



MARIA KORSNICK
President and Chief Executive Officer

1201 F Street, NW Suite 1100
Washington, DC 20004
P: 202.739.8187
mgk@nei.org
nei.org

November 20, 2017

Mr. Anthony F. Earley, Jr.
Executive Chair of the Board
PG&E Corporation
32nd Floor (B32)
77 Beale Street
San Francisco, CA 94105

Dear Mr. Earley:

First, please accept my deep appreciation for your leadership as a member of the NEI Board of Directors. Your involvement and commitment to our industry and to NEI have been invaluable in helping us achieve the industry's goals. I value your continued support for NEI and look forward to working closely with you into the future. Recognizing the economic strains on our industry, we are not increasing 2018 member dues.

As we prepare for 2018, I have enclosed the dues invoice for your company, which reflects the Board-approved dues amount for 2018. A copy of the invoice has also been sent to Mr. James M. Welsch.

This invoice also includes a voluntary contribution request for the Foundation for Nuclear Studies. A 501(c)(3) nonprofit organization, the Foundation organizes congressional briefings on Capitol Hill, educational site tours for congressional staff, and roundtable discussions for thought leaders. Your contributions help the Foundation achieve its goals, and we encourage your continued support in 2018.


This year, NEI has led the industry in developing the National Nuclear Energy Strategy (NNES). This strategy brings together critical stakeholders, both internal to our industry and externally from broad sectors, in creating the nuclear imperative. The four objectives of this strategy are:

- Preserve: appropriately value existing nuclear generation
- Sustain: create sustainability via an improved regulatory framework and reduced burden
- Innovate: innovate, commercialize and deploy new nuclear technologies
- Thrive: create the environment for our industry to compete globally

To be successful, NEI needs you – our members. Your leadership and support are more important than ever, given the challenges the industry faces. I look forward to working with you and your company in the year ahead.

As always, please don't hesitate to call me with your suggestions or advice.

Best regards,



Maria Korsnick

Enclosures

c: Mr. James M. Welsch

NUCLEAR. CLEAN AIR ENERGY



Nuclear Energy Institute

Nuclear Energy Institute Invoices

Invoice #: 00316- 18

WIRE PAYMENT INFORMATION

2015-2020

Invoice Date : 11/20/17

ACH/WIRE

WELLS FARGO BANK

740 15th Street, N.W.

Washington, DC 20005

Routing # 121000248

Account # 2030000023990

Swift Code: WFBIUS6S



Mr. Anthony F. Earley, Jr.
 Executive Chair of the Board
 PG&E Corporation
 32nd Floor (B32)
 77 Beale Street
 San Francisco, CA 94105

Membership Dues: \$970,596.00

Foundation Contribution: _____

Amount Enclosed: _____

Detach and return top portion with your payment.

Invoice #	Terms	Purchase Order#	Invoice Date	Amount
00316- 18	Net Due 01/31/18; otherwise interest will be charged at 7.5% per annum.	3100961775	11/20/17	
<p>2018 Annual Membership Dues</p> <p>Pursuant to section 6033(e) of the Internal Revenue Code of 1986, NEI has estimated that 2.5% of NEI's 2018 dues are attributable to lobbying expenses and, therefore, are not deductible as ordinary and necessary business expenses.</p> <p>Contributions or gifts to the Nuclear Energy Institute are not tax deductible as charitable contributions for federal income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses.</p>				\$970,596.00
<p>Voluntary Contribution to the Foundation for Nuclear Studies (FNS)</p> <p>Contributions to the Foundation for Nuclear Studies (FNS) are deductible as charitable contributions.</p> <p>The FNS amount shown here is a suggested amount. You may also elect to pay more or less than the amount shown. If you do not wish to contribute to the FNS, simply deduct the FNS amount from the amount due.</p>				\$20,000.00
Amount Due				\$990,596.00

If mailing payment, note mailing address:

Nuclear Energy Institute
 P.O. Box 759072
 Baltimore, MD 21275-9072

Nuclear Energy Institute, Inc.
 Telephone (202) 739-8000
 NEI T.I.N. 52-1209124

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020

(PG&E-5)



**Pacific Gas and Electric Company
2018 NEI Dues Calculation Sheet**

Dues Calculation Method: 2018 dollar per megawatt charge is \$417.82 (2017 dollar per megawatt charge increased by 0%), as approved by the NEI Board of Directors. Individual utility dues are determined by multiplying the dollar per megawatt charge by the number of megawatts a utility is licensed to operate. The "megawatts licensed to operate" is based on nameplate rating (megawatts electric) reported by your company to the Energy Information Administration Form 860 for your nuclear unit.

Pacific Gas and Electric's dues were calculated as follows:

Units	Megawatts	2018 Dues
Diablo Canyon 1	1,159	\$484,253.38
Diablo Canyon 2	<u>1,164</u>	<u>\$486,342.48</u>
Total	2,323	\$970,595.86

2018 NEI Dues: \$970,596

Nameplate ratings were obtained from the Energy Information Administration's website on September 5, 2017. The website contains utility filings from Energy Information Administration's Form 860 for the latest date, July 2017.



2019 NEI Membership Dues Invoice

Mr. Steven Malnight
Senior Vice President
Pacific Gas and Electric Company
77 Beale Street
B32
San Francisco, CA 94105

Invoice #: 00316-19
Invoice Date: 11/20/18

2019 Annual Membership Dues	\$987,600.00
2019 Special Membership Dues Assessment	\$43,670.00
<p>Pursuant to section 6033(e) of the Internal Revenue Code of 1986, NEI has estimated that 2.5% of NEI's 2019 dues are attributable to lobbying expenses and, therefore, are not deductible as ordinary and necessary business expenses.</p> <p>Contributions or gifts to the Nuclear Energy Institute are not tax deductible as charitable contributions for federal income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses.</p> <p>Dues are set annually by the Board of Directors on a calendar year basis and are payable in full by <u>January 15</u>. Payment of the amounts described in this invoice is non-refundable. To facilitate budget planning, NEI requires at least six-months' written notice of a member's intent to withdraw for the following membership year, which begins <u>January 1</u>.</p>	
Voluntary Contribution to the Foundation for Nuclear Studies (FNS)	\$20,000.00
<p>Contributions to the Foundation for Nuclear Studies (FNS) are deductible as charitable contributions.</p> <p>The FNS amount shown here is a suggested amount. You may also elect to pay more or less than the amount shown. If you do not wish to contribute to the FNS, simply deduct the FNS amount from the amount due.</p>	
<u>Amount Due On or Before January 15, 2019</u>	\$1,051,270.00
Purchase Order: 3500827467	

Payment Instructions:

WIRE PAYMENT INFORMATION:

ACH/WIRE
WELLS FARGO BANK
740 15th Street, N.W.
Washington, DC 20005
Routing # 121000248
Account # 2030000023990
Swift Code: WFBIUS6S

LOCKBOX MAILING ADDRESS FOR CHECKS:

Nuclear Energy Institute
P.O. Box 759072
Baltimore, MD 21275-9072

Nuclear Energy Institute, Inc.
Telephone (202) 739-8000
NEI T.I.N. 52-1209124

2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Energy Institute Invoices 2015-2020

(PG&E-5)



**Pacific Gas and Electric Company
2019 NEI Dues Calculation Sheet**

Dues Calculation Method: 2019 dollar per megawatt charge is \$425.14 (2018 dollar per megawatt charge increased by 1.75%), as approved by the NEI Board of Directors. Individual utility dues are determined by multiplying the dollar per megawatt charge by the number of megawatts a utility is licensed to operate. The "megawatts licensed to operate" is based on nameplate rating (megawatts electric) reported by your company to the Energy Information Administration Form 860 for your nuclear unit.

Pacific Gas and Electric's dues were calculated as follows:

Units	Megawatts	2019 Dues
Diablo Canyon 1	1,159	\$492,737.26
Diablo Canyon 2	<u>1,164</u>	<u>\$494,862.96</u>
Total	2,323	\$987,600.22

2019 NEI Dues: \$987,600

Nameplate ratings were obtained from the Energy Information Administration's website on October 2, 2018. The website contains utility filings from Energy Information Administration's Form 860 for the latest date, September 2018.



2020 NEI Membership Dues Invoice

Mr. William D. Johnson
President and Chief Executive Officer
Pacific Gas and Electric Company
77 Beale Street
MC B32
San Francisco, CA 94105

Invoice #: 00316-20
Invoice Date: 11/26/19

2020 Annual Membership Dues	\$1,016,731.00
<p>Pursuant to section 6033(e) of the Internal Revenue Code of 1986, NEI has estimated that 1.5% of NEI's 2020 dues are attributable to lobbying expenses and, therefore, are not deductible as ordinary and necessary business expenses.</p> <p>Contributions or gifts to the Nuclear Energy Institute are not tax deductible as charitable contributions for federal income tax purposes. However, they may be tax deductible as ordinary and necessary business expenses.</p> <p>Dues are set annually by the Board of Directors on a calendar year basis and are payable in full by <u>January 15</u>. Payment of the amounts described in this invoice is non-refundable. To facilitate budget planning, NEI requires at least six-months' written notice of a member's intent to withdraw for the following membership year, which begins <u>January 1</u>.</p>	
Voluntary Contribution to the Foundation for Nuclear Studies (FNS)	\$20,000.00
<p>Contributions to the Foundation for Nuclear Studies (FNS) are deductible as charitable contributions.</p> <p>The FNS amount shown here is a suggested amount. You may also elect to pay more or less than the amount shown. If you do not wish to contribute to the FNS, simply deduct the FNS amount from the amount due.</p>	
Purchase Order # 3500827467	
<u>Amount Due On or Before January 15, 2020</u>	\$1,036,731.00

Payment Instructions:

WIRE PAYMENT INFORMATION:

ACH/WIRE
WELLS FARGO BANK
740 15th Street, N.W.
Washington, DC 20005
Routing # 121000248
Account # 2030000023990
Swift Code: WFBUS6S

LOCKBOX MAILING ADDRESS FOR CHECKS:

Nuclear Energy Institute
P.O. Box 759072
Baltimore, MD 21275-9072

Nuclear Energy Institute, Inc.
Telephone (202) 739-8000
NEI T.I.N. 52-1209124

Confidential, Member Only Information - Do Not Distribute

Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Capital Expenditures by Major Work Category
 (Thousands of Nominal Dollars)

No.	MWC	MWC Description	Capital Expenditures													
			2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference		
1			1,696	350	156	18	-	-	-	-	-	-	-	-	-	-
2	3	Office Furniture & Equipment	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	4	Fleet / Auto Equip	1,969	4,048	3,052	2,059	422	681	739	748	-	-	-	-	-	-
4	5	Tools & Equipment	178,746	158,071	40,227	105,728	43,283	21,319	12,261	10,252	6,000	1,000	-	-	-	-
5	20	DCPP Capital	37,470	28,059	7,884	690	5,945	-	-	-	-	-	-	-	-	-
6	31	Nuclear Safety and Security	219,683	190,527	51,379	108,495	49,649	22,000	13,000	11,000	6,000	1,000	-	-	-	-
		Grand Total														

Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Forecast Capital Expenditures Summary
(Thousands of Nominal Dollars)

Line No.	Description	Capital Expenditures						Reference
		2020 CWIP	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	
1	Projects > \$3 Million*	50,020	12,914	4,167	5,250	4,954	998	- WP 3-76 - WP 3-87
2	Other Work	7,927	9,086	8,833	5,750	1,046	2	-
3	Total	57,947	22,000	13,000	11,000	6,000	1,000	-

4 * Planning orders where Construction Work in Progress (CWIP) Balance as of December 31, 2020 plus six years (2021-2026) of forecast.

Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Recorded CWIP and Forecast Capital Expenditures Details - Projects Over \$3 Million*
(Thousands of Nominal Dollars)

Line No.	Planning Order	Description	MWC	Operative Date	CWIP Recorded Adjusted	Capital Expenditures						Subtotal	Reference	
						2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast			
MWC - 20														
1	5542319	DCPP Aging Management Program	20		-	-	-	4,171	4,954	-	998	-	10,123	WP 3-77
2	5744598	COM: Replace Oily Water Separator System	20	Jan-2021	12,039	-	-	-	-	-	-	-	12,039	WP 3-78
3	5746339	U2: Upgrade Polisher Computer Workstation	20	May-2021	3,664	1,012	-	-	-	-	-	-	4,676	WP 3-79
4	5748282	U2: Repl AFW Chem Injection Pumps	20	May-2021	3,497	1,227	-	-	-	-	-	-	4,724	WP 3-80
5	5766778	COM: Wedge Barrier System - Gate 20	20	Aug-2023	1,776	144	1,079	-	-	-	-	-	3,132	WP 3-82
6	5772846	COM: Repl PAC 0-1 thru 0-7	20	Feb-2021	6,332	403	-	-	-	-	-	-	6,736	WP 3-83
7	5774969	U2: Repl Aux Transfrm 2-1 Radiators	20	Jun-2021	1,776	1,581	-	-	-	-	-	-	3,357	WP 3-85
8	5775279	COM: Repl PA Microwave Transceiver	20	Dec-2022	259	51	4,023	-	-	-	-	-	4,333	WP 3-86
9	5780939	COM: Upgrd Integrd Video Mgmt System	20	Mar-2021	16,047	1,411	-	-	-	-	-	-	17,459	WP 3-87
10	5786060	U2: Replace RCP Seals (2R22)	20	May-2021	1,615	7,095	-	-	-	-	-	-	8,710	WP 3-88
11	5786378	COM: MW Links 12A & 13A Modification	20	May-2021	3,016	-	-	-	-	-	-	-	3,016	WP 3-90
12	Total				50,020	12,914	4,167	5,250	4,954	998	-	-	78,303	
13		Grand Total			50,020	12,914	4,167	5,250	4,954	998	-	-	78,303	

* Planning orders where Construction Work in Progress (CWIP) Balance as of December 31, 2020 plus six years (2021-2026) of forecast.

Pacific Gas and Electric Company
2023 GRC

Exhibit (PG&E-5), Chapter 3
Nuclear Operations

Recorded and Forecast Capital Expenditures Details - Other Work*
(Thousands of Nominal Dollars)

Line No.	MWC	MWC Description	Capital Expenditures																					
			2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026	
			Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted
1	3	Office Furniture & Equipment	1,696	350	156	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	4	Fleet / Auto Equip	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	5	Tools & Equipment	1,969	4,048	3,052	2,059	422	681	739	748	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	20	DCPP Capital	177,466	154,771	24,200	90,768	27,438	8,405	8,093	5,002	1,046	-	-	-	-	-	-	-	-	-	-	-	-	-
5	31	Nuclear Safety and Security	37,470	28,059	7,884	690	5,945	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6		Grand Total	218,603	187,228	35,292	93,535	33,805	9,086	8,833	5,750	1,046	1,046	2	2	2	2	2	2	2	2	2	2	2	2

* Excludes projects greater than \$3M

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: DCPP Aging Management Program

Major Work Categories: 20

Planning Orders: 5542319

Project Start Date: 1/1/2023

Project Completion Date: 4/1/2025

Operative Dates (only applies to Capital): N/A

Description

The Aging/Obsolescence/Emergent Capital work category has been established to cover the increasing likelihood of the necessity to replace plant equipment and components due to their degraded condition or failure in the latter years of plant life, caused by the preceding dramatic decline in the portfolio of projects that were implemented to avoid such risk.

Justification

As the station's Capital investment and portfolio of projects declines the likelihood of equipment and component failures this work was intended to avoid becomes virtually inevitable. Since the exact scope of this emergent Capital work cannot be identified or precisely scaled, it is prudent to create and fund a contingency account for this type of work, that is by GAAP and Utility standards Capital in nature.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$-	\$-	\$-	\$4,171	\$4,954	\$998	\$10,123

Assumptions:

-Decisions to perform such emergent work will be based on the Station's Operational Decision-Making model, involving Station leadership, and considering factors such as the nuclear and industrial safety risks of not performing the work, and the necessity to replace versus alternate possibilities.

-Examples of the types of equipment and components anticipated by this account include, but is not limited to, replacement of Fans and Blowers, Pumps, Large Motors, A/C units and Chillers, Doors (including Security, Fire and Roll-up types), Plant Installed Instruments (radiation monitors, temperature and pressure detectors, and transmitters) and Security Infrastructure Components such as Cameras and Microwave Links.

-The requested funding for each year includes procurement and installation activities and labor but assumes minimal engineering involvement.

Alternatives Considered

None

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Replace Oily Water Separator System
Major Work Categories: 20
Planning Orders: 5744598
Project Start Date: 6/1/2014
Project Completion Date: 1/31/2021
Operative Dates (only applies to Capital): 1/31/2021

Description

Replace the Oily Water Separator System with a new skid mounted system to in the Reverse Osmosis Room. This would include an above ground sludge holding tank.

Justification

The Oily Water Separator Tank is corroded to the point where it cannot be repaired. Other equipment associated with the Oily Water Separator, the Hold Up Tank and some system piping is corroded to the point where it should be replaced. Failure of the Oily Water Separator System can cause environmental concerns with discharge of turbine building waste.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$12,039	\$-	\$-	\$-	\$-	\$-	\$12,039

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Graded Nuclear Safety Related Design & Procurement
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Replace the Oily Water Separator, piping and hold up tanks with new corrosion resistant components on a piece by piece basis. This would incur significant downtime where turbine building waste could not be discharged. Replacing the Oily Water Separator tanks inside the existing Oily Water Separator room would be very difficult, requiring that the tanks be pieced together in place or that the walls be demolished.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Upgrade Condensate Polisher Computer Workstation
Major Work Categories: 20
Planning Orders: 5746339
Project Start Date: 10/1/2013
Project Completion Date: 5/30/2021
Operative Dates (only applies to Capital): 5/30/2021

Description

Replace current Condensate Polisher Computer System with a modern architecture that is based on Commercial Off the Shelf (COTS) hardware and software that uses standard protocols for interfacing between many plant systems.

Justification

The Condensate Polishing System is essential to the maintenance of Steam Generator health. Each unit has an obsolete Condensate Polisher Computer System and a data acquisition and control system that were installed in 1992. Microsoft Corporation no longer supports Windows NT 4.0 operating system. National Instruments Lookout (NIL) Human Machine Interface (HMI) software is several versions old and is no longer supported. Rockwell Automation (Allen Bradley) is migrating customers from PLC-5/40 to new technology. Additionally, the current operating system is unable to comply to NRC cyber security requirements.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$3,664	\$1,012	\$-	\$-	\$-	\$-	\$4,676

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Refueling Outage required for installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Status quo:

This is not considered a viable option as maintaining the health of the steam generators is essential to safe and reliable plant operation.

The marketplace search for replacement parts has been unsuccessful nor would it provide a permanent solution.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Upgrade Auxiliary Feedwater Chemical Injection Pumps
Major Work Categories: 20
Planning Orders: 5748282
Project Start Date: 11/1/2015
Project Completion Date: 5/31/2021
Operative Dates (only applies to Capital): 5/31/2021

Description

Replace Auxiliary Feedwater (AFW) chemical injection pumps and install a new chemical injection skid mounting system for a more reliable model.

Justification

The existing AFW chemical injection pumps have shown to be unreliable when AFW chemical injection is first initiated during both forced and scheduled outages.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$3,497	\$1,227	\$-	\$-	\$-	\$-	\$4,724

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Graded Nuclear Safety Related Design & Procurement
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Replace the pumps only:

Improves the reliability of the pumps and SG chemistry but does not incorporate a solution to all the other design issues. The alternative would most likely require piping change to the suction and discharge piping.

Perform small design changes to add a flowmeter, recirculation line, vent valve, etc.:

This does not help with the pump issues but would add some design features to aid in maintaining the pumps.

Replace only hydrazine pumps (2) per unit and (1) swing pump:

Installation of a new swing pump could be used for ammonia injection. Ammonia pumps are outdated, and parts are difficult to obtain. May run the risk of replacing these pumps due to obsolescence.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Tie into the existing Feedwater chemical injection pumps currently in use in the Polisher Butress and Turbine building to the AFW injection points in the RCA: Hydrazine pumps in the turbine building supplying main feedwater are always in use and pose less risk of gas binding during outages. Leaks in the tubing run could go undetected for longer periods of time. A FSAR would need to be changed to implement this alternative. Ammonia pumps may need to be replaced due to obsolescence.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Upgrade Wedge Barrier System at Gate 20

Major Work Categories: 20

Planning Orders: 5766778

Project Start Date: 8/4/2016

Project Completion Date: 8/30/2023

Operative Dates (only applies to Capital): 8/30/2023

Description

Replace existing vehicle barriers at Gate 20 with more reliable equipment that requires less maintenance and is less prone to failures.

Justification

A reliable Vehicle Barrier System (VBS) is essential for Protected Area entry and exit to ensure the safety of the Plant, the Public, and Plant Personnel (Security Threat, Medical, Fire Protection, etc.). Gate 20 is unreliable and has periodic issues due to the corrosive outdoor marine environment and other design issues.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$1,776	\$133	\$144	\$1,079	\$-	\$-	\$3,132

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Graded Nuclear Safety Related Design & Procurement
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Status Quo:

Continued expensive burden to plant resources to maintain and perform corrective actions on the wedge barriers with potential NRC Force on Force inspection impacts and delays to timely egress/ingress of Emergency Responders.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Replace Plant Air Compressors 0-1 through 0-7

Major Work Categories: 20

Planning Orders: 5772846

Project Start Date: 2/1/2017

Project Completion Date: 2/15/2021

Operative Dates (only applies to Capital): 2/15/2021

Description

Replace existing compressors with new oil free rotary screw compressors of same capacity; rated for 125 psig with digital controls, intercooler and aftercooler electronic drains, and control cubicle ventilation fan/ filter.

Justification

The existing compressors are degraded, and unavailability of these compressors would create emergent work and vendor mobilization to repair the degraded parts. The new oil free rotary screw compressors are positive displacement compressors that use meshing helical screws to compress the air and provide 100% oil free compressed air. The new compressors provide a flow of compressed air with less pressure fluctuation when compared to reciprocating compressors. These compressors are efficient and reliable solution to meet the system design requirements.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$6,332	\$403	\$-	\$-	\$-	\$-	\$6,736

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Graded Nuclear Safety Related Design & Procurement
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Oil Free Reciprocating Compressors:

Oil free reciprocating compressors are positive displacement compressors that use a piston or pistons to produce high, 100% oil free compressed air. Reciprocating compressors generally require more routine maintenance, have a higher initial cost, and have a higher operational cost than rotary screw compressors. Oil free reciprocating compressors are more prevalently used in higher pressure applications (1000+ psig) and are essentially obsolete for lower pressure applications.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Oil Free Centrifugal Compressor:

Oil free centrifugal compressors use high speed impeller(s) to add pressure and velocity to the inlet air. The pressure of the compressed air is further increased as the velocity of the compressed air is decreased. Oil free centrifugal compressors provide 100% oil free compressed air, are best suited for full capacity, steady operation and are normally used for high airflow requirements. Due to the unsteady and relatively low air flow requirements of PAC 0-7, this is not a viable option.

Oil Injected Rotary Screw Compressors:

Oil injected rotary screw compressors are positive displacement compressors that use meshing helical screws to compress the air and provide compressed air with oil content less than 3 ppm. These compressors provide a flow of compressed air with less pressure fluctuation when compared to reciprocating compressors but cannot meet the instrument air subsystem cleanliness standards for oil of less than 1 ppm. Therefore, this option is not viable.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Replace Auxiliary Transformer 2-1 Radiators
Major Work Categories: 20
Planning Orders: 5774969
Project Start Date: 8/1/2017
Project Completion Date: 6/5/2021
Operative Dates (only applies to Capital): 6/5/2021

Description

Replace existing Auxiliary Transformer 2-1 Radiators to resolve the transformer oil leakage issues.

Justification

The Auxiliary Transformer 2-1 radiators have deteriorated due to corrosion caused by their outdoor location and the severe marine environment. Significant corrosion has formed on the inner radiator tubes where repairs are difficult due to the geometry of the radiator tubes. Furthermore, the radiator flanges are subject to leakage.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$1,776	\$1,581	\$-	\$-	\$-	\$-	\$3,357

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Refueling Outage required for installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Status Quo:

Continue with radiator leak repairs as leaks develop. This will increase O&M costs during the time in which repairs are still possible, and since the radiators are not projected to remain functional through the end of plant life, only postpone the ultimate replacement.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Replace Protected Area Microwave Transceiver
Major Work Categories: 20
Planning Orders: 5775279
Project Start Date: 6/1/2017
Project Completion Date: 12/15/2022
Operative Dates (only applies to Capital): 12/15/2022

Description

Replace all Main PA Microwave Transmitter/Receiver/Transceiver heads (except for existing high reliability heads with hydrophobic radomes) and corroded supporting hardware/posts, cabinets, cabinet tamper switches, and associated power supply PS40.

Justification

The existing Main PA Microwave Transmitter/Receiver/Transceiver heads are essential to the plant security system, are an on-going maintenance burden, and are at the end of their useful life span of 10-15 years per the manufacturer.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$259	\$51	\$4,023	\$-	\$-	\$-	\$4,333

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Graded Nuclear Safety Related Design & Procurement
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Status Quo:

Continue high-reliability head replacement as heads fail, however existing corroded posts and hardware cannot be repaired and must be replaced, making replace after failure much less efficient than a project approach.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Upgrade Integrated Video Management System

Major Work Categories: 20

Planning Orders: 5780939

Project Start Date: 8/1/2018

Project Completion Date: 3/31/2021

Operative Dates (only applies to Capital): 3/31/2021

Description

Replace existing protected area camera system with a more reliable video capture system that has proven industry success.

Justification

The existing installed protected area camera system (Pivotal Vision video system) failed a software upgrade Site Acceptance Test (SAT). This failure prompted the DCPD SLT decision to replace the Pivotal Vision video system in August 2015. The current video management system is operable only because of the implemented bridging strategy that is installed and the existing service contract that is in place.

Cost

Major Project Spending Estimates

(Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$16,047	\$1,411	\$-	\$-	\$-	\$-	\$17,459

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Graded Nuclear Safety Related Design & Procurement
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Status Quo:

Continue to work with vendor to repair and resolve the testing issues until the SAT is successfully completed. Continues the perpetual cycle of issue resolution for an unknown duration and cost.

Continue to work with vendor to resolve only the regulatory issues:

This alternative is not viable due to the uncertainty of regulatory issue resolution duration and cost. Other performance issues are not resolved until a replacement system is installed.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Replace Reactor Coolant Pump Seal Sets
Major Work Categories: 20
Planning Orders: 5786060
Project Start Date: 2/1/2019
Project Completion Date: 5/31/2021
Operative Dates (only applies to Capital): 5/31/2021

Description

This project funds the replacement of RCP seal sets in each of the four Unit 2 RCPs to ensure continued reliability through the end of plant life.

Justification

Failure of an RCP seal can cause an unplanned reactor shutdown and extended unplanned unit outage, as well as cause other collateral plant challenges and consequences. RCP seal manufacturer advises a 5 year inspect/replacement interval which is supported by operating experience. DCPD has experienced multiple reoccurrences of Reactor Coolant Decay Tanks (RCDT) backflow that have damaged RCP seal packages. Each time this has occurred, it has resulted in elevated RCS leak rates which encroach on Technical Specification limits. A seal package replacement assures the lowest risk of unplanned seal failure.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$1,615	\$7,095	\$-	\$-	\$-	\$-	\$8,710

Assumptions:

- No License Amendment Required
- No Design Required
- Nuclear Safety Related Design & Procurement
- Refueling Outage required for installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Status Quo:

This alternative would require seal spare parts availability and will result in the highest risk to equipment reliability that may result in multiple and extended forced outages for the remainder of the plant's life.

Increasing frequency of preventive maintenance:

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

This will increase O&M costs while only marginally decreasing the risk of seal failures. The consequence is an increased likelihood of forced outages due to unplanned seal replacements.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Major Project Summaries for Capital Projects > \$3 million

(PG&E-5)

Project Title: Microwave Links 12A and 13A Modification

Major Work Categories: 20

Planning Orders: 5786378

Project Start Date: 7/11/2019

Project Completion Date: 5/31/2021

Operative Dates (only applies to Capital): 5/31/2021

Description

Provide an Intrusion Detection System design and installation in the 12A and 13A zones that will increase the nuisance and false alarm setpoint margin and eliminate failed test points for the Microwave-12A and Microwave-13A zones.

Justification

A modification to the regulatory credited protected area (PA) Intrusion Detection System in the area of microwave zones 12A and 13A is required to add margin to address the excessive alarm rate that resulted in a 24/7 compensatory measure.

Cost

Major Project Spending Estimates
 (Thousands of Nominal Dollars)

Total Capital	CWIP	2021	2022	2023	2024	2025	Total
Expenditures	\$3,016	\$-	\$-	\$-	\$-	\$-	\$3,016

Assumptions:

- No License Amendment Required
- Design by station personnel or engineering contractor at SAP standard hourly rate
- Non-Outage (on-line) installation
- Installation by contractor with station support at SAP standard hourly rates
- Capital work including standard overheads, burdens, AFUDC, and escalation

Alternatives Considered

Troubleshooting of Microwave-12A/13A has confirmed that normal system maintenance will not be able to correct the nuisance alarms in the zone and would continue to require costly long-term compensatory measures committed to the equipment.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Cost
 Capital Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC 20

Ln. No.	Year	ID	Program/Activity	Amount	Detailed Description/Assumptions
1	2020		Recorded Adjusted	43,283	
2		5786059	U1: RCP Seals Replacement (1R22)	(5,548)	Project complete in 2020
3		5758540	COM:Devit ASW & Impl Reclass of Intk PA	(2,730)	Scope Changes in multi-year project
4		5786378	COM: MW Links 12A & 13A Modification	(2,983)	Project complete in 2020
5		5744598	COM:Replace Oily Water Separator System	(3,006)	Project scope primarily in 2020
6		5733690	U2:Replace Main Generator Stator	(2,538)	Project complete in 2020
7		5746338	U1:Upgrade Polisher Computer Workstation	(2,351)	Scope Changes in multi-year project
8		5772846	COM: Repl PAC 0-1 thru 0-7	(2,215)	Scope Changes in multi-year project
9		5748281	U1:Replace AFW Chem Injection Pumps	(2,529)	Project complete in 2020
10		5780939	COM: Upgrd Integrtd Video Mgmt System	(1,101)	Scope Changes in multi-year project
11		5787767	U1: Security Pathway Structure Upgrde	(1,290)	Project complete in 2020
12		5719418	U1:Repl DEG 11/13 Governor Control Sys	(1,331)	Project complete in 2020
13		5772188	COM: Repl PAD 0-1 Panel, 0-2, 0-5	901	Scope Changes in multi-year project
14		5774969	U2: Repl Aux Transfrm 2-1 Radiators	1,412	Scope Changes in multi-year project
15		5734098	U1:Replace Main Annunciator System	1,890	Project cancelled in 2020
16		5786060	U2: Replace RCP Seals (2R22)	5,392	Project scope primarily in 2021
17			All Other	(3,256)	Scope Changes in multi-year projects
18	2021		Forecast	22,000	
19		5786060	U2: Replace RCP Seals (2R22)	(7,152)	Project complete in 2021
20		5774969	U2: Repl Aux Transfrm 2-1 Radiators	(1,583)	Project complete in 2021
21		5772188	COM: Repl PAD 0-1 Panel, 0-2, 0-5	(1,527)	Project complete in 2021
22		5780939	COM: Upgrd Integrtd Video Mgmt System	(1,401)	Project complete in 2021
23		5748282	U2:Repl AFW Chem Injection Pumps	(1,220)	Project complete in 2021
24		5746339	U2:Upgrade Polisher Computer Workstation	(1,010)	Project complete in 2021
25		5775279	COM: Repl PA Microwave Transceiver	3,970	Project scope primarily in 2022
26			All Other	923	Scope Changes in multi-year projects
27	2022		Forecast	13,000	
28		5775279	COM: Repl PA Microwave Transceiver	(3,992)	Project complete in 2022
29		5789365	COM: Replc Sec Svr & Multiplx	(1,885)	Project complete in 2022
30		5746725	DCPP Aging Management System Capital	4,171	Emergent work scope
31			All Other	(294)	Scope Changes in multi-year projects
32	2023		Forecast	11,000	
33		5766778	COM: Wedge Barrier System - Gate 20	(1,086)	Project complete in 2023
34		5772475	COM: Replace North Gate	(970)	Project complete in 2023
35		5524319	COM: REPL RP INSTRUMENTATION PGM -2021	(948)	Project complete in 2023
36		5784804	U1: Replace Hydraulic Snubbers 1R24	(879)	Project complete in 2023
37			All Other	(1,117)	Scope Changes in multi-year projects
38	2024		Forecast	6,000	
39		5746725	DCPP Aging Management System Capital	(3,957)	Reduced anticipated emergent work
40		5784786	U2: Replace Hydraulic Snubbers 2R24	(696)	Project complete in 2024
41		5516252	U1-U2: Capital Valve Replacement Program	(348)	Project complete in 2024
42			All Other	0	
43	2025		Forecast	1,000	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Cost
Capital Walk by Major Work Category
(Thousands of Nominal Dollars)
MWC 03

Ln. No.	Year	ID	Program/Activity	Amount		Detailed Description/Assumptions
1	2020		Recorded Adjusted	0		
2	2021		Forecast	0		
3	2022		Forecast	0		
4	2023		Forecast	0		
5	2024		Forecast	0		
6	2025		Forecast	0		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Cost
 Capital Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC 05

Ln. No.	Year	ID	Program/Activity	Amount	Detailed Description/Assumptions
1	2020		Recorded Adjusted	422	
2		5516247	COM: PURCHASE CAPITAL TOOLS	259	Changes in demand for Tools and Equipment
3			All Other	(0)	
4	2021		Forecast	681	
5		5516247	COM: PURCHASE CAPITAL TOOLS	59	Changes in demand for Tools and Equipment
6	2022		Forecast	739	
7		5516247	COM: PURCHASE CAPITAL TOOLS	9	Changes in demand for Tools and Equipment
8	2023		Forecast	748	
9		5516247	COM: PURCHASE CAPITAL TOOLS	(748)	Changes in demand for Tools and Equipment
10	2024		Forecast	0	
11		5516247	COM: PURCHASE CAPITAL TOOLS	0	
12	2025		Forecast	0	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Cost
 Capital Walk by Major Work Category
 (Thousands of Nominal Dollars)
MWC 3I

Ln. No.	Year	ID	Program/Activity	Amount	Detailed Description/Assumptions
1	2020		Recorded Adjusted	5,945	
2		5764721	COM: N Access Rd NRCBA	(6,003)	Project complete in 2020
3			All Other	58	Scope Changes in multi-year projects
4	2021		Forecast	0	
5	2022		Forecast	0	
6	2023		Forecast	0	
7	2024		Forecast	0	
8	2025		Forecast	0	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2016 Recorded	2017 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	03	Office Furniture & Equipment	1,696	350	(1,346)	yes	-79%	yes	yes	yes	Change in Office Furniture and Equipment procurement to meet demand
2	5	3	04	Fleet / Auto Equip	3	-	(3)	no	-100%	yes	yes	yes	Change in fleet procurement to meet demand
3	5	3	05	Tools & Equipment	1,969	4,048	2,079	yes	106%	yes	yes	yes	Change in Tools & Equipment procurement to meet demand
4	5	3	20	DCPP Capital	174,105	149,957	(24,148)	yes	-14%	yes	yes	yes	Progress on Dry Cask load campaign, completion of Protective Strategy upgrade, progress on Security Defensive Strategy upgrade, completion of Permanent Reactor Cavity Seal Project, completion of LBVP-Hosgri plus LOCA Seismic Licensing Basis, completion of License Basis Verification Project, completion of Baffle Bolts Project, completion of CFCU Cooling Coils 1-5 Project, completion of Access Road repavement
5	5	3	31	Nuclear Safety and Security	36,397	19,337	(17,060)	yes	-47%	yes	yes	yes	Fukushima, EP Rulemaking, and NFPA 805 changes in scope

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2017 Recorded	2018 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	03	Office Furniture & Equipment	350	156	(194)	no	-55%	yes	yes	yes	Change in Office Furniture and Equipment procurement to meet demand
2	5	3	04	Fleet / Auto Equip	-	-	0	no					
3	5	3	05	Tools & Equipment	4,048	3,052	(996)	no	-25%	yes	yes	yes	Change in Tools & Equipment procurement to meet demand
4	5	3	20	DCCP Capital	149,957	(26,597)	(176,554)	yes	-118%	yes	yes	yes	Project cancellations due to decision not to pursue life extension, significant progress on Dry Cask load campaign, completion of HP Turbine Rotor Blades Project, Rod Control Cluster Assemblies procurement, progress on Security Vehicle Inspection Station relocation, completion of Spent Fuel Pool Bridge Crane Project
5	5	3	3I	Nuclear Safety and Security	19,337	5,570	(13,767)	yes	-71%	yes	yes	yes	Fukushima, EP Rulemaking, and NPPA 805 changes in scope, completion of Cyber Security Event Management System

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2018 Recorded	2019 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	03	Office Furniture & Equipment	156	18	(138)	no	-88%	yes	yes	yes	Change in Office Furniture and Equipment procurement to meet demand
2	5	3	04	Fleet / Auto Equip	-	-	0	no					
3	5	3	05	Tools & Equipment	3,052	2,059	(993)	no	-33%	yes	yes	yes	Change in Tools & Equipment procurement to meet demand
4	5	3	20	DCCP Capital	(26,597)	105,641	132,238	yes	-497%	yes	yes	yes	Significant progress on Main Generator Stator Project, completion of Security Vehicle Inspection Station relocation, Rod Control Cluster Assemblies procurement, completion of CFCU Cooling Coils 2-5 Project, progress on Oily Water System Project, completion of Boric Acid Transfer Pump Project, progress on Integrated Video Management System upgrade, completion of DEG 2-1 Governor Controls System Project
5	5	3	31	Nuclear Safety and Security	5,570	605	(4,965)	yes	-89%	yes	yes	yes	Completion of all NPPA 805 fire protection modifications

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 3
 Nuclear Operations
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2019 Recorded	2020 Recorded	Variance	Variance Greater Than \$1M?	Variance %	Variance Greater Than or Equal to 5%	Variance Greater Than or Equal to 10%	Variance Required Y/N	Variance Explanation
1	5	3	03	Office Furniture & Equipment	18	-	(18)	no	-100%	yes	yes	yes	Change in Office Furniture and Equipment procurement to meet demand
2	5	3	04	Fleet / Auto Equip	-	-	0	no					
3	5	3	05	Tools & Equipment	2,059	422	(1,637)	yes	-80%	yes	yes	yes	Change in Tools & Equipment procurement to meet demand
4	5	3	20	DCPP Capital	105,641	43,003	(62,638)	yes	-59%	yes	yes	yes	Completion of DEG 1-1 and DEG 1-3 Governor Controls System Project, completion of Main Generator Stator Project, progress on Unit 1 Condensate Polisher Computer Workstation Project, progress on Oily Water System Project, completion of Unit 1 AFW Chemical Injection Pump Project, completion of U1 RCP Seals Replacement Project, completion of Security Pathway Structure Project, progress on Integrated Video Management System upgrade, progress on Devitalize Auxiliary Salt Water System at Intake Project, completion of Microwave Links 12A and 13A Project
5	5	3	3I	Nuclear Safety and Security	605	6,018	5,413	yes	895%	yes	yes	yes	North Access Road Project changes in scope

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Projects Cancelled through Affordability Initiative
MWC 20

Proj #	Planning		2020 GRC	2023 GRC	Adjustments
	Order	Title	Total Costs	Total Costs	
P.02037	5733691	COM:Repl Turbine Building HELB Louvers	\$172,244	\$172,244	\$0
P.02168	5733720	COM:Instl Intake Bar Rack Raking System	\$2,528,067	\$2,528,067	\$0
P.02252	5733424	U2: Control Room Condenser Replacement	\$1,235,240	\$1,304,662	\$69,422
P.02252	5755714	U1: Control Room Condenser Replacement	\$1,933,633	\$2,007,141	\$73,508
P.02591	5730278	U1:Repl Main Gen Voltage Regulator	\$114,661	\$114,661	\$0
P.02591	5733432	U2:Repl Main Gen Voltage Regulator	\$135,408	\$135,410	\$2
P.02702	5731878	U1:Repl FHB Supply Fans	\$79,864	\$79,864	\$0
P.02702	5733439	U2:Repl FHB Supply Fans	\$1,302,010	\$1,302,010	\$0
P.02703	5731879	U1:Repl Aux Bldg Supply Fans	\$102,270	\$102,270	\$0
P.02703	5733440	U2:Repl Aux Bldg Supply Fans	\$416,319	\$416,319	\$0
P.02764	5732159	U2:Upgr Air Partic&Gas Montr RM-11 & 12	\$45,640	\$45,640	\$0
P.02764	5736000	U1:Upgr Air Partic & Gas Montr RM-11 & 12	\$657,809	\$657,808	(\$1)
P.02939	5738238	U1:Add Iso Vlv SI Test Hdr Phase II 1R19	\$1,184,362	\$1,184,362	\$0
P.03028	5727860	U1: Rpl Process Protection System (PPS)	\$25,171,299	\$25,174,806	\$3,507
P.03028	5727861	U2: Rpl Process Protection System (PPS)	\$12,416,485	\$12,417,311	\$825
P.03170	5736129	U1:Replace Excore Thermocouples	\$591,430	\$593,670	\$2,240
P.03285	5736141	Turb Bldg Sump Pmps & Lvl Controls Mod	\$105,890	\$105,890	\$0
P.03381	5735677	U1:Replace 12Kv Bus E Relays	\$1,077,513	\$1,077,513	\$0
P.03381	5735678	U2:Replace 12Kv Bus E Relays	\$75,917	\$75,917	\$0
P.03389	5745078	Replace Gaseous Radwaste Monitoring Sys	\$658,747	\$658,747	\$0
P.03395	5735694	COM:Rem Abandoned Caustic/Acid Tanks	\$100,721	\$100,721	\$0
P.03452	5739859	U1:Instl Redundant Vapor Extractor	\$141,806	\$141,806	\$0
P.03519	5735879	U2:Replace FLUR/SLUR Relays	\$1,938,310	\$1,938,310	\$0
P.03519	5740839	U1:Replace FLUR/SLUR Relays	\$3,371,044	\$3,371,044	\$0
P.03520	5735686	U1-U2:Replace DFO Transfer Pumps	\$1,004,692	\$1,004,692	\$0
P.03538	5740886	U2:Instl ICW Head Tank N2 Cover System	\$58,631	\$58,631	\$0
P.03655	5746098	U1:Add Thermal Relief Vlv to SCW HX	\$41,300	\$41,300	\$0
P.03655	5746099	U2:Add Thermal Relief Vlv to SCW HX	\$36,720	\$36,720	\$0
P.03658	5735026	U2:Upgrade Fuel Transfer Cart & Controls	\$333,868	\$334,938	\$1,070
P.03658	5735028	U1:Upgrade Fuel Transfer Cart & Controls	\$40,669	\$40,669	\$0
P.03659	5735024	U1:Repl Manipulator Control Center	\$60,976	\$61,358	\$382
P.03659	5735027	U2:Repl Manipulator Control Center	\$70,170	\$70,612	\$442
P.03660	5742281	COM:Add Equip to Inj PAA to FW Sys	\$726,410	\$728,447	\$2,038
P.03667	5742339	U1:Replace Main Generator Output Breaker	\$2,478,079	\$2,478,079	\$0
P.03720	5743121	COM:Upgrade Primary Chemistry Lab	\$8,678	\$8,678	\$0
P.03774	5743878	U1:Replace EH Vacuum Dehydrator	\$134,389	\$134,389	\$0
P.03897	5745278	U1:Replace Instr in Panels PM-177&179	\$7,047	\$7,047	\$0
P.03983	5745442	COM:Instl SWRO Discharge Modifications	\$466,088	\$466,088	\$0
P.04120	5749719	U2:Replace Pressurizer Heaters	\$864,198	\$864,198	\$0
P.04353	5749764	COM: Instl Diesel to Suppt Security Upgr	\$77,096	\$77,096	\$0
P.04392	5750041	U1:Upgrade DEG (Margin Deficiency)	\$93,700	\$93,700	\$0
P.04392	5761274	U2: UPGRADE DEG 2-2 LOADING MARGIN	\$774,980	\$774,980	\$0
P.04680	5746172	COM:Replace DCPD Pwr Block Lighting	\$155,924	\$155,924	\$0
P.05236	5752766	COM:TS Setpt Calcs Rev & Reloc Proj(CAP)	\$5,137,778	\$5,137,778	\$0
P.05244	5752819	U1:Repl Main Generator Protection	\$225,571	\$225,571	\$0
P.05244	5752820	U2:Repl Main Generator Protection	\$185,242	\$187,606	\$2,365
P.05308	5753459	U1:Repl PPC Servers	\$480,942	\$480,942	\$0
P.05309	5753458	U2:Repl PPC Servers	(\$646)	(\$646)	\$0
P.07482	5757412	U2: Upgrade EDG Ducting	\$1,947	\$1,947	\$0
P.07862	5758524	U2:Inst ASW Cathodic Protection	\$1,211,193	\$1,208,200	(\$2,992)
P.09699	5762786	Install Wireless Comm Sys-Ph 3 & 4	\$854,752	\$854,752	\$0
P.10704	5746724	U1:REPL CFCU COOLING COILS 1-2	\$631,141	\$607,334	(\$23,807)
P.10976	5769686	COM:Upgrd 230 Kv Switchyard Conversion	\$432,334	\$432,334	\$0
P.10977	5769687	COM: Upgrd 230 Kv Tie Lines	\$91,803	\$91,803	\$0
P.11041	5770218	U1: Repl Penetration 9E	\$175,766	\$175,766	\$0
P.11069	5770362	COM: Instl PAC 0-7 Enclosure	\$116,573	\$116,573	\$0

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Projects Cancelled through
Affordability Initiative MWC 20

(PG&E-5)

Proj #	Planning		2020 GRC	2023 GRC	Adjustments
	Order	Title	Total Costs	Total Costs	
P.11197	5771802	U1: Instl Condenser Sodium Analyzers	\$133,831	\$133,831	\$0
P.11233	5772189	COM: SEPARATE 12KV YRD LOOP FROM PWR BLK	\$6,291	\$6,291	\$0
P.11372	5773058	COM: Install 480V Switchgear Protection	\$272,640	\$272,640	\$0
P.11621	5740883	U1:Instl SCW Head Tank N2 Cover System	\$1,293,720	\$1,293,720	\$0
P.11621	5740884	U2:Instl SCW Head Tank N2 Cover System	\$226,958	\$226,958	\$0
P.08428	5759418	COM: MSLB Impact on 4KV vital SWGRs	\$1,634,678	\$1,634,678	\$0
P.06757	5761286	U1:Refurbish RCP Rotor R6	\$302,398	\$311,399	\$9,001
P.09696	5764036	Purchase and Install CWP Mtr Rtr CWP 2-1	\$101,196	\$107,695	\$6,500
P.11183	5771398	U1: EDG Turbocharger Support Upgrade	\$44,234	\$48,751	\$4,516
P.11183	5771399	U2: EDG Turbocharger Support Upgrade	\$130,680	\$139,073	\$8,393
Total			\$76,681,327	\$76,838,737	\$157,409

New Planning Orders Since 2020 GRC:

			Total Costs
P.11610	5776466	COM: Updrd Security Admin Bldg Pos	\$48,837
P.03079	5734098	U1:Replace Main Annunciator System	\$1,907,477
P.03080	5734099	U2:Replace Main Annunciator System	\$275,217
P.11311	5762337	DCPP-Upgrade EOF	\$15,448
P.09414	5763645	U2: Purchase CCW Motor (Spare)	\$97,602
P.10915	5768939	COM: Repl PAD 0-2 Air Dryer	\$384
P.10915	5768940	COM: Repl PAD 0-5 Air Dryer	\$2,775
P.10879	5771266	U2:Upgrde RCP Vibration Monitoring Equip	\$383,034
P.12024	5786058	U1: RVLIS Bellow Replacement 1R22	\$185,048
P.02151	5768023	COM: Replace Plant Recorders	\$879,055
Subtotal			\$3,794,877

Adjustments from 2020 GRC

\$157,409

Grand Total

\$80,633,614

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Plant Description and Generation**

PLANT DESCRIPTION:

Diablo Canyon Nuclear Power Plant is a two-unit, Westinghouse, Pressurized Water Reactor station located in Avila beach, California.

Start of Commercial Operation:

Unit 1 - May 7, 1985

Unit 2 - March 13, 1986

Maximum Dependable Capacity:

Unit 1 = 1122 Mwe

Unit 2 = 1118 Mwe

Annual Net Generation (ISO Meter Values):

Unit 1:

2016 = 9,975,318 Mwh

2017 = 8,188,529 Mwh

2018 = 9,739,819 Mwh

2019 = 8,842,399 Mwh

2020 = 8,910,573 Mwh

2023 = 8,981,050 Mwh

Unit 2:

2016 = 8,955,921 Mwh

2017 = 9,762,826 Mwh

2018 = 8,551,761 Mwh

2019 = 7,322,988 Mwh

2020 = 7,373,850 Mwh

2023 = 9,633,247 Mwh

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Materials and Supplies Inventory
 (Millions of Nominal Dollars)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Full Year
	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual
Beginning Balance	101.10	99.77	99.91	101.16	101.44	101.54	102.16	101.95	102.18	102.53	102.60	102.67	
Utilization	(2.95)	(1.65)	0.05	(0.75)	(0.97)	(0.68)	(0.65)	(0.75)	(0.63)	(0.70)	(1.07)	(1.54)	(12.28)
Purchases	1.63	1.80	1.22	1.05	1.13	1.32	0.99	1.08	1.03	1.21	1.26	1.93	15.65
Salvage	(0.00)	(0.01)	(0.00)	(0.00)	(0.06)	(0.01)	(0.54)	(0.06)	(0.05)	(0.44)	(0.11)	(0.94)	(2.23)
Obsolete - Write-off	(0.01)	(0.00)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)	(0.00)	(0.01)	(0.05)	(0.16)
Ending Balance	(1.33)	0.13	1.25	0.28	0.10	0.62	(0.22)	0.24	0.35	0.07	0.07	(0.60)	0.98
2018	99.77	99.91	101.16	101.44	101.54	102.16	101.95	102.18	102.53	102.60	102.67	102.67	
2018	99.77	99.91	101.16	101.44	101.54	102.16	101.95	102.18	102.53	102.60	102.67	102.67	
Less M&S Inv Contra Account Balance													
Net Ending Balance	102.08	100.89	98.96	100.02	100.51	101.33	102.15	102.51	101.54	100.65	100.49	101.12	
Utilization	(1.94)	(3.52)	(0.05)	(0.75)	(0.64)	(0.29)	(0.90)	(2.09)	(2.63)	(1.32)	(0.46)	(0.09)	(14.67)
Purchases	1.03	1.71	1.18	1.33	1.49	1.13	1.33	1.38	1.75	1.30	1.09	0.97	15.69
Salvage	(0.23)	(0.10)	(0.06)	(0.08)	(0.02)	(0.00)	(0.07)	(0.24)	(0.00)	(0.14)	(0.00)	(1.02)	(1.96)
Obsolete - Write-off	(0.05)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.00)	(0.03)	(0.01)	(0.00)	(0.00)	(0.01)	(0.17)
Ending Balance	(1.19)	(1.93)	1.06	0.49	0.82	0.83	0.36	(0.98)	(0.89)	(0.16)	0.63	(0.15)	(1.11)
2019	100.89	98.96	100.02	100.51	101.33	102.15	102.51	101.54	100.65	100.49	101.12	100.97	
2019	100.89	98.96	100.02	100.51	101.33	102.15	102.51	101.54	100.65	100.49	101.12	100.97	
Less M&S Inv Contra Account Balance													
Net Ending Balance	100.97	101.69	101.86	101.99	102.46	102.65	103.30	104.14	104.22	101.39	100.74	101.57	
Utilization	(0.39)	(0.77)	(0.75)	(0.85)	(0.91)	(0.95)	(0.66)	(1.42)	(3.83)	(1.55)	(0.36)	(2.53)	(14.97)
Purchases	1.14	0.95	0.96	1.40	1.19	1.61	1.52	1.52	1.12	1.05	1.20	2.37	16.03
Salvage	(0.02)	-	(0.06)	(0.06)	(0.06)	(0.01)	(0.01)	(0.02)	(0.10)	(0.14)	(0.00)	(0.21)	(0.68)
Obsolete - Write-off	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.15)
Sub-total	0.72	0.17	0.13	0.47	0.19	0.65	0.84	0.08	(2.84)	(0.65)	0.83	(0.37)	0.23
Ending Balance	101.69	101.86	101.99	102.46	102.65	103.30	104.14	104.22	101.39	100.74	101.57	101.20	
2020	101.69	101.86	101.99	102.46	102.65	103.30	104.14	104.22	101.39	100.74	101.57	101.20	
2020	101.69	101.86	101.99	102.46	102.65	103.30	104.14	104.22	101.39	100.74	101.57	101.20	
Less M&S Inv Contra Account Balance													
Net Ending Balance	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Materials and Supplies Inventory
 (Millions of Nominal Dollars)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Full Year
	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast
Beginning Balance	101.20	101.00	98.60	98.90	99.10	99.30	99.50	99.70	99.90	100.10	100.30	100.50	
Utilization	(1.50)	(3.50)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(13.00)
Purchases	1.30	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	12.50
Salvage	-	-	-	-	-	-	-	-	-	-	-	-	-
Obsolete - Write-off	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	(0.20)	(2.40)	0.30	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	(0.50)
Ending Balance	101.00	98.60	98.90	99.10	99.30	99.50	99.70	99.90	100.10	100.30	100.50	100.70	
Less M&S Inv Contra Account Balance	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	-
Net Ending Balance	40.70	38.30	38.60	38.80	39.00	39.20	39.40	39.60	39.80	40.00	40.20	40.40	
Beginning Balance	100.70	102.20	101.70	99.45	99.50	99.60	99.70	99.80	101.30	100.80	98.55	98.60	
Utilization	(0.80)	(1.50)	(3.25)	(0.85)	(0.80)	(0.80)	(0.80)	(0.80)	(1.50)	(3.25)	(0.85)	(0.80)	(16.00)
Purchases	2.30	1.00	1.00	0.90	0.90	0.90	0.90	2.30	1.00	1.00	0.90	0.90	14.00
Salvage	-	-	-	-	-	-	-	-	-	-	-	-	-
Obsolete - Write-off	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	1.50	(0.50)	(2.25)	0.05	0.10	0.10	0.10	1.50	(0.50)	(2.25)	0.05	0.10	(2.00)
Ending Balance	102.20	101.70	99.45	99.50	99.60	99.70	99.80	101.30	100.80	98.55	98.60	98.70	
Less M&S Inv Contra Account Balance	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	(60.30)	-
Net Ending Balance	41.90	41.40	39.15	39.20	39.30	39.40	39.50	41.00	40.50	38.25	38.30	38.40	
Beginning Balance	98.70	98.70	98.70	98.70	98.70	98.70	98.70	98.70	99.90	99.40	97.20	97.20	
Utilization	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(0.80)	(1.50)	(3.00)	(0.80)	(0.80)	(12.50)
Purchases	0.80	0.80	0.80	0.80	0.80	0.80	0.80	2.00	1.00	0.80	0.80	0.80	11.00
Salvage	-	-	-	-	-	-	-	-	-	-	-	-	-
Obsolete - Write-off	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	-	-	-	-	-	-	-	1.20	(0.50)	(2.20)	-	-	(1.50)
Ending Balance	98.70	98.70	98.70	98.70	98.70	98.70	98.70	99.90	99.40	97.20	97.20	97.20	
Less M&S Inv Contra Account Balance	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(34.60)
Net Ending Balance	3.80	3.80	3.80	3.80	3.80	3.80	3.80	5.00	4.50	2.30	2.30	2.30	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Materials and Supplies Inventory
 (Millions of Nominal Dollars)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Full Year
	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast
Beginning Balance	97.20	97.20	98.25	97.75	95.75	95.70	95.70	95.70	95.70	95.70	95.70	95.70	95.70
Utilization	(0.75)	(0.75)	(1.50)	(2.75)	(0.80)	(0.75)	(0.75)	(0.75)	(0.75)	(0.75)	(0.60)	(0.60)	(11.50)
Purchases	0.75	1.80	1.00	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.60	0.60	10.00
Salvage	-	-	-	-	-	-	-	-	-	-	-	-	-
Obsolete - Write-off	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	1.05	(0.50)	(0.50)	(2.00)	(0.05)	-	-	-	-	-	-	-	(1.50)
2024 Ending Balance	97.20	98.25	97.75	95.75	95.70	95.70	95.70	95.70	95.70	95.70	95.70	95.70	95.70
Less M&S Inv Contra Account Balance	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)
2024 Net Ending Balance	2.30	3.35	2.85	0.85	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Beginning Balance	95.70	95.60	95.50	95.40	95.30	95.20	95.10	95.00	94.90	94.90	94.90	94.90	94.90
Utilization	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(0.60)	(4.80)
Purchases	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	4.00
Salvage	-	-	-	-	-	-	-	-	-	-	-	-	-
Obsolete - Write-off	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.80)
2025 Ending Balance	95.60	95.50	95.40	95.30	95.20	95.10	95.00	94.90	94.90	94.90	94.90	94.90	94.90
Less M&S Inv Contra Account Balance	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)	(94.90)
2025 Net Ending Balance	0.70	0.60	0.50	0.40	0.30	0.20	0.10	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Materials and Supplies Regulatory Asset
 (Millions of Nominal Dollars)

	2020	2021	2022	2023	2024	2025	Total
Beginning Balance	-	48.24	36.18	24.12	35.13	11.53	
Record Regulatory Asset	60.30			34.60			94.90
2020 GRC Approved Amortization	(12.06)	(12.06)	(12.06)				(36.18)
2023 GRC Proposed Amortization	-	-	-	(23.59)	(23.59)	(11.53)	(58.72)
Ending Balance	48.24	36.18	24.12	35.13	11.53	-	-

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
Average Annual Headcount

MWC	Department Description	2020	2021	2022	2023	2024	2025
		Average	Average	Average	Average	Average	Average
BP	Facility Maintenance	15	15	15	14	12	7
	Risk Mgmt and Cyber Security	18	16	16	16	16	11
BP Total		33	31	31	30	28	17
BQ	Access & Badging	5	5	5	5	5	3
	Emergency Svcs. Performance	20	16	13	13	13	9
	Security Operations	243	247	243	243	243	160
BQ Total		268	268	261	261	261	172
BR	Chemistry & Environmental	15	15	15	15	13	7
	Fire Protection	21	21	21	21	21	14
	Operations Services	184	182	176	176	176	92
	Radiation Protection	75	74	73	72	70	40
BR Total		294	292	285	284	280	153
BS	Electrical Maintenance	40	38	36	32	26	13
	Facility Projects	5	5	5	5	4	3
	I&C Maintenance	54	51	47	44	37	20
	Maintenance Planning Capital	12	7	7	7	6	-
	Maintenance Planning O&M	30	27	21	21	21	11
	Maintenance Support Teams	55	44	59	67	61	37
	Mechanical Maintenance	68	59	43	43	37	19
Project Services	9	12	12	11	8	3	
BS Total		273	243	230	229	199	107
BT	Performance Improvement	14	11	10	9	6	4
BT Total		14	11	10	9	6	4
BV	Design Engineering	38	34	31	31	31	15
	ICE Systems	30	29	28	28	27	15
	Mechanical Systems	35	31	31	31	30	15
	Technical Support Engineering	34	33	33	33	30	13
	Nuclear Fuels Purchasing	5	5	5	4	3	2
	Geosciences	18	18	18	18	18	12
BV Total		159	150	146	145	139	71
OM	Director, Maintenance Svcs.	22	26	13	13	13	7
	Business & Tech Services Office	1	1	1	1	1	1
	Chief Nuclear Officer	5	5	5	7	7	5
	Sr. Dir., Eng, Tech, & Emerg. Svcs.	7	7	7	7	7	5
	Station Director	6	5	5	5	5	3
OM Total		41	44	31	33	33	21
OS	General Services	42	38	38	38	38	23
	Outage Management	15	13	13	13	12	3
	Work Control/Scheduling	13	10	10	10	10	4
	Emergency Planning	9	9	9	9	9	5
	Learning Services	53	49	48	42	30	20
	Nuclear Business Operations	13	12	11	11	11	7
	Regulatory Services	12	10	9	9	7	3
Quality Verification	24	23	22	22	22	12	
OS Total		181	164	160	154	138	77
Grand Total		1,263	1,203	1,154	1,144	1,083	622

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Average Annual Headcount by Organization

Reports to	Owner	Department Description	2020	2021	2022	2023	2024	2025
			Average	Average	Average	Average	Average	Average
CNO	Chief Nuclear Officer	Chief Nuclear Officer	5	5	5	7	7	5
		Quality Verification	24	23	22	22	22	12
Sr. Dir., Eng, Tech, & Emerg. Svcs.	Chief Nuclear Officer Total		29	28	27	29	29	17
	Sr. Dir., Eng, Tech, & Emerg. Svcs.	Sr. Dir., Eng, Tech, & Emerg. Svcs.	7	7	7	7	7	5
		Emergency Planning	9	9	9	9	9	5
		Outage Management	15	13	13	13	13	3
	Sr. Dir., Eng, Tech, & Emerg. Svcs. Total		30	29	29	29	28	13
	Engineering	Technical Support Engineering	34	33	33	33	30	13
		Mechanical Systems	35	31	31	31	30	15
		Design Engineering	38	34	31	31	31	15
		ICE Systems	30	29	28	28	27	15
		Project Services	9	12	12	11	8	3
	Engineering Total		146	139	135	134	126	60
	Security & Emergency Services	Security Operations	243	247	243	243	243	160
		Fire Protection	21	21	21	21	21	14
		Access & Badging	5	5	5	5	5	3
		Emergency Svcs. Performance	20	16	13	13	13	9
Sr. Dir., Eng, Tech, & Emerg. Svcs. Total			289	289	282	282	282	186
Station Director			465	458	446	445	436	259
	Station Director	Station Director	6	5	5	5	5	3
	Station Director Total		6	5	5	5	5	3
	Maintenance Services	Director, Maintenance Svcs.	22	26	13	13	13	7
		Maintenance Planning O&M	30	27	21	21	21	11
		Maintenance Planning Capital	12	7	7	7	6	-
		Facility Maintenance	15	15	15	14	12	7
		Facility Projects	5	5	5	5	4	3
		I&C Maintenance	54	51	47	44	37	20
		Electrical Maintenance	40	38	36	32	26	13
		Mechanical Maintenance	68	59	43	43	37	19
		Site Service Supplier	-	-	-	-	-	-
		Maintenance Support Teams	55	44	59	67	61	37
		Work Control/Scheduling	13	10	10	10	10	4
	Maintenance Services Total		313	282	256	255	225	121
	Operations Services	Operations Services	184	182	176	176	176	92
		Chemistry & Environmental	15	15	15	15	13	7
		Radiation Protection	75	74	73	72	70	40
	Operations Services Total		273	271	264	263	259	139
Station Director Total			592	558	525	523	489	263
Vice President Business & Technical Services	VP Business & Technical Svcs.	B&TS Sr Director Office	1	1	1	1	1	1
		Geosciences	18	18	18	18	18	12
		Learning Services	53	49	48	42	30	20
		Performance Improvement	14	11	10	9	6	4
		Nuclear Fuels Purchasing	5	5	5	4	3	2
	VP Business & Technical Svcs. Total		90	84	82	74	58	39
	Business Operations	Nuclear Business Operations	13	12	11	11	11	7
		General Services	42	38	38	38	38	23
	Business Operations Total		55	50	49	49	49	30
	Risk and Compliance	Regulatory Services	12	10	9	9	7	3
		Risk Mgmt and Cyber Security	18	16	16	16	16	11
	Risk and Compliance Total		30	26	25	25	23	13
Vice President Business & Technical Services Total			175	160	156	148	130	82
Grand Total			1,263	1,203	1,154	1,144	1,083	622

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations Costs
DCPP Avoided Greenhouse Gas (GHG) Emissions

METHODOLOGY:

$$\text{Avoided GHG Emissions (millions of metric tons)} = (\text{Electricity Generation Mwh} * \text{Avoided GHG Emissions Rate (Metric tons per Mwh)}) / 10^6$$

DATA		
2020 DCPP Net Generation (Mwh)		
Unit 1	8,910,573	Mwh
Unit 2	7,373,850	Mwh
Total	<u>16,284,423</u>	Mwh
2019 DCPP Net Generation (Mwh)		
Unit 1	8,842,399	Mwh
Unit 2	7,322,988	Mwh
Total	<u>16,165,387</u>	Mwh

Range of Avoided GHG Emissions rate for conventional generation in California		
ARB MRR Reg - unspecified sources ¹	0.428	Metric Tons of CO₂e/MWh
Average Emissions Rate of NGCC Unit in CA ²	0.382	Metric Tons of CO₂e/MWh

RESULTS:**Range of Avoided GHG Emissions from DCPP are 6-to-7 Million Metric Tons CO₂e / Year**For **2020** Year

Compared to ARB MRR Reg unspecified sources emissions rate	6.97
Compared to Average NGCC Unit in CA emissions rate	6.22

For **2019** Year

Compared to ARB MRR Reg unspecified sources emissions rate	6.92
Compared to Average NGCC Unit in CA emissions rate	6.18

¹ California Air Resources Board, Mandatory Reporting Regulation (MRR), Data Requirements and Calculation Methods for Electric Power Entities - 17 CCR Section 95111(b)

² California Energy Commission, Thermal Efficiency of Gas Fired Generation in California: 2019 Update Publication #CEC-200-2020-05

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Deferred Work Analysis Summary

The Nuclear deferred work analysis follows the principles for determining if work was deferred set forth in PG&E's 2020 GRC Settlement Agreement. Each MWC in this chapter
Check 1: The work was requested and authorized based on representations that it was needed to provide safe and reliable service.
Check 2: PG&E did not perform all of the authorized and funded work, as measured by authorized (explicit or imputed) units of work.

Check 2a: The work is measured by units of work.

Check 2b: PG&E expects to perform fewer of such units during the 2020-2022 period.

Check 3: PG&E continues to represent that the curtailed work is necessary to provide safe and reliable service

Line	2023 GRC Chapter	Type	MWC CODE	Description	Check 2			Deferred Work (Yes or No)	Explanation	Units Comparison			Dollar Comparison (\$000s)			Under/Over Spend Explanation
					Check 1	Check 2a	Check 2b			Check 3	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	Difference	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	
1	3	Capital	20	DCPP Capital Office Furniture and Equipment	No	No	N/A	No	Work not utilized but includes discrete projects, some of which were either completed during the 2020 GRC period and some of which were cancelled. The cancelled work is no longer needed for safety and reliability.	N/A	N/A	N/A	\$ 76,880	\$ 83,913	\$ 7,023	Underspent due to additional cancelled projects. - See WP 3-97 for list of additional cancelled projects.
2	3	Capital	3	Equipment	No	No	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ -	\$ 45	\$ 45	
3	3	Capital	5	Tools and Equipment	No	No	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ 1,842	\$ 1,267	\$ (575)	
4	3	Capital	31	Nuclear Safety and Security	No	No	N/A	No	Work not utilized but includes discrete projects. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 5,945	\$ 5,945	\$ -	
5	3	Expense	AB	2nd Outage Levelization	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ (38)	\$ (38)	\$ -	
6	3	Expense	AK	Manage Environmental Operation	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 6,041	\$ 6,018	\$ (23)	
7	3	Expense	BP	Manage DCPPT Business	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 39,691	\$ 42,573	\$ 2,882	Lower headcount
8	3	Expense	BO	DCPP Loss Prevention	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 135,656	\$ 144,080	\$ 8,424	Security project initiatives to eliminate compensatory measures; no project work.
9	3	Expense	BR	Operate DCPPT Plant	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 238,256	\$ 249,141	\$ 10,885	Lower headcount
10	3	Expense	BS	Maintain DCPPT Plant Assets	No	No	N/A	No	Work not utilized but includes discrete projects. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 327,497	\$ 331,539	\$ 4,042	Lower headcount
11	3	Expense	BT	Enhance DCPPT Personnel Perform	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 47,072	\$ 46,814	\$ (258)	
12	3	Expense	BU	Procure DCPPT Materials & Svcs	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ (1,111)	\$ (1,111)	\$ (0)	
13	3	Expense	BV	Maintain DCPPT Plant Configurat	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 113,891	\$ 109,815	\$ (4,076)	Seismic reclass from IG
14	3	Expense	OM	Operational Management	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 23,040	\$ 25,545	\$ 2,505	Capital Overhead Credits
15	3	Expense	OS	Operational Support	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 77,431	\$ 70,446	\$ (6,985)	difference
16	3	Expense	EO	Provide Nuclear Support	No	No	N/A	No	Work not utilized. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ -	\$ 97	\$ 97	
17	3	Expense	IG	Regulatory Balancing Account	No	No	N/A	No	Work not utilized but includes discrete projects. All work needed for safety and reliability was completed.	N/A	N/A	N/A	\$ 8,684	\$ 14,454	\$ 5,770	Seismic reclass to BV

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 3
Nuclear Operations
Department of Energy Litigation Proceeds

Claim #	Period Covered		DCPP	DCPP Decomm	HBPP	Total		Allocation %			
	Start	End	Received	Received	Received	Received		DCPP	Decomm	HBPP	Total
5	6/1/2015	5/31/2016	\$ 9,251,365		\$ 5,663,956	\$ 14,915,321		62%	0%	38%	100.0%
6	6/1/2016	5/31/2017	\$ 22,680,873		\$ 6,195,687	\$ 28,876,560		79%	0%	21%	100.0%
7	6/1/2017	5/31/2018	\$ 18,080,726		\$ 6,836,830	\$ 24,917,556		73%	0%	27%	100.0%
8	6/1/2018	5/31/2019	\$ 10,989,094		\$ 7,435,415	\$ 18,424,509		60%	0%	40%	100.0%
9	6/1/2019	5/31/2020	\$ 1,672,588	\$ 142,689	\$ 6,657,521	\$ 8,472,799	Note #1	20%	2%	79%	100.7%
10	6/1/2020	5/31/2021	\$ 1,722,766	\$ 2,614,691	\$ 7,365,663	\$ 11,703,120	Note #2 / #3	15%	22%	63%	100.0%
11	6/1/2021	5/31/2022	\$ 1,774,449	\$ 2,844,412	\$ 7,586,633	\$ 12,205,494		15%	23%	62%	100.0%
12	6/1/2022	5/31/2023	\$ 1,827,682	\$ 4,125,579	\$ 7,814,232	\$ 13,767,493		13%	30%	57%	100.0%
13	6/1/2023	5/31/2024	\$ 1,882,513	\$ 2,353,007	\$ 8,048,659	\$ 12,284,178		15%	19%	66%	100.0%
14	6/1/2024	5/31/2025	\$ 1,938,988		\$ 8,290,118	\$ 10,229,106		19%	0%	81%	100.0%
15	6/1/2025	5/31/2026	\$ 499,289	\$ 1,497,868	\$ 8,538,822	\$ 10,535,980		5%	14%	81%	100.0%
16	6/1/2026	5/31/2027	\$ -	\$ 2,057,072	\$ 8,794,987	\$ 10,852,059		0%	19%	81%	100.0%

Note #1 Claim #9, for the period ended 05/31/2020 is an estimate - utilized prior 3 year average of % Success to estimate Received amount.

Note #2 DCPP Projected Filed amount is Claim #9 escalated @3% each year

Note #3 HBPP Projected and Received Filed amount is an average of prior 5 years - escalated each year @3%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Costs of Controls by Risk Code
 (Thousands of Nominal Dollars)

RISK Code	Mitigation or Control Name	MWC	Planning Order No.	Planning Order Description	Alloc. %	2020 - \$	2021 - \$	2022 - \$	2023 - \$	2024 - \$	2025 - \$
NCORE-C1	Maintaining the Systems	BS	5001120	SCV-12725-12690-Maintenance Planning	0.9	6,148	4,881	4,659	4,470	4,550	2,026
			5004730	Outage Management	0.9	1,455	1,406	2,862	1,475	1,509	-
			5004731	SCV-10567-2&C Maintenance	0.9	14,406	14,524	18,084	13,673	13,041	6,732
			5004732	SCV-10569-Electrical Maintenance	0.9	11,222	11,374	15,161	10,417	9,540	4,347
			5004733	SCV-10922-Mechanical Maintenance	0.9	22,970	23,302	26,840	20,700	20,505	11,028
			5029633	DCPP BHI Support Material Handling	0.9	14,362	8,701	12,477	12,192	11,757	6,983
			5029634	DCPP BHI Support Tunnel Cleaning	0.9	342	279	563	289	295	-
			5029635	DCPP BHI Maintenance Construction	0.9	811	1,160	1,753	1,355	1,440	-
			5029636	DCPP BHI Support Temp Power	0.9	3,127	-	-	-	-	-
			5029637	DCPP BHI Support Incremental Paint	0.9	526	645	1,300	667	682	-
			5029638	DCPP BHI Support Misc Base Work	0.9	111	124	270	135	138	-
			5029640	DCPP BHI Support Seconded Labor	0.9	68	-	-	-	-	-
			5029650	DCPP BHI Support Scaffolding	0.9	32	318	635	318	415	-
			5029651	DCPP BHI Support Rigging	0.9	1,146	1,080	1,963	1,008	1,031	-
			5033881	Oper Suppt Nuclear PCC 10558	0.9	613	630	1,288	658	673	-
5033885	Oper Suppt Nuclear PCC 12724	0.9	1,760	1,562	1,683	1,636	1,633	678			
5035410	DCPP- BHI Emergent Priority Work	0.9	2,574	2,312	2,540	2,342	2,299	606			
5048110	DCPP BHI Mechanical Maintenance Support	0.9	12	863	891	1,097	1,145	382			
5048111	DCPP BHI I&C Maintenance Support	0.9	313	151	167	184	284	65			
5048112	DCPP BHI Electrical Maintenance Support	0.9	28	54	54	76	142	32			
5048113	DCPP BHI Teams Maintenance Support	0.9	245	194	216	238	349	86			
5048114	DCPP BHI Core Field Staff Support	0.9	148	95	105	116	173	43			
5246157	OMD U1 Turbine Generator Maint Program	0.9	419	1,430	1,498	1,509	1,520	678			
5246158	OMD U2 Turbine Generator Maint Program	0.9	8394	9,779	3,948	3,611	3,704	-			
	BS Total			\$ 91,457	\$ 84,844	\$ 102,210	\$ 78,094	\$ 76,917	\$ 33,685		
NCORE-C2	Operating the Facility Within Requirements	BR	5001124	SCV-10585-Chemistry	0.9	10,211	10,009	10,492	10,508	10,489	6,748
			5004729	SCV-10582-Operations	0.9	36,783	35,344	38,109	35,926	37,594	19,518
			5034875	Once Through Cooling Mitigation Fee	0.9	3,982	4,224	4,173	4,586	4,540	1,668
			BR Total		\$ 50,956	\$ 49,577	\$ 52,774	\$ 51,020	\$ 52,633	\$ 27,934	
NCORE-C3	Plant and System Configuration Control	BV	5000026	SCV-10543-Technical Support Engineering	0.9	6,836	7,262	7,781	6,643	6,380	2,458
			5000028	SCV-10544-Mechanical Systems	0.9	7,211	6,022	7,421	6,232	6,313	2,671
			5000029	SCV-10545-Design Engineering	0.9	5,399	5,530	5,656	5,186	5,533	2,536
			5000030	SCV-10546-I&C Systems	0.9	5,011	5,003	5,257	5,139	4,950	2,712
			5031070	DCPP-OMD PHC Engineering Program	0.9	123	45	46	47	49	19
			5034459	Field Drafting (10545)	0.9	466	803	845	832	777	402
			BV Total		\$ 25,047	\$ 24,665	\$ 27,006	\$ 24,080	\$ 24,002	\$ 10,797	
NCORE-C4	Security from External and Internal Threats, and Emergency Response	BQ	5000024	Nuc Gen Emergency Planning	0.9	5,041	4,563	4,678	4,806	4,918	3,349
			5004737	SCV-10559-Security Services	0.9	32,002	27,449	29,172	28,454	29,535	20,138
			5029631	SCV-14903-DCPP Security Sys & Compl	0.9	3,282	2,422	2,042	2,094	2,178	1,501
			5034492	DCPP Security Training	0.9	76	131	134	137	141	96
			5034493	Site Access	0.9	2,489	2,578	2,697	2,722	2,771	1,951
			5040889	SCV-14902-Access and Badging	0.9	1,044	986	1,142	1,027	1,057	635
			5040889	Operate & Maint Used Fuel Strg Facility	0.9	736	819	957	865	881	620
			BQ Total		\$ 44,672	\$ 38,944	\$ 40,724	\$ 40,106	\$ 41,479	\$ 28,280	
NCORE-C5	Independent Oversight and Training	BT	5000027	Quality Verification	0.9	64	95	194	100	102	-
			5004736	SCV-13564-Problem Prevention & Resolution	0.9	1,980	1,536	1,506	1,305	953	612
			5009372	Learning Services	0.9	1,454	966	990	1,017	1,040	688
			BT Total		\$ 3,499	\$ 2,597	\$ 2,691	\$ 2,421	\$ 2,095	\$ 1,300	
NCORE-C6	Regulatory Required Improvements and Ongoing Seismic Evaluations	OS	5033879	Oper Suppt Nuclear PCC 10533	0.9	2,768	2,621	2,735	2,668	2,707	1,574
			5033883	Oper Suppt Nuclear PCC 10606	0.9	8,614	8,321	8,689	7,500	5,582	3,726
			OS Total		\$ 11,382	\$ 10,942	\$ 11,425	\$ 10,168	\$ 8,289	\$ 5,301	
NCORE-C6 Total					\$ 14,880	\$ 13,538	\$ 14,115	\$ 12,589	\$ 10,384	\$ 6,600	
NCORE-C6	Regulatory Required Improvements and Ongoing Seismic Evaluations	BT	5000025	Regulatory Services	0.9	10,814	11,244	11,525	11,836	11,872	4,387
			BT Total		\$ 10,814	\$ 11,244	\$ 11,525	\$ 11,836	\$ 11,872	\$ 4,387	
NCORE-C6	Regulatory Required Improvements and Ongoing Seismic Evaluations	OS	5033880	Oper Suppt Nuclear PCC 10549	0.9	1,998	1,548	1,531	1,564	1,256	491
			OS Total		\$ 1,998	\$ 1,548	\$ 1,531	\$ 1,564	\$ 1,256	\$ 491	
NCORE-C6 Total					\$ 12,811	\$ 12,791	\$ 13,056	\$ 13,400	\$ 13,127	\$ 4,879	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations Costs
 Costs of Controls by Risk Code
 (Thousands of Nominal Dollars)

RISK Code	Mitigation or Control Name	MWC	Planning Order No.	Planning Order Description	Alloc. %	2020 - \$	2021 - \$	2022 - \$	2023 - \$	2024 - \$	2025 - \$				
NSHUT-C1	Maintaining the Systems	BS	5001120	SCV-12725-12690-Maintenance Planning	0.1	683	542	518	489	506	506	225			
			5001122	Outage Management	0.1	162	196	320	164	168	168	-			
			5004730	SCV-10567-I&C Maintenance	0.1	1,601	1,614	2,009	1,519	1,449	1,449	483			
			5004731	SCV-10569-Electrical Maintenance	0.1	1,247	1,264	1,685	1,157	1,060	1,060	748			
			5004732	SCV-10922-Mechanical Maintenance	0.1	2,552	2,589	2,982	2,300	2,278	2,278	1,225			
			5004733	SCV-10923-Maintenance Support Teams	0.1	1,596	967	1,386	1,355	1,306	1,306	776			
			5029633	DCPP BHI Support Material Handling	0.1	38	31	63	32	33	33	-			
			5029634	DCPP BHI Support Tunnel Cleaning	0.1	90	129	195	151	160	160	-			
			5029635	DCPP BHI Maintenance Construction	0.1	347	-	-	-	-	-	-			
			5029636	DCPP BHI Support Temp Power	0.1	58	72	144	74	76	76	-			
			5029637	DCPP BHI Support Incremental Paint	0.1	12	14	30	15	15	15	-			
			5029638	DCPP BHI Support Misc Base Work	0.1	8	-	-	-	-	-	-			
			5029640	DCPP BHI Support Seconded Labor	0.1	4	35	71	35	46	46	-			
			5029650	DCPP BHI Support Scaffolding	0.1	127	120	218	112	115	115	-			
			5029651	DCPP BHI Support Rigging	0.1	68	70	143	73	75	75	-			
NSHUT-C2	Operating the Facility Within Requirements	BR	5033881	Oper. Suppt Nuclear PCC 10558	0.1	196	174	187	182	181	181	75			
			5033885	Oper. Suppt Nuclear PCC 12724	0.1	286	257	282	260	255	255	67			
			5035410	DCPP: BHI Emergent Priority Work	0.1	1	95	99	122	127	127	42			
			5048110	DCPP BHI Mechanical Maintenance Support	0.1	35	17	19	20	32	32	7			
			5048111	DCPP BHI I&C Maintenance Support	0.1	3	5	6	8	16	16	4			
			5048112	DCPP BHI Electrical Maintenance Support	0.1	27	22	24	26	39	39	10			
			5048113	DCPP BHI Teams Maintenance Support	0.1	16	11	12	13	19	19	5			
			5048114	DCPP BHI Core Field Staff Support	0.1	47	159	166	168	169	169	75			
			5246157	OMD U1 Turbine Generator Maint Program	0.1	933	-	393	401	401	401	-			
			5246158	OMD U2 Turbine Generator Maint Program	0.1	25	1,087	405	383	422	422	-			
			BS Total					10,162	9,427	11,357	8,677	8,546	8,546	3,743	
			NSHUT-C2 Total					10,162	9,427	11,357	8,677	8,546	8,546	3,743	
			NSHUT-C2	Operating the Facility Within Requirements	BR	5001124	SCV-10585-Chemistry	0.1	1,135	1,112	1,166	1,168	1,167	1,167	750
						5004729	SCV-10582-Operations	0.1	4,085	3,927	4,234	3,992	4,177	4,177	2,169
						5034875	Once Through Cooling Mitigation Fee	0.1	440	469	464	510	504	504	185
BR Total					5,660	5,509	5,864	5,669	5,848	5,848	3,104				
NSHUT-C2 Total					5,660	5,509	5,864	5,669	5,848	5,848	3,104				
NSHUT-C3	Plant and System Configuration Control	BV	5000026	SCV-10543-Technical Support Engineering	0.1	760	807	865	738	709	709	273			
			5000028	SCV-10544-Mechanical Systems	0.1	801	689	825	692	701	701	287			
			5000029	SCV-10545-Design Engineering	0.1	600	614	628	576	615	615	282			
			5000030	SCV-10546-I&C Systems	0.1	557	556	584	571	550	550	301			
			5031070	DCPP-OMD PHC Engineering Program	0.1	14	5	5	5	5	5	2			
			5034459	Field Drafting (10545)	0.1	52	89	94	92	86	86	45			
			BV Total					2,783	2,741	3,001	2,676	2,667	1,200		
			NSHUT-C3 Total					2,783	2,741	3,001	2,676	2,667	1,200		
			NSHUT-C4	Security from External and Internal Threats, and Emergency Response	BQ	5000024	Nuc Gen Emergency Planning	0.1	560	507	520	534	546	546	372
						5004737	SCV-10559-Security Services	0.1	3,556	3,050	3,241	3,162	3,282	3,282	2,238
5029631	SCV-14903-DCPP Security Sys & Compl	0.1				365	269	227	233	242	242	167			
5029632	DCPP Security Training	0.1				8	15	15	15	16	16	11			
5034492	Site Access	0.1				277	286	300	302	308	308	217			
5034493	SCV-14902-Access and Badging	0.1				116	110	127	114	117	117	71			
5040889	Operate & Maint Used Fuel Strig Facility	0.1				82	91	95	96	98	98	69			
BQ Total								4,964	4,327	4,525	4,456	4,609	3,143		
NSHUT-C4 Total								4,964	4,327	4,525	4,456	4,609	3,143		
NSHUT-C5	Independent Oversight and Training	BT				5000027	Quality Verification	0.1	7	11	22	11	11	11	-
			5004736	SCV-13564-Problem Prevention & Resolution	0.1	220	171	167	145	106	106	68			
			5009372	Learning Services	0.1	162	107	110	113	116	116	76			
BT Total					389	289	299	269	233	144					
NSHUT-C6	Regulatory Required Improvements and Ongoing Seismic Evaluations	OS	5033879	Oper. Suppt Nuclear PCC 10533	0.1	308	291	304	296	301	301	175			
			5033883	Oper. Suppt Nuclear PCC 10606	0.1	957	925	965	833	820	820	414			
			OS Total					1,265	1,216	1,269	1,130	921	589		
NSHUT-C5 Total					1,653	1,504	1,568	1,399	1,154	733					
NSHUT-C6	Regulatory Required Improvements and Ongoing Seismic Evaluations	BT	5000025	Regulatory Services	0.1	1,202	1,249	1,281	1,315	1,319	1,319	487			
			BT Total					1,202	1,249	1,281	1,315	1,319	487		
			OS Total					222	172	170	174	140	55		
NSHUT-C6 Total					1,423	1,421	1,451	1,489	1,459	542					
Grand Total					266,448	249,269	277,649	243,655	242,824	242,824	124,650				

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 3
 Nuclear Operations
 Expense by MWC by Cost Type - Recorded and Test Year
 (Thousands of Nominal Dollars)

Cost Category	MWC	ID	Title	2020	2021	2022	2023	2024	2025		
E	BS	5224137	COM:Concrete Repairs Program	\$ 382	\$ 795	\$ 795	\$ 795	\$ 797	\$ -		
		5227994	U1:Repair Concrete CW Tunnels 11&12	\$ -	\$ 12	\$ 539	\$ -	\$ -	\$ -		
		5234189	COM:Repair Discharge Structure Concrete	\$ 52	\$ 285	\$ 279	\$ 50	\$ 51	\$ -		
		5241200	U2:Restore FWH 2-4B & 2-4C Shell (FAC)	\$ (0)	\$ 614	\$ -	\$ -	\$ -	\$ -		
		5252298	U1:Repair/Swap Snubbers 1R21	\$ 0	\$ -	\$ -	\$ -	\$ -	\$ -		
		5252299	U1 Repair/Swap Snubbers 1R22	\$ 591	\$ -	\$ -	\$ -	\$ -	\$ -		
		5252300	U1:Repair/Swap Snubbers 1R23	\$ -	\$ 11	\$ 922	\$ -	\$ -	\$ -		
		5252302	U2: Repair/Swap Snubbers 2R21	\$ 19	\$ -	\$ -	\$ -	\$ -	\$ -		
		5252303	U2: Repair/Swap Snubbers 2R22	\$ -	\$ 822	\$ -	\$ -	\$ -	\$ -		
		5256113	U2:Instl 480v Switchgr Vent Gap Duct	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
		5256793	U1: Perform ILRT - 1R21	\$ 4	\$ -	\$ -	\$ -	\$ -	\$ -		
		5261473	COM: TORNADO MISSILE RISK EVAL LAR	\$ 11	\$ -	\$ -	\$ -	\$ -	\$ -		
		5263397	U2 Mn Condenser East Inlet Recoat	\$ (0)	\$ -	\$ -	\$ -	\$ -	\$ -		
		5265252	U2: Repair/Swap Snubbers 2R23	\$ -	\$ -	\$ 860	\$ -	\$ -	\$ -		
		5265253	U1: Repair/Swap Snubbers 1R24	\$ -	\$ -	\$ -	\$ 838	\$ 47	\$ -		
		5265254	U2: Repair/Swap Snubbers 2R24	\$ -	\$ -	\$ -	\$ 30	\$ 831	\$ -		
		5260723	COM:Intake Reclassification LAR	\$ 5	\$ -	\$ -	\$ -	\$ -	\$ -		
		BS Total				\$ 1,064	\$ 2,539	\$ 3,395	\$ 1,713	\$ 1,726	\$ -
		N	IG	5248852	COM:Fukushima Fragilities & Seismic PRA	\$ 5	\$ -	\$ -	\$ -	\$ -	\$ -
				5261957	U1: 480v Switchgr Vent Gap Duct	\$ (0)	\$ -	\$ -	\$ -	\$ -	\$ -
5261976	U2: Repr 480v Switchgr Vent Gap Duct			\$ 10	\$ -	\$ -	\$ -	\$ -	\$ -		
5231992	COM:Impl Cyber Security (Exp) Req'mnts			\$ (58)	\$ -	\$ -	\$ -	\$ -	\$ -		
5252656	COM: NRC Rulemaking SECY-15-0065 PH2			\$ 97	\$ 724	\$ -	\$ -	\$ -	\$ -		
IG Total				\$ 53	\$ 724	\$ -	\$ -	\$ -	\$ -		
Total				\$ 1,117	\$ 3,263	\$ 3,395	\$ 1,713	\$ 1,726	\$ -		

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-5) ENERGY SUPPLY

WORKPAPERS SUPPORTING
CHAPTER 4, HYDRO OPERATIONS COSTS

TABLE OF CONTENTS

Subject	Page No.
Expense Workpapers	
Expenses by Major Work Category (Nominal Dollars)	WP 4-1
Expenses by Major Work Category (Base Year Dollars)	WP 4-2
Expenses by Planning Order (Nominal Dollars)	WP 4-3
Expense Walk from 2020-2023 by Major Work Category	WP 4-25
Expense and Capital Escalation 2021-2026	WP 4-40
Expense Forecast Drivers	WP 4-41
Risk Register Mapping - Expense	WP 4-42
Expense Walk from 2016-2020	WP 4-46
Capital Workpapers	
Capital Expenditures by Major Work Category (Nominal Dollars)	WP 4-50
Forecast Capital Expenditures Summary (Nominal Dollars)	WP 4-51
Capital Detail and CWIP by Major Work Category – Projects Over \$3 Million	WP 4-52
Recorded and Forecast Capital Expenditures Details - Other Work	WP 4-56
Capital by Planning Order (Nominal Dollars)	WP 4-57
Capital Expenditure Walk 2020-2026 by Major Work Category	WP 4-87
Risk Register Mapping – Capital	WP 4-96
Capital Walk from 2016-2020	WP 4-100
Other Workpapers	
Hydroelectric Powerhouse Data	WP 4-104
Headcount Forecast – Power Generation	WP 4-106
Organizational Chart	WP 4-107
FERC Relicensing Projects Timetable	WP 4-109
Historical Forced Outage Factor by Unit	WP 4-110

PACIFIC GAS AND ELECTRIC COMPANY
 2023 GENERAL RATE CASE
 EXHIBIT (PG&E-5) ENERGY SUPPLY

WORKPAPERS SUPPORTING
 CHAPTER 4, HYDRO OPERATIONS COSTS

TABLE OF CONTENTS
 (CONTINUED)

Subject	Page No.
Historical Equivalent Availability Factor by Unit	WP 4-113
Operations & Maintenance Cost per kW Benchmark	WP 4-116
Hydro License Surrender and Decommissioning by Planning Order	WP 4-117
Fire Risk Mitigation Memorandum Account Related Year 2020 work	WP 4-118
Deferred Work Analysis Summary	WP 4-119
Rescheduled Work from 2020 GRC	WP 4-122
2015-2019 NERC GADS Generating Unit Statistical Brochure, Calculation of PG&E's Hydro Industry Averages	WP 4-125
2019 Generating Unit Statistical Brochure, Five Years 2015-2019, All Units Reporting	WP 4-126
Project Summaries	WP 4-128

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Expenses by Major Work Category
 (Thousands of Nominal Dollars)

Line No.	MWC	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference (A)
1	AB	Misc Expense	3,464	3,277	2,988	3,142	5,205	5,681	8,913	7,473	WP 4-3, Line 28
2	AK	Manage Environmental Oper	938	813	750	586	1,046	1,136	1,163	1,167	WP 4-3, Line 39
3	AX	Maint Resv.Dams&Waterways	22,163	26,883	17,128	20,163	28,426	24,540	27,784	28,883	WP 4-9, Line 288
4	AY	Habitat and Species Protection	85	89	114	130	112	251	259	267	WP 4-9, Line 293
5	BC	Perf Reimburs Wk for Oth	52	(77)	46	(163)	23				WP 4-9, Line 304
6	EP	Manage Property & Bldgs	775	1,028	1,209	1,095	1,400	1,175	1,213	1,254	WP 4-10, Line 314
7	ES	Implement Environment Projects	476	555	121	4					WP 4-10, Line 318
8	IG	Manage Var Bal Acct Processes	9,107	11,740	12,025	17,915	16,954	26,556	30,948	30,552	WP 4-12, Line 408
9	KG	Operate Hydro Generation	32,900	31,685	29,971	30,290	43,462	36,285	36,107	37,091	WP 4-15, Line 551
10	KH	Maint Hydro Generating Equip	22,047	21,433	19,581	21,745	23,121	23,493	23,134	23,640	WP 4-18, Line 694
11	KI	Maint Hydro Bldg,Grnd,Infrast	9,008	12,495	5,939	7,890	8,946	10,429	12,073	14,590	WP 4-20, Line 791
12	KJ	License Compliance Hydro Gen	24,054	20,973	18,611	19,646	21,964	24,211	24,142	24,179	WP 4-23, Line 882
13	LX	Catastrophic Events						78	81	84	WP 4-23, Line 885
14	OM	Operational Management	3,029	3,353	1,830	1,631	2,794	2,647	2,732	3,180	WP 4-23, Line 908
15	OS	Operational Support	1,795	4,606	4,607	3,846	2,836	3,794	3,916	4,047	WP 4-23, Line 925
16	ZC	Corporate Items	2,133	1,762	1,796	1,722	2,008	1,500	1,500	1,500	WP 4-24, Line 928
17	Grand Total		132,026	140,617	116,717	129,642	158,297	161,776	173,966	177,909	Sum of Lines 1-16
18		Total Hydro BA (MWC (G))	9,107	11,740	12,025	17,915	16,954	26,556	30,948	30,552	Line 8
19		Total Hydro O&M Expense	122,919	128,877	104,692	111,727	141,343	135,220	143,018	147,357	Line 17 less Line 18

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Expenses by Major Work Category
 (Thousands of Base Year Dollars)

Line No.	MWC	Description	2016		2017		2018		2019		2020		2021		2022		2023	
			Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Forecast	Forecast	Forecast
1	AB	Misc Expense	3,784		3,521		3,073		3,144		5,205		5,681		8,664		7,039	
2	AK	Manage Environmental Oper	1,041		883		782		595		1,046		1,114		1,105		1,073	
3	AX	Maint Resv,Dams&Waterways	24,328		28,774		17,575		20,044		28,426		24,373		26,782		26,957	
4	AY	Habitat and Species Protection	94		97		120		132		112		246		246		245	
5	BC	Perf Reimburs Wk for Oth	390		(2)		74		(175)		23				(25)		(51)	
6	EP	Manage Property & Bldgs	869		1,124		1,278		1,117		1,400		1,148		1,146		1,145	
7	ES	Implement Environment Projects	513		585		121		4									
8	IG	Manage Var Bal Acct Processes	9,788		12,353		11,944		17,456		16,954		26,685		30,250		28,955	
9	KG	Operate Hydro Generation	36,796		34,395		31,336		30,798		43,462		35,643		34,345		34,125	
10	KH	Maint Hydro Generating Equip	24,455		23,164		20,359		21,877		23,121		23,121		22,054		21,802	
11	KI	Maint Hydro Bldg,Gmd,Infrast	9,926		13,365		6,180		7,899		8,946		10,336		11,606		13,580	
12	KJ	License Compliance Hydro Gen	26,188		22,333		18,895		19,444		21,964		24,091		23,322		22,624	
13	LX	Catastrophic Events											78		78		78	
14	OM	Operational Management	3,369		3,631		1,927		1,667		2,794		2,576		2,570		2,891	
15	OS	Operational Support	1,818		4,919		4,796		3,928		2,836		3,711		3,705		3,702	
16	ZC	Corporate Items	2,366		1,909		1,865		1,744		2,008		1,485		1,440		1,394	
17	Total		145,725		151,053		120,325		129,675		158,297		160,288		167,289		165,559	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference	
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Forecast	Forecast	Forecast	Forecast		
1	AB	5031867	PCC-12679-Elec-PGEN-Hydro Balch Lodging	568.2	337.1	176.5	191.2	191.2	33.3	276.9	359.3	371.3									
2	AB	5031868	PCC-13548-Elec - PGen-Hydro Helms	819.0	752.9	481.8	578.6	578.6	833.7	678.3	700.0	723.4									
3	AB	5034769	PG O&M South Dir - Contract & Consulting	29.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4	AB	5034770	Asset Strategy Dir - Contract & Consult	82.1	(1.6)	59.7	-	-	10.0	-	-	-	-	-	-	-	-	-	-	-	
5	AB	5034771	Business Ops - Contract & Consulting	416.4	70.4	30.7	2.4	2.4	88.4	-	-	-	-	-	-	-	-	-	-	-	
6	AB	5034772	Engineering - Contract & Consulting	18.0	-	-	-	-	317.8	162.3	167.5	173.1									
7	AB	5034773	Project Execution - Contract & Consult	423.3	138.6	131.7	56.0	56.0	34.2	50.7	52.3	54.1									
8	AB	5034789	PG VP - Contract & Consult	105.5	120.3	92.4	419.1	419.1	207.0	66.0	68.1	70.4									
9	AB	5034909	PG Portion of Annual EEI Dues	99.4	102.3	104.0	103.6	103.6	106.6	104.1	107.5	111.1									
10	AB	5035350	Engineering & Projects - Facility Costs	284.7	234.5	206.6	135.1	135.1	128.3	135.0	135.0	135.0									
11	AB	5038369	PCC 15860 - Portfolio Strategy - Hydro	173.6	874.7	1,026.9	987.2	987.2	851.4	854.5	881.9	911.3									
12	AB	5051869	Indirect Labor OH Var - Power Gen	-	-	-	-	-	(0.0)	-	-	-									
13	AB	5248117	SQS: Energy Storage RFO	4.0	0.0	-	-	-	-	-	-	-									
14	AB	5250993	PE Monitoring Plan - Exp	11.6	-	-	-	-	-	-	-	-									
15	AB	5251412	Hydro PH Disposition Support	238.6	418.5	639.9	413.6	413.6	526.6	750.0	774.1	799.1	WP 4-236								
16	AB	5253198	PG Probability Risk Assessment	117.2	14.0	-	-	-	-	120.0	123.8	128.0									
17	AB	5254976	Pumped Storage Due Diligence	49.4	(8.2)	-	-	-	-	-	-	-									
18	AB	5255065	Proj. Mgmt. - Systems / Tools	23.5	223.6	38.1	4.0	4.0	4.2	-	-	-									
19	AB	5261153	Powerhouse Decommissioning Studies	-	-	-	-	-	174.4	500.0	500.0	500.0	WP 4-273								
20	AB	5263272	ENGR: Risk Quantification-RAMP/RIBA 2.0	-	-	-	2.5	2.5	-	-	-	-									
21	AB	5265077	FSP: Dam Safety 2.0 Implementation	-	-	-	212.2	212.2	903.9	-	-	-									
22	AB	5265792	AM: Applications and Tools	-	-	-	36.5	36.5	390.2	40.0	44.0	40.0									
23	AB	5268973	Spillway Contracts and Consulting SAIP	-	-	-	-	-	230.3	-	-	-									
24	AB	5269273	ISO 55000 Certification	-	-	-	-	-	359.6	1,943.0	2,000.0	450.0	WP 4-277								
25	AB	5271874	New Gen Studies	-	-	-	-	-	4.6	-	-	-									
26	AB	5272412	AM: Data Governance	-	-	-	-	-	-	-	-	-									
27	AB	5272438	Geoscience Engineering and Risk Research	-	-	-	-	-	-	-	2,800.0	2,800.0	WP 4-275								
28	AB	AB Total		3,464	3,277	2,988	3,142	3,142	5,205	5,681	8,913	7,473	Sum of Lines 1-27								
29	AB																				
30	AK	5000493	Shasta Manage Environmental Opns	208.8	177.1	141.7	113.6	113.6	257.8	266.4	275.0	284.2									
31	AK	5000494	DeSabra Manage Environmental Opns	184.1	146.7	141.1	142.3	142.3	249.3	220.1	227.1	234.7									
32	AK	5000495	Drum Manage Environmental Opns	83.7	84.5	93.0	87.0	87.0	114.7	92.2	95.1	98.3									
33	AK	5000496	ML Manage Environmental Opns	66.8	67.9	74.5	64.0	64.0	155.6	91.0	93.9	97.0									
34	AK	5000497	KCV Manage Environmental Opns	122.5	120.3	136.1	107.2	107.2	133.1	133.8	138.1	142.7									
35	AK	5000498	Helms Manage Environmental	76.4	60.0	45.7	47.8	47.8	51.3	80.3	82.9	85.7									
36	AK	5009059	Potter Valley Manage Environmental Op.	1.1	0.9	1.2	0.9	0.9	-	8.1	8.4	8.7									
37	AK	5011570	AM: Powerhouse SPCC Plan Program	194.6	155.5	116.5	23.2	23.2	84.6	143.7	142.8	166.2									
38	AK	5053409	DeSabra Manage Enviro Projects	-	-	-	-	-	-	100.0	100.0	50.0									
39	AK	AK Total		938	813	750	586	586	1,046	1,136	1,163	1,167	Sum of Lines 30-38								
40	AK																				
41	AX	5000528	Shasta Maint Reservoirs/Dams/Waterways	280.2	524.7	61.8	868.8	868.8	579.2	532.7	549.7	568.1									
42	AX	5000529	DeSabra Maint Reservoirs/Dams/Waterways	902.8	161.2	568.0	313.0	313.0	370.9	626.7	646.8	668.4									
43	AX	5000530	Drum Maint Reservoirs/Dams/Waterways	1,431.6	1,149.6	1,300.1	1,555.0	1,555.0	2,339.1	1,537.7	1,587.0	1,640.0									
44	AX	5000531	ML Maint Reservoirs/Dams/Waterways	1,736.2	1,143.4	1,413.7	1,068.6	1,068.6	2,643.1	1,160.0	1,197.2	1,237.2									
45	AX	5000532	KCV Maint Reservoirs/Dams/Waterways	1,490.7	812.0	563.9	684.8	684.8	834.8	1,070.6	1,105.0	1,141.9									

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023			
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Reference	Forecast	Reference		
46 AX		5000533	Helms Maint Reservoirs/Dams/Waterways	120.7	108.8	88.4	50.9	43.5	123.2	127.1	131.4										
47 AX		5004009	Non Req Facility Safety Program	264.2	131.4	134.8	166.4	95.7	161.4	143.6	194.8										
48 AX		5008809	DeSabra Waterway Support	91.6	2,617.8	176.5	99.1	90.9	-	-	-										
49 AX		5008820	Shasta Waterway Support	73.9	93.4	-	-	-	-	-	-										
50 AX		5009055	Potter Valley Maintain Dams & Reservoirs	392.8	529.7	268.6	311.3	605.5	406.7	419.7	433.7										
51 AX		5010036	Helms NonReqd Facility Safety Prog	0.5	-	-	-	16.5	-	-	-										
52 AX		5010039	ML NonReq Facility Safety Prog	0.9	-	-	-	-	-	-	-										
53 AX		5014629	Drum Vegetation Management	610.4	799.5	866.1	900.9	1,155.9	1,024.0	889.6	919.3										
54 AX		5014630	ML Vegetation Management	852.4	874.3	756.3	864.3	976.7	953.1	564.1	583.0										
55 AX		5015289	Camp One Maint Reservoirs/Dams/Waterways	1,794.3	1,734.5	1,069.7	665.3	588.9	1,044.5	1,078.0	1,114.0										
56 AX		5015292	Mannton Main Reservoirs/Dams/Waterways	1,244.2	989.8	1,034.9	1,253.6	1,172.4	1,171.3	1,208.9	1,249.2										
57 AX		5018429	Pit 1 Levee Maintenance	125.9	102.5	170.1	198.6	188.8	155.5	160.5	165.8										
58 AX		5018935	KCV Vegetation Management	432.7	677.1	503.3	509.0	704.3	595.2	614.3	634.8										
59 AX		5020449	DeSabra NFFR Vegetation Mgmt	257.0	299.6	168.8	218.4	232.4	252.3	260.4	269.1										
60 AX		5020450	Camp One Vegetation Mgmt	311.2	278.6	173.7	472.9	355.0	242.9	250.7	259.0										
61 AX		5020615	AM: Water Conveyance Assessments Prgm	1,012.9	809.2	733.3	232.6	492.1	814.9	809.8	730.0										
62 AX		5020617	AM: Penstock Program	1,886.5	1,894.2	1,534.3	1,433.5	2,135.2	1,309.0	1,300.8	1,514.5										
63 AX		5020623	AM: Cableways Program	141.0	196.1	143.0	111.8	98.0	130.6	129.8	151.1										
64 AX		5020624	AM: Pressure Boundaries Program	362.3	393.5	419.5	568.3	299.2	439.0	436.2	507.9										
65 AX		5021709	AM: Dam Safety Program	-	-	-	1.7	2,466.4	-	-	-										
66 AX		5021849	Helms Vegetation Management	49.1	93.8	94.0	110.4	182.8	183.5	189.4	195.7										
67 AX		5022128	Potter Valley - Gravel Removal	-	0.7	-	-	4.9	-	-	-										
68 AX		5025049	Hydro SCV - MWC AX Maint Resv,Dams&Water	105.2	176.6	0.6	(0.0)	-	-	-	-										
69 AX		5029209	Easement Management	115.9	16.2	-	-	-	-	-	-										
70 AX		5043750	SCV - 11587 - Hydro Construction -MWC AX	-	-	336.1	27.3	58.2	-	-	-										
71 AX		5043756	SCV - 11634 - HYDRO PROJ MGMT - MWC AX	-	-	(183.3)	78.7	(22.3)	-	-	-										
72 AX		5043759	SCV - 14054 - PG Contractors - MWC AX	-	-	90.2	364.6	(2.9)	-	-	-										
73 AX		5047493	DeSabra Spillways Maint SAIP	-	-	-	105.8	-	-	-	-										
74 AX		5047494	Shasta Spillways Maint SAIP	-	-	-	8.2	-	-	-	-										
75 AX		5047495	Drum Spillways Maint SAIP	-	-	-	64.7	2.1	-	-	-										
76 AX		5051988	Dam Safety Expense	-	-	-	-	542.7	-	-	-										
77 AX		5053589	AM: CO2 Removal Program	-	-	-	-	124.2	-	-	-										
78 AX		5200049	South Yuba Flumes Maintenance 2016	370.9	-	-	-	-	-	-	-										
79 AX		5202233	Upper Drum Conveyance Patching Annual	53.7	-	91.9	66.4	137.3	209.0	200.0	250.0										
80 AX		5215601	Lake valley Conveyance Patching Semi Ann	-	-	-	-	22.2	-	-	-										
81 AX		5215750	Hamilton Br Canal - Repair Undermining	1.2	-	-	-	-	-	-	-										
82 AX		5215762	Pit 5 Dredge Tailrace	0.2	-	-	-	-	-	-	-										
83 AX		5215872	Almanor Dredge Prattville Intake	82.0	152.9	150.1	0.2	2.2	-	-	-										
84 AX		5216173	South Conveyance Patching Annual	-	-	-	-	-	104.4	100.0	130.0										
85 AX		5216174	Wise Canal Patching Annual	-	-	-	-	-	100.0	100.0	150.0										
86 AX		5216175	Bear River Conveyance Patching Annual	250.0	-	-	-	-	-	-	-										
87 AX		5216180	Ham Br. Canal - seal joints, coat	-	-	-	-	-	-	-	-										
88 AX		5218518	PV Evaluate Gates at Scott Dam	(2.9)	-	-	-	-	-	-	-										
89 AX		5219994	Canyon Dam Outlet Protection	-	-	103.4	11.5	-	-	-	-										

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
90 AX		5222749	Main Tuolumne Canal - Flume Maint (GC)	0.0	-	-	-	-	-	-	-	-
91 AX		5222892	Desabla Evaluate Butte Siphon Roll-Out	-	-	-	-	-	-	-	150.0	-
92 AX		5228492	Helms - Tunnel Safety Study	0.9	-	-	-	-	-	-	-	-
93 AX		5230672	Crane Valley - Ditch Repairs	52.5	-	-	-	-	-	-	-	-
94 AX		5235191	Lyons Dam foundation dental grouting	27.3	-	-	-	-	-	-	-	-
95 AX		5236323	Lyons Dam foundation dental grouting	-	23.0	797.1	5.0	-	-	750.0	-	-
96 AX		5236324	Cresta Repair Tailrace Erosion	-	-	-	57.9	35.8	100.0	750.0	500.0	WP 4-306
97 AX		5236360	Rock Cr Dam Paint Gates	-	24.1	796.9	8.6	-	-	750.0	-	-
98 AX		5238788	Lower Drum Spillway Review & Improv	1.4	-	-	-	-	-	-	-	-
99 AX		5241197	Tiger Creek Canal - Clear Sub-Drains	-	-	10.6	0.2	-	-	-	-	-
100 AX		5241206	Drum Canal undercrossing Inspection	-	-	-	-	-	75.0	40.0	40.0	-
101 AX		5241277	Caribou Penstock Monitoring	14.4	1.0	-	0.5	-	-	-	-	-
102 AX		5241280	Hamilton Br Repair Indian Ole Leak	-	-	14.4	3.2	-	-	-	-	-
103 AX		5241319	Lyons Dam - Repair Concrete Face	50.0	-	-	-	-	-	-	-	-
104 AX		5244113	PV Van Arsdale Fish Screen Alarms	1.4	-	-	-	-	-	-	-	-
105 AX		5245337	Pit 3 RCC Repair Tunnel Spall	132.4	(202.1)	-	-	-	-	-	-	-
106 AX		5245340	Pit 1 Spillway Repair Upstm Rt Abutment	7.5	0.9	-	-	-	-	-	-	-
107 AX		5245341	Pit 7 LLO #1 Repair and Stoplog Removal	(25.9)	-	-	-	-	-	-	-	-
108 AX		5245415	Drum PH Road Culvert Repairs (Cancelled)	0.0	-	-	-	-	-	-	-	-
109 AX		5245416	Drum Tunnel Expense Repair - Grouting	690.8	(2.0)	-	-	-	-	-	-	-
110 AX		5245420	Fordyce Dam Leakage Reduction EXPENSE	114.7	7.3	0.0	-	-	-	-	-	-
111 AX		5245423	Salt Springs Dam Radial Gate Repair	5.5	6.7	399.2	286.0	-	-	-	-	-
112 AX		5245426	Spaulding Dam 1 Patching	439.4	1.9	-	-	811.3	50.0	-	-	-
113 AX		5245428	Stan - Sand Bar Dam Evaluate Fix	-	-	-	-	-	50.0	-	-	-
114 AX		5245432	Tiger Creek Afterbay LLO	990.0	22.4	-	-	-	-	-	-	-
115 AX		5245433	Tiger Creek Afterbay Radial Gate Repair	44.9	15.2	-	-	-	-	-	-	-
116 AX		5245437	Belden Siphon & Penstock Drainage Repair	61.6	0.4	-	-	-	-	-	-	-
117 AX		5245444	Rock Cr Dam Repair Aux Supply Pipe	52.3	2.4	-	-	-	-	-	-	-
118 AX		5245743	Hamilton Br Repair Clear Cr Undermine	46.6	(0.0)	-	-	-	-	-	100.0	-
119 AX		5245763	Pit 7 Dam Radial Gate Assessment	14.6	(1.0)	-	-	-	-	-	-	-
120 AX		5245766	Pos Dam Bridge Seismic Structural Analysis	-	-	-	-	-	150.0	-	-	-
121 AX		5246195	Volta 1 Lake Nora Penst Foundation Mitig	119.2	22.7	-	-	-	-	-	-	-
122 AX		5247378	Upper Bear Dam - Repair Gunite Liner	91.3	39.7	-	-	-	-	-	-	-
123 AX		5247476	Lower Bear Dam (Mok) Repr U/S Concr Face	-	-	-	-	-	147.0	-	-	-
124 AX		5247532	Hendricks 6/4 Flume Repair	0.1	-	-	-	-	-	-	-	-
125 AX		5247652	Volta 1 Lake Grace Repair Penstk Joint	0.2	-	-	-	-	-	-	-	-
126 AX		5247774	Inskip Diversion Repr Spillway Cladding	309.1	(2.8)	-	-	-	-	-	-	-
127 AX		5247934	Emergent Projects - Expense	-	-	-	-	-	2,250.0	1,771.4	-	WP 4-240
128 AX		5248494	Caribou 2 Penstock Repack Joint 6	0.3	-	-	-	-	-	-	-	-
129 AX		5249939	Tule - Wood Stave Pipe Repairs	41.6	-	-	-	-	-	-	-	-
130 AX		5250098	North Battle Creek Dam Repair Upstr Face	124.5	726.3	1.5	-	-	-	-	-	-
131 AX		5250237	Rock Cr Dam Repair Toe Voids	213.4	220.0	(148.5)	0.0	-	-	-	-	-
132 AX		5250362	AG Wishon - Penstock Alt Analysis	6.2	9.9	-	-	-	-	-	-	-
133 AX		5250364	Kings River - Drain Tunnel & TSV Inspect	27.9	-	-	-	-	-	-	-	-

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference		
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Forecast	Forecast	Forecast			
134 AX		5250575	Cow Creek Penstock Support Repairs	12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
135 AX		5250593	Volta 1 Repl McCumber Gate Actuator Oil	22.2	8.9	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
136 AX		5251303	Lyons Dam foundation dental grouting	14.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
137 AX		5251552	South Yuba Canal Patching	58.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
138 AX		5251694	Drum PS3 Intake Gate Investigation	114.6	(0.7)	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
139 AX		5251695	Strawberry Dam LLO Repair Gate Valve	281.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
140 AX		5251733	Poe Tunnel Temp Repair 2015	923.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
141 AX		5251822	Drum PH Road Culvert Repairs	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
142 AX		5252259	Lime Saddle Penstock Leak Perm Repair	58.9	24.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
143 AX		5252692	Pit 6 Dam Radial Gate Assessment	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
144 AX		5252792	SAH - Bark Beetle Veg Mgmt	18.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
145 AX		5253132	Spaulding Dam LLO Dredge	3.2	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
146 AX		5253192	Cow Creek Penstock Support Reinforcement	13.1	42.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
147 AX		5253553	Volta 1 Lake Grace Embankment Repairs	-	118.5	69.3	49.3	851.8	50.0	-	-	-	-	-	-	-	-	-	-	-	-	
148 AX		5253874	Caribou 1 Intake Repair Walkway Anchor	14.0	16.9	91.0	82.1	143.5	50.0	-	-	-	-	-	-	-	-	-	-	-	-	
149 AX		5253923	Inskip Header Box Sedimentation Evaluati	41.4	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
150 AX		5253924	Cape Horn Dam Abut Stairs Veg Mgmt	12.6	91.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
151 AX		5253952	South PH Refurbish Trashrake Expense	65.2	116.7	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
152 AX		5254421	Cresta Dam Assess Drum Gate #1	-	91.0	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
153 AX		5254422	Grizzly Forebay Surface Debris Removal	-	-	-	-	-	-	0.7	1.2	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
154 AX		5254424	Grizzly Fryby Remove Debris Subsurface	-	31.3	21.3	108.7	2,165.6	50.0	-	-	-	-	-	-	-	-	-	-	-	-	
155 AX		5254425	Cresta Tunnel Clean Surge Chamber	-	16.0	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
156 AX		5254426	Cresta Dam Inspect Intake Gate	-	19.3	(2.2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
157 AX		5254494	Caribou 1 Pst Rock Anchor Liftoff Test	-	43.9	(43.9)	28.1	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	
158 AX		5254495	Caribou 2 Penstock Expansion Joint Eval	-	19.1	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
159 AX		5254498	Belden Spillway Wall Panel Alt Analysis	-	209.5	14.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
160 AX		5254653	Mok - Lwr Blue - Repair M-3 Weir	-	3.8	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
161 AX		5254654	Tiger Ck Canal - Sta 196 - Manage Slide	-	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
162 AX		5255352	Inskip Eagle Cyn DivDam Abutment Erosion	-	15.5	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
163 AX		5255413	Mok Up Blue Seismic Stability Mitigation	0.2	21.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
164 AX		5255872	Chili Bar Bypass Tailrace Gate Repair	-	37.3	11.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
165 AX		5255894	South Yuba Conveyance Patching Annual	-	481.8	368.8	262.6	412.2	350.0	-	-	-	-	-	-	-	-	-	-	-	-	
166 AX		5255895	Phoenix Main Tuolumne Flume Maint 2017	-	38.5	70.0	3.5	12.3	-	-	-	-	-	-	-	-	-	-	-	-	-	
167 AX		5256058	Drum Storm Work	-	934.1	(1.6)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
168 AX		5256059	ML Storm Work	-	981.9	2.0	(235.1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
169 AX		5256094	Lower Drum Conveyance Patching Annual	-	283.4	316.5	140.4	292.6	-	-	-	-	-	-	-	-	-	-	-	-	-	
170 AX		5256125	2017 Mok Storm Dmg TC Abay Dredge	-	755.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
171 AX		5256136	Upper Drum Conveyance Patching 2017	-	85.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
172 AX		5256352	Wishon Dam - Repair Shoulder	-	49.5	15.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
173 AX		5256632	Pit 5 PH Dredge Tailrace 2017 Storm Dmg	-	2,819.1	(2,322.4)	(496.7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
174 AX		5256673	South Yuba Canal Patching	-	52.0	48.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
175 AX		5256813	KCV - 2017 STORM DAMAGE	-	521.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
176 AX		5256814	KERN - 2017 STORM DAMAGE	-	209.9	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
177 AX		5257172	LA Tower Recondition Gate Operators	-	256.7	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference	
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted		
178 AX		5257552	Rock Cr Dam Hinge Plate Repair	-	239.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
179 AX		5257852	Helms - 2017 Penstock 1 Weld 2 Inspec	-	157.2	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	
180 AX		5257872	Rock Cr PH Recoat Valve House Penstock	-	110.8	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	
181 AX		5257952	Volta 1 Lake Nora Embankment Repairs	-	-	-	41.8	-	36.9	-	552.6	-	47.1	-	-	-	-	-	-	-	
182 AX		5257976	Tiger Creek Penstock Bellows Leak	-	37.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
183 AX		5258062	Tiger Crk Abay Dam DS Bulkhead Removal	-	94.0	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	
184 AX		5258066	PV Scott Dam Recoat US Slide Gates	-	-	-	32.1	-	34.0	-	1,069.1	-	-	-	-	-	-	-	-	-	
185 AX		5258413	Pit 7 Repr Spillway Flip Bucket Strm Dmg	-	-	-	110.6	-	(110.6)	-	-	-	-	-	-	-	-	-	-	-	
186 AX		5258674	Belden Spillway Hoist Deck Spalling Eval	-	-	-	23.3	-	4.1	-	-	-	-	-	-	-	-	-	-	-	
187 AX		5258698	Drum Rock Crk Res ROV Inspection	-	13.8	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	
188 AX		5258701	Tiger Crk Reg Resurface Spillway Chute	-	64.8	-	79.9	-	-	-	-	-	-	-	-	-	-	-	-	-	
189 AX		5258709	Drum Canal US Hwy 20 Uplift	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	
190 AX		5258852	Poe Dam Repair Toe Voids	-	-	-	87.1	-	132.5	-	45.5	-	-	-	-	3,192.0	-	-	640.0	WP 4-308	
191 AX		5258853	DeSabra Forebay LLO Abandon Aoa	-	-	-	-	-	-	-	18.9	-	-	-	-	-	-	-	-	-	
192 AX		5259155	Spaulding 3 Penstock Leak Repair	-	28.7	-	58.2	-	-	-	-	-	-	-	-	-	-	-	-	-	
193 AX		5260054	Upper Wise Tunnel 8 Grouting	-	-	-	732.1	-	10.3	-	-	-	-	-	-	-	-	-	-	-	
194 AX		5260093	Wise Forebay Tree Removal/Rebuild Berm	-	-	-	0.2	-	51.1	-	318.6	-	100.0	-	610.0	-	-	-	-	-	
195 AX		5260125	Pit 6 Unit 1 Recoat Intake Gates	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	
196 AX		5260126	Pit 7 U1 Recoat Penstock Intake Gates	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	
197 AX		5260127	Pit 6 Unit 2 Recoat Intake Gates	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	
198 AX		5260128	Pit 7 Unit 2 Recoat Intake Gates	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	
199 AX		5260129	Pit 6 Spilwly Aprn/Tailrce Remove Block 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
200 AX		5260382	Helms Penstock Field Weld Reinspections	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
201 AX		5260392	Kelly Lake Spillway Repair	-	-	-	100.3	-	(24.0)	-	-	-	-	-	-	-	-	-	-	-	
202 AX		5260394	Towle Canal Tunnel 1 Survey	-	-	-	22.8	-	-	-	-	-	-	-	-	-	-	-	-	-	
203 AX		5260447	Upr Rck (Drum) Restor Crst to Design Elev	-	-	-	115.2	-	-	-	-	-	-	-	-	-	-	-	-	-	
204 AX		5260792	Drum - SYC 8.5 Mile Avalanche	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	
205 AX		5260812	Chilli Bar Gate Hoists Wire Rope Replace	-	-	-	77.3	-	-	-	-	-	-	-	-	-	-	-	-	-	
206 AX		5260813	Chilli Bar LLO Gate Inspection	-	-	-	293.6	-	9.7	-	-	-	-	-	-	-	-	-	-	-	
207 AX		5260894	Wishon Dam - Upstream Face Repair	-	-	-	187.0	-	-	-	-	-	-	-	-	-	-	-	-	-	
208 AX		5260994	Fordyce Paint Radial Gates 2019	-	-	-	-	-	4.0	-	67.4	-	150.0	-	-	-	-	-	-	-	
209 AX		5261073	PV Evaluate Old Intake	-	-	-	-	-	7.5	-	18.8	-	-	-	-	-	-	-	-	-	
210 AX		5261777	Rock Creek Aux Dam Tree Root Removal	-	-	-	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-	
211 AX		5261837	McCloud Spillway Repairs SAIP	-	-	-	553.0	-	1.3	-	-	-	-	-	-	-	-	-	-	-	
212 AX		5261873	LA Tower Evaluate Low Level Outlet Gates	-	-	-	23.5	-	12.6	-	-	-	-	-	-	-	-	-	-	-	
213 AX		5261874	Lake Fordyce Spillway Repair SAIP	-	-	-	37.4	-	(8.8)	-	-	-	-	-	-	-	-	-	-	-	
214 AX		5261875	Upper Bear Spillway Repair SAIP	-	-	-	41.4	-	-	-	-	-	-	-	-	-	-	-	-	-	
215 AX		5261876	Tiger Creek Reg Spillway Repair SAIP	-	-	-	0.5	-	317.7	-	49.6	-	-	-	-	-	-	-	-	-	
216 AX		5261877	Grizzly Cr Xing Assess and Repair Tunnel	-	-	-	3.2	-	20.2	-	12.3	-	-	-	100.0	-	-	-	-	-	1,000.0 WP 4-306
217 AX		5262332	Mok Twin Lakes Crest Width Improvements	-	-	-	71.0	-	-	-	-	-	-	-	-	-	-	-	-	-	
218 AX		5262369	Volta 1 Lake Nora Repair Spill Basin	-	-	-	-	-	-	-	27.0	-	-	-	-	-	-	-	-	-	
219 AX		5262612	Lake Valley Spillway Repair SAIP	-	-	-	35.3	-	-	-	-	-	-	-	-	-	-	-	-	-	
220 AX		5262613	Kidd Lake Spillway Repair SAIP	-	-	-	57.9	-	(1.2)	-	-	-	-	-	-	-	-	-	-	-	
221 AX		5262614	Wise Forebay Spillway Repair SAIP	-	-	-	50.4	-	0.8	-	-	-	-	-	-	-	-	-	-	-	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Reference	Forecast	Reference	
222 AX		5263072	Grizzly FB Dam Alt Analysis	-	-	-	46.8	-	-	215.7	60.4	400.0	-	-	-	-	-	-	-	-
223 AX		5263074	Cresta Repair 24" Bypass Valve Leak	-	-	-	-	-	17.8	(0.3)	-	-	-	-	-	-	-	-	-	-
224 AX		5263087	Halsey Afterbay Spillway Repair SAIP	-	-	-	34.2	-	-	-	-	-	-	-	-	-	-	-	-	-
225 AX		5263088	Halsey Forebay Spillway Repair SAIP	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-
226 AX		5263113	Rucker Lake Spillway Repair SAIP	-	-	-	18.4	-	-	-	-	-	-	-	-	-	-	-	-	-
227 AX		5263116	Spaulding 2 Aux Spillway Repair SAIP	-	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-
228 AX		5263117	Spaulding 2 Primary Spillway Repair SAIP	-	-	-	25.0	-	50.5	-	-	-	-	-	-	-	-	-	-	-
229 AX		5263119	Upper Peak Lake Spillway Repair SAIP	-	-	-	46.7	-	-	-	-	-	-	-	-	-	-	-	-	-
230 AX		5263148	Pit 5 Unit 4 Repair Penstock	-	-	-	421.5	-	103.2	-	-	-	-	-	-	-	-	-	-	-
231 AX		5263207	Kelly Lake (Drum) Remove Tree Stumps	-	-	-	-	-	8.2	5.4	40.0	450.0	-	-	-	-	-	-	-	-
232 AX		5263209	Lwr Bear LLO Restore Pipe Fasteners	-	-	-	-	-	-	-	30.0	-	-	-	-	-	-	-	-	-
233 AX		5263353	Dam Surveillance IA Action Plan	-	-	-	-	-	108.0	-	-	-	-	-	-	-	-	-	-	-
234 AX		5263402	RCC Dams LLO Restoration Evaluation	-	-	-	-	-	33.0	35.6	-	-	-	-	-	-	-	-	-	-
235 AX		5263403	Caribou 2 Penstock Modify Rock Bolts	-	-	-	-	-	1.6	12.5	-	-	-	-	-	-	-	-	-	250.0
236 AX		5263404	Caribou 2 Penstock Slope Lidar Phase 2	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-
237 AX		5263407	Bucks Creek Pnstk Erosion Mitigation	-	-	-	-	-	-	41.2	1,820.0	250.0	250.0	WP 4-309	-	-	-	-	-	-
238 AX		5263639	Inskip Repair Eagle Canyon Flume	-	-	-	160.4	-	0.3	-	-	-	-	-	-	-	-	-	-	-
239 AX		5263732	DeSabra 2018 Camp Fire Response	-	-	-	865.7	-	2,294.5	424.7	-	-	-	-	-	-	-	-	-	-
240 AX		5264902	Tiger Creek AB Repair Structural Members	-	-	-	-	-	231.6	1,034.3	12.9	-	-	-	-	-	-	-	-	-
241 AX		5264955	DeSabra 2019 CEMA Storm Response	-	-	-	-	-	387.6	-	-	-	-	-	-	-	-	-	-	-
242 AX		5265076	Kunkle Reservoir Make Safe	-	-	-	-	-	31.9	-	-	-	-	-	-	-	-	-	-	-
243 AX		5265412	Drum - Canal Escape Aid Design/Eval	-	-	-	-	-	76.9	49.9	-	-	-	-	-	-	-	-	-	-
244 AX		5265852	Kilarc Canal Repairs	-	-	-	-	-	9.7	-	-	-	-	-	-	-	-	-	-	-
245 AX		5266012	Cape Horn Dam Fish Screen Ladder AOA	-	-	-	-	-	7.3	0.4	-	-	-	-	-	-	-	-	-	-
246 AX		5267075	Mannton Flume Board Widening	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
247 AX		5267076	Pit 3 Refurbish LLO No. 1 (expense)	-	-	-	-	-	-	-	30.6	250.0	1,792.0	5,000.0	WP 4-146	-	-	-	-	-
248 AX		5267516	McCloud Dam LLO Hydraulic Leak Repair	-	-	-	-	-	2,418.6	(354.7)	-	-	-	-	-	-	-	-	-	-
249 AX		5267522	Upper Blue Lake Dam SWPPP BMPs	-	-	-	-	-	-	-	5.0	5.0	-	-	-	-	-	-	-	-
250 AX		5267538	DeSabra Forebay Slope Erosion Control	-	-	-	-	-	-	78.2	100.0	-	-	-	-	-	-	-	-	-
251 AX		5267612	DeSabra Repair Fishing Platform	-	-	-	-	-	-	61.9	150.0	-	-	-	-	-	-	-	-	-
252 AX		5267614	Lovelock Tunnel Repair Liner Boards	-	-	-	-	-	-	91.7	400.0	-	-	-	-	-	-	-	-	-
253 AX		5267615	Canyon Dam Evaluate Outlet Structure	-	-	-	-	-	-	35.0	200.0	-	-	-	-	-	-	-	-	-
254 AX		5269152	Cherokee Fire Expense	-	-	-	56.0	-	-	-	-	-	-	-	-	-	-	-	-	-
255 AX		5269295	Pit 1 Forebay Spillway DSE Support SAIP	-	-	-	-	-	-	5.5	-	-	-	-	-	-	-	-	-	-
256 AX		5269441	Pit 6 Dam Repair Drains/Piezors	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-
257 AX		5269442	Pit 7 Dam Repair Drains/Piezors	-	-	-	-	-	-	241.9	-	-	-	-	-	-	-	-	-	-
258 AX		5269692	McCloud Hawkins Crk Xing Repair Footings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.0
259 AX		5270152	Pit 4 Dam Paint Steel Footbridge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260 AX		5270895	Pit 6 Debris Boom Anchor Recoating	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300.0
261 AX		5270896	Coleman Forebay Install Seepage Monitor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
262 AX		5270897	JBB ICD Vertical Access Shaft Evaluation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0
263 AX		5271254	JBB ICD LLO Temp Hydraulic Hose	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
264 AX		5271349	Relief Dam - Maintain U/S Liner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	750.0
265 AX		5271350	Bear River Canal Patching	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	WP 4-196
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250.0

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
266 AX		5271351	Drum - Remove Dead and Diseased Trees	-	-	-	-	-	150.0	150.0	300.0	
267 AX		5271381	Poe Surge Shaft Repair Sink Holes	-	-	-	-	-	-	-	647.0	
268 AX		5271412	Lower Bear LLO Recoat Valves	-	-	-	-	-	300.0	-	-	
269 AX		5271413	Spaulding 1 Gov/PRV Controls Evaluation	-	-	-	-	-	500	-	200.0	
270 AX		5271414	Spaulding Dam Radial Gate Repair	-	-	-	-	-	75.0	130.0	-	
271 AX		5271415	Lyons Dam Radial Gate Repair	-	-	-	-	-	200.0	-	-	
272 AX		5271416	Wise Forebay Increase Flow Capacity	-	-	-	-	-	100.0	75.0	-	
273 AX		5271417	Drum Physical Security Repair/Mitigation	-	-	-	-	-	152.3	-	-	
274 AX		5271419	Tgr Crk AB Eval Radial Gates Hoists Auto	-	-	-	-	-	150.0	-	-	
275 AX		5271420	Motherlode Physical Security Repair/Miti	-	-	-	-	-	110.8	-	-	
276 AX		5271421	Lyons Dam Radial Gate Spillway Concr Rpr	-	-	-	-	-	100.0	-	-	
277 AX		5271426	Drum 1 PH - Evaluate SC Automation	-	-	-	-	-	30.0	-	-	
278 AX		5271427	Drum 2 PH - Evaluate SC Automation	-	-	-	-	-	30.0	-	-	
279 AX		5271428	Wise PH - Evaluate SC Automation	-	-	-	-	-	30.0	-	-	
280 AX		5271438	Shasta Dam Infrastructure Maintenance	-	-	-	-	-	-	-	287.6	
281 AX		5271456	Helms Tunnel Scaling	-	-	-	-	-	100.0	-	125.0	
282 AX		5271458	Kerckhoff 2 Tunnel Drain	-	-	-	-	-	125.0	-	-	
283 AX		5271462	SAH Physical Security Repair/Mitigation	-	-	-	-	-	108.0	-	-	
284 AX		5271463	Courtright Dam Parapet Manway Fill	-	-	-	-	-	35.0	-	-	
285 AX		5271464	Wishon Dam Parapet Manway Fill	-	-	-	-	-	35.0	-	-	
286 AX		5271602	Cole Creek Diversion Dam Dredge	-	-	-	-	-	-	-	250.0	
287 AX		5271842	DamWatch USES licensing fee & Supp. Serv	-	-	-	-	108.0	-	-	-	
288 AX		AX Total		22,163	26,883	17,128	20,163	28,426	24,540	27,784	28,883	Sum of Lines 42-287
289 AX		5018934	HL: VELB Permit Costs	10.8	3.5	-	-	-	10.4	10.7	11.1	
290 AY		5047952	HL: Zebra Quagga Prevention Program	60.4	83.7	113.1	129.9	112.3	240.3	248.1	256.3	
291 AY		5238780	Balch Abay - LLO Project Revegetation	14.0	1.7	1.3	0.4	-	-	-	-	
292 AY		AY Total		85	89	114	130	112	251	259	267	Sum of Lines 290-292
293 AY		5000584	YCWA Perform Reimbursable Work	16.2	-	-	-	-	-	-	-	
294 AY		5000590	MID Perform Reimbursable Work	-	(6.7)	(0.6)	0.4	-	-	-	-	
295 BC		5001764	PCWA Perform Reimburs Work-Irrig Distr	(7.1)	(0.4)	0.3	7.9	(8.4)	-	-	-	
296 BC		5004951	SID Perform Reimbursable Work	(0.0)	5.2	64.3	(62.6)	(5.2)	-	-	-	
297 BC		5012600	Grizzly Powerhouse O&M	52.3	(71.4)	(26.4)	(67.4)	156.3	-	-	-	
298 BC		5030729	Grizzly Reimbursable Capital Work	(25.8)	7.3	2.3	(9.6)	(107.2)	-	-	-	
299 BC		5243037	CalTrans Bridge Replacement Support	16.1	(11.5)	6.1	(31.7)	(12.6)	-	-	-	
300 BC		5255492	Merced Falls 2017 Outage	-	(0.0)	-	-	-	-	-	-	
301 BC		5259854	Merced Falls 2018 Outage	-	0.3	-	-	-	-	-	-	
302 BC		BC Total		52	-77	46	-163	23	0	0	0	Sum of Lines 295-303
303 BC		5001136	Desabla Manage Land Rights	211.2	397.3	554.7	525.8	578.5	556.2	574.1	593.2	
304 BC		5001493	KCV Land Right Management Services	181.4	170.6	229.3	180.3	309.4	133.0	137.3	141.9	
305 BC		5001497	Drum Manage Land Rights	115.3	130.3	130.1	113.3	199.0	127.0	131.1	135.5	
306 EP		5008821	Shasta Land Rights Support	159.8	193.8	176.0	198.9	220.4	219.9	226.9	234.5	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference		
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Forecast	Forecast	Forecast	Forecast				
310 EP		5009930	ML Manage Land Rights	45.2	78.1	50.3	50.4	50.4	50.4	75.9	60.8	62.8	64.9									
311 EP		5009931	Potter Valley Land Rights	61.5	54.8	26.7	25.9	16.8	78.6	81.2	83.9											
312 EP		5010249	Helms Manage Land Rights	0.3	0.9	0.3	0.3	0.3	-	-	-	-	-									
313 EP		5258794	PE: Rock Creek Yard Uninstall Trailers	-	2.3	42.0	-	-	-	-	-	-	-									
314 EP		EP Total		775	1,028	1,209	1,095	1,400	1,175	1,213	1,254	Sum of Lines 306-313										
315 EP		5029458	AM: Sumps System Program	123.8	36.3	-	-	-	-	-	-	-	-									
316 ES		5241292	Crane Valley Dam - Mitigation/Monitoring	352.0	518.9	120.8	4.2	-	-	-	-	-	-									
317 ES		ES Total		476	555	121	4	0	0	0	0	0	0									
318 ES		ES Total		476	555	121	4	0	0	0	0	0	0									
319 ES																						
320 IG		5018814	Des Cent LC - Lic Comp Stand Exp	76.5	20.4	-	-	-	-	-	-	-	-									
321 IG		5018815	Des Cent Pre/Post License Withdrawal	-	93.4	6.3	14.7	17.3	-	-	-	-	-									
322 IG		5020069	Chili Bar LC Execute L&EM - FERC 2155	74.7	150.1	110.9	96.2	53.7	-	-	-	-	-									
323 IG		5021931	UNFFR LC-Land Stand	-	-	-	-	-	-	-	-	1,768.9	1,144.2									
324 IG		5021932	UNFFR LC-Lic Comp Stand	-	-	-	-	-	120.0	98.0	933.5	933.5										
325 IG		5021933	UNFFR LC-OM Stand	-	-	-	-	-	177.0	531.6	523.6	523.6										
326 IG		5044150	PoELC-Implement Land Dept Plans	-	-	-	-	-	98.7	101.4	104.2	104.2										
327 IG		5044151	PoELC-O&M Conditions	-	-	-	-	-	-	2.1	286.3	286.3										
328 IG		5044152	PoELC-Implement Plans for Bio Measures	-	-	-	-	203.8	357.4	864.5	479.5	479.5										
329 IG		5046449	Poe LC - New License Conditions	-	-	-	-	35.9	43.0	5.4	5.6	5.7										
330 IG		5046516	PoELC-Implement Historic Properties Plan	-	-	-	-	-	16.3	16.7	17.2	17.2										
331 IG		5056356	ML DSOD Fees	288.4	301.6	407.1	488.5	488.0	520.1	536.8	554.7	554.7										
332 IG		5056357	Shasta DSOD Fees	-	-	-	-	-	377.9	390.0	403.0	403.0										
333 IG		5056358	Drum DSOD Fees	206.8	216.8	292.5	350.9	430.3	373.8	385.7	398.6	398.6										
334 IG		5056359	DeSabra DSOD Fees	198.8	208.4	281.2	337.4	331.4	359.4	370.9	383.3	383.3										
335 IG		5056360	KCV DSOD Fees	113.7	112.7	152.1	182.5	145.6	194.2	200.4	207.1	207.1										
336 IG		5056361	Helms DSOD Fees	95.5	100.1	135.2	162.2	185.2	172.6	184.1	184.1	184.1										
337 IG		5056362	Potter Valley DSOD Fees	-	-	-	-	-	60.7	62.6	64.7	64.7										
338 IG		5056363	DeSabra FERC Fees	1,532.7	2,210.6	1,970.0	1,801.3	1,871.8	1,829.1	1,894.8	2,215.3	2,215.3										
339 IG		5056364	Helms FERC Fees	1,389.6	1,742.2	1,966.4	1,641.8	1,849.9	2,048.5	1,836.1	2,180.6	2,180.6										
340 IG		5056365	KCV FERC Fees	1,245.5	1,886.3	1,584.2	1,578.1	1,603.9	1,758.9	1,815.3	1,875.9	1,875.9										
341 IG		5056366	Shasta FERC Fees	1,969.9	2,447.5	2,353.5	2,316.9	2,430.5	1,273.1	1,313.9	1,357.8	1,357.8										
342 IG		5056367	ML FERC Fees	806.3	1,042.3	934.0	911.8	959.5	1,009.0	1,041.4	1,076.1	1,076.1										
343 IG		5056368	Drum FERC Fees	408.9	782.5	676.1	551.9	605.0	684.0	705.7	729.2	729.2										
344 IG		5056409	Potter Vly FERC Fees	98.8	112.5	130.4	136.1	100.9	86.3	89.1	92.1	92.1										
345 IG		5056410	Crane Valley Recreation Settlement Agmt	-	-	-	-	-	150.0	2,545.0	3,274.0	3,274.0										
346 IG		5215605	Chili Bar License Conditions-Expense	69.2	-	-	-	-	-	-	-	-										
347 IG		5215606	Drum-Spauid License Conditions	-	-	-	-	-	103.7	55.7	20.0	20.0										
348 IG		5215765	PoELC-Develop Plans for Bio Measures	-	-	-	-	-	-	-	5,600.0	5,600.0										
349 IG		5215768	McCloud- Pit License Condit	-	-	-	-	-	63.3	70.4	21.7	21.7										
350 IG		5215854	PoELC-New Lic Plans, Drawing updates	-	-	-	-	-	-	-	1,000.0	1,000.0										
351 IG		5215856	UNFFR LC- Lake Almanor Payment to FS	-	-	-	-	-	-	-	0.1	0.1										
352 IG		5232293	Des Cent LC - Implementation Expense	189.4	3.3	-	-	-	-	-	-	-										
353 IG		5236354	PoELC- Paint Poe Dam light & gate imp	-	-	-	-	-	-	-	54.2	54.2										

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference	
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast		
354	IG	5236355	PoeLC-Prepare Land Dept Plans	-	-	-	-	-	-	69.8	46.3	-	-	-	-	-	-	-	-	-	
355	IG	5236356	PoeLC-License Management	-	-	-	-	-	-	185.4	158.5	86.8	-	-	-	-	-	-	-	-	
356	IG	5236367	UNFR LC-Bio Mon Spec	-	-	-	-	-	-	-	-	150.0	814.0	-	-	-	-	-	-	-	
357	IG	5236368	UNFR LC-Bio Mon Stand	-	-	-	-	-	-	-	-	-	-	490.4	WP 4-245	-	-	-	-	-	
358	IG	5236369	UNFR LC-Land Spec	-	-	-	-	-	-	-	-	-	-	279.5	1,527.5	818.0	WP 4-245	-	-	-	
359	IG	5236370	UNFR LC-Lic Comp Spec	-	-	-	-	-	-	-	-	-	-	137.0	155.6	12.4	-	-	-	-	
360	IG	5261975	Poe LC- Prepare Historic Properties Plan	-	-	-	-	-	-	100.0	49.2	-	-	-	-	-	-	-	-	-	
361	IG	5264542	Potter Valley PM Closeout	-	-	-	-	-	-	1.9	3.6	-	-	-	-	-	-	-	-	-	
362	IG	5265013	EH FERC 2661 Com WSIP/CWIP	-	-	-	-	-	-	109.0	-	-	-	-	-	-	-	-	-	-	
363	IG	5265014	EH FERC 233 Com WSIP/CWIP	-	-	-	-	-	-	224.2	-	-	-	-	-	-	-	-	-	-	
364	IG	5265015	EH Potter Valley WSIP/CWIP	-	-	-	-	-	-	22.8	-	-	-	-	-	-	-	-	-	-	
365	IG	5265016	EH Shasta Common WSIP/CWIP	-	-	-	-	-	-	263.8	-	-	-	-	-	-	-	-	-	-	
366	IG	5265052	EH Drum Common WSIP/CWIP	-	-	-	-	-	-	305.0	0.1	-	-	-	-	-	-	-	-	-	
367	IG	5265053	EH KingsCrane Common WSIP/CWIP	-	-	-	-	-	-	467.1	3.6	-	-	-	-	-	-	-	-	-	
368	IG	5265054	EH Feather Common WSIP/CWIP	-	-	-	-	-	-	243.4	(10.0)	-	-	-	-	-	-	-	-	-	
369	IG	5265055	EH Butte Common WSIP/CWIP	-	-	-	-	-	-	174.9	-	-	-	-	-	-	-	-	-	-	
370	IG	5265056	EH Mantion HQ Common WSIP/CWIP	-	-	-	-	-	-	252.6	-	-	-	-	-	-	-	-	-	-	
371	IG	5265057	EH Stanislaus Common WSIP/CWIP	-	-	-	-	-	-	26.5	-	-	-	-	-	-	-	-	-	-	
372	IG	5265058	EH Mokelumne Common WSIP/CWIP	-	-	-	-	-	-	135.4	4.5	-	-	-	-	-	-	-	-	-	
373	IG	5267525	Powerhouse Decommissioning Studies	-	-	-	-	-	-	-	(0.2)	-	-	-	-	-	-	-	-	-	
374	IG	5270132	2020 Butte Common FRMMA Expense	-	-	-	-	-	-	-	676.2	-	-	-	-	-	-	-	-	-	
375	IG	5271616	Bucks Creek Relicensing - Expense LC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
376	IG	5272032	Drum Spillways FSP Engr SAIP	-	-	-	-	-	-	527.2	564.6	1,425.0	806.8	806.8	1,305.8	WP 4-257	-	-	-	-	
377	IG	5272053	DeSabilia Spillways FSP Engr SAIP	-	-	-	-	-	-	192.8	344.1	939.0	94.9	15.1	WP 4-238	-	-	-	-	-	
378	IG	5272054	Motherlode Spillways FSP Engr SAIP	-	-	-	-	-	-	68.8	122.6	787.5	86.3	13.8	WP 4-238	-	-	-	-	-	
379	IG	5272055	Relief Spillway Repair SAIP	-	-	-	-	-	-	-	28.5	28.5	512.7	431.3	68.8	WP 4-238	-	-	-	-	
380	IG	5272056	Lake Almanor Spillway Repairs SAIP	-	-	-	-	-	-	2.8	701.1	99.4	500.0	500.0	-	-	-	-	-	-	
381	IG	5272057	Cape Horn Dam Spillway Repair SAIP	-	-	-	-	-	-	-	102.6	500.0	500.0	-	-	-	-	-	-	-	
382	IG	5272058	Philbrook Spillway Repairs SAIP	-	-	-	-	-	-	-	36.6	450.0	-	-	-	-	-	-	-	-	-
383	IG	5272059	Main Strawberry Spillway Repair SAIP	-	-	-	-	-	-	-	1.6	409.6	-	-	-	-	-	-	-	-	-
384	IG	5272060	Round Valley Spillway Repairs SAIP	-	-	-	-	-	-	-	80.2	371.2	-	-	-	-	-	-	-	-	-
385	IG	5272061	Shasta Spillways FSP Engr SAIP	-	-	-	-	-	-	186.5	747.0	355.0	280.3	280.3	344.7	WP 4-238	-	-	-	-	-
386	IG	5272062	Kings Crane Spillways FSP Engr SAIP	-	-	-	-	-	-	-	32.0	300.0	-	-	-	-	-	-	-	-	-
387	IG	5272063	Salt Springs Spillway Repair SAIP	-	-	-	-	-	-	-	118.8	300.0	-	-	-	-	-	-	-	-	-
388	IG	5272064	North Battle Creek Spillway Repairs SAIP	-	-	-	-	-	-	-	31.7	289.3	-	-	-	-	-	-	-	-	-
389	IG	5272065	Courtright Spillway Repair SAIP	-	-	-	-	-	-	-	-	252.0	-	-	-	-	-	-	-	-	-
390	IG	5272066	Pit 1 Forebay Spillway Repairs SAIP	-	-	-	-	-	-	-	53.5	214.5	-	-	-	-	-	-	-	-	-
391	IG	5272067	Upper Blue Spillway Repair SAIP	-	-	-	-	-	-	-	-	200.0	43.1	6.9	-	-	-	-	-	-	-
392	IG	5272068	Pit 5 Spillway Repair Open Conduit SAIP	-	-	-	-	-	-	-	32.2	175.8	194.7	-	-	-	-	-	-	-	-
393	IG	5272069	Macumber Dam Spillway Repair SAIP	-	-	-	-	-	-	-	-	125.0	-	-	-	-	-	-	-	-	-
394	IG	5272070	Crane Valley Spillway Repair SAIP	-	-	-	-	-	-	-	-	110.0	-	-	-	-	-	-	-	-	-
395	IG	5272071	Drum Forebay Spillway Repair SAIP	-	-	-	-	-	-	-	82.2	100.0	-	-	-	-	-	-	-	-	-
396	IG	5272072	Lower Bear Spillway Repair SAIP	-	-	-	-	-	-	-	-	50.0	86.3	86.3	13.8	-	-	-	-	-	-
397	IG	5272073	Iron Canyon Spillway Repair SAIP	-	-	-	-	-	-	-	-	10.4	195.0	-	-	-	-	-	-	-	-

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
398 IG		5272074	Lake Tabeau Spillway Repair SAIP	-	-	-	-	-	-	86.3	13.8	
399 IG		5272075	Upper Peak Lake Spillway Repair SAIP	-	-	-	-	60.2	-	-	-	
400 IG		5272076	PV Scott Dam Spillway Repairs SAIP	-	-	-	-	19.7	150.0	603.8	126.3	
401 IG		5272077	Inundation Maps	342.6	309.6	958.2	746.5	587.7	500.0	431.3	568.8	WP 4-248
402 IG		5272092	Helms Spillways FSP Engr SAIP	-	-	-	-	100.7	600.0	-	-	
403 IG		5272592	Belden Forebay Spillway Repairs SAIP	-	-	32.9	1,161.4	1,007.2	-	-	-	
404 IG		5272593	Bucks Storage Spillway Repairs SAIP	-	-	31.4	174.6	9.5	-	-	-	
405 IG		5272594	Butt Valley Spillway Repairs SAIP	-	-	-	474.9	9.7	-	-	-	
406 IG		5272595	Halsey Afterbay Spillway Repair SAIP	-	-	-	68.4	90.0	-	-	-	
407 IG		5272596	McCloud Spillway Slide Evaluation SAIP	-	-	-	54.0	58.7	-	-	-	
408 IG		5906284	Battle Creek License Surrender	-	-	-	-	-	-	-	-	
409 IG		IG Total		9,107	11,740	12,025	17,915	16,954	26,556	30,948	30,552	Sum of Lines 320-408
410 IG												
411 KG		5000512	Shasta Operate Generation Facilities	4,133.8	3,756.7	3,665.5	3,497.9	4,879.6	3,910.6	4,036.1	4,170.8	
412 KG		5000513	DeSabra Operate Generation Facilities	4,372.1	3,888.9	3,634.9	3,761.3	5,565.0	4,271.4	4,408.4	4,555.6	
413 KG		5000514	Drum Operate Generation Facilities	5,585.7	4,593.5	4,941.4	5,071.0	6,272.2	6,014.6	6,207.6	6,414.8	
414 KG		5000515	ML Operate Generation Facilities	3,359.9	2,893.9	2,860.9	2,532.2	2,462.4	3,692.3	3,810.8	3,938.0	
415 KG		5000516	KCV Operate Generation Facilities	1,671.4	1,479.9	1,442.6	948.5	1,248.6	1,606.0	1,657.5	1,712.9	
416 KG		5000517	Helms Operate Generation Facilities	1,376.1	1,723.9	1,961.9	1,608.7	1,986.5	1,698.5	1,753.0	1,811.5	
417 KG		5000640	DeSabra Manage Waste Disposal/Transport	54.0	47.2	38.4	32.2	28.4	30.4	31.4	32.4	
418 KG		5000643	KCV Manage Haz Waste Disp/Transp	35.9	18.6	11.6	0.2	0.3	16.0	16.6	17.1	
419 KG		5000644	Helms Manage Haz Waste Disp/Transp	13.5	11.7	3.1	0.2	2.7	12.1	12.5	12.9	
420 KG		5001614	HC: Manage Water Resources	1,054.4	1,120.8	1,084.5	967.7	1,253.3	1,337.8	1,380.7	1,426.8	
421 KG		5001623	HC: Manage Partnership Opns	74.7	208.0	234.2	9.3	(87.0)	-	-	-	
422 KG		5001636	Power Gen Safety Committee	21.1	56.7	21.9	44.3	31.9	49.2	50.8	52.5	
423 KG		5001777	Manage Technical Services	1,446.2	1,524.6	1,045.7	777.5	892.2	1,000.0	1,032.1	1,066.5	
424 KG		5008269	Helms Manage Safety	101.5	87.6	41.4	23.1	40.3	64.3	66.4	68.6	
425 KG		5008270	KCV Manage Safety	72.4	47.0	14.0	5.3	62.2	39.1	40.3	41.7	
426 KG		5008810	ML Manage Safety	30.2	28.5	3.2	16.8	23.3	-	-	-	
427 KG		5008811	Shasta Manage Safety	120.1	57.2	50.7	105.4	100.3	83.9	86.6	89.5	
428 KG		5008812	DeSabra Manage Safety	107.7	24.1	43.6	10.8	91.0	64.9	67.0	69.2	
429 KG		5009209	KCV Water Mgmt	224.7	139.7	145.4	191.7	194.4	160.6	165.7	171.3	
430 KG		5011009	KCV Helicopter Charges	261.6	316.5	347.2	348.1	270.9	25.0	25.8	26.7	
431 KG		5011013	DeSabra Helicopter Charges	29.9	262.6	337.1	162.2	150.2	109.5	113.0	116.8	
432 KG		5012590	Potter Valley Operate PH	543.0	491.5	444.5	495.2	577.1	655.1	676.1	698.7	
433 KG		5012613	Crane Valley Operate Gen Fac	-	-	-	4.2	1.3	-	-	-	
434 KG		5013155	Shasta Hydrographic Operations	300.7	234.5	186.1	266.5	249.0	288.7	298.0	307.9	
435 KG		5013156	DeSabra Water Mgmt Cloud Seeding	169.2	118.7	70.9	79.4	18.3	236.3	243.9	252.0	
436 KG		5013162	KCV FOC Switching Center Support	786.9	668.1	622.4	554.0	716.6	770.9	795.6	822.1	
437 KG		5015109	Rigging Program	77.7	47.3	(2.9)	-	-	60.8	62.8	64.9	
438 KG		5015790	ML Moke Cloud Seeding-Weather Mod	123.0	45.9	47.5	110.9	102.7	22.6	23.3	24.1	
439 KG		5018937	Training and Quails	465.2	724.1	585.8	567.5	899.6	888.7	1,020.5	1,054.5	
440 KG		5018938	Corrective Action Program	611.1	422.0	560.5	652.6	158.3	-	-	-	
441 KG		5020613	AM: Arc Flash Hazard Assessment Program	77.1	82.6	68.5	77.8	53.2	60.6	60.3	70.2	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	
442	KG	5020614	Fall Protection Program	213.4	231.3	211.8	(0.1)	-	-	202.8	209.3	216.3	-	-	-	-	-	-	-	-
443	KG	5020618	AM: Grounding Program	91.5	66.3	65.3	104.1	53.6	71.7	71.7	71.2	82.9	-	-	-	-	-	-	-	-
444	KG	5023289	AM: Fire Protection Program	105.0	133.3	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
445	KG	5024410	DeSabra Expense SO Increment	-	-	3.2	23.3	-	-	-	-	-	-	-	-	-	-	-	-	-
446	KG	5024830	AM: HV Breaker Program	8.1	4.2	-	23.7	17.7	20.9	20.9	20.8	24.2	-	-	-	-	-	-	-	-
447	KG	5024831	AM: Exciter Program	(0.2)	5.4	-	-	-	28.0	28.0	27.8	32.4	-	-	-	-	-	-	-	-
448	KG	5025050	Hydro SCV - MWC KG Operate Hydro Gen	312.0	521.1	100.8	22.8	-	-	-	-	-	-	-	-	-	-	-	-	-
449	KG	5025709	Electric Safety Program	125.0	295.1	259.7	185.7	214.2	228.2	228.2	235.5	243.4	-	-	-	-	-	-	-	-
450	KG	5028049	DeSabra Hydrographer Support	421.4	368.7	423.7	368.0	450.8	299.9	299.9	309.5	319.9	-	-	-	-	-	-	-	-
451	KG	5028370	DeSabra Crane Annual Certification	-	-	-	0.8	21.4	-	-	-	-	-	-	-	-	-	-	-	-
452	KG	5032509	Power Gen Electric Meter Charges	939.5	816.8	785.6	282.6	270.8	-	-	-	-	-	-	-	-	-	-	-	-
453	KG	5036012	Project Execution - ATS Support	17.7	52.5	25.6	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-
454	KG	5037149	HC Hazardous Waste-Mat'l Mgmt	171.7	176.2	345.2	327.3	408.0	182.2	182.2	188.1	194.3	-	-	-	-	-	-	-	-
455	KG	5043751	SCV - 11591 - Shasta Hydro O&M - MWC KG	-	-	245.6	311.1	299.3	-	-	-	-	-	-	-	-	-	-	-	-
456	KG	5043752	SCV - 11597 - DeSabra Hydro O&M - MWC KG	-	-	338.3	723.8	654.6	-	-	-	-	-	-	-	-	-	-	-	-
457	KG	5043753	SCV - 11605 - Central Hydro O&M - MWC KG	-	-	(190.9)	727.8	(687.3)	-	-	-	-	-	-	-	-	-	-	-	-
458	KG	5043754	SCV - 11616 - KCV Hydro O&M - MWC KG	-	-	233.2	168.9	471.5	-	-	-	-	-	-	-	-	-	-	-	-
459	KG	5043755	SCV - 11623 - Helms Hydro O&M - MWC KG	-	-	(136.1)	203.9	344.0	-	-	-	-	-	-	-	-	-	-	-	-
460	KG	5043757	SCV - 11636 - Hydro Tech Svcs - MWC KG	-	-	151.9	73.4	147.5	-	-	-	-	-	-	-	-	-	-	-	-
461	KG	5045397	SCV - 11581 - Water Management - MWC KG	-	-	-	1.1	(169.3)	-	-	-	-	-	-	-	-	-	-	-	-
462	KG	5047178	FERC Security Plan	-	-	27.9	627.5	478.1	329.4	329.4	340.0	351.4	-	-	-	-	-	-	-	-
463	KG	5051013	EH FERC 2661 Com Defensible Space	-	-	-	-	6.9	-	-	-	-	-	-	-	-	-	-	-	-
464	KG	5051014	EH FERC 233 Com Defensible Space	-	-	-	-	58.1	-	-	-	-	-	-	-	-	-	-	-	-
465	KG	5051015	EH Potter Valley Defensible Space	-	-	-	-	-	7.1	7.1	7.3	7.6	-	-	-	-	-	-	-	-
466	KG	5051017	EH Shasta Common Defensible Space	-	-	-	-	39.1	92.7	92.7	95.7	98.9	-	-	-	-	-	-	-	-
467	KG	5051019	EH Drum Common Defensible Space	-	-	-	-	75.2	72.3	72.3	74.6	77.1	-	-	-	-	-	-	-	-
468	KG	5051022	EH Kings Crane Common Defensible Space	-	-	-	-	60.4	63.1	63.1	65.1	67.3	-	-	-	-	-	-	-	-
469	KG	5051025	EH Feather Common Defensible Space	-	-	-	-	57.6	43.6	43.6	45.0	46.5	-	-	-	-	-	-	-	-
470	KG	5051028	EH Butte Common Defensible Space	-	-	-	-	114.1	26.4	26.4	27.2	28.1	-	-	-	-	-	-	-	-
471	KG	5051049	EH Manton HQ Common Defensible Space	-	-	-	-	18.4	-	-	-	-	-	-	-	-	-	-	-	-
472	KG	5051050	EH Stanislaus Common Defensible Space	-	-	-	-	15.9	15.2	15.2	15.7	16.2	-	-	-	-	-	-	-	-
473	KG	5051051	EH Mokelumne Common Defensible Space	-	-	-	-	30.5	29.2	29.2	30.2	31.2	-	-	-	-	-	-	-	-
474	KG	5052002	DeSabra Area 3rd Party Support	-	-	-	22.1	56.8	50.0	50.0	50.0	50.0	-	-	-	-	-	-	-	-
475	KG	5052293	SCV - 15988 - Drum Hydro O&M - MWC KG	-	-	-	-	844.9	-	-	-	-	-	-	-	-	-	-	-	-
476	KG	5052294	SCV - 15989 - ML Hydro O&M - MWC KG	-	-	-	-	568.1	-	-	-	-	-	-	-	-	-	-	-	-
477	KG	5052296	PCC 15990 - PGEN CAP & PI	-	-	-	-	432.1	577.2	577.2	595.7	615.6	-	-	-	-	-	-	-	-
478	KG	5053105	PCC 18010 - PGEN Quality Verification	-	-	-	-	320.9	837.1	837.1	864.1	892.9	-	-	-	-	-	-	-	-
479	KG	5053217	PCC 15990 - PGEN Compliance	-	-	-	-	250.7	435.4	435.4	449.4	464.4	-	-	-	-	-	-	-	-
480	KG	5054509	PG CAP/PI Consulting Costs	-	-	-	-	7.8	20.0	20.0	20.6	21.3	-	-	-	-	-	-	-	-
481	KG	5054869	PG - Dropped Objects Program	-	-	-	-	-	1,034.7	1,034.7	-	-	-	-	-	-	-	-	-	-
482	KG	5210392	HC: Hydro OIT Program	-	-	-	48.4	-	-	-	-	-	-	-	-	-	-	-	-	-
483	KG	5215934	Tule Grounding Repairs	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
484	KG	5215938	S#3 Ground Grid Repairs	63.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
485	KG	5215940	Kern Canyon Ground Grid Rpris	(0.0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
486	KG	5215942	Crane Valley Ground Grid Rprs	1.9	-	-	-	-	-	-	-	-
487	KG	5234638	PG Learning Contract Costs	556.2	291.2	154.4	126.8	142.4	322.0	330.9	340.0	-
488	KG	5235188	SQS: Develop Hydro Lockout/Tagout	0.0	-	-	-	-	-	-	-	-
489	KG	5235952	SQS:Hydro ERM Gaps 1,2,3,4 & 7	12.4	-	-	-	-	-	-	-	-
490	KG	5236336	Records Management Initiative - exp	548.2	794.3	596.9	1,028.5	1,214.5	852.0	875.4	899.5	-
491	KG	5236339	Hydro Waterway Public Safety Exp	1,334.4	1,438.5	735.4	888.6	1,015.1	86.0	77.6	109.4	-
492	KG	5236349	NERC Compliance Matrix Dvlpmnt & Prc Impr	-	-	160.9	115.5	88.5	-	-	-	-
493	KG	5236365	Stanislaus Ground Grid repairs	82.2	0.4	-	-	-	-	-	-	-
494	KG	5236366	Tiger Cr Ground Grid repair	30.6	4.1	-	-	-	-	-	-	-
495	KG	5237919	SQS:WM Equipment Records	20.4	-	-	-	-	-	-	-	-
496	KG	5241288	Hat Creek 1 Ground Grid Repairs	8.2	-	-	-	-	-	-	-	-
497	KG	5243452	PG Driving Safety Initiatives	189.9	179.9	278.2	139.6	1.9	-	-	-	-
498	KG	5245332	Pit 3 PH Ground Grid Modifications	-	0.9	53.3	45.4	110.7	-	-	-	-
499	KG	5245334	Pit 6 PH Ground Grid Modifications	3.9	-	-	-	-	-	-	-	-
500	KG	5245418	Dutch Flat 1 Ground Grid Upgrades	0.0	-	-	-	-	-	-	-	-
501	KG	5245439	Butt Valley Ground Grid Modification	137.9	22.1	-	-	-	-	-	-	-
502	KG	5245442	Bucks Cr Ground Grid Modification	30.0	165.5	-	-	-	-	-	-	-
503	KG	5245745	JBB Ground Grid Modification	(1.7)	-	-	-	-	-	-	-	-
504	KG	5245750	Lwr Drum PHs Description of Operations	-	-	-	-	-	-	-	100.0	-
505	KG	5245756	Pit 4 Ground Grid Modifications	45.6	-	-	-	-	-	-	-	-
506	KG	5245769	Rock Creek Ground Grid Modification	41.2	1.7	-	-	-	-	-	-	-
507	KG	5245772	San Joaquin 2 Ground Grid Modifications	(0.0)	-	-	-	-	-	-	-	-
508	KG	5247772	Salt Springs Ground Grid Mitigation	-	-	84.0	1.1	-	-	-	-	-
509	KG	5247925	KCV - Kerckhoff Mitigation Feasibility St	0.0	-	-	-	-	-	-	-	-
510	KG	5248052	SQS: Confined Space	3.8	-	-	-	-	-	-	-	-
511	KG	5248552	Drum- Rock Creek Res Siphon	5.6	2.0	16.5	-	-	-	-	-	-
512	KG	5249454	KCV - SLG Fault Telecomm Mitigation	(4.4)	-	-	-	-	-	-	-	-
513	KG	5250154	Kings River - Rough Fire Support	3.8	-	-	-	-	-	-	-	-
514	KG	5250192	Electra PH Ground Grid Mitigation	1.5	-	-	-	-	-	-	-	-
515	KG	5250317	Butte Fire Support	0.8	-	-	-	-	-	-	-	-
516	KG	5250354	Kerckhoff 2 - Repair Ground Grid	2.0	-	-	-	-	-	-	-	-
517	KG	5250359	ENGR: FERC Security Plans	5.1	10.4	0.4	-	-	-	-	-	-
518	KG	5250378	Caribou 2 Evaluate-Repair Intake Gate	(5.3)	-	-	-	-	-	-	-	-
519	KG	5251693	Drum - NID Condemnation Support	7.2	3.9	4.6	12.4	0.6	-	-	-	-
520	KG	5251917	Spaulding 2 - Evaluate Elevator	60.2	3.5	-	-	-	-	-	-	-
521	KG	5252252	Pit 5 Tailrace U3 & U4 Sediment Removal	0.0	-	-	-	-	-	-	-	-
522	KG	5253320	Coleman Ground Grid Mitigation	-	-	-	144.7	4.3	-	-	-	-
523	KG	5253321	South PH Ground Grid Mitigation	-	-	-	60.2	-	-	-	-	-
524	KG	5253552	Battle Cr Restoration Safety Imprvmtns E	0.9	-	-	-	-	-	-	-	-
525	KG	5254492	Poe PH Ground Grid Modification	5.7	326.3	-	-	-	-	-	-	-
526	KG	5254652	Halsey ground grid mitigation	-	96.6	34.5	0.1	-	-	-	-	-
527	KG	5255038	NERC Relay Settings Evaluation	-	469.3	182.5	44.2	0.2	-	-	-	-
528	KG	5256593	SQS: Work Management Tool Enhancement	-	49.0	-	-	-	-	-	-	-
529	KG	5256714	HC: Lead and Mercury Mitigation Plan	-	32.6	10.0	(8.9)	-	-	-	-	-

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Table with columns: Line No., MWC, Planning Order, Description, 2016-2023 Recorded and Forecast values, and Reference. Includes a 'KG Total' row and a 'Sum of Lines 411-551' row.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Reference	Forecast	Reference	
574	KH	5001645	PG Design, Drafting & Drawing Mgmt. LOE	326.4	287.4	287.4	262.6	521.9	630.2	309.8	319.7	330.4								
575	KH	5004592	KCV Engineering Support	89.3	59.2	59.2	94.2	48.6	75.0	107.1	110.6	114.2								
576	KH	5009053	Potter Valley Maint Turbine & Governors	122.5	144.5	144.5	176.4	260.5	276.6	99.4	102.6	106.0								
577	KH	5009056	Potter Valley Maintain Other Equip	93.9	149.3	149.3	49.2	64.4	51.5	62.9	64.9	67.1								
578	KH	5010551	Drum LOE	110.0	99.5	99.5	71.6	108.8	121.2	120.9	124.8	128.9								
579	KH	5015231	SCADA-Operatnl Issues,Stndrds & Plug	231.6	352.9	352.9	44.0	278.8	472.9	286.0	254.4	345.0								
580	KH	5015389	DeSabra Engineering LOE	162.7	157.4	157.4	138.6	139.7	231.9	214.0	220.8	228.2								
581	KH	5015390	Shasta Engineering LOE	239.4	113.2	113.2	110.9	217.8	118.8	174.8	180.5	186.5								
582	KH	5020612	AM: PRV Program	186.5	235.9	235.9	57.9	40.3	-	-	-	-								
583	KH	5020616	AM: Governor Program	100.3	173.8	173.8	75.4	459.1	388.2	455.3	452.5	354.1								
584	KH	5020619	AM: High Voltage Transformer Program	45.8	109.3	109.3	250.5	73.7	140.1	81.4	80.9	94.1								
585	KH	5020620	AM:Turbine Maintenance Platforms Program	86.2	65.5	65.5	77.0	18.3	-	-	-	-								
586	KH	5020621	AM: Generator Assessment Program	99.3	96.1	96.1	74.8	64.6	71.3	88.6	88.1	102.6								
587	KH	5022294	AM: Bearing Program	233.7	278.1	278.1	370.1	483.4	522.8	485.1	482.1	561.3								
588	KH	5022297	AM: Turbine Program	129.8	198.0	198.0	271.7	179.2	297.0	284.6	282.8	269.9								
589	KH	5023290	AM: Shutoff Valve Program	244.8	145.3	145.3	50.9	115.9	-	-	-	-								
590	KH	5025051	Hydro SCV - MWC KH Maint Hydro Gen Equip	(145.8)	460.8	460.8	232.3	-	-	-	-	-								
591	KH	5027189	DeSabra-Fire Protection ITM Contract	30.5	19.1	19.1	-	-	-	-	-	-								
592	KH	5027190	Shasta-Fire Protection ITM Contract	24.8	(11.3)	(11.3)	7.2	9.0	6.5	-	-	-								
593	KH	5027191	Kings Crane-Fire Protection ITM Contr	(3.1)	46.6	46.6	40.5	36.1	39.3	37.4	38.6	39.9								
594	KH	5027192	Drum - Fire Protection ITM Contract	40.0	13.4	13.4	11.4	13.5	13.8	14.0	14.0	15.0								
595	KH	5030871	AM: Cooling Water Systems	4.2	(0.0)	(0.0)	-	-	-	-	-	-								
596	KH	5036010	AM - ATS Support	3.6	0.0	0.0	-	-	-	-	-	-								
597	KH	5036013	PG O&M South Dir - ATS Support	33.3	15.6	15.6	23.5	9.2	11.4	-	-	-								
598	KH	5037289	SQS - ATS Support	99.5	89.7	89.7	8.4	-	-	-	-	-								
599	KH	5037618	Cost Model Adjustment-KH	-	-	-	0.3	1.4	-	-	-	-								
600	KH	5043763	SCV - 15065 - DESIGN DRAFT DRAW - MWC KH	-	-	-	20.3	(101.7)	166.6	-	-	-								
601	KH	5045396	SCV - 14411 - Proj Engineering - MWC KH	-	-	-	-	(14.4)	112.1	-	-	-								
602	KH	5053629	Motherlode- Fire Protection ITM Contract	-	-	-	4.7	2.0	7.0	14.0	14.0	15.0								
603	KH	5222375	Helms - Outage Expense Work	3.0	-	-	-	-	-	-	-	-								
604	KH	5225873	Drum Rec Sites - Repair Vandalism/Overus	-	-	-	-	6.2	-	-	-	-								
605	KH	5227516	Pit 6 CB Actuator Upgrade	12.8	-	-	-	-	-	-	-	-								
606	KH	5227752	Drum 2, Unit 5 - Needle Servos	17.0	-	-	-	-	-	-	-	-								
607	KH	5232333	Belden Repair Lower Draft Tube	244.3	540.7	540.7	-	358.5	1.2	-	-	-								
608	KH	5232336	DeSabra Consolidate SWITCH Ctr	0.1	-	-	-	-	-	-	-	-								
609	KH	5236332	Halsey Inspect & Repair Draft Tubes	-	153.4	153.4	(34.4)	-	-	-	-	-								
610	KH	5241293	Kerckhoff 2 - Refurbish Runner	967.0	-	-	-	-	-	-	-	-								
611	KH	5241355	PE: Electrical One Lines and P&IDs	150.2	131.4	131.4	79.8	56.3	0.0	-	-	-								
612	KH	5241992	RC 480V Switchgear Refurbi Expense	33.7	1.1	1.1	-	-	-	-	-	-								
613	KH	5243632	Pit 3 Transformer Leak Remediation	0.1	-	-	-	-	-	-	-	-								
614	KH	5243674	Kerckhoff 2 - Unit Alignment	(2.4)	-	-	-	-	-	-	-	-								
615	KH	5244398	Helms - Wishon Res. Repair Spillgate 6	0.6	-	-	-	-	-	-	-	-								
616	KH	5245350	Helms - T2 Plug & Bypass Drain Repairs	-	168.6	168.6	-	-	-	-	-	-								
617	KH	5245424	Salt Springs Unit 2 Governor Mods	3.3	5.2	5.2	-	-	-	-	-	-								

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference	
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted		
618	KH	5245441	Caribou 1 Repl Wheel Cover Lifting Brkts	50.9	164.6					0.8											
619	KH	5245700	AG Wishon - U4 Re Needle Shaft/Repl Bush			3.3															
620	KH	5245733	Chili Bar Runner Repair													10.0					
621	KH	5245734	Chili Bar Segment Governor Turb/Bypass		(7.0)																
622	KH	5245767	Poe U2 Repair Draft Tube				6.9			7.9											
623	KH	5245774	Spaulding 2 Runner Repair and Rebalance										0.8						115.0		
624	KH	5245775	West Point PH Generator Cleaning	257.6	(0.0)																
625	KH	5249614	Pit 5 Switchgear Breaker Panel Repairs	64.5																	
626	KH	5249813	Deer Creek CB 30 disconnects and bypass	7.3																	
627	KH	5250096	South PH CO2 Cleaning	223.4																	
628	KH	5250356	AG Wishon - Generator CO2 Cleaning	114.8																	
629	KH	5252261	Coleman Refurbish TSV Actuator Motor Exp	9.3																	
630	KH	5252653	PV Arc Flash Test & Modify Relays	2.5	2.6																
631	KH	5253412	Haas - Repair/insulate Collector Rings	97.9	27.0																
632	KH	5253692	Pit 4 U2 Refurbish Bearings	68.2	48.2																
633	KH	5253717	SQS: Bearings Initiative	89.2	2.9					6.2											
634	KH	5253873	Centerville Decomm Transformer Support	1.1						7.0											
635	KH	5254072	Helms - Repair Draft Tube Door		0.0																
636	KH	5254974	Pit 4 Unit 2 Repair TSV Seats	78.0	16.1																
637	KH	5256312	Newcastle Ground Grid Upgrade							37.7											
638	KH	5257055	Poe PH Repair U2 Generator		1,856.4					2.5											
639	KH	5258697	West Point PH Ground Grid Mitigation							60.2											
640	KH	5258856	DeSaba Ground Grid Mitigation							20.5											
641	KH	5260119	Shasta 10-yr Sump Pump Cleanings																	60.0	
642	KH	5260130	Pit 3 U1 TSV motor refurbishment																	60.0	
643	KH	5260372	Balch 1 Reinsulate Collector Rings													100.0					
644	KH	5260373	Balch 2 U2 Runner Welding													125.0					
645	KH	5260374	Balch 2 U3 Runner Welding																	150.0	
646	KH	5260383	Kerckhoff 2 - Runner Welding													100.0				125.0	
647	KH	5260415	Pit 6 Draft Tube Structural Retrofit																		
648	KH	5261092	Helms - U1 Alignment/Bearing Adjustment													110.0					
649	KH	5261093	Helms - U2 Alignment/Bearing Adjustment													75.0					
650	KH	5261094	Helms - U3 Alignment/Bearing Adjustment													75.0					
651	KH	5261142	Pit 5 U3 3 Repair Turbine Guide Bearing							337.0											
652	KH	5261143	Spring Gap Uprate Study																	100.0	
653	KH	5261367	Spring Gap Main Bank Failure							54.3											
654	KH	5261732	Cresta PH Repair Trxfmr Bank A Bushing							129.8											
655	KH	5262015	Poe PH Repair U1 Generator							163.3										166.3	
656	KH	5262370	Pit 4 U1 & U2 PRV PLC Programming																	100.0	
657	KH	5263392	Helms Cycling Study																		
658	KH	5263393	Helms Rotor Field Warranty Inspection																	4.2	
659	KH	5263405	DeSaba - BTH Rigging Equipment																	20.7	
660	KH	5263406	DeSaba - 10 Yr Sump Cleaning																	2.0	
661	KH	5264932	Butt Valley Remove Wicket Gate Shims																	60.0	
										576.6											

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference		
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Forecast	Forecast	Forecast	Forecast							
662	KH	5265134	Helms SPOF Study	-	-	-	-	-	-	10.8	-	7.7	-	-	-	-	-	-	-	-		
663	KH	5265765	DeSaba Area WSIP Equipment Repairs	-	-	-	-	-	-	183.1	-	38.3	-	-	-	-	-	-	-	-		
664	KH	5266213	AM: Engineering Effort	-	-	-	-	-	-	61.0	-	(2.7)	-	-	-	-	-	-	-	-		
665	KH	5266252	SCADA Documentation/File Review/Creation	-	-	-	-	-	-	517.8	-	44.2	-	-	-	-	-	-	-	-		
666	KH	5266792	Helms - U2 Draft Tube Repair/Slab Leak	-	-	-	-	-	-	162.3	-	140.2	-	-	-	-	-	-	-	-		
667	KH	5267052	Helms - Rplc CB270/CB280 Interrupters	-	-	-	-	-	-	333.0	-	9.8	-	-	-	-	-	-	-	-		
668	KH	5267613	Helms PH Rebuild WG Upthrust Assembly	-	-	-	-	-	-	-	-	85.5	312.0	1,200.0	-	-	-	-	-	WP 4-310		
669	KH	5269345	Helms U1 Draft Tube Door Seal Repair	-	-	-	-	-	-	-	-	422.0	-	-	-	-	-	-	-	-		
670	KH	5269492	Newcastle Replace Main Bank HO Bushing	-	-	-	-	-	-	-	-	49.1	-	-	-	-	-	-	-	-		
671	KH	5269792	Pit 3 Refurb Bank 3/IG & 3/ID Switches	-	-	-	-	-	-	-	-	-	120.0	-	-	-	-	-	-	-		
672	KH	5270892	Pit 4 PH Evaluate Heat Exchanger Upgrde	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75.0		
673	KH	5270902	JBB Move L.G. Bearing Oil Level Device	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250.0		
674	KH	5270914	AM: Employee Charge In	-	-	-	-	-	-	-	-	54.6	-	-	-	-	-	-	-	-		
675	KH	5271255	Pit 3 U2 CO2 Cleaning	-	-	-	-	-	-	-	-	-	-	21.0	-	-	-	-	-	-		
676	KH	5271317	Helms U1 - Runner Welding	-	-	-	-	-	-	-	-	-	-	260.0	-	-	-	-	-	-		
677	KH	5271319	Helms U3 - Runner Welding	-	-	-	-	-	-	-	-	-	-	260.0	-	-	-	-	-	-		
678	KH	5271376	Rock Creek PH Redesign Auto Sync 52G	-	-	-	-	-	-	-	-	-	-	80.0	200.0	-	-	-	-	-		
679	KH	5271377	Hamilton Branch Ground Grid Mitigation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200.0		
680	KH	5271380	Poe PH U2 Repair Wicket Gates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200.0		
681	KH	5271424	Spaulding 3 Repair Runner Eval	-	-	-	-	-	-	-	-	-	-	60.0	-	-	-	-	-	-		
682	KH	5271453	Helms CB270 Replace Interrupters	-	-	-	-	-	-	-	-	-	-	50.0	-	-	-	-	-	-		
683	KH	5271454	Helms CB270 Replace Mech Heads	-	-	-	-	-	-	-	-	-	-	175.0	-	-	-	-	-	200.0		
684	KH	5271455	Helms CB290 Replace Mech Heads	-	-	-	-	-	-	-	-	-	-	175.0	-	-	-	-	-	200.0		
685	KH	5271457	Haas Deferred Maint Crane Repairs	-	-	-	-	-	-	-	-	-	-	175.0	-	-	-	-	-	-		
686	KH	5271459	Helms # U1 Replace Main Tub Oil	-	-	-	-	-	-	-	-	-	-	250.0	-	-	-	-	-	-		
687	KH	5271460	Helms # U3 Replace Main Tub Oil	-	-	-	-	-	-	-	-	-	-	135.0	-	-	-	-	-	-		
688	KH	5271461	Haas U1 Runner Welding	-	-	-	-	-	-	-	-	-	-	135.0	-	-	-	-	-	-		
689	KH	5271598	Spaulding Repair Intake & Dredge	-	-	-	-	-	-	-	-	-	-	40.0	-	-	-	-	-	50.0		
690	KH	5271600	Electra U1 Bearing Inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500.0		
691	KH	5271601	Electra U3 Bearing Inspection	-	-	-	-	-	-	-	-	-	-	-	-	10.0	-	-	-	-		
692	KH	5271604	Helms CB280 Replace Interrupters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.0		
693	KH	5271605	Helms CB290 Replace Interrupters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175.0		
694	KH	5271653	Haas U2 Runner Welding	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175.0		
695	KH Total			22,047	21,433	19,581	21,745	23,121	23,493	23,134	23,640	23,134	23,640	23,134	23,640	23,134	23,640	23,640	23,640	Sum of Lines 554-694		
696	KH	5000541	Shasta Maint Roads/Bridges	702.4	886.5	601.3	645.1	701.6	718.7	741.7	766.5	701.6	718.7	741.7	766.5	701.6	718.7	741.7	766.5	701.6	718.7	
698	KI	5000542	DeSaba Maint Roads/Bridges	289.1	734.2	258.4	219.8	337.3	769.7	794.4	820.9	337.3	769.7	794.4	820.9	337.3	769.7	794.4	820.9	337.3	769.7	
699	KI	5000543	Drum Maint Roads/Bridges	288.0	296.2	353.3	179.0	157.9	392.0	571.4	590.4	157.9	392.0	571.4	590.4	157.9	392.0	571.4	590.4	157.9	392.0	
700	KI	5000544	ML Maint Roads/Bridges	290.9	415.1	294.6	400.9	386.1	325.2	755.1	780.4	386.1	325.2	755.1	780.4	386.1	325.2	755.1	780.4	386.1	325.2	
701	KI	5000545	KCV Maint Roads/Bridges	311.3	480.5	271.1	243.9	185.2	374.7	399.6	399.6	185.2	374.7	399.6	185.2	374.7	399.6	185.2	374.7	399.6	185.2	
702	KI	5000546	Helms Maint Roads/Bridges	75.9	9.4	50.3	1.6	45.3	26.8	27.6	28.6	45.3	26.8	27.6	28.6	45.3	26.8	27.6	28.6	45.3	26.8	
703	KI	5000658	Shasta Maint Generation Fac Structure	252.7	71.5	128.2	148.3	215.0	85.7	88.8	91.8	215.0	85.7	88.8	91.8	215.0	85.7	88.8	91.8	215.0	85.7	
704	KI	5000659	DeSaba Maint Generation Fac Structure	697.2	463.3	562.9	488.9	618.9	549.6	567.3	586.2	618.9	549.6	567.3	586.2	618.9	549.6	567.3	586.2	618.9	549.6	
705	KI	5000660	Drum Maint Generation Fac Structure	394.4	281.6	486.8	753.9	624.8	482.0	497.5	514.1	624.8	482.0	497.5	514.1	624.8	482.0	497.5	514.1	624.8	482.0	497.5

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference	
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Forecast	Forecast	Forecast		
706	KI	5000661	ML Maint Generation Fac Structure	529.3	502.0	826.5	640.8	769.6	315.0	325.1	335.9										
707	KI	5000662	KCV Maint Generation Fac Structure	1,277.0	987.5	1,113.9	911.8	814.0	855.0	882.4	911.8										
708	KI	5000663	Helms Maint Generation Fac Structure	752.1	504.1	491.0	610.2	782.1	588.8	607.7	628.0										
709	KI	5009052	Potter Valley Maint Structures	29.6	50.5	23.9	5.0	26.9	38.5	39.8	41.1										
710	KI	5009058	Potter Valley Maintain Roads	9.6	1.3	8.3	0.4	69.1	57.8	59.7	61.6										
711	KI	5009210	Helms Snow Removal	1,099.7	1,418.1	1,056.5	1,478.2	1,289.9	1,224.3	1,263.6	1,305.8										
712	KI	5015290	Camp One Maintain Roads & Bridges	203.3	151.1	244.7	169.0	187.5	292.1	301.4	311.5										
713	KI	5015291	Camp One Maintain Gen Structures	170.6	238.7	173.8	343.4	137.4	220.1	227.1	234.7										
714	KI	5015293	Manton Maint Roads & Bridges	178.3	112.6	213.1	238.0	266.6	160.3	165.5	171.0										
715	KI	5015294	Manton Maint Gen Structures	106.8	101.1	136.4	233.3	111.9	289.2	298.5	308.5										
716	KI	5015791	AM: Hydro Bridge Program	460.2	297.7	329.0	215.2	245.9	233.2	231.8	269.9										
717	KI	5024754	MLode Routine Bldg. Mtc	6.3	-	-	-	-	-	-	-										
718	KI	5025891	AM: Roads Program	111.5	6.1	-	-	-	-	-	-										
719	KI	5056565	AM: Substation Inspection Program	-	-	-	-	-	-	835.5	862.3										
720	KI	5212912	Belden Forebay Repair Bridge Abutment	23.5	216.6	57.8	-	-	-	-	-										
721	KI	5215720	Belden Repair Control Room Ceiling	-	-	-	-	-	50.0	-	-										
722	KI	5215721	Caribou Camp - Repair Camp Buildings	73.3	44.1	76.2	-	2.2	25.0	25.0	25.0										
723	KI	5215821	Caribou 1 Paint Powerhouse	-	-	-	-	-	-	-	-										
724	KI	5215833	Pit 1 Repair Valvehouse Roof	(2.4)	-	-	-	-	-	-	-										
725	KI	5216183	Belden PH - seal and coat floor	-	-	-	-	-	-	-	-										
726	KI	5217652	Pit 3 VH Concrete Repair	-	-	-	-	-	-	-	-										
727	KI	5222748	ElectraPH Stabilize Slope	-	-	-	-	-	-	-	-										
728	KI	5223734	Stanislaus - General Maintenance/Paint	-	26.1	-	-	-	-	-	-										
729	KI	5223752	Spaulding Tram Timber Repairs Annual	-	-	12.1	42.8	75.1	50.0	100.0	100.0										
730	KI	5232832	Drum PH - SY Erosion Ctrl and Cldrains	1.2	-	-	-	-	-	-	-										
731	KI	5236316	Bucks Cr Paint Gen & Turb Decks	-	-	-	-	-	-	-	-										
732	KI	5236330	Drum Road Seal Coat	-	-	-	-	-	100.0	75.0	-										
733	KI	5236346	Salt Springs - Paint Cabins	-	-	-	-	-	25.0	-	-										
734	KI	5236347	Paint Tiger Ck PH	-	-	-	-	-	-	-	-										
735	KI	5238789	Rock Creek VH - Concrete Ceiling Repairs	-	5.2	78.4	54.2	24.7	-	-	-										
736	KI	5240972	AG Wishon - Exp Material Condition Improv	0.3	-	-	-	-	-	-	-										
737	KI	5241278	Caribou 2 U5 Draft Tube Platform Support	156.6	-	-	-	-	-	-	-										
738	KI	5241316	SpringGapPH-Repair Removable Bridge	-	1.1	-	-	-	-	-	-										
739	KI	5241972	Helms - Support Fac Leachfield Study	240.4	(34.0)	-	-	-	-	-	-										
740	KI	5243872	Pit 3 Tailrace Bridge Expense Upgrade	1.1	-	91.5	-	346.3	1,350.0	1,500.0	1,500.0										WP 4-143
741	KI	5245744	Hat 1 PH Remove Lead Paint (MCI)	29.8	-	-	-	-	-	-	-										
742	KI	5245755	Pit 3 Ext Tailrace Wall Rmv Lead Paint	50.2	44.4	-	-	-	-	-	-										
743	KI	5245757	Pit 5 Diversion Gates Paint	-	-	0.1	142.0	-	-	-	-										
744	KI	5245761	Pit 6 Repair PH Roof Deck Seams	-	23.5	1.7	-	-	-	-	-										
745	KI	5245765	Pit 7 Repair PH Roof Deck Seams	58.0	-	-	-	-	-	-	-										
746	KI	5246172	Helms - Evaluate HQ Comm Tower Footing	19.5	(3.1)	2.9	-	-	-	-	-										
747	KI	5248733	Rock Crest Camp Repairs	14.3	29.6	1.0	(1.0)	-	25.0	25.0	25.0										
748	KI	5250233	Lower Bear Leakage Weir Access Improve	7.9	-	(0.0)	-	-	-	-	-										
749	KI	5250379	Caribou Road Milepost 7 Install Rip Rap	(6.1)	-	-	-	-	-	-	-										

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
750	KI	5251913	HC: Roadway Safety Improvement Project	37.8	42.3	0.3	-	-	-	-	-	-
751	KI	5252815	Inskip Repair South Wet Crossing	31.5	10.2	-	-	-	-	-	-	-
752	KI	5253514	CV - Lakeshore Park Lot Sale Reimburse	6.9	17.2	0.8	1.0	-	-	-	-	-
753	KI	5253812	Pit 1 PH Repair Gutters & Down Spouts	-	-	-	-	-	50.0	-	-	-
754	KI	5254430	Poe PH Bridge Repair	(19.3)	248.8	47.9	-	-	-	-	-	-
755	KI	5254437	Rodgers Flat SC Office Additions	6.8	22.7	-	-	-	-	-	-	-
756	KI	5254493	Butt-Gasner Road Stabilization	-	(0.0)	-	-	-	-	-	-	-
757	KI	5255973	Pit 5 PH Road 2017 Storm Damage Expense	-	303.5	(255.0)	-	(48.5)	-	-	-	-
758	KI	5256060	2017 MLode Jan-Feb Storm Work (Roads)	-	262.6	-	-	-	-	-	-	-
759	KI	5256104	Pit 5 PH Exp Restoration 17 storm damage	-	2,311.4	(1,944.9)	-	(366.5)	-	-	-	-
760	KI	5256292	Oak Flat Repair PH Access Road	-	1.3	-	-	-	-	-	-	-
761	KI	5256293	Caribou Rd Repair Storm Damage @ Siphon	-	191.5	-	-	(191.5)	-	-	-	-
762	KI	5256628	Helms - McKinley Grove Rd Failure STORM	-	181.7	26.1	-	-	-	-	-	-
763	KI	5256772	Helms - McKinley Grove Rd Patching STORM	-	462.8	(9.0)	-	-	-	-	-	-
764	KI	5256812	Helms - 2017 STORM DAMAGE	41.0	76.6	-	-	-	-	-	-	-
765	KI	5259936	Drum 1 & 2 - Ground Grid Mitigation	-	-	-	-	63.6	(0.0)	-	-	-
766	KI	5260073	Drum 1 PH MCI for Window Replace	-	-	-	-	-	30.0	-	-	-
767	KI	5260352	Drum Penstock Access Evaluation	-	-	25.5	-	(2.6)	-	-	-	-
768	KI	5260436	Bear River Suspension Bridge M20 Repairs	-	-	-	-	9.9	-	-	-	-
769	KI	5261061	Poe PH Rock Slide at Station Service	-	-	-	-	28.5	-	-	-	-
770	KI	5261813	DeSabra Helicopter LZ Structural Evaltn	-	-	46.4	-	-	50.0	-	-	-
771	KI	5262173	Halsey PH Repair Roof	-	-	55.5	-	(0.2)	-	-	-	-
772	KI	5264892	Narrows Tram Repl Wire Rope	-	-	-	-	53.3	-	-	-	-
773	KI	5265492	Drum - Bridge Repairs	-	-	-	-	58.8	-	-	-	-
774	KI	5265763	DeSabra Area WSIP Infrastructure Repairs	-	-	-	-	21.2	9.6	-	-	-
775	KI	5267114	DeSabra Area NERC Security Repairs	-	-	-	-	108.7	243.8	-	-	-
776	KI	5267521	Phoenix Ground Grid Mitigation	-	-	-	-	-	31.6	-	-	-
777	KI	5267617	Belden Adit 1 Bridge Repair Footing	-	-	-	-	-	80.0	175.0	-	-
778	KI	5269614	Pit 1 Valvehouse Repair	-	-	-	-	-	-	-	60.0	-
779	KI	5269615	Pit 5 Diversion Dam Reinforce Fence	-	-	-	-	-	-	-	70.0	-
780	KI	5269754	Pillsbury Pines Erosion Repairs	-	-	-	-	-	132.7	100.0	-	-
781	KI	5270894	Pit 6 Dam Repair Road Stabilization	-	-	-	-	-	150.0	-	-	-
782	KI	5270898	Pit 3 Dam Bridge Repair Guardrail Posts	-	-	-	-	-	-	-	100.0	-
783	KI	5271172	Dutch Flat Roof Installl Snow Guards	-	-	-	-	-	-	-	-	-
784	KI	5271315	Helms - McKinley Grove Rd Patching	-	-	-	-	-	-	-	-	600.0
785	KI	5271316	Balch - Black Rock Road Patching	-	-	-	-	-	-	-	-	329.7
786	KI	5271320	Helms - Paint Employee Housing	-	-	-	-	-	-	-	-	265.0
787	KI	5271339	West Point Valve House Pave Access Road	-	-	-	-	-	140.0	5.4	-	-
788	KI	5271418	Drum Canal Tahoe Spill Clean Road Cross	-	-	-	-	-	64.8	-	-	-
789	KI	5271422	Alta PH Drainage Improvements	-	-	-	-	-	125.0	-	-	-
790	KI	5271437	Shasta Road Maintenance	-	-	-	-	-	75.0	-	-	-
791	KI	5272374	AM: Civil Infrastructure Program	-	-	-	-	-	-	239.0	247.0	-
792	KI		KI Total	9,008	12,495	5,939	7,890	8,946	10,429	12,073	14,590	Sum of Lines 697-791
793	KI											

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expenses by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Reference	Forecast	Reference	
794	KJ	5000403	Shasta Comply with Hydro Licenses	339.6		258.7		343.5		394.9		480.0		776.1		801.0		827.7		
795	KJ	5000405	Drum Comply with Hydro Licenses	115.5		139.4		143.5		119.3		124.2		280.7		289.7		299.3		
796	KJ	5000406	ML Comply with Hydro Licenses	249.8		185.3		174.0		199.4		221.4		422.5		436.1		450.6		
797	KJ	5000407	KCV Comply with Hydro Licenses	174.5		150.2		114.2		178.3		1,287.5		281.3		290.4		300.1		
798	KJ	5000408	Helms Comply with Hydro Licenses	32.4		20.8		8.8		6.2		17.1		32.3		33.3		34.5		
799	KJ	5000537	Drum Maint Fish/Wildlife Facilities	8.9		11.1		11.0		12.2		0.4		12.1		12.5		12.9		
800	KJ	5000538	ML Maint Fish/Wildlife Facilities	24.9		20.2		34.1		15.5		21.1		33.2		34.3		34.3		
801	KJ	5000539	KCV Maint Fish/Wildlife Facilities	-		-		-		-		-		22.3		23.0		23.8		
802	KJ	5000540	Helms Maint Fish/Wildlife Facilities	68.0		(2.1)		17.0		34.1		46.8		38.1		39.4		40.7		
803	KJ	5000670	Shasta Manage Recreational Facilities	629.8		624.0		657.9		602.3		710.3		659.2		680.3		703.0		
804	KJ	5000672	Drum Manage Recreational Facilities	436.1		489.2		603.8		504.9		539.2		332.0		342.6		354.0		
805	KJ	5000673	ML Manage Recreational Facilities	438.0		495.9		413.4		572.3		598.1		356.2		367.7		379.9		
806	KJ	5000674	Southern Area Hydro Minge Rec Facilities	378.9		357.8		332.8		411.9		458.1		317.5		327.6		338.6		
807	KJ	5000675	Helms Manage Recreational Facilities	12.5		1.2		0.5		0.5		12.1		-		-		-		
808	KJ	5001043	Required Facility Safety Program	2,624.0		1,582.8		2,271.6		2,160.6		2,860.8		819.0		716.8		963.2		
809	KJ	5001137	DeSabra Manage Recreation Facilities	853.6		1,091.1		1,198.3		1,030.6		909.1		1,105.7		1,141.2		1,179.3		
810	KJ	5001765	HL: Manage Hydro Regulatory Program	406.2		325.8		402.9		374.1		607.3		506.2		522.4		539.8		
811	KJ	5003229	DeSabra Comply with Hydro Licenses	419.9		399.1		357.7		563.8		733.6		150.1		154.9		160.0		
812	KJ	5009050	Potter Valley Comply w/ Hydro License	110.6		105.0		64.5		51.8		57.7		92.4		95.4		98.6		
813	KJ	5009057	Potter Valley Maintain Recreation Fac.	386.7		426.1		461.4		445.5		612.8		474.6		489.8		506.2		
814	KJ	5009849	Moke LC - FERC 137 - L&EM	1,192.6		746.2		538.1		669.8		883.0		1,157.5		350.0		300.0		
815	KJ	5010029	Helms Required Facility Safety Prog	79.1		91.5		118.4		260.9		207.2		250.0		261.5		319.9		
816	KJ	5010030	KCV Required Facility Safety Prog	216.6		99.4		98.9		504.1		593.5		500.0		523.1		639.8		
817	KJ	5010031	ML Required Facility Safety Prog	255.0		707.3		815.2		943.6		946.6		750.0		1,773.1		539.8		
818	KJ	5010032	Drum Required Facility Safety Prog	516.9		959.4		1,062.4		1,162.8		1,098.1		1,100.0		1,550.7		3,187.5		
819	KJ	5010033	Potter Valley Req Facility Sfty Pgm	492.1		330.9		693.2		1,056.5		551.8		600.0		627.7		672.7		
820	KJ	5010034	Shasta Reqr'd Facility Safety Prog	1,609.0		1,575.2		462.4		608.1		890.7		1,500.0		836.9		863.6		
821	KJ	5010035	DeSabra Reqr'd Facility Safety Prog	403.0		600.7		419.8		757.3		1,199.8		800.0		836.9		863.6		
822	KJ	5011049	Pit 1 LC - FERC 2687 - L&EM	507.8		444.8		451.3		322.7		302.2		390.8		403.4		416.8		
823	KJ	5011551	RCC-FERC 1962 License Compliance	730.8		1,140.2		1,428.8		1,098.3		669.8		640.9		661.5		683.6		
824	KJ	5011560	Crane Valley Recreation Settlement Agmt	29.2		-		-		-		-		-		-		-		
825	KJ	5011566	Hat Creek LC - FERC 2661 - L&EM	89.7		76.1		123.2		87.2		86.1		181.0		186.8		193.0		
826	KJ	5012409	Stan SGap LC ProjExp - FERC 2130 - L&EM	574.3		1,185.9		301.6		207.6		169.5		234.6		242.1		250.2		
827	KJ	5012428	Battle Cr NSO Salmon Proj O&M	18.7		8.1		18.6		0.1		-		-		-		-		
828	KJ	5012429	Battle Cr NSO Salmon Mitigate & Monitor	-		-		-		-		-		310.7		320.7		331.4		
829	KJ	5012430	Battle Cr NSO Salmon AMP Mitigate & Mon	70.8		78.0		87.2		84.8		81.5		92.9		95.9		99.1		
830	KJ	5012433	Crane Vly LC Cultural O&M - NSO	10.8		93.1		38.5		66.0		82.5		116.7		120.4		124.5		
831	KJ	5012434	Crane Vly LC Ecol - FERC 1354 - L&EM	316.4		636.8		308.0		310.2		241.0		474.6		489.8		506.2		
832	KJ	5012436	Crane Vly LC Capital Improv O&M - NSO	-		-		-		-		-		29.1		30.0		31.0		
833	KJ	5012549	Potter Valley LC - FERC 77 - L&EM	627.6		515.2		427.5		576.5		631.4		835.8		862.6		891.4		
834	KJ	5012592	DeSabra Routine License Compliance	-		4.3		-		-		-		-		-		-		
835	KJ	5012598	Shasta FERC 2106 Fish Planting and Tag	250.9		246.3		210.4		241.8		236.4		337.3		270.8		279.8		
836	KJ	5012617	ML USGS Fees	78.1		81.9		84.0		81.2		81.4		87.9		90.7		93.8		
837	KJ	5012618	Drum USGS Fees	108.6		106.3		121.5		120.2		120.7		122.2		126.1		130.3		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference
				Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Recorded	Adjusted	Forecast	Reference	Forecast	Reference	
838	KJ	5012619	Potter Valley USGS Fees	21.9		20.5		20.4		20.3		35.4		32.1		33.2		34.3		
839	KJ	5012621	KCV USGS Fees	71.7		75.7		78.3		79.9		80.4		80.7		83.3		86.1		
840	KJ	5012813	Pit 345 LC - FERC 233 - L&EM	1,241.0		749.0		915.8		630.9		746.0		529.4		546.3		564.6		
841	KJ	5012814	Pit 345 LC Operation Related	99.6		114.5		124.1		230.8		90.1		222.9		230.0		237.7		
842	KJ	5012815	Pit 345 LC Revng Maint and Monitor	140.8		52.4		23.5		22.2		17.8		35.5		36.6		37.9		
843	KJ	5012817	Pit 345 LC Rec Fac Maint - NSO	360.4		421.1		295.4		522.0		287.4		472.7		487.8		504.1		
844	KJ	5013149	Stan SGap LC TLS/ES Proj. Exp	264.6		164.6		190.6		11.3		5.7		-		-		-		
845	KJ	5013154	Shasta USGS Fees	111.9		114.2		122.1		124.1		122.5		123.7		127.6		131.9		
846	KJ	5013158	DeSabra USGS Fees	71.6		75.6		81.5		82.7		80.9		93.7		96.7		99.9		
847	KJ	5015232	Bucks Cr LA 103 - FERC 619 - L&EM	101.0		106.3		106.6		62.3		63.5		106.3		109.7		113.4		
848	KJ	5015789	Haas-Kings LC Fisheries Monitoring	-		104.9		35.6		2.8		17.2		235.0		242.5		250.6		
849	KJ	5016109	Kern License Conditions	101.3		48.1		56.3		66.2		56.6		93.6		96.6		99.8		
850	KJ	5019231	Balch LC L&EM	5.1		0.1		-		-		-		-		-		-		
851	KJ	5025052	Hydro SCV - MWC KJ License Compliance	32.2		190.4		(0.0)		-		-		-		-		-		
852	KJ	5027339	Shasta Crayfish Fund	131.3		36.9		100.6		158.5		23.1		150.5		155.3		160.5		
853	KJ	5042369	Des Cent LC - FERC 803 - L&EM	-		44.2		27.9		15.8		23.3		20.3		20.9		21.6		
854	KJ	5043749	SCV - 11583 - Hydro Licensing -MWC KJ	-		-		86.3		32.7		60.9		-		-		-		
855	KJ	5043762	SCV - 15060 - Facilities Safety - MWC KJ	-		-		(34.5)		(123.3)		11.0		-		-		-		
856	KJ	5045749	Chili Bar LC - FERC 2155 (POST BA)	-		-		-		-		68.6		109.5		113.0		116.8		
857	KJ	5047951	Spring Gap-Stan PE&C Recreation Exp	1,660.7		434.9		172.8		310.1		307.1		349.9		361.1		373.1		
858	KJ	5047954	HL: ADA Compliance Recreation Facilities	107.4		84.2		73.1		-		104.8		76.1		78.5		81.1		
859	KJ	5054251	DSP: Surveillance Data Acqstn/Eval	-		-		-		-		-		447.0		387.3		524.7		
860	KJ	5054252	DSP: Radial Gates Investigation	-		-		-		-		-		703.0		609.8		826.2		
861	KJ	5215842	Belden Dam Paint Radial Gates	-		-		21.9		-		-		-		50.0		750.0		
862	KJ	5215846	Poe Dam Paint Skimmer	-		-		27.6		(0.4)		-		-		-		-		
863	KJ	5215863	McCloud Dam Radial Gates Assessment	241.8		(0.6)		-		-		-		-		-		-		
864	KJ	5216964	Pit 345 Road Management Plan (Expense)	89.8		49.9		103.5		(0.0)		13.8		-		-		129.1		
865	KJ	5226093	Narrows Fisheries Enhancement Fund	20.0		20.0		20.0		20.0		-		-		-		-		
866	KJ	5227054	Balch Camp - Cultural Resource Plan	4.0		1.3		0.6		0.1		0.3		-		-		-		
867	KJ	5236325	Deer Mortality Protection Assessment	3.4		2.4		0.1		-		-		-		-		-		
868	KJ	5238786	Pit 1 River Gate House Overhaul	2,807.5		0.5		0.3		-		-		-		-		-		
869	KJ	5245335	Pit 3 Britton Dam Concrete Bridge Repair	62.3		4.1		-		-		49.0		2,250.0		2,500.0		-		WP 4-144
870	KJ	5245348	Volta 2 Penstock Ground Grid Repairs	115.6		-		-		-		-		-		-		-		
871	KJ	5245417	Drum Watershed USA Underground	(0.4)		-		-		-		-		-		-		-		
872	KJ	5245436	Belden Spillway Wall Panel & Drain Repai	24.8		0.9		-		-		-		-		-		-		
873	KJ	5246179	Drum -FERC Patching Annual	-		-		-		-		87.1		200.0		50.0		250.0		
874	KJ	5250361	HC Powerhouse Flow Reporting- Testing	-		-		-		-		57.5		100.0		103.2		106.7		
875	KJ	5251692	Belden Spillway Wall Panel Temp Repair	271.7		-		-		-		-		-		-		-		
876	KJ	5252755	Butte Cr Bank Repair Walkway	3.5		-		-		-		-		-		-		-		
877	KJ	5258012	Spillway Assessments SAIP	-		1,648.0		541.3		147.2		3.5		-		-		-		
878	KJ	5258854	Potter Valley Dredge Fish Hotel	-		-		-		265.4		0.5		150.0		150.0		-		
879	KJ	5263197	Poe Dam Paint Bypass Gates	-		-		-		-		5.4		217.9		-		-		
880	KJ	5263408	Haskins Valley CG Repair Boat Ramp	-		-		-		15.4		-		-		-		-		
881	KJ	5271379	DeSabra Non-NERC Facility Security	-		-		-		-		-		174.0		-		-		

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
882	KJ	5271423	Upper Blue Dam Sensitive Species Monitor	-	-	-	-	-	15.0	15.0	15.0	
883	KJ		KJ Total	24,054	20,973	18,611	19,646	21,964	24,211	24,142	24,179	Sum of Lines 794-882
884	KJ			-	-	-	-	-	78.4	81.2	84.1	
885	LX	5273036	Power Gen CEMA Straight Time Expense	-	-	-	-	-	-	-	-	
886	LX		LX Total	0	0	0	0	0	78	81	84	Line 885
887	LX			-	-	-	-	-	-	-	-	
888	OM	5033712	Oper Mgmt Hydro Common	193.5	255.4	225.9	0.1	-	1,324.1	1,366.6	1,769.4	
889	OM	5033713	Oper Mgmt Hydro PCC 11589	666.1	485.4	(1.0)	-	-	-	-	-	
890	OM	5033714	Oper Mgmt Hydro PCC 11590	588.4	631.4	(0.6)	-	-	-	-	-	
891	OM	5033715	Oper Mgmt Hydro PCC 11596	774.9	830.2	(19.6)	-	-	-	-	-	
892	OM	5033716	Oper Mgmt Hydro PCC 11610	453.0	649.1	(12.3)	-	-	-	-	-	
893	OM	5033717	Oper Mgmt Hydro PCC 11615	544.3	539.0	(3.1)	-	-	-	-	-	
894	OM	5033718	Oper Mgmt Hydro PCC 11621	325.7	320.5	(3.7)	-	-	-	-	-	
895	OM	5033719	Oper Mgmt Hydro PCC 12691	311.3	839.5	807.8	770.2	489.4	-	-	-	
896	OM	5033720	Oper Mgmt Hydro PCC 12692	406.9	616.6	1,413.5	977.9	658.1	-	-	-	
897	OM	5033721	Oper Mgmt Hydro PCC 13733	366.8	279.1	261.5	(2.1)	276.0	423.9	437.5	452.1	
898	OM	5033722	Oper Mgmt Hydro PCC 14029	222.6	65.0	(0.0)	-	-	-	-	-	
899	OM	5033723	Oper Mgmt Hydro PCC 14793	409.4	146.7	(0.1)	-	-	-	-	-	
900	OM	5033724	Oper Mgmt Hydro PCC 15042	209.0	230.1	489.5	755.9	580.8	899.0	927.8	958.8	
901	OM	5033725	Oper Mgmt Hydro PCC 15055	42.1	17.1	-	-	-	-	-	-	
902	OM	5034342	Oper Mgmt PGEN Hydro Cap OH Cr	(3,020.4)	(2,962.1)	(2,019.3)	(1,364.9)	(952.4)	-	-	-	
903	OM	5034343	Oper Mgmt PGEN Hydro NE OH Cr	(2.2)	(7.6)	(10.8)	(16.1)	-	-	-	-	
904	OM	5034344	Oper Mgmt PGEN Hydro OBS OH Cr	(5.2)	-	-	-	-	-	-	-	
905	OM	5041334	Oper Mgmt Hydro PCC 15814	272.1	362.4	262.5	13.4	104.3	-	-	-	
906	OM	5044310	Oper Mgmt Hydro PCC 11566	271.1	54.7	440.4	137.1	244.5	-	-	-	
907	OM	5047674	Oper Mgmt Hydro PCC 12676	-	-	-	359.7	220.1	-	-	-	
908	OM	5052295	Oper Mgmt PGEN PCC 15992	-	-	-	-	1,173.7	-	-	-	
909	OM		OM Total	3,029	3,353	1,830	1,631	2,794	2,647	2,732	3,180	Sum of Lines 888-908
910	OM			-	-	-	-	-	-	-	-	
911	OS	5033876	Oper Suppt Hydro PCC 14458	288.7	-	-	-	-	-	-	-	
912	OS	5033921	Oper Suppt Hydro PCC 14005	1,143.9	1,469.1	2,100.0	2,621.5	3,010.1	-	-	-	
913	OS	5033922	Oper Suppt Hydro PCC 14703	315.9	359.6	2,384.9	2,293.8	1,710.6	-	-	-	
914	OS	5033923	Oper Suppt Hydro PCC 14705	3,137.5	2,618.1	2,712.5	2,579.5	2,515.5	3,794.2	3,915.9	4,046.7	
915	OS	5033924	Oper Suppt Hydro PCC 15057	696.2	603.1	(0.1)	-	-	-	-	-	
916	OS	5033925	Oper Suppt Hydro PCC 15059	162.8	249.8	-	-	-	-	-	-	
917	OS	5033926	Oper Suppt Hydro PCC 15062	538.3	573.8	-	-	-	-	-	-	
918	OS	5033927	Oper Suppt Hydro PCC 15063	602.7	589.3	-	-	-	-	-	-	
919	OS	5033929	Oper Suppt Hydro PCC 15064	1,484.8	1,448.8	(1.3)	-	-	-	-	-	
920	OS	5033930	Oper Suppt Hydro PCC 15202	604.1	733.5	-	-	-	-	-	-	
921	OS	5033931	Oper Suppt PGEN Hydro PCC 15205	295.2	356.3	(0.1)	-	-	-	-	-	
922	OS	5034372	Oper Suppt PGEN Hydro Cap OH Cr	(6,785.1)	(4,098.5)	(3,479.1)	(4,550.9)	(4,816.4)	-	-	-	
923	OS	5034373	Oper Suppt PGEN Hydro NE OH Cr	(676.6)	(296.6)	(314.7)	-	-	-	-	-	
924	OS	5034374	Oper Suppt PGEN Hydro OBS OH Cr	(13.3)	-	-	-	-	-	-	-	
925	OS	5043945	Oper Suppt Hydro PCC 15056	-	-	1,161.3	1,216.8	416.3	-	-	-	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Expenses by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
926	OS	OS Total		1,795	4,606	4,607	3,846	2,836	3,794	3,916	4,047	Sum of Lines 911-925
927	OS											
928	ZC	5011969	Lands Conservation Support	2,133.0	1,762.0	1,795.7	1,721.5	2,007.6	1,500.0	1,500.0	1,500.0	
929	ZC	ZC Total		2,133	1,762	1,796	1,722	2,008	1,500	1,500	1,500	Line 928
930	ZC											
931	Grand Total			132,026	140,617	116,717	129,642	158,297	161,776	173,966	177,909	928

Sum of Lines
 28,39,288,293,304,314,
 318,408,551,694,791,8
 82,885,908,925 and

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category AB
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	5,205		WP 4-1, Line 1
2		Escalation	73	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Adjustment	323	Increase in Powerhouse Decommissioning Studies	WP 4-3, Line 19
4		Adjustment	1,578	ISO 55000 Certification	WP 4-3, Line 24
5		Adjustment	-917	FSP: Dam Safety 2.0 Implementation	WP 4-3, Line 21
6		Adjustment	-356	AM: Applications and Tools	WP 4-3, Line 22
7		Adjustment	-234	Spillway Contracts and Consulting SAIP	WP 4-3, Line 23
8		Misc Adjustment	7	Other adjustments	Line 11 less Lines 1-7
9		Total Net Change	476		Sum of Lines 2-8
10					
11	2021	Forecast	5,681		WP 4-1, Line 1
12		Escalation	182	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
13		Adjustment	2,800	AM: Data Governance	WP 4-3, Line 26
14		Adjustment	200	Geoscience Engineering and Risk Research	WP 4-3, Line 27
15		Misc Adjustment	50	Other adjustments	Line 18 less Lines 11-14
16		Total Net Change	3,232		Sum of Lines 12-15
17					
18	2022	Forecast	8,913		WP 4-1, Line 1
19		Escalation	298	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
20		Adjustment	-1,617	ISO 55000 Certification	WP 4-3, Line 24
21		Misc Adjustment	-121	Other adjustments	Line 24 less Lines 18-20
22		Total Net Change	-1,440		Sum of Lines 19-21
23					
24	2023	Forecast	7,473		WP 4-1, Line 1

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category AK
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	1,046		WP 4-1, Line 2
2		Escalation	15	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Misc Adjustment	74	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds	Line 6 less Lines 1-2
4		Total Net Change	89		Sum of Lines 2-3
5					
6	2021	Forecast	1,136		WP 4-1, Line 2
7		Escalation	36	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
8		Misc Adjustment	-9	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds	Line 11 less Lines 6-7
9		Total Net Change	27		Sum of Lines 7-8
10					
11	2022	Forecast	1,163		WP 4-1, Line 2
12		Escalation	39	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
13		Misc Adjustment	-35	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds	Line 16 less Lines 11-12
14		Total Net Change	4		Sum of Lines 12-13
15					
16	2023	Forecast	1,167		WP 4-1, Line 2

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category AX
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	28,426		WP 4-1, Line 3
2		Escalation	400	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Adjustment	-2,146	Grizzly Frby Remove Debris Subsurface	WP 4-6, Line 154
4		Adjustment	-1,520	ML Maint Reservoirs/Dams/Waterways	WP 4-3, Line 44
5		Adjustment	1,778	Bucks Creek Pnstk Erosion Mitigation	WP 4-8, Line 237
6		Adjustment	-1,084	PV Scott Dam Recoat US Slide Gates	WP 4-7, Line 184
7		Adjustment	-1,036	Tiger Creek AB Repair Structural Members	WP 4-8, Line 240
8		Misc Adjustment	-278	Net adjustment for yearly cost fluctuations in managing the dams and waterways of various watersheds	Line 11 less sum of Lines 1-7
9		Total Net Change	-3,886		Sum of Lines 2-8
10					
11	2021	Forecast	24,540		WP 4-1, Line 3
12		Escalation	787	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
13		Adjustment	3,192	Poe Dam Repair Toe Voids	WP 4-7, Line 190
14		Adjustment	-1,628	Bucks Creek Pnstk Erosion Mitigation	WP 4-8, Line 237
15		Adjustment	1,000	Pit 4 Dam Paint Steel Footbridge	WP 4-8, Line 259
16		Misc Adjustment	-107	Net adjustment for yearly cost fluctuations in managing the dams and waterways of various watersheds	Line 19 less sum of Lines 11-15
17		Total Net Change	3,244		Sum of Lines 12-16
18					
19	2022	Forecast	27,784		WP 4-1, Line 3
20		Escalation	927	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
21		Adjustment	-1,830	Emergent Projects cost Pressure Reduction	WP 4-5, Line 127
22		Adjustment	3,148	Pit 3 Refurbish LLO No. 1 (expense)	WP 4-8, Line 247
23		Adjustment	-1,033	Pit 4 Dam Paint Steel Footbridge	WP 4-8, Line 259
24		Misc Adjustment	-112	Net adjustment for yearly cost fluctuations in managing the dams and waterways of various watersheds	Line 27 less sum of Lines 19-23
25		Total Net Change	1,100		Sum of Lines 20-24
26					
27	2023	Forecast	28,883		WP 4-1, Line 3

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category AY
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	112		WP 4-1, Line 4
2		Escalation	2	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Misc Adjustment	137	Net adjustment for increases in VELB permit costs and zebra/quagga mussel prevention program, decrease in Balch afterbay low level outlet project revegetation	Line 6 less sum of Lines 1-2
4		Total Net Change	139		Sum of Lines 2-3
5					
6	2021	Forecast	251		WP 4-1, Line 4
7		Escalation	8	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
8		Total Net Change	8		Line 7
9					
10	2022	Forecast	259		WP 4-1, Line 4
11		Escalation	9	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
12		Total Net Change	9		Line 11
13					
14	2023	Forecast	267		WP 4-1, Line 4

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category BC
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	23			WP 4-1, Line 5
2		Misc Adjustment	-23		Net adjustment for yearly cost fluctuations in reimbursable work of various watersheds	Line 5 less Line 1
3		Total Net Change	-23			Line 2
4						
5	2021	Forecast	0			WP 4-1, Line 5
6		Total Net Change	0			Line 5
7						
8	2022	Forecast	0			WP 4-1, Line 5
9		Total Net Change	0			Line 8
10						
11	2023	Forecast	0			WP 4-1, Line 5

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category EP
(Thousands of Dollars)**

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	1,400		WP 4-1, Line 6
2		Escalation	20	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Misc Adjustment	-244	Net adjustment for yearly cost fluctuations in managing the land rights of various watersheds	Line 6 less sum of Lines 1-2
4		Total Net Change	-224		Sum of Lines 2-3
5					
6	2021	Forecast	1,175		WP 4-1, Line 6
7		Escalation	38	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
8		Total Net Change	38		Line 7
9					
10	2022	Forecast	1,213		WP 4-1, Line 6
11		Escalation	41	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
12		Total Net Change	41		Line 11
13					
14	2023	Forecast	1,254		WP 4-1, Line 6

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category IG
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	16,954		WP 4-1, Line 8
2		Escalation	239	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Adjustment	5,240	Yearly cost fluctuations in spillway repair work (SAIP Projects)	WP 4-11/12, sum of Lines 376-400 and WP 4-12 Lines 402 - 407
4		Adjustment	5,165	Yearly cost fluctuations in license condition work of various watersheds	WP 4-10/11 sum of Lines 320-330 and Lines 346 - 360, 375
5		Adjustment	150	Crane Valley Recreation Settlement Agmt	WP 4-10, Line 345
6		Misc Adjustment	-1,192	Net adjustment for yearly cost fluctuations in spillway repair work and license condition work of various watersheds	Line 9 less sum of Lines 1-5
7		Total Net Change	9,602		Sum of Lines 2-6
8					
9	2021	Forecast	26,556		WP 4-1, Line 8
10		Escalation	852	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
11		Adjustment	-6,818	Yearly cost fluctuations in spillway repair work (SAIP Projects)	WP 4-11/12, sum of Lines 376-400 and WP 4-12 Lines 402 - 407
12		Adjustment	8,324	Yearly cost fluctuations in license condition work of various watersheds	WP 4-10/11 sum of Lines 320-330 and Lines 346 - 360, 375
13		Adjustment	2,390	Crane Valley Recreation Settlement Agmt	WP 4-10, Line 345
14		Misc Adjustment	-356	Net adjustment for yearly cost fluctuations in spillway repair work and license condition work of various watersheds	Line 17 less sum of Lines 9-13
15		Total Net Change	4,392		Sum of Lines 10-14
16					
17	2022	Forecast	30,948		WP 4-1, Line 8
18		Escalation	1,033	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
19		Adjustment	-2,086	Yearly cost fluctuations in spillway repair work (SAIP Projects)	WP 4-11/12, sum of Lines 376-400 and WP 4-12 Lines 402 - 407
20		Adjustment	-650	Yearly cost fluctuations in license condition work of various watersheds	WP 4-10/11 sum of Lines 320-330 and Lines 346 - 360, 375
21		Adjustment	644	Crane Valley Recreation Settlement Agmt	WP 4-10, Line 345
22		Misc Adjustment	664	Net adjustment for yearly cost fluctuations in spillway repair work and license condition work of various watersheds	Line 25 less sum of Lines 17-21
23		Total Net Change	-395		Sum of Lines 18-22
24					
25	2023	Forecast	30,552		WP 4-1, Line 8

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category KG
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	43,462		WP 4-1, Line 9
2		Escalation	612	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Adjustment	-1,984	Dropped Objects Program	WP 4-13, Line 480 and WP 4-15, Line 541
4		Adjustment	-2,161	Conclusion of Compliance Maturity Model enhanced effort	WP 4-15, Line 542
5		Adjustment	-2,710	Shasta, Drum & DeSabra Operating cost due to Covid-19 related additional overheads and labor hours.	WP 4-12, Lines 410- 412
6		Misc Adjustment	-933	Net adjustment for yearly cost fluctuations in various asset management programs, the operation of various generation facilities, and facility safety programs	Line 9 less sum of Lines 1-5
7		Total Net Change	-7,176		Sum of Lines 2-6
8					
9	2021	Forecast	36,285		WP 4-1, Line 9
10		Escalation	1,164	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
11		Adjustment	-1,068	Dropped Objects Program	WP 4-13, Line 480 and WP 4-15, Line 541
12		Misc Adjustment	-274	Net adjustment for yearly cost fluctuations in various asset management programs, the operation of various generation facilities, and facility safety programs	Line 15 less sum of Lines 9-11
13		Total Net Change	-178		Sum of Lines 10-12
14					
15	2022	Forecast	36,107		WP 4-1, Line 9
16		Escalation	1,205	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
17		Misc Adjustment	-221	Net adjustment for yearly cost fluctuations in various asset management programs, the operation of various generation facilities, and facility safety programs	Line 20 less sum of Lines 15-16
18		Total Net Change	984		Sum of Lines 16-17
19					
20	2023	Forecast	37,091		WP 4-1, Line 9

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category KH
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	23,121		WP 4-1, Line 10
2		Escalation	325	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Misc Adjustment	46	Net adjustment for yearly cost fluctuations in various asset management programs, and the maintaining of various generation facilities	Line 6 less sum of Lines 1-2
4		Total Net Change	371		Sum of Lines 2-3
5					
6	2021	Forecast	23,493		WP 4-1, Line 10
7		Escalation	754	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
8		Adjustment	878	Belden PH Rebuild WG Upthrust Assembly	WP 4-18, Line 667
9		Adjustment	-524	Pit 6 Draft Tube Structural Retrofit	WP 4-17, Line 646
10		Adjustment	-537	Helms Runner Welding (Unit 1 & 3)	WP 4-18, Line 675
11		Adjustment	-258	Haas Deferred Maint Crane Repairs	WP 4-18, Line 684
12		Misc Adjustment	-672	Net adjustment for yearly cost fluctuations in various asset management programs, and the maintaining of various generation facilities	Line 15 less sum of Lines 6-11
13		Total Net Change	-359		Sum of Lines 7-12
14					
15	2022	Forecast	23,134		WP 4-1, Line 10
16		Escalation	772	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
17		Adjustment	-1,240	Belden PH Rebuild WG Upthrust Assembly	WP 4-18, Line 667
18		Adjustment	500	Spaulding Repair Intake & Dredge	WP 4-18, Line 688
19		Misc Adjustment	474	Net adjustment for yearly cost fluctuations in various asset management programs, and the maintaining of various generation facilities	Line 22 less sum of Lines 15-18
20		Total Net Change	506		Sum of Lines 16-19
21					
22	2023	Forecast	23,640		WP 4-1, Line 10

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category KI
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	8,946		WP 4-1, Line 11
2		Escalation	126	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Adjustment	999	Pit 3 Tailrace Bridge Expense Upgrade	WP 4-19, Line 739
4		Adjustment	1,062	Roads related assessment and maintenance after storm for public and employee safety	WP 4-18/19/20, Lines 696-701,709,711,713,731,760 - 762,780,783,786,787
5		Misc Adjustment	-704	Net adjustment for yearly cost fluctuations in bridge assessment and repair, and the maintaining of generation facility infrastructure	Line 8 less sum of Lines 1-4
6		Total Net Change	1,483		Sum of Lines 2-5
7					
8	2021	Forecast	10,429		WP 4-1, Line 11
9		Escalation	335	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
10		Adjustment	835	AM: Substation Inspection Program	WP 4-19, Line 718
11		Adjustment	269	Roads related assessment and maintenance after storm for public and employee safety	WP 4-18/19/20, Lines 696-701,709,711,713,731,760 - 762,780,783,786,787
12		Misc Adjustment	205	Net adjustment for yearly cost fluctuations in bridge assessment and repair, and the maintaining of generation facility infrastructure	Line 13 less sum of Lines 8-11
13		Total Net Change	1,644		Sum of Lines 9-12
14					
15	2022	Forecast	12,073		WP 4-1, Line 11
16		Escalation	403	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
17		Adjustment	600	Helms - McKinley Grove Rd Patching	Sum of WP 4-20, Line 783
18		Adjustment	450	Paint Tiger Ck PH	Sum of WP 4-19, Line 733
19		Adjustment	522	Roads related assessment and maintenance after storm for public and employee safety	WP 4-18/19/20, Lines 696-701,709,711,713,731,760 - 762,780,783,786,787
20		Misc Adjustment	542	Net adjustment for yearly cost fluctuations in bridge assessment and repair, and the maintaining of generation facility infrastructure	Line 23 less sum of Lines 15-19
21		Total Net Change	2,517		Sum of Lines 16-20
22					
23	2023	Forecast	14,590		WP 4-1, Line 11

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category KJ
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	21,964		WP 4-1, Line 12
2		Escalation	309	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Adjustment	-1,024	KCV Comply with Hydro Licenses	WP 4-21, Line 796
4		Adjustment	262	Mokelumne License Codition - FERC 137 - land and environmental management	WP 4-21, Line 813
5		Adjustment	2,200	Pit 3 Britton Dam Concrete Bridge Repair	WP 4-22, Line 868
6		Adjustment	447	DSP: Surveillance Data Acqstn/Eval	WP 4-22, Line 858
7		Adjustment	703	DSP: Radial Gates Investigation	WP 4-22, Line 859
8		Misc Adjustment	-650	Net adjustment for yearly cost fluctuations in regulatory compliance activities such as maintaining fish and wildlife facilities, maintaining recreational facilities and facility safety programs	Line 11 less sum of Lines 1-7
9		Total Net Change	2,247		Sum of Lines 2-8
10					
11	2021	Forecast	24,211		WP 4-1, Line 12
12		Escalation	777	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
13		Adjustment	-845	Mokelumne License Codition - FERC 137 - land and environmental management	WP 4-21, Line 813
14		Adjustment	178	Pit 3 Britton Dam Concrete Bridge Repair	WP 4-22, Line 868
15		Adjustment	-74	DSP: Surveillance Data Acqstn/Eval	WP 4-22, Line 858
16		Adjustment	-116	DSP: Radial Gates Investigation	WP 4-22, Line 859
17		Misc Adjustment	11	Net adjustment for yearly cost fluctuations in regulatory compliance activities such as FERC/DSOD/USGS fees, maintaining fish and wildlife facilities, maintaining recreational facilities and facility safety programs	Line 20 less sum of Lines 11-16
18		Total Net Change	-69		Sum of Lines 12-17
19					
20	2022	Forecast	24,142		WP 4-1, Line 12
21		Escalation	806	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
22		Adjustment	698	Belden Dam Paint Radial Gates	WP 4-22, Line 860
23		Adjustment	-2,583	Pit 3 Britton Dam Concrete Bridge Repair	WP 4-22, Line 868
24		Adjustment	198	Drum -FERC Patching Annual	WP 4-22, Line 872
25		Adjustment	125	DSP: Surveillance Data Acqstn/Eval	WP 4-22, Line 858
26		Adjustment	196	DSP: Radial Gates Investigation	WP 4-22, Line 859
27		Misc Adjustment	597	Net adjustment for yearly cost fluctuations in regulatory compliance activities such as USGS fees, maintaining fish and wildlife facilities, maintaining recreational facilities and facility safety programs	Line 30 less sum of Lines 20-26
28		Total Net Change	37		Sum of Lines 21-27
29					
30	2023	Forecast	24,179		WP 4-1, Line 12

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category LX
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	0			WP 4-1, Line 13
2		Adjustment	78		Power Gen CEMA Straight Time Expense	WP 4-23, Line 884
3		Total Net Change	78			Line 2
4						
5	2021	Forecast	78			WP 4-1, Line 13
6		Escalation	3		Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
7		Total Net Change	3			Line 6
8						
9	2022	Forecast	81			WP 4-1, Line 13
10		Escalation	3		Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
11		Total Net Change	3			Line 10
12						
13	2023	Forecast	84			WP 4-1, Line 13

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category OM
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	2,794		WP 4-1, Line 14
2		Escalation	39	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Misc Adjustment	-187	Net adjustment for yearly cost fluctuations in operation management due to vacancies	Line 6 less sum of Lines 1-2
4		Total Net Change	-148		Sum of Lines 2-3
5					
6	2021	Forecast	2,647		WP 4-1, Line 14
7		Escalation	85	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
8		Total Net Change	85		Line 7
9					
10	2022	Forecast	2,732		WP 4-1, Line 14
11		Escalation	91	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
12		Adjustment	357	Inclusion of VP Generation salary under Power Generation	WP 4-23, Line 887
13		Total Net Change	448		Sum of Lines 11-12
14					
15	2023	Forecast	3,180		WP 4-1, Line 14

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category OS
(Thousands of Dollars)**

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	2,836		WP 4-1, Line 15
2		Escalation	40	Includes labor and non-labor escalation of 1.4%	WP 4-40, Line 4
3		Misc Adjustment	918	Change in headcounts under Hydro Contracts & Outage Management, Business Planning and Asset Management due to reorganization of Power Gen LOB and filling vacancies.	WP 4-23, Line 913
4		Total Net Change	958		Sum of Lines 2-3
5					
6	2021	Forecast	3,794		WP 4-1, Line 15
7		Escalation	122	Includes labor and non-labor escalation of 3.2%	WP 4-40, Line 4
8		Total Net Change	122		Line 7
9					
10	2022	Forecast	3,916		WP 4-1, Line 15
11		Escalation	131	Includes labor and non-labor escalation of 3.3%	WP 4-40, Line 4
12		Total Net Change	131		Line 11
13					
14	2023	Forecast	4,047		WP 4-1, Line 15

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Walk by Major Work Category ZC
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	2,008			WP 4-1, Line 16
3		Misc Adjustment	-508		Change in costs and activities to support PG&E's land conservation commitment.	WP 4-24, Line 927
4		Total Net Change	-508			Line 3
5						
6	2021	Forecast	1,500			WP 4-1, Line 16
7		Misc Adjustment	0	NA		WP 4-24, Line 927
8		Total Net Change	0			Line 7
9						
10	2022	Forecast	1,500			WP 4-1, Line 16
11		Misc Adjustment	0	NA		WP 4-24, Line 927
12		Total Net Change	0			Line 11
13						
14	2023	Forecast	1,500			WP 4-1, Line 16

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Generation Operations
Expense and Capital Escalation 2021-26

Line No.

1 Standing Order Escalation Rates for GRC

2

3

4

	2021	2022	2023	2024	2025	2026
Hydro Expense	1.4%	3.2%	3.3%	3.0%	2.9%	2.9%

5

6

7

01. GRC 2023 Planning Guidelines Q1 2020

8

Table 15

9

Forecast Labor Escalation Rates 2021 - 2026

10

11

	2021	2022	2023	2024	2025	2026
A&G	3.06%	3.28%	3.28%	3.28%	3.28%	3.28%
O&M	3.02%	3.52%	3.52%	3.52%	3.52%	3.52%
Total Com	3.03%	3.47%	3.47%	3.47%	3.47%	3.47%

12

13

14

15

Non-Labor Escalation Rates: Operations & Maintenance and Administrative and General Expenses

16

17

18

Line No.	Year	Gas O&M			Electric O&M			Hydro Gen	Fossil Gen	A&G	
		Gas Dist.	Gas Trans	Gas Storage	Electric Dist.	Electric Trans	Nuclear Gen				
19	1	2013	1.90%	1.50%	1.50%	0.80%	0.90%	1.00%	0.60%	1.20%	1.60%
20	2	2014	2.10%	1.80%	1.30%	0.70%	0.40%	0.80%	0.40%	0.80%	1.60%
21	3	2015	-1.20%	-0.60%	-1.10%	-0.80%	-0.70%	-0.40%	-1.40%	-0.20%	1.50%
22	4	2016	0.20%	0.20%	-0.40%	-0.80%	-0.50%	0.30%	-0.80%	0.20%	1.10%
23	5	2017	2.50%	2.40%	2.50%	1.30%	0.70%	1.70%	2.10%	1.90%	1.50%
24	6	2018	3.60%	3.80%	4.10%	3.70%	2.90%	3.50%	5.90%	3.70%	1.70%
25	7	2019	1.80%	1.40%	1.20%	2.40%	2.20%	2.30%	2.20%	2.50%	2.10%
26	8	2020	-1.80%	-1.70%	-2.10%	-1.70%	-0.60%	-1.20%	-2.80%	-0.80%	1.00%
27	9	2021	0.80%	0.20%	-0.50%	-0.40%	-0.40%	0.20%	-0.70%	-0.60%	1.40%
28	10	2022	2.80%	2.60%	2.30%	2.20%	1.60%	2.50%	2.80%	2.20%	1.90%
29	11	2023	2.90%	2.90%	2.50%	2.40%	1.90%	2.70%	3.10%	2.70%	2.30%
30	12	2024	2.40%	2.30%	1.90%	2.20%	1.50%	2.30%	2.30%	2.30%	2.30%
31	13	2025	2.30%	2.30%	1.90%	2.00%	1.40%	2.10%	2.20%	2.10%	2.10%
32	14	2026	2.30%	2.20%	1.80%	1.90%	1.40%	2.10%	2.20%	2.20%	2.10%

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

For capital, the escalation rate uses a combined Labor and Non-Labor escalation rate

35

36

37

Line No.	Year	Gas Plant			Electric Plant			Hydro Gen	Fossil Gen	Common Plant	
		Gas Dist.	Gas Trans	Gas Storage	Electric Dist.	Electric Trans	Nuclear Gen				
38	1	2013	1.70%	-0.70%	1.60%	3.60%	1.90%	1.90%	1.70%	1.40%	4.90%
39	2	2014	2.80%	6.00%	2.40%	3.10%	1.80%	1.50%	1.60%	3.30%	1.50%
40	3	2015	2.30%	-1.10%	1.60%	2.40%	2.10%	5.30%	2.70%	2.60%	5.70%
41	4	2016	2.40%	-0.30%	1.60%	1.60%	2.10%	3.60%	2.50%	3.10%	2.20%
42	5	2017	2.60%	5.20%	2.00%	3.30%	1.80%	0.20%	1.60%	0.50%	0.30%
43	6	2018	2.40%	3.00%	2.60%	3.10%	2.60%	1.90%	2.00%	2.20%	2.70%
44	7	2019	3.10%	5.90%	4.00%	5.80%	5.80%	5.00%	4.60%	4.00%	3.60%
45	8	2020	1.90%	0.00%	1.30%	3.30%	2.10%	1.50%	2.10%	1.90%	3.40%
46	9	2021	1.10%	0.00%	0.90%	2.80%	1.70%	2.10%	2.20%	2.10%	2.50%
47	10	2022	1.70%	3.10%	1.80%	2.60%	1.80%	1.90%	2.10%	1.70%	2.90%
48	11	2023	2.30%	3.00%	2.20%	2.70%	2.20%	2.10%	2.20%	2.00%	3.40%
49	12	2024	2.50%	2.50%	2.40%	2.70%	2.20%	2.20%	2.20%	2.20%	3.90%
50	13	2025	2.30%	2.80%	2.30%	2.70%	2.00%	2.20%	2.20%	2.10%	3.80%
51	14	2026	2.30%	3.10%	2.30%	2.70%	2.00%	2.20%	2.20%	2.10%	3.80%

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Expense Forecast Drivers
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	158,297		WP 4-1, Line 17
2		Escalation	13,097	Includes labor and non-labor escalation for 2021, 2022 & 2023	Escalation from WP 4-25 to WP 4-38 for years 2021, 2022 & 2023
3		Adjustment	11,475	Increase in relicensing and license condition implementation related spending (MWC IG)	WP 4-12, Line 408 - Year 2023 less Year 2020 less Escalation for 2021, 2022, 2023 (WP 4-31, Lines 2,10,18)
4		Adjustment	4,781	Increase in hydro maintenance expense(MWC KI)	WP 4-20 Line 791 - Year 2023 less Year 2020 less Escalation for 2021, 2022, 2023 (WP 4-34, Lines 2,9,16)
5		Adjustment	-9,352	Reduction in hydro operation expense(MWC KG)	WP 4-15 Line 551 - Year 2023 less Year 2020 less Escalation for 2021, 2022, 2023 (WP 4-32, Lines 2,10,16)
6		Adjustment	-389	Other	Line 7 less sum of Lines 1-5
7	2023	Forecast	177,909		WP 4-1, Line 17

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Expense
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023 Forecast (\$000)
1	Extended Unplanned Shutdown of a Critical Power Generation Asset				
2	5018937	Training and Quals	C1 - Administrative Controls	KG	1,055
3	5236336	Records Management Initiative exp	C1 - Administrative Controls	KG	899
4	5267544	Guidance Documents	C1 - Administrative Controls	KG	852
5	5269273	ISO 55000	C1 - Administrative Controls	AB	450
6	5015231	SCADA Op Issues, Standards, Plannin	C1 - Administrative Controls	KH	345
7	5234638	PG Learning Contract Costs	C1 - Administrative Controls	KG	340
8	5265792	AM: Applications and Tools	C1 - Administrative Controls	AB	40
9	5009210	Helms Snow Removal	C2 - Ancillary Support to Operate & Maintain Plants	KI	1,306
10	5001777	Manage Technical Svcs	C2 - Ancillary Support to Operate & Maintain Plants	KG	1,067
11	5013162	KCV FOC Switching Center Support	C2 - Ancillary Support to Operate & Maintain Plants	KG	822
12	5001645	PE: Hydro Support Services (engr LOE)	C2 - Ancillary Support to Operate & Maintain Plants	KH	330
13	5028049	DeSabra Hydrographic Support	C2 - Ancillary Support to Operate & Maintain Plants	KG	320
14	5015389	DeSabra Engineering LOE	C2 - Ancillary Support to Operate & Maintain Plants	KH	228
15	5015390	Shasta Engineering LOE	C2 - Ancillary Support to Operate & Maintain Plants	KH	186
16	5034772	ENG: Contract & Consulting	C2 - Ancillary Support to Operate & Maintain Plants	AB	173
17	5010551	Drum Engineer Level of Effort	C2 - Ancillary Support to Operate & Maintain Plants	KH	129
18	5011013	DeSabra Helicopter Base Charge	C2 - Ancillary Support to Operate & Maintain Plants	KG	117
19	5001568	Motherlode Engineer Level Of Effort	C2 - Ancillary Support to Operate & Maintain Plants	KH	66
20	5011009	KCV Helicopter Charges	C2 - Ancillary Support to Operate & Maintain Plants	KG	27
21	5020617	AM: Penstock Program	C3 - Assessment or Inspection of Systems	AX	1,515
22	5056565	AM: Substation Inspection Program	C3 - Assessment or Inspection of Systems	KI	862
23	5020615	AM: Water Conveyance Systems Prgm	C3 - Assessment or Inspection of Systems	AX	730
24	5022294	AM: Bearing Assessment Program	C3 - Assessment or Inspection of Systems	KH	561
25	5020624	AM: Pressure Boundaries Program	C3 - Assessment or Inspection of Systems	AX	508
26	5020616	AM: Governor Program	C3 - Assessment or Inspection of Systems	KH	354
27	5258826	Relay and Battery test records	C3 - Assessment or Inspection of Systems	KG	347
28	5015791	AM: Hydro Bridge Program	C3 - Assessment or Inspection of Systems	KI	270
29	5022297	AM: Turbine Assessment Program	C3 - Assessment or Inspection of Systems	KH	270
30	5272374	AM: Civil Infrastructure Program	C3 - Assessment or Inspection of Systems	KI	247
31	5020621	AM: Generator Program	C3 - Assessment or Inspection of Systems	KH	103
32	5020619	AM: High Voltage Transformer Program	C3 - Assessment or Inspection of Systems	KH	94
33	5020613	AM: Arc Flash Hazard Assessment Program	C3 - Assessment or Inspection of Systems	KG	70
34	5027191	AM:Kings Crane-Fire Protection ITM Contr	C3 - Assessment or Inspection of Systems	KH	40
35	5024831	AM: Exciter Program	C3 - Assessment or Inspection of Systems	KG	32
36	5024830	AM: HV Breakers Program	C3 - Assessment or Inspection of Systems	KG	24
37	5047178	FERC Security Plan	C4 - Controls related to External Events	KG	351
38	5263273	NERC Proposed Regulations & Guidance	C4 - Controls related to External Events	KG	167
39	5266134	Integrated Seismic Risk Mgmt Prog- Hydro	C4 - Controls related to External Events	KG	158
40	5051017	EH Shasta Common Defensible Space	C4 - Controls related to External Events	KG	99
41	5051019	EH Drum Common Defensible Space	C4 - Controls related to External Events	KG	77
42	5051022	EH Kings Crane Common Defensible Space	C4 - Controls related to External Events	KG	67
43	5054251	DSP: Surveillance Programs	C4 - Controls related to External Events	KJ	52
44	5051025	EH Feather Common Defensible Space	C4 - Controls related to External Events	KG	47
45	5051051	EH Mokelumne Common Defensible Space	C4 - Controls related to External Events	KG	31
46	5051050	EH Stanislaus Common Defensible Space	C4 - Controls related to External Events	KG	16
47	5000514	Drum Operate Generation Facilities	C5 - Maintaining the Systems	KG	6,415
48	5000557	Shasta Maint Generators	C5 - Maintaining the Systems	KH	3,713
49	5000561	KCV Maint Generators	C5 - Maintaining the Systems	KH	2,412
50	5000562	Helms Maint Generators	C5 - Maintaining the Systems	KH	2,071
51	5000558	DeSabra Maint Generators	C5 - Maintaining the Systems	KH	1,857
52	5000530	Drum Maint Reservoirs/Dam/Waterways	C5 - Maintaining the Systems	AX	1,640

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Expense
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023
					Forecast (\$000)
53	5000618	Shasta Maint Other Plant	C5 - Maintaining the Systems	KH	1,253
54	5000531	MLode Maint Reservoirs/Dams/Waterways	C5 - Maintaining the Systems	AX	1,237
55	5000532	KCV Maint Reservoirs/Dams/Waterways	C5 - Maintaining the Systems	AX	1,142
56	5000662	KCV Maint Generation Fac Structure	C5 - Maintaining the Systems	KI	912
57	5000449	Shasta Maint TCom/Comput/Network	C5 - Maintaining the Systems	KH	909
58	5000559	Drum Maint Generators	C5 - Maintaining the Systems	KH	878
59	5000560	MLode Maint Generators	C5 - Maintaining the Systems	KH	847
60	5000542	DeSabra Maint Roads/Bridges	C5 - Maintaining the Systems	KI	821
61	5000544	MLode Maint Roads/Bridges	C5 - Maintaining the Systems	KI	780
62	5000541	Shasta Maint Roads/Bridges	C5 - Maintaining the Systems	KI	767
63	5000621	MLode Maint Other Plant	C5 - Maintaining the Systems	KH	688
64	5000529	DeSabra Maint Reserv, Dams & Waterways	C5 - Maintaining the Systems	AX	668
65	5000619	DeSabra Maint Other Plant Equip	C5 - Maintaining the Systems	KH	659
66	5000663	Helms Maint Generation Fac Structure	C5 - Maintaining the Systems	KI	628
67	5000543	Drum Maint Roads/Bridges	C5 - Maintaining the Systems	KI	590
68	5000528	Shasta Maint Reservoirs/Dams/Waterways	C5 - Maintaining the Systems	AX	568
69	5000452	MLode Maint TCom/Computer Network	C5 - Maintaining the Systems	KH	561
70	5000622	KCV Maint Other Plant	C5 - Maintaining the Systems	KH	517
71	5000545	KCV Maint Roads/Bridges	C5 - Maintaining the Systems	KI	400
72	5000451	Drum Maint TCom/Computer Network	C5 - Maintaining the Systems	KH	396
73	5000450	DeSabra Maint TCom/Comp/Network	C5 - Maintaining the Systems	KH	371
74	5000661	MLode Maint Generation Facility Structur	C5 - Maintaining the Systems	KI	336
75	5000620	Drum Maint Other Plant	C5 - Maintaining the Systems	KH	334
76	5010032	DSP: Drum Req Facility Safety Program	C5 - Maintaining the Systems	KJ	319
77	5000623	Helms Maint Other Plant	C5 - Maintaining the Systems	KH	285
78	5000494	DeSabra Manage Environmental Ops	C5 - Maintaining the Systems	AK	235
79	5018429	Pit 1 Levee Maintenance	C5 - Maintaining the Systems	AX	166
80	5000453	KCV Maint TCom/Computer/Network Sys	C5 - Maintaining the Systems	KH	164
81	5000533	Helms Maint Reservoirs/Dams/Waterways	C5 - Maintaining the Systems	AX	131
82	5000495	Drum Manage Environmental Ops	C5 - Maintaining the Systems	AK	98
83	5001043	DSP: Required Facility Safety Program	C5 - Maintaining the Systems	KJ	96
84	5000658	Shasta Maint Generation Fac Structure	C5 - Maintaining the Systems	KI	92
85	5010035	DSP: DeSabra Req Facility Safety Program	C5 - Maintaining the Systems	KJ	86
86	5010034	DSP: Shasta Req Facility Safety Program	C5 - Maintaining the Systems	KJ	86
87	5054252	DSP: Gates and Valves Program	C5 - Maintaining the Systems	KJ	83
88	5000454	Helms Maint TCom/Computer/NetworkSys	C5 - Maintaining the Systems	KH	74
89	5010030	DSP: KCV Req Facility Safety Program	C5 - Maintaining the Systems	KJ	64
90	5010031	DSP: MTL Req Facility Safety Program	C5 - Maintaining the Systems	KJ	54
91	5010029	DSP: Helms Req Facility Safety Program	C5 - Maintaining the Systems	KJ	32
92	5000546	Helms Maint Roads/Bridges	C5 - Maintaining the Systems	KI	29
93	5004009	DSP: FSP Instrumentation/Mntrng/Rprtng	C5 - Maintaining the Systems	AX	19
94	5027192	Drum-Fire Protection ITM Contract	C5 - Maintaining the Systems	KH	15
95	5053629	ML--Fire Protection ITM Contract	C5 - Maintaining the Systems	KH	15
96	5000513	DeSabra Operate Generation Facilities	C6 - Operating the Facility Within Requirements	KG	4,556
97	5000512	Shasta Operate Generation Facilities	C6 - Operating the Facility Within Requirements	KG	4,171
98	5033923	Oper Suppt Hydro, 14705, Asset Mgmt Mngr	C6 - Operating the Facility Within Requirements	OS	4,047
99	5000515	MLode Operate Generation Facilities	C6 - Operating the Facility Within Requirements	KG	3,938
100	5000517	Helms Operate Generation Facilities	C6 - Operating the Facility Within Requirements	KG	1,812
101	5033712	Oper Mgmt Hydro, 11566, PG Vice Pres.	C6 - Operating the Facility Within Requirements	OM	1,769
102	5000516	KCV Operate Generation Facilities	C6 - Operating the Facility Within Requirements	KG	1,713
103	5033724	Oper Mgmt Hydro, 15042, SQS Director	C6 - Operating the Facility Within Requirements	OM	959
104	5033721	Oper Mgmt Hydro, 13733, Licensing Direct	C6 - Operating the Facility Within Requirements	OM	452

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Expense
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023
					Forecast (\$000)
105	5000493	Shasta Manage Environmental Opns	C6 - Operating the Facility Within Requirements	AK	284
106	5001567	Helms Operations Support	C6 - Operating the Facility Within Requirements	KH	171
107	5000497	KCV Manage Environmental	C6 - Operating the Facility Within Requirements	AK	143
108	5004592	KCV Operations Support	C6 - Operating the Facility Within Requirements	KH	114
109	5000496	MLode Manage Environmental Opns	C6 - Operating the Facility Within Requirements	AK	97
110	5000498	Helms Manage Environmental	C6 - Operating the Facility Within Requirements	AK	86
111	5261877	Grizzly Cr Xing Assess & Repair Tunnel	M1 - Component Replacement or Repair Civil	AX	1,000
112	5215842	Belden Dam Paint Radial Gates	M1 - Component Replacement or Repair Civil	KJ	750
113	5258852	Poe Dam Repair Toe Voids	M1 - Component Replacement or Repair Civil	AX	640
114	5271598	Spaulding Repair Intake & Dredge	M1 - Component Replacement or Repair Civil	KH	500
115	5236324	Cresta Repair Tailrace Erosion	M1 - Component Replacement or Repair Civil	AX	500
116	5260129	Pit 6 Spilwy Aprn/Tailrce Remove Block 1	M1 - Component Replacement or Repair Civil	AX	500
117	5267076	Pit 3 Refurbish LLO No. 1 (expense)	M1 - Component Replacement or Repair Civil	AX	500
118	5270895	Pit 6 Debris Boom Anchor Recoating	M1 - Component Replacement or Repair Civil	AX	300
119	5263407	Bucks Creek Pnstk Erosion Mitigation	M1 - Component Replacement or Repair Civil	AX	250
120	5215872	Almanor Dredge Prattville Intake	M1 - Component Replacement or Repair Civil	AX	250
121	5202233	Drum Canal Patching	M1 - Component Replacement or Repair Civil	AX	250
122	5263403	Caribou 2 Penstock Modify Rock Bolts	M1 - Component Replacement or Repair Civil	AX	250
123	5222748	ElectraPH Stabilize Slope	M1 - Component Replacement or Repair Civil	KI	150
124	5271456	Helms Tunnel Scaling	M1 - Component Replacement or Repair Civil	AX	125
125	5254422	Grizzly Forebay Surface Debris Removal	M1 - Component Replacement or Repair Civil	AX	100
126	5269614	Pit 1 Valvehouse Repair	M1 - Component Replacement or Repair Civil	KI	60
127	5269692	McCloud Hawkins Crk Xing Repair Footings	M1 - Component Replacement or Repair Civil	AX	50
128	5272061	Shasta Spillways FSP Engr SAIP	M1 - Component Replacement or Repair Civil	IG	34
129	5272054	Motherlode Spillways FSP Engr SAIP	M1 - Component Replacement or Repair Civil	IG	7
130	5272032	Drum Spillways FSP Engr SAIP	M1 - Component Replacement or Repair Civil	IG	2
131	5272053	DeSabra Spillways FSP Engr SAIP	M1 - Component Replacement or Repair Civil	IG	1
132	5272072	Lower Bear Spillway Improvements SAIP	M1 - Component Replacement or Repair Civil	IG	1
133	5272074	Lake Tabeaud Spillway Improvements SAIP	M1 - Component Replacement or Repair Civil	IG	1
134	5272067	Upper Blue Spillway Improvements SAIP	M1 - Component Replacement or Repair Civil	IG	1
135	5271453	Helms CB270 Replace Interrupters	M2 - Component Replacement or Repair Electrical	KH	200
136	5271454	Helms CB270 Replace Mech Heads	M2 - Component Replacement or Repair Electrical	KH	200
137	5260382	Helms Penstock Field Weld Reinspections	M3 - Component Replacement or Repair Mechanical	AX	1,000
138	5222375	Helms - Outage Expense Work	M3 - Component Replacement or Repair Mechanical	KH	300
139	5260374	Balch 2 U3 Runner Welding	M3 - Component Replacement or Repair Mechanical	KH	150
140	5260383	Kerckhoff 2 - Runner Welding	M3 - Component Replacement or Repair Mechanical	KH	125
141	5262370	Pit 4 U1 & U2 PRV PLC Programming	M3 - Component Replacement or Repair Mechanical	KH	100
142	5270892	Pit 4 PH Evaluate Heat Exchanger Upgrde	M3 - Component Replacement or Repair Mechanical	KH	75
143	5260130	Pit 3 U1 TSV motor replace/refurbish	M3 - Component Replacement or Repair Mechanical	KH	60
144	5263406	DeSabra - 10 Yr Sump Cleaning	M3 - Component Replacement or Repair Mechanical	KH	60
145	5260119	Shasta 10-yr Sump Pump Cleanings	M3 - Component Replacement or Repair Mechanical	KH	60
146	5271461	Haas U1 Runner Welding	M3 - Component Replacement or Repair Mechanical	KH	50
147	5271601	Electra U3 Bearing Inspection	M3 - Component Replacement or Repair Mechanical	KH	10
148	5271381	Poe Surge Shaft Repair Sink Holes	M4 - External Event Mitigation	AX	647
149					
150			Total		85,929
151					
152		Large Uncontrolled Water Release (Dam Failure)			
153	5010032	DSP: Drum Req Facility Safety Program	C1 - Dam Safety Program	KJ	2,869
154	5001043	DSP: Required Facility Safety Program	C1 - Dam Safety Program	KJ	867
155	5010035	DSP: DeSabra Req Facility Safety Program	C1 - Dam Safety Program	KJ	777
156	5010034	DSP: Shasta Req Facility Safety Program	C1 - Dam Safety Program	KJ	777

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Expense
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023
					Forecast (\$000)
157	5054252	DSP: Gates and Valves Program	C1 - Dam Safety Program	KJ	744
158	5010033	DSP: Potter Valley Req Facility Safety	C1 - Dam Safety Program	KJ	673
159	5010030	DSP: KCV Req Facility Safety Program	C1 - Dam Safety Program	KJ	576
160	5272077	DSP: Inundation Maps	C1 - Dam Safety Program	IG	569
161	5010031	DSP: MTL Req Facility Safety Program	C1 - Dam Safety Program	KJ	486
162	5054251	DSP: Surveillance Programs	C1 - Dam Safety Program	KJ	472
163	5010029	DSP: Helms Req Facility Safety Program	C1 - Dam Safety Program	KJ	288
164	5004009	DSP: FSP Instrumentation/Mntrng/Rprtng	C1 - Dam Safety Program	AX	175
165	5272061	Shasta Spillways FSP Engr SAIP	M2 - Spillway Remediation	IG	310
166	5272076	PV Scott Dam Spillway Repairs	M2 - Spillway Remediation	IG	126
167	5272054	Motherlode Spillways FSP Engr SAIP	M2 - Spillway Remediation	IG	62
168	5272032	Drum Spillways FSP Engr SAIP	M2 - Spillway Remediation	IG	14
169	5272053	DeSabra Spillways FSP Engr SAIP	M2 - Spillway Remediation	IG	12
170	5272072	Lower Bear Spillway Improvements SAIP	M2 - Spillway Remediation	IG	12
171	5272074	Lake Tabeaud Spillway Improvements SAIP	M2 - Spillway Remediation	IG	12
172	5272067	Upper Blue Spillway Improvements SAIP	M2 - Spillway Remediation	IG	6
173	5267076	Pit 3 Refurbish LLO No. 1 (expense)	M4 - LLO Refurbishment	AX	4,500
174					
175			Total		14,327
176					
177		Grand Total			100,257

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2016 Recorded	2017 Recorded	Variance	Variance Required Y/N	Variance Explanation	Percentage Change
1	5	4	AB	Misc Expense	3,464	3,277	(187)	Yes	PCC-13548-Elec - PGen-Hydro Helms	-5%
2	5	4	AK	Manage Environmental Oper	938	813	(125)	Yes	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds	-13%
3	5	4	AX	Maint Resv,Dams&Waterways	22,163	26,883	4,720	Yes	Pit 5 PH Dredge Tailrace 2017 Storm Damage and DeSabi Waterway Support	21%
4	5	4	AY	Habitat and Species Protection	85	89	4	No	NA	4%
5	5	4	BC	Perf Reimburs Wk for Oth	52	(77)	(129)	Yes	Net adjustment for yearly cost fluctuations in reimbursable work of various watersheds	-249%
6	5	4	EP	Manage Property & Bldgs	775	1,028	253	Yes	Net adjustment for yearly cost fluctuations in managing the land rights of various watersheds	33%
7	5	4	ES	Implement Environment Projects	476	555	79	Yes	Crane Valley Dam - Mitigation/Monitoring	17%
8	5	4	IG	Manage Var Bal Acct Processes	9,107	11,740	2,633	Yes	Increase due to FERC fees	29%
9	5	4	KG	Operate Hydro Generation	32,900	31,685	(1,214)	No	NA	-4%
10	5	4	KH	Maint Hydro Generating Equip	22,047	21,433	(613)	No	NA	-3%
11	5	4	KI	Maint Hydro Bldg,Grnd,Infrastr	9,008	12,495	3,487	Yes	Pit 5 PH Exp Restoration 17 storm damage	39%
12	5	4	KJ	License Compliance Hydro Gen	24,054	20,973	(3,081)	Yes	Pit 1 River Gate House Overhaul	-13%
13	5	4	LX	Catastrophic Events	-	-	-	No	NA	0%
14	5	4	OM	Operational Management	3,029	3,353	323	Yes	Net adjustment for yearly cost fluctuations in operation management due to vacancies	11%
15	5	4	OS	Operational Support	1,795	4,606	2,811	Yes	Net adjustment for yearly cost fluctuations in operation support due to vacancies	157%
16	5	4	ZC	Corporate Items	2,133	1,762	(371)	Yes	Change in costs and activities to support PG&E's land conservation commitment.	-17%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2017 Recorded	2018 Recorded	Variance	Variance Required Y/N	Variance Explanation	
1	5	4	AB	Misc Expense	3,277	2,988	(289)	Yes	PCC-13548-Elec - PGen-Hydro Helms	-9%
2	5	4	AK	Manage Environmental Oper	813	750	(63)	Yes	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds	-8%
3	5	4	AX	Maint Resv,Dams&Waterways	26,883	17,128	(9,756)	Yes	Plt 5 PH Dredge Tailrace 2017 Storm Damage and DeSabella Waterway Support	-36%
4	5	4	AY	Habitat and Species Protection	89	114	25	Yes	HL: Zebra Quagga Prevention Program	29%
5	5	4	BC	Perf Reimburs Wk for Oth	(77)	46	123	Yes	Net adjustment for yearly cost fluctuations in reimbursable work of various watersheds	-160%
6	5	4	EP	Manage Property & Bldgs	1,028	1,209	181	Yes	Net adjustment for yearly cost fluctuations in managing the land rights of various watersheds	18%
7	5	4	ES	Implement Environment Projects	555	121	(434)	Yes	Crane Valley Dam - Mitigation/Monitoring	-78%
8	5	4	IG	Manage Var Bal Acct Processes	11,740	12,025	285	No	NA	2%
9	5	4	KG	Operate Hydro Generation	31,685	29,971	(1,714)	No	NA	-5%
10	5	4	KH	Maint Hydro Generating Equip	21,433	19,581	(1,852)	No	NA	-9%
11	5	4	KI	Maint Hydro Bldg,Grnd,Infrast	12,495	5,939	(6,556)	Yes	Plt 5 PH Exp Restoration 17 storm damage	-52%
12	5	4	KJ	License Compliance Hydro Gen	20,973	18,611	(2,362)	Yes	Spillway Assessments SAIP	-11%
13	5	4	LX	Catastrophic Events	-	-	-	No	NA	0%
14	5	4	OM	Operational Management	3,353	1,830	(1,522)	Yes	Net adjustment for yearly cost fluctuations in operation management due to vacancies	-45%
15	5	4	OS	Operational Support	4,606	4,607	0	No	NA	0%
16	5	4	ZC	Corporate Items	1,762	1,796	34	No	NA	2%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2018 Recorded	2019 Recorded	Variance	Variance Required Y/N	Variance Explanation	
1	5	4	AB	Misc Expense	2,988	3,142	154	Yes	PCC-13548-Elec - PGen-Hydro Helms	5%
2	5	4	AK	Manage Environmental Oper	750	586	(164)	Yes	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds	-22%
3	5	4	AX	Maint Resv,Dams&Waterways	17,128	20,163	3,035	Yes	DeSabra 2018 Camp Fire Response and McCloud Dam LLO Hydraulic Leak Repair	18%
4	5	4	AY	Habitat and Species Protection	114	130	16	Yes	HL: Zebra Quagga Prevention Program	14%
5	5	4	BC	Perf Reimburs Wk for Oth	46	(163)	(209)	Yes	Net adjustment for yearly cost fluctuations in reimbursable work of various watersheds	-454%
6	5	4	EP	Manage Property & Bldgs	1,209	1,095	(115)	Yes	Net adjustment for yearly cost fluctuations in managing the land rights of various watersheds	-9%
7	5	4	ES	Implement Environment Projects	121	4	(117)	Yes	Crane Valley Dam - Mitigation/Monitoring	-97%
8	5	4	IG	Manage Var Bal Acct Processes	12,025	17,915	5,890	Yes	Net adjustment for yearly cost fluctuations in spillway repair work and license condition work of various watersheds	49%
9	5	4	KG	Operate Hydro Generation	29,971	30,290	319	No	NA	1%
10	5	4	KH	Maint Hydro Generating Equip	19,581	21,745	2,164	Yes	Net adjustment for yearly cost fluctuations in various asset management programs, and the maintaining of various	11%
11	5	4	KI	Maint Hydro Bldg,Grnd,Infrast	5,939	7,890	1,951	Yes	Pit 5 PH Exp Restoration 17 storm damage	33%
12	5	4	KJ	License Compliance Hydro Gen	18,611	19,646	1,034	No	NA	6%
13	5	4	LX	Catastrophic Events	-	-	-	No	NA	0%
14	5	4	OM	Operational Management	1,830	1,631	(199)	Yes	Net adjustment for yearly cost fluctuations in operation management due to vacancies	-11%
15	5	4	OS	Operational Support	4,607	3,846	(761)	Yes	Net adjustment for yearly cost fluctuations in operation support due to vacancies	-17%
16	5	4	ZC	Corporate Items	1,796	1,722	(74)	No	NA	-4%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Expense Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2019 Recorded	2020 Recorded	Variance	Variance Required Y/N	Variance Explanation
1	5	4	AB	Misc Expense	3,142	5,205	2,062	Yes	Dam Safety 2.0 and ISO 55000 implementation
2	5	4	AK	Manage Environmental Oper	586	1,046	460	Yes	Net adjustment for yearly cost fluctuations in managing the environmental operations of various watersheds
3	5	4	AX	Maint Resv,Dams&Waterways	20,163	28,426	8,263	Yes	ML Maint Reservoirs/Dams/Waterways and Dam safety program
4	5	4	AY	Habitat and Species Protection	130	112	(18)	Yes	HL: Zebra Quagga Prevention Program
5	5	4	BC	Perf Reimburs Wk for Oth	(163)	23	186	Yes	Net adjustment for yearly cost fluctuations in reimbursable work of various watersheds
6	5	4	EP	Manage Property & Bldgs	1,095	1,400	305	Yes	Net adjustment for yearly cost fluctuations in managing the land rights of various watersheds
7	5	4	ES	Implement Environment Projects	4	-	(4)	Yes	Crane Valley Dam - Mitigation/Monitoring
8	5	4	IG	Manage Var Bal Acct Processes	17,915	16,954	(961)	Yes	Net adjustment for yearly cost fluctuations in spillway repair work and license condition work of various watersheds
9	5	4	KG	Operate Hydro Generation	30,290	43,462	13,173	Yes	Increase in Shasta, Drum & DeSabra Operating cost due to Covid-19 related additional overheads and labor hours.
10	5	4	KH	Maint Hydro Generating Equip	21,745	23,121	1,376	No	NA
11	5	4	KI	Maint Hydro Bldg,Grnd,Infrast	7,890	8,946	1,055	Yes	PI: 5 PH Exp Restoration 17 storm damage
12	5	4	KJ	License Compliance Hydro Gen	19,646	21,964	2,318	Yes	KCV Comply with Hydro Licenses
13	5	4	LX	Catastrophic Events	-	-	-	No	NA
14	5	4	OM	Operational Management	1,631	2,794	1,163	Yes	Net adjustment for yearly cost fluctuations in operation management due to vacancies
15	5	4	OS	Operational Support	3,846	2,836	(1,010)	Yes	Net adjustment for yearly cost fluctuations in operation support due to vacancies
16	5	4	ZC	Corporate Items	1,722	2,008	286	Yes	Change in costs and activities to support PG&E's land conservation commitment.

Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Capital Expenditures by Major Work Category
 (Thousands of Nominal Dollars)

No.	MWC	MWC Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	2L	Instl/Repl for Hydro Safety&Reg	40,147	48,888	20,422	20,604	28,592	42,983	39,083	62,960	48,087	26,058	18,648	WP 4-53, Line 375
2	2M	Instal/Repl Hydro Generating Eqp	109,942	115,184	96,997	81,417	94,880	93,128	69,240	84,460	93,852	134,430	118,105	WP 4-74, Line 1098
3	2N	Instal/Repl Resv,Dams&Waterway	55,796	50,414	40,768	42,367	45,193	38,322	27,658	42,682	30,754	25,322	24,788	WP 4-82, Line 1532
4	2P	Instl/Repl Hydr Bldg/Gm/Infst	23,465	33,525	26,533	21,890	8,015	19,372	16,148	26,574	14,553	12,954	9,650	WP 4-85, Line 1759
5	3H	Hydroelec Lic & Lic Conditions	20,573	8,110	23,884	19,844	17,708	27,787	72,956	144,247	155,128	103,296	88,334	WP 4-86, Line 1813
6		Other MWCs												
7	03	Office Furniture & Equipment	8	195	270	45	-	-	-	-	-	-	-	- WP 4-57, Line 5
8	05	Tools & Equipment	971	1,144	1,223	1,297	1,898	701	986	567	645	706	788	WP 4-57, Line 16
9	11	Relicensing Hydro Gen	2,467	843	1,350	472	567	550	1,750	4,250	4,000	500	-	WP 4-57, Line 35
10	12	Implement Environment Projects	2,292	2,089	796	133	84	24	10	10	1,000	500	1,000	WP 4-57, Line 51
11	3Q	Catastrophe Events	-	-	-	-	-	116	119	121	124	127	129	WP 4-86, Line 1816
12		Total Other MWCs	5,738	4,271	3,639	1,947	2,548	1,391	2,865	5,363	5,769	1,853	1,918	Sum of Lines 7-11
13														
14		Grand Total	255,662	261,392	212,243	188,069	197,937	222,983	227,948	366,287	348,143	303,893	261,443	Sum of Lines 1-11
15		Total Hydro BA (MWC 3H)	20,573	8,110	23,884	19,844	17,708	27,787	72,956	144,247	155,128	103,296	88,334	Line 5
16		Total Hydro Gen Cap Expenditures	235,089	253,282	188,359	168,225	180,229	195,196	154,993	222,039	193,015	200,597	173,109	Line 14 less Line 15

Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Forecast Capital Expenditures Summary
 (Thousands of Nominal Dollars)

Line No.	Description	Capital Expenditures					Reference		
		2020 CWIP	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast		2025 Forecast	2026 Forecast
1	Projects > \$3 Million*	179,480	121,497	164,162	299,310	284,764	255,670	215,411	WP 4-55, Line 138
2	Other Work	32,676	101,486	63,786	66,977	63,379	48,223	46,032	WP 4-56, Line 12
3	Total	212,156	222,983	227,948	366,287	348,143	303,893	261,443	

4 * Planning orders where Construction Work in Progress (CWIP) Balance as of December 31, 2020 plus six years (2021-2026) of forecast.

Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Recorded CWIP and Forecast Capital Expenditures Details - Projects Over \$3 Million*
 (Thousands of Nominal Dollars)

Line No.	Planning Order	Description	MWC	Operative Date	CWIP 2020 Recorded Adjusted	Capital Expenditures					Subtotal	Reference
						2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast		
MWC - 11 Relicensing Hydro Gen												
1	5733458	Battle Cr Salmon/Steelhead Phase 2	11	Sep-2025	2,648	300	1,500	1,500	1,500	500	7,948	WP 4-139
2	5752167	Battle Creek NFSL Additional Design Imp	11	Dec-2023	3,010	250	250	250			3,760	WP 4-141
3	5766283	Caribou Camp Capital Improvements	11	Dec-2024			2,500	2,500			5,000	WP 4-301
4	Total				5,658	550	1,750	4,250	4,000	500	16,708	Sum of Lines 1-3
MWC - 2L Instl/Rpl for Hydro Safety&Reg												
5	5742783	Pit 3 PH Seismic Retrofit	2L	Dec-2022	799	500	2,000				3,299	WP 4-148
6	5745679	Fordyce Dam Leakage Reduction	2L	Oct-2025	11,993	20,399	20,400	13,000		500	92,492	WP 4-178
7	5771199	Pit 7 Radial Gate 1 Repl Arms & Trunnions	2L	Nov-2025	99	7	1,337	2,515		98	17,264	WP 4-128
8	5771200	Pit 6 Radial Gate 1 Repl Arms & Trunnions	2L	Nov-2023	187	1,288	2,500	98			16,789	WP 4-129
9	5773911	PV Scott Dam Replace Radial Gate Hoist	2L	Oct-2021	3,177		1,337	2,500		98	3,177	WP 4-297
10	5776722	Pit 6 Radial Gate 2 Repl Arms & Trunnions	2L	Nov-2024				12,754			16,689	WP 4-129
11	5776723	Pit 7 Radial Gate 2 Repl Arms & Trunnions	2L	Nov-2026				1,384		13,663	17,570	WP 4-128
12	5779214	Pit 6 Spillway Apron Replace Block 3	2L	Oct-2023			101	4,059			4,160	WP 4-157
13	5783541	Lower Bucks Dam Resurface DS Face	2L	Oct-2023	321	300	400	9,000			19,021	WP 4-291
14	5788188	HC: Cableways Install Hornet Cabinets	2L	Sep-2021		3,500					3,500	WP 4-166
15	5792879	Public Safety Early Warning System	2L	Dec-2022		735	2,000	2,000		1,300	10,035	WP 4-280
16	5793128	UOG Hydro DTT Installation Program	2L	Dec-2021			1,680	1,680		1,680	8,400	WP 4-316
17	Total				16,576	26,730	30,425	54,992	42,431	17,241	212,396	Sum of Lines 5-16
MWC - 2M Instl/Repl Hydro Generating Equip												
18	5720513	Salt Springs 1 Rewind Generator	2M	Nov-2023	72	79	1,000	3,500			4,651	WP 4-183
19	5720528	Electra U2 Rewind Generator	2M	Apr-2021	5,962	3,135					9,097	WP 4-282
20	5720588	AM: Turbine/Runner Replcmnt Prgm Capital	2M	Sep-2026					8,000		12,000	WP 4-249
21	5720593	AM: Turbine Shutoff Valves	2M	Sep-2026					1,750	3,500	5,250	WP 4-318
22	5720600	AM: HV Transformer Capital	2M	Sep-2026					4,000	8,000	12,000	WP 4-251
23	5720656	Caribou 1 PH Rewind U1	2M	Oct-2021	3,002	5,300					8,302	WP 4-282
24	5720657	Caribou 1 PH Rewind U2	2M	Oct-2025	2,039	89	93	1,250		5,000	8,569	WP 4-282
25	5720659	Caribou 2-5 Rewind	2M	Feb-2023	879	900	3,275	2,984			8,038	WP 4-282
26	5720663	Cresta U2 Replace Wickets & FPs	2M	Apr-2023	83	1,000	4,000	2,000			7,083	WP 4-285
27	5720696	Pit 4 Unit 1 Turbine Upgrade	2M	Jun-2026				558			5,258	WP 4-136
28	5720719	Pit 6 U1 Replace Runner	2M	Jun-2027					4,700	3,200	3,700	WP 4-147
29	5720725	Caribou 1 U1 Repl Runners-Bearings-Shaft	2M	Oct-2021	8,451	5,000					13,451	WP 4-282
30	5720726	Caribou 1 U2 Repl Runners-Bearings-Shaft	2M	Oct-2025	3,677	122	128	2,135	3,000	2,500	11,562	WP 4-282
31	5720727	Caribou 1 U3 Repl Rnner, Brng, Shft & Ndl	2M	Oct-2026					250	1,935	4,935	WP 4-282
32	5720747	Pit 4 U1 Rewind	2M	Jun-2026		6	7	750		10,000	12,750	WP 4-137
33	5734298	Bucks Cr PH Upp U2 Governor Controls	2M	Jun-2021	134	600					3,054	WP 4-282
34	5747177	Drum Unit 1 Rewind	2M	Aug-2026	8,514					3,400	9,115	WP 4-289
35	5747215	Balch 2 - U2 Repl Cooling Water Piping	2M	Mar-2025		196	300				3,655	WP 4-177
36	5758119	Bucks Creek U2 Rewind Generator	2M	Apr-2021	2,733	2,000		208		1,661	5,097	WP 4-219
37	5760038	Spaulding 1 TSV Refurbishment	2M	Nov-2024	94	7	540	2,300		108	8,375	WP 4-289
38	5760154	AM Exciter Program Capital	2M	Sep-2026						2,000	3,049	WP 4-167
39	5760607		2M								3,623	WP 4-278

Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Recorded CWIP and Forecast Capital Expenditures Details - Projects Over \$3 Million*
(Thousands of Nominal Dollars)

Line No.	Planning Order	Description	MWC	Operative Date	CWIP 2020 Recorded Adjusted	Capital Expenditures						Subtotal	Reference
						2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast		
40	5760617	Balch 2 U3 Replace Cooling Water Piping	2M	Apr-2025	1,985	138		153	274	1,705	4,255	WP 4-221	
41	5760650	Cresta PH Crane Upgrade	2M	May-2022	344	1,000	3,898				5,242	WP 4-285	
42	5760655	Cresta U1 Replace Wicket Gates & FPs	2M	Feb-2026	430	33	20	21	1,000	4,000	7,504	WP 4-285	
43	5760669	Drum 2 U5 Rewind	2M	Sep-2024	93	20		1,900	4,000		6,013	WP 4-188	
44	5760705	Pit 1 Unit 1 Rewind Generator	2M	Apr-2021	7,165	4,000					11,165	WP 4-151	
45	5760715	Potter Valley U1 Repl Runner & Wickets	2M	Oct-2026					507	1,100	3,107	WP 4-299	
46	5762324	Pit 3 U1 Turbine Upgrade	2M	Jan-2025				558	4,700	2,200	7,458	WP 4-131	
47	5762325	Pit 3 U2 Turbine Upgrade	2M	Dec-2025				558	558	4,700	7,458	WP 4-131	
48	5762326	Pit 3 U3 Turbine Upgrade	2M	Dec-2026						558	5,258	WP 4-131	
49	5762329	Kerckhoff 2 - Generator Rewind/Restack	2M	Mar-2025				3,000	6,000	7,000	16,000	WP 4-228	
50	5766152	Pit 4 Replace Generator Air Breakers	2M	May-2023	1,072	60	1,000	3,000			5,132	WP 4-153	
51	5766153	Pit 5 TGB Install Inline Oil Filtration	2M	Oct-2024	2,697	120	120	120	2,000		5,057	WP 4-155	
52	5766253	Bucks Creek U1 Generator Stator Rewind	2M	Jan-2021	7,939	44					7,983	WP 4-289	
53	5767080	Halsey PH - Replace Runner and Wicket	2M	Feb-2022	2,555	2,628	300				5,483	WP 4-190	
54	5767980	Halsey U1 Upgrade Gov Controls	2M	Nov-2021	1,096	2,500					3,596	WP 4-282	
55	5772744	Rock Cr PH U1 & U2 Repl WG Seals	2M	Oct-2026	1,264				100		5,364	WP 4-295	
56	5778043	Helms - U1 Repl TSV	2M	Mar-2028	1,197	451	450	450	1,613	1,674	7,631	WP 4-214	
57	5778044	Helms - U2 Repl TSV	2M	Mar-2028	1,498	449	450	450	1,613	1,796	7,930	WP 4-214	
58	5778045	Helms - U3 Repl TSV	2M	Dec-2026	1,134	2,056	1,674	1,796	500	10,881	18,839	WP 4-214	
59	5778054	Spring Gap PH - Generator Rewind	2M	Oct-2024	106	63	130	800	3,500	310	4,909	WP 4-181	
60	5778266	Cresta Tunnel Refurbish Liner	2M	Apr-2026	26				50	2,215	3,116	WP 4-215	
61	5778441	Helms Replace 230KV Oil-Filled Cables	2M	Dec-2026	86					4,000	15,086	WP 4-216	
62	5778900	Tiger Creek U2 Rewind	2M	Jun-2025	1,764	144	112	112	3,000	3,500	8,632	WP 4-169	
63	5778973	Pit 7 Replace Transformer Bank 1	2M	Jul-2022	91	1,125	5,750	250			7,216	WP 4-134	
64	5778974	Pit 7 Replace Transformer Bank 2	2M	Jul-2022	54	1,125	5,750	250			7,179	WP 4-134	
65	5778975	JBB Replace Transformer Bank 1	2M	Nov-2023	4	50	1,000	5,750	250	250	7,054	WP 4-138	
66	5778976	JBB Replace Transformer Bank 2	2M	Dec-2024	5			1,000	5,750		7,005	WP 4-138	
67	5779215	Hat Creek 2 Replace Transformer Bk-1-ABC	2M	May-2021	1,229	2,135					3,364	WP 4-159	
68	5779423	Belden PH Refurbish TSV	2M	Mar-2022	110	716	2,240				3,066	WP 4-293	
69	5779444	K2 - Turbine Overhaul (Wicket gates and	2M	Dec-2026				100	300	2,000	5,900	WP 4-230	
70	5779526	Poe PH Trxfmr Repl Bank 1	2M	Nov-2026				100	1,500	2,000	4,600	WP 4-287	
71	5780618	Pit 5 Unit 4 Replace WGs, FPs & Seal Rng	2M	Dec-2021	1,091	4,500					5,591	WP 4-160	
72	5780659	Balch 2 - Bank 3 Replacement	2M	Dec-2025	89	4		375	49	2,817	3,335	WP 4-225	
73	5781162	Cresta PH U2 Rewind	2M	Apr-2023	909	976	2,580	3,323			7,788	WP 4-285	
74	5785758	Electra U2 Gen Relays Replacement	2M	Apr-2022	1,158	1,594	1,129	2,500			3,881	WP 4-186	
75	5788224	Helms Repl Elevator Shaft Control Wiring	2M	Dec-2023		240	500				3,240	WP 4-218	
76	5788226	Haas U1 Rotor Pole Refurb	2M	Dec-2023	67	1,186	1,649	632			3,534	WP 4-200	
77	5788228	Balch 2 Bank 2 Replacement	2M	Apr-2025	86	3		399	130	2,811	3,429	WP 4-225	
78	5788238	Caribou 1 Replace Bank 8A-B-C-SP	2M	Aug-2022	135	2,324	2,000				4,459	WP 4-282	
79	5788242	Rock Cr U2 Repl Upper Thrust Bracket	2M	Dec-2026					500	1,000	3,500	WP 4-295	
80	5788247	Poe GSU Transformer Repl Bank 2	2M	Feb-2027					100	1,500	3,600	WP 4-287	
81	5791359	Haas U2 Rotor Pole Refurb	2M	Feb-2022	1,386	3,272	477				5,135	WP 4-202	
82	5792671	Butt Valley PH Replace GSU Bank & Spare	2M	Nov-2026		4,000	4,000	7,000	250	2,000	6,250	WP 4-305	
83	5792878	SCADA Powerhouse Automation	2M	Dec-2021					7,000	7,000	36,000	WP 4-271	

Pacific Gas and Electric Company

2023 GRC

Exhibit (PG&E-5), Chapter 4

Hydro Operations

Recorded CWIP and Forecast Capital Expenditures Details - Projects Over \$3 Million*

(Thousands of Nominal Dollars)

Line No.	Planning Order	Description	MWC	Operative Date	CWIP 2020 Recorded Adjusted	Capital Expenditures					Subtotal	Reference
						2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast		
84	5792938	Kings River GSU Bank Replacement	2M	Mar-2024				1,800	3,600		5,400	WP 4-232
85	5792939	Balch 2 U2 Reinsulate Field Poles	2M	May-2025			500	1,500		2,000	4,000	WP 4-234
86	Total				80,879	55,391	43,732	47,810	58,752	103,644	479,357	Sum of Lines 18-85
MWC - 2N Instl/Repl Resv,Dams&Waterway												
87	5720633	Dam Remediation - Capital	2N	Sep-2024					4,000	7,000	21,000	WP 4-253
88	5762807	Emergent Projects - Capital	2N	Dec-2021		114	658	394	2,987	3,793	11,033	WP 4-240
89	5766145	Pit 1 LLO & Replace Radial Gate Retrofit	2N	Feb-2021	8,613						8,613	WP 4-324
90	5777491	Relief Dam (Stanislaus) Replace Liner	2N	Sep-2023		250	250	10,000			10,500	WP 4-194
91	5778440	Courtright Dam Upgrade I/D Gate Control	2N	Jun-2023	290	1,064	1,064	2,412	18		3,873	WP 4-223
92	5779207	Helms - Repl Courtright LLO Bypass Valve	2N	Sep-2024	5	190	190	3,311	272	12	3,835	WP 4-208
93	5779209	Helms - Install Incline Tunnel Liner	2N	Dec-2023	409	2,434	480	7,064			10,388	WP 4-210
94	5779471	Tiger Cr Cnl-Install Flume Lnr 2020/2021	2N	Jun-2021	2,099	2,199	2,199	1,351			4,299	WP 4-171
95	5779472	Tiger Cr Cnl-Install Flume Lnr 2022/2023	2N	Apr-2023		1,229	6,700	90			3,550	WP 4-171
96	5783000	Lower Blue Seepage Reduction	2N	Sep-2022	86	200	1,500	5,000	5,000	200	8,104	WP 4-187
97	5785096	Pit 3 LLO No1. Refurbish Actuator	2N	Oct-2024		200	1,500				11,900	WP 4-146
98	5787318	JBB IC Dam LLO Replace Actuator & Piping	2N	Dec-2022	244	1,122	2,250				3,616	WP 4-162
99	5793557	Tiger Creek Abay Spillway Gates Automati	2N	Sep-2026		200	200	300	3,000	2,500	8,500	WP 4-198
100	Total				11,746	7,682	15,491	29,922	15,278	13,505	109,211	Sum of Lines 87-99
MWC - 2P Instl/Repl Hydr BldgGrndInfrst												
101	5760289	Pit 5 PH Access Road Bridge Installation	2P	Oct-2021	624	3,310					3,934	WP 4-150
102	5772624	Helms - Repave McKinley Grove Road	2P	May-2026					500	6,000	12,500	WP 4-314
103	5776830	Pit 5 PH Surge Chmbr & VH Slide Strm Dmg	2P	Jan-2018		200	3,000	100			3,300	WP 4-312
104	5778990	Lake Valley Canal Convert to Pipe	2P	Oct-2028						2,000	4,000	WP 4-192
105	5779398	Drum Penstock Access Improvements	2P	Sep-2023		1,500	1,000	1,000			3,500	WP 4-173
106	5779437	Helms Crane Rail Capacity Uprate	2P	Dec-2023	784	321	300	2,775			4,180	WP 4-212
107	5783123	Helms Install Backup Power at Portal	2P	Aug-2024	254	170	250	1,718	1,517		3,909	WP 4-204
108	5785093	Pit 3 PH Replace Crane(s) Controls	2P	May-2021	373	4,079					4,452	WP 4-132
109	5785094	Pit 5 PH Replace Crane(s) Controls	2P	Nov-2024		10	10	1,500	1,000		3,500	WP 4-132
110	5785095	Pit 1 PH Replace Crane(s) Controls	2P	Aug-2024	267	200	3,000		2,000		3,805	WP 4-132
111	5786858	Rock Creek VH Replace Roof	2P	Aug-2022							3,467	WP 4-303
112	5792458	Pit 4 PH Replace Crane(s) Controls	2P	Oct-2025		75	185	6,500	2,500	1,000	3,500	WP 4-132
113	5792563	JBB Willow Creek Rd Stabilization	2P	Dec-2023		500	500	2,566	2,728	2,903	6,760	WP 4-164
114	5792584	Pit 3 Repave Road	2P	Oct-2025							8,797	WP 4-165
115	Total				2,588	9,864	8,245	18,659	10,245	11,903	69,604	Sum of Lines 101-114

Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Recorded CWIP and Forecast Capital Expenditures Details - Projects Over \$3 Million*
(Thousands of Nominal Dollars)

Line No.	Planning Order	Description	MWC	Operative Date	CWIP 2020 Recorded Adjusted	Capital Expenditures					Subtotal	Reference	
						2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast			2026 Forecast
116	MWC - 3H	Hydroelec Lic & Lic Conditions											
117	5700287	RCC LC: River Water Temp Control	3H	Dec-2024	4,115	200	2,500	2,500	2,500		11,815	WP 4-255	
118	5716718	DeSabra Centerville Relicensing	3H	Jan-2027	26,425						26,425	WP 4-320	
119	5718898	Battle Cr Salmon Restoration FERC Lic Am	3H	Jul-2026	3,377	750					4,127	WP 4-326	
120	5720508	Drum-Spauiding Lic Cond	3H	Dec-2026				18,057	16,920	9,196	61,932	WP 4-269	
121	5720688	McCloud-Pit License Conditions - Capital	3H	Dec-2026		1,120	6,300	28,900	46,200	9,500	102,520	WP 4-242	
122	5741504	UNFR LC-Capital Projects	3H	Dec-2026		1,827	14,977	3,129	6,430	2,750	34,662	WP 4-245	
123	5760695	Kerckhoff 1 & 2 Relicensing	3H	Nov-2022	11,883	3,150	1,800	600	800	600	19,633	WP 4-261	
124	5760704	Phoenix Relicensing	3H	Aug-2022	6,592	1,334	1,084	819	629		10,458	WP 4-263	
125	5760714	Potter Valley Relicensing	3H	Jan-2027	7,417						7,417	WP 4-322	
126	5767854	Balch 1 & 2 Relicensing	3H	Apr-2026	286	1,600	4,400	4,500	2,300	950	16,136	WP 4-265	
127	5779306	Bucks Creek Relicensing - Capital LC	3H	Dec-2028		321	321	1,272	979	598	7,036	WP 4-257	
128	5779438	Helms Relicensing FERC #2735	3H	Apr-2026	319	1,400	4,900	5,100	2,300	1,900	18,719	WP 4-267	
129	5781662	Poe LC- HEA Implementation	3H	Dec-2022		2,400	2,400	1,400			3,800	WP 4-259	
130	5793127	Salmon HEA Implement - UNFR LC	3H	Dec-2023			7,000	4,300			11,300	WP 4-259	
131	5793129	Phoenix Relicensing- Capital LC	3H	Dec-2029						1,530	3,102	WP 4-263	
132	5794013	Belden Forebay Spillway Improv SAIP	3H	Dec-2026	283	200	250	1,000	5,000	5,000	21,733	WP 4-238	
133	5794027	Butt Valley Spillway Improv SAIP	3H	Dec-2023		250	500	10,000			10,750	WP 4-238	
134	5794031	Lower Bucks Spillway Restoration SAIP	3H	Sep-2022	264	350	5,000				5,614	WP 4-238	
135	5794032	McCloud Spillway Improvements SAIP	3H	Dec-2026		5,000	7,787	40,000	40,000	40,000	172,787	WP 4-238	
136	5794035	Tiger Creek Reg Spillway Improv SAIP	3H	Feb-2025	1,070	1,800	2,800	15,000	20,000	480	41,150	WP 4-238	
137	5794098	Spillway Assessment Prgm Cap Mitigation	3H	Dec-2021		2,300	2,500	7,100	10,000	10,000	41,900	WP 4-238	
	Total				62,034	21,280	64,519	143,676	154,058	102,116	85,334	633,018	Sum of Lines 116-136
138	Grand Total				179,480	121,497	164,162	299,310	284,764	255,670	215,411	1,520,295	Sum of Lines 4, 17, 86, 100, 115 and 137

* Planning orders where Construction Work in Progress (CWIP) Balance as of December 31, 2020 plus six years (2021-2026) of forecast.

Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Recorded and Forecast Capital Expenditures Details - Other Work*
 (Thousands of Nominal Dollars)

Line No.	MWC	MWC Description	Capital Expenditures												Reference		
			2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast				
1	3	Office Furniture & Equipment	8	195	270	45	-	-	-	-	-	-	-	-	-	-	-
2	5	Tools & Equipment	971	1,144	1,223	1,297	1,898	701	986	567	645	706	788	-	-	-	-
3	11	Relicensing Hydro Gen	1,888	(244)	37	(119)	0	-	-	-	-	-	-	-	-	-	-
4	12	Implement Environment Projects	2,292	2,089	796	133	84	24	10	425	1,000	500	1,000	-	-	-	-
5	20	DCPP Capital	4,901	-	(52,875)	-	-	-	-	-	-	-	-	-	-	-	-
6	2L	Instl/Rpl for Hydro Safety&Reg	39,604	48,923	17,943	14,986	24,085	16,254	8,657	7,968	5,656	2,057	1,407	-	-	-	-
7	2M	Instal/Repl Hydro Gnerating Eqp	107,759	105,880	87,173	64,884	51,170	37,737	25,508	36,650	35,100	30,786	28,955	-	-	-	-
8	2N	Instal/Repl Resv,Dams&Waterway	55,675	50,309	40,440	36,253	40,027	30,640	12,167	12,760	15,476	11,816	9,202	-	-	-	-
9	2P	Instl/Repl Hydr BldgGrndInfrst	23,345	29,917	25,805	21,702	6,583	9,508	7,903	7,914	4,308	1,051	1,550	-	-	-	-
10	3H	Hydroelec Lic & Lic Conditions	17,002	4,632	15,907	11,601	8,027	6,507	8,436	571	1,070	1,180	3,000	-	-	-	-
11	3Q	Catastrophic Events	-	-	-	-	-	116	119	121	124	127	129	-	-	-	-
12		Grand Total	253,445	242,846	136,719	150,782	131,874	101,486	63,786	66,977	63,379	48,223	46,032				

13 * Excludes projects greater than \$3M

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW/C	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1 03		5757657	FOC - Replace Consoles		3.44	-3.44									
2 03		5769418	Burney HQ Install Monitor & Wireless Sys		5.01										
3 03		5774879	FOC - Replace Consoles		198.30	258.14	44.84								
4 03		5780458	Shasta PE HQ Install Workstations 2018			12.31									
5 03		03 Total		8.45	194.86	270.45	44.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Sum of Lines 1-4
6 03		5500311	PE: Purchase Capital Tools	379.12	462.79	253.73	532.79	987.68	357.00	211.77	216.64	257.08	264.15	271.42	
7 05		5500312	Shasta Purchase Capital Tools/Equip	132.90	51.26	109.80	69.70	77.39	70.00	73.23	79.05	87.70	99.88	116.70	
8 05		5500313	DesSable Purchase Capital Tools/Equip	225.61	431.58	119.77	425.71	276.80	70.00	73.23	79.05	87.70	99.88	116.70	
9 05		5500314	Drum Central Purchase Capital Tools	41.07	121.29	149.18	83.65	198.79	35.00	36.61	39.52	43.85	49.94	58.35	
10 05		5500315	Milode Purchase Capital Tools/Equip	67.88	58.00	143.77	17.70	100.84	69.00	36.61	39.52	43.85	49.94	58.35	
11 05		5500316	KCV Purchase Capital Tools/Equip	91.24	19.51	71.44	6.46	115.89	50.00	52.31	56.46	62.64	71.34	83.35	
12 05		5500317	Helms Purchase Capital Tools/Equip	32.82		48.54	37.09	65.74	50.00	502.31	56.46	62.64	71.34	83.35	
13 05		5542481	Oper Svcs: Purchase Capital Tools					56.02							
14 05		5778311	Peen SCAOA Lab Set-up		326.76		124.25	18.56							
15 05		05 Total		970.63	1,144.43	1,222.99	1,297.35	1,897.71	701.01	986.06	566.71	645.45	706.47	788.22	Sum of Lines 7-15
16 05		5505001	DesSable Capital Regulatory Compliance		-1.73		-119.65								
17 05		5719001	Spring Gap St.LC- Dismantle Abay Dam-C	1.55											
18 11		5719002	Spring Gap St.LC-Flow & Monitoring Systems		-3.53										
19 11		5719003	Spring Gap St.LC-SandBar Dam Fish Scrns	69.24											
20 11		5719004	Spring Gap Stan LC - Stream Flow Moods-C	47.92											
21 11		5720817	Bass Lake Remove Molly Clayton Cabin	-10.66	0.00		-0.00	0.00							
22 11		5732438	UNFR LC Remove Gasner Fish Barrier	-2.63											
23 11		5733458	Battle Cr Salmon/Steelhead Phase 2	322.20	362.48	692.30	409.06	427.89	300.00	1,500.00	1,500.00	1,500.00	500.00		
24 11		5740922	Battle Creek Restoration Phase 1B	240.83	86.70	41.89	0.69								
25 11		5741547	Pt 345 LC Historic Prop Mgmt. Capital		-1.24										
26 11		5743959	Pt 3 Road Full Section Replacement	-598.28											
27 11		5745699	Kerckhoff License Amend - KI shutdown	-125.75											
28 11		5752167	Battle Creek NFSL Additional Design Imp	256.33	724.36	620.72	182.17	139.21	250.00	250.00					
29 11		5757567	Pt 5 LLO Open Conduit Decommissioning	-7.00											
30 11		5758843	Pt 345 LC Historic Prop Mgmt. Phase 2	1,177.80	-416.39										
31 11		5760049	PV Lake Pillsbury Install Alt Boat Ramp	1,093.76	86.86										
32 11		5766283	Caribou Camp Capital Improvements												
33 11		11 Total		2,466.63	842.77	1,349.65	472.26	567.10	550.00	1,750.00	4,250.00	4,000.00	500.00	2,500.00	Sum of Lines 17-34
34 11		5735100	Balch - Install Sewer Pipe	399.97											
35 11		5735101	Balch - Replace Oak Flat Water Piping	358.12											
36 11		5741922	Cresta OSPP Phase 2 Sump	1,221.71	352.62	13.56	0.50								
37 12		5747226	Haas Remove OSPP	61.37	27.39	42.00	66.43	82.44	23.92	10.00	425.00				
38 12		5747227	Halsey Sump OSPP	108.97	280.72	224.58	47.80								
39 12		5747287	Potter Valley OSPP Phase 2 Sump	41.47	2.24										
40 12		5747295	Rock Crest Camp Replace Bridge Deck	18.86	21.21	182.24	14.43								
41 12		5747296	Rock Creek OSPP Phase 2 Sump	63.45	1,351.17	297.91	2.56								
42 12		5747305	Spaulding 1 OSPP Phase 2 Sump	0.36	0.22	0.00	0.02								
43 12		5752720	Rock Cr U1 Oil Spill Prevention	17.98		0.06									
44 12		5754844	Butt Valley OSPP Phase 3 PSV Valvehouse												
45 12		5760510	AM: Sumps Systems - Capital												
46 12		5773998	Rock Creek PH Upgrade Lighting System		53.34	35.68									
47 12		5779284	Caribou 1 Switchyard Install SPCC												
48 12		12 Total		2,292.26	2,088.90	796.02	132.69	83.60	23.92	10.00	425.00	1,000.00	500.00	1,000.00	Sum of Lines 37-50
49 12		5511182	Drum - Hydro Safety & Regulatory		28.56			0.00	100.00	100.00	100.00	100.00	100.00	100.00	
50 12		5718961	Drum Common Remove Abandoned Com Lines	0.00											
51 12		5719010	Tiger Creek Repl 480 station service		-0.70										
52 12		5719014	AM: Arc Flash Remediation												
53 12		5720569	Halsey PH Station Svc-Auto Transfer	-3.88											
54 12		5720809	Pt 6 Replace Stopping Lifting Device	354.39	522.35	896.35	141.99	-9.22							
55 12		5720810	Pt 7 Replace Stopping Lifting Device	338.17	464.52	614.06	253.69	77.74							
56 12		5720814	Courtright Dam Repl Slabs/Joints	20.34											
57 12		5720877	Auberry SC Remove House		-1.60										
58 2L		5720879	Chilkoot Reservoir - LLO Pipe & Valve Re	2.01											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
63	2L	5724979	Crane Valley Dam - Seismic Upgrade	0.02											
64	2L	5726819	KCV - Install Fall Protection	1,279.92	38.06										
65	2L	5729018	Pit 5 Arc Flash Remediation	2.66											
66	2L	5729593	Helms - Emergency Notification System		10.92				100.00						
67	2L	5729718	West Point PH - Replace Switchgear												
68	2L	5729759	Tiger Creek Rd - Repair Road Sections	623.18											
69	2L	5729770	Haas - Arc Flash Remediation	-11.66											
70	2L	5730439	Crestia Arc Flash Remediation	121.03											
71	2L	5730440	Rock Cr PH Arc Flash Remediation	1,109.34											
72	2L	5730442	Caribou 1-AF Exciter Switchgear Equip.	43.36	77.80										
73	2L	5730450	Pit 4 Arc Flash Remediation	-0.42											
74	2L	5735801	Spaulding Ofc Comm Room Security												
75	2L	5739358	Caribou 2 Pstik Stair Upgrade												
76	2L	5739640	Helms - Fire Protection Systems												
77	2L	5739709	Kings River Remove CO2 System												
78	2L	5739727	Balch 2 - U2/U3 Remove CO2 System												
79	2L	5739737	WestPH-InstallTailraceWateringCnrtts	190.51											
80	2L	5741529	Sterling Dam Parapet Wall Rebuild/Raise	877.52											
81	2L	5741560	HC: Install New Gages SBX7_8	402.79											
82	2L	5742258	Poe Dam Gate 1 Trunnion Replacement	73.59											
83	2L	5742783	Pit 3 PH Seismic Retrofit	116.38											
84	2L	5743638	Haas - Rpl Elevator Cables and Control	0.24											
85	2L	5744480	PhiladelphiaDivision-InstallFishLadder	659.65											
86	2L	5745378	Bucks Lake Remove Cabin	-20.06											
87	2L	5745658	PE: ISO Meter Replacement Phase 1Capital	-2.74											
88	2L	5745671	Deer Creek Gen Cables and Arc Flash	420.17											
89	2L	5745672	DeSable Butte 3/6A Spillway Improvements	97.60											
90	2L	5745679	ForceDuck Dam Leakage Reduction	403.93											
91	2L	5745682	Haasey Install Abay Trash Rack	743.52											
92	2L	5745688	Waterway Public Safety Improv Cap	2,405.36											
93	2L	5745713	Rock Cr Replace NF-51 Cableway	262.20											
94	2L	5745719	Spaulding 1 PRV Controls Upgrade	151.05											
95	2L	5745723	Tiger Creek Install 11 kV Disconnect SW	748.07											
96	2L	5747225	Gauging Station Recording Equipment												
97	2L	5747277	Pit 6 Replace Spillway Apron	431.73											
98	2L	5747312	Tiger Creek Afterbay abutment shotcrete	4.44											
99	2L	5748778	Hydro Install Emerg Eye/Body Wash Sta.	135.12											
100	2L	5749662	Rock Creek Bench Recreational Access	3,665.07											
101	2L	5750218	Asbury Pump Bridge-NO83-HS20 Upgrade	9.94											
102	2L	5750223	Balden Siphon - Piezo Access	380.78											
103	2L	5750234	Hydro Dam Security	0.65											
104	2L	5750234	Hydro Dam Security												
105	2L	5751088	Kerckhoff 2 - Replace CO2 System	7.25											
106	2L	5751058	Poe Dam Gate 2 Trunnion Replacement	4,700.78											
107	2L	5751059	Poe Dam Gate 3 Trunnion Replacement	319.77											
108	2L	5751060	Poe Dam Gate 4 Trunnion Replacement	284.88											
109	2L	5752306	Ham Br Canal Install RTU	1.49											
110	2L	5752307	Ham Br Install Remote Cr Pumps	0.18											
111	2L	5754680	Helms - Instl Company Vehicle Snowroofs	0.46											
112	2L	5754687	Kerckhoff Dam - Replace Handrails	494.90											
113	2L	5754795	Lake Almanor Dam Security	64.86											
114	2L	5754849	DeSable Common Crane Limit Switches	14.14											
115	2L	5754960	JBB IC Repl Penst Bypass Valve Actuator	417.27											
116	2L	5754962	Pit 4 Draft Tube Platform Replacement	69.40											
117	2L	5754965	Pit 7 PH47 Real Time Communication Upgra	20.79											
118	2L	5754970	Coleman Intk Siphons1&2 TrashRack Install	131.84											
119	2L	5754973	Pit 3 River Canyon Rd Stabilize - Cap	12.17											
120	2L	5757382	Drum - Spaulding Tram Safety Improvement	1.17											
121	2L	5757598	Kern - Instl Penstock Leak Detection Eq	11.60											
122	2L	5758137	Helms -T3AT Structural Reinforcements	-8.07											
123	2L	5758898	Poe Install Jib Crane and Hatch	277.29											
124	2L	5759043	Rock Cr PH Repl 480V Switchgear	11.42											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWCC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
125	2L	5759299	DesSaba Arch Rock Automate NF-56 Cablewa	4.79											
126	2L	5759300	Kern - KE16 Cableway Automate Unit	40.84	0.60										
127	2L	5759558	PE ISO Meter Replacement Phase 2 Capital	34.17											
128	2L	5760007	PE ISO Meter Replacement Phase 2 Capital	756.19	20.27										
129	2L	5760008	PH 1 AF 11.5 KV Station Services Bus	344.54	555.77		9.41	0.00							
130	2L	5760009	PH 3 Siren System Upgrade	44.94	-85.35										
131	2L	5760022	PH 3 Rip Rap River Road Erosion Capital	3,232.70	787.51		-11.13	-29.04							
132	2L	5760025	Helms - Ventilation Upgrades	165.94	0.38		0.43	-5.94							
133	2L	5760028	AGWishon - Penstock D/C Mitigation	256.24	7.91										
134	2L	5760040	Bucks Creek Repl SWD Lighting	322.80	460.18		405.84	1,721.33		500.00					
135	2L	5760041	Lower Bucks Dam Install Upstream Liner	3.96	1.18										
136	2L	5760042	Bucks Cr Inst Security Gates & Buoys	311.15	2,153.06		54.37	0.64							
137	2L	5760044	Caribou 2 Penstock Slope Shotcrete	78.73	11.07										
138	2L	5760050	PV Arc Flash Mitigation 2.4KV Switchgear	261.95	237.65										
139	2L	5760053	PV Repl Slide Gate Hoist	266.89	25.09										
140	2L	5760057	Beliden Dam Inst Position Meters on Gates	468.55	3,799.95										
141	2L	5760091	Helms - T2 U/S Plug Carpi Liner	150.87											
142	2L	5760109	Kings River PH - Repl Draft Tube Platform	34.96											
143	2L	5760125	Chili Bar-Replace Station Service XFRMR	244.36											
144	2L	5760137	Dutch Flat 1 Station Service AC PNLs	215.09											
145	2L	5760138	Electra AF-460V Station Service Swgr.	20.96	0.64										
146	2L	5760143	Halsey Penstock D/C Mitigation	473.54	473.54										
147	2L	5760146	Narrows Draft Tube Platform Replacement	18.85	18.85										
148	2L	5760157	Narrows Draft Tube Platform Replacement	74.93	74.93		19.09	-136.25							
149	2L	5760157	Spaulding Lake Logboom Replacement	5.09	3.85										
149	2L	5760159	Stanislaus CO2 Fire Protection Systems	-4.20											
150	2L	5760164	West Point PH-Roll Up Doors	25.34	2.95										
151	2L	5760188	Ham Branch Repl 2.4KV Indoor Swgr AF	58.71											
152	2L	5760191	Lake Almanor Automate Cableways	652.76											
153	2L	5760194	Centerville Improve Access Trail to BW98	24.19	-57.24		0.10	-1.33		-0.02					
154	2L	5760418	Shasta MC-1 Ah-Di-Na Automate Cableway	7.96											
155	2L	5760419	Shasta MC-3 McCloud Dam Automate Cableway	7.55											
156	2L	5760420	Shasta MC-5 Lake Shasta Automate Cableway	9.92											
157	2L	5760423	PE: ISO Meter Replacement Phase 3 Capita	40.96	4.42										
158	2L	5760424	PE: ISO Meter Replacement Phase 4 Capita	71.50	129.40		402.92	79.36							
159	2L	5760451	Crane Valley Dam - W3 Cableway Automate	89.26	131.77		42.47								
160	2L	5760451	Crane Valley Dam - W3 Cableway Automate	0.01											
161	2L	5760504	DesSaba Pulga Bridge Automate NF-23 Cabl	7.46											
162	2L	5760505	PV Van Arsdale Dam Automate E-11 Cablewa	193.60											
163	2L	5760506	PV Scott Dam Automate E-2 Cableway	178.68											
164	2L	5760619	Beliden PH - Add DC Lighting												
165	2L	5760621	Beliden Upgrade CO2 Fire System												
166	2L	5760639	Centerville 0/5 Rebuild Berm												
167	2L	5760643	Chili Bar Replace Generator breaker	7.63	245.36		16.20								
168	2L	5760649	Cresta Dam Repl Intake Hoist	6.91	13.87		-20.78								
169	2L	5760671	Drum Penstock 3 Access Platforms	111.65	-1.81										
170	2L	5760685	Hamilton Br Mtn Meadows-Elim Flashboards	0.22	2.82		0.44	-6.18							
171	2L	5760687	Hat 2 Canal Remediate Bluff Overhang	162.54	652.97		21.06								
172	2L	5760688	HC-FP Drum Fire Protection Upgrades	2.38	-2.38										
173	2L	5760690	HC-FP Motherlode Fire Protection Upgrade	68.01	0.00										
174	2L	5760728	South Yuba 9 1/2 Mile Spill Oper / Gates	166.83	737.23		22.61								
175	2L	5760740	Spaulding1 Exciter Field Bkr Replacement	768.55	399.22		1.83								
176	2L	5761265	Caribou 2 Penstock Inst Robotic Station	209.57											
177	2L	5762201	KCV - Receptacle Replacement	137.54											
178	2L	5764942	Helms - Install Microwave, Wishon Camera	0.53											
179	2L	5764943	Tule PH - Install New Forebay Br. Deck	22.88											
180	2L	5765419	Up Drum YB200 Cableway Fall Prot Upgrade	246.77											
181	2L	5765420	ML S-12 Cableway Automation	18.95											
182	2L	5765479	Drum 1. Install SDS protection BK1 & BK2	572.35	0.55		537.53	0.27							
183	2L	5765978	PH 3 PH Install Security Upgrades	184.18	147.46		281.09	1.32							
184	2L	5765979	PH 5 PH Install Security Upgrades	184.18	78.26		121.00	-1.92							
185	2L	5766079	South PH Replace Saxophone Walkways	65.83	193.12										
186	2L	5766159	Caribou Security Upgrades	76.77	719.29		66.17								

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
187	2L	5766164	Crane Valley - J-2 Cableway Fall Protect	114.41	225.50	225.50	5.84								
188	2L	5766219	Inskip Eagle Canyon Access Safety Improv	435.64	1,278.07	1,278.07	181.45	-8.07	0.00						
189	2L	5766248	Griswold Access Bridge Upgrade - DRM 53									50.00	150.00		
190	2L	5766252	Crestia Ground Grid Mitigation - Capital												
191	2L	5766255	DeSaba NF-57 Cableway Fall Protection	781.86	54.93	54.93	8.41								
192	2L	5766257	DeSaba NF-1 Cableway Fall Protection	44.37	208.67	208.67	8.41								
193	2L	5766278	DeSaba NF-70 Cableway Fall Protection	51.26	55.21	55.21	5.35								
194	2L	5766279	DeSaba NF-51 Cableway Fall Protection	44.99	47.55	47.55	4.86								
195	2L	5766280	Philbrook Install Hand Railings	-0.00											
196	2L	5766281	DeSaba Intake Replace Platform	16.51	9.19	9.19	31.87								
197	2L	5766287	Kings River PH - Install Ground Grid Imp	514.60	186.13	186.13									
198	2L	5766384	San Joaquin 2 - Install Ground Grid	170.25											
199	2L	5766392	Kern - Install Ground Grid	144.43	27.58	27.58									
200	2L	5766396	Balch - Install Ground Grid	721.34	208.58	208.58									
201	2L	5766420	Porter Valley Replace PIS - CAISO Recert	42.34											
202	2L	5766462	Balch - Install Fall Prot K122 Cableway	84.55	285.83	285.83	3.24								
203	2L	5766658	Crane Valley - Weir Access Improvements	157.06											
204	2L	5766688	Caribou 2 Penstock Inst Bore Hole Extens	161.80	2,271.02	2,271.02	402.67	0.17							
205	2L	5766689	Caribou 2 Penstock Inst Extensometer Sen	189.34	1,318.97	1,318.97	5.29								
206	2L	5767386	Cresta PH Repl 480V Switchgear	0.66	274.77	274.77	299.96	18.84							
207	2L	5768193	Crane Valley - Install Deer Crossings	36.36											
208	2L	5769181	South PH Inst Safety Barriers Gener Hsg	47.19											
209	2L	5769182	Inskip Inst Safety Barrier Gener Housing												
210	2L	5769183	Coleman Inst Safety Barrier Gener Housing												
211	2L	5769304	Tule - Replace Switchyard Handrails	439.00	36.82	36.82									
212	2L	5769305	Kerckhoff 2 - Replace Switchyard Fence	151.17	38.29	38.29									
213	2L	5769306	CV PH - Install Switchyard Ground Grid	91.70											
214	2L	5769919	Volta 2 Replace Generator Breaker	62.19	374.73	374.73	4.00								
215	2L	5770003	HC Roadway Safety Improvements Capital	0.76	26.16	26.16	0.50								
216	2L	5770179	Crane Valley - Install Spillway Platform	31.70	199.41	199.41	7.39								
217	2L	5770184	Electra PH Install Smoke Detection	110.12	37.54	37.54									
218	2L	5770434	Caribou 2 Repl Bolts PistK Joints 5-6	131.58											
219	2L	5770838	PV PH Install Tyximer Depressurization	243.20	630.90	630.90	452.04								
220	2L	5770859	Pt 4 Install TSV Access Platform	38.34											
221	2L	5770966	Pt 4 Dam Replace LLO Gate Controls	157.73	398.11	398.11	0.78								
222	2L	5770967	Pt 1 Tailrace Install Protection	11.95	-11.95	-11.95									
223	2L	5770998	Caribou 2 Penstock Slope Drain Improve	167.50	1,649.53	1,649.53	31.47	0.20							
224	2L	5771199	Pt 7 Radial Gate1 Repl Arms & Trunnions	10.49	64.03	64.03	14.72	4.73	11.61	7.00	1,337.45	2,515.02	13,200.68	98.21	
225	2L	5771200	Pt 6 Radial Gate1 Repl Arms & Trunnions	12.48	94.39	94.39	22.44	36.93	33.22	1,288.34	2,500.00	12,716.02	97.63		
226	2L	5771298	SJA - Install Radial Gate Hoist	49.97	-1.44	-1.44									
227	2L	5771299	Crane Valley - Install Radial Gate Hoist	50.55	2.10	2.10									
228	2L	5771300	SIB - Install Radial Gate Hoist	51.18	-0.84	-0.84									
229	2L	5771321	Manton Svc Ctr Security Improvements	106.75	93.19	93.19	-0.11								
230	2L	5771323	Battle Cr Restoration Safety Imprvmtns C		144.90	144.90									
231	2L	5771631	Haas - Instl Fire Det & Alarm Syst	23.26	462.26	462.26	12.61								
232	2L	5771632	Kerckhoff 2 - Instl Fire Det & Alarm Sys	287.90	3.78	3.78	36.45								
233	2L	5771818	PE: ISO Meter Replacement Phase 5 Capita	191.39	101.22	103.61	168.15	272.43	168.15	750.00					
234	2L	5772098	Inskip Diversion Install Dam Toe Buttrss	39.76	79.14	106.27	72.85	276.46	725.89	50.00					
235	2L	5772623	Haas - Upgrade PH Ventilation System		72.30	72.30	72.85	64.36	124.94	795.71					
236	2L	5772630	Helms - Mercury Device Replacement		1.45	1.45	0.11	0.08	0.13						
237	2L	5772635	K2 - Upgrade Control Room Ventilation		0.60	0.60	0.05	0.03	0.06						
238	2L	5772727	Caribou 2 Repl Intake Gate Seals	307.10	131.85	131.85	131.85	0.06							
239	2L	5772733	Poe Dam Gate 3 Replace Controls	14.69	271.79	271.79	1.79								
240	2L	5772734	Poe PH Deck/Roof Resurfance	73.01	1,432.07	422.94	141.73	151.44							
241	2L	5772740	PV Recreation Erosion Control	91.28	57.37	57.37	18.75	-167.40							
242	2L	5772745	Rock Crest Camp Remove Cabins	-0.02	0.81	0.81	-0.78								
243	2L	5773121	Caribou PH Grnd Grid Mitigation Phase 2	11.78	16.18	16.18	0.39	0.17							
244	2L	5773911	PV Scott Dam Replace Radial Gate Hoist	133.52	486.92	486.92	493.29	2,092.05							
245	2L	5774118	TC/SS Rd Emer. Capital (2017)	672.41	1.52	1.52	1.52								
246	2L	5774800	Crane Valley Dam-Intake Twr Seismic Upgr	97.32	419.49	419.49	115.57	182.35	390.30	1,307.77	290.05				
247	2L	5775698	Spa 1 Snow Shed Stairway Improvements	16.46	16.46	16.46	-8.27	150.12							
248	2L	5776138	Balch - Install Abay Guardrail	234.26	2.94	2.94	218.06	1.52							

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
249	2L	5776218	Camp 9 Road MP2.5 Landslide Mitigation	267.65	-34.46	-43.71								
250	2L	5776722	Pit 6 Radial Gate2 Repl Arms & Trunnions								12,754.28	97.92		
251	2L	5776723	Pit 7 Radial Gate2 Repl Arms & Trunnions	737.71							1,384.26	2,522.57	13,662.71	
252	2L	5777159	Rock Cr PH Replace Ground Grid	753.89										
253	2L	5777258	TigerCK Rd Install AC Paving - 2,300 Ton		21.85				100.00					
254	2L	5777316	Caribou 2 Return Transformer Bank 9				159.96							
255	2L	5777374	Pit 3 Repl Turbine Maintenance Platform	0.80	103.52		0.94							
256	2L	5777495	KI-22 Gage Access Ladder Replacement	15.09	112.39		180.26		51.50					
257	2L	5777497	Balch 1 Penstock A Block & Platform	0.92	165.54		170.18							
258	2L	5777563	Poe PH Repl 208V Circuit Breakers		35.53		94.33							
259	2L	5777916	Pit 5 Repl Turbine Maintenance Platform		22.20		51.50							
260	2L	5778068	Drum Abay - Install Security Fencing		268.48		-34.18							
261	2L	5778072	Electra PH Replace Station Service BK #1		57.58		405.83		2.47					
262	2L	5778240	TC/SS & Tiger AB Dam Rds Storm Damage	1,116.37	212.92									
263	2L	5778259	Pit 6 PH Arc Flash Mitigation		5.22		9.68							
264	2L	5778260	PV Scott Dam Repl Floor in Bldg				0.44			100.00				
265	2L	5778263	Kunkle Reservoir Remove Co House		18.14		2.17							
266	2L	5778268	Crestia PH Repl Turbine Maint Platform		57.02		100.35		50.00	40.00				
267	2L	5778338	KCV - Hydro Wtway Public Safety		364.18		4.80							
268	2L	5778339	Helms - Instl Fall Proctn (LC Conduit)		27.16		151.52		0.15					
269	2L	5778340	Crane Valley - Instl HighFlow Gaging Sta		92.15		62.11							
270	2L	5779203	Helms - Fire Protection PRV		11.17		191.93							
271	2L	5779214	Pit 6 Spillway Apron Replace Block 3				-11.17			101.47				
272	2L	5779436	Helms - Courtright Dam Line US Face								250.00			
273	2L	5779442	Helms Ventilation Upgrade							250.00				
274	2L	5779466	Round Valley Replace Log Boom				66.25							
275	2L	5779468	Scott Dam: Modify hoist-remote operation				-0.00							
276	2L	5780378	MT Canal (Span) Old Oak Rd Crossing Impr		24.81									
277	2L	5780517	Poe Dam Repl Skimmer Gate Seals		52.47		43.61							
278	2L	5780793	Kerckhoff 2 - Replace Interior Roof		25.43		130.87							
279	2L	5781144	Regulator Dam Install Platform Surv Mon.		38.62					19.36				
280	2L	5781738	Tiger Creek Road - Widen Road & Pave											
281	2L	5781778	Helms - Install Air Monitoring											
282	2L	5781800	Helms HQ - Install Card Reader		2.48		94.79							
283	2L	5781918	Mother Lode Install Fencing (Pub Safety)		11.50		55.34							
284	2L	5782085	Spaulding 3 Install Fencing (Switchyard)		144.55		235.37							
285	2L	5782092	Fordyce Install New Ladder and Handrail		0.51		168.54							
286	2L	5782202	Drum Install Fencing (Pub Safety)		63.70		5.23							
287	2L	5782578	Poe PH U1 Upgrade Gen Mgmt Relay Pkg		256.34		502.85							
288	2L	5782679	Poe PH U2 Upgrade Gen Mgmt Relay Pkg		77.67		1,248.96							
289	2L	5782680	Butt Valley Repl Gen Relay NERC		240.58		5,180.23							
290	2L	5782838	Rock Cr Dam Reface Toe											
291	2L	5782924	Main Tuolumne Canal Inst Access S-17/51		31.70									
292	2L	5782987	Cresta Replace Log Boom				64.00							
293	2L	5782988	DeSable LLO Trestle Install Fencing				73.93							
294	2L	5782990	LA Tower Replace Actuators				162.72							
295	2L	5782997	PV Mitigate 2, 4kV Bus Overstressed Brks				36.81							
296	2L	5783001	Spaulding 1 & 2 Install Fence & Platform				70.58							
297	2L	5783124	Helms Install Protective Devices				141.65							
298	2L	5783136	Haas Install Air Monitoring				1.10							
299	2L	5783171	Grizzly Fly Dam Access Improvements				49.65							
300	2L	5783172	Cresta PH U2 Repl Gen Relay NERC				4.93							
301	2L	5783173	Cresta PH U1 Repl Gen Relay NERC				4.74							
302	2L	5783541	Lower Bucks Dam Resurface DS Face				265.97							
303	2L	5783834	Scott Dam Improve Monitoring Equipment				1.47							
304	2L	5785563	Drum Canal Escape Ladders				312.58							
305	2L	5787761	Pit 7 Dam Install Steel Walkways				61.60							
306	2L	5787968	AM:Caribou 1 PH Replace Chobross Insula											
307	2L	5787969	AM:South PH Replace Ohio Brass Insulator											
308	2L	5787995	Upp Miscene Canal Remove Damaged Flumes				303.15							
309	2L	5788182	AM: DeSable PH Replace Ohio Brass Insula				210.86							
310	2L	5788183	Hat Creek 2 Replace Ohio Brass Insulator				151.15							

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
311.2L		5788187	PH 7 PHUI Replace Gen Relay					5.07							
312.2L		5788188	HC: Cableways Install Hornet Cabinets					0.00	3,500.00						
313.2L		5788243	Cresta PH Replace CB 52-24					10.06		20.00					
314.2L		5788244	Philbrook Res Dam Install Pizo Stair					11.82	75.00						
315.2L		5788245	Burt Creek #1 (BR #6) Replace Guardrails						75.00						
316.2L		5788246	Rock Creek PH Turbine Maint Platform					19.72	70.00	400.00					
317.2L		5788248	DeSaba Res Dam Install Pizo Stairs					9.31	75.00						
318.2L		5788250	Poe Dam Install Ped Bridge & Survey Plat					52.91	375.00						
319.2L		5788251	PV Scott Dam Replace & Relocate Catwalk					19.55	50.00	175.00					
320.2L		5789146	Baich Afterbay Ripic Fall Protection					160.18	39.29						
321.2L		5789158	Tule Area Animal Abatement					22.40							
322.2L		5789320	Helms - Replace KI-17 Handrail System					2.02							
323.2L		5789325	CVD Repl Gates, Stems, Guides & Actuator					37.79	463.32	1,500.00					
324.2L		5790058	Deer Creek Flume Liner Install SYC					165.83							
325.2L		5790117	Kerckhoff I Animal Abatement					18.99							
326.2L		5790158	Drum Install Fencing 2020 (Pub Safety)					515.06							
327.2L		5791043	Drum PH Remove 2 Company Cabins									100.00	100.00		
328.2L		5791044	South Yuba Wood Box Flume Install Liner						400.00						
329.2L		5791458	Helms - Replace KI-27 Walkway					29.71							
330.2L		5792575	PH 5 Diversion Dam Install Fall Protec						500.00						
331.2L		5792576	McCloud Dam/Reservoir Install Fencing					90.23	95.14						
332.2L		5792583	PH 3 PH Install Wye PTS & Switch						360.00						
333.2L		5792677	Bucks Creek Replace 11.5KV Aux Cubicles						100.00	600.00					
334.2L		5792692	Drum Install Fencing 2021 (Pub Safety)					329.07	1,000.00						
335.2L		5792724	Phoenix PH Replace ISO Meters						100.00	100.00					
336.2L		5792725	Wise 2 PH Replace ISO Meters						100.00	100.00					
337.2L		5792726	Alta PH Replace ISO Meters						100.00	100.00					
338.2L		5792728	Halsay PH Replace ISO Meters						125.00	100.00					
339.2L		5792729	Wise 1 PH Replace ISO Meters						100.00	100.00					
340.2L		5792730	Meadow Lake Install Railing Drum						200.00						
341.2L		5792732	Rock Creek Rsvr North Fencing						125.00						
342.2L		5792738	CVD Hoisting Motor Pipe Threading Tool						150.00						
343.2L		5792743	Helms - Repl Zone 12 Fire Protect Sys						100.00	350.00					
344.2L		5792752	McCloud Dam Inst Security Surveillance						1,000.00				1,000.00		
345.2L		5792753	PH 3 Lake Britton Dam Inst Security Sys												
346.2L		5792754	PH 5 Diversion Dam Install Security Sys												
347.2L		5792762	Belden PH Install PS Siren						80.00	100.00					
348.2L		5792763	Caribou 1 Install Non-Conductive Fencing						300.00						
349.2L		5792879	Public Safety Early Warning System						175.00						
350.2L		5792921	Belden Arc Fish Mlgrn Ovstrd LV Brkrs												
351.2L		5793128	UOG Hydro DTT Installation Program												
352.2L		5793566	Spaulding PH 1 Transformer Fire System												
353.2L		5793567	Spaulding PH 3 Transformer Fire System												
354.2L		5793572	Drum Install Fencing 2022 (Pub Safety)												
355.2L		5793573	Drum Install Fencing 2023 (Pub Safety)												
356.2L		5793581	Spaulding PHs - Install Smoke Detection												
357.2L		5793591	Wise 1 & 2 PHs - Install Smoke Detection												
358.2L		5793603	Drum 1 Governor Oil Fire System												
359.2L		5793606	Dutch Flat 1 PH - Install Smoke Detection												
360.2L		5793607	Newcastle PH - Install Smoke Detection												
361.2L		5793608	Fuller Lake Install Railing												
362.2L		5793609	Drum Canal Install Foot Bridge at 373+00												
363.2L		5793610	Drum Canal Install Foot Bridge at 227+50												
364.2L		5793651	Chili Bar PH-Install 21KV SCADA Reduser					2.10							
365.2L		5793652	Chili Bar PH - Install DTT Receivers					54.51							
366.2L		5793653	Toadown PH - Install DTT Receiver					19.89							
367.2L		5793654	Desable PH - Install DTT Receiver					19.27							
368.2L		5793655	Desable PH - Install 60KV and 12KV Reven					21.19							
369.2L		5793656	Kern PH Install 70KV and 12KV Meters					-34.70	28.13						
370.2L		5793659	Kern PH Install DTT Receiver					-176.94	174.63						
371.2L		5793660	Kern PH Install T-line SCADA Switch & TPS					-606.48	765.88						
372.2L		5793661	Placerville Sub-install Bank 2 LTC Cont.					13.49							

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW/C	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
374 2L		5793662	Chili Bar PH-Install 21kV Meter												
375 2L		5793664	Toadown PH - Install 12kV Meter												
376 2L		2L Total		40,147.50	49,887.74	20,422.02	20,604.19	29,591.93	42,983.03	39,082.60	62,959.81	48,087.30	26,057.94	18,648.26	Sum of Lines 53-374
								0.21							
5500325			Shasta Ins/Repl Hydro Generating Equip	558.94	324.38	24.41	255.56	195.08	300.00	313.83	338.78	375.84	428.05	500.13	
5500326			Desabla Emergent Capital Work	316.60	453.90	39.05	27.04	2.29							
5500327			Drum Ins/Repl Hydro Generating Equip	88.31	78.30	79.93	8.81	121.36	300.00	156.92	169.39	187.92	214.02	250.06	
5500328			MLoode Ins/Repl Hydro Generating Equip	42.82	86.34	29.85	29.85	541.67	150.00	156.92	169.39	187.92	214.02	250.06	
5501133			Desabla Repl/Obso/Deteriorated Eqpt/Fac	263.28	822.62	1,015.78	1,985.62	1,873.41	300.00	313.83	338.78	375.84	428.05	500.13	
5502519			KCV Replace Obsolete/Deteriorated Eqpt	1,637.20	328.31	793.30	1,074.84	567.60	239.37	230.14	248.44	275.62	313.90	366.76	
5502521			Helms Repl Obsolete/Deteriorated Eqpt	300.60	411.43	1,024.01	90.68	314.44	220.00	230.14	248.44	275.62	313.90	366.76	
5502522			Rock Cr Upgrade Unit 2	162.94	18.67	2.79									
5719042			San Joaquin PH 1A Rpl Digital Base Radio			-0.33									
5720512			Wise 1 Replace TSV			-4.34									
5720513			Salt Springs 1 Rewind Generator			6.06	564.72	-494.09	78.60	1,000.00	3,500.00				
5720528			Electra U2 Rewind Generator		871.36	946.75	47.21	4,095.41	3,134.60						
5720539			Spring Gap Repl Gen Relays		140.97	1,070.73	12.73	1.54							
5720585			AM: Governor Program CAP										250.00	500.00	
5720588			AM: Turbine/Runner Repl/mtm Prgm Capital										4,000.00	8,000.00	
5720593			AM: Turbine Shutoff Valves										4,000.00	8,000.00	
5720600			AM: HV Transformer Capital												
5720636			Caribou 2 U4 Replace Gen Breakers 4/2	101.59	828.16	42.40									
5720638			Centerville Replace Switch 85	4.48											
5720654			Desabla Replace Runner										100.00	300.00	
5720655			Pt 7 U2 Rewind												
5720656			Caribou 1 PH Rewind U1	12.67	6.25	1,487.49	3,224.86	7,494.04							
5720657			Caribou 1 PH Rewind U2		509.40	888.54	668.86	922.12	5,300.00	93.00	98.00	1,250.00	5,000.00		
5720658			Caribou 1 U1 Repl Gen. Breaker		768.03	15.47	1,112.72	142.13	89.00						
5720659			Caribou 2-5 Rewind		16.46	109.34	6.26	35.90	105.00						
5720663			Cresta U2 Replace Wickets & FPs			10.44	36.27	938.54	900.00	3,275.00	2,984.00				
5720666			Oak Flat Rewind					42.19	1,000.00	4,000.00	2,000.00				
5720670			Rock Cr PH Refurb GSU Bank 1, 2 & Spare												
5720682			Pt 3 Unit 3 Rewind Generator	856.22	1,101.44	4,934.46	5,776.50		2,335.33						
5720696			Pt 4 Unit 1 Turbine Upgrade												
5720714			Pt 3 U3 Governor Replacement	1,043.97	10.02										
5720715			Pt 7 Replace Voltage Regs/PSS	10.70											
5720718			Pt 6 Replace Voltage Regs/PSS	-0.03											
5720719			Pt 6 U1 Replace Runner												
5720720			Pt 6 U2 Replace Runner												
5720722			Caribou 2-4 Replace Marathon Exciter	472.93	1,532.39	32.21									
5720723			Caribou 2-5 Replace Marathon Exciter	64.89	829.05	1,239.56									
5720725			Caribou 1 U1 Repl Runners-Bearings-Shaft	6.68	10.68	118.06	3,197.44	5,115.79	5,000.00						
5720726			Caribou 1 U2 Repl Runners-Bearing-Shaft	175.15	281.36	-30.68	1,933.28	1,194.78	122.00	2,135.00	3,000.00	2,500.00	3,000.78	1,934.63	
5720727			Caribou 1 U3 Repl Rnmr, Brng, Shft & Ndl												
5720735			Butt Valley Install AGC Capability	2.36	1.10	-14.93									
5720737			Belden Replace Runner, Wickets & FPs	9,071.22	98.02	346.46	-0.78								
5720747			Pt 4 U1 Rewind												
5720752			Desabla Repl Needles & Seats	10.99	-48.23										
5720829			AGWishon U3 Rewind Generator												
5720843			San Joaquin 3 - Governor Controls Upgrade	8.49	9.55	-18.04									
5720881			AGWishon U4 Rewind Generator												
5724338			Coleman Replace Wicket Gates	122.38											
5724400			Narrowa Replace Master Contactor 4 & 4x	205.70											
5724778			Caribou 1 PH Automate U1-U2 U3	1.18											
5724779			Pt 5 Automate Powerhouse & SB Generator	1,927.18	2.12										
5724818			PV Replace U4 TSV												
5724918			M.Tuolumne-Retaining Headwall												
5726821			Helms - Upgrade Cooling Water-Sys Contr	67.88											
5728078			Helms - Replace Relays												
5728980			Haas - U1/U2 Replace Governor	16.75	81.01	-101.07									
5728982			Kings River PH - Replace Governor	48.65	197.97	941.71									
5728986			Balch 2 - Replace TSV Controller	-7.87	5.96										

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
433	2M	5728990	Helms - Install Liquid Rheostat Backup	1,008.21	994.78	667.33	477.79	60.27							
436	2M	5729258	Helms - Install DCS System	0.16											
437	2M	5729439	Shasta Consolidate Switching Ctrs SCADA	19.32	34.54	5.84									
438	2M	5729440	DeSable Consolidate Switching Centers	26.83	42.10	5.40									
439	2M	5729590	Courtright Dam - Valve Chamber Upgrades	0.10											
440	2M	5729598	Helms - Cooling Water Pumps	4.59	4.95	-67.09									
441	2M	5729698	DeSable Repl Sta Battery	187.12	37.86	10.14									
442	2M	5731362	SCADA RTU Life Cycle Replacements	2.13											
443	2M	5732798	Ham Br. Hdr Box - Repl Battery & Charger	1,375.92	0.34										
444	2M	5732843	Kerckhoff 2 - Replace Draft Tube	467.34	46.07										
445	2M	5732845	Helms - Replace STP Backup Generator	73.64	52.33	-33.99	7.11	10.77	6.20	6.50	6.90	750.00	2,150.00		
446	2M	5734298	Caribou 1 PH Upg U2 Governor Controls	17.42	6.49	8.16	6.03	9.72							
447	2M	5734402	AG Wishon - Install Static Excitation	727.22	37.65										
448	2M	5734684	Bucks C U1 Upgrade Governor Controls	7.56											
449	2M	5735378	Caribou 2 Replace Station Batteries	45.94	17.64		2,023.54	742.39	0.08						
450	2M	5735379	Cresta Refurbish Transformer Banks	325.22	2,021.48	-14.63									
451	2M	5737519	Helms - Replace HPCO HPU	5,782.86	6,899.36	2.57									
452	2M	5737699	Belden Rewind	138.91	671.94	28.62									
453	2M	5738004	Helms - U1 Repl TSV Servo Seals/Bushing	701.06											
454	2M	5738005	Helms - U2 Repl TSV Servo Seals/Bushing	33.53	2.01	10.13	3.72	6.00							
455	2M	5739258	AGWishon - Replace Load Controller	5.08											
456	2M	5739641	Helms - Rplc Switchyard Switchgear	30.03	64.34	9.43	5.51	166.88							
457	2M	5739698	Balch 1 - Replace Governor	39.34	121.13	63.22	149.40	14.22				439.97	753.44		
458	2M	5739699	Balch 2 - Replace Station Service Bikers	251.69											
459	2M	5739708	Kings River - Replace Stat Serv Breaker	17.54	14.67	2.49	1.84	2.97							
460	2M	5739712	SJB - Repl TSV	259.98	-4.96										
461	2M	5739716	Tule - Replace Runners (U1&U2)	45.55	32.20	6.01	-83.76					150.00	200.00		
462	2M	5739718	AG Wishon - Replace Switches 71, 73	56.02	-4.08	13.30	10.06	19.46				745.55	478.76	61.91	
463	2M	5739725	Haas - CO2 Retrofit	1.98	84.84	0.97	-13.92								
464	2M	5739738	Pt 4 Replace Generator Relays	89.39											
465	2M	5739918	AGWishon Replace Field Breakers	44.29											
466	2M	5740399	Helms - Install Auto Transfer Switch	1,212.50	28.22	11.81			0.00					100.00	
467	2M	5740887	Kerckhoff 2 - Replace Turb Seal Ring	0.47											
468	2M	5741544	DeSable PH Replace Governor	0.35											
469	2M	5741553	Poe Replace CW Strainer System	0.11											
470	2M	5743659	Dutch Flat Dewatering Pump	3.78											
471	2M	5744199	Motherlode RTU Battery Replacement	0.07											
472	2M	5744318	Pt 5 Purchase & Install Jib Cranes	0.35											
473	2M	5745659	Balch #2 Unit 2 Generator Rewind	13.12	14.15	-191.92									
474	2M	5745664	Caribou 1 U2 Replace Needles & Seats	1,520.48	12.43		8.70	-12.63					2,500.00		
475	2M	5745665	Caribou 2 U5 Rebuild Governor	4,359.10	7.05	72.81	276.74	479.20							
476	2M	5745673	DeSable Replace AVR	1.82	24.64										
477	2M	5745677	Electra U3 New Needle, stem & Bushings	272.92	1,089.77	1,709.01	3,056.89	11.34							
478	2M	5745687	Hat 1 CB22 Replacement	1.94											
479	2M	5745692	Kerckhoff 1 - U3 Replace Transformer	26.48											
480	2M	5745696	Kerckhoff 2 - Install New RTDs	1,542.55											
481	2M	5745697	Kerckhoff 2 - Repl Runner Coupling Bolts	46.68											
482	2M	5745698	Kerckhoff 2 - Rotor Pole Refurbish	13.12	14.15	-191.92									
483	2M	5745704	Pt 3 U3 PRV Refurbishment	1,520.48	12.43										
484	2M	5745706	Pt 4 Unit 2 Replace Runner & Wickets	8,824.73	8,108.41	204.94	9.04								
485	2M	5745710	Poe U2 Governor Upgrade Controls	214.76	28.34	43.34	1,546.58	1,862.14							
486	2M	5745716	Salt Springs PH Repl Station Air Comp	1.69	1.64	-4.06									
487	2M	5745722	Tiger Creek FB Install Backup Generator	6.95	-94.13	130.72	478.03	0.15							
488	2M	5745724	Tiger Creek U2 Gov Control Upgrades	133.94	39.53	27.77									
489	2M	5745874	Helms - U2 Inst Rotor Air Gap Monit Sys	153.79											
490	2M	5746642	Narrow's Replace Annunciator	-0.00											
491	2M	5746658	Helms - U3 Generator Rotor Replacement	2,868.30											
492	2M	5747174	Balch #2 Unit 3 Generator Rewind	1,301.62											
493	2M	5747175	Balch 2 - U2 & U3 Bearing RTDs	148.94	1,221.79	424.80	1,846.38								
494	2M	5747177	Bucks C PH Repl U2 Turb Brg / Shaft	84.74	46.37	753.62	1,734.70	52.60							
495	2M	5747184	Butt Valley Replace Exciter	581.61											
496	2M	5747193	Chili Bar PH Replace RTD Monitor/Relay												

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
497	2M	5747200	Cresta U2 Rebuild TSV	436.37	51.58										
498	2M	5747208	DeSable Rewind Generator		5.61									100.00	1,925.00
499	2M	5747211	Drum U2 Replace Vibration Relay		291.80	441.02	-4.75								
500	2M	5747213	Drum PH Replace Standby Generator		823.41	38.92									
501	2M	5747214	Drum US Refurbish Transformer												
502	2M	5747215	Drum Unit 1 Rewind												
503	2M	5747222	Dutch Flat Replace Transformers	0.59											
504	2M	5747242	Helms - Common Replace piping and valves	40.75	1,212.95	262.66	262.66	-4.96							
505	2M	5747243	Helms - Replace Load Center 1,2,7,8&	155.99	600.76	574.90	574.90	17.29	0.00	43.36	114.05	892.99	115.74		
506	2M	5747252	K2 - Repl Gen NERC/Mmr Mgmt Relays												
507	2M	5747254	K2 - Replace Transformer Surface Coolers	301.69	26.19	239.63	826.24	212.18							
508	2M	5747260	Kings River - Repl Exciter	31.55											
509	2M	5747268	Narrows Replace Vibration Monitor	299.18											
510	2M	5747269	Newcastle Cooling Water Flow Mtr Replace	21.83											
511	2M	5747276	Pt 5 Repl Traxmtr BIABC & B2ABCS	1,603.89	5,593.59	5,903.24	906.75	36.39							
512	2M	5747282	Poe Rebuild TSV Accuator U1	384.23											
513	2M	5747283	Poe Rebuild TSV Accuator U2	324.98											
514	2M	5747285	Poe U1 Governor Upgrade Controls	1,391.72	0.91										
515	2M	5747313	Tiger Creek U1 Repl Generator Relays	41.88	1,137.40		534.22	3.55							
516	2M	5747320	Wide Standby Generator	317.15											
517	2M	5747338	Helms - U2 Generator Rotor Replacement	916.28											
518	2M	5747939	Helms - U1 Generator Rotor Replacement	2,929.13	-1,265.55										
519	2M	5748838	Helms - U1 Repl TSV Bypass Valve Seals	4.45	4.81	-67.42									
520	2M	5749500	AGWishon - U4 Reinsulate Field Poles	653.07	0.34										
521	2M	5749501	AGWishon - U3 Reinsulate Field Poles	0.29											
522	2M	5749538	Belden Replace Station Service Breaker												
523	2M	5749738	Helms - Repl Draft Tube Door Controls												
524	2M	5749818	Helms - U2 Refurbish Reverse Disconnect												
525	2M	5750238	Newcastle Carbon Dust Vacuum System	284.15											
526	2M	5750558	Rock Cr Upgrade Unit1	0.11											
527	2M	5750758	Halsey Governor Heat Exchanger	-54.58											
528	2M	5752818	Pt 3 VH Replace Charger	-7.98											
529	2M	5752920	Belden Upgrade Transformer Protection	25.53	27.08	4.17									
530	2M	5753799	Helms - Install Brush Holder Sets	0.35											
531	2M	5754659	Electra 480VAC Bank 2 Replacement	166.38	98.84										
532	2M	5754672	Newcastle TSV Refurbish	66.97	-69.34										
533	2M	5754678	Helms - Install Gov. Transducers	-15.48											
534	2M	5754679	Helms - Install SV Breaker Health Monitor	382.02	27.26										
535	2M	5754688	Kerckhoff Dam - Replace Gate 3 Trunnions	758.99	76.92										
536	2M	5754689	Balch 2 - Refurbish CB242	57.50	44.66										
537	2M	5754690	Balch 2 - Replace U2 Vapor Seal	26.25	42.24										
538	2M	5754691	AG Wishon - Repl Cooling Water Regulator	103.72	128.31	272.91	13.93		5.92	1.79					
539	2M	5754693	Kings River - Intake Diff Scheme Mod	3.50											
540	2M	5754716	Narrows 1 OSP Phase Ia Bearing	223.61	35.09	37.15	586.45	3.56							
541	2M	5754717	Spaulding 2 Gov HPU and Control Upgrade	2,089.30	82.74	0.34									
542	2M	5754722	Drum U2 Full Static Excitation System												
543	2M	5754840	Caribou 1 PH U3 Refurb TSV Cylinders	0.77											
544	2M	5754841	Caribou 2 U4 Rebuild Governor	449.57	4,137.27										
545	2M	5754842	Bucks Cr Replace Energy Dissipators	684.59	-11.85										
546	2M	5754843	Bucks Cr Upgrade PSV Aux Equip	127.25	1,011.16										
547	2M	5754968	Coleman Replace TSV Motor	-142.20											
548	2M	5755571	Kerckhoff 1 - Retire Unit 2	1,461.08	86.25										
549	2M	5756603	Belden Bearing RTDs	399.64											
550	2M	5756604	Caribou1 Repl Cooling Water Supply	233.88	172.10	1,306.22	90.22	-4.34							
551	2M	5757058	Dutch Flat Replace Draft Tube Platform	0.07	0.07	-0.97									
552	2M	5757599	Belden Refurbish Thrust Nut	841.63	0.07	0.07	-1.00								
553	2M	5758050	Haas - U2 Replace Governor	2,837.24	1,501.33	74.64									
554	2M	5758051	Haas - U1 Replace Governor	51.04	1,273.77	3,628.50	107.20	9.42							
555	2M	5758054	Kerckhoff 2 - Repl Thrust & LGB Oil Cool	109.92	0.13										
556	2M	5758055	AGWishon - U3 Repl Gen Bearings	33.07	46.17										
557	2M	5758056	AGWishon - U4 Repl Gen Bearings	722.96											
558	2M	5758057	Balch 2 - Replace PSV Servo Seals	1.12											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference	
559 2M		5758119	Balch 2 - U2 Repl Cooling Water Piping	641.06	1,244.28	9.37	420.89	351.84	195.56	207.57	300.10	1,660.75				
560 2M		5758121	Haas - U1 Replace Cooling Water Flow Dev	35.53	1,858.06	2,917.96	78.80	3.94								
561 2M		5758122	Haas - U2 Replace Cooling Water Piping	3,436.36	993.99	-13.15										
562 2M		5758131	Helms GSO - Replace Transf Heat Exchanger	-52.73												
563 2M		5758133	Helms Repl Interr/Arm Mech CB270	269.95	8.44											
564 2M		5758136	Helms - Switchyard Emerg Access/Elevator	302.23	3.87	19.47	63.42	113.87	753.57	1,000.00	350.00					
565 2M		5758178	Poe U1 Repl Gen Rotor Brake Ring		0.15											
566 2M		5758179	Bucks C U2 Upgrade Governor Controls	717.56	61.72											
567 2M		5758740	Caribou 2 PH Automate U4 & U5	102.55												
568 2M		5759145	Kerckhoff 2 - Repl Wicklet Bushings													
569 2M		5759238	Helms - Replace Sewer Lift Station Pump	11.96	2.17											
570 2M		5759998	Pt 3 U1 Governor Replacement	403.22	994.12	1.18										
571 2M		5759999	Pt 3 U2 Governor Replacement	396.53	836.51	-0.81										
572 2M		5760001	Volta 2 Powerhouse Replace Annunciators	2.61												
573 2M		5760004	Coleman Powerhouse Replace Relays	15.06												
574 2M		5760005	JBB Replace Synch & Speed Check Relays	7.12												
575 2M		5760006	Pt 1 Install RTU Governor Connection	143.90	3.47											
576 2M		5760010	Pt 3 Replace Neutral Transformer	97.57	23.70	23.46	17.34	27.94	27.20	150.00	500.00					
577 2M		5760011	Pt 3 Powerhouse Replace AC/DC Panel	153.21	18.84	18.87	13.94	22.47	28.10	338.60	1,000.00					
578 2M		5760021	Pt 5 Replace Wiring to the Valvehouse	1,074.67	-1.25											
579 2M		5760026	Kerckhoff 2 - Repl SER & Annunciator	35.30	94.18	790.30	111.29	-0.16								
580 2M		5760027	Helms - Repl Valves (6 Penstock)	-0.91												
581 2M		5760038	Bucks Creek U2 Rewind Generator	748.49	630.63	908.84	266.61	3,817.68	2,000.17							
582 2M		5760045	Caribou 2 U4/U5 Repl CW Pumps	11.01												
583 2M		5760046	Caribou 1 PH U1 Refurb TSV Cylinders	1,085.21	0.15											
584 2M		5760047	Caribou 1 PH U3 Wheel Pit Cladding	1,756.65	26.99	706.60										
585 2M		5760056	Belden Refurbish PRV	1,824.97												
586 2M		5760098	Helms - Repl Interrup/Mech CB290	155.80	10.41											
587 2M		5760099	Balch 2 - Install TWD Automation	129.37	33.90											
588 2M		5760102	Balch 2 - U2 Install Additional CTS	-6.45												
589 2M		5760122	Chill Bar Auto-Lift System	818.31	49.30											
590 2M		5760124	Chill Bar-Replace Cooling Water Piping	67.17												
591 2M		5760129	Drum 2 U5 Governor Upgrade	1,724.43	142.55	-7.63										
592 2M		5760136	Dutch Flat - Replace TSV Seals	97.96												
593 2M		5760140	Electra U3 Governors and Servos Refurb	0.07	0.01	-0.09										
594 2M		5760152	Spaulding 1 & 2 Alternate Station Serv	31.10												
595 2M		5760154	Spaulding 1 TSV Refurbishment	0.10	20.89	-4.86	247.83	33.16	7.20	540.00	2,300.00	108.00				
596 2M		5760160	Stanislaus Governor Jockey Pump Rpl	7.24	31.28											
597 2M		5760167	Cresta PH Replace U1 Exciter	4.00	1.96	7.54	12.83	10.97								
598 2M		5760195	Belden PH Install Stand-by Generator	6.55												
599 2M		5760607	AM Exciter Program Capital													
600 2M		5760609	AM: PRV Program CAP													
601 2M		5760617	Balch 2 U3 Replace Cooling Water Piping	16.72	747.62	229.20	570.89	419.58	137.96	152.90	177.00	273.94	1,705.19			
602 2M		5760627	Bucks U1 TSV Refurbish	757.23	43.57			883.33								
603 2M		5760628	Bucks U2 TSV Refurbish	271.39	11.03											
604 2M		5760630	Caribou 1 Refurb PSV Aux Equip	0.50	1.80	0.18	0.13	-2.60								
605 2M		5760632	Caribou 1 U2 Repl Gen Breaker	14.40	14.40	107.26	6.05	31.27	30.00	513.47	88.00					
606 2M		5760633	Caribou 1 U3 Repl Gen Breaker	14.37	14.37	110.18	6.20	13.92	30.00	75.00						
607 2M		5760634	Caribou 2 Repl CB 282	66.58	556.46	414.02	21.56									
608 2M		5760635	Caribou 2 U4/U5 Replace CWS System	49.28	164.05	72.02										
609 2M		5760636	Caribou 2 U5 Replace Gen Breakers 5/2	88.20	654.09	171.68										
610 2M		5760648	Crane Valley - Runner Replacement													
611 2M		5760650	Cresta PH Crane Upgrade	28.93	46.79		104.16	186.88	1,000.00	3,898.00	281.00					
612 2M		5760651	Cresta U1 PRV Replace Energy Dissipaters		55.50	71.56	55.50	71.56	6.93	5.00						
613 2M		5760652	Cresta PH Replace U2 Exciter		22.06	24.82										
614 2M		5760654	Cresta U2 PRV Replace Energy Dissipaters	133.13												
615 2M		5760655	Cresta U1 Replace Wicklet Gates & FPS		103.30	145.87	112.91	96.63	33.33	20.00						
616 2M		5760662	Drum 1 U2 Rewind													
617 2M		5760666	Drum 1 U3 & U4 Exciter Replacement	338.82	1,125.08	1,556.68	3.21									
618 2M		5760667	Drum U1-4 Separate Governor HPU	150.82	606.34	1,035.19	1.40									
619 2M		5760669	Drum 2 U5 Rewind		21.98											
620 2M		5760680	Electra U1 Governors and Servos Refurb													

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
621	2M	5760681	Electra U2 Governors and Servos Refurb												
622	2M	5760684	Halsey Replace Exciter	48.35	8.94	144.38	144.38	-87.60	11.65	7.92	180.00	650.00		750.00	
623	2M	5760699	Narrows Repl Sta. Serv Switchboard	38.47	23.18	96.27	96.27								
624	2M	5760705	Pit 1 Unit 1 Rewind Generator		15.42	1,420.60	1,420.60	73.68	6,410.88	4,000.00					
625	2M	5760710	Pit 3 U2 PRV Refurbishment	242.19	1,560.35	28.64									
626	2M	5760712	Pit 3 U1 PRV Refurbishment	237.01	1,696.66	26.54									
627	2M	5760715	Potter Valley U1 Repl Runner & Wickets									507.34	1,100.00	1,500.00	
628	2M	5760716	Potter Valley U1 TSV Seats Repla									100.00	550.00	50.00	
629	2M	5760718	Potter Valley U4 Repl Runner & Wickets									1,000.00	1,000.00	1,500.00	
630	2M	5760719	Potter Valley U3 TSV 5-Way Valve	41.35	0.17										
631	2M	5760721	Rock Cr-VH Upg Aux Equipment	2.43	3.37	0.45	0.45	0.33	-6.58			80.00	250.00	510.00	
632	2M	5760722	Salt Springs 2 Repl Needle Valvs & Seat								800.00	50.00			
633	2M	5760724	San Joaquin 3 - Replace Batteries												
634	2M	5760736	Spaulding 3 Switchgear Replacement												
635	2M	5760742	Tiger Creek U1 Rewind Generator	1,035.51	2,865.78	3,367.00	3,367.00	220.14	387.26	1,192.60					
636	2M	5760744	Tule 2.3kV Gen Switchgear	58.39	238.44	22.95	16.96	-0.10							
637	2M	5760746	West Pt Battery Charger	1.19	0.71	92.86	92.86	180.40	27.33						
638	2M	5760747	Wise 1 Replace Exciter	181.82	1,236.44	34.16									
639	2M	5760842	West Point Alternate Station Service	329.73	4.40										
640	2M	5761039	Narrows Flow Meter Replacement	27.04	3.12										
641	2M	5761119	Pit 1 Unit 2 Replace Generation Relays												
642	2M	5761123	Pit 1 Repl 65E ABC 11kv Sta. Ser Dis Swl												100.00
643	2M	5761124	Pit 1 Repl 480V Stat Svc Bnk 1 & Discnt												100.00
644	2M	5761242	Butt Valley Repl Wicket Shims	2.52	11.82	1.83	1.83	14.82	142.46	1,300.00					
645	2M	5761341	Cresta PH Replace Switch 295		4.00	229.23	229.23	-24.19	-1.37						
646	2M	5761658	Salt Springs Line and Bkr Rpl	232.17											
647	2M	5761938	Oak Flat Replace Generator Breaker	195.03											
648	2M	5761939	Cresta Replace Bypass Valves	112.93	6.17										
649	2M	5762150	Tiger Creek U1 Exciter Replacement	39.66	1,252.36	623.52	623.52	1.08							
650	2M	5762219	Dutch Flat Vibration Rly and Flow Meter	417.67	1.44	0.01									
651	2M	5762318	Pit 4 U1 Replace Excitation System												
652	2M	5762320	Pit 5 U1 Replace Excitation System												
653	2M	5762321	Pit 5 U2 Replace Excitation System												
654	2M	5762322	Pit 5 U3 Replace Excitation System												
655	2M	5762324	Pit 5 U4 Replace Excitation System												
656	2M	5762325	Pit 3 U1 Turbine Upgrade												
657	2M	5762325	Pit 3 U2 Turbine Upgrade												
658	2M	5762326	Pit 3 U3 Turbine Upgrade												
659	2M	5762329	Kerckhoff 2 - Generator Rewind/Restack												
660	2M	5762592	AM: Bearings Program - Capital		3.84	1.59	1.59	101.39							
661	2M	5763098	Bucks Cr Inst Prstk Cross-Tie Pipe	276.21	0.01										
662	2M	5763329	Kerckhoff 2 - Install Air Gap Monitoring	175.72	0.15										
663	2M	5763330	Kerckhoff 2 - Replace Shaft Sleeve												
664	2M	5763364	Stanislaus Sump Valves Replacement	23.31											
665	2M	5763658	Spaulding 1 Replace CB70	1,388.40	-16.70										
666	2M	5763928	Poe Install Actuated Valves	187.10											
667	2M	5764035	Pit 5 System Control Upgrades	1,959.56	-2.83										
668	2M	5764058	Pit 3 PH Replace Operator Consoles	763.29	149.35	67.13									
669	2M	5764140	Deer Creek Mech Overspeed Install	285.00	0.01										
670	2M	5764141	Halsey Insp/Repl Thrust Bearing	1.97											
671	2M	5764546	Caribou 2 Install Bearing CW Flow Meters	34.38											
672	2M	5764547	Caribou 2 Install Annunciators	7.03											
673	2M	5764548	Caribou 2 Install Auto Sync Relays	21.58											
674	2M	5764558	Pit 5 Autom Gen Brg Oil Filtration & Htg	94.12	19.23	85.83	85.83	21.16	33.36	20.00	1,766.00				
675	2M	5764659	Pit 6 U 1 Replace OSP skid cntrl panel	85.37											
676	2M	5764941	Lake Valley LLO Automate	481.48	83.07	-0.14									
677	2M	5765058	Balch 2 - U2 Repl TSV Actuator Seal	42.85	106.83										
678	2M	5765059	Balch 2 - U3 Repl TSV Actuator Seal	38.96	12.49	12.49	12.49	38.19	8.83	9.05	168.29				
679	2M	5765118	Drum PS3 Intake Gate Replacement												
680	2M	5765707	Toadown PH Replace Runners	88.24	8.82	86.93	86.93	247.06	495.40	1,003.37	40.00				
681	2M	5765882	Balch 2 - U2 Replace TSV Seats (2)	386.72											
682	2M	5766043	Spaulding 1 & 2 Primary Sta Serv XFRMs	61.78											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
683	2M	5766146	Volta 1 PH Grace Penstock Actuator Lock	90.58											
684	2M	5766150	Pit 4 Replace Station Battery Charger	107.10		103.88	336.94		8.33						
685	2M	5766151	Pit 4 Replace Station Batteries	89.79		0.22									
686	2M	5766152	Pit 4 Replace Generator Air Breakers	96.72		463.13	221.31	194.73	95.52	60.00	1,000.00	3,000.00	2,000.00		
687	2M	5766153	Pit 5 TGB Install Inline Oil Filtration	20.74		229.11	1,651.65	594.79	200.14	120.00	1,116.10	27.50			
688	2M	5766154	JBB PH U1 Upgrade Governor Controls												
689	2M	5766156	Wise 1 Bearing Work	29.48											
690	2M	5766157	Butte Canal 6/5 Repl Flume Sheets	221.01											
691	2M	5766218	Dutch Flat Governor Upgrade	88.09											
692	2M	5766241	Tiger Creek U2 Exciter Replacement	32.40		420.00	1,008.75	3.57					543.00		
693	2M	5766242	Drum U5 Install RTD	17.84		32.65	10.15	9.37	21.30	11.68	25.00	25.00			
694	2M	5766243	Tiger Creek U2 Repl Generator Relays	29.14		16.49	2.65	1.96	10.26	3.42	105.00	508.00			
695	2M	5766244	Drum U5 Cooling Water Flow meters	13.88		38.92	17.04	9.74	21.85	22.51	20.84	20.84	1,095.00		
696	2M	5766251	Drum 1 Remote Control			14.55	2.81	3.83	7.67	3.00	105.00	354.00			
697	2M	5766253	Bucks Creek U1 Generator Stator Rewind			15.27	18.94	-18.94	0.00		420.40				
698	2M	5766254	Caribou 1 PH Repl Standby Generator	76.45		150.55	329.73	6,429.31	44.00						
699	2M	5766285	Balch - Repl Rough Fire Damaged Cm Cable	4.21			397.86	82.67	3.68						
700	2M	5766379	Helms - Wishon 120in Vlv Cont Sys Replc	10.42		92.17	50.12	8.10	-160.81	12.65					
701	2M	5766380	Helms - Replace Air Compressors	6.80		28.13	1,192.71	34.00	0.53						
702	2M	5766381	Helms - Install PI	269.13		73.87									
703	2M	5766388	AG Wishon - U4 Install Gen RTDs	192.01											
704	2M	5766394	Kern - Replace Turbine Platform	29.64		10.35	3.09	-42.55	-0.52						
705	2M	5766418	Kerckhoff 2 - Replace Sump Pump	102.00		142.18									
706	2M	5766419	Kerckhoff 2 - Install Liner DCAT	51.56		110.55	762.22	14.05							
707	2M	5766460	Haas - Install Collector Ring Vacuum Sys	15.47		-15.47									
708	2M	5766531	Drum Replace Siphon No2 Drain	513.29		77.06	254.72	48.59	0.61						
709	2M	5766622	Bucks PH Unit 1 Refurb Gen Bearings	82.49		29.68									
710	2M	5766749	Helms - U2 Repl TSV Bypass Valve	242.27		108.70	70.62	170.12	1,962.58	2,628.15	300.00				
711	2M	5767080	Halsey PH - Replace Runner and Wicket	-2.45											
712	2M	5767104	Toadown PH Repl Wicket Gate Bushings	86.26		180.33	43.45	372.94	2,233.41						
713	2M	5767539	Tiger Creek U1 Gov Control Upgrades			159.12	336.66	474.30	185.15	2,500.00			750.00	2,250.00	
714	2M	5767978	AGWishon - Repl U1 Runner			15.44	1.71	0.91	1.47	0.00			150.00	750.00	
715	2M	5767980	Caribou 1 U1 Upgrade Gov Controls												
716	2M	5767981	Caribou 1 U3 Upgrade gov Controls												
717	2M	5767983	Coleman Repl Metal Clad Switchgear			44.75	246.68	747.99	0.00						
718	2M	5767986	Dutch Flat 1 Replace 480V Switchgear				3,593.16	7,031.01	9,602.84						
719	2M	5767993	Helms - Rewind U2												
720	2M	5768002	JBB Unit 2 Convert to Digital Governor			380.24	788.06	0.17					27.50		
721	2M	5768007	Narrows Unit 1 Install Exciter												
722	2M	5768011	Poe Unit 1 Excitation System Replacement												
723	2M	5768012	Poe Unit 2 Excitation System Replacement												
724	2M	5768013	South PH Inst Station Serv Disconnect												
725	2M	5768015	South PH Repl Metal Clad Switchgear												
726	2M	5768020	Volta 1 Inst Station Service Disconnect												
727	2M	5768038	Caribou 1 PH U2 Wheel Pft Cladding	85.75		66.38	7.17	18.20	2.01						
728	2M	5768039	Caribou 1 PH U1 Wheel Pft Cladding	100.07		49.68	1,028.62	-0.60							
729	2M	5768098	Chili Bar Replace GSU Transformer Cables			0.55	-0.55								
730	2M	5768238	Drum Canal Pittman Flume Repairs												
731	2M	5768269	Toadown PH Repl Wicket Gate Bushings	148.08											
732	2M	5768562	PV Replace Transformer Bushings	255.25		7.61									
733	2M	5769080	Spaulding 3 Replace Crane Motor	131.13		0.15									
734	2M	5769300	Stan PH Tailrace Gates - Replace Winches	156.61											
735	2M	5769307	Haas - U1 Replace Surface Cooler #4	135.70		6.32									
736	2M	5769308	Haas - U2 Replace Surface Coolers	398.12		20.05									
737	2M	5769309	Haas - U1 Replace Surface Coolers	1.87		338.95									
738	2M	5769311	San Joaquin 2 - Replace Generator Cables	145.88		10.41									
739	2M	5769312	Kerckhoff 1 - Refurbish Bank 3 Transfrm	494.26											
740	2M	5769341	Stanislaus Area - Replace/Modify Winches	58.79		0.26									
741	2M	5769342	Mokelumne - Replace/Modify Winches	55.98		40.83									
742	2M	5769343	Drum Winch Replacement/Modification	-0.00											
743	2M	5769344	Phoenix - Replace/Modify Winches	-0.00											
744	2M	5769898	Balch 2 - Replace Bank 3 Ximr Bushing	122.87											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
745 2M		5770001	JBB Replace TSV Bypass Valves	2.87	35.54	148.49	3.96								
746 2M		5770058	Spring Gap PH - Replace Exciter AVR	110.62	469.84	0.38									
747 2M		5770099	Helms - U2 Replace TSV Downstream Seat	651.50	-10.84										
748 2M		5770240	Belden Install Generator Protection	974.45	1,416.58										
749 2M		5770318	Halsey Replace Runner B Seal Ring	864.04	-0.90										
750 2M		5770608	Kings River - Replace TSV Seats/Bushing	26.63	1,419.31	0.72									
751 2M		5770609	Kings River - Replace PRV Seat	9.31	1,085.99				0.22						
752 2M		5770824	Pit 4 U2 Repl Nitrogen Accumulator tanks	127.07	0.16										
753 2M		5770842	Merced PH Instl Redundant Meters	0.00	7.68	-7.68									
754 2M		5770883	Pit 4 U2 Install New High Lift System	109.73	128.10										
755 2M		5770969	JBB Replace Annunciators		127.88										
756 2M		5771119	Poe PH Repl TSV Bypass Valves	71.25	125.78										
757 2M		5771301	Helms - U3 Rpl GSU Xfmr Heat Exchanger	611.63	728.80		0.06								
758 2M		5771302	Helms - U1 Rpl GSU Xfmr Heat Exchanger	612.15	660.83		55.15	-1.62							
759 2M		5771318	Pit 7 U2 Repl Gov Pump Echelon Controls		1.27		128.67								
760 2M		5771319	Pit 4 U1 Repl Gov Pump Echelon Controls		48.88		202.46								
761 2M		5771320	Pit 6 Replace Gov Pump Echelon Controls		99.71		2.59								
762 2M		5771578	Pit 4 U2 Refurbish Surface Coolers		114.53		0.84								
763 2M		5771629	Haas - U1 Replace 12 & 5 Way Valves	10.78	76.08										
764 2M		5771630	Haas - U2 Replace 12 & 5 Way Valves	6.61	70.88		1.14								
765 2M		5771839	Balch 2 - U2 Bearing RTDs	96.71	1,028.44		32.80								
766 2M		5771958	Helms - U3 Wicket Gate Servo Refurb	62.90	2,905.04		25.31								
767 2M		5772018	Haas - Replace U1 Bearings/Install RTDs	5.93	194.86		15.53	11.47							
768 2M		5772059	Belden PH Repl Cooling Water Pumps	71.70	6.66		43.86		202.00		1,829.00	219.00			
769 2M		5772341	K1 - Replace U1 Generator Leads		33.27		2.00	3.22							
770 2M		5772342	K1 - Replace U3 Generator Leads		7.51		0.58	0.43							
771 2M		5772499	Pit 5 Install Ground Fault Recorders		5.25										
772 2M		5772628	Tule - U2 Reinsulate Exciter Poles		2.76		-2.76								
773 2M		5772629	Helms U3 - Replace SW293		1.59		0.12								
774 2M		5772631	Balch 2 - U2 Vent Pipe Replacement		1.73										
775 2M		5772632	K2 - Crane Radial Controls		0.80		31.54								
776 2M		5772633	Kings River PH - Replace CB132		0.60		369.43		29.78						
777 2M		5772634	K2 - Replace Turbine Deck Switchgear		98.88		683.41								
778 2M		5772636	SJ2 - Replace Load/Excess Flow Controller		5.17		0.40								
779 2M		5772637	SJ3 - Replace Load/Excess Flow Controller		5.58		0.43								
780 2M		5772666	South PH Replace Generator Cable		108.09		0.43								
781 2M		5772735	Poe PH U2 Repl Trans Heat Exchangers		2.76		479.83								
782 2M		5772744	Rock Cr PH U1 & U2 Repl WG Seals		1,067.79		181.09						1,000.00	3,000.00	
783 2M		5772823	Rock Cr PH U1 Repl Bearings		-61.43										
784 2M		5772888	Inskip Replace Wicket Gates		0.00										
785 2M		5772924	Electra U1 Jet Brake Refurbish		0.00										
786 2M		5772930	Spaulding 1 PRV Seal Replacement		313.44		2.57								
787 2M		5772934	Tiger Creek U1 and U2 Re-piping to OSPP		15.04		9.21								
788 2M		5773041	Belden PH Replace Break Ring		166.36										
789 2M		5773182	West Point PH - Replace Annunciator		1.44										
790 2M		5773183	Stanislaus Replace Generator Relays		3,122.11		321.06								
791 2M		5773804	Helms - Instl Draft Tube Door Cylinders		27.40		51.04								
792 2M		5773877	Stanislaus PH Repl CW Flowmeters		86.82		105.45								
793 2M		5774081	AG Wishon - U3 Install Gen RTDs		348.01		6.71								
794 2M		5774225	Spring Gap PH - Rpl Generator Cables		41.50		2,734.76								
795 2M		5774227	Pit 5 PH Cap Restoration 17 storm damage		9,764.00										
796 2M		5774635	Drum PH Units Bearing Replacement		609.42		1.85								
797 2M		5774678	Potter Valley U1 Replace Thrust Bearing		39.73		1.22								
798 2M		5774780	Kern - Replace Station Batteries		100.53										
799 2M		5774781	Crane Valley - Replace Station Batteries		16.70										
800 2M		5774782	Haas - Replace Station Batteries		80.66										
801 2M		5774818	San Joaquin 2 - Rplce Station Batteries		57.12										
802 2M		5774880	Helms U3 - Replace SW283		615.02		7.57								
803 2M		5775020	M Tuolumne Canal - Flume Walk Board Impr		927.15										
804 2M		5775080	Belden PRV Draft Tube Install Liner		4,914.94										
805 2M		5775207	Pit 1 Unit 2 Rewind Generator												
806 2M		5775222	Haas - Replace U2 Bearings/Install RTDs												

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
807	2M	5775223	HaaS - Replace Distribution Panels/boards		3.38	71.26	355.65	29.39							
808	2M	5775299	Tule - U2 Install Thrust Bearing		51.80	1.46	2.82	4.55							
809	2M	5775438	Pt 1 Unit 1 Replace Generator Relays			237.33	30.78	185.12	1,310.00						
810	2M	5775790	K2 - Inst Main Bank Discnt/Rpl Bushing		6.73	438.36	2.33								
811	2M	5776405	Baich 2 - Replace Station Batteries		60.81	92.57									
812	2M	5776659	Poe PH U2 Refurbish Thrust Bearings		1,006.17										
813	2M	5777469	Pt 6 U1 Replace Main Bank Transformer		1,891.53	2,586.14	1,873.48	3,497.06	100.00	761.00					
814	2M	5777365	Pt 5 Replace Gov Pump Echelon Controls			423.24	107.25	0.36	202.94						
815	2M	5777366	Hat Creek 1 Replace Transformer Bk-1-ABC												
816	2M	5777367	Pt 5 PH Units 1 & 2 Replace Bus Ducts		1,077.07	15.05									
817	2M	5777368	Pt 5 PH Units 3 & 4 Replace Bus Ducts		886.96		-80.50								
818	2M	5777373	JBB Unit 1 Inst New Bus With Gen Breaker					0.00						250.00	1,136.34
819	2M	5777411	Tiger Creek Bearing RTDs and Bearing Ins		89.21										
820	2M	5777496	Baich Old Hq Install HVP												
821	2M	5777578	Pt 6 U1 CEM Temp Main Bank Transformer		1,108.08										
822	2M	5777931	Caribou 2 US Repl Bearings		226.72	1,421.96	22.08	22.08							
823	2M	5778043	Helms - U1 Repl TSV			20.06	922.73	254.18	451.29	450.00	450.00	1,612.50	1,673.95	1,795.82	
824	2M	5778044	Helms - U2 Repl TSV			155.31	1,016.74	325.85	449.29	450.00	450.00	1,612.50	1,673.95	1,795.82	
825	2M	5778045	Helms - U3 Repl TSV			22.41	870.55	240.41	2,055.81	1,673.95	1,795.82	500.00	10,881.37	798.28	
826	2M	5778049	Kings River - Rpl TSV Cntrl Wtr Strms			112.45	176.97	11.63							
827	2M	5778053	Halsey PH - Replace Bearing (2017)		417.11	422.58									
828	2M	5778054	Spring Gap PH - Generator Rewind			18.54	15.94	18.54	63.00	130.00	800.00	3,500.00	310.00		
829	2M	5778056	Dutch Flat 1 Cooling Water Upgrade			11.76	494.26	66.69							
830	2M	5778058	Spring Gap PH - Replace Air Washer			18.86	27.11	132.94	481.29	20.00					
831	2M	5778059	Spring Gap PH - Gen Vault Water Pump			26.70									
832	2M	5778061	Tiger Creek AB Replace Backup Generator			261.40	579.58	45.07							
833	2M	5778062	Electra PH-Replace Bus Protection Relays			81.68	1,233.76	46.20							
834	2M	5778071	Phoenix PH Install Gen Vault Water Pump			31.29	7.36	53.76							
835	2M	5778073	Drum 1 PH U1-U4 Replace Gen Bkrs			336.54	210.66	424.28	15.00						
836	2M	5778158	Kerckhoff 1 - Inst Backfeed Station Svc			41.13	8.88	4.05							
837	2M	5778161	Kerckhoff Dam - Upgrd Radial Gate Cntrls			19.89	587.29	17.61							
838	2M	5778162	Kings River - Replace Generator Decking			0.00									
839	2M	5778219	Butt Valley PH Refurbish PRV			67.92	3,442.75	2.22							
840	2M	5778265	Cresta PH Repl Surface Cooler CW Pumps			318.74	30.95								
841	2M	5778266	Cresta Tunnel Refurbish Liner			19.65	5.86								
842	2M	5778267	Butt Valley PH Standby Generator			214.34	1,262.97	24.20							
843	2M	5778269	Rock Cr PH U2 Repl TSV Seal and Bushings			835.41	187.76	76.83							
844	2M	5778361	Spaulding 1 Repl PRV Seal B			252.40	3.29								
845	2M	5778441	Helms Replace 230KV Oil-Filled Cables			21.36	63.62	6.67							
846	2M	5778602	SCADA 2018 RTU Life Cycle Replacement		1,455.32	633.90	-78.72								
847	2M	5778603	Coleman PH Replace Thrust Bearing		0.00										
848	2M	5778640	Spaulding 3 Replace Bearing 2017			995.78	57.07								
849	2M	5778645	Caribou 2 Repl LV 25KV Trans Bushings		232.24	295.75									
850	2M	5778698	Narrows - Refurbish Bearing 2017		24.08	819.23									
851	2M	5778900	Tiger Creek U2 Rewind												
852	2M	5778920	Electra U2 Convert to Digital Governor												
853	2M	5778921	Electra U3 Convert to Digital Governor												
854	2M	5778922	Electra U1 Convert to Digital Governor												
855	2M	5778941	Inst Halsey Penstock Pressure Transducer		3.94	0.28									
856	2M	5778970	Pt 6 U1 Inst New Bus With Gen Breaker												
857	2M	5778971	Pt 7 U1 Inst New Bus With Gen Breaker												
858	2M	5778972	Pt 6 U2 Replace Transformer			243.53	37.61	152.51	143.94	112.00	112.00	3,000.00	3,500.00	1,550.00	
859	2M	5778973	Pt 7 Replace Transformer Bank 1												
860	2M	5778974	Pt 7 Replace Transformer Bank 2												
861	2M	5778975	JBB Replace Transformer Bank 1												
862	2M	5778976	JBB Replace Transformer Bank 2												
863	2M	5778997	Drum 5 Station Service Switchgear Replc												
864	2M	5779178	Newcastle TSV Refurbish Seal				68.37	242.90	608.39	30.00					
865	2M	5779202	Helms - Tunnel Instrumentation Upgrade		21.45	109.86									
866	2M	5779210	Kerckhoff 2 - Replace TSV Seal		240.12	67.80									
867	2M	5779211	Kerckhoff 2 - Refurbish TSV Servo		106.20	290.28									
868	2M	5779215	Hat Creek 2 Replace Transformer Bk-1-ABC			140.78	1,088.05	1,088.05	2,135.33						

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
869	2M	577920	Phoenix PH Replace Transfr. Contain Basin											
870	2M	577921	Phoenix PH 17KV Bus Replace PFS	4.65		15.29	-4.65	1.19						
871	2M	577941	Balch 1 - Replace PSV					67.95	167.21	423.49	892.28			
872	2M	577942	Balch 1 Wheel Pit Liner					15.18	122.09	260.87	728.62			
873	2M	577943	Belden PH Refurbish TSV					117.42	716.16	2,240.00				
874	2M	577944	Cresta Tunnel Instal Sluice Vlv. Operator			3.44		0.82	100.00					
875	2M	577945	Cresta Vh Refurb Sluice Valve			6.62		4.97						
876	2M	577946	Haas U1 Communic/Annunc-Device43 Swtchs			13.34		21.23	427.85	93.31		300.00		
877	2M	577947	Haas U1 Replace TSV Cntrl Wtr Strainers					119.83	188.40	47.40				
878	2M	577948	Haas U2 Communic/Annunc-Device43 Swtchs					28.39	332.32	149.10				
879	2M	577949	Haas U2 Replace TSV Cntrl Wtr Strainers					84.46	588.66	112.18				
880	2M	577950	Helms U3 Replace TSV Seats					4.07	167.00	47.40				
881	2M	577951	Helms U3 Rotor Demo					14.23		691.10				
882	2M	577952	K2 - Replace Governor							761.00				
883	2M	577953	K2 - Turbine Overhaul (Wicket gates and Kings River - Replace Brgs/Instal RTDs							100.00				
884	2M	577954	Kings River - Upgrade Cooling Water Syst							250.00				
885	2M	577955	Kings River Instal Turbine SW Strainer							250.00				
886	2M	577956	Poe U1 & U2 Rep TSV Cylinders		145.45			7.44						
887	2M	577957	Toadown PH Inst Elec Stoplog Operator											
888	2M	577958	Poe PH Trxfmr Repl Bank 1											
889	2M	577959	Stanislaus Replace TWD (1)											
890	2M	577960	Salt Springs U1 Pentock bypass pipe repl											
891	2M	577961	Helise Reinsulate Field Poles											
892	2M	577962	Helise Reinsulate Field Poles											
893	2M	578047	PH 1 Valvehouse Replace 480V Circuit											
894	2M	578048	SCADA 2019 RTU Life Cycle Replacement											
895	2M	578049	SCADA 2020 RTU Life Cycle Replacement											
896	2M	578050	SCADA 2021 RTU Life Cycle Replacement											
897	2M	578051	SCADA 2022 RTU Life Cycle Replacement											
898	2M	578052	Drum Hydro SCADA Radio Replacement											
899	2M	578053	Mother Lode Hydro SCADA Radio Replace											
900	2M	578054	PH 5 U4 Replace Turbine Guide Bearing											
901	2M	578055	Shasta Hydro SCADA Radio Replacement											
902	2M	578056	PH 5 Unit 4 Replace WGS, PFS & Seal Ring											
903	2M	578057	Balch 2 - Bank 3 Replacement											
904	2M	578058	Balch 2 - U2 Repl Transfrmr Mgmt Relays											
905	2M	578059	Balch 2 - U3 Repl Transfrmr Mgmt Relays											
906	2M	578060	Haas - U1 Turbine Vapor Mist Recovery Sys											
907	2M	578061	Haas - U2 Turbine Vapor Mist Recovery Sys											
908	2M	578062	Helms - Install Cycling Instrumentation											
909	2M	578063	Helms - U2 InstThrst Bracket LoadCells											
910	2M	578064	Helms - Replace Sump Level Controls											
911	2M	578065	Helms - U1 Replace Turbine Gage Board											
912	2M	578066	Helms - U2 Replace Turbine Gage Board											
913	2M	578067	Helms - U3 Replace Turbine Gage Board											
914	2M	578068	Helms - U1 Wicket Gate Servomotor Refurb											
915	2M	578069	Helms - Draft Tube Hinge/Faloring Plate											
916	2M	578070	Kings River - Repl Transfrmr Mgmt Relays											
917	2M	578071	Rock Creek U1 & U2 PRV Vibration Sensors											
918	2M	578072	TC U1 Replace Needles & Deflectors											
919	2M	578073	TC U2 Replace Needles & Deflectors											
920	2M	578074	Kings River Replace TSV Bypass Valve											
921	2M	578075	Haasey TSV Actuator Replacement											
922	2M	578116	Cresta PH U2 Rewind											
923	2M	578117	JBB Unit 2 Inst New Bus with Gen Breaker											
924	2M	578128	Belden PH Instal Thrust Bearing 2018											
925	2M	578138	Kings/Crane Hydro SCADA Radio Replcmnt											
926	2M	578139	Helms Hydro SCADA Radio Replacement											
927	2M	578138	Hat Creek 2 PH Replace Excitation System											
928	2M	578139	Hat Creek 1 PH Replace Excitation System											
929	2M	578154	PH 6 PH Replace BOP Annunciators											
930	2M	578154	PH 6 Replace Station Service 1 Transfrmr											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
931	2M	5781542	Pit 6 Replace Station Service 2 Transfmr				123.94	764.14	100.00						
932	2M	5781543	Pit 7 Replace Station Service 1 Transfmr				1.70	14.38	150.00						750.00
933	2M	5781544	Pit 7 Replace Station Service 2 Transfmr				1.66	13.38	150.00						750.00
934	2M	5781545	JBB Replace Station Service 1 Transfmr					0.00				750.00			
935	2M	5781546	JBB Replace Station Service 2 Transfmr									150.00			
936	2M	5781551	Pit 6 U1 Repl Generator Mgmt Relay NERC				1,219.13	98.00							750.00
937	2M	5781552	Pit 4 PH Replace BOP Annunciator							70.00					
938	2M	5781553	Pit 4 PH Isolate 43 Test Switch							90.00					
939	2M	5781741	Poe PH U1 Repl Gen Fan Blades				138.61	21.44							
940	2M	5781759	Tiger Creek CEM Spare Bearings				1.18	-1.99							
941	2M	5781859	Helms - Refurbish CB280				595.36	448.88							
942	2M	5781959	Pit 6 U2 Inst New Bus With Gen Breaker					2.09							
943	2M	5782001	Balch 2 - U2 TSV Dedicated Control Water					9.06			1,100.00				
944	2M	5782060	Stanislaus PH Switchyard AC Pavement				87.87	-96.93							
945	2M	5782078	Helms - Replace Station Batteries				488.21	171.65							
946	2M	5782088	Pit 3 U2 Repl Generator Mgmt Relays NERC				129.83	558.48		40.00					
947	2M	5782089	Pit 3 U1 Repl Bearing Temperature Relay								60.00		140.00		
948	2M	5782090	JBB Unit 1 Replace Speed Switch												
949	2M	5782091	JBB Unit 2 Replace Speed Switch												
950	2M	5782112	Hamilton Br PH Repl Bank 2 U Bushings				329.41	4.91							
951	2M	5782146	Kings River - Replace Sump Valves				78.74	0.04							
952	2M	5782147	Kings River - Refurb Wicket Gate Servos				22.16	1.35							
953	2M	5782603	Poe PH Replace Hatches				37.35	36.97							
954	2M	5782983	Caribou 2 PH-AF Mitigation 208V Breakers				1.08	13.88							
955	2M	5782985	Cresta PH U1 Install Bearing Monitoring												100.00
956	2M	5782986	Cresta PH U2 Install Bearing Monitoring												100.00
957	2M	5782992	Lwr Feather Hydro RTU Radio Replacement									200.00			
958	2M	5782993	Upper Feather Hydro RTU Radio Replace												200.00
959	2M	5782994	Porter Wly Hydro RTU Radio Replacement												200.00
960	2M	5782996	Poe PH Replace Station Service Trans No1												
961	2M	5783003	Kerckhoff 2 Generator Prtl Dschrg Monitr				3.75								600.00
962	2M	5783073	Salt Springs 2 Cooling Coils & RTD Repl				22.41	22.11							
963	2M	5783125	Helms Replace 13.8KV Breakers				16.75	166.24				1,240.00			
964	2M	5783126	Helms Replace Ground Detection System												
965	2M	5783127	Helms U2 Repl Thrust Tub Door Seal												
966	2M	5783128	Helms U2 Replace Thrust Bearing LoadCell												
967	2M	5783129	AG Wishon Replace Station Batteries												
968	2M	5783130	Balch 2 Repl 22" Needle Vlv Actuat & Wir												
969	2M	5783131	Balch 2 U2 Governor Mechanical Upgrades				7.58	0.59							
970	2M	5783132	Balch 2 U2 Install Duplex Strainers				153.68	26.61							
971	2M	5783133	Balch 2 U2 New Design 5&12 Way Valve				-0.00	42.81							
972	2M	5783134	Balch 2 U3 Governor Mechanical Upgrades												
973	2M	5783137	K2 - Repl Transformer Mgmt Relays				119.51	-119.51							
974	2M	5783158	K2 Replace Station Batteries				12.28	331.95							
975	2M	5783159	Kerckhoff 2 Install Air Monitoring				2.94	67.10							
976	2M	5783161	Kings River Replace Battery Chargers												
977	2M	5783170	Poe PH U2 Repl Gen Rotor Brake Ring												
978	2M	5783238	Drum 2 US Replace Generator Relays				390.35	485.79							
979	2M	5783292	Salt Springs 2 Repl Thrust Bearing Shoes				1.84	4.37							
980	2M	5783519	Spa1 PRV Rmv Prstsk Depcy CW Pumps				243.15	1.77							
981	2M	5783841	Helms - U2 Repl Turbine Equalizing Line												
982	2M	5784139	Pit 6 PH Replace Bearing Temp Relays												
983	2M	5784298	Wise 1 Replace TSV Seal												
984	2M	5784299	Spaulding 1 Replace Governor Servo				113.46	28.88							
985	2M	5784682	Bucks Cr Repl GSU XFMR 251T Relay NERC				423.21	3.67							
986	2M	5785015	Helms U2 TSV U/S Seal Secondary Source					1,592.77							
987	2M	5785092	Pit 6 U2 Repl Generator Relays/GE-SFR489				439.87	81.93							
988	2M	5785168	Camp 1 Office Repl Standby Generator				68.11	0.71							
989	2M	5785173	Pit 7 U2 Inst New Bus With Gen Breaker				11.24	1.03							
990	2M	5785298	Caribou 1 Bank 8 Repl Spare XFMR Bushing				28.90	1,128.37							
991	2M	5785758	Electra U2 Gen Relays Replacement												1,129.30
992	2M	5785782	Balch 2 U3 Install Duplex Strainers				61.98	49.40							

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
993	2M	5785793	Balch 2 U2 Replace Bearing Cooling Coil				5.14	62.41	3.70	11.06	283.09				
994	2M	5785794	Balch 2 U3 Replace Bearing Cooling Coil				9.63	100.17	5.79	12.21	282.24				
995	2M	5785795	Haas U1 Replace Bearing Cooling Coil				11.52	121.88	4.26	419.79	75.00				
996	2M	5785796	Haas U2 Replace Bearing Cooling Coil				51.22	32.77	304.44	100.85	1.81				
997	2M	5785818	Halsey PH Replace AC & DC Panel				413.52	33.05							
998	2M	5785860	Balch 2 Black Start High Lift Conversion				67.98	171.30	144.15						
999	2M	5785861	Haas Black Start High Lift Conversion				2.20	0.20	173.10						
1000	2M	5786424	Bucks C Valvehouse Battery Replacement				5.78	309.92							
1001	2M	5786680	Pit 6 Install Instrumentation Phase 1				39.83	2.87							
1002	2M	5786718	Shasta PM Trailer PTP Radio Upgrade				9.72	4.03	75.00						
1003	2M	5786879	Helms - U1 Repl Turbine Equalizing Line				0.00	0.00							
1004	2M	5786880	Helms - U3 Repl Turbine Equalizing Line				0.00	0.00			500.00				
1005	2M	5787218	Helms - U3 Repl TPC Rupture Disks				278.68	743.63							
1006	2M	5787500	Poe PH SCADA Device Integration				215.93	272.67							
1007	2M	5787578	Poe PH U2 Replace PRV Seats				106.24	73.64							
1008	2M	5787718	Helms - U3 Replace Turbine Shaft Seal				4.46	504.39	82.21						
1009	2M	5787959	Helms - Replace X1 X2 Bushings					1,377.55			2,000.00				
1010	2M	5787971	SCADA 2023 RTU Life Cycle Replacement												
1011	2M	5787972	SCADA 2024 RTU Life Cycle Replacement												
1012	2M	5788224	Helms Repl Elevator Shaft Control Wiring					0.00	240.00	500.00					
1013	2M	5788225	Helms Replace HPU Instrumentation					40.27	107.83						
1014	2M	5788226	Haas U1 Rotor Pole Refurb					71.11	1,186.26	1,648.75	632.10				
1015	2M	5788228	Balch 2 Bank 2 Replacement					91.31	3.29		398.85	130.12	2,811.36		
1016	2M	5788231	Electra Bank 3 Alt Sta Svc Inst Disc SW					9.67	9.75	225.00	250.00				
1017	2M	5788232	MT Reba (ML) Replace Generator				0.68	151.94	364.53	15.00					
1018	2M	5788235	Spring Gap Replace Batteries					841.43							
1019	2M	5788237	Stanislaus Repl SS Panel, SWGR, Breakers					19.70	529.97	2,000.00					
1020	2M	5788238	Caribou 1 Replace Bank 8A-B-C-SP					144.18	2,323.86						
1021	2M	5788239	Burt Valley - Refurb Spare Transformer					2.11							
1022	2M	5788242	Rock Cr U2 Repl Upper Thrust Bracket						300.00						
1023	2M	5788247	Poe GSU Transformer Repl Bank 2												
1024	2M	5788249	Caribou 2 PH Replace Annunciators												
1025	2M	5788541	AM: Centrifuge - Capital				381.96	-0.92							
1026	2M	5789058	Helms - U2 Repl Governor Air Compressor					27.84							
1027	2M	5789147	Helms - U1 Replace Turbine Shaft Seal					0.57	381.69						
1028	2M	5789321	Helms - U1 Repl Governor Air Compressor					23.45							
1029	2M	5789323	K2 - Replace TSV Strainers					100.08	301.37						
1030	2M	5789324	K2 Replace Thrust Bearing RTDs					39.73	252.55						
1031	2M	5789339	Kings River Replace Annunciators												
1032	2M	5789538	Dutch Flat VH Standby Generator					52.93	10.00						
1033	2M	5789598	West Point PRV Controls Upgrade					39.25	302.45	790.00					
1034	2M	5789720	Salt Springs Rplc Transformer Bushings					196.76							
1035	2M	5791359	Haas U2 Rotor Pole Refurb					1,385.32	3,272.00	477.00					
1036	2M	5792369	West Point Rewind Generator					11.33							
1037	2M	5792459	Pit 3 Replace GSU Transformer Bushings						510.00						
1038	2M	5792577	Pit 3 PH Replace Gen CTS & Bus SWS						200.00						
1039	2M	5792578	Pit 6 Install Inverter for HPOL's												
1040	2M	5792579	JBB Install Inverter for HPOL's												
1041	2M	5792580	Volta 1 Repl Metal Clad Switchgear												
1042	2M	5792581	Coleman Inst Station Service Disconnect												
1043	2M	5792671	Burt Valley PH Replace GSU Bank & Spare												
1044	2M	5792690	West Point Upgrade Valve House HPU												
1045	2M	5792691	Stanislaus Replace TSV Control						400.00	900.00					
1046	2M	5792719	Dutch Flat Replace Brush Rigging						325.00	700.00	50.00				
1047	2M	5792722	Lake Tableaud Replace Wheel Gate Controls						75.00	200.00					
1048	2M	5792723	Spring Gap Replace Generator PTHs						200.00	50.00					
1049	2M	5792734	Balch 1 Replace Stator Lower Controls						75.00	150.00					
1050	2M	5792735	Drum 2 US Repl CCVT						20.00	50.00	200.00				
1051	2M	5792737	Halsey PH Sump Improvement						100.00	100.00					
1052	2M	5792740	Haas Replace PSV Seat						50.00	150.00					
1053	2M	5792741	Kerhoff 2 PH Replace ISO Meters						90.00	86.00					
1054	2M	5792742	Haas Install ISO Phase Maint Platform						50.00	150.00					

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1055	2M	5792750	Helms Upgrd De-Mineralized Water Sys					150.00							
1056	2M	5792751	Balch - Replace Sandtrap Valves				7.90	250.00		100.00	500.00				
1057	2M	5792761	Poe U2 Repl WG Servo Bushings and Seals					600.00							
1058	2M	5792764	Poe PH Install Flow Meters					300.00							
1059	2M	5792765	Poe PH Replace Bank 2 Lighting Arrestors				0.72	100.00							
1060	2M	5792766	Butt Valley TSV/Mech Overspeed Upgrade					4,000.00		4,000.00	7,000.00	7,000.00	7,000.00	250.00	
1061	2M	5792881	SCADA Powerhouse Automation					100.00							
1062	2M	5792922	TULE REPLACE GE TYPE U BUSHING					100.00							
1063	2M	5792922	Caribou 2 Install Inverters for HPOIL'S					200.00							
1064	2M	5792938	Kings River G5U Bank Replacement					1,800.00							
1065	2M	5792939	Balch 2 U2 Reinsulate Field Poles					500.00							
1066	2M	5792941	Kerckhoff 2 Replace CB 172					250.00						2,000.00	
1067	2M	5792942	AGWishon - Repl U2 Runner					1,000.00						750.00	
1068	2M	5792943	Kings River Rotor Pole Refurb					100.00						600.00	
1069	2M	5792944	Helms U1 Replace Turbine Equalizing Line					500.00						400.00	
1070	2M	5792947	Helms Liquid Rheostat A					100.00							
1071	2M	5792950	Kerckhoff 2 - Mitigate Arc Flash 480v					300.00							
1072	2M	5792953	San Joaquin 2 PH Replace ISO Meters					95.00							
1073	2M	5792954	Crane Valley PH Replace ISO Meters					146.00							
1074	2M	5792955	San Joaquin 3 PH Replace ISO Meter					129.00							
1075	2M	5792956	Balch 1 Repl Rocktrap Drain Valve & Line					100.00							
1076	2M	5792957	Helms U1 Repl Thrust Tub Door Seal					75.00							
1077	2M	5793002	Helms U3 Repl Thrust Tub Door Seal					75.00							
1078	2M	5793133	AM Replace Ohio Brass Insulators											400.00	300.00
1079	2M	5793134	AM: Replace XFMR Sudden Pressure Relays											100.00	200.00
1080	2M	5793558	Drum Siphon Trash Rack Improvements					200.00						2,000.00	
1081	2M	5793569	Tiger Creek Bellows Joint Replacement					900.00		250.00				50.00	
1082	2M	5793574	Spaulding Dam Install Emerg Generator					150.00						700.00	
1083	2M	5793575	Stanislaus Refurbish TWD (2)					750.00							
1084	2M	5793576	Stanislaus Refurbish TWD (3)					750.00							
1085	2M	5793580	Drum PHS 1 & 2 - Install Smoke Detection					200.00						300.00	
1086	2M	5793582	Newcastle Cooling Water Flow Meters					150.00						350.00	
1087	2M	5793586	West Point Replace Field Breaker					200.00						300.00	
1088	2M	5793592	Spaulding 1 Rewind											300.00	
1089	2M	5793605	Dutch Flat Refurbish Servo Rod					250.00							
1090	2M	5793616	Alta Replace Bearings Temp. Protection					100.00							
1091	2M	5793621	Stan PH Repl Thrust Bearing Cooling Coil					50.00							
1092	2M	5793622	Wise PH Semi-Automate Dispatch					25.00							
1093	2M	5794125	Helms PH U2 Repl TSV Mechanical Locks						2,062.24						
1094	2M	5794158	Hat Creek 2 PH Repl Pwr Potential Xfmr				0.80	23.09							
1095	2M	5794991	Cresta PH Automation					115.08							
1096	2M	5795443	SCADA 2025 RTU Life Cycle Replacement												
1097	2M	5795444	SCADA 2026 RTU Life Cycle Replacement												
1098	2M		ZM Total	109,942.05	115,183.59	96,997.28	81,416.92	94,879.98	95,127.98	69,239.61	84,460.14	93,851.68	134,430.43	2,229.13	118,104.57 Sum of Lines 377-1097
1099	2M	5511186	DeSable Inst/Repl Rsrvrs, Dams & Wtrwys	26.77	102.02	40.40	320.51	186.64	100.00	104.61	112.93	125.28	142.68	166.71	
1100	2N	5511187	Shasta Inst/Repl Rsrvrs, Dams & Wtrwys	221.04	2.97	48.14			104.61	104.61	112.93	125.28	142.68	166.71	
1101	2N	5511188	Drum Inst/Repl Rsrvrs, Dams & Wtrwys	413.69	126.63	102.04	205.11	242.37	50.00	52.31	56.46	62.64	71.34	83.35	
1102	2N	5511189	MIcode Inst/Repl Rsrvrs, Dams & Wtrwys	47.44	82.10			1.54	50.00	52.31	56.46	62.64	71.34	83.35	
1103	2N	5537959	Inskip Remove Diversion Dam				216.91	-200.51							
1104	2N	5538460	Coleman Decommission Asbury Pipe				803.66								
1105	2N	5718980	Philadelphia Canal-Flume Shs Liner	0.15											
1106	2N	5720573	Phoenix Flume Sheet Liner	1.10											
1107	2N	5720633	Dam Remediation - Capital												
1108	2N	5720733	PT 6 Replace Trash Rake				354.66								
1109	2N	5720745	DeSable Install Butte Siphon Roll-out				6.95								
1110	2N	5720818	Crane Valley System Gunite Ditches	36.02	84.88	10.17		11.20							
1111	2N	5720878	SJA - Ditch L Mid way Flume Fiberglass	-0.57											
1112	2N	5720880	Tule Repl Wood Stave Pipe	423.09	3,959.49	-112.84									
1113	2N	5724404	PV Replace Lower Woodstave Penstock	2,369.13	0.67										
1114	2N	5724406	Potter Valley Scott Dam Needle Valve Sys												
1115	2N	5729358	PT 1 Replace Trash Rake and Rack	1,542.90	150.14	36.26		-0.00							
1116	2N														

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1117 2N		5729550	Electra - Modify Diversion Piping	1,021.24	59.21										
1118 2N		5729601	Main Tuolumne Canal-Install Shotcrete Liner	-0.02											
1119 2N		5729667	Drum Canal YB 137 - New Gate Controller	26.69											
1120 2N		5729919	South Yuba Canal - Big Tunnel Spill	985.86	-1.64										
1121 2N		5732826	Drum 2015 O&M Access Improvements	98.77											
1122 2N		5733249	Pit 3 Dam Replace Dam Gates	8.11											
1123 2N		5737520	Volta1 Replace Intake Gate Operator	1.28											
1124 2N		5739319	Salt Springs 2 Sandtrap Ops Mods	-359.99											
1125 2N		5739326	Coleman Decommission Asbury Pipe	182.24											
1126 2N		5739327	Coleman Inst. Tailrace Barrier Trashrake	123.61	56.96										
1127 2N		5739642	Helms - Replace T1 Gate Controls	311.65	141.34	178.60									
1128 2N		5739728	Balch 1 - Replace Penstock PSV Seats	-36.34	7,259.45	625.41									
1129 2N		5741522	Krause II Flume Stabilization	18.88											
1130 2N		5748399	Stanislaus Sand Bar Dam Bypass Pipe	5.64											
1131 2N		5748600	DeSaba U Cent Canal Install Gunite				-3.78								
1132 2N		5745708	Pit 5 U1 Repair Stoplog Slots & Gates	-3.64											
1133 2N		5747178	Bucks Rebuild Milk Ranch Div 3	188.44	134.75	115.83									
1134 2N		5747198	Crestia Dam Repl Res Elev Stilling	53.43	72.35	301.35			742.00						
1135 2N		5747199	Cresta PH U2 Install Penstock X Piping	124.63	515.64	46.71									
1136 2N		5747201	Cubertson Dam Reface	841.54	89.62										
1137 2N		5747204	DeSaba Install Butte Canal Lining		111.24				0.00				200.00	200.00	
1138 2N		5747263	Lake Valley Shotcrete									800.00			
1139 2N		5747301	SI Ditch 3 / Browns Ditch Flume Coating												
1140 2N		5747826	Butt Valley PSV Aux Operating Equip	1.38	3.12				1,742.32						
1141 2N		5748118	YB50 and YB56 Actuator Replacement	13.32											
1142 2N		5748338	LS Mio Canal Remediate 55+00 Slide		6.83										
1143 2N		5748658	South Yuba Abandoned Treated Lumber	4.61											
1144 2N		5748841	Kerckhoff 1 - Inst Tailrace Gate	20.75	22.38										
1145 2N		5749361	Noite Pond Spillway Improvements	12.05	46.11										
1146 2N		5750239	Pit 1 Fall R Rp Weir & Gate Strct Capita	2,461.37											
1147 2N		5750802	South Canal Shotcrete 2013												
1148 2N		5752119	Bear River Canal 2015	-143.21											
1149 2N		5752159	Drum - YB 74 Flume - Design and Const	0.33											
1150 2N		5752282	Tiger Creek Canal RTU/Flow Monitor												
1151 2N		5752285	Bear/Wise/South Flow Monitor/RTU	-0.06											
1152 2N		5752288	Towle - Remote Operate YB-117 Gate/Valve	-0.46											
1153 2N		5752348	Blue Lake Dam SCADA Improvements	-0.16											
1154 2N		5752349	Kidd Lake Aux. Dam SCADA Improvement	-0.23											
1155 2N		5752351	BRC Rock Creek S. Aux Dam SCADA Improv.	4.02											
1156 2N		5752354	Central Area Pre 1940 Penstock Protectio	6.07											
1157 2N		5752518	San Joaquin Ditch 2 - Re-line Flume1												
1158 2N		5752778	Rock Cr PH Repl/Stopping Hoist	476.31											
1159 2N		5753359	Helms - T2 & Bypass Tunnel Lining	250.08	1,866.29	2,531.15									
1160 2N		5753478	Lake Valley (Drum) LLO Repl Pipe	90.91	90.79										
1161 2N		5753578	Kerckhoff Dam - Repl LLO Gate	6,694.33	555.17										
1162 2N		5754617	BRC - Fiddler Green 2014 Conveyance Work	99.08	400.56										
1163 2N		5754661	Lower Drum Canal Walkways	120.86											
1164 2N		5754663	Lower Bear Res-60' Cone Valve Act Repl	2.83	-19.58										
1165 2N		5754667	Drum - South Canal YB259 Diversion	4.19	-56.84										
1166 2N		5754668	Spaulding Dam 1 Tunnel Valves Upgrade	-13.05											
1167 2N		5754669	Drum - Lake Valley 2015 Conveyance Work	16.74											
1168 2N		5754677	Drum Towle Bridges 31-33 Culvert Install	0.88											
1169 2N		5754699	Drum - Lwr Lindsey - Shotcrete Spill Chan												
1170 2N		5754701	Wise Canal 2015 Conveyance Work	1.70											
1171 2N		5754711	Wise FB Replace Intake Gate Operator	244.20	394.89	582.52									
1172 2N		5754715	Tiger Ck. Canal - Install 60' - 24" CMP	17.45											
1173 2N		5754724	Tiger Ck FBay Reake-Install Platforms	5.76	-78.08										
1174 2N		5754771	South Area Pre 1940 Penstock Protection	0.12	0.13	0.14									
1175 2N		5754846	Cresta Dam Replace LPG Tank												
1176 2N		5754848	Bucks Pre 1940 Penstock Protection	987.53	414.72	-11.24									
1177 2N		5754851	Hamilton Br Refurbish Diversion Dam	39.18	0.70	4.81									
1178 2N		5754853	Poe Dam Replace Gate 1 Controls	16.95											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1179	2N	5754959	South PH Install Excess Flow Protection	15.88											
1180	2N	5754963	Pt 3 Tailrace Procure New Stoplog Gates	2.32											
1181	2N	5754966	JBB McCloud IFR Valve Replacement	0.95		-12.93									
1182	2N	5754998	Hat 2 Automation of Baum Lake Reg Gate	13.09											
1183	2N	5755068	Halsey Forebay 2 Dam SCADA Improvements	0.31											
1184	2N	5757119	Potter Valley Replace PSVs	289.67		81.08	5.79								
1185	2N	5757566	Pt 3 PH Tailrace Slot & Conc. Replace	409.52		2,200.37	2,746.13	1,030.95	11.54						
1186	2N	5757904	Browns Dam - Install IFR/Repl Dam Sec	32.76		26.50	15.03	10.81	17.43						
1187	2N	5758128	Helms - Grout Tunnel 2 Plug	427.06		5,626.98	491.91	4.18							
1188	2N	5758658	Volta 1 Install Excess Flow Protection	54.88		-105.98									
1189	2N	5758762	Potter Valley Presk Cathodic Protection	62.02											
1190	2N	5759519	Halsey Forebay Spill Channel Rehab												
1191	2N	5759923	Hendricks Canal Install Encoders	672.24		-19.83									
1192	2N	5760013	Pt 4 Dam Remove Ship Ladder	9.79			21.50								
1193	2N	5760096	Bear River Canal 2016 Improvements	2,518.29		49.63	-0.99								
1194	2N	5760105	Helms - K119 & K115 Staff Plates	85.77		31.17	42.03	1.27							
1195	2N	5760118	Bowman-Spaulding Spill Gate Operator			-3.00	-3.00								
1196	2N	5760121	BRC Y856 Install Cross Gate	163.75		534.23	18.07	0.84							
1197	2N	5760123	Chili Bar Gallery Drains	-12.74											
1198	2N	5760126	Drum - Carr Lake replace intake Gate	0.06		-0.75									
1199	2N	5760127	Drum - Rock Creek Dam-62 Seepage Drains	0.20		0.21	-2.87								
1200	2N	5760133	Drum PS#3 Intake Gate Operator Refurb	8.65											
1201	2N	5760134	Drum Y873 Trash Rack Access	33.87		70.37	-4.72								
1202	2N	5760135	Lower Rock Dam (Drum) Intake Replacement	1.09		-2.31									
1203	2N	5760151	South Yuba Penstock Cathodic Protection	0.06		-0.87									
1204	2N	5760155	Spaulding 3 Repl Header box radial gate	217.18											
1205	2N	5760156	Spaulding Dam Face Capital Patch	-0.02					0.00						
1206	2N	5760158	Stan Forebay - Install Liner & Joints	1.26											
1207	2N	5760161	Towle Canal 2016 Improvements	140.04											
1208	2N	5760162	Upper Feely Replace Rack, Intake, & Gate	56.73		98.90	4.98								
1209	2N	5760163	Upper Rock Lake Dam LLO Rebuild	3.08		2.08	-1.28								
1210	2N	5760168	Cresta Replace Stoplog Hoist	132.23		296.77	1,384.82	312.66	227.94						
1211	2N	5760169	Cresta PSV Aux Equip Replace/Rebuild			97.63	155.93	49.62	33.46	14.50	15.00	80.00	250.00	500.00	
1212	2N	5760173	Desabla PH - Repl Bypass Guard Valve	361.81											
1213	2N	5760174	DeS-Hend Canal Improve Tunnel Entrance	50.39		684.18	45.98	31.34							
1214	2N	5760176	Butte Canal Bank Stabilization	173.30		102.23									
1215	2N	5760179	Line Saddle U W/O Canal Retain Wall	632.12		6.40									
1216	2N	5760180	LS Mio Canal Install Lining 1/1 & 1/2	29.55											
1217	2N	5760182	LS U Mio Canal Install Lining 0/3 & 0/4	809.93											
1218	2N	5760185	Line Saddle Access Rd Bridge (ZMM)	424.43		223.56									
1219	2N	5760189	Rock Cr Replace VH Batteries	0.67		43.07	19.24								
1220	2N	5760190	RCC Dam Repl Radial Gate Motors	35.97		4.99		-61.59							
1221	2N	5760193	PV Van Arsdale Repl Air Compressor	316.42		0.58	0.13	0.10	0.16						
1222	2N	5760219	Easement Mitigation			1.69									
1223	2N	5760238	Tiger Cr Cnl-Install Flume Liner 2015/16	2,211.60											
1224	2N	5760240	Tiger Creek Dam Regulating Valve	113.38		568.99	43.82								
1225	2N	5760266	Deer Creek - SY Tunnel Lagging Replc	329.16											
1226	2N	5760444	Stan Gauging Stn - S-52 (Kennedy Meadows)	162.50		-0.07									
1227	2N	5760445	Mokel Gauging Stn - M-10 (Cole Crk Div)	150.50											
1228	2N	5760446	Mokel Gauging Stn - M-11 (Salt Spr Camp)	163.40											
1229	2N	5760447	Mokel Gauging Stn - M-59 (TC Abay Dam)	6.04											
1230	2N	5760448	Stan Gauging Stn - S-61 (Strawberry)	53.18											
1231	2N	5760623	BRC Bentaylor Spill Gate Rpl&Spill Imp	129.06		3.40	0.52								
1232	2N	5760624	BRC Limekiln Spill Gate Rpl&Spillway Imp			115.76	128.91	3.26							
1233	2N	5760625	BRC Pinercroft Spill Gate&Spillway Imp	89.09		8.39									
1234	2N	5760626	BRC Plumtree Spill Gate Rpl&Spillway Imp	106.98		175.41	25.95	-308.35	0.00						
1235	2N	5760644	Coleman Install Canal Gate	81.63		0.74									
1236	2N	5760670	Drum Atterbay Log Booms			28.83	176.08								
1237	2N	5760679	Dutch Flat 1 Trash Rake Install PLC Cntrl	20.41		1.00									
1238	2N	5760683	Halsey PSV Actuator Replacement	161.76											
1239	2N	5760696	Lake Valley 2016 Improvements												
1240	2N	5760698	N. Fork Willow Creek Dam Replace Gates			28.90	2.02	1.49	2.41						

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1241 2N		5760703	Oak Flat Intake Grizzly	241.32		-241.32									
1242 2N		5760727	South PH Intake Trash Rake Replacement	-0.00											
1243 2N		5760734	Spaulding 3 Repl Pstk Guard & Air Valves	61.38											
1244 2N		5760741	Tiger Creek Afterbay Trash Rack Apron	8.48		5.63									
1245 2N		5760860	South Yuba Canal 2016 Improvements	1,583.35											
1246 2N		5761118	Pit 7 Radial Gate Chain Replacement	414.78											
1247 2N		5761120	Pit 4 Replace PSV Valve Controls	219.85		291.13		195.52	1,721.39						
1248 2N		5761121	Pit 1 Valvehouse Repl AC Trnsfr Switch						20.29						
1249 2N		5761239	Pit 6 Radial Gates Replace Hoist Chains	443.49											
1250 2N		5761246	Cow Creek Pnsc Support Replacement	15.64		-15.64									
1251 2N		5761262	Kerckhoff Dam - Repl Steel Log Boom	126.51		133.60	-1.80								
1252 2N		5761263	San Joaquin 2 - Install Mech Trash Rake	25.06		41.83	5.17	3.82	6.16						
1253 2N		5761959	Chili Bar Repl LLO Gate Replacement	2,318.64		92.52	-71.45								
1254 2N		5762183	Inskip Division Dam & Bank Improvements	2,067.48		-21.12									
1255 2N		5762422	Stan Strawberry Dam - Rpr Concrete (C)	1.38		-1.51									
1256 2N		5762606	Ham Br Indian Ole Dam Inst Cutoff Wall	45.73		119.82	39.95	-484.77							
1257 2N		5762807	Emergent Projects - Capital												
1258 2N		5764004	Relief Dam (Stan) LLO Bevel Gear Repl		100.15	92.10	37.47	9.34	113.66	658.06	393.90	2,987.42	3,793.44	3,086.82	
1259 2N		5764660	Volta 1 Penstock Pipe Segment Rplcmnt	-1.07					1.20						
1260 2N		5764718	Wise Canal 2016 Improvements	2,802.21		12.19									
1261 2N		5764738	RCC Dams Replace Walkway Decking	7.25											
1262 2N		5765835	Pit 7 Dam Lining Replace Expansion Joint	984.85		7.67									
1263 2N		5765836	Potter Valley Bifurcation Remediation	136.82											
1264 2N		5766038	JBB Repl Willow Crk Siphon Drain Valve	42.74		34.51									
1265 2N		5766145	Pit 1 LLO & Replace Radial Gate Retrofit	121.30		104.81	258.62	5,962.01	2,163.65						
1266 2N		5766147	Battle Creek Flow Monitoring Upgrades			45.14	3.02		39.10						
1267 2N		5766155	N Battle Crk Feeder Dam Replace Ladder	73.71		-73.71									
1268 2N		5766220	Inskip CB112 Trail Access Improvements	0.00											
1269 2N		5766239	Bear River Canal 2017 Improvements	271.64		3,608.38	32.79								
1270 2N		5766240	Wise Canal 2017 Improvements	213.48		1,330.44	42.29								
1271 2N		5766245	YB 93 Automate Towle Diversion	10.00		1,776	13.86	228.24	23.79	124.90					
1272 2N		5766246	Tiger Creek Canal Trash Rack Improvement	130.91		409.89	1.65								
1273 2N		5766247	Drum Canal 2018 Improvements	1.92		-33.53									
1274 2N		5766250	BRC-Relocate Alarm Building 1 Infrastructure	86.74		1.22									
1275 2N		5766390	K Dam - Instl Remote Op Fish Rel Valve	43.10		46.92	61.04	301.44	962.57	19.53					
1276 2N		5766760	South Yuba Canal 2016 - Flume Sheets	294.83											
1277 2N		5766761	BRC YB74 Flume Repair Phase 3	168.88											
1278 2N		5766872	Pit 1 McArthur Levee Inst Seepage Embkmt	58.54		298.14	7.37								
1279 2N		5766921	Spaulding LLO Seepage Weir Improvements	185.58		1.57									
1280 2N		5767259	Phoenix Install Flume Sheet Liner 2016	313.77											
1281 2N		5767607	DeSable PH - Repl Bypass Valve	129.93											
1282 2N		5767608	Coleman Repl Penstk Cathodic Protection	71.49		51.15	53.82	-175.53	-0.93						
1283 2N		5767724	Stan Strawberry Dam - Rpr Concrete	377.09		33.22									
1284 2N		5767772	Tiger Cr Cnl-Install Flume Liner 2016-18	2,912.33		260.47	1,745.85								
1285 2N		5767773	Philadelphia Ditch Flumes-Install Liner	238.20											
1286 2N		5767879	2016 Stan Forebay- Install Liner & Joint	117.29		2.65									
1287 2N		5767880	2016 Main Tuolumne Canal-Install Shotcre	236.94											
1288 2N		5767982	Centerville 0/8 Flume Repl Sheets											300.00	
1289 2N		5767984	Coleman Inst Intake Actuator Oil Contain				32.58	3.28	2.91	199.64					
1290 2N		5767995	Inskip Eagle Cvt Canals Inst Flow TLM	186.44		33.99	50.59								
1291 2N		5768683	Chili Bar Segment Governor Turb/Bypass	329.04		702.82	559.74	0.08							
1292 2N		5768955	Stan Gauging Sln - S-51 (Lyons Dam)	94.39		2.52									
1293 2N		5768959	Cresta PH Repl Tailrace Stopping Gates	147.47		837.33	100.36	100.36	340.18	563.00	350.00				
1294 2N		5768960	Rock Cr PH Repl Tailrace Gates	201.31		170.67	100.47	100.47	99.47						
1295 2N		5768961	Rucker Lake LLO Gate Replace	12.32		109.42	819.15		96.35						
1296 2N		5769098	Upper Centerville Canal - Install Pipe	37.71		0.02									
1297 2N		5769340	Upper Milocene 2/2 Replace Flume Sheets			-12.32									
1298 2N		5769141	Upper Milocene Resurface Berm	23.96											
1299 2N		5769159	TC Canal Embankment Erosion Repairs 805	376.81											
1300 2N		5769303	SJ2 - Reline Ditch 2 Flume 2	490.78											
1301 2N		5769481	Deer Creek - SY Flume Slide (Emrgent)	751.29											
1302 2N		5769699	Poe Dam Replace Gate 2 Controls	170.73		5.21									

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1365	2N	5778046	Baich 1 - Penstock AB6 Rock/Soil Fence		6.30	0.33	0.54							
1366	2N	5778063	Drum Griswold Flume Retaining Wall		0.00									
1367	2N	5778064	Upper Wise Canal Access Improvement		49.49	3.75								
1368	2N	5778065	Wise Tunnel & Replace Retaining Wall		212.29									
1369	2N	5778066	Spa LLO - Deer Creek Divert Flow		67.27	3.76	6.19	75.00	250.00					
1370	2N	5778067	Spaulding 3 Tail Race Log Boom		95.87	82.46								
1371	2N	5778077	Stan Forebay Intake - Install Shotcrete		364.29	1.91								
1372	2N	5778271	Lake Almanor Automate Instrumentation	125.27	6.00	32.11	125.72	1,010.00						
1373	2N	5778272	Butt Valley Dam Automate Instrumentation		0.50	24.20	109.78	739.00						
1374	2N	5778336	Lower Bear-Rep/ Cone Valve Actuators		176.09	63.26	-1.26							
1375	2N	5778337	Lwr Bear (Mok) Leakage Weir Access Impr		144.94									
1376	2N	5778440	Courtright Dam Upgrade /D Gate Control		47.21	84.23	177.99	89.90	1,063.52	2,412.07	17.75			
1377	2N	5778984	Lower Drum Canal Trail Imprmnts		135.89									
1378	2N	5778996	Griswold Cross Gate Trunnion Replacement							100.00	360.00	400.00	50.00	
1379	2N	5779023	Spaulding Dam 1 Install Log Booms							200.00	150.00			
1380	2N	5779122	YB 116 Remote Control Gate				0.00	125.00						
1381	2N	5779207	Helms - Repl Courtright LLO Bypass Valve				5.02	44.56	190.23	3,310.81				
1382	2N	5779209	Helms - Install Incline Tunnel Liner		8.58	2.10	425.96	2,434.09	480.47	7,064.31	272.50	12.01		
1383	2N	5779218	Tiger Crk Abby Erosion Protection			95.18	192.14	1,198.90	30.00	150.00				
1384	2N	5779219	Wise Intake Replace Side Spill Gate				70.61	299.38						
1385	2N	5779222	Halsey Forebay Install Seepage Drain											
1386	2N	5779449	MainTuolumne CH-Install Shot Lin 2018											
1387	2N	5779450	MainTuolumne CH-Install Shot Lin 2019											
1388	2N	5779452	MainTuolumne CH-Install Shot Lin 2021											
1389	2N	5779453	MainTuolumne CH-Install Shot Lin 2022											
1390	2N	5779455	Philadelphia Ditch Flume-Instl Lnr 2019											
1391	2N	5779456	Philadelphia Ditch Flume-Instl Lnr 2020											
1392	2N	5779457	Philadelphia Ditch Flume-Instl Lnr 2021											
1393	2N	5779458	Phoenix Install Flume Sheet Liner 2018											
1394	2N	5779459	Phoenix Install Flume Sheet Liner 2019											
1395	2N	5779461	Phoenix Install Flume Sheet Liner 2021											
1396	2N	5779462	Phoenix Install Flume Sheet Liner 2022											
1397	2N	5779463	Poe Dam Replace Gate Chains											
1398	2N	5779470	Tiger Cr CH-Install Flume Lnr 2019/2020											
1399	2N	5779471	Tiger Cr CH-Install Flume Lnr 2020/2021											
1400	2N	5779472	Tiger Cr CH-Install Flume Lnr 2022/2023											
1401	2N	5779498	RV Reservoir, Remote Monitoring											
1402	2N	5779521	Wise Fbay (Drum) Spill Channel Improv											
1403	2N	5779522	Salt Springs UJ Penstock Air Valves Repl											
1404	2N	5779525	Three Lakes Dam Install Wiers											
1405	2N	5779560	Salt Springs LLO & IFR Valve Maint Platf											
1406	2N	5779561	Lower Bear LLO & IFR Valve Maint Platf											
1407	2N	5779569	Spaulding 3 - Replace Prnstk Drain Valve											
1408	2N	5779570	Dutch Flat - Replace Prnstk Drain Valve											
1409	2N	5779638	Tiger Creek Regulator Dam LLO Automation											
1410	2N	5779680	Tiger Creek Forebay LLO Install Access											
1411	2N	5780422	Halsey Install Piezometer											
1412	2N	5780440	Pt 7 Radial Gate Inst Backup Pwr Supply											
1413	2N	5780441	Pt 6 Radial Gate Inst Backup Pwr Supply											
1414	2N	5780459	M11 Replace Stilling Well Pipe & Valve											
1415	2N	5780666	Helms - Wishon Replace /D Gate Seal											
1416	2N	5780747	Grizzly Frby Dam Inst LLO											
1417	2N	5780880	Phoenix Install Flume Sheet Liner 2023											
1418	2N	5780881	MainTuolumne CH-Install Shot Lin 2023											
1419	2N	5780885	Fordyce Dam Replace LLO and Guard Valves											
1420	2N	5781058	Upper Miocene Canal 3/6 Repl Lining											
1421	2N	5781143	Spaulding Dam Alternate IFR											
1422	2N	5781251	TC Reg Canal Replace Energy Dissipater											
1423	2N	5781266	Drum Abby Install New Skimmer Gate Chnrl											
1424	2N	5781299	Dutch Flat Tunnel Replace Sluice Valves											
1425	2N	5781379	S5 Dam Radial Gate Repair (C) - Phase 2											
1426	2N	5781480	Tiger Creek Canal Install Drain System											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1427 2N		5781760	K2 Repl Dewatering and Pnstk Root Valves		2.48	27.55	208.22	556.27						
1428 2N		5781888	Drum Abay Install Backup Power Source		39.83	18.59	-0.24							
1429 2N		5782065	Lower Bear Dam-Replace Leakage Weir 478		35.46									
1430 2N		5782069	BRC Liner DS 2016 B2		180.38	2.45								
1431 2N		5782098	Upper Wise Culvert Inlet Replacement		22.79	1.93	2.10	100.00						
1432 2N		5782240	Tiger Crk Canal 2018 Erosion Mitigation		4.77	401.01	0.14							
1433 2N		5782278	Tiger Crk Canal Embank/Road Restoration		30.68	193.43	889.63							
1434 2N		5782324	Drum Canal STA 421+00 Install Liner		456.79	-36.51								
1435 2N		5782905	Bear River Canal Liner STA 505+27.510+00		390.19	54.49								
1436 2N		5782980	SYC Little Tunnel Culvert & Retain Wall		156.71	1.67								
1437 2N		5782981	SYC Excelsior Culvert & Retain Wall		87.36	0.85								
1438 2N		5782982	Belden Dam Spillway Deck Improvements		422.09	72.46	13.28	1,031.07						
1439 2N		5782989	Toadown Canal Mitigate Undermining		47.29	76.32	114.15							
1440 2N		5782995	Philbrook Dam Install New Weir			8.83	76.32	250.01						
1441 2N		5782998	Poe Dam Repl Bypass Gate Seals			11.49	4.43	440.00	20.00					
1442 2N		5783000	Lower Blue Seepage Reduction			5.28	80.16	1,228.60	6,700.00	90.00				
1443 2N		5783303	Wise Canal 2018 Improvements		5.45	-0.00								
1444 2N		5783499	M12 Bridge (Mok) Instl Support Trestles											
1445 2N		5783598	South Canal Sta 19+50 Replace Underdrain						100.00	750.00				
1446 2N		5784170	BRC Erosion Mitigation (Sta 545+00)		523.34	52.48	1.08							
1447 2N		5784383	LWC Uplift Mitigation at Imperm Liner		348.84	67.50	448.19							
1448 2N		5784398	Tiger Creek AB Repl Radial Gate Chains		1,083.09		38.13		300.00					
1449 2N		5784683	Rock Creek Cresta Corfer Dam		229.84		88.59	2,000.00	20.00	5,000.00	5,000.00	200.00		
1450 2N		5785096	Pt 3 LLO No.1. Refurbish Actuator											
1451 2N		5785171	Volta Lake Nara Replace Spill Basin Wall				243.42	50.00						
1452 2N		5785442	Canyon Dam LLO Install Cutoff Wall				448.19	1,500.00	600.00					
1453 2N		5786404	Pt 6 U1 Repl Pnstk Intake Gate Ctrl Sys					150.00	600.00					
1454 2N		5786405	Pt 6 U2 Repl Pnstk Intake Gate Ctrl Sys					150.00	600.00					
1455 2N		5786406	Pt 7 Unit 1 Repl Intake Gate Cntrl Sys				48.91	600.00						
1456 2N		5786407	Pt 7 Unit 2 Repl Intake Gate Cntrl Sys		44.23		111.93	600.00						
1457 2N		5787318	JBB IC Dam LLO Replace Actuator & Piping		48.64		212.30	1,121.93	2,250.00					
1458 2N		5787439	Bucks Milk Ranch Conduit Inst 36" Valves		169.43		162.93							
1459 2N		5787458	JBB Iron Canyon Dam Install Weir				21.30	200.00						
1460 2N		5787460	Poe Dam Instrumentation Improvements		483.59		183.97							
1461 2N		5787698	Halsey Afterbay SAIP - Bridge Removal											
1462 2N		5787802	Halsey Forebay SAIP - Armoring		45.16		1.47							
1463 2N		5787970	Salt Springs Log Boom				63.15	300.00	60.00					
1464 2N		5788227	Kerckhoff Replace Dam LLO Gate 1				0.00	50.00	50.00	500.00	1,000.00			
1465 2N		5788233	Salt Springs 1 Penstock Excess Flow Prot				54.05	673.19						
1466 2N		5788234	Spring Gap Forebay Install Generator					302.44						
1467 2N		5788241	Hendricks Canal Liner Improvements		1.71		148.99	350.02						
1468 2N		5788278	Strawberry Dam Replace LLO Conduit&Comm				26.01	17.00						
1469 2N		5789319	Drum Abay Replace Fish Release Valve				189.89							
1470 2N		5789680	Strawberry Dam (Stam)-Replace Liner 2023						400.00					
1471 2N		5789718	Strawberry Dam (Stam)-Replace Liner 2024		156.10						415.00			
1472 2N		5789918	Cherokee Fire Capital											
1473 2N		5790116	PV Caps Horn Dam Fish Hotel Improvements											
1474 2N		5791361	Pt 7 Dam Log Boom Replacement				832.88	500.09						
1475 2N		5792339	Pt 3 U3 Repl Tailrace Slot & Concrete				106.94	1,150.00	30.00					
1476 2N		5792565	Baum Lake Upgrade RTU				4,577.40	300.00						
1477 2N		5792566	Pt 1 Forebay Manufacture Stop Logs							272.50				
1478 2N		5792567	Pt 1 Dam Upgrade RTU Gates 4 & 5							512.27				34.49
1479 2N		5792568	Lake Britton Upgrade RTU					250.00						
1480 2N		5792569	Pt 5 Diversion Dam Upgrade RTU					250.00						
1481 2N		5792570	Pt 6 Dam Replace Annunciators				200.00							
1482 2N		5792571	Pt 7 Dam Install RTU RSVR Level Ind.				250.00							
1483 2N		5792572	Pt 7 Dam Replace Annunciators				200.00							
1484 2N		5792573	McCloud Dam LLO Repl. 5x7 3G Actuator				400.00							2,200.00
1485 2N		5792574	Pt 3 Lake Britton Repl Stbdy Generator											
1486 2N		5792582	Pt 5 Diversion Dam Repl Lighting											
1487 2N		5792672	Bucks Creek Pnstk Uprg Erosion Protect											
1488 2N		5792673	Rock Cr Dam Repl Radial BP Gate Hoist							100.00				800.00

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1485	2N	5792674	Cresta Dam Repl Radial BP Gate Hoist								100.00	500.00	800.00		
1490	2N	5792675	Poe Dam Rpl Radial BP Gate Hoist & Cntrl						100.00	100.00	500.00	800.00			
1491	2N	5792676	Rock Creek Dam Replace Stilling Wells						100.00	100.00	400.00				
1492	2N	5792689	Drum Annual Cnl Liner Improvements 2021						2,000.00	30.00					
1493	2N	5792693	Meadow Lake Resurface Gunite Liner						85.00	450.00					
1494	2N	5792697	SYC U/S Little Tunnel Install Liner						100.00	200.00					
1495	2N	5792727	Spaulding Dam 2 Skimmer Gate Modificatio						100.00	100.00					
1496	2N	5792731	Lwr Bear Dam Gate Rplc Wire Rope Lifting						150.00	100.00					
1497	2N	5792733	Spaulding Dam 3 Leakage Weir Handrails				86.63								
1498	2N	5792818	Spaulding Dam 1 Install Weir						50.00	100.00					
1499	2N	5792920	Bucks Creek Inst DC svc for Lube system						100.00	200.00					
1500	2N	5792940	Courtright Spillway Road Raise										500.00		1,500.00
1501	2N	5792945	Courtright Added Reservoir Monitoring												
1502	2N	5792946	Wishon Added Reservoir Monitoring												
1503	2N	5793557	Tiger Creek Abay Spillway Gates Automati												
1504	2N	5793559	Spaulding Dam Replace LLO												
1505	2N	5793560	Drum Annual Cnl Liner Improvements 2022												
1506	2N	5793561	Drum Annual Cnl Liner Improvements 2023												
1507	2N	5793562	Drum Annual Cnl Liner Improvements 2024												
1508	2N	5793563	Drum Annual Cnl Liner Improvements 2025												
1509	2N	5793564	Drum Annual Cnl Liner Improvements 2026												
1510	2N	5793565	BRC Relocate Ragsdale Racks												
1511	2N	5793568	Spaulding 2 Replace Apron												
1512	2N	5793570	Pittman Spill Channel Improvements												
1513	2N	5793571	Alta Bypass Replacement												
1514	2N	5793577	Drum Canal Pittman Springs Culvert												
1515	2N	5793584	Halsey Afterbay Dam Inflow Design Flood												
1516	2N	5793585	Salt Springs Spillway Gate No. 6-8 Auto												
1517	2N	5793587	Drum Abay Repl Radial Gate Remote Cntrls												
1518	2N	5793588	Phoenix Install Flume Sheet Liner 2024												
1519	2N	5793589	Phoenix Install Flume Sheet Liner 2025												
1520	2N	5793590	Drum Canal Tahoe Spill Replace Gate												
1521	2N	5793593	Phoenix Install Flume Sheet Liner 2026												
1522	2N	5793594	Phoenix Install Flume Sheet Liner 2024												
1523	2N	5793595	Phoenix Install Flume Sheet Liner 2025												
1524	2N	5793596	Phoenix Install Flume Sheet Liner 2026												
1525	2N	5793597	Philadelphia Ditch Flume-Instl Lnr 2022												
1526	2N	5793598	Philadelphia Ditch Flume-Instl Lnr 2023												
1527	2N	5793599	Philadelphia Ditch Flume-Instl Lnr 2024												
1528	2N	5793600	Philadelphia Ditch Flume-Instl Lnr 2025												
1529	2N	5793601	Philadelphia Ditch Flume-Instl Lnr 2026												
1530	2N	5793602	Lake Fuller Aux Spillway Replace Rip Rap												
1531	2N	5793613	Drum U1 Discharge Install Erosion Pro												
1532	2N		2N Total	55,796.48	50,413.86	40,767.70	42,366.53	45,193.11	36,322.01	27,658.39	42,682.27	30,755.68	25,321.78	24,788.41	Sum of Lines 1099-1531
1533	2P	5501073	DeSable Improve Facilities	460.49	189.39	173.74	411.03	806.05	70.00	73.23	79.05	87.70	99.88	116.70	
1534	2P	5501077	Drum Inst/Repl Buildings, Grnds, Infra	113.66	185.34	84.03	52.32	168.51	310.00	36.61	39.52	43.85	49.94	58.35	
1535	2P	5510814	Shasta Inst/Repl Buildings, Grnds, Infra	81.63	19.62	19.62	5.09	0.00	70.00	73.23	79.05	87.70	99.88	116.70	
1537	2P	5511185	Milode Inst/Repl Buildings, Grnds, Infra	232.21	11.05	134.79	25.35	15.89	60.00	36.61	39.52	43.85	49.94	58.35	
1538	2P	5712583	KCV Remove Cottages/Buildings				-43.68								
1539	2P	5720640	Belden Replace HVAC	29.91	-5.00										
1540	2P	5720728	Cresta Replace Powerhouse Roof	400.83	9.91										
1541	2P	5720856	Helms Repave Support Facility	1,550.00											
1542	2P	5729595	Helms - Replace SY Generator Bldg	15.65	16.88	-234.95									
1543	2P	5729699	Lake Valley Rd - Replace Culvert	1,340.46	-83.26										
1544	2P	5730598	Tiger Creek - Replace Air Compressor	0.51											
1545	2P	5734078	Helms - Install Pump/ Load Center at T3A	-0.14											
1546	2P	5740888	Balch - Pave PH Road	764.47											
1547	2P	5741178	Caribou Road Capital Improvements	435.27											
1548	2P	5743678	Helms - Repl Elevator Shaft Terminal Box	107.25	158.99	2,443.62	-77.14								
1549	2P	5745714	Rodgers Flat - Fence Abandoned Bridge	0.05		30.54									
1550	2P	5747183	Bucks Cr PH Repl Access Bridge Decking	13.15											

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1613 2P		5766378	Balch - Pavé Road Bridge to Siphon	31.16	-19.58										
1614 2P		5766459	Haas - Replace PH Water Supply Tank	39.47	98.14		128.29	523.71	370.45	12.42					
1615 2P		5766562	Kidd Lake Dam Easement	21.24	66.14		8.03	1.68							
1616 2P		5767021	Balch - Pavé HQ Parking Lot	49.64											
1617 2P		5767979	Camp One - Backup Generator	1.79	143.31										
1618 2P		5767990	Helms - Pavng HQ & Support Facilities				22.46	1,293.02							
1619 2P		5768005	Manton SC Replace Fueling Island											202.90	
1620 2P		5768006	Manton SC Resurface Parking Lots												
1621 2P		5768545	Caribou Switching Center Repl Septic Sys												
1622 2P		5769364	Desabla PH Road Install Gabions	102.90	42.33										
1623 2P		5769485	Pt 5 Spring Hill Rd 2016 Storm Damage	251.10											
1624 2P		5769698	Coal Cany Mid Wico Berry Rd Repl Culvert	393.28	53.94										
1625 2P		5769938	PV Install Fencing & Security Gate	263.85	1.27										
1626 2P		5770038	Helms - Install HQ Leachfield	71.36											
1627 2P		5770358	Caribou Road Install Gabions 2016	23.89	-7.54		35.16	5.55	49.15	112.12	100.00	1,600.00			
1628 2P		5770698	Helms - Install HVP Communication System	265.00	25.15										
1629 2P		5770818	Miocene Roads Install Culverts	44.35	87.89		333.29								
1630 2P		5771008	Spaulding 2 Elevator Replacement	231.08	5.04										
1631 2P		5771823	South PH Road Full Section Replacement	61.69	351.98		1,126.43	23.61							
1632 2P		5771967	Helms - Install Garage Dormer Roof	87.18	346.43		-0.51								
1633 2P		5771968	Kern - Install Office Trailer	11.59	-2.41										
1634 2P		5772235	Hydro Wtrwy Public Safety - 2017 Mlode	2.41	38.59		21.59								
1635 2P		5772236	Hydro Wtrwy Public Safety - 2017 Drum		333.05		31.74								
1636 2P		5772624	Helms - Repave McKinley Grove Road										500.00	6,000.00	6,000.00
1637 2P		5772625	Balch - Install Warehouse	15.88	15.88		0.96	0.89	1.44						
1638 2P		5772728	Grizzly Fbry Access Rd Mitigate Erosion	27.27	23.86		23.86								
1639 2P		5772925	Lyons Dam - Install Lights + Access	0.23	263.21										
1640 2P		5772937	West Point Valve House Access Rd Improve	1.42	1.42		0.11	15.79	130.76	9.00					
1641 2P		5773018	Balch 2 - Replace Valve House Roof	13.04	89.62										
1642 2P		5773318	Rock Cr Switch Center Upgrade Septic	29.45											
1643 2P		5773462	Feather River Pl Road Improvements 2017	387.88											
1644 2P		5773669	Balch Camp - 2017 Housing Renovation	41.60			-2.44	0.12							
1645 2P		5773742	Pt 6 Road Storm Damage Jan 2017 Capital	2,784.13	757.71		1,003.49	-337.66	-406.87						
1646 2P		5773858	Butte Head Dam Rd Improve 2017	6.23	6.23		945.23	27.74							
1647 2P		5774078	Pt 5 PH Road 2017 Storm Damage Capital	6,232.28	6,232.28		666.47	-804.45	-1,157.39						
1648 2P		5774079	Pt 4 PH Road Storm Damage Feb 2017	1,958.01	2.32		2.32	-256.16	-335.58						
1649 2P		5774199	Butt-Gasner Road Stabilization - Capital	125.76	634.05		634.05								
1650 2P		5774219	Salt Springs Rd Landslide - Panther Grade	2,233.40	146.59		146.59	-311.00	-393.14						
1651 2P		5774220	Tiger CK Canal - Emergency Storm Damage	1,689.92	-220.82		-220.82	-112.20	-284.52						
1652 2P		5774226	Pt 7 Rd Returnment 2017 Storm Damage	3,032.67	3,032.67		1,096.44	-112.20	-776.30						
1653 2P		5774228	Caribou Rd at French Cr Improvements	33.82			935.09	85.03	16.07	78.32					
1654 2P		5774680	Volita Lk Grace Repl Intake Battery Bldg				27.76	16.07	3.53						
1655 2P		5774758	Poe Dam Road Improvements	479.05				-62.60	-20.82						
1656 2P		5774854	Oak Flat PH Improve Access Road	631.32				-82.50	-94.51						
1657 2P		5775320	Helms - Repl Sewer Collection System	61.93	845.87		845.87	33.50							
1658 2P		5775661	Caribou Road Culvert Installation	97.37	1,432.51		1,432.51	-173.30	-264.71						
1659 2P		5775662	Butte Head Dam Rd Site 2 Improvements	52.90	140.65		140.65	25.47							
1660 2P		5775792	Drum 1 PH - Crane 2 Modifications		52.43		52.43	466.29	6.05						
1661 2P		5776118	Caribou Rd Stabilization at PH	66.39	112.74		112.74	1,840.72	11.44						
1662 2P		5776459	Halsey PH - Replace Shed Roof	191.66			0.67								
1663 2P		5776698	Balch Road - MM 1 Rd Stability Imprv	56.80	418.91		418.91								
1664 2P		5776738	Strawberry Dam - Access Imprv (Storm)	137.64	1.98		1.98								
1665 2P		5776830	Pt 5 PH Surge Chmbr & Vh Slide Strm Dmg	3,565.25	316.46		316.46	-174.97	-558.38	200.00	3,000.00	100.00			
1666 2P		5777045	Pt 3 Tailrace Brag Deck Capital Upgrade		0.20		0.20	0.01	-0.21					250.00	
1667 2P		5777200	Drum 5YC Spring Road Slide	228.41	-40.00		-40.00								
1668 2P		5777201	Drum Siphon Slide 2017	201.42	0.76		0.76								
1669 2P		5777519	Newcastle Bridge Deck Replacement	19.44	73.15		73.15								
1670 2P		5777718	Drum Canal Culvert Replacement (268+00)	21.13	-0.62		-0.62								
1671 2P		5778048	Haas - Replace Elevator Controls	40.90			81.91	134.06	1,270.41						
1672 2P		5778051	Balch 2 - Emergency Power Backfeed 12KV	124.40			124.40	-0.63							
1673 2P		5778055	Dutch Flat Rd Drainage Improvements	72.98	658.02		658.02	8.87							
1674 2P		5778069	Lake Valley Rd (Drum) 4 x 3 Culvert	127.70			127.70								

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1675 2P		5778261	Belden Refurbish Adit 1 BR42 Bridge					200.00							
1676 2P		5778262	Rodgers Flat SC Remodel	173.90	39.19				-5.28	500.00					
1677 2P		5778989	Fordyce Cabin Platform/Deck Replacement	141.85											
1678 2P		5778990	Lake Valley Canal Convert to Pipe										2,000.00	2,000.00	
1679 2P		5778991	Stanislaus Replace Jib Crane	97.50	0.95										
1680 2P		5779019	Spa3 Penstock Replace Air Valve Bldgs									75.00			
1681 2P		5779022	Tiger Creek Road MP 1.7 Gabion Wall	23.11								500.00			
1682 2P		5779080	Install Gates to Drum Siphon Racks & Cnl												
1683 2P		5779081	Strawberry Dam - Extend HeliPad						380.01						
1684 2P		5779082	Relief Dam - Install Concrete HeliPad						0.94						
1685 2P		5779201	Sand Bar Install Stairway/Platforms												
1686 2P		5779398	Drum Penstock Access Improvements						285.23	1,500.00	1,000.00				
1687 2P		5779419	Balch 1 Replace Cooling Wtr Tank Control						24.08	110.78	75.81	901.00			
1688 2P		5779437	Helms Crane Rail Capacity Uprate	382.84	165.31				289.27	320.59	300.00	2,775.00			
1689 2P		5779575	Electra PH Crane Modernization						84.38	90.60	75.00				
1690 2P		5779576	Tiger Springs PH Crane Modernization						21.50	21.14	5.00	1,478.00			
1691 2P		5779577	Salt Springs PH Crane Modernization						12.05	3.71	5.00	5.00			
1692 2P		5780500	TC/SS Rd Emergency Restoration 2018	1,694.21	-3.72									51.00	1,100.00
1693 2P		5780518	Phoenix PH Tailrace Rd Restoration 2018	110.21											
1694 2P		5780599	Pt 5 Open Conduit Replace Building						203.56	150.00					
1695 2P		5780660	K2 - Replace Stairway						34.63	150.85		22.54			
1696 2P		5780984	Culbertson Rd Imprv Drm Cnl 354+00 Slide	202.06	5.35										
1697 2P		5782145	Drum Forebay Bridge Deck Replacement	95.24											
1698 2P		5783123	Helms Install Backup Power at Portal						195.79	169.54	250.00	1,718.42			
1699 2P		5783168	Scott Dam Repl Standby Generator	14.51	49.74				0.46						
1700 2P		5783343	Spring Gap Bunk Inst Wiring & Lighting	143.57	57.92				4.87						
1701 2P		5783415	Poe PH Road Slide 2018						20.02						
1702 2P		5783487	Crestia PH Road Mitigate Erosion	2.25	92.389				5.42						
1703 2P		5783518	Cresta VH Road Install Culvert	109.90	1,320.37				6.97						
1704 2P		5784779	Wise PH Road Septic Holding Tank		70.88										
1705 2P		5784998	Cow Creek Restore 03/NO71 Access Bridge	215.17					3.62						
1706 2P		5785093	Pt 3 PH Replace Crane(s) Controls						397.83	4,079.00					
1707 2P		5785094	Pt 5 PH Replace Crane(s) Controls												
1708 2P		5785095	Pt 1 PH Replace Crane(s) Controls												
1709 2P		5786368	Balch 1 - Replace Penstock Inspect Bridge	166.10					304.42	10.00	10.00	2,500.00	1,000.00		
1710 2P		5786658	Rock Creek VH Replace Roof	10.39	274.96				14.99						
1711 2P		5786681	Central - Common Gantry Crane	48.58	385.51				23.86	50.00	3,000.00				
1712 2P		5786900	Helms - Rpic Suprt Fac Back Up Generator						14.20						
1713 2P		5786907	Helms - Upgrade Supt Fac Propane Sys	94.15											
1714 2P		5787559	Drum Cranes 1 & 2 Aux Hoist Installs												
1715 2P		5787738	Poe PH S5 Rock Slide Mitigate Erosion	17.57					121.12	20.00	20.00	460.00			
1716 2P		5787994	Haskins CG Repl Boat Ramp	13.92					180.93	550.00					
1717 2P		5788189	Pt 3 Rock Creek Bridge Replace Deck						30.93						
1718 2P		5788229	Bridge MD5 Install Guard Rail & Widens Rd						113.06	9.00	975.50	42.78			
1719 2P		5788236	Stanislaus FB Instl Alt Power (WSIP)						126.48	9.00	920.00				
1720 2P		5789800	Tiger Creek-Repl Company Houses Roofs						147.13						
1721 2P		5791558	Haas - Upgrade Crane Controls						186.85						
1722 2P		5792458	Pt 4 PH Replace Crane(s) Controls						925.00	1,110.00	250.00	850.00			
1723 2P		5792540	Stanislaus FB Instl Communication Path												
1724 2P		5792558	Pt 6 Dam Road Stabilization Capital												
1725 2P		5792559	Pt 6 Replace Lighting System												
1726 2P		5792560	JBB Replace Lighting System												
1727 2P		5792561	Pt 4 PH Replace Lighting System												
1728 2P		5792563	JBB Willow Creek Rd Stabilization						150.00	200.00	6,500.00	2,566.00			
1729 2P		5792584	Pt 3 Repave Road						75.00						
1730 2P		5792694	Lower Lindsey Dam Install Handrail												
1731 2P		5792718	Meadow Lake Dam Upgrade Power Source												
1732 2P		5792720	Lower Blue Lake Dam Upgrade Power Source												
1733 2P		5792721	Upper Blue Lake Dam Upgrade Power Source												
1734 2P		5792736	Drum Canal Y836 Gaug Sta Improve Access												
1735 2P		5792739	Spaulding Housing Septic Line Rpl												
1736 2P		5792746	Balch Remodel Lodging Facility												

Table 4-3
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Expenditures by Planning Order
(Thousands of Nominal Dollars)

Line No.	MW/C	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1737 2P		5792747	Helmis Remedial Lodging Facility						75.00						
1738 2P		5792748	Kerckhoff Dam Repl Stairway to IFR						425.00						
1739 2P		5792749	Helmis - Replc Swtchyard Gen Fuel System						500.00						
1740 2P		5792758	Caribou Road Resurfacing						100.00		100.00		100.00	100.00	
1741 2P		5792759	Caribou Rd PNF Rd 27N26 Mitigate Erosion						100.00		300.00				
1742 2P		5792760	Potter Valley PH Exterior Roof Recoat										200.00		
1743 2P		5792948	Helmis PH Install Second Story Offices								100.00	75.00	350.00		
1744 2P		5792949	Helmis Replace Access Tunnel Lighting								250.00	250.00			
1745 2P		5792951	Kerckhoff Dam - Install Landing Area Ret								250.00				
1746 2P		5792952	Kerckhoff Dam Install Access Road								600.00	362.00	50.00		
1747 2P		5793578	Spaulding 3 Install Generator (PSPS)												
1748 2P		5793579	SYC Y8139 Structure Install Snow Shelter							500.00					
1749 2P		5793583	Spaulding 1 Install Backup Gen (PSPS)								158.00				
1750 2P		5793604	Dutch Flat 1 Install Backup Gen (PSPS)								250.00				
1751 2P		5793611	Spaulding Road Repave Access Road								180.00				
1752 2P		5793612	Lake Valley Propane Install Snow Cover									150.00			
1753 2P		5793614	Lake Valley Propane Install Snow Cover								105.00				
1754 2P		5793615	Alta SC Retaining Wall Install Drain								125.00				
1755 2P		5793617	Alta SC Replace Failed Asphalt								100.00				
1756 2P		5793618	Drum Flay Propane Tank Install Snow Cover								100.00				
1757 2P		5793619	Drum Pen Culbertson Rd Replace Culvert								100.00				
1758 2P		5793620	Spaulding Well Replace Culvert										100.00		
1759 2P		2P Total		23,464.79	33,525.36	26,532.97	21,890.19	8,015.35	19,371.63	16,147.55	26,573.89	14,553.22	12,953.63	9,650.09	Sum of Lines 1534-1758
1760 2P		5700287	RCC LC: River Water Temp Control					0.00	200.00	2,500.00	2,500.00				
1761 3H		5701979	Poe FERC 2107 Relicence	1,688.35	1,982.01	2,567.37	242.34								
1762 3H		5704039	UNFR FERC 2105 Relicence	3,862.71	3,860.88	5,452.52	3,181.62	2,175.71	2,100.00	130.00					
1763 3H		5716718	DeSable Centerville Relicence	2,404.50	7.00			0.00							
1764 3H		5718898	Battle C Salmon Restoration FERC Lic-Am	528.05	486.40	414.49	275.63	368.51	750.00						
1765 3H		5719039	McCloud-Pt FERC 2106 Relicence	3,448.78	3,686.67	3,800.55	3,138.53	1,721.12	580.00						
1766 3H		5719538	Drum Spaulding Relicence	3,474.22	3,775.22	3,913.36	3,164.82	1,281.07	694.40	330.20					
1767 3H		5720507	Chill Bar License Conditions-Capital	66.99	483.59	52.16									
1768 3H		5720508	Drum-Spaulding Lic Cond												
1769 3H		5720509	Merced Falls FERC 2467 Relicence	274.06	-3,458.77	1.08	0.80	-15.85							
1770 3H		5720686	Bucks Creek FERC 619 Relicence	3,227.91	2,700.95	1,965.36	1,348.81	892.85	351.60	129.80					
1771 3H		5741498	McCloud-Pt License Conditions - Capital						1,120.00						
1772 3H		5720787	Kilarc-Cow License Surr Relic	799.07	-9,134.38	-294.23		198.89	100.00						
1773 3H		5722537	Poe LC-Rec. Enhancement Plans/ Poe Beach												
1774 3H		5726532	Salmon Habitat Expansion Agreement	120.68	130.20	-1,757.19	-8.54								
1775 3H		5741503	DeSable Centerville LC-FishScreen&Ladder	13.74	0.00			0.00							
1776 3H		5741504	DeSable Centerville LC-H2Otemp D forebay	16.89	0.00			0.00							
1777 3H		5747281	UNFR LC-Capital Projects												
1778 3H		5747281	Poe LC-Poe PH Recreation Improvements												
1779 3H		5760695	Kerckhoff 1 & 2 Relicence	63.14	823.29	1,972.13	4,394.73	96.37	1,826.70	14,976.67	3,128.67	6,430.00	5,550.00	2,750.00	
1780 3H		5760700	Narrowa Relicence	8.20	544.62	153.08		4,677.13	126.00	500.00	600.00	800.00	800.00	600.00	
1781 3H		5760704	Phoenix Relicence	138.38	752.18	1,038.84	2,339.82	-705.89	3,150.00	1,800.00					
1782 3H		5760714	Potter Valley Relicence	437.02	1,408.91	4,551.65	1,087.06	66.19	1,333.50	1,084.00	819.00	629.00			
1783 3H		5766591	Battle Creek - Easement at Inskip Div.		61.29	52.62	-113.91								
1784 3H		5767854	Baich 1 & 2 Relicence					305.78	1,600.00	4,400.00	4,500.00	2,300.00	2,100.00	950.00	
1785 3H		5779306	Bucks Creek Relicence - Capital LC												
1786 3H		5779438	Helmis Relicence FERC #2735					340.68	1,400.00	321.48	1,271.60	978.94	598.28	3,866.05	
1787 3H		5781662	Poe LC- HEA implementation							4,900.00	5,100.00	2,300.00	2,800.00	1,900.00	
1788 3H		5781666	Poe LC- HEA implementation							600.00	1,400.00				
1789 3H		5781666	Poe LC- Sandy Beach Improvements					60.56	152.00						
1790 3H		5781666	Poe LC- Poe Reservoir Trail and Signage					48.21	164.00						
1791 3H		5781667	Poe LC- Bardees Bar Rec & Cult Rsrcs Imp						53.00						
1792 3H		5781668	Poe LC- Bardees Bar Drainage Imp & Reveg				45.38		436.00						
1793 3H		5781669	Poe LC- Implement Road Management Plan						540.00						
1794 3H		5781670	Poe LC- Improve Bardees Bar Road					0.00	100.00						
1795 3H		5793127	Salmon HEA Implement - UNFR LC							125.00	571.00	1,070.00			
1796 3H		5793129	Phoenix Relicence - Capital LC							7,000.00	4,300.00				
1797 3H		5793130	Mokelumne FERC-137 Relicence												
1798 3H		5793131	Rock Creek-Cresta FERC-1962 Relicence												
															1,529.80
															590.00
															590.00
															1,200.00
															1,200.00

Table 4-3
 Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Capital Expenditures by Planning Order
 (Thousands of Nominal Dollars)

Line No.	IMWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1799	3H	5793132	Hat Creek #1 & #2 FERC-2661 Relicensing												
1800	3H	5794013	Belden Forebay Spillway Improv SAIP				21.13	313.44	200.00	250.00	1,000.00	5,000.00	10,000.00	5,000.00	600.00
1801	3H	5794026	Belden Spillway Fence Replacement SAIP					603.19	50.00	500.00	10,000.00				
1802	3H	5794027	Burt Valley Spillway Improv SAIP						150.00	150.00					
1803	3H	5794029	Halsey Spillway Improvements SAIP						200.00	2,012.40					
1804	3H	5794030	Lake Almanor Spillway Improv SAIP				124.57	42.51	200.00	5,000.00					
1805	3H	5794031	Lower Bucks Spillway Restoration SAIP					157.43	350.00	7,787.00					
1806	3H	5794032	McCloud Spillway Improvements SAIP						5,000.00	2,000.00					
1807	3H	5794034	McCloud Refb Hawkins Cr Rd Upr Slid SAIP						300.00	2,800.00					
1808	3H	5794035	Tiger Creek Reg Spillway Improv SAIP					1,069.67	1,800.00	15,000.00					
1809	3H	5794037	Wise Canal Head Gate Inst Autotrip SAIP						85.00						
1810	3H	5794098	Spillway Assessment Prgm Cap Mitigation						2,300.00	2,500.00					
1811	3H	5794174	Upper Peak Install Rip Rap SAIP												
1812	3H	5794806	Bucks Storage Spillway Improv SAIP												
1813	3H	3H Total		438.86	1,439.00	19,845.53	23,883.78	17,708.49	27,787.20	72,955.55	144,247.48	155,128.15	103,296.29	88,334.14	Sum of Lines 1761-1812
1814	3H	5795379	Power Gen CEWA Straight Time Capital						116.17	118.61	121.22	123.88	126.61	129.39	
1815	3Q	3Q Total							116.17	118.61	121.22	123.88	126.61	129.39	Line 1815
1816	3Q	Grand Total		255,661.51	261,391.57	212,242.87	188,068.51	197,937.27	222,982.94	227,948.36	366,286.52	348,743.37	303,893.15	261,443.08	2,175,918.13 and 1816
1817	3Q														

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 2L
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	29,592		WP 4-50, Line 1
2		Adjustment	17,236	Fordyce Dam Leakage Reduction	WP 4-58, Line 90
3		Adjustment	3,500	HC: Cableways Install Hornet Cabinets	WP 4-62, Line 312
4		Adjustment	1,255	Pit 6 Radial Gate (1 & 2) Repl Arms & Trunnions	WP 4-60, Line 225 & WP 4-61, Line 250
5		Adjustment	1,817	Kerckhoff 2 - Replace Interior Roof	WP 4-61, Line 278
6		Adjustment	-14,993	Lower Bucks Dam Install Upstream Liner	WP 4-59, Line 135
7		Misc Adjustment	4,576	Net adjustment for yearly cost fluctuations	Line 10 less sum of Lines 1-6
8		Total Net Change	13,391		Sum of Lines 2-7
9					
10	2021	Forecast	42,983		WP 4-50, Line 1
11		Adjustment	-3,500	HC: Cableways Install Hornet Cabinets	WP 4-62, Line 312
12		Misc Adjustment	-400	Net adjustment for yearly cost fluctuations	Line 15 less sum of Lines 10-11
13		Total Net Change	-3,900		Sum of Lines 11-12
14					
15	2022	Forecast	39,083		WP 4-50, Line 1
16		Adjustment	8,600	Lower Bucks Dam Resurface DS Face	WP 4-61, Line 302
17		Adjustment	11,379	Pit 6 Radial Gate (1 & 2) Repl Arms & Trunnions	WP 4-60, Line 225 & WP 4-61, Line 250
18		Adjustment	3,957	Pit 6 Spillway Apron Replace Block 3	WP 4-61, Line 271
19		Misc Adjustment	-59	Net adjustment for yearly cost fluctuations	Line 22 less sum of Lines 15-18
20		Total Net Change	23,877		Sum of Lines 16-19
21					
22	2023	Forecast	62,960		WP 4-50, Line 1
23		Adjustment	-2,364	Pit 6 Radial Gate (1 & 2) Repl Arms & Trunnions	WP 4-60, Line 225 & WP 4-61, Line 250
24		Adjustment	-4,059	Pit 6 Spillway Apron Replace Block 3	WP 4-61, Line 271
25		Adjustment	-8,700	Fordyce Dam Leakage Reduction	WP 4-58, Line 90
26		Misc Adjustment	250	Net adjustment for yearly cost fluctuations	Line 29 less sum of Lines 22-25
27		Total Net Change	-14,873		Sum of Lines 23-26
28					
29	2024	Forecast	48,087		WP 4-50, Line 1
30		Adjustment	-8,500	Fordyce Dam Leakage Reduction	WP 4-58, Line 90
31		Adjustment	-12,754	Pit 6 Radial Gate (1 & 2) Repl Arms & Trunnions	WP 4-60, Line 225 & WP 4-61, Line 250
32		Misc Adjustment	-775	Net adjustment for yearly cost fluctuations	Line 35 less sum of Lines 29-31
33		Total Net Change	-22,029		Sum of Lines 30-32
34					
35	2025	Forecast	26,058		WP 4-50, Line 1
36		Adjustment	-4,000	Fordyce Dam Leakage Reduction	WP 4-58, Line 90
37		Adjustment	-1,962	Pit 7 Radial Gate (1 & 2) Repl Arms & Trunnions	WP 4-60, Line 224 & WP 4-61, Line 251
38		Misc Adjustment	-1,447	Net adjustment for yearly cost fluctuations	Line 41 less sum of Lines 35-37
39		Total Net Change	-7,409		Sum of Lines 36-38
40					
41	2026	Forecast	18,648		WP 4-50, Line 1

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 2M
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	94,880		WP 4-50, Line 2
2		Adjustment	-2,918	Pit 6 U2 Replace Transformer	WP 4-70, Line 858
3		Adjustment	1,887	Haas U2 Rotor Pole Refurb	WP 4-73, Line 1035
4		Misc Adjustment	-721	Net adjustment for yearly cost fluctuations on generator Rewind/Restack related projects	Line 7 less sum of Lines 1-3
5		Total Net Change	-1,752		Sum of Lines 2-4
6					
7	2021	Forecast	93,128		WP 4-50, Line 2
8		Adjustment	-5,300	Caribou 1 PH Rewind U1	WP 4-63, Line 398
9		Adjustment	-4,500	Pit 5 Unit 4 Replace WGs, FPs & Seal Rng	WP 4-71, Line 902
10		Adjustment	-5,000	Caribou 1 U1 Repl Runners-Bearings-Shaft	WP 4-63, Line 414
11		Adjustment	-2,795	Haas U2 Rotor Pole Refurb	WP 4-73, Line 1035
12		Adjustment	-2,335	Rock Cr PH Refurb GSU Bank 1, 2 & Spare	WP 4-63, Line 404
13		Misc Adjustment	-3,958	Net adjustment for yearly cost fluctuations on generator Rewind/Restack related projects	Line 16 less sum of Lines 7-12
14		Total Net Change	-23,888		Sum of Lines 8-13
15					
16	2022	Forecast	69,240		WP 4-50, Line 2
17		Adjustment	2,000	Pit 4 Replace Generator Air Breakers	WP 4-68, Line 686
18		Adjustment	2,007	Caribou 1 U2 Repl Runners-Bearing-Shaft	WP 4-63, Line 415
19		Adjustment	2,000	Helms Repl Elevator Shaft Control Wiring	WP 4-73, Line 1012
20		Adjustment	3,000	SCADA Powerhouse Automation	WP 4-74, Line 1061
21		Adjustment	4,750	JBB Replace Transformer Bank 1	WP 4-70, Line 861
22		Misc Adjustment	1,464	Net adjustment for yearly cost fluctuations on generator Rewind/Restack related projects	Line 25 less sum of Lines 16-21
23		Total Net Change	15,221		Sum of Lines 17-22
24					
25	2023	Forecast	84,460		WP 4-50, Line 2
26		Adjustment	5,258	Pit 3 & 4 Turbine Upgrades	WP 4-67, Lines 656-658 & WP 4-63, Line 406
27		Adjustment	2,500	Caribou 1 U2 Replace Needles & Seats	WP 4-64, Line 474
28		Misc Adjustment	1,634	Net adjustment for yearly cost fluctuations on generator Rewind/Restack related projects	Line 31 less sum of Lines 25-27
29		Total Net Change	9,392		Sum of Lines 26-28
30					
31	2024	Forecast	93,852		WP 4-50, Line 2
32		Adjustment	10,381	Helms - U3 Repl TSV	WP 4-70, Line 825
33		Adjustment	4,000	AM: Turbine/Runner Replmnt Prgm Capital	WP 4-63, Line 391
34		Adjustment	6,342	Pit 3 & 4 Turbine Upgrades	WP 4-67, Lines 656-658 & WP 4-63, Line 406
35		Adjustment	3,001	Caribou 1 U3 Repl Rnnr, Brng, Shft & Ndl	WP 4-63, Line 416
36		Adjustment	3,000	Cresta U1 Replace Wicket Gates & FPs	WP 4-66, Line 615
37		Adjustment	4,000	Helms Replace 230kV Oil-Filled Cables	WP 4-70, Line 845
38		Adjustment	5,449	Balch 2 Bank 2 & 3 Replacement	WP 4-71, Line 903 & WP 4-73, Line 1015
39		Misc Adjustment	4,405	Net adjustment for yearly cost fluctuations on generator Rewind/Restack related projects	Line 42 less sum of Lines 31-38
40		Total Net Change	40,578		Sum of Lines 32-39
41					
42	2025	Forecast	134,430		WP 4-50, Line 2
43		Adjustment	-5,258	Pit 3 & 4 Turbine Upgrades	WP 4-67, Lines 656-658 & WP 4-63, Line 406
44		Adjustment	-10,083	Helms - U3 Repl TSV	WP 4-70, Line 825
45		Misc Adjustment	-985	Net adjustment for yearly cost fluctuations on generator Rewind/Restack related projects	Line 48 less sum of Lines 42-44
46		Total Net Change	-16,326		Sum of Lines 43-45
47					
48	2026	Forecast	118,105		WP 4-50, Line 2

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 2N
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	45,193		WP 4-50, Line 3
2		Adjustment	-4,322	Lake Valley (Drum) LLO Repl Pipe	WP 4-75, Line 1160
3		Adjustment	-4,770	Tiger Cr Cnl-Install Flume Lnr 2019/2020	WP 4-79, Line 1398
4		Adjustment	1,911	Rock Creek Cresta Coffe Dam	WP 4-80, Line 1449
5		Misc Adjustment	309	Net adjustment for yearly cost fluctuations on Reservoir and Dam related projects	Line 8 less sum of Lines 1-4
6		Total Net Change	-6,871		Sum of Lines 2-5
7					
8	2021	Forecast	38,322		WP 4-50, Line 3
9		Adjustment	-2,199	Tiger Cr Cnl-Install Flume Lnr 2020/2021	WP 4-79, Line 1399
10		Adjustment	-1,980	Rock Creek Cresta Coffe Dam	WP 4-80, Line 1449
11		Adjustment	-1,970	Drum Annual Cnl Liner Improvements 2021	WP 4-81, Line 1492
12		Adjustment	-1,954	Helms - Install Incline Tunnel Liner	WP 4-79, Line 1382
13		Adjustment	-1,721	Pit 4 Replace PSV Valve Controls	WP 4-77, Line 1247
14		Misc Adjustment	-839	Net adjustment for yearly cost fluctuations on Reservoir and Dam related projects	Line 17 less sum of Lines 8-13
15		Total Net Change	-10,663		Sum of Lines 9-14
16					
17	2022	Forecast	27,658		WP 4-50, Line 3
18		Adjustment	9,750	Relief Dam (Stanislaus) Replace Liner	WP 4-78, Line 1363
19		Adjustment	6,584	Helms - Install Incline Tunnel Liner	WP 4-79, Line 1382
20		Misc Adjustment	-1,310	Net adjustment for yearly cost fluctuations on Reservoir and Dam related projects	Line 23 less sum of Lines 17-19
21		Total Net Change	15,024		Sum of Lines 18-20
22					
23	2023	Forecast	42,682		WP 4-50, Line 3
24		Adjustment	-10,000	Relief Dam (Stanislaus) Replace Liner	WP 4-78, Line 1363
25		Adjustment	-2,394	Courtright Dam Upgrade I/D Gate Control	WP 4-79, Line 1376
26		Misc Adjustment	466	Net adjustment for yearly cost fluctuations on Reservoir and Dam related projects	Line 29 less sum of Lines 23-25
27		Total Net Change	-11,928		Sum of Lines 24-26
28					
29	2024	Forecast	30,754		WP 4-50, Line 3
30		Adjustment	-4,800	Pit 3 LLO No1. Refurbish Actuator	WP 4-80, Line 1450
31		Misc Adjustment	-632	Net adjustment for yearly cost fluctuations on Reservoir and Dam related projects	Line 34 less sum of Lines 29-30
32		Total Net Change	-5,432		Sum of Lines 30-31
33					
34	2025	Forecast	25,322		WP 4-50, Line 3
35		Misc Adjustment	-533	Net adjustment for yearly cost fluctuations on Reservoir and Dam related projects	Line 38 less Line 34
36		Total Net Change	-533		Line 35
37					
38	2026	Forecast	24,788		WP 4-50, Line 3

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 2P
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	8,015		WP 4-50, Line 4
2		Adjustment	3,681	Pit 3 PH Replace Crane(s) Controls	WP 4-84, Line 1706
3		Adjustment	3,067	Pit 5 PH Access Road Bridge Installation	WP 4-82, Line 1589
4		Adjustment	1,215	Drum Penstock Access Improvements	WP 4-84, Line 1686
5		Adjustment	1,136	Haas - Replace Elevator Controls	WP 4-83, Line 1671
6		Misc Adjustment	2,257	Net adjustment for yearly cost fluctuations on Hydro Buildings related projects	Line 9 less sum of Lines 1-5
7		Total Net Change	11,356		Sum of Lines 2-6
8					
9	2021	Forecast	19,372		WP 4-50, Line 4
10		Adjustment	-3,310	Pit 5 PH Access Road Bridge Installation	WP 4-82, Line 1589
11		Misc Adjustment	86	Net adjustment for yearly cost fluctuations on Hydro Buildings related projects	Line 14 less sum of Lines 9-10
12		Total Net Change	-3,224		Sum of Lines 10-11
13					
14	2022	Forecast	16,148		WP 4-50, Line 4
15		Adjustment	6,315	JBB Willow Creek Rd Stabilization	WP 4-84, Line 1728
16		Adjustment	2,500	Pit 5 PH Replace Crane(s) Controls	WP 4-84, Line 1707
17		Adjustment	2,475	Helms Crane Rail Capacity Uprate	WP 4-84, Line 1688
18		Misc Adjustment	-864	Net adjustment for yearly cost fluctuations on Hydro Buildings related projects	Line 21 less sum of Lines 14-17
19		Total Net Change	10,426		Sum of Lines 15-18
20					
21	2023	Forecast	26,574		WP 4-50, Line 4
22		Adjustment	-6,500	JBB Willow Creek Rd Stabilization	WP 4-84, Line 1728
23		Adjustment	-2,775	Helms Crane Rail Capacity Uprate	WP 4-84, Line 1688
24		Adjustment	-1,500	Pit 5 PH Replace Crane(s) Controls	WP 4-84, Line 1707
25		Misc Adjustment	-1,246	Net adjustment for yearly cost fluctuations on Hydro Buildings related projects	Line 28 less sum of Lines 21-24
26		Total Net Change	-12,021		Sum of Lines 22-25
27					
28	2024	Forecast	14,553		WP 4-50, Line 4
29		Adjustment	-1,000	Pit 5 PH Replace Crane(s) Controls	WP 4-84, Line 1707
30		Misc Adjustment	-600	Net adjustment for yearly cost fluctuations on Hydro Buildings related projects	Line 33 less sum of Lines 28-29
31		Total Net Change	-1,600		Sum of Lines 29-30
32					
33	2025	Forecast	12,954		WP 4-50, Line 4
34		Adjustment	-2,803	Pit 3 Repave Road	WP 4-84, Line 1729
35		Misc Adjustment	-501	Net adjustment for yearly cost fluctuations on Hydro Buildings related projects	Line 38 less sum of Lines 33-34
36		Total Net Change	-3,304		Sum of Lines 34-35
37					
38	2026	Forecast	9,650		WP 4-50, Line 4

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 3H
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	17,708		WP 4-50, Line 5
2		Adjustment	5,000	McCloud Spillway Improvements SAIP	WP 4-86, Line 1806
3		Adjustment	2,300	Spillway Assessment Prgm Cap Mitigation	WP 4-86, Line 1810
4		Adjustment	1,827	UNFFR LC-Capital Projects	WP 4-85, Line 1778
5		Adjustment	1,294	Balch 1 & 2 Relicensing	WP 4-85, Line 1785
6		Misc Adjustment	-342	Net adjustment for yearly cost fluctuations on relicensing spending for other licenses	Line 9 less sum of Lines 1-5
7		Total Net Change	10,079		Sum of Lines 2-6
8					
9	2021	Forecast	27,787		WP 4-50, Line 5
10		Adjustment	13,150	UNFFR LC-Capital Projects	WP 4-85, Line 1778
11		Adjustment	7,000	Salmon HEA Implement - UNFFR LC	WP 4-85, Line 1795
12		Adjustment	5,180	McCloud-Pit License Conditions - Capital	WP 4-85, Line 1772
13		Adjustment	4,650	Lower Bucks Spillway Restoration SAIP	WP 4-86, Line 1805
14		Adjustment	3,500	Helms Relicensing FERC #2735	WP 4-85, Line 1787
15		Adjustment	2,800	Balch 1 & 2 Relicensing	WP 4-85, Line 1785
16		Adjustment	2,787	McCloud Spillway Improvements SAIP	WP 4-86, Line 1806
17		Misc Adjustment	6,101	Net adjustment for yearly cost fluctuations on relicensing spending for other licenses	Line 20 less sum of Lines 9-16
18		Total Net Change	45,168		Sum of Lines 10-17
19					
20	2022	Forecast	72,956		WP 4-50, Line 5
21		Adjustment	32,213	McCloud Spillway Improvements SAIP	WP 4-86, Line 1806
22		Adjustment	22,600	McCloud-Pit License Conditions - Capital	WP 4-85, Line 1772
23		Adjustment	18,057	Drum-Spauding Lic Cond	WP 4-85, Line 1769
24		Adjustment	12,200	Tiger Creek Reg Spillway Improv SAIP	WP 4-86, Line 1808
25		Adjustment	-11,848	UNFFR LC-Capital Projects	WP 4-85, Line 1778
26		Misc Adjustment	-1,930	Net adjustment for yearly cost fluctuations on relicensing spending for other licenses	Line 29 less sum of Lines 20-25
27		Total Net Change	71,292		Sum of Lines 21-26
28					
29	2023	Forecast	144,247		WP 4-50, Line 5
30		Adjustment	17,300	McCloud-Pit License Conditions - Capital	WP 4-85, Line 1772
31		Adjustment	5,000	Tiger Creek Reg Spillway Improv SAIP	WP 4-86, Line 1808
32		Adjustment	-10,000	Butt Valley Spillway Improv SAIP	WP 4-86, Line 1802
33		Misc Adjustment	-1,419	Net adjustment for yearly cost fluctuations on relicensing spending for other licenses	Line 36 less sum of Lines 29-32
34		Total Net Change	10,881		Sum of Lines 30-33
35					
36	2024	Forecast	155,128		WP 4-50, Line 5
37		Adjustment	-35,700	McCloud-Pit License Conditions - Capital	WP 4-85, Line 1772
38		Adjustment	-19,520	Tiger Creek Reg Spillway Improv SAIP	WP 4-86, Line 1808
39		Adjustment	5,000	Belden Forebay Spillway Improv SAIP	WP 4-86, Line 1800
40		Misc Adjustment	-1,612	Net adjustment for yearly cost fluctuations on relicensing spending for other licenses	Line 43 less sum of Lines 36-39
41		Total Net Change	-51,832		Sum of Lines 37-40
42					
43	2025	Forecast	103,296		WP 4-50, Line 5
44		Adjustment	-8,562	Drum-Spauding Lic Cond	WP 4-85, Line 1769
45		Adjustment	-5,000	Belden Forebay Spillway Improv SAIP	WP 4-86, Line 1800
46		Misc Adjustment	-1,400	Net adjustment for yearly cost fluctuations on relicensing spending for other licenses	Line 49 less sum of Lines 43-45
47		Total Net Change	-14,962		Sum of Lines 44-46
48					
49	2026	Forecast	88,334		WP 4-50, Line 5

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 05
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	1,898		WP 4-50, Line 8
2		Misc Adjustment	-1,197	Reduction in overall tools and equipment forecast across all hydro areas	Line 5 less Line 1
3		Total Net Change	-1,197		Line 2
4					
5	2021	Forecast	701		WP 4-50, Line 8
6		Misc Adjustment	285	Net adjustment for yearly cost fluctuations in tools and equipments	Line 9 less Line 5
7		Total Net Change	285		Line 6
8					
9	2022	Forecast	986		WP 4-50, Line 8
10		Misc Adjustment	-419	Net adjustment for yearly cost fluctuations in tools and equipments	Line 13 less Line 9
11		Total Net Change	-419		Line 10
12					
13	2023	Forecast	567		WP 4-50, Line 8
14		Misc Adjustment	79	Net adjustment for yearly cost fluctuations in tools and equipments	Line 17 less Line 13
15		Total Net Change	79		Line 14
16					
17	2024	Forecast	645		WP 4-50, Line 8
18		Misc Adjustment	61	Net adjustment for yearly cost fluctuations in tools and equipments	Line 21 less Line 17
19		Total Net Change	61		Line 18
20					
21	2025	Forecast	706		WP 4-50, Line 8
22		Misc Adjustment	82	Net adjustment for yearly cost fluctuations in tools and equipments	Line 25 less Line 21
23		Total Net Change	82		Line 22
24					
25	2026	Forecast	788		WP 4-50, Line 8

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 11
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	567		WP 4-50, Line 9
2		Adjustment	-128	Battle Cr Salmon/Steelhead Phase 2	WP 4-57, Line 25
3		Adjustment	111	Battle Creek NFSL Additional Design Imp	WP 4-57, Line 30
4		Total Net Change	-17		Sum of Lines 2-3
5					
6	2021	Forecast	550		WP 4-50, Line 9
7		Adjustment	1,200	Battle Cr Salmon/Steelhead Phase 2	WP 4-57, Line 25
8		Total Net Change	1,200		Line 7
9					
10	2022	Forecast	1,750		WP 4-50, Line 9
11		Adjustment	2,500	Caribou Camp Capital Improvements	WP 4-57, Line 34
12		Total Net Change	2,500		Line 11
13					
14	2023	Forecast	4,250		WP 4-50, Line 9
15		Adjustment	-250	Battle Creek NFSL Additional Design Imp	WP 4-57, Line 30
16		Total Net Change	-250		Line 15
17					
18	2024	Forecast	4,000		WP 4-50, Line 9
19		Adjustment	-1,000	Battle Cr Salmon/Steelhead Phase 2	WP 4-57, Line 25
20		Adjustment	-2,500	Caribou Camp Capital Improvements	WP 4-57, Line 34
21		Total Net Change	-3,500		Sum of Lines 19-20
22					
23	2025	Forecast	500		WP 4-50, Line 9
24		Adjustment	-500	Battle Cr Salmon/Steelhead Phase 2	WP 4-57, Line 25
25		Total Net Change	-500		Line 24
26					
27	2026	Forecast	0		WP 4-50, Line 9

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 12
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	84		WP 4-50, Line 10
2		Adjustment	-59	Haas Remove OSPP	WP 4-57, Line 40
3		Misc Adjustment	-1	Net adjustment for yearly cost fluctuations	Line 6 less sum of Lines 1-2
4		Total Net Change	-60		Sum of Lines 2-3
5					
6	2021	Forecast	24		WP 4-50, Line 10
7		Adjustment	-14	Haas Remove OSPP	WP 4-57, Line 40
8		Total Net Change	-14		Line 7
9					
10	2022	Forecast	10		WP 4-50, Line 10
11		Adjustment	415	Haas Remove OSPP	WP 4-57, Line 40
12		Total Net Change	415		Line 11
13					
14	2023	Forecast	425		WP 4-50, Line 10
15		Adjustment	-425	Haas Remove OSPP	WP 4-57, Line 40
16		Adjustment	1,000	AM: Sumps Systems -Capital	WP 4-57, Line 48
17		Total Net Change	575		Sum of Lines 15-16
18					
19	2024	Forecast	1,000		WP 4-50, Line 10
20		Adjustment	-500	AM: Sumps Systems -Capital	WP 4-57, Line 48
21		Total Net Change	-500		Line 20
22					
23	2025	Forecast	500		WP 4-50, Line 10
24		Adjustment	500	AM: Sumps Systems -Capital	WP 4-57, Line 48
25		Total Net Change	500		Line 24
26					
27	2026	Forecast	1,000		WP 4-50, Line 10

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Capital Walk by Major Work Category 3Q
(Thousands of Dollars)

Line No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Adjusted Recorded	0		WP 4-50, Line 11
2		Adjustment	116	Power Gen CEMA Straight Time Capital	WP 4-86, Line 1815
3		Total Net Change	116		Line 2
4					
5	2021	Forecast	116		WP 4-50, Line 11
6		Escalation	2	Power Gen CEMA Straight Time Capital	WP 4-86, Line 1815
7		Total Net Change	2		Line 6
8					
9	2022	Forecast	119		WP 4-50, Line 11
10		Escalation	3	Power Gen CEMA Straight Time Capital	WP 4-86, Line 1815
11		Total Net Change	3		Line 10
12					
13	2023	Forecast	121		WP 4-50, Line 11
14		Escalation	3	Power Gen CEMA Straight Time Capital	WP 4-86, Line 1815
15		Total Net Change	3		Line 14
16					
17	2024	Forecast	124		WP 4-50, Line 11
18		Escalation	3	Power Gen CEMA Straight Time Capital	WP 4-86, Line 1815
19		Total Net Change	3		Line 18
20					
21	2025	Forecast	127		WP 4-50, Line 11
22		Escalation	3	Power Gen CEMA Straight Time Capital	WP 4-86, Line 1815
23		Total Net Change	3		Line 22
24					
25	2026	Forecast	129		WP 4-50, Line 11

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Capital
(Thousands of Nominal Dollars)

Line	Planning			2023
No.	Order	Planning Order Description	Mitigation or Control Name	Forecast (\$000)
1	Extended Unplanned Shutdown of a Critical Power Generation Asset			
2	5777491	Stan-Relief Dam Gunite Liner	M1 - Component Replacement or Repair Civil	2N 10,000
3	5779209	Helms - Install Incline Tunnel Liner	M1 - Component Replacement or Repair Civil	2N 7,064
4	5792563	JBB Willow Creek Rd Stabilization	M1 - Component Replacement or Repair Civil	2P 6,500
5	5794032	McCloud Spillway Improvements SAIP	M1 - Component Replacement or Repair Civil	3H 4,000
6	5779437	Helms - Crane Rail Capacity Uprate	M1 - Component Replacement or Repair Civil	2P 2,775
7	5794035	Tiger Creek Reg Spillway Improv SAIP	M1 - Component Replacement or Repair Civil	3H 1,500
8	5779472	Tiger Cr Cnl-Install Flume Lnr 2022/2023	M1 - Component Replacement or Repair Civil	2N 1,351
9	5779398	Drum Penstock Access Improvements	M1 - Component Replacement or Repair Civil	2P 1,000
10	5794027	Butt Valley Spillway SAIP Improvements	M1 - Component Replacement or Repair Civil	3H 1,000
11	5793569	Tiger Creek Bellows Joint Replacement	M1 - Component Replacement or Repair Civil	2M 900
12	5783541	Lower Bucks Dam Resurface DS Face	M1 - Component Replacement or Repair Civil	2L 900
13	5779420	Balch 1 Wheel Pit Liner	M1 - Component Replacement or Repair Civil	2M 729
14	5794098	Spillway Assessment Prgm Cap Mitigation	M1 - Component Replacement or Repair Civil	3H 710
15	5792566	Pit 1 Forebay Manufacture Stop Logs	M1 - Component Replacement or Repair Civil	2N 512
16	5779022	Tiger Creek Road MP 1.7 Gabion Wall	M1 - Component Replacement or Repair Civil	2P 500
17	5787738	Poe PH SS Rock Slide Mitigate Erosion	M1 - Component Replacement or Repair Civil	2P 460
18	5779214	Pit 6 Spillway Apron Replace Block 3	M1 - Component Replacement or Repair Civil	2L 406
19	5792558	Pit 6 Dam Road Stabilization Capital	M1 - Component Replacement or Repair Civil	2P 250
20	5780881	MainTuolumne Cl-Install Shot Lin 2023	M1 - Component Replacement or Repair Civil	2N 250
21	5793609	Drum Canal Install Foot Bridge at 373+00	M1 - Component Replacement or Repair Civil	2L 200
22	5793610	Drum Canal Install Foot Bridge at 227+50	M1 - Component Replacement or Repair Civil	2L 200
23	5760654	Cresta U2 PRV Energy Dissipators Replace	M1 - Component Replacement or Repair Civil	2M 160
24	5511186	DeSabra Inst/Repl Rsrvrs, Dams & Wtrwys	M1 - Component Replacement or Repair Civil	2N 113
25	5511187	Shasta Inst/Repl Rsrvrs, Dams & Wtrwys	M1 - Component Replacement or Repair Civil	2N 113
26	5776830	Pit 5 PH Surge Chamber & Valve House Sli	M1 - Component Replacement or Repair Civil	2P 100
27	5794013	Belden Forebay Spillway Improv SAIP	M1 - Component Replacement or Repair Civil	3H 100
28	5783000	Lower Blue Seepage Reduction	M1 - Component Replacement or Repair Civil	2N 90
29	5511189	MLode Inst/Repl Rsrvrs, Dams & Wtrwys	M1 - Component Replacement or Repair Civil	2N 56
30	5511188	Drum Inst/Repl Rsrvrs, Dams & Wtrwys	M1 - Component Replacement or Repair Civil	2N 56
31	5768238	Drum Canal Pittman Flume Repairs	M1 - Component Replacement or Repair Civil	2M 50
32	5789680	Strawberry Dam (Stan)-Replace Liner 2023	M1 - Component Replacement or Repair Civil	2N 40
33	5780660	K2 Address Leakage and Replace Stairway	M1 - Component Replacement or Repair Civil	2P 23
34	5760651	Cresta U1 PRV Energy Dissipators Replace	M1 - Component Replacement or Repair Civil	2M 5
35	5779577	Salt Springs PH DS Crane Modernization	M1 - Component Replacement or Repair Civil	2P 5
36	5778975	JBB Replace Transformer Bank 1	M2 - Component Replacement or Repair Electrical	2M 5,750
37	5720513	Salt Springs 1 Generator Rewind	M2 - Component Replacement or Repair Electrical	2M 3,500
38	5781162	Cresta PH U2 Rewind	M2 - Component Replacement or Repair Electrical	2M 3,323
39	5762329	Kerckhoff 2 - Generator Rewind/Restack	M2 - Component Replacement or Repair Electrical	2M 3,000
40	5766152	Pit 4 Replace Generator Air Breakers	M2 - Component Replacement or Repair Electrical	2M 3,000
41	5720659	Caribou 2 U5 Generator Rewind	M2 - Component Replacement or Repair Electrical	2M 2,984
42	5785094	Pit 5 PH Replace Crane(s) Controls	M2 - Component Replacement or Repair Electrical	2P 2,500
43	5788224	Helms Repl Elevator Shaft Control Wiring	M2 - Component Replacement or Repair Electrical	2M 2,500
44	5778440	Courtright Dam Upgrade I/D Gate Control	M2 - Component Replacement or Repair Electrical	2N 2,412
45	5787971	SCADA 2023 RTU Life Cycle Replacement	M2 - Component Replacement or Repair Electrical	2M 2,000
46	5788187	Pit 7 PH U1 Replace Gen Relay	M2 - Component Replacement or Repair Electrical	2L 2,000
47	5760669	Drum 2 U5 Rewind	M2 - Component Replacement or Repair Electrical	2M 1,900
48	5792938	Kings River GSU Bank Replacement	M2 - Component Replacement or Repair Electrical	2M 1,800
49	5783123	Helms Install Backup Power at Portal	M2 - Component Replacement or Repair Electrical	2P 1,718
50	5785095	Pit 1 PH Replace Crane(s) Controls	M2 - Component Replacement or Repair Electrical	2P 1,500
51	5760652	Cresta PH Replace Exciter U2	M2 - Component Replacement or Repair Electrical	2M 1,483

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Capital
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023
					Forecast (\$000)
52	5779576	Tiger Creek PH Crane Modernization	M2 - Component Replacement or Repair Electrical	2P	1,478
53	5783125	Helms - Replace 13.8kV Breakers	M2 - Component Replacement or Repair Electrical	2M	1,240
54	5778970	Pit 6 U1 Inst New Bus with Gen Breaker	M2 - Component Replacement or Repair Electrical	2M	1,100
55	5781959	Pit 6 U2 Inst New Bus With Gen Breaker	M2 - Component Replacement or Repair Electrical	2M	1,100
56	5778976	JBB Replace Transformer Bank 2	M2 - Component Replacement or Repair Electrical	2M	1,000
57	5760011	Pit 3 Replace Old AC and DC Panel	M2 - Component Replacement or Repair Electrical	2M	1,000
58	5779419	Balch 1 Replace Cooling Wtr Tank Control	M2 - Component Replacement or Repair Electrical	2P	901
59	5747243	Helms - Repl Load Center 1, 2, 7 & 8	M2 - Component Replacement or Repair Electrical	2M	893
60	5762320	Pit 5 U1 Replace Excitation System	M2 - Component Replacement or Repair Electrical	2M	750
61	5781545	JBB Replace Station Service 1 Tranxfmr	M2 - Component Replacement or Repair Electrical	2M	750
62	5783238	Drum 2 U5 Replace Generator Relays NERC	M2 - Component Replacement or Repair Electrical	2M	750
63	5788226	Haas U1 Rotor Pole Refurb	M2 - Component Replacement or Repair Electrical	2M	632
64	5792939	Balch 2 U2 Reinsulate Field Poles	M2 - Component Replacement or Repair Electrical	2M	500
65	5760010	Pit 3 PH Replace Neutral Transformers	M2 - Component Replacement or Repair Electrical	2M	500
66	5788228	Balch 2 Bank 2 Replacement	M2 - Component Replacement or Repair Electrical	2M	399
67	5780659	Balch 2 Bank 3 Replacement	M2 - Component Replacement or Repair Electrical	2M	375
68	5793557	Tiger Creek Abay Spillway Gates Automati	M2 - Component Replacement or Repair Electrical	2N	300
69	5792950	Kerckhoff 2 - Mitigate Arc Flash 480v	M2 - Component Replacement or Repair Electrical	2M	300
70	5792568	Lake Britton Upgrade RTU	M2 - Component Replacement or Repair Electrical	2N	273
71	5778973	Pit 7 Replace Transformer Bank 1	M2 - Component Replacement or Repair Electrical	2M	250
72	5778974	Pit 7 Replace Transformer Bank 2	M2 - Component Replacement or Repair Electrical	2M	250
73	5792941	Kerckhoff 2 Replace CB 172	M2 - Component Replacement or Repair Electrical	2M	250
74	5780698	Kings River Repl Transformer Mgmt Relays	M2 - Component Replacement or Repair Electrical	2M	200
75	5792734	Balch 1 Replace Gen Stator Louver Ctrl	M2 - Component Replacement or Repair Electrical	2M	200
76	5779122	YB 116 Automate Gate	M2 - Component Replacement or Repair Electrical	2N	200
77	5780661	Balch 2 U2 Repl Transformer Mgmt Relays	M2 - Component Replacement or Repair Electrical	2M	151
78	5781546	JBB Replace Station Service 2 Tranxfmr	M2 - Component Replacement or Repair Electrical	2M	150
79	5778900	Tiger Creek U2 Rewind	M2 - Component Replacement or Repair Electrical	2M	112
80	5766242	Drum U5 Install RTD	M2 - Component Replacement or Repair Electrical	2M	105
81	5779526	Poe PH Replace GSU Transformer Bank 1	M2 - Component Replacement or Repair Electrical	2M	100
82	5720657	Caribou 1 U2 Rewind	M2 - Component Replacement or Repair Electrical	2M	98
83	5779429	Haas U1 Communic/Annunc+Device43 Swtchs	M2 - Component Replacement or Repair Electrical	2M	93
84	5768011	Poe PH U1 Replace Excitation System	M2 - Component Replacement or Repair Electrical	2M	80
85	5782089	Pit 3 U1 Repl Bearing Temperature Relay	M2 - Component Replacement or Repair Electrical	2M	60
86	5780662	Balch 2 U3 Repl Transformer Mgmt Relays	M2 - Component Replacement or Repair Electrical	2M	50
87	5766241	Tiger Creek U2 Exciter Replacement	M2 - Component Replacement or Repair Electrical	2M	25
88	5766243	Tiger Creek Generator Relays Unit 2	M2 - Component Replacement or Repair Electrical	2M	21
89	5720726	Caribou 1 U2 Repl Runners, Bearing&Shaft	M3 - Component Replacement or Repair Mechanical	2M	2,135
90	5720663	Cresta U2 Wickets & FPs Replace	M3 - Component Replacement or Repair Mechanical	2M	2,000
91	5780674	Helms U1 Refurb Wicket Gate Servo	M3 - Component Replacement or Repair Mechanical	2M	1,888
92	5778045	Helms - U3 Repl TSV	M3 - Component Replacement or Repair Mechanical	2M	1,796
93	5764558	Pit 5 Autom Gen Brg Oil Filtration & Htg	M3 - Component Replacement or Repair Mechanical	2M	1,766
94	5771200	Pit 6 Radial Gate1 Repl Arms & Trunnions	M3 - Component Replacement or Repair Mechanical	2L	1,272
95	5766154	JBB PH U1 Upgrade Governor Controls	M3 - Component Replacement or Repair Mechanical	2M	1,116
96	5779418	Balch 1 - Replace PSV	M3 - Component Replacement or Repair Mechanical	2M	892
97	5772621	Kerckhoff Dam - Replace Radial Gate Trun	M3 - Component Replacement or Repair Mechanical	2N	850
98	5792675	Poe Dam Rpl Radial BP Gate Hoist & Ctrl	M3 - Component Replacement or Repair Mechanical	2N	800
99	5760722	Salt Springs 2 Replace Needles & Seats	M3 - Component Replacement or Repair Mechanical	2M	800
100	5779443	K2 - Replace Governor	M3 - Component Replacement or Repair Mechanical	2M	761
101	5793575	Stanislaus Refurbish TWD (2)	M3 - Component Replacement or Repair Mechanical	2M	750
102	5739725	Haas - CO2 Retrofit	M3 - Component Replacement or Repair Mechanical	2M	746

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Capital
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023
					Forecast (\$000)
103	5779434	Haas U2 Replace TSV Seats	M3 - Component Replacement or Repair Mechanical	2M	691
104	5768002	JBB Unit 2 Convert to Digital Governor	M3 - Component Replacement or Repair Mechanical	2M	558
105	5762324	Pit 3 U1 Turbine Upgrade	M3 - Component Replacement or Repair Mechanical	2M	558
106	5792674	Cresta Dam Repl Radial BP Gate Hoist	M3 - Component Replacement or Repair Mechanical	2N	500
107	5779442	Helms - Ventilation Upgrade	M3 - Component Replacement or Repair Mechanical	2L	500
108	5792944	Helms U1 Replace Turbine Equalizing Line	M3 - Component Replacement or Repair Mechanical	2M	500
109	5786880	Helms - U3 Repl Turbine Equalizing Line	M3 - Component Replacement or Repair Mechanical	2M	500
110	5785096	Pit 3 Restore LLO No.1 (capital)	M3 - Component Replacement or Repair Mechanical	2N	500
111	5778043	Helms - U1 Repl TSV	M3 - Component Replacement or Repair Mechanical	2M	450
112	5778044	Helms - U2 Repl TSV	M3 - Component Replacement or Repair Mechanical	2M	450
113	5758136	Helms - Switchyard Emerg Access/Elevator	M3 - Component Replacement or Repair Mechanical	2M	350
114	5768960	Rock Cr PH Replace Tailrace Gates	M3 - Component Replacement or Repair Mechanical	2N	350
115	5500325	Shasta Instal/Replace Hydro Gen Equip	M3 - Component Replacement or Repair Mechanical	2M	339
116	5779207	Helms - Repl Courtright LLO Bypass Valve	M3 - Component Replacement or Repair Mechanical	2N	331
117	5739698	Balch 1 - Replace Governor	M3 - Component Replacement or Repair Mechanical	2M	315
118	5785793	Balch 2 U2 Replace Bearing Cooling Coil	M3 - Component Replacement or Repair Mechanical	2M	283
119	5785794	Balch 2 U3 Replace Bearing Cooling Coil	M3 - Component Replacement or Repair Mechanical	2M	282
120	5778971	Pit 7 U1 Inst New Bus With Gen Breaker	M3 - Component Replacement or Repair Mechanical	2M	250
121	5779446	Kings River - Upgrade Cooling Water Syst	M3 - Component Replacement or Repair Mechanical	2M	250
122	5779445	Kings River - Replace Brgs/Install RTDs	M3 - Component Replacement or Repair Mechanical	2M	250
123	5776722	Pit 6 Radial Gate2 Repl Arms & Trunnions	M3 - Component Replacement or Repair Mechanical	2L	250
124	5502519	Balch 2 U2/U3 Replace 5&12 Way Valve	M3 - Component Replacement or Repair Mechanical	2M	248
125	5778921	Electra U3 Convert to Digital Governor	M3 - Component Replacement or Repair Mechanical	2M	225
126	5772018	Haas - Replace U1 Bearings/Install RTDs	M3 - Component Replacement or Repair Mechanical	2M	219
127	5758119	Balch 2 U2 Repl Cooling Wtr System	M3 - Component Replacement or Repair Mechanical	2M	208
128	5793558	Drum Siphon Trash Rack Improvements	M3 - Component Replacement or Repair Mechanical	2M	200
129	5500327	Drum Inst/Repl Hydro Generating Equip	M3 - Component Replacement or Repair Mechanical	2M	169
130	5500328	Motherlode Inst/Repl Hydro Generating E	M3 - Component Replacement or Repair Mechanical	2M	169
131	5765059	Balch 2 - U3 Replace TSV Actuator Seal	M3 - Component Replacement or Repair Mechanical	2M	168
132	5760617	Balch 2 U3 Upgrade Cooling Water System	M3 - Component Replacement or Repair Mechanical	2M	153
133	5771199	Pit 7 Radial Gate1 Repl Arms & Trunnions	M3 - Component Replacement or Repair Mechanical	2L	134
134	5766153	Pit 5 TGB Install Inline Oil Filtration	M3 - Component Replacement or Repair Mechanical	2M	120
135	5766244	Drum U5 Cooling Water Flow meters	M3 - Component Replacement or Repair Mechanical	2M	105
136	5779444	K2 - Turbine Upgrade	M3 - Component Replacement or Repair Mechanical	2M	100
137	5792673	Rock Cr Dam Repl Radial BP Gate Hoist	M3 - Component Replacement or Repair Mechanical	2N	100
138	5792943	Kings River Rotor Pole Refurb	M3 - Component Replacement or Repair Mechanical	2M	100
139	5792947	Helms Liquid Rheostat A	M3 - Component Replacement or Repair Mechanical	2M	100
140	5792740	Haas Replace PSV Seat	M3 - Component Replacement or Repair Mechanical	2M	100
141	5782986	Cresta PH U2 Install Bearing Monitoring	M3 - Component Replacement or Repair Mechanical	2M	100
142	5793603	Drum 1 Governor Oil Fire System	M3 - Component Replacement or Repair Mechanical	2L	100
143	5760135	Lower Rock Dam (Drum) Intake Replacement	M3 - Component Replacement or Repair Mechanical	2N	100
144	5792956	Balch 1 Repl Rocktrap Drain Valve & Line	M3 - Component Replacement or Repair Mechanical	2M	100
145	5760630	Caribou 1 Refurb PSV Aux Equip	M3 - Component Replacement or Repair Mechanical	2M	88
146	5775222	Haas - U2 Repl Bearings - Install RTDs	M3 - Component Replacement or Repair Mechanical	2M	80
147	5785795	Haas U1 Replace Bearing Cooling Coil	M3 - Component Replacement or Repair Mechanical	2M	75
148	5793590	Drum Canal Tahoe Spill Replace Gate	M3 - Component Replacement or Repair Mechanical	2N	75
149	5783134	Balch 2 U3 Governor Mechanical Upgrades	M3 - Component Replacement or Repair Mechanical	2M	62
150	5780663	Haas U1 Turbine Vapor Mist Recovery Sys	M3 - Component Replacement or Repair Mechanical	2M	53
151	5792691	Stanislaus PH Replace TSV Controls	M3 - Component Replacement or Repair Mechanical	2M	50
152	5779433	Haas U2 Replace TSV Ctrl Water Strainers	M3 - Component Replacement or Repair Mechanical	2M	47
153	5779430	Haas U1 Replace TSV Cntrl Wtr Strainers	M3 - Component Replacement or Repair Mechanical	2M	47

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Risk Register Mapping - Capital
(Thousands of Nominal Dollars)

Line No.	Planning Order	Planning Order Description	Mitigation or Control Name	MWC	2023
					Forecast (\$000)
154	5783131	Balch 2 U2 Governor Mechanical Upgrades	M3 - Component Replacement or Repair Mechanical	2M	41
155	5751038	K2 - Replace CO2 System	M3 - Component Replacement or Repair Mechanical	2L	38
156	5780666	Helms Wishon Replace I/D Gate Seal	M3 - Component Replacement or Repair Mechanical	2N	33
157	5745724	Tiger Creek U2 Gov Control Upgrades	M3 - Component Replacement or Repair Mechanical	2M	30
158	5760655	Cresta U1 Replace Wicket Gates & FPs	M3 - Component Replacement or Repair Mechanical	2M	21
159	5760169	Cresta Replace PSV Aux Equip	M3 - Component Replacement or Repair Mechanical	2N	16
160	5734298	Caribou 1 U2 Upgrade Gov Controls	M3 - Component Replacement or Repair Mechanical	2M	7
161	5785796	Haas U2 Replace Bearing Cooling Coil	M3 - Component Replacement or Repair Mechanical	2M	2
162	5792753	Pit 3 Lake Britton Dam Inst Security Sys	M4 - External Event Mitigation	2L	1,000
163	5762807	Emergent Projects - Capital	M4 - External Event Mitigation	2N	394
164	5793580	Drum PHs 1 & 2 - Install Smoke Detection	M4 - External Event Mitigation	2M	200
165	5750234	DSP: Hydro Dam Security	M4 - External Event Mitigation	2L	120
166	5511182	Drum - Hydro Safety & Regulatory	M4 - External Event Mitigation	2L	100
167					131,749
168		Large Uncontrolled Water Release (Dam Failure)			
169	5745679	Fordyce Dam Leakage Reduction	M1 - Internal Erosion Mitigation	2L	21,700
170	5789680	Strawberry Dam (Stan)-Replace Liner 2023	M1 - Internal Erosion Mitigation	2N	360
171	5794032	McCloud Spillway Improvements SAIP	M2 - Spillway Remediation	3H	36,000
172	5794035	Tiger Creek Reg Spillway Improv SAIP	M2 - Spillway Remediation	3H	13,500
173	5794027	Butt Valley Spillway SAIP Improvements	M2 - Spillway Remediation	3H	9,000
174	5794098	Spillway Assessment Prgm Cap Mitigation	M2 - Spillway Remediation	3H	6,390
175	5779214	Pit 6 Spillway Apron Replace Block 3	M2 - Spillway Remediation	2L	3,653
176	5794013	Belden Forebay Spillway Improv SAIP	M2 - Spillway Remediation	3H	900
177	5779219	Wise Intake Replace Side Spill Gate	M2 - Spillway Remediation	2N	150
178	5771200	Pit 6 Radial Gate1 Repl Arms & Trunnions	M3 - Seismic Retrofit	2L	11,444
179	5783541	Lower Bucks Dam Resurface DS Face	M3 - Seismic Retrofit	2L	8,100
180	5776722	Pit 6 Radial Gate2 Repl Arms & Trunnions	M3 - Seismic Retrofit	2L	2,250
181	5771199	Pit 7 Radial Gate1 Repl Arms & Trunnions	M3 - Seismic Retrofit	2L	1,204
182	5774800	Crane Valley Intake Tower Stabilization	M3 - Seismic Retrofit	2L	290
183	5785096	Pit 3 Restore LLO No.1 (capital)	M4 - LLO Refurbishment	2N	4,500
184	5779207	Helms - Repl Courtright LLO Bypass Valve	M4 - LLO Refurbishment	2N	2,980
185	5780885	Fordyce Dam Replace LLO and Guard Valves	M4 - LLO Refurbishment	2N	150
186					122,571
187					
188		Grand Total			254,319

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2016 Recorded	2017 Recorded	Variance	Variance Required Y/N	Variance Explanation	Percentage Change
1	5	4	03	Office Furniture & Equipment	8	195	186	Yes	Annual Capital Projects started and completed	2206%
2	5	4	05	Tools & Equipment	971	1,144	174	Yes	Annual Capital Projects started and completed	18%
3	5	4	11	Relicensing Hydro Gen	2,467	843	(1,624)	Yes	Annual Capital Projects started and completed	-66%
4	5	4	12	Implement Environment Projects	2,292	2,089	(203)	Yes	Annual Capital Projects started and completed	-9%
5	5	4	2L	Instl/Rpl for Hydro Safety&Reg	40,147	49,888	9,740	Yes	Pit 6 Replace Spillway Apron	24%
6	5	4	2M	Instal/Repl Hydro Generating Eqp	109,942	115,184	5,242	No	NA	5%
7	5	4	2N	Instal/Repl Resv,Dams&Waterway	55,796	50,414	(5,383)	No	NA	-10%
8	5	4	2P	Instl/Repl Hydr BldgGrndInfstr	23,465	33,525	10,061	Yes	2017 Storm Damage Capital related projects at Pit 5, 6 & 7	43%
9	5	4	3H	Hydroelec Lic & Lic Conditions	20,573	8,110	(12,463)	Yes	Merced Falls FERC 2467 Relicense and Kilarc-Cow License Surr Relic	-61%
10	5	4	3Q	Catastrophic Events	-	-	-	No	NA	0%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2017 Recorded	2018 Recorded	Variance	Variance Required Y/N	Variance Explanation	Percentage Change
1	5	4	03	Office Furniture & Equipment	195	270	76	Yes	Annual Capital Projects started and completed	39%
2	5	4	05	Tools & Equipment	1,144	1,223	79	Yes	Annual Capital Projects started and completed	7%
3	5	4	11	Relicensing Hydro Gen	843	1,350	507	Yes	Annual Capital Projects started and completed	60%
4	5	4	12	Implement Environment Projects	2,089	796	(1,293)	Yes	Annual Capital Projects started and completed	-62%
5	5	4	2L	Instl/Rpl for Hydro Safety&Reg	49,888	20,422	(29,466)	Yes	Pit 6 Replace Spillway Apron and Poe Dam Gate 4 Trunnion Replacement	-59%
6	5	4	2M	Instal/Repl Hydro Generating Eqp	115,184	96,997	(18,186)	Yes	Pit 4 Unit 2 Replace Runner & Wickets and Pit 5 PH Cap Restoration 17 storm damage	-16%
7	5	4	2N	Instal/Repl Resv,Dams&Waterway	50,414	40,768	(9,646)	Yes	Helms - Replace T1 Gate Controls	-19%
8	5	4	2P	Instl/Repl Hydr BldgGrndInfstr	33,525	26,533	(6,992)	Yes	2017 Storm Damage Capital related projects at Pit 5, 6 & 7	-21%
9	5	4	3H	Hydroelec Lic & Lic Conditions	8,110	23,884	15,774	Yes	Merced Falls FERC 2467 Relicense and Kilarc-Cow License Surr Relic	194%
10	5	4	3Q	Catastrophic Events	-	-	-	No	NA	0%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2018 Recorded	2019 Recorded	Variance	Variance Required Y/N	Variance Explanation	Percentage Change
1	5	4	03	Office Furniture & Equipment	270	45	(226)	Yes	Annual Capital Projects started and completed	-83%
2	5	4	05	Tools & Equipment	1,223	1,297	74	Yes	Annual Capital Projects started and completed	6%
3	5	4	11	Relicensing Hydro Gen	1,350	472	(877)	Yes	Annual Capital Projects started and completed	-65%
4	5	4	12	Implement Environment Projects	796	133	(663)	Yes	Annual Capital Projects started and completed	-83%
5	5	4	2L	Instl/Rpl for Hydro Safety&Reg	20,422	20,604	182	No	NA	1%
6	5	4	2M	Instal/Repl Hydro Generating Eqp	96,997	81,417	(15,580)	Yes	Pit 5 Repl Transformer B1ABC & B2ABCSP and Pit 1 Unit 2 Rewind Generator	-16%
7	5	4	2N	Instal/Repl Resv,Dams&Waterway	40,768	42,367	1,599	No	NA	4%
8	5	4	2P	Instl/Repl Hydr BldgGrndInfrstr	26,533	21,890	(4,643)	Yes	2017 Storm Damage Capital related projects at Pit 5, 6 & 7	-17%
9	5	4	3H	Hydroelec Lic & Lic Conditions	23,884	19,844	(4,040)	Yes	Potter Valley Relicensing	-17%
10	5	4	3Q	Catastrophic Events	-	-	-	No	NA	0%

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 4
 Year-Over-Year Recorded Capital Variance Summary in Dollars
 (Thousands of Nominal Dollars)

Line No.	Exhibit	Chapter	MWC	MWC Description	2019 Recorded	2020 Recorded	Variance	Variance Required Y/N	Variance Explanation	Percentage Change
1	5	4	03	Office Furniture & Equipment	45	-	(45)	Yes	Annual Capital Projects started and completed	-100%
2	5	4	05	Tools & Equipment	1,297	1,898	600	Yes	Annual Capital Projects started and completed	46%
3	5	4	11	Relicensing Hydro Gen	472	567	95	Yes	Annual Capital Projects started and completed	20%
4	5	4	12	Implement Environment Projects	133	84	(49)	Yes	Annual Capital Projects started and completed	-37%
5	5	4	2L	Instl/Rpl for Hydro Safety&Reg	20,604	29,592	8,988	Yes	Lower Bucks Dam Install Upstream Liner	44%
6	5	4	2M	Instal/Repl Hydro Gneratng Eqp	81,417	94,880	13,463	Yes	Pit 7 U2 Rewind and Bucks Creek U1 Generator Stator Rewind	17%
7	5	4	2N	Instal/Repl Resv,Dams&Waterway	42,367	45,193	2,827	No	NA	7%
8	5	4	2P	Instl/Repl Hydr BldgGrndInfrst	21,890	8,015	(13,875)	Yes	Helms and Caribou 1 PH - Crane Upgrades/Replacement	-63%
9	5	4	3H	Hydroelec Lic & Lic Conditions	19,844	17,708	(2,135)	Yes	Drum Spaulding Relicensing	-11%
10	5	4	3Q	Catastrophic Events	-	-	-	No	NA	0%

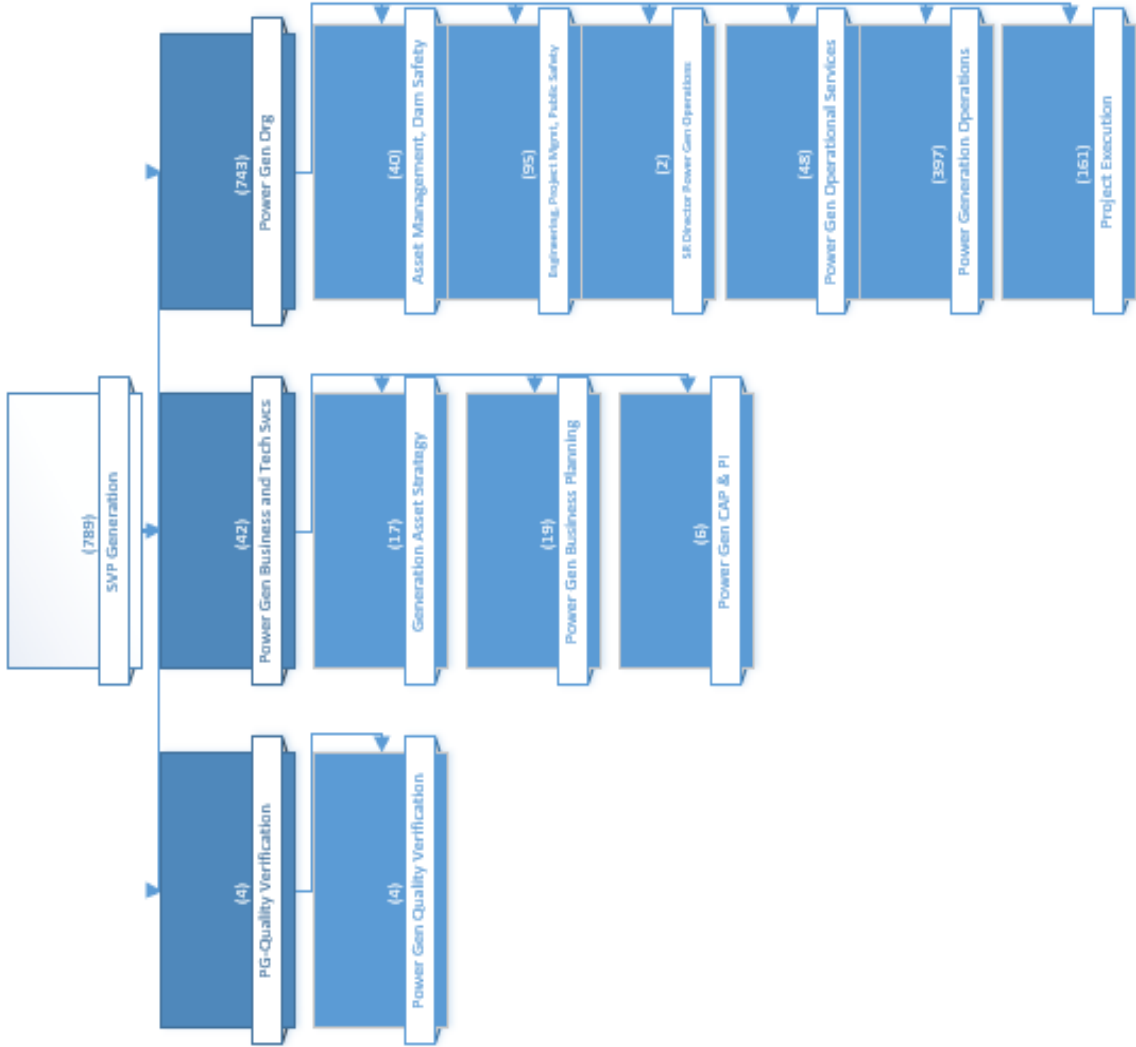
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Hydroelectric Powerhouse Data as of December 31, 2017

Line No.	Area	Water-shed	Powerhouse	FERC License No.	No. of Units	RPS Eligible	Normal Max. Gross Head (Ft)	Flow (1) (CFS)	Normal Operating Capacity (2) (MW)	Year of Operation	PG&E Hydro Fleet Guidance Classification
1	Shasta										
2	<u>McCLOUD PIT</u>										
3			Hat Creek #1	2661		1 Yes	213.0	545.0	8.5	1921	C
4			Hat Creek #2	2661		1 Yes	198.0	580.0	8.5	1921	C
5			Pit #1	2687		2 No	455.0	1,900.0	61.0	1922	B
6			Pit #3	233		3 No	315.0	3,300.0	70.0	1925	A
7			Pit #4	233		2 No	382.0	3,816.0	95.0	1955	A
8			Pit #5	233		4 No	615.0	3,900.0	160.0	1944	A
9			James B. Black	2106		2 No	1,226.0	2,000.0	172.0	1965	A
10			Pit #6	2106		2 No	155.0	6,470.0	80.0	1965	A
11			Pit #7	2106		2 No	205.0	7,440.0	112.0	1965	A
12	<u>COW-BATTLE CREEK</u>										
13			Volta #1	1121		1 Yes	1,264.0	115.0	9.0	1980	C
14			Volta #2	1121		1 Yes	125.0	115.0	0.9	1981	C
15			South	1121		1 Yes	516.0	190.0	7.0	1979	C
16			Inskip	1121		1 Yes	383.0	270.0	8.0	1979	C
17			Coleman	1121		1 Yes	482.0	340.0	13.0	1979	C
18			Kilarc	606		1 Yes	1,192.0	43.0	1.6	1903	C
19			Cow Creek	606		2 Yes	715.0	50.0	1.8	1907	C
20	Total Shasta					27			808.3		
21											
22	DeSabra										
23	<u>DE SABLA SYSTEM</u>										
24			Toadtown	803		1 Yes	185.0	134.0	1.5	1986	C
25			De Sabla	803		1 Yes	1,530.0	171.0	18.5	1963	C
26			Centerville	803		2 Yes	590.0	183.0	6.4	1900	C
27			Lime Saddle	--		2 Yes	462.0	87.0	2.0	1906	C
28	<u>FEATHER</u>										
29			Hamilton Branch	--		2 Yes	410.0	200.0	4.8	1921	C
30			Butt Valley	2105		1 No	362.0	2,118.0	41.0	1958	A
31			Caribou #1	2105		3 No	1,151.0	1,114.0	75.0	1921	A
32			Caribou #2	2105		2 No	1,150.0	1,464.0	120.0	1958	A
33			Oak Flat	2105		1 Yes	137.0	140.0	1.3	1985	A
34			Belden	2105		1 No	770.0	2,410.0	125.0	1969	A
35			Rock Creek	1962		2 No	535.0	2,880.0	112.0	1950	A
36			Rock Creek Upgrade*			Yes			14.0	2013	A
37			Bucks Creek	619		2 No	2,558.0	384.0	65.0	1928	B
38			Cresta	1962		2 No	290.0	3,510.0	70.0	1949	A
39			Poe	2107		2 No	488.0	3,700.0	120.0	1958	A
40	<u>EEL</u>										
41			Potter Valley	77		3 Yes	478.0	331.0	9.2	1908	C
42	Total DeSabra					27			785.7		
43	* Rock Creek was upgraded for an additional 14 MW (7 MW per unit). This additional capacity is RPS eligible.										
44											
45	Central										
46	<u>SOUTH YUBA</u>										
47			Spaulding #3	2310		1 Yes	318.0	270.0	5.8	1929	B
48			Spaulding #2	2310		1 Yes	344.0	200.0	4.4	1928	B
49			Deer Creek	2310		1 Yes	837.0	110.0	5.7	1908	C
50			Spaulding #1	2310		1 Yes	197.0	550.0	7.0	1928	B
51			Drum #1	2310		4 No	1,373.0	643.0	54.0	1913	B
52			Drum #2	2310		1 No	1,370.0	505.0	49.5	1965	B
53			Alta	2310		1 Yes	648.0	28.0	1.0	1902	B
54			Dutch Flat #1	2310		1 Yes	643.0	490.0	22.0	1943	B

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Hydroelectric Powerhouse Data as of December 31, 2017

Line No.	Area	Water-shed	Powerhouse	FERC License No.	No. of Units	RPS Eligible	Normal Max. Gross Head (Ft)	Flow (1) (CFS)	Normal Operating Capacity (2) (MW)	Year of Operation	PG&E Hydro Fleet Guidance Classification
55			Halsey	2310	1	Yes	327.0	495.0	11.0	1916	B
56			Wise	2310	1	Yes	519.0	393.0	14.0	1917	B
57			Wise #2	2310	1	Yes	519.0	80.0	3.2	1986	B
58			Newcastle	2310	1	Yes	415.0	392.0	11.5	1986	B
59			<u>AMERICAN</u>								
60			Chili Bar	2155	1	Yes	60.0	1,500.0	7.0	1965	C
63			<u>MOKELUMNE</u>								
64			Salt Springs	137	2	No	2,370.0	818.0	44.0	1931	B
65			Tiger Creek	137	2	No	1,219.0	750.0	58.0	1931	B
66			West Point	137	1	Yes	312.0	675.0	14.5	1948	B
67			Electra	137	3	No	1,272.0	1,130.0	98.0	1948	B
68			<u>STANISLAUS</u>								
69			Spring Gap	2130	1	Yes	1,865.0	59.0	7.0	1921	B
70			Stanislaus	2130	1	No	1,525.0	830.0	91.0	1963	B
71			Phoenix	1061	1	Yes	1,187.0	25.0	2.0	1940	C
72	Total Central				27				510.6		
73											
74	Kings-Crane										
75			<u>SAN JOAQUIN</u>								
76			Crane Valley	1354	1	Yes	128.0	160.0	0.9	1919	C
77			San Joaquin #3	1354	1	Yes	405.0	164.0	4.2	1923	C
78			San Joaquin #2	1354	1	Yes	307.0	148.0	3.2	1917	C
79			San Joaquin #1-A	1354	1	Yes	42.0	167.0	0.4	1919	C
80			Wishon	1354	4	Yes	1,412.0	235.0	20.0	1910	C
81			Kerckhoff	96	2	Yes	350.0	1,156.7	25.4	1920	A
82			Kerckhoff #2	96	1	No	421.0	5,100.0	155.0	1983	A
83			<u>KINGS</u>								
84			Haas	1988	2	No	2,444.0	825.0	144.0	1958	A
85			Balch #1	175	1	No	2,379.0	213.0	34.0	1927	A
86			Balch #2	175	2	No	2,389.0	630.0	105.0	1958	A
87			Kings River	1988	1	No	798.0	990.0	52.0	1962	A
88			<u>TULE</u>								
89			Tule River	1333	2	Yes	1,544.0	66.0	6.4	1914	C
92	Total Kings-Crane				19				550.5		
93											
94	Helms										
95			Helms	2735	3	No	1,744.0	9,000.0	1,212.0	1984	A
96	Total Helms				3				1,212.0		
97											
98	PG&E TOTAL				103.0				3,867.1		
99											
100			Notes								
101			1) Flow @ Normal Operating Capacity @ Normal Maximum Gross Head								
102			2) Based on best available 30-YR historical data								

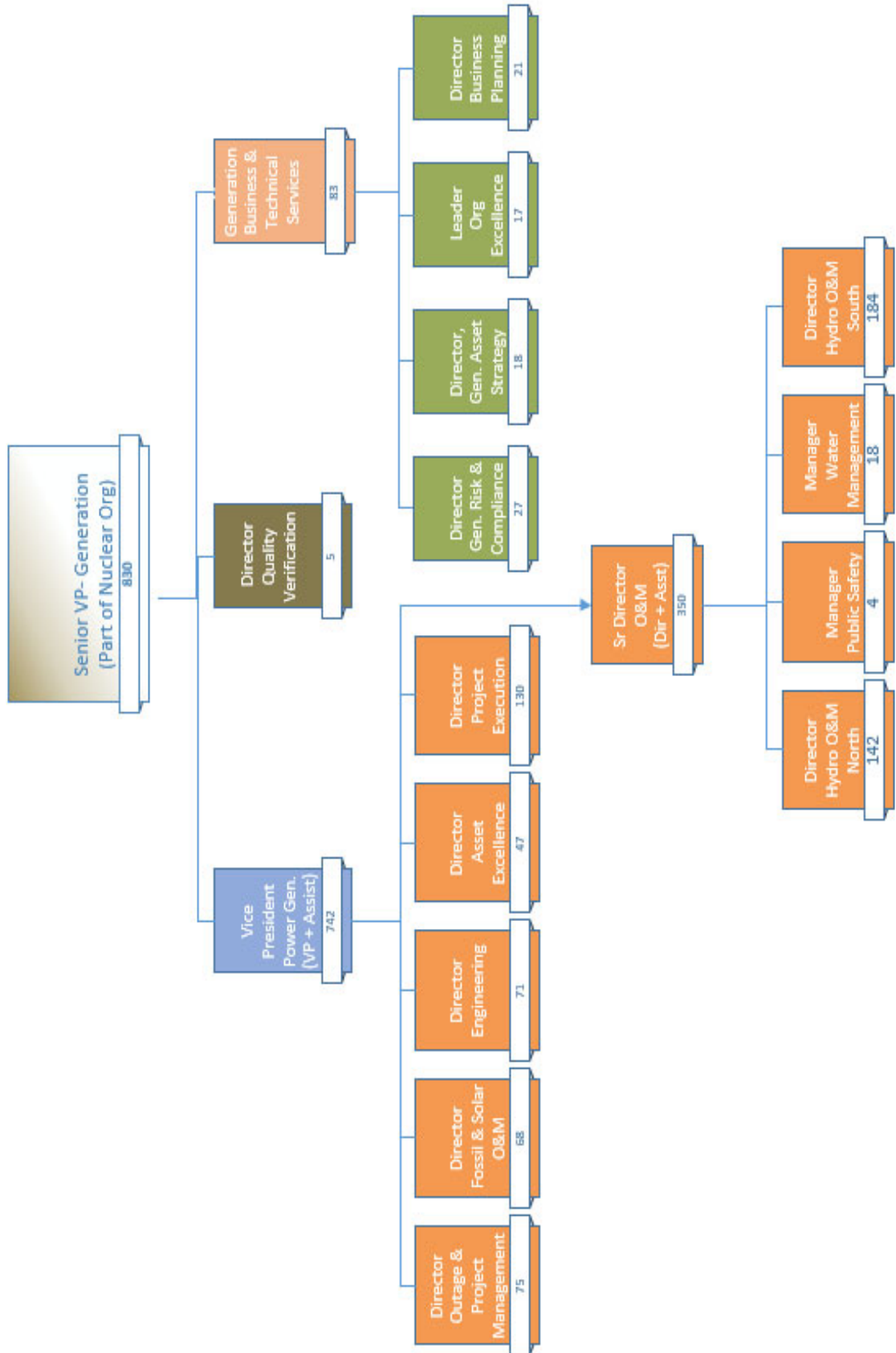
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Power Generation
Organizational Chart for 2020



Power Generation
Headcount December 2020

Total Headcount:
789 Actual

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Power Generation
Organizational Chart for 2023



Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 FERC Relicensing Timetable

FERC LICENSE	PROJECT NAME	NORMAL MW CAPACITY	LICENSE EXPIRES	NOI FILING DEADLINE	APPLICATION FILING DEADLINE	ESTIMATED LICENSE ISSUANCE	LICENSE STATUS
2105	Upper NF Feather River	362.3	10/31/2004	10/31/1999	10/31/2002	Sep-21	Application filed 10/23/2002
606	Kilarc-Cow Creek Surrender	5	3/27/2007	3/27/2002	3/27/2005	Dec-21	License Surrender Application filed 5/12/2009. Kilarc PH not operational.
803	DeSabra-Centerville	26.4	10/11/2009	10/11/2004	10/11/2007	N/A	FLA filed 10/2/2007. License application withdrawal filed 2/16/2017.
2106	McCloud - Pit	364	7/31/2011	7/31/2006	7/31/2009	Sep-21	Application filed 7/16/2009
2310	Upper Drum	144	4/30/2013	4/30/2008	4/30/2011	Apr-23	Application filed 4/12/11. ESA Section 7 and WQC schedules TBD.*
14531	Lower Drum	40	n/a	4/30/2008	4/30/2011	Apr-23	5/31/13 request to split Drum-Spauding into 3 projects.
619	Bucks Creek	84.8	12/31/2018	12/31/2013	12/31/2016	Jul-22	Application filed 12/12/2016. Supplemental application filed 5/22/2018.
77	Potter Valley	9.2	4/14/2022	4/14/2017	4/14/2020	N/A	January 25, 2019, PG&E withdrew its NOI and PAD and formally discontinued the Integrated Licensing Process.
96	Kerckhoff #1 and #2	180.4	11/30/2022	11/30/2017	11/30/2020	Nov-25	License received 11/8/1976; amended 2013. DLA filed on 6/26/2020.
175	Balch #1 and #2	139	4/30/2026	4/30/2021	4/30/2024	Apr-29	FLA filed 11/24/20 for K2 only.
2735	Helms	1212	4/30/2026	4/30/2021	4/30/2024	Apr-29	License received 4/18/1980
1121	Battle Creek	37.9	7/31/2026	7/31/2021	7/31/2024	N/A	License received 5/18/1976
137	Mokelumne River	214.5	9/30/2031	9/30/2026	9/30/2029		August 31, 2018, PG&E informed the Commission of its decision not to relicense Battle Creek.
1962	Rock Creek-Cresta	195.7	9/30/2034	9/30/2026	9/30/2029		April 17, 2019, PG&E withdrew its Phase 2 license amendment application.
2661	Hat Creek #1 and #2	17	9/30/2032	9/30/2027	9/30/2030		License received 10/11/2001
1333	Tule River	6.4	7/31/2033	7/31/2028	7/31/2031		License received 10/30/2002
1988	Haas-Kings River	196	2/28/2041	2/28/2036	2/28/2039		License received 12/30/1993
2687	Pit #1	61	2/28/2042	2/28/2037	2/28/2040		License received 3/6/2001
233	Pit #3, #4 and #5	325	6/30/2043	6/30/2038	6/30/2041		License received 3/19/2003
1354	Crane Valley	28.7	9/30/2043	9/30/2038	9/30/2041		License received 7/2/2007
2130	Spring Gap-Stanislaus	98	3/31/2047	3/31/2042	3/31/2045		License received 9/16/2003
2107	Poe	120	12/1/2068	12/1/2063	12/1/2066		License received 4/24/2009
2155	Chili Bar	7	7/1/2064	7/1/2059	7/1/2062		License received 12/17/2018 (50 years)
14530	Deer Creek (Drum)	5.7	n/a	4/30/2008	4/30/2011	Apr-23	License received 8/20/2014
1061	Phoenix	2	8/31/2022	8/31/2017	8/31/2020	Aug-25	5/31/13 request to split Drum-Spauding into 3 projects. (We anticipate project transfer to MID prior to license issuance.) License received 9/10/1992. NOI filed on 8/22/17. DLA filed on 2/31/20. FLA filed on 8/24/20. (We anticipate project transfer to TUD prior to license issuance.)

* Regulatory schedules for FERC's ESA Section 7 consultations and SWRCB's CEQA/WQC processes are not available.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Historical Forced Outage Factor by Unit

Line No.	UnitName	2016	2017	2018	2019	2020	Comments
1	ALTA POWERHOUSE UNIT #1	1.64%	0.40%	2.89%	1.24%	7.35%	
3	BALCH PH 1 UNIT 1	0.17%	0.35%	0.02%	0.00%	0.04%	
4	BALCH PH 2 UNIT 2	0.00%	0.00%	0.28%	0.00%	0.07%	
5	BALCH PH 2 UNIT 3	0.00%	0.03%	0.28%	10.79%	0.06%	
6	BELDEN POWERHOUSE	0.83%	0.16%	28.47%	0.02%	1.32%	
7	BUCKS CREEK PH UNIT #1	1.01%	4.39%	1.15%	0.25%	0.00%	
8	BUCKS CREEK PH UNIT #2	1.17%	6.95%	0.35%	0.05%	0.76%	
9	BUTT VALLEY POWERHOUSE	0.03%	3.59%	9.50%	3.47%	3.60%	
10	CARIBOU #1 POWERHOUSE UNIT #1	1.18%	2.39%	0.17%	0.19%	1.17%	
11	CARIBOU #1 POWERHOUSE UNIT #2	0.12%	1.76%	4.55%	0.24%	0.60%	
12	CARIBOU #1 POWERHOUSE UNIT #3	0.12%	0.87%	0.24%	0.35%	1.18%	
13	CARIBOU #2 POWERHOUSE UNIT #4	0.07%	1.30%	5.87%	0.21%	3.03%	
14	CARIBOU #2 POWERHOUSE UNIT #5	0.24%	1.67%	1.76%	0.13%	2.73%	
15	CENTERVILLE PH UNIT NO.1	NA	NA	NA	NA	NA	Mothball
16	CENTERVILLE PH UNIT NO.2	NA	NA	NA	NA	NA	Mothball
17	CHILI BAR POWERHOUSE UNIT #1	0.64%	2.38%	1.00%	5.34%	2.97%	
19	COLEMAN PH UNIT NO.1	6.50%	4.01%	3.54%	5.77%	5.23%	
20	COW CREEK PH UNIT NO.1	4.09%	1.39%	0.00%	33.94%	1.11%	
21	COW CREEK PH UNIT NO.2	4.97%	1.15%	0.00%	35.67%	0.15%	
22	CRANE VALLEY PH UNIT 1	0.05%	1.77%	1.62%	60.29%	16.11%	
23	CRESTA POWERHOUSE UNIT #1	0.14%	3.27%	0.08%	0.17%	0.02%	
24	CRESTA POWERHOUSE UNIT #2	6.58%	3.16%	0.12%	0.06%	0.02%	
25	DE SABLA PH UNIT NO.1	6.76%	17.97%	4.26%	13.19%	11.45%	
26	DEER CREEK PH UNIT #1	0.12%	0.08%	1.68%	4.72%	4.41%	
27	DRUM POWERHOUSE #1, UNIT #1	0.00%	6.49%	0.70%	0.26%	1.05%	
28	DRUM POWERHOUSE #1, UNIT #2	0.20%	5.53%	0.03%	3.53%	1.05%	
29	DRUM POWERHOUSE #1, UNIT #3	0.01%	7.54%	0.24%	0.26%	1.05%	
30	DRUM POWERHOUSE #1, UNIT #4	1.78%	6.05%	0.22%	0.87%	1.05%	
31	DRUM POWERHOUSE #2, UNIT #5	0.07%	0.13%	0.04%	1.73%	1.21%	
32	DUTCH FLAT POWERHOUSE UNIT #1	0.49%	1.03%	0.18%	2.23%	2.04%	
33	ELECTRA POWERHOUSE UNIT #1	0.01%	4.09%	0.45%	2.27%	0.03%	
34	ELECTRA POWERHOUSE UNIT #2	0.06%	4.08%	0.42%	1.43%	0.28%	
35	ELECTRA POWERHOUSE UNIT #3	0.00%	4.61%	0.44%	1.09%	0.00%	
36	HAAS PH UNIT 1	0.59%	0.37%	0.00%	0.05%	0.42%	
37	HAAS PH UNIT 2	0.85%	0.36%	5.15%	0.14%	0.58%	
38	HALSEY POWERHOUSE UNIT #1	23.08%	26.04%	8.73%	1.26%	6.52%	
39	HAMILTON BRANCH PH UNIT #1	NA	NA	NA	NA	NA	Mothball
40	HAMILTON BRANCH PH UNIT #2	1.02%	31.87%	60.16%	100.00%	100.00%	Forced
41	HAT CREEK PH 1 UNIT 1	0.08%	0.72%	0.43%	0.06%	0.67%	
42	HAT CREEK PH 2 UNIT 1	0.04%	0.05%	1.81%	0.96%	15.57%	
43	INSKIP PH UNIT NO.1	2.65%	25.37%	100.00%	100.00%	100.00%	Forced
44	JAMES B. BLACK PH UNIT #1	0.08%	1.40%	0.23%	0.29%	0.25%	
45	JAMES B. BLACK PH UNIT #2	0.05%	0.15%	0.04%	0.32%	0.08%	
46	KERCKHOFF PH 1 UNIT 1	0.53%	3.19%	76.41%	NA	NA	Mothball
48	KERCKHOFF PH 1 UNIT 3	14.96%	3.64%	76.46%	NA	NA	Mothball
49	KERCKHOFF PH 2 UNIT 1	0.01%	2.43%	2.84%	0.72%	6.51%	
50	KERN CANYON PH UNIT 1	0.02%	97.17%	NA	NA	NA	MB - Sold 12/29/2020
51	KILARC PH UNIT NO.1	0.92%	5.81%	13.86%	72.42%	100.00%	Forced

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Historical Forced Outage Factor by Unit

Line No.	UnitName	2016	2017	2018	2019	2020	Comments
53	KINGS RIVER PH UNIT 1	0.26%	0.12%	0.17%	0.01%	0.06%	
54	LIME SADDLE PH UNIT NO.1	33.40%	16.17%	29.28%	99.92%	100.00%	
55	LIME SADDLE PH UNIT NO.2	34.07%	16.04%	29.28%	99.92%	100.00%	
56	MERCED FALLS PH UNIT 1	0.17%	0.00%	NA	NA	NA	Sold
57	NARROWS POWERHOUSE #1 UNIT #1	13.58%	15.71%	24.19%	11.69%	39.76%	Sold 3/31/2020
58	NEWCASTLE POWERHOUSE UNIT #1	0.03%	0.88%	0.02%	29.47%	0.77%	
59	OAK FLAT POWERHOUSE UNIT #1	40.97%	32.15%	51.34%	10.41%	3.98%	
60	PHOENIX POWERHOUSE UNIT #1	0.42%	0.36%	21.12%	14.55%	2.89%	
61	PIT PH 1 UNIT 1	0.08%	0.01%	1.30%	0.09%	0.03%	
62	PIT PH 1 UNIT 2	0.10%	2.12%	1.58%	0.12%	0.47%	
63	PIT PH 3 UNIT 1	0.00%	0.00%	0.85%	0.22%	1.01%	
64	PIT PH 3 UNIT 2	0.92%	0.00%	0.82%	0.26%	0.46%	
65	PIT PH 3 UNIT 3	0.11%	0.00%	0.02%	5.44%	0.46%	
66	PIT PH 4 UNIT 1	0.32%	0.91%	0.06%	0.01%	0.02%	
67	PIT PH 4 UNIT 2	0.00%	30.42%	0.07%	0.17%	0.12%	
68	PIT PH 5 UNIT 1	0.17%	66.05%	0.53%	0.00%	0.00%	
69	PIT PH 5 UNIT 2	0.42%	74.09%	0.12%	0.00%	0.84%	
70	PIT PH 5 UNIT 3	0.20%	87.11%	0.27%	0.00%	0.00%	
71	PIT PH 5 UNIT 4	0.02%	92.44%	55.75%	4.99%	0.00%	
72	PIT PH 6 UNIT 1	0.07%	27.75%	21.54%	4.21%	5.38%	
73	PIT PH 6 UNIT 2	0.02%	4.61%	0.00%	0.56%	5.40%	
74	PIT PH 7 UNIT 1	2.87%	5.47%	0.00%	1.25%	0.00%	
75	PIT PH 7 UNIT 2	2.47%	5.23%	0.05%	1.22%	15.22%	
76	POE POWERHOUSE UNIT #1	0.56%	5.95%	14.81%	0.51%	1.88%	
77	POE POWERHOUSE UNIT #2	3.76%	29.45%	0.11%	0.36%	0.21%	
78	POTTER VALLEY UNIT 1	0.00%	21.83%	0.33%	29.15%	94.26%	
79	POTTER VALLEY UNIT 3	0.00%	17.12%	0.00%	0.02%	3.75%	
80	POTTER VALLEY UNIT 4	0.78%	3.21%	3.36%	3.85%	3.25%	
81	ROCK CREEK POWERHOUSE UNIT #1	10.69%	3.75%	0.33%	0.45%	2.50%	
82	ROCK CREEK POWERHOUSE UNIT #2	2.86%	2.93%	0.15%	0.02%	2.30%	
83	SALT SPRINGS PH UNIT #1	3.10%	0.79%	0.25%	3.07%	18.50%	
84	SALT SPRINGS PH UNIT #2	3.72%	2.15%	7.62%	2.40%	0.86%	
85	SAN JOAQUIN 1A PH UNIT 1	4.00%	100.00%	65.34%	32.37%	100.00%	Forced
86	SAN JOAQUIN 2 PH UNIT 1	11.96%	12.93%	0.00%	32.17%	100.00%	Forced
87	SAN JOAQUIN 3 PH UNIT 1	22.79%	92.18%	100.00%	100.00%	100.00%	Forced
88	SOUTH PH UNIT NO.1	4.17%	4.32%	1.97%	3.40%	0.28%	
89	SPALDING PH #1, UNIT #1	6.83%	0.50%	0.00%	1.29%	4.45%	
90	SPALDING PH #2, UNIT #1	1.33%	47.97%	0.02%	7.21%	0.94%	
91	SPALDING PH #3, UNIT #1	1.29%	17.42%	96.89%	4.95%	3.81%	
92	SPRING GAP POWERHOUSE UNIT #1	1.26%	4.49%	1.89%	2.18%	0.89%	
93	STANISLAUS POWERHOUSE UNIT #1	0.50%	4.18%	0.26%	0.28%	0.01%	
94	TIGER CREEK PH UNIT #1	0.61%	29.59%	4.89%	2.54%	0.02%	
95	TIGER CREEK PH UNIT #2	0.63%	16.97%	2.48%	2.59%	0.03%	
96	TOADTOWN PH UNIT NO.1	13.58%	20.77%	9.77%	15.79%	11.03%	
97	TULE RIVER PH UNIT 1	0.28%	34.13%	NA	NA	NA	Mothball
98	TULE RIVER PH UNIT 2	6.86%	34.13%	NA	NA	NA	Mothball
99	VOLTA 1 PH UNIT NO.1	0.12%	0.00%	0.02%	5.19%	1.86%	
100	VOLTA 2 PH UNIT NO.2	5.63%	0.12%	3.62%	16.14%	12.61%	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Historical Forced Outage Factor by Unit

Line No.	UnitName	2016	2017	2018	2019	2020	Comments
101	WEST POINT PH UNIT #1	0.17%	4.22%	2.42%	7.64%	2.31%	
102	WISE POWERHOUSE #1, UNIT #1	0.05%	0.59%	0.00%	0.61%	0.00%	
103	WISE POWERHOUSE #2, UNIT #1	0.00%	0.00%	0.00%	0.57%	0.00%	
104	WISHON PH 1 UNIT 1	1.34%	5.16%	7.78%	0.62%	5.18%	
105	WISHON PH 1 UNIT 2	1.16%	4.35%	7.76%	11.58%	20.05%	
106	WISHON PH 1 UNIT 3	1.65%	7.05%	37.32%	1.14%	5.17%	
107	WISHON PH 1 UNIT 4	0.03%	3.82%	6.73%	0.85%	17.62%	
108	Conventional Hydro MW weighted FOF	1.72%	9.87%	5.56%	2.22%	2.94%	
109							
110	HELMS POWERHOUSE UNIT 1	0.37%	0.75%	1.75%	4.83%	0.01%	
111	HELMS POWERHOUSE UNIT 2	0.35%	0.19%	5.46%	3.64%	0.04%	
112	HELMS POWERHOUSE UNIT 3	0.95%	0.20%	1.95%	0.04%	0.42%	
113	Pumped Storage MW weighted FOF	0.55%	0.38%	3.05%	2.84%	0.16%	
114							
115	Hydro System	1.36%	6.90%	4.77%	2.41%	2.06%	
116							
117	Notes						
118	ALTA POWERHOUSE UNIT #2		Retired 2011				
119	CENTERVILLE PH UNIT NO.1		Mothball 01/2014				
120	CENTERVILLE PH UNIT NO.2		Mothball 01/2014				
121	COAL CANYON PH UNIT NO.1		Retired 2013				
122	HAMILTON BRANCH PH UNIT #1		Mothball 01/2016				
123	KERCKHOFF PH 1 UNIT 1		Mothball 09/2018				
124	KERCKHOFF PH 1 UNIT 2		Retired 2013				
125	KERCKHOFF PH 1 UNIT 3		Mothball 09/2018				
126	KERN CANYON PH UNIT 1		Mothball 06/2017 - Sold 12/2020				
127	KILARC PH UNIT NO.2		Mothball 02/2017 - Retired 01/18				
128	MERCED FALLS PH UNIT 1		Sold 02/2017				
129	NARROWS POWERHOUSE #1 UNIT #1		Sold 3/2020				
130	TULE RIVER PH UNIT 1		Mothball 10/2017				
131	TULE RIVER PH UNIT 2		Mothball 10/2017				

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Historical Equivalent Availability Factor by Unit

Line No.	UnitName	2016	2017	2018	2019	2020	Comments
1	ALTA POWERHOUSE UNIT #1	90.40%	95.85%	89.90%	90.71%	85.82%	
3	BALCH PH 1 UNIT 1	93.76%	93.60%	93.18%	95.25%	95.21%	
4	BALCH PH 2 UNIT 2	87.21%	73.55%	96.46%	92.87%	90.86%	
5	BALCH PH 2 UNIT 3	66.16%	88.43%	96.01%	80.59%	92.90%	
6	BELDEN POWERHOUSE	41.55%	59.22%	69.92%	83.51%	96.37%	
7	BUCKS CREEK PH UNIT #1	76.39%	82.98%	96.30%	95.24%	37.79%	
8	BUCKS CREEK PH UNIT #2	86.98%	82.81%	97.19%	90.88%	37.26%	
9	BUTT VALLEY POWERHOUSE	91.00%	83.25%	75.82%	58.75%	85.36%	
10	CARIBOU #1 POWERHOUSE UNIT #1	80.71%	93.06%	78.49%	90.85%	96.18%	
11	CARIBOU #1 POWERHOUSE UNIT #2	93.97%	93.87%	74.16%	89.86%	96.82%	
12	CARIBOU #1 POWERHOUSE UNIT #3	93.72%	95.15%	82.56%	88.08%	96.80%	
13	CARIBOU #2 POWERHOUSE UNIT #4	95.78%	46.69%	88.57%	91.19%	92.95%	
14	CARIBOU #2 POWERHOUSE UNIT #5	67.38%	78.26%	81.94%	91.26%	93.44%	
15	CENTERVILLE PH UNIT NO.1	NA	NA	NA	NA	NA	Mothball
16	CENTERVILLE PH UNIT NO.2	NA	NA	NA	NA	NA	Mothball
17	CHILI BAR POWERHOUSE UNIT #1	83.69%	88.52%	84.50%	76.57%	96.93%	
19	COLEMAN PH UNIT NO.1	89.88%	93.08%	96.40%	76.73%	90.71%	
20	COW CREEK PH UNIT NO.1	92.89%	91.73%	98.75%	64.78%	95.99%	
21	COW CREEK PH UNIT NO.2	91.87%	92.01%	98.75%	63.08%	97.07%	
22	CRANE VALLEY PH UNIT 1	86.13%	83.00%	54.47%	27.11%	67.30%	
23	CRESTA POWERHOUSE UNIT #1	87.99%	90.94%	73.64%	94.85%	95.00%	
24	CRESTA POWERHOUSE UNIT #2	81.25%	89.11%	73.60%	94.95%	96.26%	
25	DE SABL A PH UNIT NO.1	81.07%	64.71%	87.78%	67.95%	82.42%	
26	DEER CREEK PH UNIT #1	90.76%	94.46%	91.74%	80.47%	86.36%	
27	DRUM POWERHOUSE #1, UNIT #1	96.77%	81.25%	74.42%	92.69%	95.25%	
28	DRUM POWERHOUSE #1, UNIT #2	84.83%	82.88%	75.09%	89.42%	95.31%	
29	DRUM POWERHOUSE #1, UNIT #3	96.90%	75.97%	75.59%	90.88%	89.84%	
30	DRUM POWERHOUSE #1, UNIT #4	94.07%	81.32%	75.61%	90.25%	87.71%	
31	DRUM POWERHOUSE #2, UNIT #5	75.68%	90.09%	93.01%	92.91%	93.23%	
32	DUTCH FLAT POWERHOUSE UNIT #1	92.53%	93.91%	85.11%	75.50%	92.92%	
33	ELECTRA POWERHOUSE UNIT #1	96.89%	86.56%	93.38%	83.57%	94.71%	
34	ELECTRA POWERHOUSE UNIT #2	96.81%	86.94%	94.26%	83.70%	75.43%	
35	ELECTRA POWERHOUSE UNIT #3	96.90%	87.63%	78.45%	49.34%	92.64%	
36	HAAS PH UNIT 1	90.74%	98.10%	62.44%	91.18%	92.45%	
37	HAAS PH UNIT 2	76.12%	81.21%	81.19%	90.31%	92.10%	
38	HALSEY POWERHOUSE UNIT #1	65.66%	68.68%	81.09%	81.00%	77.36%	
39	HAMILTON BRANCH PH UNIT #1	NA	NA	NA	NA	NA	Mothball
40	HAMILTON BRANCH PH UNIT #2	92.99%	68.13%	39.81%	0.00%	0.00%	Forced
41	HAT CREEK PH 1 UNIT 1	97.10%	96.45%	95.62%	89.39%	98.19%	
42	HAT CREEK PH 2 UNIT 1	87.79%	97.16%	98.19%	96.38%	79.05%	
43	INSKIP PH UNIT NO.1	92.79%	31.06%	0.00%	0.00%	0.00%	Forced
44	JAMES B. BLACK PH UNIT #1	92.04%	82.39%	95.24%	98.37%	87.56%	

45 JAMES B. BLACK PH UNIT #2	94.58%	75.83%	95.93%	99.50%	91.60%	
46 KERCKHOFF PH 1 UNIT 1	88.00%	91.04%	23.59%	NA	NA	Mothball
48 KERCKHOFF PH 1 UNIT 3	73.71%	90.59%	23.54%	NA	NA	Mothball
49 KERCKHOFF PH 2 UNIT 1	68.04%	88.54%	78.01%	91.82%	92.91%	
50 KERN CANYON PH UNIT 1	88.39%	2.83%	NA	NA	NA	12/29/2020
51 KILARC PH UNIT NO.1	94.93%	91.02%	84.90%	27.15%	0.00%	Forced
53 KINGS RIVER PH UNIT 1	88.91%	80.13%	92.56%	57.11%	94.54%	
54 LIME SADDLE PH UNIT NO.1	54.17%	81.07%	64.64%	0.08%	0.00%	
55 LIME SADDLE PH UNIT NO.2	53.50%	81.20%	64.33%	0.08%	0.00%	
56 MERCED FALLS PH UNIT 1	97.14%	46.57%	NA	NA	NA	Sold
57 NARROWS POWERHOUSE #1 UNIT #1	77.34%	78.60%	59.77%	80.56%	60.24%	3/31/2020
58 NEWCASTLE POWERHOUSE UNIT #1	89.87%	84.19%	82.95%	65.42%	93.98%	
59 OAK FLAT POWERHOUSE UNIT #1	58.91%	51.67%	45.85%	82.78%	92.11%	
60 PHOENIX POWERHOUSE UNIT #1	97.17%	96.44%	76.16%	84.83%	92.06%	
61 PIT PH 1 UNIT 1	91.40%	96.35%	96.45%	96.72%	63.75%	
62 PIT PH 1 UNIT 2	91.74%	72.88%	67.08%	97.04%	90.06%	
63 PIT PH 3 UNIT 1	96.73%	71.77%	69.46%	99.44%	91.95%	
64 PIT PH 3 UNIT 2	95.43%	70.16%	69.74%	99.62%	72.66%	
65 PIT PH 3 UNIT 3	80.55%	69.98%	69.56%	67.86%	73.40%	
66 PIT PH 4 UNIT 1	95.96%	98.81%	97.86%	94.18%	92.88%	
67 PIT PH 4 UNIT 2	73.13%	31.51%	98.63%	86.59%	94.76%	
68 PIT PH 5 UNIT 1	91.95%	33.01%	88.80%	95.99%	92.78%	
69 PIT PH 5 UNIT 2	91.49%	25.80%	89.21%	95.95%	91.98%	
70 PIT PH 5 UNIT 3	66.36%	12.89%	78.62%	95.20%	97.00%	
71 PIT PH 5 UNIT 4	62.23%	7.56%	44.25%	89.70%	98.84%	
72 PIT PH 6 UNIT 1	96.67%	66.80%	76.59%	78.66%	71.71%	
73 PIT PH 6 UNIT 2	96.42%	87.81%	96.31%	89.28%	71.73%	
74 PIT PH 7 UNIT 1	92.38%	92.89%	94.20%	94.46%	94.74%	
75 PIT PH 7 UNIT 2	92.38%	93.33%	94.11%	86.34%	37.60%	
76 POE POWERHOUSE UNIT #1	75.19%	86.07%	84.61%	82.06%	86.53%	
77 POE POWERHOUSE UNIT #2	69.73%	66.57%	89.15%	81.96%	83.70%	
78 POTTER VALLEY UNIT 1	43.66%	63.78%	90.88%	54.71%	5.74%	
79 POTTER VALLEY UNIT 3	41.71%	66.86%	91.31%	91.58%	96.18%	
80 POTTER VALLEY UNIT 4	40.93%	80.67%	88.06%	87.63%	96.68%	
81 ROCK CREEK POWERHOUSE UNIT #1	85.87%	82.13%	80.83%	99.44%	93.38%	
82 ROCK CREEK POWERHOUSE UNIT #2	93.83%	77.97%	80.46%	99.86%	94.18%	
83 SALT SPRINGS PH UNIT #1	85.64%	90.34%	85.85%	90.00%	63.27%	
84 SALT SPRINGS PH UNIT #2	84.68%	90.02%	74.34%	92.28%	92.60%	
85 SAN JOAQUIN 1A PH UNIT 1	81.80%	0.00%	34.66%	53.32%	0.00%	Forced
86 SAN JOAQUIN 2 PH UNIT 1	69.68%	72.65%	70.97%	51.58%	0.00%	Forced
87 SAN JOAQUIN 3 PH UNIT 1	59.52%	7.82%	0.00%	0.00%	0.00%	Forced
88 SOUTH PH UNIT NO.1	83.76%	49.77%	97.95%	89.02%	45.55%	
89 SPAULDING PH #1, UNIT #1	58.62%	87.40%	83.38%	91.73%	89.05%	
90 SPAULDING PH #2, UNIT #1	64.91%	52.03%	92.26%	79.44%	94.58%	
91 SPAULDING PH #3, UNIT #1	86.66%	77.48%	3.11%	86.50%	90.90%	
92 SPRING GAP POWERHOUSE UNIT #1	89.82%	74.28%	79.74%	87.83%	89.81%	
93 STANISLAUS POWERHOUSE UNIT #1	90.22%	88.55%	91.07%	85.95%	89.50%	
94 TIGER CREEK PH UNIT #1	91.14%	44.44%	67.53%	84.69%	82.39%	
95 TIGER CREEK PH UNIT #2	90.92%	69.68%	87.69%	85.22%	85.41%	

96	TOADTOWN PH UNIT NO.1	64.54%	62.90%	85.02%	75.60%	83.34%	
97	TULE RIVER PH UNIT 1	44.04%	0.00%	NA	NA	NA	Mothball
98	TULE RIVER PH UNIT 2	41.66%	0.00%	NA	NA	NA	Mothball
99	VOLTA 1 PH UNIT NO.1	96.70%	93.65%	98.14%	93.50%	59.01%	
100	VOLTA 2 PH UNIT NO.2	90.98%	87.80%	95.43%	82.88%	57.37%	
101	WEST POINT PH UNIT #1	87.33%	89.54%	90.64%	86.00%	88.50%	
102	WISE POWERHOUSE #1, UNIT #1	88.70%	86.23%	90.63%	88.91%	84.73%	
103	WISE POWERHOUSE #2, UNIT #1	87.44%	89.34%	90.21%	87.93%	97.58%	
104	WISHON PH 1 UNIT 1	90.51%	60.82%	71.23%	76.72%	78.43%	
105	WISHON PH 1 UNIT 2	85.98%	61.04%	71.31%	66.02%	64.16%	
106	WISHON PH 1 UNIT 3	73.35%	58.21%	49.63%	76.19%	78.36%	
107	WISHON PH 1 UNIT 4	59.28%	61.37%	72.06%	76.15%	66.41%	
108	Conventional Hydro MW weighted FOF	82.55%	76.14%	82.85%	87.43%	86.57%	
109							
110	HELMS POWERHOUSE UNIT 1	97.42%	79.48%	93.40%	87.99%	78.68%	
111	HELMS POWERHOUSE UNIT 2	78.91%	80.26%	88.00%	66.30%	37.97%	
112	HELMS POWERHOUSE UNIT 3	97.40%	80.42%	93.18%	92.69%	83.35%	
113	Pumped Storage MW weighted FOF	91.24%	80.05%	91.53%	82.33%	66.67%	
114							
115	Hydro System	85.25%	77.36%	85.57%	85.82%	80.27%	
116							
117	Notes						
118	ALTA POWERHOUSE UNIT #2 (1)			Retired 2011			
119	CENTERVILLE PH UNIT NO.1			Mothball 01/2014			
120	CENTERVILLE PH UNIT NO.2			Mothball 01/2014			
121	COAL CANYON PH UNIT NO.1 (2)			Retired 2013			
122	HAMILTON BRANCH PH UNIT #1			Mothball 01/2016			
123	KERCKHOFF PH 1 UNIT 1			Mothball 09/2018			
124	KERCKHOFF PH 1 UNIT 2 (3)			Retired 2013			
125	KERCKHOFF PH 1 UNIT 3			Mothball 09/2018			
126	KERN CANYON PH UNIT 1			Mothball 06/2017 - Sold 12/2020			
127	KILARC PH UNIT NO.2			Mothball 02/2017 - Retired 01/18			
128	MERCED FALLS PH UNIT 1			Sold 02/2017			
129	NARROWS POWERHOUSE #1 UNIT #1			Sold 3/2020			
130	TULE RIVER PH UNIT 1			Mothball 10/2017			
131	TULE RIVER PH UNIT 2			Mothball 10/2017			

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
Operations & Maintenance Cost per KW Benchmark**

Line No.	Hydro Facility Type	PG&E Capacity by Hydro Facility Type (MW)	EUCG Average by Hydro Facility Type (1) (O&M \$/ KW)
1	Small (<=30 MW)	278.6	149.12
2	Medium (30-100 MW)	1,037.5	61.82
3	Large (>=100 MW, <200 MW)	1,339.0	41.38
4	Pumped Storage	1,212.0	23.43
5			
6	Total PG&E Capacity	3,867.1	
7	PG&E Benchmark (2)		49.00
8			
9			
10	(1) Source: Electrical Utility Cost Group (EUCG), an industry group which		
11	provides operating cost benchmarking data to group members, 2015 -2019 Data		
12	(2) PG&E Benchmark = the EUCG Average by Hydro Facilities Type weighted by		
13	PG&E's Capacity by Hydro facility type.		

Pacific Gas and Electric Company
 2023 GRC
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Decommissioning by Planning Order
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016 Recorded Adjusted	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	55	5906283	Inskip Diversion Dam Decommissioning	-	-	-	-	-	125	125	8,000	-	-	-	
2	55	5906381	Coleman Decommission Asbury Pipe	-	-	-	-	-	-	-	800	-	-	-	
3	3H	5732881	Kilarc-Cow Physical Decom Relic	-	-	-	-	-	-	2,100	4,300	4,500	6,800	9,500	
4			Total	-	-	-	-	-	125	2,225	13,100	4,500	6,800	9,500	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Generation Operations
 Fire Risk Mitigation Memorandum Account Related Year 2020 work
 (Thousands of Nominal Dollars)

Line No.	MWC	Planning Order	Description	2016		2017		2018		2019		2020		2021		2022		2023		Reference
				Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	
1	IG	5270132	2020 Butte Common FRMMA Expense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	WP 4-11, Line 374
2	IG		Total Expense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3																				
4	2L	5789158	Tule Area Animal Abatement	-	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	WP 4-62, Line 321
5	2L	5790117	Kerckhoff 1 Animal Abatement	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-	WP 4-62, Line 325
6	2L		Total Capital	-	-	-	-	-	-	-	-	41	-	-	-	-	-	-	-	

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Deferred Work Analysis Summary**

The Energy Supply deferred work analysis follows the principles for determining if work was deferred in compliance with Section 5.2 of the 2020 GRC Settlement Agreement. Each MAT or MWC in this chapter was checked against those principles by following the checks listed below.

Check 1: The work was requested and authorized based on representations that it was needed to provide safe and reliable service.

Check 2: PG&E did not perform all of the authorized and funded work, as measured by authorized (explicit or imputed) units of work;

Check 2a: The work is measured by units of work.

Check 2b: PG&E expects to perform fewer of such units during the 2020-2022 period.

Check 3: PG&E continues to represent that the curtailed work is necessary to provide safe and reliable service

Line No.	2023 GRC Chapter	Type	MWC	MAT Code	Description	Check 1			Check 2			Deferred Work	Explanation	Units Comparison			Dollar Comparison (\$000s)			Workpaper Reference
						Check 1 (See Note 1)	Check 2a	Check 2b	Check 3	Check 2a	Check 2b			Check 3	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	Difference	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	
1	4	Capital	03	N/A	Office Furniture & Equipment	No	No	N/A	N/A	No	No	N/A	N/A	N/A	-	47	(47)	WP 4-50, Line 7		
2	4	Capital	05	N/A	Tools & Equipment	No	No	N/A	N/A	No	No	N/A	N/A	N/A	3,585	2,066	1,518	WP 4-50, Line 8		
3	4	Capital	11	N/A	Relicensing Hydro Gen	No	No	N/A	N/A	No	No	N/A	N/A	N/A	2,867	667	2,200	WP 4-50, Line 9		
4	4	Capital	12	N/A	Implement Environment Projects	No	No	N/A	N/A	No	No	N/A	N/A	N/A	118	3,594	(3,477)	WP 4-50, Line 10		
5	4	Capital	2L	N/A	Instl/Rpl for Hydro Safety&Reg	No	No	N/A	N/A	No	No	N/A	N/A	N/A	111,658	74,548	37,109	WP 4-50, Line 1		
6	4	Capital	2M	N/A	Instal/Repl Hydro Gnerating Equip	No	No	N/A	N/A	No	No	N/A	N/A	N/A	257,248	276,011	(18,763)	WP 4-50, Line 2		
7	4	Capital	2N	N/A	Instal/Repl Resv,Dams&Waterway	No	No	N/A	N/A	No	No	N/A	N/A	N/A	111,174	181,394	(70,221)	WP 4-50, Line 3		
8	4	Capital	2P	N/A	Instl/Repl Hydr BldgGrndInfrst	No	No	N/A	N/A	No	No	N/A	N/A	N/A	43,535	15,141	28,394	WP 4-50, Line 4		

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Deferred Work Analysis Summary**

The Energy Supply deferred work analysis follows the principles for determining if work was deferred in compliance with Section 5.2 of the 2020 GRC Settlement Agreement. Each MAT or MWC in this chapter was checked against those principles by following the checks listed below.

Check 1: The work was requested and authorized based on representations that it was needed to provide safe and reliable service.

Check 2: PG&E did not perform all of the authorized and funded work, as measured by authorized (explicit or imputed) units of work;

Check 2a: *The work is measured by units of work.*

Check 2b: *PG&E expects to perform fewer of such units during the 2020-2022 period.*

Check 3: PG&E continues to represent that the curtailed work is necessary to provide safe and reliable service

Line No.	2023 GRC Chapter	Type	MWC	MAT Code	Description	Check 1 (See Note 1)	Check 2			Deferred Work	Explanation	Units Comparison			Dollar Comparison (\$000s)			Workpaper Reference
							Check 2a	Check 2b	Check 3			2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	Difference	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	Difference	
9	4	Capital	3H	N/A	Hydroelectric Lic & Lic Conditions	No	No	N/A	No	N/A	N/A	N/A	118,451	109,313	9,138	9,138	WP 4-50, Line 5	
10	4	Capital	3Q	N/A	Catastrophic Events	No	No	N/A	No	N/A	N/A	N/A	235	0	235	235	WP 4-50, Line 11	
11	4	Expense	AB	N/A	Misc Expense	No	No	N/A	No	N/A	N/A	N/A	19,799	19,309	490	490	WP 4-1, Line 1	
12	4	Expense	AK	N/A	Manage Environmental Oper	No	No	N/A	No	N/A	N/A	N/A	3,345	3,103	242	242	WP 4-1, Line 2	
13	4	Expense	AX	N/A	Maint Resv	No	No	N/A	No	N/A	N/A	N/A	80,750	72,575	8,175	8,175	WP 4-1, Line 3	
14	4	Expense	AY	N/A	Habitat and Species Protection	No	No	N/A	No	N/A	N/A	N/A	622	419	203	203	WP 4-1, Line 4	
15	5	Expense	BC	N/A	Perf Reimburs Wk for Oth	No	No	N/A	No	N/A	N/A	N/A	23	66	(43)	(43)	WP 4-1, Line 5	
16	4	Expense	EP	N/A	Manage Property & Bldgs	No	No	N/A	No	N/A	N/A	N/A	3,789	3,019	770	770	WP 4-1, Line 6	
17	4	Expense	ES	N/A	Implement Environment Projects	No	No	N/A	No	N/A	N/A	N/A	0	162	(162)	(162)	WP 4-1, Line 7	
18	4	Expense	IG	N/A	Manage Var Bal Acct Processes	No	No	N/A	No	N/A	N/A	N/A	74,458	16,082	58,375	58,375	WP 4-1, Line 8	
19	4	Expense	KG	N/A	Operate Hydro Generation	No	No	N/A	No	N/A	N/A	N/A	115,855	94,358	21,497	21,497	WP 4-1, Line 9	
20	4	Expense	KH	N/A	Maint Hydro Generating Equip	No	No	N/A	No	N/A	N/A	N/A	69,748	65,529	4,219	4,219	WP 4-1, Line 10	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Deferred Work Analysis Summary

The Energy Supply deferred work analysis follows the principles for determining if work was deferred in compliance with Section 5.2 of the 2020 GRC Settlement Agreement. Each MAT or MWC in this chapter was checked against those principles by following the checks listed below.

Check 1: The work was requested and authorized based on representations that it was needed to provide safe and reliable service.

Check 2: PG&E did not perform all of the authorized and funded work, as measured by authorized (explicit or imputed) units of work;

Check 2a: The work is measured by units of work.

Check 2b: PG&E expects to perform fewer of such units during the 2020-2022 period.

Check 3: PG&E continues to represent that the curtailed work is necessary to provide safe and reliable service

Line No.	2023 GRC Chapter	Type	MWC	MAT Code	Description	Check 1 (See Note 1)	Check 2			Deferred Work	Explanation	Units Comparison		Dollar Comparison (\$000s)		Difference	Workpaper Reference	
							Check 2a	Check 2b	Check 3			2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)			
21	4	Expense	KI	N/A	Maint Hydro Bldg	No	No	No	N/A	N/A	No	N/A	N/A	31,447	27,128	4,319	WP 4-1, Line 11	
22	4	Expense	KJ	N/A	License Compliance	No	No	No	N/A	N/A	No	N/A	N/A	70,317	112,209	(41,892)	WP 4-1, Line 12	
23	4	Expense	LX	N/A	Hydro Gen Catastrophic Events Operational	No	No	No	N/A	N/A	No	N/A	N/A	160	0	160	WP 4-1, Line 13	
24	4	Expense	OM	N/A	Management	No	No	No	N/A	N/A	No	N/A	N/A	8,173	10,099	(1,926)	WP 4-1, Line 14	
25	4	Expense	OS	N/A	Operational Support	No	No	No	N/A	N/A	No	N/A	N/A	10,546	19,005	(8,458)	WP 4-1, Line 15	
26	4	Expense	ZC	N/A	Corporate Items	No	No	No	N/A	N/A	No	N/A	N/A	5,008	0	5,008	WP 4-1, Line 16	
27														648,869	662,781	(13,913)		
28														494,040	443,062	50,978		
29																		

Notes:

30 1. Although the Spending Accountability Report may include variance explanations for certain MWCs (rather than the more detailed MAT code level) since they include some safety and reliability-related work, in PG&E's 2020 GRC, not all work in those MWCs were requested and authorized based on representations that it was needed to provide safe and reliable service.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Rescheduled Work from 2020 GRC

Line	MWC	PO	Item	Needed to Provided SRM	2020 Recorded CWIP + 2021 and 2022 Forecast	2020-2022 Forecast (in 2020 GRC)	Reason Rescheduled
1	2L	5779442	Helms - Ventilation Upgrade	Yes	352	507	Reprioritized work. Controls in place to mitigate risk.
2	2L	5751038	K2 - Replace CO2 System	Yes	261	837	Rescheduled due to re-scoping and/or design review.
3	2L	5779436	Helms - Courtright Dam Line US Face	Yes	-	1,065	Rescheduled due to re-scoping and/or design review.
4	2L	5774800	Crane Valley Intake Tower Stabilization	Yes	2,461	4,109	Rescheduled due to re-scoping and/or design review.
5	2L	5771200	Pit 6 Radial Gate 1 Repl Arms & Trunnions	Yes	3,975	6,900	Rescheduled due to re-scoping and/or design review.
6	2L	5776722	Pit 6 Radial Gate 2 Repl Arms & Trunnions	Yes	1,337	5,215	Rescheduled due to re-scoping and/or design review.
7	2L	5779214	Pit 6 Spillway Apron Replace Block 3	Yes	101	4,160	Rescheduled to optimize project work during outages.
8			Total MWC 2L		8,488	22,795	
9	2M	5778044	Helms - U2 Repl TSV	Yes	2,398	101	Rescheduled to optimize project work during outages.
10	2M	5720663	Cresta U2 Wickets & FPs Replace	Yes	5,083	4,312	Rescheduled to optimize project work during outages.
11	2M	5772018	Haas - Replace U1 Bearings/Install RTDs	Yes	2,371	1,625	Rescheduled to optimize project work during outages.
12	2M	5758119	Balch 2 U2 Repl Cooling Wtr System	Yes	2,928	101	Rescheduled to optimize project work during outages.
13	2M	5779429	Haas U1 Communic/Annunc+Device43 Swtchs	Yes	728	355	Rescheduled to optimize project work during outages.
14	2M	5760630	Caribou 1 Refurb PSV Aux Equip	Yes	513	101	Rescheduled due to re-scoping and/or design review.
15	2M	5775222	Haas - U2 Repl Bearings - Install RTDs	Yes	1,928	1,623	Rescheduled to optimize project work during outages.
16	2M	5779430	Haas U1 Replace TSV Cntrl Wtr Strainers	Yes	508	304	Rescheduled to optimize project work during outages.
17	2M	5778045	Helms - U3 Repl TSV	Yes	4,863	3,653	Rescheduled to optimize project work during outages.
18	2M	5762320	Pit 5 U1 Replace Excitation System	Yes	413	36	Rescheduled due to re-scoping and/or design review.
19	2M	5760010	Pit 3 PH Replace Neutral Transformers	Yes	524	172	Rescheduled due to re-scoping and/or design review.
20	2M	5760011	Pit 3 Replace Old AC and DC Panel	Yes	647	494	Rescheduled to optimize project work during outages.
21	2M	5779473	Toadown PH Inst Elec Stoplog Operator	Yes	-	101	Reprioritized work. Controls in place to mitigate risk.
22	2M	5779420	Balch 1 Wheel Pit Liner	Yes	397	507	Rescheduled to optimize project work during outages.
23	2M	5768013	South PH Inst Station Serv Disconnect	No	-	112	Rescheduled to optimize project work during outages.
24	2M	5745664	Caribou 1 U2 Replace Needles & Seats	Yes	-	178	Rescheduled to optimize project work during outages.
25	2M	5760654	Cresta U2 PRV Energy Dissipators Replace	Yes	595	812	Rescheduled to optimize project work during outages.
26	2M	5779428	Cresta VH Refurb Sluice Valve	Yes	37	254	Rescheduled to optimize project work during outages.
27	2M	5774081	AG Wishon Unit 3 Install Gen Bearing RTD	Yes	100	254	Reprioritized work. Controls in place to mitigate risk.
28	2M	5778054	Spring Gap Generator Rewind	Yes	299	984	Reprioritized work. Controls in place to mitigate risk.
29	2M	5780671	Helms U1 Replace Turbine Gauge Board	No	178	406	Rescheduled to optimize project work during outages.
30	2M	5780673	Helms U3 Replace Turbine Gauge Board	No	154	406	Rescheduled to optimize project work during outages.
31	2M	5780698	Kings River Repl Transformer Mgmt Relays	Yes	-	304	Rescheduled to optimize project work during outages.
32	2M	5768020	Volta 1 Inst Station Service Disconnect	Yes	26	446	Rescheduled to optimize project work during outages.
33	2M	5760652	Cresta PH Replace Exciter U2	Yes	1,386	1,623	Rescheduled to optimize project work during outages.
34	2M	5768015	South PH Repl Metal Clad Switchgear	Yes	-	502	Rescheduled to optimize project work during outages.
35	2M	5766154	JBB PH U1 Upgrade Governor Controls	Yes	1,116	1,674	Rescheduled to optimize project work during outages.
36	2M	5779178	Newcastle TSV Refurbish Seal	Yes	-	558	Rescheduled to optimize project work during outages.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Rescheduled Work from 2020 GRC

Line	MWC	PO	Item	Needed to Provided SRM	2020 Recorded CWIP + 2021 and 2022 Forecast	2020-2022 Forecast (in 2020 GRC)	Reason Rescheduled
37	2M	5762324	Pit 3 U1 Turbine Upgrade	Yes	-	558	Rescheduled to optimize project work during outages.
38	2M	5779464	Poe PH U1 & U2 Repl TSV Cylinders	Yes	-	558	Reprioritized work. Controls in place to mitigate risk.
39	2M	5768002	JBB Unit 2 Convert to Digital Governor	Yes	-	558	Rescheduled to optimize project work during outages.
40	2M	5760681	Electra U2 Governors and Servos Refurb	Yes	-	609	Rescheduled to optimize project work during outages.
41	2M	5760716	Potter Valley U1 TSV Seats Repla	Yes	-	609	Reprioritized work. Controls in place to mitigate risk.
42	2M	5760684	Halsey Replace Exciter	Yes	126	663	Reprioritized work. Controls in place to mitigate risk.
43	2M	5766244	Drum U5 Cooling Water Flow meters	Yes	43	701	Reprioritized work. Controls in place to mitigate risk.
44	2M	5760651	Cresta U1 PRV Energy Dissipators Replace	Yes	131	812	Rescheduled to optimize project work during outages.
45	2M	5760721	Rock Cr Refurbish PSV Aux Equip	Yes	-	812	Rescheduled due to re-scoping and/or design review.
46	2M	5739725	Haas - CO2 Retrofit	Yes	218	826	Rescheduled due to re-scoping and/or design review.
47	2M	5760722	Salt Springs 2 Replace Needles & Seats	Yes	350	1,166	Rescheduled to optimize project work during outages.
48	2M	5766242	Drum U5 Install RTD	Yes	50	862	Reprioritized work. Controls in place to mitigate risk.
49	2M	5780661	Balch 2 U2 Repl Transformer Mgmt Relays	Yes	95	1,015	Rescheduled to optimize project work during outages.
50	2M	5780662	Balch 2 U3 Repl Transformer Mgmt Relays	Yes	91	1,015	Rescheduled to optimize project work during outages.
51	2M	5779434	Haas U2 Replace TSV Seats	Yes	13	1,015	Rescheduled to optimize project work during outages.
52	2M	5762318	PIT 4 U1 Replace Excitation System	Yes	-	1,116	Rescheduled due to re-scoping and/or design review.
53	2M	5762321	Pit 5 U2 Replace Excitation System	Yes	-	1,152	Rescheduled due to re-scoping and/or design review.
54	2M	5779446	Kings River - Upgrade Cooling Water Syst	Yes	-	1,268	Rescheduled to optimize project work during outages.
55	2M	5779445	Kings River - Replace Brigs/Install RTDs	Yes	-	1,268	Rescheduled to optimize project work during outages.
56	2M	5766241	Tiger Creek U2 Exciter Replacement	Yes	136	1,421	Reprioritized work. Controls in place to mitigate risk.
57	2M	5768011	Poe PH U1 Replace Excitation System	Yes	-	1,395	Reprioritized work. Controls in place to mitigate risk.
58	2M	5762322	Pit 5 U3 Replace Excitation System	Yes	-	1,431	Rescheduled due to re-scoping and/or design review.
59	2M	5734298	Caribou 1 U2 Upgrade Gov Controls	Yes	147	1,634	Rescheduled to optimize project work during outages.
60	2M	5760167	Cresta PH Replace Exciter U1	Yes	54	1,623	Rescheduled to optimize project work during outages.
61	2M	5780659	Balch 2 Bank 3 Replacement	Yes	93	1,790	Rescheduled to optimize project work during outages.
62	2M	5766243	Tiger Creek Generator Relays Unit 2	Yes	155	1,776	Reprioritized work. Controls in place to mitigate risk.
63	2M	5778920	Electra U2 Convert to Digital Governor	Yes	-	1,826	Rescheduled to optimize project work during outages.
64	2M	5779441	Helms U3 Rotor Demo	No	-	1,928	Rescheduled to optimize project work during outages.
65	2M	5778921	Electra U3 Convert to Digital Governor	Yes	-	2,029	Rescheduled to optimize project work during outages.
66	2M	5779418	Balch 1 - Replace PSV	Yes	654	2,892	Rescheduled to optimize project work during outages.
67	2M	5780674	Helms U1 Refurb Wicket Gate Servo	Yes	238	2,537	Rescheduled to optimize project work during outages.
68	2M	5720513	Salt Springs 1 Generator Rewind	Yes	1,151	3,602	Rescheduled to optimize project work during outages.
69	2M	5760617	Balch 2 U3 Upgrade Cooling Water System	Yes	2,123	2,943	Rescheduled to optimize project work during outages.
70	2M	5767981	Caribou 1 U3 Upgrade Gov Controls	Yes	18	2,537	Rescheduled to optimize project work during outages.
71	2M	5778043	Helms - U1 Repl TSV	Yes	2,099	3,653	Rescheduled to optimize project work during outages.
72	2M	5778266	Cresta Tunnel Refurbish Liner	Yes	26	3,044	Rescheduled to optimize project work during outages.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 4
 Hydro Operations
 Rescheduled Work from 2020 GRC

Line	MWC	PO	Item	Needed to Provided SRM	2020 Recorded CWIP + 2021 and 2022 Forecast	2020-2022 Forecast (in 2020 GRC)	Reason Rescheduled
73	2M	5778976	JBB Replace Transformer Bank 2	Yes	5	3,095	Reprioritized work. Controls in place to mitigate risk.
74	2M	5739698	Balch 1 - Replace Governor	Yes	273	3,450	Rescheduled to optimize project work during outages.
75	2M	5760669	Drum 2 U5 Rewind	Yes	113	3,551	Reprioritized work. Controls in place to mitigate risk.
76	2M	5779526	Poe PH Replace GSU Transformer Bank 1	Yes	-	3,703	Reprioritized work. Controls in place to mitigate risk.
77	2M	5760655	Cresta U1 Replace Wicket Gates & FPs	Yes	483	4,312	Rescheduled to optimize project work during outages.
78	2M	5778975	JBB Replace Transformer Bank 1	Yes	1,054	5,834	Rescheduled to optimize project work during outages.
79	2M	5720727	Caribou 1 U3 Repl Rnmr, Brng, Shift & Ndl	Yes	-	5,581	Rescheduled to optimize project work during outages.
80	2M	5778441	Helms - Replace 230kV Oil-Filled Cables	Yes	86	6,103	Rescheduled due to re-scoping and/or design review.
81	2M	5778900	Tiger Creek U2 Rewind	Yes	2,020	7,509	Reprioritized work. Controls in place to mitigate risk.
82	2M	5720726	Caribou 1 U2 Repl Runners, Bearing&Shaft	Yes	3,927	8,319	Rescheduled to optimize project work during outages.
83	2M	5720657	Caribou 1 U2 Rewind	Yes	2,221	8,726	Rescheduled to optimize project work during outages.
84			Total MWC 2M		45,383	136,825	
85	2N	5779209	Helms - Install Incline Tunnel Liner	Yes	3,324	2,790	Rescheduled to optimize project work during outages.
86	2N	5770968	South PH Install Digger Creek Div Gate	Yes	-	122	Rescheduled to optimize project work during outages.
87	2N	5778996	Griswold Cross Gate Improvements	No	-	152	Rescheduled to optimize project work during outages.
88	2N	5779525	Three Lakes Dam Install Weir(s)	Yes	80	355	Rescheduled due to re-scoping and/or design review.
89	2N	5779207	Helms - Repl Courtright LLO Bypass Valve	Yes	239	649	Rescheduled to optimize project work during outages.
90	2N	5777491	Stan-Relief Dam Gunite Liner	Yes	500	913	Rescheduled due to re-scoping and/or design review.
91	2N	5779521	Wise Forebay Increase Flow Capacity	No	75	680	Rescheduled to optimize project work during outages.
92	2N	5760169	Cresta Replace PSV Aux Equip	Yes	345	812	Rescheduled due to re-scoping and/or design review.
93	2N	5778440	Courtright Dam Upgrade I/D Gate Control	Yes	1,443	4,566	Rescheduled due to re-scoping and/or design review.
94			Total MWC 2N		6,006	11,040	
95	2P	5779398	Drum Penstock Access Improvements	Yes	2,500	578	Rescheduled due to weather and/or wildfire
96	2P	5779022	Tiger Creek Road MP 1.7 Gabion Wall	Yes	100	274	Rescheduled to optimize project work during outages.
97	2P	5768006	Manton SC Resurface Parking Lots	No	-	203	Reprioritized work. Controls in place to mitigate risk.
98	2P	5747297	Rodgers Flat Inst New Storage Facility	No	-	609	Reprioritized work. Controls in place to mitigate risk.
99	2P	5770038	Helms - Install HQ Leachfield	No	312	1,015	Reprioritized work. Controls in place to mitigate risk.
100	2P	5779576	Tiger Creek PH Crane Modernization	Yes	45	1,015	Rescheduled due to re-scoping and/or design review.
101	2P	5779577	Salt Springs PH DS Crane Modernization	Yes	39	1,015	Reprioritized work. Controls in place to mitigate risk.
102	2P	5779419	Balch 1 Replace Cooling Wtr Tank Control	Yes	209	1,218	Rescheduled to optimize project work during outages.
103			Total MWC 2P		3,205	5,926	
104			Total of All MWCs		63,082	176,585	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 4
Hydro Operations
2015-2019 NERC GADS Generating Unit Statistical Brochure
Calculation of PG&E's Hydro Industry Averages

Line	Equivalent Availability Factor	NERC GADS Data	2020 Capacity (MW)
1	Conventional Hydro	81.58%	2,655.1
2	Hydro Pumped Storage	78.33%	1,212.0
3	Hydro Portfolio	80.56%	3,867.1

Line	Forced Outage Factor	NERC GADS Data	2020 Capacity (MW)
4	Conventional Hydro	3.04%	2,655.1
5	Hydro Pumped Storage	3.61%	1,212.0
6	Hydro Portfolio	3.22%	3,867.1

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (P&ES), Chapter 4
 Power Generation

2015-2019 Generating Unit Statistical Brochure -- All Units Reporting

NOTE: This brochure contains data on units reporting events only. For a review of statistics containing units that reported events, see the brochure "2015-2019 Generating Unit Statistical Brochure -- Units Reporting Events".

(The differences between statistics with or without events will appear in equations needing derating information such as EAF, EFOR, and other equations. The equations are more accurate if events are reported.)

Unit Type	MW Truncated Nameplate	# of Units	Unit Years	ART	SR	NCF	NOF	SF	AF	EAF	FOR	EFOR	SOF	FOF	UOF	EUOF	EUOR	POF	MOF	WSF	WAF	WEAF	WFOR	WEOF	WSOF	WFOF	WVWF
FOSSIL All Fuel Types	All Sizes	1326	5452	166.07	98.76	42.27	70.82	52.65	82.35	79.57	8.71	11.69	9.1	12.62	5.03	8.7	10.71	17.31	8.95	3.67	59.69	81.37	78.68	7.86	10.66	13.54	5.09
FOSSIL All Fuel Types	100-199	309	1169	123.15	99.29	29.52	63.72	44.1	84.93	81.97	10.07	13.11	9.08	10.13	4.94	8.35	10.2	19.24	6.72	3.41	46.33	85.07	82.22	9.25	12.25	10.21	4.72
FOSSIL All Fuel Types	200-299	314	1227	165.3	97.16	29.52	66.0	41.24	84.99	81.06	8.86	13.3	8.44	12.93	4.97	8.15	9.94	17.81	8.96	3.20	51.82	82.76	79.78	9.72	13.01	12.93	4.91
FOSSIL All Fuel Types	300-399	115	598	212.04	98.03	21.52	62.01	50.73	81.49	79.06	8.21	11.38	9.01	13.87	4.54	8.09	10.07	16.97	10.42	3.55	50.05	81.43	79.48	8.98	11.43	14.05	4.52
FOSSIL All Fuel Types	400-599	208	927	330.51	97.5	42.92	70.31	60.85	80.3	77.37	9.17	12.35	10.7	13.56	6.14	8.87	12.26	17.24	9.83	3.73	61.04	80.35	77.43	9.19	12.35	13.47	6.18
FOSSIL All Fuel Types	600-799	147	650	512.6	96.67	50.88	72.02	66.84	81.96	79.25	6.61	9.28	8.38	13.31	4.73	8.35	10.6	14.03	9.67	3.64	66.92	81.5	79.21	6.63	12.37	13.35	4.75
FOSSIL All Fuel Types	800-999	60	287	287.72	98.09	47.34	72.49	64.89	82.41	80.29	5.9	8.2	7.15	13.52	4.07	7.8	9.77	13.38	9.79	3.73	65.3	82.51	80.39	5.84	8.11	13.45	4.05
FOSSIL All Fuel Types	1000 Plus	16	60	647.34	96.42	50.71	75.92	65.73	73.82	70.41	8.65	10.84	10.12	19.96	6.22	12.47	14.54	18.54	13.71	6.25	66.79	74.07	70.79	8.49	10.64	19.73	6.2
FOSSIL Coal Primary	All Sizes	843	3223	345	97.96	51.99	74.2	64.35	82.44	79.56	7.35	9.88	8.66	12.46	5.11	8.89	10.94	14.87	8.68	3.78	70.07	81.67	78.92	6.88	9.28	13.15	5.18
FOSSIL Coal Primary	100-199	138	414	235.16	98.65	35.18	72.3	45.05	86.45	83.88	8.45	10.85	8.36	9.4	4.16	6.92	8.48	16.1	6.64	2.76	48.65	87.36	84.83	6.86	9.21	9.06	3.58
FOSSIL Coal Primary	200-299	206	665	137.78	99.14	36.84	65.95	55.62	83.58	80.04	7.83	10.74	8.34	11.7	4.72	8.64	10.67	16.45	7.78	3.92	55.85	83.46	79.93	7.84	10.94	11.73	4.82
FOSSIL Coal Primary	300-399	68	291	424.55	96.72	44.95	70.41	63.88	81.02	77.94	7.48	11.08	9.8	13.17	6	10.66	12.46	17.04	8.52	4.66	61.78	81.33	78.61	8.63	10.91	12.84	5.84
FOSSIL Coal Primary	400-599	141	639	535.11	97.09	53.98	73.42	73.42	81.44	78.5	7.37	10.06	9.46	12.72	5.84	9.22	11.6	14.01	9.34	3.38	63.85	81.09	78.02	8.49	10.69	13.74	5.17
FOSSIL Coal Primary	600-799	120	535	620.09	96.86	57.12	77.12	73.97	82.94	80.38	5.86	8.01	7.51	12.45	4.6	8.2	10.22	12.42	8.85	3.6	74.06	82.95	80.38	5.85	8	12.44	4.6
FOSSIL Coal Primary	800-999	43	205	696.3	95.7	54.73	74.49	73.36	81.32	79.12	6.31	8.31	7.86	13.74	4.94	8.87	10.89	13.21	3.92	73.47	81.5	79.32	6.23	8.2	13.62	4.88	
FOSSIL Coal Primary	1000 Plus	14	56	658.08	96.39	52.85	76.81	68.25	74.2	71.06	8	9.86	9.34	19.86	5.93	12.17	13.94	17.33	13.63	6.23	68.81	74.39	71.32	7.98	9.87	19.64	5.97
FOSSIL Oil Primary	All Sizes	90	262	84.27	99.05	6.42	43.37	24.09	82.88	80.81	13.34	19.22	9.99	13.42	3.71	8.78	10.71	31.85	8.35	5.07	14.8	81.52	79.98	16.03	21.86	15.65	2.82
FOSSIL Oil Primary	100-199	24	81	72.3	99.62	28.72	49.35	49.05	83.49	79.32	7.48	14.33	9.58	12.55	3.96	12.27	16.43	26.31	4.24	8.31	58.2	82.97	78.42	5.5	11.9	13.65	3.39
FOSSIL Oil Primary	200-299	19	58	195.87	97.09	11.14	53.6	18.02	82.92	81.53	24.95	30.29	17.82	11.09	5.99	11.41	39.92	11.41	3.88	20.79	82.49	80.82	21.34	26.61	11.87	5.64	
FOSSIL Oil Primary	300-399	13	45	167.04	98.66	9.88	38.09	25.44	83.14	82.63	9.11	10.12	7.34	14.31	2.55	5.15	5.47	17.79	11.71	2.16	25.95	83.25	82.74	8.52	9.5	14.33	4.43
FOSSIL Oil Primary	400-599	14	32	210.7	98.79	1.83	35.62	2.94	84.52	83.49	56.01	61.78	24.21	11.73	3.75	6.59	7.59	73.63	8.58	3.16	2.9	84.42	83.41	8.57	62.49	11.74	2.84
FOSSIL Oil Primary	600-799	9	26	292.5	98.77	2.51	43.38	6.25	82.44	81.24	13.17	23.7	8.82	16.51	0.95	6.46	7.47	54.78	11.1	5.51	6.04	81.01	79.73	13.32	25.03	18.06	0.93
FOSSIL Oil Primary	800-999	7	13	52.79	85.6	0.55	28.84	1.93	78.95	78.25	8.95	28.32	8.01	20.86	0.19	4.72	5.29	73.38	4.53	1.89	79.07	78.35	8.99	28.79	20.74	0.19	
FOSSIL Gas Primary	All Sizes	402	1534	60.55	99.01	12.27	42.18	27	80.87	78.69	16.24	20.44	10.95	13.9	5.24	9.01	10.67	28.83	10.12	3.77	29.1	78.86	76.46	15.85	20.51	15.66	5.48
FOSSIL Gas Primary	100-199	116	412	64.26	99.2	12.2	44.11	22.1	82.62	81.08	22.54	25.05	11.75	10.95	6.43	10.59	11.48	34.45	6.79	4.82	27.66	82.17	80.5	19.99	22.24	10.92	6.91
FOSSIL Gas Primary	200-299	46	178	41.82	99.3	11.82	44.7	25.35	82.41	80.1	13.45	17.82	8.74	13.65	3.94	7.15	8.75	26.08	10.44	3.21	26.44	82.05	79.57	12.96	17.2	14.01	3.94
FOSSIL Gas Primary	300-399	40	157	105.78	99	16.43	42.78	37.98	82.78	80.41	9.48	14.07	9.01	13.24	3.98	7.35	9.66	20.69	9.87	3.38	38.41	82.68	80.42	9.09	13.47	13.48	3.84
FOSSIL Gas Primary	400-599	57	225	71.58	98.72	10.63	36.78	29.04	80.8	78.74	12.91	16.99	9.97	14.89	4.31	7.04	8.69	23.44	12.61	2.73	28.9	80.53	78.52	12.97	16.96	15.17	4.31
FOSSIL Gas Primary	600-799	17	55	87.03	98.25	12.73	42.97	29.58	75.44	72.59	20.66	25.87	16.08	16.86	7.7	12.82	15.12	34.86	11.74	5.12	29.62	75.74	72.88	20.79	25.95	16.49	7.77
FOSSIL Gas Primary	800-999	10	34	144.79	94.28	12.86	49.02	25.1	69.76	66.15	22.28	30.65	20.74	23.05	7.19	11.57	15.17	38.61	18.67	4.38	26.23	75.05	67.16	21.61	29.29	22.27	7.23
FOSSIL Gas Primary	1000 Plus	10	34	22.51	99.55	8.14	32.5	24.98	84.48	83.78	5.09	6.55	3.11	14.18	1.34	5.57	6.23	19.99	9.95	4.23	25.05	84.33	83.61	4.94	6.42	14.37	1.3
FOSSIL Lignite Primary	All Sizes	35	124	52.18	99.55	65.82	78.86	82.61	87.53	83.12	4.45	8.42	7.98	8.63	3.85	5.2	8.82	10.04	7.27	1.36	83.45	88.16	83.77	4.49	8.94	7.92	3.92
FOSSIL Oil/Gas Primary	100-199	138	493	66.46	99.31	15.38	45.86	26.41	82.76	80.8	18.61	22.25	11.06	11.21	6.04	10.86	12.27	32.31	6.38	4.82	35.53	82.32	80.1	15.67	19.17	11.44	6.23
FOSSIL Oil/Gas Primary	200-299	47	180	44.57	99.25	11.75	45.41	24.57	82.47	80.23	14.48	18.93	9.19	13.37	4.16	7.44	9.04	27.36	10.09	3.28	25.88	82.09	78.7	13.7	18.03	13.8	4.11
FOSSIL Oil/Gas Primary	300-399	51	202	105.77	98.96	16.38	42.84	37.82	82.85	80.49	9.47	14.07	9	13.2	3.95	7.31	9.62	20.68	9.83	3.96	38.24	82.75	80.5	9.08	13.47	13.43	3.82
FOSSIL Oil/Gas Primary	400-599	67	258	80.14	98.27	11.21	42.87	25.98	85.67	74.07	12.23	15.77	9.41	14.77	3.94	6.65	8.02	22.43	12.07	2.73	28.26	81.2	79.43	12.12	15.96	14.99	3.9
FOSSIL Oil/Gas Primary	600-799	12	41	83.07	98.27	11.21	42.87	25.98	85.67	74.07	12.23	15.77	9.41	14.77	3.94	6.65	8.02	22.43	12.07	2.73	28.26	81.2	79.43	12.12	15.96	14.99	3.9
FOSSIL Oil/Gas Primary	800-999	12	41	102.98	99.32	9.73	43.59	18.72	83.94	83.34	13.31	29.38	17.71	20.94	5.15	12.02	14.1	36.25	11.31	4.85	26.14	80.37	74.26	11.71	20.91	26.95	16.87
FOSSIL Oil/Gas Primary	1000 Plus	11	42	132.88	98.99	10.4	43.84	24.81	83.4	83.14	13.31	29.38	17.71	20.94	5.15	12.02	14.1	36.25	11.31	4.85	26.14	80.37	74.26	11.71	20.91	26.95	16.87
FOSSIL Oil/Gas Primary																											

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 7 Radial Gates Arms and Trunnions

Major Work Categories: 2L

Planning Order Numbers: 5771199 (Gate 1) / 5776723 (Gate 2)

Project Start Date: 2016

Project Completion Date: 2026

Operative Date: Nov-2025, Nov-2026

Description

The Pit 7 Project includes 2-units located in the lower reaches of the Pit River. The Pit 7 powerhouse produces an average of about 512 GWh of electricity annually and provides 112 MW of dependable capacity to help meet our customers' summertime demand for electricity.

The scope of this work is to engineer, permit, procure and construct replacement of the entire trunnion bearings and gate arms with high yield strength steel. The gates will be recoated and the gate seals will be replaced as needed.

Justification

In 2005, the State of California, Department of Safety of Dams (DSOD) requested radial gate tests be performed to evaluate long-term friction and steel yield stress in the radial gate and gate arms. High stresses were noted in the radial gate arms, suggesting additional strengthening was required.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5771199	Pit 7 Radial Gate1 Repl Arms & Trunnions	Nov-2025	99	7	7	1,337	2,515	13,201	98	17,264
5776723	Pit 7 Radial Gate2 Repl Arms & Trunnions	Nov-2026	n.a.	n.a.	n.a.	n.a.	1,384	2,523	13,663	17,570

Benefits

Completion of this work will allow reliable and safe operation of the dam in compliance with the facility licensing agency. Additionally, performing the work on each gate independently allows the facility to be returned to service.

Alternatives Considered

The project is directed by the Division of Safety of Dams (DSOD) and is therefore not optional. Replacement of the Dam Radial Gates Arms and Trunnions is the solution to adequately strengthen the gate elements to meet current code requirements.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 6 Radial Gates Arms and Trunnions

Major Work Categories: 2L

Planning Order Numbers: 5771200 (Gate 1) / 5776722 (Gate 2)

Project Start Date: 2016

Project Completion Date: 2024

Operative Date:

P.O. 5771200 November 2023

P.O. 5776722 November 2024

Description

The Pit 6 Project includes 2-units located in the upper reaches of the Pit River. The Pit 6 powerhouse produces an average of about 374 GWh of electricity per year and provides 80 MW of dependable capacity to help meet our customers' summertime demand for electricity.

The scope of this work is to engineer, permit, procure and construct replacement of the entire trunnion bearings and gate arms with high yield strength steel. The gates will be recoated and the gate seals will be replaced as needed.

Justification

In 2005, the State of California, Department of Safety of Dams (DSOD) requested radial gate tests be performed to evaluate long-term friction and steel yield stress in the radial gate and gate arms. High stresses were noted in the radial gate arms, suggesting additional strengthening was required.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5771200	Pit 6 Radial Gate1 Repl Arms & Trunnions	Nov-2023	187	1,288	2,500	12,716	98	n.a.	n.a.	16,789
5776722	Pit 6 Radial Gate2 Repl Arms & Trunnions	Nov-2024	n.a.	n.a.	1,337	2,500.	12,754	98	n.a.	16,689

Benefits

Completion of this work will allow reliable and safe operation of the dam in compliance with the facility licensing agency. Additionally, performing the work on each gate independently allows the facility to be returned to service.

Alternatives Considered

Replace radial gate arms and trunnions - The project is directed by the Division of Safety of Dams (DSOD) and is therefore not optional. Replacement of the Dam Radial Gates Arms and Trunnions is the solution to adequately strengthen the gate elements to meet current code requirements

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Status Quo / Do nothing – Not a viable alternative. The project is directed by the facility licensing agency and is therefore not optional.

Reschedule Replacement of Gate Trunnion – Not recommended; risk of Notice of Violation.

Strengthen Radial Gate Arms - Evaluated and ultimately determined to be insufficient to address the problem.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 3 Turbine Upgrades

Major Work Category: 2M

Planning Order Numbers: 5762324 (Unit 1), 5762325 (Unit 2), 5762326 (Unit 3)

Project Start Date: 2016

Project Completion Date: 2026

Operative Date:

P.O. 5762324 January 2025

P.O. 5762325 December 2025

P.O. 5762326 December 2026

Description

The Pit 3 Project includes 3-units located in the upper reaches of the Pit River. The Pit 3 powerhouse produces an average of about 437 GWh of electricity per year and provides 70 MW of dependable capacity to help meet our customers' summertime demand for electricity. Pit 3 Turbines Upgrade Projects will include replacement of the runners, wicket gates, and seal rings. The rebuild of all other components such as Wicket Gate Servomotors, and all new wicket gate bushings are the main items to be considered in the overall project. Inspection and available records review will be required to determine exact project scope of work.

Justification

Improve power production, lower maintenance requirements, improve reliability. The unit is used for peak/shaped power production. It also provides other ancillary services including voltage / VAR support

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5762324	Pit 3 U1 Turbine Upgrade	Jan-2025	n.a.	n.a.	n.a.	558	4,700	2,200	n.a.	7,458
5762325	Pit 3 U2 Turbine Upgrade	Dec-2025	n.a.	n.a.	n.a.	n.a.	558	4,700	2,200	7,458
5762326	Pit 3 U3 Turbine Upgrade	Dec-2026	n.a.	n.a.	n.a.	n.a.	n.a.	558	4,700	5,258

Benefits

This project reduces the likelihood of forced outages, avoids the incremental costs of an emergency project and helps ensure the long-term reliability of the Pit 3 Powerhouse.

Alternatives Considered

Status Quo - Continued operation and maintenance of the existing equipment.

Replacement of only part of the equipment – not recommended due to the age of the equipment.

Replacement of the runners, wicket gates and seal rings, wicket gate bushings and rebuild the remaining turbine equipment (preferred alternative).

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 1, Pit 3, Pit 4 and Pit 5 Powerhouses Replace Crane Controls

Major Work Category: 2P

Planning Order Numbers. 5785093, 5785094, 5785095, 5792458

Project Start Date: 2020

Project Completion Date: 2025

Operative Date:

P.O.5785093 May 2021

P.O.5785094 November 2024

P.O.5785095 August 2024

P.O.5792458 October 2025

Description

The cranes were manufactured in the early 1920s and represent original equipment. The cranes support annual powerhouse maintenance inspections as well as other planned powerhouse improvements. The powerhouse cranes operating controls are experiencing problems due to age.

Justification

An assessment of the cranes by a third-party engineering firm identified numerous crane deficiencies and a list of upgrades recommended due to the age of the cranes and the inability to obtain repair/replacement parts. The crane assessment found that the cranes switches system as well as other parts are obsolete.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5785093	Pit 3 PH Replace Crane(s) Controls	May-2021	373	4,079	n.a.	n.a.	n.a.	n.a.	n.a.	4,452
5785094	Pit 5 PH Replace Crane(s) Controls	Nov-2024	n.a.	n.a.	n.a.	2,500	1,000	n.a.	n.a.	3,500
5785095	Pit 1 PH Replace Crane (s) Controls	Aug-2024	285	10	10	1,500	2,000	n.a.	n.a.	3,805
5792458	Pit 4 PH Replace Crane (s) Controls	Oct-2025	n.a.	n.a.	n.a.	n.a.	2,500	1,000	n.a.	3,500

Benefits

This project proposes to restore the cranes to reliable operational condition and bring them up to current standards of technology and safety. Implementing the improvements will increase material handling safety, increase productivity and minimize crane down time.

Alternatives Considered:

Status Quo / Run to Failure – Not considered as a feasible alternative. Utilizing the cranes to failure introduced personnel safety risk.

Repair Crane Controls – This alternative is not feasible as many of the crane's parts are obsolete and repair parts are not available.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Replace Crane Controls – This is the recommended alternative. This will restore the cranes to current standards of technology for safe reliable operation.

Retire – Not considered a feasible alternative. The cranes are required to support annual powerhouse maintenance inspections as well as other planned powerhouse improvement projects.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 7 Replace Transformers

Major Work Category: 2M

Planning Order Numbers: 5778973 (Unit 1) / 5778974 (Unit 2)

Project Start Date: 2020

Project Completion Date: 2023

Operative Date: July 2022

Description

The Pit 7 Project includes 2-units located in the lower reaches of the Pit River. The Pit 7 powerhouse produces an average of about 512 GWh of electricity annually and provides 112 MW of dependable capacity to help meet our customers' summertime demand for electricity

The High Voltage Transformers are 3 phase transformers and have been in service since the powerhouse was commissioned in 1965. The High Voltage Transformer Program has identified the Pit 7 Transformer Bank #1 as high priority in the transformer fleet that needs to be scheduled for replacement. Due to the age of the transformer, a failure at a similar bank (Pit 6 bank 1 in 2017) and long lead time of a replacement transformer (approximately 12 months), it is recommended that the transformer be replaced.

The age and vintage of the high voltage transformers, combined with accessibility (unit 1 must be removed to reach unit 2), creates a situation where it is in PG&E's best interest to replace both units at the same time.

Justification

The purpose of this project is to improve the reliability of generation at the Pit 7 Powerhouse. This project will help to mitigate the risks associated with Transformers and Voltage Regulators.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5778973	Pit 7 Replace Transformer Bank 1	Jul-2022	91	1,125	5,750	250	n.a.	n.a.	n.a.	7,216
5778974	Pit 7 Replace Transformer Bank 2	Jul-2022	54	1,125	5,750	250	n.a.	n.a.	n.a.	7,179

Benefits

Replacement of Pit 7 transformer banks 1 and 2 will reduce the likelihood of forced outage and ensure long-term reliability of the Pit 7 generating units.

Alternatives Considered

Status Quo - This alternative is not a viable option. Leaving the transformers in the current known condition would be contrary to the technical consultant's analysis and recommendation. Doing nothing poses risk of failing a bank while in service. This is not the recommended alternative.

Replace Existing Transformer - (Recommended)

This alternative would remove the existing transformer and replace with new. This *is the* recommended alternative.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

Defer Transformer Replacement by Two Years. This alternative would defer replacement of the existing transformer two years. This is not viable as it would prolong the replacement of a transformer that is similar to one that experienced a recent failure (Pit 6 bank 1). This is not the recommended alternative.

Refurbish Existing Transformer. This alternative would refurbish the existing transformer and return it back to service. This is not recommended as cost of refurbishment is more than a new transformer. Also, the lost generation impact to PG&E would be greater as refurbishment would require a longer outage period.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 4 Unit 1 Turbine Upgrade

Major Work Category: 2M

Planning Order Numbers. 5720696

Project Start Date: 2024

Project Completion Date: 2026

Operative Date: June 2026

Description

Pit 4 includes 2-units located in the upper reaches of the Pit River. The Pit 4 powerhouse produce an average of about 505 GWh of electricity per year and provide 95 MW of dependable capacity to help meet our customers' summertime demand for electricity.

Runners (turbines) typically have an expected life of 30-40 years. The runner, wicket gates, facing plates and other appurtenances will be replaced. The timing for work will coincide with the Pit 4 Unit 1 rewind in 2026.

Justification

Pit 4 units have problems with rough run zone operation unless air injection/intake is used at low loads to remediate it. The units are also used for load shaping/peaking operation and voltage support. As such the units must be able to operate at all loads. Age, wear, difficult operating requirements, and need for excessive maintenance makes replacement necessary.

Failure of the turbine runner has a potential to cause an imbalance condition that could result in catastrophic failure and significant damage to the shaft, bearing and generating components. This type of failure would result in lost generation; inability to meet water delivery obligations; and a substantial outage duration to perform repairs or complete overhaul of both generating and turbine systems.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5720696	Pit 4 Unit 1 Turbine Upgrade	Jun-2026	n.a.	n.a.	n.a.	n.a.	558	4,700	n.a.	5,258

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages.

Alternatives Considered

Status Quo – Run to failure

Repair the equipment – equipment is old and requires excessive maintenance.

Replace the runner, wicket gates, facing plates and other appurtenances (preferred alternative).

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 4 Unit 1 Rewind

Major Work Category: 2M

Planning Order No. 5720747

Project Start Date: 2024

Project Completion Date: 2026

Operative Date: June 2026

Description

Pit 4 includes 2-units located in the upper reaches of the Pit River. The Pit 4 powerhouse produce an average of about 505 GWh of electricity per year and provide 95 MW of dependable capacity to help meet our customers' summertime demand for electricity.

The scope of this work is to rewind the Unit 1 generator at Pit 4 Powerhouse and perform other prudent generator modifications (e.g. protective relay systems, generator and turbine bearing temperature monitoring systems, vibration monitoring systems and partial discharge sensing systems) in order to ensure ongoing unit reliability and prevent a loss of generation due to coil failure.

Justification

Unit 1 generator winding has reached end of service life, almost 30 years old. The Asset Management Generator Assessment program has identified Pit 4 Unit 1 (57.5 MVA) has a health score of 4.5, failure expected within 4 years. This unit was rewound in 1986 by West/EA and PDA test of this unit is trending upward, must be rewound prior to failure.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5720747	Pit 4 Unit 1 Rewind	Jun-2026	n.a.	n.a.	n.a.	n.a.	250	2,500	10,000	12,750

Benefits

This project will minimize the risk of forced outage due to generator winding failure, minimize overall cost by performing the project during a planned outage and ensure long-term reliability of the unit.

Alternatives Considered

- Status Quo – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Rewind Generator – This is the recommended alternative.
- Reschedule one year – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: JBB Replace Transformers

Major Work Category: 2M

Planning Order Numbers: 5778975 (Unit 1) / 5778976 (Unit 2)

Project Start Date: 2020

Project Completion Date: 2025

Operative Date:

P.O. 5778975 November 2023

P.O. 5778976 December 2024

Description

James B. Black (JBB) PH is a 172 MW facility located on the Pit River in Shasta County, CA. It employs two 86 MW impulse turbines. The James B. Black Powerhouse High Voltage Transformer has been in service since 1970. The High Voltage Transformer Program has identified the James B. Black High Voltage (HV) Transformer Banks 1 and 2 as high priorities in the transformer fleet that needs to be scheduled for replacement.

Justification

This project will help improve the reliability of the transformers.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5778975	JBB Replace Transformer Bank 1	Nov-2023	4	50	1,000	5,750	250	n.a.	n.a.	7,054
5778976	JBB Replace Transformer Bank 2	Dec-2024	5	n.a.	n.a.	1,000	5,750	250	n.a.	7,005

Benefits

Replacement of James B Black transformer banks 1 and 2 will reduce the likelihood of forced outage and ensure long-term reliability of the JBB generating units.

Alternatives Considered

Status Quo – Not a feasible option, replacement is necessary. Running the transformer until it fails would result in a prolonged forced outage and higher costs to replace it on an expedited basis.

Repair – Not feasible due to age and transformer construction (shell type) which makes field repairs impossible.

Refurbish – Not feasible due to age and transformer construction (shell type) which makes field repairs impossible.

Replace (recommended) – replace transformers which have reached end of useful life

Reschedule One year – Replacement is needed due to concerns around forced outage and employee safety.

Retire – Transformers are necessary for plant operations. Not a feasible option.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Battle Creek Salmon/Steelhead Phase 2

Major Work Category: 11

Planning Order: 5733458

Project Start Date: 2011

Project Completion Date: 2025

Operative Date: September 2025

Description

Battle Creek Salmon/Steelhead Phase 2 consists of work associated with modifications to existing South Powerhouse hydropower facilities tailrace connector, the South Diversion Dam and South Canal removal, removal of Lower Ripley Creek Feeder Dam, Coleman Diversion Dam, and Soap Creek Feeder Dam, and construction of a fish screen and ladder at the Inskip Diversion Dam.

Justification

A Memorandum of Understanding (MOU) by and among Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, California Department of Fish and Game, and Pacific Gas and Electric Company (PG&E) was signed in February 1999 to establish a restoration program for Chinook Salmon and Steelhead habitat in the reaches of Battle Creek below the natural water falls on the forks of Battle Creek that act as absolute barriers to fish passage.

PG&E agreed to pay all of its internal costs associated with a FERC license amendment and its own costs required to implement the Restoration Project. The United States Bureau of Reclamation (USBR) will fund the design, permitting and construction related costs. Due to various issues which prevented all components of work described in the MOU from being implemented simultaneously, the project was divided into three phases

The costs for the new facilities are funded by Reclamation and turned over to PG&E for continued ownership, operation, and maintenance as specified in the 1999 MOU and related agreements. The PG&E cost for this implementation project will be capitalized and the value of the new facilities recorded for depreciation purposes.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5733458	Battle Cr Salmon/Steelhead Phase 2	Sep-2025	2,648	300	1,500	1,500	1,500	500	n.a.	7,948

Benefits

Establish a restoration program for critical Chinook salmon and steelhead habitat in the reaches of Battle Creek below the natural water falls on the forks of Battle Creek that act as absolute barriers to fish passage while ensuring the continued operation of 38 MWs of air emission-free, RPS-eligible renewable source of electricity.

Alternatives Considered

Status Quo – Do Nothing, Run to Failure. This alternative would abandon the work as is. No further improvements would be made. All costs to date would be transferred from Capital to Expense. This alternative is not viable. PG&E providing oversight as a requirement of the MOU to ensure that PG&E interests are protected. Also, PG&E signed a cost sharing agreement with the USBR and multiple other

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

regulatory and resource agencies. Failure to abide by this cost sharing agreement would expose the company to the risk of funding the entire cost of this over \$20M salmon habitat restoration effort.”

Implement Project per MOU (recommended). This alternative was considered as a replace/implement alternative; it would execute the project as defined in the 1999 MOU. PG&E would provide oversight to assure PG&E interests are protected and work is coordinated with Operations to limit disruptions. Facilities would be modified or removed to improve the salmon habitat along Battle Creek. PG&E would provide onsite representation and outside resources as needed to ensure compliance with all agreements and resolve issues that may arise. The project is currently in design.

Defer Implementation by one year. This alternative would delay implementation of the project for one year. This alternative is not viable because the project is under a MOU and the project schedule is driven by USBR.

Repair Alternative. This alternative would consider repairs to the existing facilities to improve salmon habitat. This alternative is not viable; the existing facilities must be removed under the MOU.

Replace Alternative. This alternative would consider replacement of the existing facilities to improve salmon habitat. This is not a viable alternative; the existing facilities must be removed under the MOU.

Refurbish Alternative. This alternative would refurbish the existing facilities to improve salmon habitat. This alternative is not viable; the existing facilities must be removed under the MOU.

Retire Alternative. This alternative would retire the existing facilities to improve salmon habitat. This alternative is not viable; the existing facilities must be removed under the MOU.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Battle Creek NFSL Design Imp.

Major Work Category: 11

Planning Order: 5752167

Project Start Date: 2012

Project Completion Date: 2023

Operative Date: December 2023

Description

The Battle Creek NFSL project consists of work associated with modifications to the Eagle Canyon Dam and North Battle Creek Feeder Dam screens and fish ladders, constructed under the Battle Creek Phase 1A project. The improvements are necessary to ensure proper functioning of the fish screens and ladder facilities to meet the project objectives (improve fish habitat along the north and south forks of the Battle Creek).

Justification

A Memorandum of Understanding (MOU) by and among Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, California Department of Fish and Game, and Pacific Gas and Electric Company (PG&E) was signed in February 1999 to establish a restoration program for Chinook Salmon and Steelhead habitat in the reaches of Battle Creek below the natural water falls on the forks of Battle Creek that act as absolute barriers to fish passage. PG&E agreed to pay internal costs associated with FERC license amendment and its own costs required to implement the Restoration Project. The Reclamation will fund the design, permitting, and construction related costs. Due to various issues which prevented all components of work described in the MOU from being implemented simultaneously the project was divided into three phases (Battle Creek Restoration Phase 1B, Battle Creek NFSL Additional Design and Battle Creek Salmon/Steelhead Phase 2).

The costs for the new facilities are funded by Reclamation and turned over to PG&E for continued ownership, operation, and maintenance as specified in the 1999 MOU and related agreements. The PG&E cost for this implementation project will be capitalized and the value of the new facilities recorded for depreciation purposes.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5752167	Battle Creek NFSL Additional Design Imp	Dec-2023	3,010	250	250	250	n.a.	n.a.	n.a.	3,760

Benefits

Establish a restoration program for critical Chinook salmon and steelhead habitat in the reaches of Battle Creek below the natural water falls on the forks of Battle Creek that act as absolute barriers to fish passage while ensuring the continued operation of 38 MWs of air emission-free, RPS-eligible renewable source of electricity.

Alternatives Considered

Status Quo – Not a feasible option. Construction is already underway. PG&E involvement is critical to ensure that PG&E interests are protected. Also, PG&E signed a cost sharing agreement with Reclamation and multiple other regulatory and resource agencies to restore critical salmon habitat in the Battle Creek

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

Watershed. Failure to abide by this cost sharing agreement will expose the Company to the risk of funding the entire cost of this over \$20 million salmon restoration effort.

Continue the project as defined in the 1999 MOU (recommended) - Continue the project as defined in the 1999 MOU and provide oversight to assure PG&E's interests are protected and work is coordinated with ongoing operations to limit disruptions. This includes onsite representation and outside resources as required to assure compliance with all agreements and resolve issues that may arise.

Reschedule One Year - A one year deferral is not recommended for the same reasons as the Status Quo.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 3 Tailrace Bridge Expense Upgrade

Major Work Category: KI

Planning Order: 5243872

Project Start Date: 2016

Project Completion Date: 2023

Operative Date: n.a. This is expense.

Description

The Pit 3 Powerhouse includes three units located in the upper reaches of the Pit River. The Pit 3 powerhouse produces an average of about 437 GWh of electricity per year and provides 70 MW of dependable capacity

In 2013 the tailrace bridge was structurally analyzed to determine if the damage to the concrete piers from the PRV discharge compromised the integrity of the structure. The analysis revealed that the tailrace bridge structure maybe unstable during a seismic event and the hydrostatic pressures are high.

The Pit 3 Powerhouse and its associated tailrace and bridge were constructed in 1924. Pit 3 has three generators that provide 30 megawatts each. The source of water is Lake Britton which is the primary storage reservoir for Shasta Hydro. Pit 3 Powerhouse also houses the upper Pit River switching center responsible for operating several powerhouses and dams in the Shasta Hydro Electric System. The Pit 3 Tailrace Bridge is part of a USDA-Forest Service owned road with maintenance responsibilities fall to Pacific Gas and Electric Company.

Justification

The installation of steel trusses between the piers will provide additional overturn stability if an earthquake occurs. Without the extra stability the bridge has the potential to collapse in a seismic event which would cause substantial damage to the powerhouse and the tailrace. Failure of the bridge deck will also require a shutdown of the powerhouse for an extended period of time to remove and replace the bridge.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5243872	Pit 3 Tailrace Bridge Expense Upgrade	n.a.	n.a.	1,350	1,500	1,500	n.a.	n.a.	n.a.	4,350

Benefits

The installation of steel trusses between the piers will provide additional overturn stability if an earthquake occurs, which will ensure public and employee safety in a seismic event as well as prevent substantial damage to the powerhouse.

Alternatives Considered

Status Quo – This alternative would not address the seismic overturn possibility of the tailrace bridge. If the piers were to overturn, not only would collapse of the bridge deck into the tailrace be likely, but there would also be damage to the pressure reducer valves/draft tubes in the tailrace and the powerhouse would be inoperable. The repairs would cause the powerhouse lost generation of at least nine months.

Defer Project by Two Years – This alternative would defer the recommended bridge pier upgrades for two years. This is not the preferred alternative.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 3 Britton Dam Concrete Bridge Repair

Major Work Category: KJ

Planning Order No. 5245335

Project Start Date: 2019

Project Completion Date: 2022

Operative Date: n.a. This is expense.

Description

The Pit 3 Powerhouse includes three units located in the upper reaches of the Pit River. The Pit 3 powerhouse produces an average of about 437 GWh of electricity per year and provides 70 MW of dependable capacity.

Pit 3 Dam is a concrete structure located on the Pit River in Shasta County, California. The reservoir formed by Pit 3 Dam is known as Lake Britton. The top deck of Pit 3 Dam serves as a public bridge across the lake as part of Clark Creek Road off of State Highway 89. The bridge is a single-lane bridge approximately 17 feet wide by 495 feet long, built in the mid-1920s. The bridge is currently rated for 19-ton inventory load, controlled by the concrete deck at the eastern end approach span.

Justification

The Pit 3 Dam Bridge exhibits several areas of deteriorating concrete that are routinely identified by FERC and DSOD as needing repair. Concrete spalling, delamination, loss of concrete sections, exposed reinforcing steel, cracks, and other deterioration have been noted primarily in the bridge superstructure and deck during various agency inspections over the past four years. According to the 2011 Annual DSOD Inspection Report, "The concrete along the roadway bridge continues to deteriorate. Exposed reinforcing steel was observed at one location along the underside of the bridge deck. This should be repaired, as previously requested." This project will help to mitigate the risks associated with Hydro Support infrastructure.

Costs

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5245335	Pit 3 Britton Dam Concrete Bridge Repair	n.a.	n.a.	2,250	2,500	n.a.	n.a.	n.a.	n.a.	4,750

Benefits

This project will comply with FERC and DSOD inspection report requirements. It will reduce the risk of public safety and dam reliability issues.

Alternatives Considered

- Status Quo/Do Nothing - This alternative would make no improvements. This is considered as a run to failure alternative and is not recommended since it will not comply with FERC and DSOD inspection report requirements and will not reduce the risk of public safety and dam reliability issues.
- Repair – The recommended alternative.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

- Replace Sections – This alternative includes replacing entire sections of the bridge. This alternative is more costly than the recommended project.
- Reschedule one year – This alternative is not recommended since it will delay by one year complying with FERC and DSOD inspection report requirements and reducing the risk of public safety and dam reliability issues.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 3 Refurbish LLO No. 1

Major Work Category: AX, 2N

Planning Order: 5267076, 5785096

Project Start Date: 2020

Project Completion Date: 2025

Operative Date:

P.O. 5267076 n.a. This is expense.

P.O. 5785096 October 2024

Description

Pit 3 Dam is located on the Pit River in Northern California. The Pit 3 Dam consist of three, 7-foot-square, outlets through the base of the spillway section.

Justification

Outlet #3 (right side looking down stream) has an orifice plate that was installed in 1988 for control of instream flow releases. Outlets 1 and 2 are controlled by vertical slide gates which are operated by hydraulic cylinders located in the gallery. The gates can be operated locally from the controls in the gallery, or remotely from Pit 3 Powerhouse. The Pit 3 Dam and associated facilities were inspected by an independent consultant on June 22, 2016. During this inspection a water leak was discovered on the Low-Level Outlet (LLO) #1 / Sluice Gate Valve. The leak is in the flange connection between the valve bonnet and the body mating surfaces and is allowing a small amount of water (~5 gal./ minute) to enter the interior of the dam's inspection tunnel at the gallery. Division of Safety of Dams (DSOD) has noted this in an inspection report and recommends that plans be made to repair the leak. A temporary repair was performed in 2016.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5267076	Pit 3 Refurbish LLO No. 1 (expense)	n.a.	n.a.	250	1,792	5,000	2,500	n.a.	n.a.	9,542
5785096	Pit 3 LLO No 1. Refurbish Actuator	Oct-2024	n.a.	200	1,500	5,000	5,000	200	n.a.	11,900

Benefits

This project will ensure compliance with DSOD and provide a long-term repair solution.

Alternatives Considered

No alternatives were considered as this work was directed by DSOD. The temporary repair will be replaced by permanent.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 6 Unit 1 Replace Runner

Major Work Category: 2M

Planning Order: 5720719

Project Start Date: 2025

Project Completion Date: 2027

Operative Date: June 2027

Description

The Pit 6 Project includes 2-units located in the upper reaches of the Pit River. The Pit 6 powerhouse produces an average of about 374 GWh of electricity per year, and provides 80 MW of dependable capacity to help meet our customers' summertime demand for electricity.

A tier 2 assessment was performed in August 2014. Runners requires typical cavitation repairs every 2 to 3 years, otherwise it is in good condition and should experience no major issues for 10 years or more with normal maintenance. The wicket gates are also in acceptable condition.

Justification

The justification for this project is reliability. The timing of a possible failure is a function of current runner condition. The existing runner has worn out due to the mineral content of the water. The runner has undergone significant welding repairs over the years in order to mitigate the areas of cavitation, weld porosity, and material voids. It is approaching the end of its life.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5720719	Pit 6 Unit 1 Replace Runner	Jun-2027	n.a.	n.a.	n.a.	n.a.	n.a.	500	3,200	3,700

Benefits

Restore unit reliability and avoid generation impacts during untimely and extended outages.

Alternatives Considered

Status Quo – Do Nothing. This alternative assumes that no action is taken other than minimal maintenance until unplanned runner failure. A very long forced outage would occur until new components could be fabricated and installed resulting in additional costs for expedited work and replacement power.

Reschedule One Year – This alternative is not preferred as this project has been delayed several times and the current construction date is planned for 2027

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 3 PH Seismic Retrofit

Major Work Category: 2L

Planning Order: 5742783

Project Start Date: 2011

Project Completion Date: 2022

Operative Date: December 2022

Description

The Pit 3 Powerhouse comprises two contiguous structurally connected buildings, the Generator Room and the Switch House. The Generator Room is a one-story tall structure with a full basement and the Switch House is a three-story structure with a partial basement. According to United States Geologic Survey (USGS), the site is located within a seismically active area. The earliest requirement for seismic design requirements for buildings is found in the 1927 Uniform Building Code; therefore, it can be assumed that this building was not designed specifically for the resistance of seismic forces.

Justification

Pit 3 Powerhouse is a steel framed structure with concrete cast-in-place walls, slab floors, and a slab roof. The powerhouse serves as a switching center for PG&E and is continuously occupied by at least two operators on a 24-hour per day, 7-day per week basis. Based upon the original drawings, the building was constructed in 1924. The intent of the project is to retrofit the building to provide safe egress for occupied space in a seismic event.

Cost

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5742783	Pit 3 PH Seismic Retrofit	Dec-2022	799	500	2,000	n.a.	n.a.	n.a.	n.a.	3,299

Benefits

Upgrade the powerhouse to meeting current seismic safety standards for the protection of personnel and generation equipment in the event of seismic loading.

Alternatives Considered

In 2003 DeSimone Consulting Engineers of San Francisco performed a structural analysis of the existing building using FEMA 356 Pre-Standard and Commentary for the Seismic Rehabilitation of Buildings published in November 2000. An ETABS computer model of the structure was created to check the structural adequacy for seismic loads. DeSimone summarized its findings in a report to PG&E on February 14, 2003 which noted that the building, both globally and with respect to individual member, was adequate for seismic loads with the exception of the concrete roof slab. The report recommended adding structural ties at the ridge between the two halves of the concrete roof diaphragm to mitigate the structural deficiency caused by the opening.

In July of 2012, an Alternative Analysis Study was submitted by Black and Veatch (BV) to evaluate alternatives for bridging the roof diaphragm at the ridge vent opening and addressing mechanical ventilation issues associated with blocking the ridge vent opening. An amendment to the study was submitted to PG&E in January of 2013. Recommendations from these two studies were not implemented by PG&E.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

In 2012 and 2013 an alternative analysis and recommended design solution was completed based on De Simone Consulting Engineer's study, including upgrade of the ventilation system. The Federal Emergency Management Agency (FEMA) 356 standard has since become obsolete and has been upgraded twice.

In 2016 PACE Engineering of Redding performed a structural analysis of the existing building using ASCE 41-13 Seismic Evaluation and Retrofit of Existing Buildings. In using ASCE 41, the analysis was intended to evaluate the powerhouse using more modern seismic performance standards. An ETABS computer model of the structure was created to check structural adequacy for seismic loads using a linear dynamic analysis procedure. PACE summarized its finding in a report to PG&E on February 19, 2016 which noted that shear wall elements, diaphragm chords and collectors, and foundation elements were not adequate for seismic loads. The report recommended extensive retrofits throughout the building.

In 2020 PG&E's project engineers performed a cursory comparison of the assumptions utilized for the 2003 and 2016 seismic evaluations. Given the variability in assumptions and recommendations between the two prior studies, PG&E decided to embark on a final seismic effort for the project.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 5 PH Access Road Bridge Installation

Major Work Category: 2P

Planning Order: 5760289

Project Start Date: 2015

Project Completion Date: 2021

Operative Date: October 2021

Description

Pit 5 is a 4-unit powerhouse located on the Pit River. Pit 5 powerhouse produces an average of about 846 GWh of electricity per year, and provides 160 MW of dependable capacity to help meet our customers' summertime demand for electricity.

The Pit 5 Powerhouse is located on the Pit 5 River in Shasta County California. The powerhouse is only accessible by Pit 5 Road, a narrow one lane road. During large storm events, the Pit 5 area receives a significant amount of annual precipitation (100+ inches per year) and has a documented history (1986, 1997 and 2012) of surficial landslide and debris flow failures. The debris tend to flow from the uphill tributaries toward the roadway and causes the existing drainage improvements, particularly the existing culvert to clog. When clogging of the culver occurs, it sends debris and storm water flowing down the road causing significant erosion of the road and flooding of the powerhouse.

Justification

The proposed arch bridge structure will allow slide debris and trees to pass in high flow events to ensure there is no plugging and overtopping that floods the powerhouse. Historic clean up costs from past flood events at the powerhouse exceed 2 million dollars per event, which does not include the cost of lost generation.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5760289	Pit 5 PH Access Road Bridge Installation	Oct-2021	624	3,310	n.a.	n.a.	n.a.	n.a.	n.a.	3,934

Benefits

The benefit of this project is to reduce flooding to the powerhouse, mitigating a risk to personnel and damages to powerhouse assets.

Alternatives Considered

Proposal – This alternative would replace the existing culvert and install a new multi plate steel arch culvert 65' in length and a new MSE wall for slope stabilization.

Status Quo – This alternative would leave the current culvert in place and make no plans for replacement until complete failure occurs

Alternative 1 – This alternative would defer installation of a new arch culvert by two years.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 1 Unit 1 Rewind Generator**Major Work Category: 2M****Planning Order: 5760705****Project Start Date: 2017****Project Completion Date: 2021****Operative Date: April 2021****Description**

Pit 1 is a two-unit, 62 MW powerhouse located in the upper reach of the Pit River Hydroelectric system. Pit 1 powerhouse produces an average of about 290 GWh of electricity per year, and provides 62 MW of dependable capacity to help meet our customers' summertime demand for electricity.

This project will rewind unit 1 at Pit 1 Powerhouse to increase the reliability and availability of the unit.

The stator windings were last replaced in the 1980's. Additionally the core iron is original to the unit. The core material is showing signs of significant deflection and separation between laminations. In March, 2017 Unit 2 experienced intense vibration due to deflection in the core iron and had to be emergently restacked. It is reasonable to expect that Unit 1 core iron will experience similar failure within 5 years.

Justification

Rewinding this generator will reduce the risk of an in-service failure and improve the reliability of the unit.

The Asset Management Generator Assessment program has forecast that the Pit 1 Unit 1 generator (38.5 MVA) is likely to fail within 3 years. The unit was last rewound in 1985 by General Electric. A partial discharge analysis (PDA) test of this unit is trending upward, indicating a rewind should be completed prior to failure. The unit has a high leakage current (110 microamps) during HI Pot testing.

The Pit 1 Unit 1 generator rewind project was rescheduled by two years from what was forecast in the 2017 GRC filing in order to allow for additional work to be added to the same outage. Rescheduling allowed PG&E to optimize project work during the outage. The unit 1 rewind was again delayed in 2017 when unit 2 experienced vibration issues due to deflection in the core iron that had be emergently restacked. The rewind of unit 2 was subsequently completed and the unit 1 rewind was rescheduled to start in the later part of 2020.

Costs

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recor ded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5760705	Pit 1 Unit 1 Rewind Generator	Apr-2021	7,165	4,000	n.a.	n.a.	n.a.	n.a.	n.a.	11,165

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages.

Alternatives Considered

Rewind currently in progress

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

- Status Quo – run to failure then procure new coils. There is a long lead time for materials. Allowing the unit to run to failure would create a long, forced outage (minimum of two years).
- Procure new coils, but postpone the installation until the unit runs to failure - Again, running the unit to failure would result in a forced outage for an undetermined amount of time.
- Delay the Rewind by 3 years – Inspections of unit 2 showed the insulation on the stator and coils is failing and the core iron is deflected to the extent that repair is not an option.
- Rewind and Restack the Units – This alternative would rewind and restack the unit. New stator coils and core iron would be installed which would reduce the risk of the unit failing due to winding or core iron wear. The unit relays would also be upgraded improving system protection. This is the preferred alternative.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 4 Replace Generator Air Breakers

Major Work Category: 2M

Planning Order: 5766152

Project Start Date: 2016

Project Completion Date: 2023

Operative Date: May 2023

Description

Pit 4 includes 2-units located in the upper reaches of the Pit River. The Pit 4 powerhouse produce an average of about 505 GWh of electricity per year, and provide 95 MW of dependable capacity to help meet our customers' summertime demand for electricity.

Pit 4 powerhouse (PH) was constructed in 1955 and generates electricity using two vertical Francis-type turbines. The fault protection equipment between the turbines and the 13.8/230kV generator step-up transformers is currently made up of the original two Westinghouse 13.8kV air blast circuit breakers. The equipment is obsolete and it is difficult to locate spare/replacement parts.

The Pit 4 Generator Air Breakers are fully integrated into a single switchgear cabinet including: two Air Blast Circuit Breakers, two sets of 6 switches (one for each breaker), and one set of 3 phase disconnect switches (connection to the main transformer). Since the switchgear contains all of the equipment, it is incredibly difficult to piecemeal out the replacement of each individual equipment.

Justification

The generator air breakers are original equipment (1955) and have exceeded the recommended design life of forty years. Repairs were made in 2011, 2014 and 2017 by Operations and Maintenance (O&M) due to significant decrease in air pressure after operation. The equipment is considered obsolete as replacement parts and repairs are subject to reseller availability, or parts have had to be custom ordered to make repairs.

The generator breakers are functional at this time, but if the generator air breakers were to fail in service, depending on repair/replacement part availability, the PH could be subject to a forced outage for up 30 days. Additionally, an arc flash study from 2006 identified the 13.8kV bus as a source of arc flash with incident energy higher than 8cal/cm². Current mitigation for this condition includes operational requirements such as remaining at minimum of four feet away from the equipment when it is in service and no maintenance on the equipment unless the bus is de-energized or operator is at a remote location. A new 13.8kV Switchgear line-up will limit the arc flash exposure in the event of an arcing fault to 8cal/cm² (or less) per PG&E standards and remove the operating restriction around the equipment. Based on historical statistics (Provided by CEATI), the air blast circuit breakers failure risk has a likely probability of failure within ten years. The air breakers are fully integrated into a single switchgear cabinet that includes the two air breakers, two sets of six switches (one for each breaker) and one set of disconnect switches (connection to main transformer). A new switchgear line-up will replace the entire switchgear cabinet and associated equipment.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5766152	Pit 4 Replace Generator Air Breakers	May-2023	1,072	60	1,000	3,000	n.a.	n.a.	n.a.	5,132

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Benefits**

Improved reliability. Reduced risk of forced outages due to failure of the disconnect switches. Ability to purchase replacement parts when needed.

Alternatives Considered

Status Quo: Operate Both Generators until Breaker/System Failure

Upgrade Generator Breakers and 13.8kV Equipment - Replace the existing generator air blast breakers and associated equipment with modern medium voltage switchgear. A modern breaker and support equipment would be much more reliable and would greatly improve the system response during a fault condition. This is the recommended alternative.

Refurbish Existing Generator Breakers and Other 13.8kV Equipment - As the existing generator breakers are not supported by known vendors, this alternative is not applicable

Retire the Generator Air Breakers at Pit 4 - This alternative would remove the air breakers from service without replacing. This is not a viable option as the breakers are the connecting point between the generator step-up (GSU) transformer and the generator and is a critical piece of the generator protection. This alternative was not considered

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 5 TGB Install Inline Oil Filtration

Major Work Category: 2M

Planning Order: 5766153

Project Start Date: 2016

Project Completion Date: 2024

Operative Date: October 2024

Description

Pit 5 is a 4-unit powerhouse located on the Pit River. Pit 5 powerhouse produces an average of about 846 GWh of electricity per year and provides 160 MW of dependable capacity to help meet our customers' summertime demand for electricity.

It is recommended that the TGB oil system be replaced and upgraded for all four units at Pit 5 PH in order to better monitor and control the temperature and cleanliness of the lubricating system for this critical operating equipment.

Justification

In June 2014, Pit 5 powerhouse (PH) units 1 and 4 experienced wiped turbine guide bearings (TGB) resulting in a forced outage. The bearings were wiped due to failure of the pressure relief valve (PRV) located atop the TGB sump. This failure resulted in oil being pumped from the sump, through the PRV and directed back into the sump without supplying oil to the bearing. The lack of lubrication wiped the bearings. There was no remote flow, pressure indication or alarms in place to alert operators of the insufficient oil supply. The PRV's were refurbished as a temporary solution to return the units to service as quick as possible. Flowmeters were also temporarily installed in the turbine pit just before the bearing so the proper flow could be visually confirmed until the system could be upgraded.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5766153	Pit 5 TGB Install Inline Oil Filtration	Oct-2024	2,697	120	120	120	2,000	n.a.	n.a.	5,057

Benefits

Improved reliability of the bearing system and mitigating the risk of a forced outage.

Alternatives Considered

Status Quo/Do Nothing – This recommendation is not recommended as failure of the lubrication system would most likely wipe the bearing as done in the past and cause a forced outage.

Replace TGB oil system – This alternative would replace the existing TGB oil system and include the addition of tripping and monitoring controls to ensure adequate lubrication of the TGBs. This is the recommended alternative to mitigate risk of wiped TGBs and forced outages.

Defer TGB oil system replacement until next major outage – This alternative would defer the replacement of the TGB oil system until the next major outage at Pit 5 per the outage planning strategy, ~ 5 years. This is not the recommended alternative due to the extended overheads and the risk of failure of the existing system.

Refurbish TGB oil system – This is not a viable alternative as the system has already been refurbished after the last failure and was considered a temporary solution until it could be replaced and upgraded to include monitoring and controls.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Retire TGB oil system – This is not a viable alternative as the oil system is a critical component for lubrication of the bearings. Without lubrication of the bearings the bearings will wipe and force the unit out of service.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 6 Spillway Apron Replace Block 3

Planning Order: 5779214

Major Work Category: 2L

Project Start Date: 2022

Project Completion Date: 2023

Operative Date: October 2023

Project Description

The Pit 6 Project includes 2-units located in the upper reaches of the Pit River. The Pit 6 powerhouse produces an average of about 374 GWh of electricity per year, and provides 80 MW of dependable capacity to help meet our customers' summertime demand for electricity.

Following the 2017 winter storms, block 3 was found to have sustained damage during high flows. Block 3 was temporarily repaired during the 2017 spillway apron replacement project. Later it was found that the structural steel was compromised and as such the duration of reliability of the temporary repair could not be estimated. Due to the time required to procure and replace block 3, it was not possible to complete this work during the 2017 project to replace the spillway apron.

Justification

This project will help to mitigate the risks associated with dam safety and is required to comply with FERC Part 12 inspection requirements.

When the temporary repairs to block 3 fails, if it damages the end sill, extensive cost of repair is highly likely. Currently the end sill provides a majority of the energy dissipation during spills as well as acts as the foundation for the cofferdam used to isolate the work area. If the end sill is damaged, safety to the PH, employees, and the public will be jeopardized and the existing cofferdam would be unable to be used. A new cofferdam design and materials would need to be completed and to install a new cofferdam costs would skyrocket 3-5 times higher than current costs.

Costs

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5779214	Pit 6 Spillway Apron Replace Block 3	Oct-2023	n.a.	n.a.	101	4,059	n.a.	n.a.	n.a.	4,160

Benefits

This project will ensure that the Pit 6 spillway apron will be able to accommodate anticipated spill flows and will ensure compliance with FERC requirements.

Alternatives Considered

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Status quo – Status quo would not satisfy the requirement for the work required by FERC. Block 3 will fail and may damage the end sill.

Temporary repair – A temporary repair has been completed, but due to compromised structural steel the block needs replacement. New structural reinforcement is not possible as post tensioning will cause concrete failure/crumbling.

Replace Block 3 - The recommended alternative is to replace block 3. Block 3 is similar to blocks 1 and 2. The design is complete and ready to implement.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Hat 2 Replace Transformer Bk-1-ABC

Major Work Category: 2M

Planning Order: 5779215

Project Start Date: 2019

Project Completion Date: 2021

Operative Date: May 2021

Description:

The Hat Creek 2 PH contains a single Francis vertical reaction type turbine. The powerhouse has been in service since 1920 and has an operating capacity of 8.5MW. Hat Creek 2 PH has three single phase Westinghouse Co. O/FA generation step up transformers that have been in service since 1982.

This project is to replace the GSU transformer, including protection relays and other electrical appurtenances and making civil improvements to the slab and oil containment.

Justification

The existing Hat Creek 2 GSU Transformer is beyond its design life and the oil tanks are not able to maintain nitrogen pressure. The existing GSU Transformer protection relays are electromechanical relays that are beyond their design life.

Costs

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5779215	Hat Creek 2 Replace Transformer Bk- 1-ABC	May-2021	1,229	2,135	n.a.	n.a.	n.a.	n.a.	n.a.	3,364

Benefits

Return the Hat 2 transformer to reliable operating condition.

Alternative Considered

Status Quo - Not Recommended. Failure Imminent

Replace Transformer - Recommended Alternative.

Defer 2 years - Not Recommended. Failure Imminent

Refurbish - Not Recommended. Failure Imminent. Replacement relay parts from the original equipment manufacturer are not available.

Retire - N/A

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 5 Unit 4 Replace Wicket Gates, Face Plates & Seal Rings

Major Work Category: 2M

Planning Order: 5780618

Project Start Date: 2019

Project Completion Date: 2021

Operative Date: December 2021

Description

The Pit 5 Powerhouse is located on the left bank of the Pit River and is part of PG&E's FERC-licensed Pit 345 Hydroelectric project (FERC 233). The powerhouse has four units with a combined normal operating capacity of 160MW.

During the Pit 5 Powerhouse Restoration outage in 2017 the wicket gates and facing plates of Unit 4 were found to have lost significant material from what appeared to be high velocity sediment erosion. The material lost is most severe near the inside bottom of the wicket gate vanes and on the lower facing plates just inside the wicket gate vanes. The upper facing plates also have some material loss in patterns that mirror those on the lower facing plates, but the material loss is far less on the upper facing plates than on the lower facing plates. Further inspection revealed that the lower runner seal rings have worn significantly and now have a gap (greater than 1/2") where there should be a small clearance (0.020" to 0.023").

Justification

During the Pit 5 Powerhouse restoration outage in 2017 all four of the turbines were dewatered and entered to inspect and adjust the wicket gates. Pit 5 Unit 4 was discovered to have severe erosion on the wicket gates and facing plates. The unit is restricted and operating under Justification for Continued Operations (JCO) 1801105 Rev2. A finite element analysis completed in 2018 confirmed the deteriorated conditions. It is recommended to replace the Pit 5 U4 wicket gates, facing plates and seal rings.

The current condition of the wicket gates and facing plates primarily affects stopping the unit due to the increased leakage through the closed wicket gates. The increased pressure fluctuations during steady state operation cause increased vibration of the draft tube and connected components which can also potentially wear out seals or loosen fasteners.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5780618	Pit 5 Unit 4 Replace WGs, FPs & Seal Rng	Dec-2021	1,091	4,500	n.a.	n.a.	n.a.	n.a.	n.a.	5,591

Benefits

This project will minimize the risk of forced outage due to failure of the wicket gates and ensure long-term reliability of the unit.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Alternatives Considered**

Status Quo: Do Nothing, Run to Failure. Doing nothing may lead to accelerated damage and deterioration of wicket gates and facing plates. If the wicket gates were to fail in service, the unit would be forced into an extended outage. Replacement parts are not readily available, and design, fabrication and delivery could take up to 1 year. If the unit is run to failure it would result in significant power generation loss. This alternative is not recommended.

Alternative A: Replace Wicket Gates, Facing Plates and Seal Rings -This alternative suggests replacing the Pit 5 Unit 4 turbine wicket gates, facing plates and seal rings. Replacement is necessary given the existing deteriorated conditions. The current condition of the wicket gates and facing plates primarily affects stopping the unit due to the increased leakage through the closed wicket gates. The increased pressure fluctuations during steady state operation cause increased vibration of the draft tube and connected components which can also potentially wear out seals or loosen fasteners. This is the recommended alternative.

Alternative B: Defer Alternative A One Year - This alternative would defer replacement of the wicket gates, facing plates and seal rings for one year. The current condition of the Pit 5 Unit 4 wicket gates and facing plates negatively affects stopping the unit due to the increased leakage through the closed wicket gates. The increased pressure fluctuations during steady state operation cause increased vibration of the draft tube and connected components which can also potentially wear out seals or loosen fasteners. This alternative is not recommended.

Alternative C: Repair or Refurbish the Wicket Gates, Facing Plates and Seal Rings - This alternative would repair the existing equipment to restore it to like new condition. This alternative is not considered based on the extent of damage to the wicket gates and facing plates. The damage is very deep and localized weld repairs are not considered feasible due to the amount of material to be restored. The wicket gates and facing plates must fit together with very small clearances, and the heat input from the weld repairs would likely distort the components making it impossible to achieve those clearances.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: JBB IC Dam Replace Actuator & Piping

Major Work Category: 2N

Planning Order: 5787318

Project Start Date: 2019

Project Completion Date: 2022

Operative Date: December 2022

Description

James B. Black (JBB) PH is a 172 MW facility located on the Pit River in Shasta County, CA. It employs two 86 MW impulse turbines.

On April of 2019, an oily sheen was noticed in the water near Iron Canyon Dam. The leak in the underwater piping leading to the actuator is secured with best management practices (BMP's) to contain the sheen.

Justification

The project is to permanently eliminate the leak of hydraulic fluid from the piping to the actuator used to operate the LLO gates.

Project management (PM) and engineering team is approaching the planned work in three phases:

- Phase 1 is sediment and water sampling/testing, permitting, and temporary repairs in the fall of 2020-2021; sediment removal to provide access to existing cylinder and trash rack, remove steel channel covering at existing hoses to allow for hose examination, and installation of flexible hydraulic hoses to existing cylinder.
- Phase 2 detailed design for replacement of the entire hydraulic system in 2020-2021.
- Phase 3 is construction to occur in 2021-2022.

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 For e-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5787318	JBB IC Dam LLO Replace Actuator & Piping	Dec-2022	244	1,122	2,250	n.a.	n.a.	n.a.	n.a.	3,616

Benefits

Assure the LLO gate is in a functional condition to ensure the water level behind the dam can be lowered in case of an emergency and to allow sediment transport during spill events.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Alternatives Considered**

Proposed - Replace Actuator with a Long Term Engineered Solution. This alternative would develop a long term engineered plan. It is estimated that over the next few months an upgraded design (double walled pipe and possible replacement of the LLO gate and frame) will be analyzed. Replacement of the piping and the actuator will stop the leakage and provide reliable operation of the LLO gate. This is the preferred alternative.

Status Quo – Do nothing. The LLO actuator and gate is currently operational, but is leaking oil and unreliable. It is required that the hydraulic piping and actuator be replaced to provide reliable operation of the LLO gate. This is not the recommended alternative.

Alternative #1 – Defer actuator replacement by two years. This is not a viable alternative. The LLO actuator and gate is currently operational, but is leaking oil and unreliable..

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: JBB Willow Creek Rd Stabilization

Major Work Category: 2P

Planning Order: 5792563

Project Start Date: 2021

Project Completion Date: 2023

Operative Date: December 2023

Description:

James B. Black (JBB) PH is a 172 MW facility located on the Pit River in Shasta County, CA.

Moderate to severe weather in the area which was previously impacted by forest fires appear to have contributed to the premature failure of roadway in several locations. More sediment than normal from fire damaged area may be clogging drainage pipes and abnormal hydraulic conditions caused by large amounts of sediment likely caused sections of erodible soils to fail along the roadway.

The siphon is accessible by foot or helicopter. The Forest Service is requesting to have PG&E restore the road access to the siphon.

Justification:

The Forest Service has rejected PG&E's request to remove the road from the license.

Repair damage and remove debris from Willow Creek Siphon. The site is currently accessible on foot along the roadway and via Helicopter. Vehicle access is limited to the beginning of the roadway

Cost

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5792563	JBB Willow Creek Rd Stabilization	Dec-2023	n.a.	75	185	6,500	n.a.	n.a.	n.a.	6,760

Benefits

Restore vehicular access to the north and south portions of the siphon.

Alternatives Considered

PG&E plans to perform an alternative analysis including performing a LiDAR survey of the slide site. PG&E will provide FERC and USFS this alternative analysis by 12/30/2022.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Pit 3 Repave Road

Major Work Category: 2P

Planning Order: 5792584

Project Start Date: 2022

Project Completion Date: 2026

Operative Date: October 2025

Description

The Pit 3 Repave Road project covers the Pit 3 Reach of the Pit River Canyon Road, which runs from Five Corners to the Pit 3 Powerhouse. The Pit 3 Reach has roughly six miles of single lane paved road.

The proposed scope of work is to engineer, permit and repave the road. The repaving effort will likely align with the following construction process:

- For portions of the road greater than 17' wide (non-critical width)
 - Pulverize old pavement, add AB, pave with HMA, and patch failed areas within recent pavement. Overlay recent pavement with 2" HMA.
- For portions of the road less than 17' wide (critical width)
 - Remove and off-haul existing pavement and base and install new base and pavement.

Justification

The Road and Transportation Facility Management Plan (RMP) for the Pit 3, 4, and 5 Hydroelectric Project stipulates an evaluation of the Pit 3 Reach (NFSR 37N60Y) roadway by an engineer once every six years. Additionally, PG&E is responsible for maintaining this paved roadway under FERC licensing agreement. The USDA Forest Service (USFS) also requires that the Pit 3 Reach be "maintained with a stable, hardened, and uniform surface, maintained for passenger car comfort, as well as other requirements presented in assigned maintenance level and Traffic Service Levels (TSL)."

Costs

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5792584	Pit 3 Repave Road	Oct-2025	n.a.	n.a.	500	2,566	2,728	2,903	100	8,797

Benefits

Completing this project will provide a reliable and smooth roadway suitable for safe travel in a passenger car traveling from Five Corners to the Pit 3 Powerhouse.

Alternatives Considered

Do nothing. This alternative is not acceptable as this is a requirement of the Pit 345 relicensing

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: HC: Cableways Install Hornet Cabinets

Major Work Category: 2L

Planning Order: 5788188

Project Start Date: 2021

Project Completion Date: 2021

Operative Date: September 2021

Description

The automated Hornet / Hornet Plus sediment sampler system was implemented system wide in 2014 and replaced all manually operated / manned cableway gauging stations by 2016. The Hornet system eliminated the frequency of cable testing and most importantly increased employee safety. Although the Hornet systems has eliminated personnel safety risk associated with the manned cableway system, it has introduced some new site safety risks due to ergonomics.

Justification

In 2016 it was agreed to by PG&E's internal Field Safety Team that a locked cabinet / metal wardrobe would be designed to allow the Hornet System to remain assembled in storage onsite. This would eliminate the ergonomic safety risk associated with assembling the equipment onsite and provide protection from the elements as well as vandalism.

Costs

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5788188	HC: Cableways Install Hornet Cabinets	Sep-2021	n.a.	3,500	n.a.	n.a.	n.a.	n.a.	n.a.	3,500

Benefits

Reduced risk of ergonomic injuries for the water management employees.

Alternatives Considered

Status Quo – Do Nothing – not an option. The hornet system requires onsite assembling and disassembling that entails heavy awkward lifting in a tight work area. As a result of this, there have been various near hit incidents and in one incident a hydrographer was injured performing a routine work assignment.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Spaulding 1 TSV Refurbishment

Major Work Categories: 2M

Planning Order Numbers: 5760154

Project Start Date: 2019

Project Completion Date: 2025

Operative Date: Nov 2024

Project Description

Lake Spaulding rests at an elevation of 5,014 feet in a glacier carved bowl of granite. The lake has a surface area of 698 acres surrounded by giant rocks and a thick pine forest with a capacity of 74,773 acre feet. The lake was originally built for hydraulic mining in 1912, but is used for water storage and recreation today. Refurbish Spaulding 1 TSV to condition adequate to shot off flow and provide clearance for turbine work.

Justification

TSV leaks significantly and needs to be refurbished to provide clearance to the runner. In the meantime, clearances are managed by closing the intake at the dam and draining the pipe to the unit. O&M crews have to have a spotter while annual inspections are done due to now being able to completely seal the TSV and excess water has to be diverted from the pipe to a drainage system in the Power house

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5760154	Spaulding 1 TSV Refurbishment	Nov-2024	94	7	n.a.	540	2300	108	n.a.	3,049

Benefits

Refurbishment of the TSV will improve safety by providing for adequate clearance for turbine work.

Alternatives Considered

- Status Quo, do nothing. - Will not provide adequate clearance for turbine work.
- Refurbish TSV. - Improve operation, clearance, provide maintenance and operational needs.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

- Install entire new TSV.- Very expensive, time and resource intensive option. Not enough improvement over refurbishment to justify cost.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Tiger Creek Unit 2 Rewind Generator

Major Work Categories: 2M

Planning Order Numbers: 5778900

Project Start Date: March 2020

Project Completion Date: February 2025

Operative Date: June 2025

Project Description

Tiger Creek is a two-unit, 58 MW powerhouse located on the Mokelumne River near Pioneer, California. The Tiger Creek Powerhouse produces an average of approximately 307 GWh of electricity per year. The Powerhouse is comprised of two Pelton horizontal, double overhung single-nozzle turbines coupled with Westinghouse generators.

Justification

The justification for this project is reliability. Rewind of the generator will reduce the risk of failure in service and improve the reliability of power generation. Tiger Creek U1 rewind is completed. Tiger Creek U2 was last rewound in 1992 by Westinghouse.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recor ded	2021 Fore-cast	2022 Fore -cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5778900	Tiger Creek U2 Rewind	June 2025	1,764	144	112	112	3,000	3,500	n.a.	8,632

Major Project Spending Estimates

(Thousands of Nominal Dollars)

Benefits

This project will provide for the safe and reliable operation of the generator reducing the likelihood of an in-service failure and extended forced outage.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternative Considered

- Status quo – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Rewind the generator with new windings and new stator core iron laminations are installed as planned during the planned unit outage (recommended). As a result, system reliability is enhanced, replacement power costs due to untimely and extended forced outages are avoided, and added costs due to expediting material procurement and installation services are averted.
- Reschedule one year – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Repair the generator windings with a reduced scope of work to meet the minimum requirements to avoid failure - In this case, winding insulation deterioration continues as indicated by high PDA test results. Spare windings are used to restore unit operation following each unplanned winding failure. It is anticipated that this alternative would eventually result in a unit rewind at a much higher cost and level of effort.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Tiger Creek Canal – Install Flume Liner****Major Work Categories: 2N****Planning Order Numbers: 5779471 and 5779472****Project Start Date: Various****Project Completion Date: Various****Operative Date*:****P.O. 5779471 June 2021****P.O. 5779472 April 2023****Project Description**

Tiger Creek is a two-unit, 52 MW powerhouse located on the Mokelumne River. This same water continues downstream to also feed the West Point and Electra powerhouses. The Tiger Creek, West Point and Electra Powerhouses produce an average of approximately 827 GWh of electricity per year. The Tiger Creek Canal is over 17 miles long and includes almost 15 miles of flumes.

This forecast includes work to refurbish and maintain the elevated flume substructure of the canal. The scope of work includes repairing the deteriorated concrete elements on 12 of 18 elevated concrete structures along the Tiger Creek canal system, including necessary repairs to selected sections of the canal walls and invert. More specifically, the failed, cracked, and spalled concrete on the elevated structure invert, canal walls, beams, corbels, and other structural elements will be repaired by:

- removing spalled and loose concrete;
- preparing the concrete and exposed reinforcing bars to facilitate adequate bonding of new concrete to the existing concrete;
- adding new or replacing reinforcing steel where required; and
- forming and placing new concrete.

Cracks will be filled with structural epoxy or hydrophilic type grout. The coal tar lining will be removed where required to facilitating adhesion of potential new lining systems to the existing flumes. This work will restore the structural integrity of the canal system.

Justification

The 1930's vintage concrete canal system has exceeded its useful life and needs to be replaced to ensure the safe and reliable operation of the water conveyance system. Water leaking through the porous concrete walls and invert is causing the rebar to rust and subsequent spalling of concrete.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5779471	Tiger Cr Cnl- Install Flume Lnr 2020/2021	Jun-2021	2,099	2,199	n.a.	n.a.	n.a.	n.a.	n.a.	4,299
5779472	Tiger Cr Cnl- Install Flume Lnr 2022/2023	Apr-2023	n.a.	n.a.	2,199	1,351	n.a.	n.a.	n.a.	3,550

Benefits

This project will improve reliability of the canal by reducing the risk of forced outages due to canal failure which would disrupt power production, water delivery and would likely have environmental impacts and potentially public safety impacts.

Alternatives Considered

- **Status quo** – Make improvements after failure occurs. This alternative results in higher costs due to emergency work; repair of consequential environmental damages; replacement power costs; public safety risks; and legal costs.
- **Reschedule one year** – This alternative prolongs the risk of failure and increases the probability of higher overall costs as described in the status quo alternative.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Drum Penstock Access Improvements

Major Work Categories: 2P

Planning Order Numbers: 5779398

Project Start Date: January 2019

Project Completion Date: 2023

Operative Date*: September 2023

Project Description

Install new handrail and path improvements to create a safer access for employees.

Justification

Drum Powerhouse receives water from Drum Forebay via three penstocks. Periodic inspection of the penstocks is required by O&M. Currently the existing access path used for penstock inspections has safety concerns related to steep slopes, loose ground material, and sudden grade changes. As part of this project, an Alternatives Analysis was completed to evaluate the penstock access path and provide recommendations for improving the path. The access path improvements will be completed over multiple years as part of a program, and the 2021 to 2023 improvements will focus on Sections 2, 3, 4, and 5. The recommended scope (new handrail and path improvements or elevated stairs) meets the project objectives to establish a safe path.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5779398	Drum Penstock Access Improvements	Sep-2023	n.a.	1,500	1,000	1,000	n.a.	n.a.	n.a.	3,500

Benefits

This project will improve reliability and safety of the access to the penstock.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternatives Considered

1. Alternative A – Rehabilitating the existing stair system
2. Alternative B – Installing a new at grade stair system
3. Alternative C – Installing a new elevated stair system
4. Alternative D – Installing a fall arrest lifeline
5. Alternative E – Installing an access path handrail

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: South Yuba Flumes Maintenance Annual

Major Work Categories: AX

Planning Order Numbers: 5255894

Project Start Date: 2021

Project Completion Date: 2023

Operative Date: n.a. This is expense.

Project Description

Annual canal and flume patching to occur every year on the Bear River, Upper Wise, Lower Wise and South Canals. This is repairs of typical wear and tear that occurs throughout the year. Damage is identified and prioritized during condition assessment of the canals that occurs the first day of the outage. Typical damage found are damage to flume timbers, cracks in the liner, voids in the liner and erosion of unlined bank.

Justification

The previously mentioned damage can lead to leaks and piping of foundation material if not repaired. If this damage is not repaired, it could progress to canal failure.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
525589 4	South Yuba Conveyance Patching Annual	n.a.	n.a.	350	350	350	n.a.	n.a.	n.a.	1,050

Benefits

This project supports safe and reliable operation of the South Yuba Water Conveyance System.

Alternative Considered

- *Status quo* – Prolonged neglect of areas where cracks have occurred along the canal system could lead to potential canal failure.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

- Annual Patching – Recommended alternative, to patch annual wear and before it progresses to be significant damage.
- Install Improved liner – Instead of repairing existing liner it could be replaced with standard design liners. This is unnecessary in some locations where patching can be implemented successfully to seal cracks or reduce seepage. Liner improvements sites are identified by the CORE team and are based on a long-term analysis of likelihood and consequence not just by the annual need for repair.
- Delay one year – Delaying of the yearly patching would lead to more patching the next year with increasing the cost and risk to safe and reliable operation.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Drum 1 U1 Generator Rewind

Major Work Categories: 2M

Planning Order Numbers: 5747215

Project Start Date: 2025

Project Completion Date: 2027

Operative Date: October 2026

Project Description

Drum Unit 1 (15 MVA) has a health score of 3, failure is with 3-5 years. This unit is over 50 years old, installed in 1961 and has reach the end of its operating life. Unit was flooded in 1997 and the winding were dried out.

Justification

Deferring the project will expose the unit to failing in service and will have a long and unscheduled outage to replace the winding and the Company will lose power generation/revenue for a long period.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5747215	Drum Unit 1 Rewind	Aug-2026	n.a.	n.a.	n.a.	n.a.	n.a.	255	3,400	3,655

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages.

Alternatives Considered

- **Status quo** – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- **Rewind generator** – This is the recommended alternative.
- **Reschedule one year** – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Fordyce Dam Leakage Reduction****Major Work Categories: 2L****Planning Order Numbers: 5745679****Project Start Date: 2016****Project Completion Date: 2026****Operative Date: October 2025****Project Description**

Lake Fordyce Dam is a concrete-faced earthfill and rockfill dam that was constructed in stages between 1873 and 1926. The dam has a long history of seepage from the downstream toe. The level of observed seepage would not generally be concerning for a rockfill-only embankment; however, Lake Fordyce dam contains, as a remnant of its early construction phases, a zone of erodible soil in the upstream toe. Erosion of this material by seepage flowing through the dam could result in cracking and damage to the upstream concrete facing, resulting in an uncontrolled release of water.

Previous seepage mitigation efforts at the dam have concentrated on the upper, more accessible part of the dam's concrete liner and have generally had only limited and temporary success. In 2005 a maximum seepage threshold of 30 cubic feet per second (cfs) was established by the Division of Safety of Dams (DSOD) as a trigger to initiate further seepage mitigation measures. This level was exceeded in 2008. Repairs to the upper liner in 2009 and 2010 have stabilized the seepage level, but have not brought it below 30 cfs. DSOD has indicated to PG&E that conducting repairs to the upper liner without also addressing seepage through the upstream toe and lower portion of the dam may no longer be considered sufficient.

In 2016, PG&E completed a seepage stability analysis and conducted a Probable Failure Mode Analysis (PFMA) workshop with DSOD. The workshop conclusion was that there was no immediate risk of dam failure, however, PG&E is required to design and construct seepage control measures to stabilize seepage through the toe. DSOD has authorized several extensions of their deadline for seepage mitigation so that PG&E could collect data and review the findings with technical experts. At 50% design, a consensus was reached between PG&E, FERC and DSOD that the approach was appropriate and PG&E approved funding to begin construction in 2021. Construction is scheduled to start in 2021 and expected to complete in 2023.

This project will reduce the seepage amount and potential for embankment erosion by making improvements to the lower part of the dam (the dam's upstream "toe"), where it is estimated that a majority of the seepage originates, by installing a CARPI liner and grouting around the LLO.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Justification**

DSOD has mandated that the long-term leakage rate below Fordyce Dam be reduced to less than 30 cfs.

The Fordyce Dam leakage reduction project was also forecast in 2017 and 2020 GRC. Work began in 2016, but the scope of the project has changed from the 2017 GRC based on the PFMA workshop with DSOD. The work was originally forecast for completion in 2019 in the 2017 GRC, but the work is now forecast for completion in 2025.

Cost

The total project expected case forecast is currently \$92.5 million, which is \$52.8 million higher than the expected case estimate prepared at during 2020 GRC.

The following cost drivers are reasons for increase in cost in the 2023 GRC:

- Construction Contract (\$17.1M) – Competitive bids for the performance design of the cofferdam and water bypass systems were significantly burdened with the risk of unknown lake bottom conditions related to cofferdam stability. This scenario resulted in bid prices that were much higher than the original McMillen constructability estimate at 10% design.
- Labor (\$9.0M) – Increase due to a much more complex cofferdam and water bypass system and associated construction support, including FERC/DSOD Quality Control and Inspection Program (QCIP) monitoring, surveillance, testing, and reporting protocol. This scenario resulted in PG&E staffing increases including the addition of a full-time field manager, two additional full-time inspectors, increased management of environmental compliance. Lastly, PG&E's internal labor burden increased by 20% from the original estimate.
- Increased Risk Allocation (\$5.1M) – Results of a 2019 in-lake geotechnical investigation at the toe of the dam and along the proposed alignment of the cofferdam and cutoff indicate potential increased complexity and quantity growth during execution. These risks have impacted construction costs and have significantly increased the return to service milestone date.
- Scope of Design (\$4.4M) – Results of the 2019 geotechnical investigation indicated that significant modifications were required to the contractor's design of the cofferdam and water bypass system.
- AFUDC Increase (\$5.5M) – Increased cash flow due to expanded scope and risk-loaded schedule added two years to the original expected case construction schedule.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Record ed	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5745679	Fordyce Dam Leakage Reduction	Oct-2025	11,993	20,399	20,400	21,700	13,000	4,500	500	92,492

Benefits

This project will demonstrate compliance with DSOD requirements and will reduce the risk of dam failure which would disrupt power production, water delivery and would likely have severe environmental impacts and potentially public safety impacts.

Alternatives Considered

- Status Quo – Continue to evaluate but make no repairs or investments. This alternative is not responsive to mandatory DSOD requirements and does not address potential risk of failure.
- Leakage reduction project – This is the recommended alternative.
- Partial or full draining of Fordyce reservoir – This alternative reduces the risk of dam failure but results in lost generation, as well as environmental and water storage consequences.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Spring Gap Generator Rewind****Major Work Categories: 2M****Planning Order Numbers: 5778054****Project Start Date: 2018****Project Completion Date: 2025****Operative Date: October 2024****Project Description**

Spring Gap Powerhouse is a one-unit, 7 MW powerhouse adjacent to the Middle Fork of the Stanislaus River. The Spring Gap Powerhouse produces an average of approximately 39 GWH of electricity per year.

The Spring Gap Generator Rewind project will rewind the existing generator at the Spring Gap Powerhouse.

Justification

The justification for this project is reliability. Rewind of this generator will reduce the risk of failure in service and also improve the reliability of power generation. Spring Gap's generator was last rewound in 1981 by Westinghouse. Furthermore, if the distribution line to Strawberry, California goes out and/or fails, or the transmission line to Spring Gap Substation goes out and/or fails, then the only alternate source of power to Strawberry, California is the Spring Gap Generator.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5778054	Spring Gap PH - Generator Rewind	Oct-2024	106	63	130	800	3,500	310		4,909

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages..

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Alternatives Considered**

- Status quo – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Rewind generator – This is the recommended alternative.
- Reschedule one year – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Salt Springs 1 Rewind Generator

Major Work Categories: 2M

Planning Order Numbers: 5720513

Project Start Date: 2018

Project Completion Date: 2023

Operative Date: November 2023

Project Description

Salt Springs 1 Powerhouse is a one-unit, 11 MW powerhouse located on the Bear River. The Salt Springs 1 Powerhouse produces an average of approximately 33 GWH of electricity per year. The Powerhouse, commissioned in 1931, is comprised of single vertical reaction (Francis) unit coupled with a Westinghouse generator and controlled by a Pelton mechanical governor. Both runner and governor are original.

The Salt Springs 1 Rewind Generator project will rewind the existing generator at the Salt Springs 1 Powerhouse.

Justification

The justification for this project is reliability. Rewind of this generator will reduce the risk of failure in service and also improve the reliability of power generation. The Westinghouse generator at Salt Springs 1 was last rewound in 1985 by Westinghouse.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Record ed	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5720513	Salt Springs 1 Rewind Generator	Nov-2023	72	79	1,000	3,500	n.a.	n.a.		4,651

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages..

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternatives Considered

- Status quo – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Rewind generator – The recommended alternative.
- Reschedule one year – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Electra U2 Rewind Generator

Major Work Categories: 2M

Planning Order Numbers: 5720528

Project Start Date: 2017

Project Completion Date: 2021

Operative Date: April 2021

Project Description

The scope of this project is to replace the windings and its components to restore generator reliability.

Justification

The unit was last rewound in 1997. The windings have exceeded their expected service life and are due for replacement in 2020. The generator is essential for the unit operation. Delaying the work will result in higher replacement costs, extended force outages while performing the work under emergency replacement conditions when the generator fails.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5720528	Electra U2 Rewind	Apr-2021	5,962	3,135	n.a	n.a.	n.a.	n.a.	n.a.	9,097

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages..

Alternatives Considered

Make no improvements

Defer Alt A 1 Year

Repair Windings

Unit 2 Rewind Using Existing Core Iron

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Electra U2 Relays Replacement****Major Work Categories: 2M****Planning Order Numbers: 5785758****Project Start Date: 2019****Project Completion Date: 2022****Operative Date: April 2022****Project Description**

The scope of work is to upgrade the Electra Powerhouse Unit 2 existing generator protection scheme to the latest generator protection design standards which utilizes micro-processor relays to provide faster performance and reliability.

Justification

The existing generator protective relays were designed/installed following a now obsolete PG&E Hydro Engineering Design Standard (HEDS). The generator protection design standard utilized Beckwith M3425 relay (11GA) and GE-Multilin SR489 relay (11GB). The Area Maintenance Crew have reported failures of the SR489 relays in other powerhouses and are upgrading those generator management relay schemes as soon as possible. The Tech crew have had difficulty testing the SR489 relay at Electra PH.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5785758	Electra U2 Gen Relays Replacement	Apr-2022	1,158	1,594	1,129	n.a.	n.a.	n.a.	n.a.	3,881

Benefits

Bring us in compliance with NERC requirements.

Alternatives Considered

Status Quo

Upgrade Generator Protection Relays

Repair / Refurbish

Defer Replacement by 1 year

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Lower Blue Dam Seepage Reduction

Major Work Categories: 2N

Planning Order Numbers: 5783000

Project Start Date: 2019

Project Completion Date: 2023

Operative Date: September 2022

Project Description

To mitigate the seepage and liquefaction concerns at Lower Blue Dam. The scope includes constructing a downstream seepage berm on the left embankment to mitigate the seepage issues as well as address seismic liquefaction hazards.

Justification

Lower Blue Lake Dam is an earth fill embankment dam and is primarily operated for seasonal storage and regulation of water for power generation farther downstream. In 2018, several persistent damp or moist areas were observed along the toe on the left side of the downstream embankment face during high reservoir levels. Until this project is constructed, PG&E will not install the spillway flashboards to restrict the maximum water storage elevation. This measure will limit the amount of seepage flow from areas around the toe of the dam, limited the potential risks of piping and slope instability until this project is complete.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5783000	Lower Blue Dam Seepage Reduction	Sep-2022	86	1,229	6,700	90	n.a.	n.a.	n.a.	8,104

Benefits

This project will significantly reduce the public safety impact.

Alternatives Considered

In the process of being developed

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Drum 2 U5 Generator Rewind****Major Work Categories: 2M****Planning Order Numbers: 5760669****Project Start Date: 2018****Project Completion Date: 2024****Operative Date: September 2024****Project Description**

Drum 2 Powerhouse is a one-unit, 50 MW powerhouse located next to the Bear River near Alta, California. The Drum 2 Powerhouse produces an average of approximately 270 GWH of electricity per year. The generator rewind project will rewind the existing generator at Drum 2.

Justification

The justification for this project is reliability. Rewind of this generator will reduce the risk of failure in service and also improve the reliability of power generation. Drum 2 U5 was last rewound in 1985 by English Electric Coil.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5760669	Drum 2 U5 Rewind	Sep-2024	93	20	n.a	1,900	4,000	n.a.	n.a.	6,013

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages..

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternatives Considered

- Status quo – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Rewind generator – This is the recommended alternative.
- Reschedule one year – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Halsey Powerhouse – Replace Turbine Runner and Wicket Gates****Major Work Categories: 2M****Planning Order Numbers: 5767080****Project Start Date: 2016****Project Completion Date: 2022****Operative Date: February 2022****Project Description**

Halsey Powerhouse is a one-unit, 11 MW powerhouse located near Auburn, California. The Halsey Powerhouse produces an average of approximately 63 GWH of electricity per year. The unit is horizontally-oriented and has two 9,000 hp Allis-Chalmers reaction turbines, each equipped with a governor and pressure regulating valve.

This project will replace two runners, two bearings, as well as new wicket gates, facing plates, and bushings for horizontal, double-hung Francis unit.

Justification

Runners (turbines) typically have an expected life of 30-40 years. The turbines at Halsey were installed in 1970, and have exceeded its service life. The two Allis-Chalmers reaction turbines produce thrust and are typically equipped with a thrust bearing to compensate. The Halsey unit is unique in that it uses opposing reaction turbines to counterbalance each other. This requires that each turbine be in good condition to avoid a bearing failure. The unit experienced forced outages in each year from 2015-2017 with each year seeing a different root cause of failure, ranging from bearing failure to seal ring failure. Inspection noted that the runner had significant damage as a result of cavitation.

The component replacement recommendation was based on asset age; condition; past repair failure rates; and consequences of component failure. Failure of the turbine runner has a potential to cause an imbalance condition that could result in catastrophic failure and significant damage to the shaft, bearing and generating components. This type of failure would result in lost generation; inability to meet water delivery obligations; and a substantial outage duration to perform repairs or complete overhaul of both generating and turbine systems.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5767080	Halsey PH - Replace Runner and Wicket	Feb-2022	2,555	2,628	300	n.a.	n.a.	n.a.	n.a.	5,483

Benefits

Restore unit reliability and avoid generation impacts during untimely and extended outages.

Alternatives Considered

- **Status Quo** – Continue to operate Halsey PH as it has been historically managed. Expectation is that the unit will be able to operate for the next 3-4 years with a forced outage occurring roughly 10 weeks in length every 12-24 months. Ultimately, the runners will fail at Halsey. Project Engineering's best estimate is that the current runners can last no more than 4 years. When the runners fail, the project team will then make a determination on whether or not to invest in the unit. This option also requires additional spillway repair work due to greater use of the spillway channel and requires repair work that addresses seepage Dam 1 Halsey Forebay to be performed sooner than would otherwise be required.
- **Long-Term Restoration to Service** – Commit to the full capital investment program required to ensure safe, long-term operation of the powerhouse. The immediate capital needs of the facility include replacing the runners, wicket gates, and bearings.
- **Unit Decommissioning** – Decommission unit and perform work that allows for the safe permanent shutdown of the generating equipment. Capital work on the spill channel will be performed to ready the canal for continuous, long-term use to fulfill PG&E's water delivery obligation. This will primarily consist of installing shotcrete and rip-rap throughout the length of the channel as well as performing vegetation management work.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Lake Valley Canal Convert to Pipe****Major Work Categories: 2N****Planning Order Numbers: 5778990****Project Start Date: 2025****Project Completion Date: 2028****Operative Date: October October 2028****Project Description**

Lake Valley Reservoir is two miles south of Interstate 80 at Yuba Gap, and has a capacity of 7,964 acre feet. The Lake Valley Canal conveys water from the Lake Valley Reservoir through the Lake Valley Diversion Dam, through approximately 1.5 miles of canal, through approximately 0.9 miles of siphon pipe under Interstate 80, eventually discharging into the Drum Canal. The majority of the approximate 1.5 miles of Lake Valley Canal is gunite-lined open ditch with the remaining Lennon flume, gunite-box flume, or HDPE pipe. It has a capacity of 36 cubic feet per second (CFS).

PG&E made operative the "Lake Valley Canal HDPE Pipe 2015" project in September 2015, which converted approximately 0.4 miles of gunite-lined open ditch beginning at the Lake Valley Diversion Dam. This Lake Valley Canal Convert to Pipe project will convert the remaining 1.1 miles of canal to HDPE pipe.

Justification

The purpose of this project is to maintain system reliability and decrease maintenance costs by replacing the remaining 1.1 miles of canal with HDPE pipe. Also, during winter months, snow and/or ice can accumulate in the open faced sections of the Lake Valley Canal. This requires significant manual effort to remove the snow and/or ice to enable water flow in the canal. Thus, PG&E shuts down water conveyance through the Lake Valley Canal as part of the Winter Operations Plan.

Cost

The cost assumptions for these projects are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5778990	Lake Valley Canal Convert to Pipe	Oct-2028	n.a	n.a	n.a	n.a	n.a	2,000	2,000	4,000

Benefits

The work proposed is necessary for reliability and safety of the water conveyance facilities of the Drum hydroelectric system.

Alternatives Considered

- **Status Quo – Do Nothing.** This alternative is not recommended due to the current condition of the existing liner and the required ongoing maintenance support.
- **Install Shotcrete Liner** - Identify sections of failed gunite liner and install new Type A Shotcrete liner per Canal Liner Standard Plans. While this alternative would alleviate the current liner conditions, the Project Team felt continued maintenance of the open canal was less favorable over the life of the asset and continued damage due to unmanaged water runoff upslope. This alternative is not recommended.
- **Buried HDPE Pipe (Recommended)** - Remove the existing 1.1 miles of open faced canal and install new HDPE pipe along the existing alignment. This alternative would require additional excavation, installation of the pipe with maintenance access points and sand traps as deemed appropriate. The pipe would be buried and upslope grading required to ensure storm water runoff is able to sheet flow over the buried pipe.
- **Buried HDPE Hybrid Option** - This option is similar to the Buried HDPE Pipe option except for channeling storm water runoff to specific areas along the conveyance system and passing the runoff beneath the pipe through open channels. This option was not recommended due to implementation challenges.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Stan-Relief Dam Gunite Liner

Major Work Categories: 2N

Planning Order Numbers: 5777491

Project Start Date: 2018

Project Completion Date: 2024

Operative Date: September 2023

Project Description

Replace / Repair existing damages to the dam upstream liner to prevent further deterioration from occurring including leakage mitigation.

Justification

This project, Dam (Facility) Safety, and adherence to FERC License conditions, is common throughout the Hydro system. Annual DSOD inspections since 2004 have noted the degradation and increase leakage. DSOD's written directive to take appropriate action is imminent. Maintenance or capital improvement execution prior to DSOD written directives makes good business sense, plus will nurture a superior relationship with the key agencies as leakage flow rates trend to increasing magnitudes over the years.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5777491	Stan-Relief Dam Gunite Liner	Sep-2023	n.a	250	250	10,000	n.a	n.a	n.a	10,500

Benefits

- 1) Adherence to FERC License conditions
- 2) Increased leakage flow values driving updated leakage threshold values (provided by the Facility Safety Team)
- 3) DSOD non-written directives.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternatives Considered

- Status Quo – This alternative is not recommended as it does not address the increased safety and reliability risks to FERC and DSOD compliance.
- Install New Carpi Liner – This is the recommended if DSOD feels that patching the liner will not mitigate the increased seepage through the year.
- Reschedule One Year – Not recommended because of the dam safety concerns over increased leakage annually.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Relief Dam - Maintain U/S Liner

Major Work Categories: AX

Planning Order Numbers: 5271349

Project Start Date: 2021

Project Completion Date: 2026

Operative Date: n.a. This is expense.

Project Description

Concrete and gunite sections along the face and walkway of the dam have begun to crack and spall with baseline map inspections including detailed photo logs commencing in 2004. Rebar and welded wire fabric are exposed, and obvious deterioration is visible in multiple areas due to natural weather cycle (freezing and thawing).

Justification

Annual DSOD inspections since 2004 have noted the degradation and increase leakage. DSOD's written directive to take appropriate action is imminent. Maintenance or capital improvement execution prior to DSOD written directives makes good business sense, plus will nurture a superior relationship with the key agencies as leakage flow rates trend to increasing magnitudes over the years.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5271349	Relief Dam - Maintain U/S Liner	n.a.	n.a	300	300	750	510	525	550	2,935

Benefits

- 1.) Facility Dam Safety
- 2.) increased leakage flow values driving generation losses
- 3.) adherence to FERC License conditions
- 4.) increased leakage flow values driving updated leakage threshold values (provided by the Facility Safety Team)

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

5.) DSOD non-written directives.

Alternatives Considered

- Status Quo – This alternative is not recommended as it does not address the increased safety and reliability risks to FERC and DSOD compliance.
- Repair Liner Annually – This is the recommended alternative if the PG&E decides that a full carpi liner replacement is not economically reasonable.
- Reschedule One Year – Not recommended because of the dam safety concerns over increased leakage annually

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Tiger Creek Abay Spillway Gates Automation

Major Work Categories: 2N

Planning Order Numbers: 5793557

Project Start Date: 2022

Project Completion Date: 2028

Operative Date: September 2026

Project Description

This project is to replace the existing two mobile hoist carts for the Tiger Creek Spillway Gates with 10 fully automated remotely controlled and operated individual hoist carts that can be operated remotely from Tiger Creek Switching Center.

Justification

Safety is the justification for replacing those hoists carts. Currently, drum doesn't comply with the recommendation from USACE EM-1110-2-2610 "Mechanical and Electrical Design for Lock and Dam Operating Equipment".

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5793557	Tiger Creek Abay Spillway Gates Automation	Sep-2026	n.a	n.a.	200	300	3,000	2,500	2,500	8,500

Benefits

Replace the two existing mobile hoists carts with new 10 fully automated remote operated electric hoists which will allow for operation of the spillway gates from the Tiger Creek Switching Center. This will dramatically cut down to the response of an uncontrolled release or in a high flow event that could trigger an EAP.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternatives Considered

- Status quo - Doing nothing will require crew to continue manually operating the hoist during storms to help with outflow out of the reservoir;
- Install 10 hoists to be operated on-site: will still require crews to be on site to operate the hoists; Replace the two existing mobile hoists with new 10 fully automated remote operated electric hoists will allow for remote operation of the spillway gates from the TC switching center.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Haas U1 Rotor Pole Refurb Capital Mitigation****Major Work Categories: 2M****Planning Order Numbers: 5788226****Project Start Date: 2020****Project Completion 2023****Operative Date: December 2023****Project Description**

Haas PH Unit 1 has shown signs of pole deterioration and insulation migration throughout the years as well as incurred increased maintenance in order to continue producing safe and reliable power. Haas PH generators have a near identical design to Helms PH, with exception to size, which already underwent similar repairs to mitigate other known design issues. This project is to include a rotor and pole fixation study and system engineering in order to secure (19) new poles (18 plus a spare) for Haas PH Unit 1. It is recommended to remove the existing 1960 vintage field poles and replace them with new updated engineered field poles which incorporate a potential new endplate design to mitigate the fatigue caused by present day increased start/stop cycles. This project proposes to remove the Haas U1 rotor poles and replace with new poles, collars, end plates and insulation to restore and continue with safe and reliable operations of Haas Powerhouse Unit 1.

Justification

Last time the rotor was pulled, repairs were performed on pole collars, but noted of needing replacement. PG&E Asset Management has determined that the Haas U1 Rotor Poles have nearly surpassed it's service life and are slowly deteriorating as time progresses. It is recommended to replace the existing filed poles with new field poles that incorporate an endplate design in order to continue safe and reliable operations of Haas PH U1. By replacing the field poles we also reduce routine maintenance and the possibility of a prolonged forced outage. These newly designed poles also provide an opportunity to uprate Haas PH in the future without the poles being a limiting factor.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from the OEM along with estimated installation overheads.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5788226	Haas U1 Rotor Pole Refurb	Dec-2023	67	1,186	1,649	632	n.a.	n.a.	n.a.	3,534

Benefits

The benefits of the Haas U1 Rotor Pole Refurb project are to replace the field poles and windings to a like new condition with renewed life expectancy of 40+ years, including the new and likely continued operational need. The newly designed poles also provide an opportunity to uprate Haas PH in the future without the poles being a limiting factor.

Alternatives Considered

- A. Replace: Installation of new rotor poles will increase efficiency and reliability of the unit while shortening the duration of the Haas 2022 Fall outage. This option is recommended.
- B. Status Quo: This alternative suggests leaving as is. Haas U1 Rotor Poles have surpassed it's service life and could eventually run to failure. This option is not recommended.
- C. Refurbish: Refurbishing the existing rotor poles will ensure better reliability and efficiency of the unit, however, this option will cause a longer outage duration to account for refurbishment durations. This option also leaves PG&E open to many pole integrity unknowns once they are overseas being refurbished which can escalate cost/time. This option is not recommended.
- D. Retire: The existing rotor poles should be replaced to ensure reliability of the unit. This option is not recommended.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Haas U2 Rotor Pole Refurb Capital Mitigation****Major Work Categories: 2M****Planning Order Numbers: 5791359****Project Start Date: 2020****Project Completion 2022****Operative Date: February 2022****Project Description**

Haas PH Unit 2 has shown signs of pole deterioration and insulation migration throughout the years as well as incurred increased maintenance in order to continue producing safe and reliable power. Haas PH generators have a near identical design to Helms PH, with exception to size, which already underwent similar repairs to mitigate other known design issues. This project is to include a rotor and pole fixation study and system engineering in order to secure (19) new poles (18 plus a spare) for Haas PH Unit 2. It is recommended to remove the existing 1960 vintage field poles and replace them with new updated engineered field poles which incorporate a potential new endplate design to mitigate the fatigue caused by present day increased start/stop cycles. This project proposes to remove the Haas U2 rotor poles and replace with new poles, collars, end plates and insulation to restore and continue with safe and reliable operations of Haas Powerhouse Unit 2.

Justification

Last time the rotor was pulled, repairs were performed on pole collars, but noted of needing replacement. PG&E Asset Management has determined that the Haas U2 Rotor Poles have nearly surpassed it's service life and are slowly deteriorating as time progresses. It is recommended to replace the existing filed poles with new field poles that incorporate an endplate design in order to continue safe and reliable operations of Haas PH U2. By replacing the field poles we also reduce routine maintenance and the possibility of a prolonged forced outage. These newly designed poles also provide an opportunity to uprate Haas PH in the future without the poles being a limiting factor.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from the OEM along with estimated installation overheads.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Major Project Spending Estimates****(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5791359	Haas U2 Rotor Pole Refurb	Feb-2022	1,386	3,272	477	n.a.	n.a.	n.a.	n.a.	5,135

Benefits

The benefits of the Haas U2 Rotor Pole Refurb project are to replace the field poles and windings to a like new condition with renewed life expectancy of 40+ years, including the new and likely continued operational need. The newly designed poles also provide an opportunity to uprate Haas PH in the future without the poles being a limiting factor.

Alternatives Considered

- A. Replace: Installation of new rotor poles will increase efficiency and reliability of the unit while shortening the duration of the Haas 2021 Fall outage. This option is recommended.
- B. Status Quo: This alternative suggests leaving as is. Haas U2 Rotor Poles have surpassed it's service life and could eventually run to failure. This option is not recommended.
- C. Refurbish: Refurbishing the existing rotor poles will ensure better reliability and efficiency of the unit, however, this option will cause a longer outage duration to account for refurbishment durations. This option also leaves PG&E open to many pole integrity unknowns once they are overseas being refurbished which can escalate cost/time. This option is not recommended
- D. Retire: The existing rotor poles should be replaced to ensure reliability of the unit. This option is not recommended.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Helms Install Backup Power at Portal Capital Mitigation****Major Work Categories: 2M****Planning Order Numbers: 5783123****Project Start Date: 2019****Project Completion Date: 2024****Operative Date: August 2024****Project Description**

Helms is located east of Fresno on the North Fork of the Kings River. The system includes two reservoirs, two intake/discharge structures, tunnels, penstocks and the powerhouse. The powerhouse has three generator motor units with a total operating capacity of 1,212 megawatts and produces an average 660,200 MWH of energy annually. Helms is PG&E's largest hydroelectric powerhouse, functioning almost exclusively as a peaking powerhouse. Helms is essential to meeting California's peak summer power demand and providing water management for the Kings River.

There is currently no means to provide backup power in the event of the 70kV / 21kV line from Haas being compromised during a 3-unit outage / tunnel drain outside of renting a large enough backup generator at an inflated cost. Renting a generator of this size requires heavy planning, time, cost, and still requires the tie-in capabilities. There are four (4) dewatering pumps, each at 500HP and two (2) sump pumps each at 200HP which are all fed from load centers 3 & 4. These load centers may be fed as an auxiliary load off one of the three units, if needed, but are typically powered from an auxiliary 21kV line. If all three units are down and service from the 21kV line is interrupted, there is no way for the plant to power the dewatering pumps or sump pumps, which may be required to start up the units.

It is recommended to install a new 480V 3-Phase backup generator and tie-in ability at the Helms portal to provide backup power to Helms powerhouse.

Justification

There is significant leakage within the powerhouse, affirming the requirement of dewatering capabilities. The switchyard backup generator tie-in is not a sufficient source at only 120/208V. This project will install a new standby generator capable of starting up the dewatering pumps to avoid flooding Helms PSP. The risk of potentially flooding should the existing lines go down is only increased with our recent PSPS events which could deenergize power to reduce fire risk in any given location. It is expected that the new standby generator will be sized around 2MVA. Included in the scope is the necessary transformer, breaker, switches, wiring, concrete pad, and potential roof.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Cost**

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from vendors, constructors, and industry professionals along with estimated installation overheads.

Major Project Spending Estimates**(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5783123	Helms Install Backup Power at Portal	Aug-2024	254	170	250	1718	1517	n.a.	n.a.	3,909

Benefits

The benefits of this Helms Backup Power at Portal project will greatly reduce the risk of Helms PSP flooding given the situations explained below which will ensure clean and reliable power.

Alternatives Considered

- A. Install Backup Genset: This option has the best NPV and is therefore most economically justifiable. This alternative has a much shorter payback period considering the risk reduced of station service / Helms PH not having power. (Often times, for the given scenario, the 3-unit outage is intentional and planned, in which case generation is not directly lost from that week. Rather, outage productivity is lost from not having power in the powerhouse, as well as the safety power provides to Helms PH, which the benefit of cannot be monetized here.)
- B. Status Quo: Assume a failure in the 21kV/70kV line within the next 5 years (estimated to be 20% chance each year for expected value of cost) when units are down yielding station service unavailable: This requires an emergency rental generator to be supplied and hooked up by alternate means. Assume 4 days down for delivery and hookup. This prolongs the current outage. Assume similar situation every 5 years. Assume rental generator mobilization during a blizzard cost of ~\$1M and \$10k/day for fuel. Assume repair of compromised line 5 days after rental hooked up.
- C. Refurbish: N/A
- D. Retire: N/A

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Helms Penstock Field Weld Reinspections

Major Work Categories: AX

Planning Order Numbers: 5260382

Project Start Date: 2021

Project Completion Date: 2023

Operative Date: n.a. This is expense.

Project Description

The objective of this work is to reinspect the full circumference of each FW with MT and UT methods. The inspections results will be evaluated for flaw growth and compare against acceptance criteria. The results of the reinspection will be used to update/revise the existing

inservice inspection plan for the FWs.

Justification

Safety – Presence of flaws in the field welds

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5260382	Helms Penstock Field Weld Reinspections	n.a	n.a	n.a	50	1,000	n.a	n.a	n.a	1,050

Benefits

Inspecting the penstock welds will confirm weld integrity or identify areas that need to be repaired to ensure continued penstock integrity.

Alternatives Considered

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Replace Penstocks – It is not determined at this time that sections or the penstocks in total will need to be replaced. The weld inspections will help determine the condition and life of the welded sections.

Inspect Weld – Perform weld inspections as planned to determine the condition and life of the welded sections.

Do nothing – Do not inspect welds. Not recommended as previous inspections had showed cracking and signs of fatigue.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Helms – Repl Courtright LLO Bypass Valve****Major Work Categories: 2N****Planning Order Numbers: 5779207****Project Start Date: 2020****Project Completion Date: 2025****Operative Date: December 2024****Project Description**

Replace two (2) 24” nonoperational emergency LLO bypass valves after freezing the supply line or blocking the LLO intake. All work is within the LLO valve chamber.

Justification

The LLO 24” emergency bypass valves are stuck in position. The upstream valve is stuck in the open position, while the downstream valve is stuck in the closed position. Courtright LLO includes equipment of original 1950's vintage. The sticking is due to age resulting in cohesion. Work may be important because Courtright will need to be drained down for I/D work, increasing the possibility that these valves may need to be used if a malfunction happens with the regular Howell-Bunger valve.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5779207	Helms – Repl Courtright LLO Bypass Valve	Dec-2024	5	45	190	3,311	272	12	-	3,835

Benefits

Restore the LLO Bypass valve to reliable operation.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Alternatives Considered

- Status Quo - Do nothing. (Does not solve issue.)
- Repair - Not viable, valve or piping would likely break when attempting to operate or disassemble for repair.
- Refurbish - N/A, see repair.
- Replace - Replace valves. (Recommended.)
- Retire - N/A

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Helms – Install Incline Tunnel Liner

Major Work Categories: 2N

Planning Order Numbers: 5779209

Project Start Date: 2018

Project Completion Date: 2024

Operative Date: December 2023

Project Description

This project will remove damaged sections of concrete liner and replace in-kind, as well as install additional improvements to address tunnel integrity and leakage concerns.

Justification

Sections of the concrete lining in the Helms penstock and incline tunnels were found to be in a state of decay upon inspections conducted during the 2017 tunnel drain. It is preliminarily recommended to reline these sections of the tunnel. This work will serve to preserve the integrity of the tunnel liner and prohibit debris from entering any of the units, as well as potentially address leakage into the powerhouse cavern.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5779209	Helms – Install Incline Tunnel Liner	Dec-2023	409	2,434	480	7,064	-	-	-	10,388

Benefits

Installation of tunnels liner sections will re-instate the integrity of the penstock tunnel liner section. The tunnel liner is constructed of reinforced concrete, damaged sections could “peel off” and run through the unit. In addition, as liner sections erode, liner integrity as a whole deteriorates as well.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Alternatives Considered**

Do nothing: Do not replace concrete liner sections. Not recommended, as it allows continued erosion of the existing liner.

Replace liner sections like in kind: Recommended. Replacement of the existing damaged liner with like-in-kind reinforced concrete will provide the best-value solution. It is expected that the outage timeframe required to complete the work is acceptable, as well as the technical solution and cost.

Replace liner sections with steel: Not recommended. Replacement of the liner with steel will be much more expensive and time consuming than a concrete liner, extending the outage timeframe to complete the work beyond an acceptable timeframe.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Helms – Crane Rail Capacity Uprate

Major Work Categories: 2P

Planning Order Numbers: 5779437

Project Start Date: 2018

Project Completion Date: 2023

Operative Date: December 2023

Project Description

Increase the capacity of the Helms Crane’s rail supporting structure to compliment the uprating completed under the “Helms Main Crane Modifications” project.

Justification

Helms PSP is equipped with two bridge cranes with a combined total lift capacity of 540 tons. The crane system is critical to the operation and maintenance of powerhouse equipment as it provides the means to lift the rotors to allow disassembly of the generators. Currently, the rotors are heavier than the rating of the crane and its components, requiring an Engineered Lift and thorough before and after inspection anytime the rotors are lifted. There is a project currently underway entitled “Helms Main Crane Modifications” that seeks to modernize the controls and drive gear and perform structural modifications to the cranes that will ultimately increase the rated capacity of the cranes.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5779437	Helms Crane Rail Capacity Uprate	Dec-2023	784	321	300	2,775	n.a.	n.a.	n.a.	4,180

Benefits

Increase the rating of the crane and allow for safe lifts of the powerhouse equipment.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Alternatives Considered**

- **Status Quo – Do Nothing**
Reliable operation of Helms Main Crane is critical for future work, as well as emergent work on the Helms units that requires rotor lifts. Continued operation of the crane outside of the rated capacity accelerates deterioration of the crane and its components, potentially decreasing the safety and reliability of the equipment.
- **Designed Solutions suitable to be sealed by a Registered Professional Engineer**
- This alternative presents solutions, that when implemented, will be designed and sealed by a professional engineer. This solution ultimately results in a crane and support system that is rated to lift the rotors at the Helms Powerhouse and minimizes liability with the continued operation of the crane at capacity.
- **Solutions not suitable to be sealed by a Registered Professional Engineer**
- These solutions implement a combination of administrative changes and engineering decisions such as reducing code requirements of safety factors and the acceptance of unvalidated engineering variables to support continued operation of the crane in critical lifts. This would place potentially unacceptable amount of risk and liability on The Company.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Helms U1-U3 Replace TSVs****Major Work Categories: 2M****Planning Order Numbers: 5778043, 5778044, 5778045****Project Start Date: Various****Project Completion Date: Various****Operative Date:****P.O. 5778043 March 2028****P.O. 5778044 March 2028****P.O. 5778045 December 2026****Project Description**

This project seeks to replace the existing Turbine Shutoff Valves (TSVs) at Helms Powerhouse with new TSVs, specifically designed to meet the current and future expected operational frequency requirements.

Justification

Commissioned in 1984, the TSVs at Helms Pumped Storage Plant (Helms PSP) are original powerhouse equipment and have been in constant operation for over 36 years. The TSVs at Helms PSP are past their industry standard service life and all three TSVs are exhibiting some form of component wear and/or failure. The TSVs are showing the expected signs of age such as worn trunnions and leaking internal seals, but in addition Helms has experienced multiple in-service failures of the TSV downstream seals on all Units 1, 2, and 3. Two of the three valves have known issues with the upstream seals, and all three valves have had two failures each of the downstream seal, requiring forced outages to repair. These in-service failures require forced outages to make repairs, impacting the generation market and electric grid conditions. In addition, the TSVs employ a poor design of the upstream seal mechanical locks that are prone to failure during application with the inability to repair in-service.

With the current energy market requiring multiple TSV operation cycles per day, equipment wear is magnified, hastening the need to replace current valves with newer ones that are engineered and built with current and future operational frequency needs in mind. Failures require downtimes ranging from 2 to 12 plus weeks, which impact PG&E's ability to provide stable electricity to the California grid as well as the stability of the generation market.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5778043	Helms - U1 Repl TSV	Mar-2028	1,197	451	450	450	1,613	1,674	1,796	7,631
5778044	Helms - U2 Repl TSV	Mar-2028	1,498	449	450	450	1,613	1,674	1,796	7,930
5778045	Helms - U3 Repl TSV	Dec-2026	1,134	2,056	1,674	1,796	500	10,881	798	18,839

Benefits

The new TSVs will be designed to operate at current operational requirements, which require multiple operations per day to respond to energy market fluctuations. In addition, the new TSV designer will utilize lessons learned from known issues of the existing valves to design and build valves that either minimize or eliminate these problems. The new valves will target an operational life of 40 years assuming 3 to 4 operations per day, as opposed to the current valves, designed to operate 3 to 4 times per week.

Alternatives Considered

- **Status Quo, Do Nothing.** This alternative assumes that no action is taken to replace the TSV Downstream Seal. Instead, Unit continues to operate until unplanned seal failure. During the unplanned unit outage following seal failure, replacement power is purchased. This alternative also assumes that an extended outage takes place at a higher cost.
- **TSV Downstream Seal Replacement.** This alternative assumes the downstream TSV seal is replaced, associated work is performed and annual maintenance is completed as planned during the upcoming scheduled unit outage. As a result, system reliability is enhanced, replacement power costs due to untimely and extended forced outages is avoided, and the ability to work downstream of the seal without draining the penstocks is achieved.
- **Replace Complete TSVs on All Units.** This alternative will provide three new replacement TSV's of modern design for installation at Helms. The TSV's would be manufactured to minimize integration work necessary with penstock, foundations, and piping. TSV's would mate to existing flanges in the penstock and utilize the existing servo actuator system to the extent practical. This alternative assumes improved seal and locking mechanism design, 40 year life, and modern design.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Helms Replace 230 kV Oil-Filled Cables

Major Work Categories: 2M

Planning Order Numbers: 5778441

Project Start Date: 2018

Project Completion Date: 2027

Operative Date: Dec-2026

Project Description

Replacement of all 10 230kv cables. Old oil-filled cables will be replaced with new cables with light-stabilized cross-linked polyethylene insulation (XDPE), or similar insulating technology

Justification

The existing 230kv cables are original equipment and are nearing end of life due. 40 years is a typical industry expected lifespan, the Helms cables are about 38 years old. In addition, the existing cables have experienced insulating jacket fatigue, requiring repair.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5778441	Helms Replace 230kV Oil-Filled Cables	Dec-2026	86	n.a.	n.a.	n.a.	n.a.	4,000	11,000	15,086

Benefits

Replacement of these cables will ensure continued reliable operation of Helms. In addition, the new cable insulation type does not require a fire suppression system in the cable shaft, allowing the removal of the problematic fire-deluge system.

Alternatives Considered

- **Status Quo, Do Nothing.** This alternative assumes that no action is taken to replace the current oil filled cables. As the current cables are cracked and have an increased risk of failure and leaking of hazardous material (oil), this alternative is not recommended as failure of the cables will result in an unplanned 3-unit outage.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

- Replace 230kV Oil filled cables. This alternative assumes the current oil filled cables are replaced with non-oil filled cables during a scheduled 3-unit outage. As a result performance will be increased, the risk of an unplanned 3-unit outage will be alleviated and current environmental hazards associated with the oil filled cables will be eliminated. This is the recommended alternative.
- Continue w/ regular inspections & 5 yr oil samples. This is currently being done but will not be sufficient for long term reliability of Helms.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Helms Repl Elevator Shaft Control Wiring

Major Work Categories: 2M

Planning Order Numbers: 5788224

Project Start Date: January 2021

Project Completion Date: 2023

Operative Date: December 2023

Project Description

This project proposes to replace or reconfigure the control wiring from the switchyard to the control room in the powerhouse at Helms and continue with safe and reliable operations of the Helms Power House.

Justification

Water intrusion and the associated corrosion at Helms has made terminal block disassembly difficult and time consuming, perhaps even impossible (as evidenced by several stripped screw heads with cut conductors left on the terminal blocks).

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5788224	Helms Repl Elevator Shaft Control Wiring	Dec-2023	n.a.	240	500	2,500	n.a.	n.a.	n.a.	3,240

Benefits

Replacement of some wiring and improvement of the terminal sections of this wiring system will ensure continued operational reliability. The existing wiring terminals are corroded, causing various issues, including tripping units.

Alternatives Considered

Alternatives have not yet been considered.

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION****Project Title: Balch 2 U2 Replace Cooling Water System****Major Work Categories: 2M****Planning Order Numbers: 5758119****Project Start Date: 2015****Project Completion Date: 2025****Operative Date: March 2025****Project Description**

It is recommended to replace the Balch 2 U2 generator cooling water system and controls. The scope of work for the Balch 2 U2 cooling water project includes:

- Complete replacement of cooling water piping, valves, and instrumentation for U2. The replacement does not include replacing bearing cooling coils or air surface coolers.
- Rerouting the cooling water such that all cooling water lines are strained by a single auto-strainer. The addition of a simplex strainer bypass for the auto-strainer.
- Replacement of the cooling water supply pumps and motors for U1 and U2 and the in-line spare.
- Replacing the existing manual control system with a PLC based control system.
- Installing additional instrumentation for PLC based control system.

Justification

The existing Balch 2 Unit 2 (U2) Powerhouse (PH) generator cooling water system is restricted due to pipe corrosion and accumulated sedimentation. This restriction negatively impacts the cooling water flow rate to the generator air surface coolers and bearing oil coolers. The restriction has resulted in unit trips and unusually high bearing temperatures. It is recommended to replace the existing piping, valves, instrumentation, and controls for Unit 3 cooling water system. This work will serve to restore the system generator to reliable operation.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5758119	Balch 2 U2 Replace Cooling Water System	Mar-2025	2,733	196	-	208	300	1,661	-	5,097

Benefits

The benefits of the project is an increased cooling capacity and cooling efficiency of the system resulting in a potential longer life generator and bearing equipment. In addition, replacing the manual control system with an automated PLC controls system will result in higher operational flexibility, higher reliability, and decreased maintenance.

Alternatives Considered

- Status Quo – This alternative is not recommended due to the significant decrease in cooling water flow that the piping is already experiencing. By allowing the corrosion inside the piping to continue to become worse, the reliability of the unit decrease. Likewise, allowing the cooling capacity to be decreased will result in derating the generating capacity or in the failure of other key turbine-generator systems.
- Replace Cooling Water System- It is recommended to replace the cooling water piping, valves, pumps, motors, and controls in order to increase cooling efficiency at the powerhouse and eliminate forced outage work and/or costly repairs.
- Reschedule Cooling Water System Replacement - This alternative assumes the same consequences as the status quo for the year that the project is deferred. Deferral of the work would allow the piping to acquire more corrosion and continue to decrease cooling water capacity.
- Repair Cooling Water System – This alternative assumes that repairs are made to the cooling water system temporarily alleviating the lack of cooling water capacity that the system is currently experiencing. The worst pipe sections would be identified and replaced every 5 years. This would have similar consequences as status quo but would prevent the probability of failure from increasing over time.

PACIFIC GAS AND ELECTRIC COMPANY

HYDRO GENERATION

Project Title: Balch 2 U3 Upgrade Cooling Water System Major Work Categories: 2M

Planning Order Numbers: 5760617

Project Start Date: 2016

Project Completion Date: 2025

Operative Date: April 2025

Project Description

It is recommended to replace the Balch 2 U3 generator cooling water system and controls. The scope of work for the Balch 2 U3 cooling water project includes:

- Complete replacement of cooling water piping, valves, and instrumentation for U3. The replacement does not include replacing bearing cooling coils or air surface coolers.
- Rerouting the cooling water such that all cooling water lines are strained by a single auto- strainer. The addition of a simplex strainer bypass for the auto-strainer.
- Replacing the existing manual control system with a PLC based control system.
- Installing additional instrumentation for PLC based control system.
- Final commissioning of the U3 cooling water system

Justification

The existing Balch 2 Unit 3 (U3) Powerhouse (PH) generator cooling water system is restricted due to pipe corrosion and accumulated sedimentation. This restriction negatively impacts the cooling water flow rate to the generator air surface coolers and bearing oil coolers. The restriction has resulted in unit trips and unusually high bearing temperatures. It is recommended to replace the existing piping, valves, instrumentation, and controls for Unit 3 cooling water system. This work will serve to restore the system generator to reliable operation.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5760617	Balch 2 U3 Upgrade Cooling Water System	Apr-2025	1,985	138	n.a.	153	274	1,705	n.a.	4,255

Benefits

The benefits of the project is an increased cooling capacity and cooling efficiency of the system resulting in a potential longer life generator and bearing equipment. In addition, replacing the

PACIFIC GAS AND ELECTRIC COMPANY**HYDRO GENERATION**

manual control system with an automated PLC controls system will result in higher operational flexibility, higher reliability, and decrease maintenance.

Alternatives Considered

- Status Quo –This alternative is not recommended due to the significant decrease in cooling water flow that the piping is already experiencing. By allowing the corrosion inside the piping to continue to become worse, the reliability of the unit decreases. Likewise, allowing the cooling capacity to be decreased could result in either derating the generating capacity or will result in the failure of other key turbine-generator systems.
- Replace Cooling Water System- It is recommended to replace the cooling water piping, valves, pumps, motors, and controls in order to increase cooling efficiency at the powerhouse and eliminate forced outage work and/or costly repairs.
- Reschedule Cooling Water System Replacement - This alternative assumes the same consequences as Alternative 1 for the year that the project is deferred. Deferral of the work would allow the piping to acquire more corrosion and continue to decrease cooling water capacity.
- Repair Cooling Water System – This alternative assumes that repairs are made to the cooling water system temporarily alleviating the lack of cooling water capacity that the system is currently experiencing. The worst pipe sections would be identified and replaced every 5 years. This would have similar consequences as Alternative 1 but would prevent the probability of failure from increasing over time.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Courtright Dam Upgrade I/D Gate Cylinder and Hydraulic Line Replacement

Major Work Categories: 2N

Planning Order Numbers: 5778440

Project Start Date: 2018

Project Completion Date: 2024

Operative Date: June 2023

Project Description

The ID Gate work consists of the following:

- ID Cylinder and dogging pin cylinders replacement, all with position indication.
- ID bypass gate valves and cylinders replacement, all with position indication.
- ID structure oil spill containment roof modifications.
- Conduit duct bank and electric cables for ID, dogging pin and bypass gate valve cylinders position sensing.
- Replacement of existing steel submerged piping with new SS double wall piping, with a new oil spill containment vault just above the maximum water level. New submerged piping and submerged electrical conduit to be encased in concrete routed along or above the existing steel pipe duct bank.
- ROV access door at upstream end of ID grizzly.

These recommendations are based off field inspections and lessons learned during the 2017 T1 Gatehouse outage.

Justification

The Helms Pumped Storage facility is located in Fresno County, CA near Wishon Reservoir. Helms Powerhouse is a three-unit facility that was commissioned on June 30, 1984. When the facility is in generation mode, water is conveyed from Courtright Reservoir through the Courtright I/D gates, the T1 gate, through several miles of tunnel, down the penstock into Helms Powerhouse, then discharged out to Wishon Reservoir via the Wishon I/D gates. Flow is reversed when in pump mode. The Courtright I/D gates and T1 gate are operated by a common hydraulic system that has experienced several component failures. The Courtright I/D gates are closed as part of the procedure for draining the tunnel. The reliable operation of the Courtright I/D gates and T1 gate is critical for the overall safety and reliability of the powerhouse.

The hydraulic operating equipment of both these gates has many components that need to function properly in order for the entire system to be reliable. The gates are operated using a shared hydraulic system located inside T1 gatehouse. The existing hydraulic equipment is nearing the end of its useful life and lacks the indication required to ensure proper functioning of the gates.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5778440	Courtright Dam Upgrade I/D Gate Cylinder and Hydraulic Line Replacement	Jun-2023	290	90	1,064	2,412	18	n.a.	n.a.	3,873

Benefits

The Courtright Dam Upgrade I/D Gate Cylinder and Hydraulic Lines project will improve reliability and the functionality of the system. It will also decrease the likelihood of an environmental incident related to releasing oil to the water by replacing hydraulic equipment that is nearing the end of its useful life.

Alternatives Considered

- Status Quo – This alternative is not recommended as the current state of the gate cylinders and hydraulic lines leading to the gate are nearing the end of their expected life and a failure would lead to significant environmental damage. This would also lead to reduced safety and reliability of the Helms Pump Storage Facility
- Replace Gate Cylinders but use Existing Hydraulic Lines – This alternative will be evaluated to see if existing hydraulic lines that are incased in concrete are still viable or need to be replaced due to end of life expectancy.
- Replace Gate Cylinders and Hydraulic Lines – This is the current recommended alternative based on life expectancy of cylinders and hydraulic lines in the environment that they are exposed to.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Balch 2 Bank 2 and Bank 3 Replacement

Major Work Categories: 2M

Planning Order Numbers: 5788228 / 5780659

Project Start Date: 2020

Project Completion Date: 2025

Operative Date:

P.O. 5788228 April 2025

P.O. 5780659 December 2025

Project Description

The Balch 2 powerhouse is located on the North Fork of the King's River in Fresno County and contains two units that were commissioned in 1958. Unit 2 and Unit 3 are Pelton Wheel Turbine Generators. The Unit 2 Generator was rewound in 2013 and the Unit 3 Generator was rewound in 2016. Both generators are rated for 61.60/70.84 MVA (ratings for 60°/80°C rise over ambient).

The existing Bank 2 and 3 GSU Transformers are two-winding, three-phase transformers rated for 54 MVA FOW (forced oil, water cooled), 230kV/13.8kV in a wye-delta configuration. The GSU Transformers are located outside in the GSU Transformer Yard on the south side of the control building adjacent to Station Service Transformers 2 and 3, the disconnect switches for the Bank 2 and 3 GSU Transformers and Station Service Transformers 2 and 3, and the associated isophase bus. The existing secondary containment is comprised of gravel and culverts that lead to a common containment pit. The Bank 2 and 3 GSU Transformers, Station Service Transformers 2 and 3, and their associated disconnect switches are on concrete foundations within the containment area. The existing GSU Transformer low-voltage side leads are comprised of isophase bus from the GSU disconnect switches to the GSU low voltage bushings. The existing GSU high-voltage side leads are routed overhead from the GSU Transformer high-voltage bushings to the SF6 line PCB located in the switchyard across the access road from the GSU Transformer Yard. The existing Bank 2 and 3 GSU Transformers high-voltage side leads and surge arresters are supported by steel structures located in the GSU Transformer Yard above the GSU Transformers. The ground cables associated with the surge arresters are routed to the ground grid via stand-off insulators mounted to the control building wall adjacent to the GSU transformers.

This project will replace the existing Bank 2 and 3 GSU Transformers at the Balch 2 Powerhouse. The existing transformers will be removed, as well as their associated ancillary equipment and power and control cables. The new GSU transformers will be located in the same location as the existing GSU transformers in the transformer yard adjacent to the control building's south wall. The existing isophase bus will be retained and modified, if and as needed,

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

for connection to the new GSU transformers. The GSU Transformer foundations will be modified to accommodate the new GSU Transformer. The existing containment will be modified as needed based on the oil volume of the new GSU transformers.

Justification

The High Voltage Transformer Program has identified the Balch 2 GSU Transformer Bank 2 and Bank 3 as high priority in the transformer fleet that needs to be scheduled for replacement. Balch 2 Bank 2 and Bank 3 is a 3-phase transformer, rated for 54 MVA that has been in service since 1965. Due to the age of the transformer and elevated gas levels as shown in an oil analysis, replacement is recommended.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5780659	Balch 2 - Bank 3 Replacement	Dec-2025	89	4	n.a.	375	49	2,817	n.a.	3,335
5788228	Balch 2 Bank 2 Replacement	Apr-2025	86	3	n.a.	399	130	2,811	n.a.	3,429

Benefits

This project will mitigate the reliability risks due to age of GSU transformers noted above.

Alternatives Considered

- Status Quo – Do Nothing. This alternative assumes that no action is taken other than minimal maintenance. This is not considered a viable alternative due to high likelihood of failure and the extensive generation loss associated with a lengthy forced outage.
- Replacement of Bank 2 and Bank 3 (recommended) – This alternative is the preferred alternative. Replacing the GSU transformers will mitigate reliability issues and prevent further elevated gas levels.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

- Reschedule One Year – This alternative assumes the project is rescheduled one year. This alternative ultimately has the same long-term benefits as the recommended alternative; however, in the short-term, this alternative is not recommended for the same reasons discussed in status quo. There is a benefit in performing work during scheduled outage in 2025.
- Repair – Not feasible due to age and elevated gas levels as shown in transformer oil analysis.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Kerckhoff 2 - Generator Rewind/Restack

Major Work Categories: 2M

Planning Order Numbers: 5762329

Project Start Date: 2023

Project Completion: 2025

Operative Date: March 2025

Project Description

During the course of the 2014 Kerckhoff 2 (K2) outage, it was verified that the generator air gap had decreased significantly in the South West quadrant from the original documentation from construction. The recommended alignment was completed and the resulting plumb measurement of the rotating parts in this optimized position was 1.41 mils/ft of shaft length. This puts the Kerckhoff 2 turbine generator outside the industry recommended tolerances for plumb. In order to achieve all industry recommended tolerances, a full realignment of the unit is required. This could include a full disassembly of the unit, at which point a rewind and restack would be performed.

Justification

The justification for this project is reliability. Rewind of this generator will reduce the risk of failure in service and also improve the reliability of power generation.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from the OEM along with estimated installation overheads.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5762329	Kerckhoff 2 - Generator Rewind/Restack	Mar-2025	n.a.	n.a.	n.a.	3,000	6,000	7,000	n.a.	16,000

Benefits

Improved efficiency, increased reliability and avoidance of lost generation impacts during untimely and extended outages.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status quo – Running the generator until it fails would result in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.
- Rewind generator – This is the recommended alternative.
- Reschedule one year – Rescheduling the project by one year increases the likelihood of a generator failure before the rewind resulting in a prolonged forced outage (a minimum of two years) and higher costs to rewind the generator on an expedited basis.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: K2 - Turbine Upgrade
Major Work Categories: 2M/2M2
Planning Order Numbers: 5779444
Project Start Date: 2023
Project Completion: 2026
Operative Date: December 2026

Project Description

K2's turbine runner has shown signs of increased fatigue, wear, and cracking which is evident by the routine necessary weld repairs which only enables PG&E to repair accessible surfaces. In order to inspect and repair all surfaces, the turbine runner must be removed and shipped offsite. It is recommended to replace, upgrade, or overhaul K2's 1983 vintage turbine runner in order to reduce vibration and increase the operating range. The proposed solution will be determined through engineering review and possible alternative cost analysis.

Justification

K2 has experienced increased vibration due to turbine runner cavitation, increased maintenance cost for weld repairs, and loss of generation due to increased maintenance as a result of turbine runner wear and damage. By replacing or refurbishing the turbine runner we reduce routine maintenance, increase the operating range and flexibility, reset the operating life cycle, and reduce the possibility of a prolonged forced outage.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from the OEM along with estimated installation overheads.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5779444	K2 - Turbine Upgrade	Dec-2026	n.a.	n.a.	n.a.	100	300	2,000	3,500	5,900

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Benefits

The benefit of the K2 - Turbine Upgrade project is renewed life expectancy of 40+ years, increased operating range/flexibility, and reduced powerhouse vibration which can negatively affect other components and equipment.

Alternatives Considered

- A. Replace: Installation of a new turbine will increase efficiency and reliability of the unit. This option is recommended.
- B. Status Quo: This alternative suggests leaving as is. The K2 turbine has surpassed it's service life and could eventually run to failure. This option is not recommended.
- C. Refurbish: Refurbishing the existing turbine runner will ensure better reliability and efficiency of the unit, however, this option will cause a longer outage duration to account for refurbishment durations. This option also leaves PG&E open to many turbine integrity unknowns which can greatly increase repairs cost and ultimately lead to replacement. This option is not recommended
- D. Retire: The existing turbine should be replaced to ensure reliability of the unit. This option is not recommended.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Kings River GSU Bank Replacement

Major Work Categories: 2M

Planning Order Numbers: 5792938

Project Start Date: 2023

Project Completion Date: 2024

Operative Date: March 2024

Project Description

Install 1 new cost-effective transformer for Kings River that meets or exceeds latest industry standards for efficiency and reliability; including repairs and / or replacements of all associated components. Concrete base, Grounding modifications, ISO phase bus duct and all its components, raceway conduits & wiring, bushings, Spill Prevention Control and Countermeasure (SPCC) work may be included in the scope. Install “real time” monitoring system and Dissolved Gas Analyzer (DGA) monitoring system. Dispose existing transformers. Improve reliability of power generation by reducing forced outages.

Justification

The Kings River GSU is a 3-phase transformer that has been in service since 1965, oil testing shows elevated gas levels in the oil. Failure of the transformer can result in a forced outage. There is a long 12 month lead for a replacement transformer and there are no readily available spares.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from vendors, constructors, and industry professionals along with estimated installation overheads.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5792938	Kings River GSU Bank Replacement	Mar-2024	n.a.	n.a.	n.a.	1,800	3,600	n.a.	n.a.	5,400

Benefits

A replacement transformer will provide long-term reliability and be equipped with modern instrumentation for asset health and condition monitoring. Due to the proximity to the control room door (<25 feet), replacement transformer will utilize FR3 oil which has a higher flashpoint and is environmentally friendly in case of a spill to the nearby waterway.

Alternatives Considered

- 1) Status Quo – Not a feasible option, replacement is necessary.
- 2) Repair – Not feasible due to age and elevated gas levels as shown in oil analysis.
- 3) Refurbish – Not feasible due to age
- 4) Replace (recommended) – replace transformer which has reached its end of life Defer One year – Replacement is needed due to concerns around forced outage and employee safety
- 5) Retire – Transformer is necessary for plant operations. Not a feasible option.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Balch 2 U2 Reinsulate Field Poles

Major Work Categories: 2M

Planning Order Numbers: 5792939

Project Start Date: 2023

Project Completion Date: 2025

Operative Date: May 2025

Project Description

Balch 2 Unit 2 has shown signs of pole deterioration and insulation migration throughout the years which was confirmed through pole drop testing. It is recommended to remove the existing 1962 vintage field poles and replace them with new updated engineered field poles which incorporate a potential new endplate design to mitigate the fatigue caused by present day increased start/stop cycles or to refurbish the existing field poles by reinsulating turn to turn and ground wall insulation. The proposed solution will be determined through engineering review and possible alternative cost analysis..

Justification

Balch 2 Unit 2 pole drop test results revealed issues with the turn to turn insulation on 3 poles. PG&E Asset Management has determined that the Balch 2 Unit 2 filed poles have nearly surpassed their service life and are slowly deteriorating as time progresses. By replacing or refurbishing the field poles we also reduce routine maintenance and the possibility of a prolonged forced outage.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from the OEM along with estimated installation overheads.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5792939	Balch 2 U2 Reinsulate Field Poles	May-2025	n.a.	n.a.	n.a.	500	1,500	2,000	n.a.	4,000

Benefits

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

The benefits of the Balch 2 U2 Reinsulate Field Poles project are to replace or refurbish the field poles and windings to a like new condition with renewed life expectancy of 40+ years, including the new and likely continued operational need

Alternatives Considered

- 1) Replace: Installation of new rotor poles will increase efficiency and reliability of the unit. This option is recommended.
- 2) Status Quo: This alternative suggests leaving as is. The Balch 2 U2 field poles have surpassed it's service life and could eventually run to failure. This option is not recommended.
- 3) Refurbish: Refurbishing the existing rotor poles will ensure better reliability and efficiency of the unit, however, this option will cause a longer outage duration to account for refurbishment durations. This option also leaves PG&E open to many pole integrity unknowns once they are overseas being refurbished which can escalate cost/time. This option is not recommended
- 4) Retire: The existing rotor poles should be replaced to ensure reliability of the unit. This option is not recommended.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Hydro Powerhouse Disposition Support

Major Work Categories: AB

Planning Order Numbers: 5251412

Project Start Date: 2018

Project Completion Date: n.a.

Operative Date: n.a. This is expense.

Project Description

As PG&E continues to review its hydroelectric assets, certain assets will be put up for sale to other entities prior to surrendering the license. The sale process requires disposition support from third parties who specialize in the sale of these assets.

The costs associated with Hydro PH Disposition Support include: contractor support, legal support, and miscellaneous studies. PG&E has hired an experienced investment banker, Bodington & Company (B&Co), to advise on the sale of hydroelectric projects. B&Co provides specific services for each transaction including: hosting virtual data rooms, preparation of offering materials, communication with potential purchasers, negotiation of offers, and management of the closing process. In 2017, B&Co supported five separate transactions, which are ongoing. In addition to contractor and legal support, the Portfolio Strategy organization contracts with third party consultants/ engineering firms to conduct ad-hoc studies. This includes studies for implementing project features (e.g. fish ladder), and other miscellaneous activities.

Justification

Reviewing hydroelectric assets and divesting of less economic ones will lower costs to customers, while continuing to maintain the more economic powerhouses in our portfolio that benefit customers. This strategy achieves the lowest reasonable overall costs for customers, consistent with good utility practices.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Fore-cast
5251412	Hydro PH Disposition Support	n.a.	n.a.	750	774	799	822	844	866	4,854

Benefits

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Reviewing hydroelectric assets and divesting of less economic ones will lower costs to customers, while continuing to maintain the more economic powerhouses in our portfolio that benefit customers. This strategy achieves the lowest reasonable overall costs for customers, consistent with good utility practices.

Alternatives Considered

N/A. This is not a project with alternatives.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Spillway Assessment Program Expense and Capital Mitigation

Major Work Categories: AX, 2N

Planning Order Numbers: Various

Project Start Date: Various

Project Completion Date: Various

Operative Date: n.a. for expense. Various for capital.

Project Description

This item represents expense and capital placeholders for projects arising from the 2017 spillway assessment recommendations originating from the Oroville spillway incident. PG&E completed the 36 spillway assessments in 2017, resulting in over 400 recommendations. The recommendations consist of five categories: immediate action items, near term items, long term items, maintenance items, and surveillance and monitoring items.

The recommendations will be prioritized by urgency and funded via these spillway assessment program expense and capital mitigations planning orders.

A typical scope of a spillway mitigation is as follows: implement permanent repairs and/or retrofit to the chute slabs, joints, walls, and armoring as identified during detailed investigation, evaluation, and alternative analysis.

Justification

The objective of the spillway mitigations is to minimize the probability and consequences associated with catastrophic or unplanned failure of a dam by systematically mitigating identified spillway risks. An in-service failure of a dam can have serious consequences to public and employee safety, third party property damage, collateral damage to Hydro facilities, and environmental damage. In addition, failure to properly maintain and upgrade spillway facilities in accordance with FERC and DSOD requirements can lead to non-compliance notices, fines, and potential loss of the FERC license or water storage rights.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5794013	Belden Forebay Spillway Improv SAIP	Dec-2026	283	200	250	1,000	5,000	10,000	5,000	21,733
5794027	Butt Valley Spillway Improv SAIP	Dec-2023	n.a.	250	500	10,000	n.a.	n.a.	n.a.	10,750
5794031	Lower Bucks Spillway Restoration SAIP	Sep-2022	264	350	5,000	n.a.	n.a.	n.a.	n.a.	5,614
5794032	McCloud Spillway Improvements SAIP	Dec-2026	n.a.	5,000	7,787	40,000	40,000	40,000	40,000	172,787
5794035	Tiger Creek Reg Spillway Improv SAIP	Feb-2025	1,070	1,800	2,800	15,000	20,000	480	n.a.	41,150
5794098	Spillway Assessment Prgm Cap Mitigation	Dec-2021	n.a.	2,300	2,500	7,100	10,000	10,000	10,000	41,900
5272032	Drum Spillways FSP Engr SAIP	n.a.	n.a.	1,425	95	15	n.a.	n.a.	n.a.	1,535
5272053	DeSabra Spillways FSP Engr SAIP	n.a.	n.a.	939	86	14	n.a.	n.a.	n.a.	1,039
5272054	Motherlode Spillways FSP Engr SAIP	n.a.	n.a.	788	431	69	n.a.	n.a.	n.a.	1,288
5272061	Shasta Spillways FSP Engr SAIP	n.a.	n.a.	355	280	345	n.a.	n.a.	n.a.	980

Benefits

The benefits of this spillway mitigation program are to mitigate the safety and reliability risks noted above.

Alternatives Considered

Alternatives are evaluated for each of these projects and the alternative that results in the highest net present value to customers is chosen.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Emergent Work Capital and Expense

Major Work Categories: AX, 2N

Planning Order Numbers: 5247934, 5762807

Project Start Date: 2019

Project Completion Date: Various

Operative Date:

P.O. 5247934 n.a. This is expense.

P.O. 5762807 December 2021*

* specific projects become operative individually starting with the dates given

Project Description

This program is to fund emergent work on water conveyance facilities. Historically, weather events, seismic events, and wildfires have resulted in unplanned work due to failures of water conveyance facilities. These facility failures are typically corrected by rebuilding canal sections, installing retaining walls or replacing flume sections.

Justification

PG&E's hydro water conveyance facilities are susceptible to damage during severe weather, seismic events and wildfires. Also, due to the dispersed nature of the hydro water conveyance facilities they often do not correspond with state-designated disaster areas that may be declared following such events. For these reasons this work is not normally covered through other funding mechanisms such as CEMA. Without an emergent work fund, these emergent projects displace other planned work.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5247934	'Emergent Projects - Expense	n.a.	n.a.	2,250	1,771	n.a.	5,069	9,889	7,011	25,990
5762807	'Emergent Projects - Capital	Dec-2021	n.a.	114	658	394	2,987	3,793	3,087	11,033

Benefits

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Funding emergent work will minimize the need to reschedule planned work. This alternative minimizes overall cost and outage time as described in the alternatives considered discussed below.

Alternatives Considered

- *Remove emergent work funding* – Do not provide discrete funding for emergent work. This results in re-scheduling planned work to provide funding for high priority emergent work. The process of putting some projects on hold and re-distributing budget adds cost and outage time.
- *Continue to Establish Annual Capital and Expense Emergent Work Funds* – Recommended. Provides funding for emergent work based on historical level of such work and allows other funded projects to continue without schedule impacts. This alternative minimizes overall cost and outage time.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: McCloud- Pit FERC 2106 Relicensing and New License Conditions

Major Work Categories: IG, 3H

Planning Order Numbers: 5215768, 5719039, 5720688

Project Start Date: 2006

Project Completion Date: various

Operative Date:

P.O. 5215768 n.a. this is expense

P.O. 5720688 December 2026

Project Description

The McCloud-Pit (McP) Project includes three powerhouses located on the McCloud and Pit Rivers in northern California. The MCP powerhouses have a combined normal operating capacity of 364 MW.

The long-term FERC license for the MCP Project expired in 2011. PG&E has been in the relicensing process for the MCP since 2006. The forecast cost includes the work necessary to complete the relicensing process and to implement the anticipated license conditions in the new license. Ongoing relicensing work includes completion of negotiation of recommended license conditions, acquisition of a Water Quality Certificate from the State Water Resources Control Board (SWRCB), state environmental review, and preparations for license acceptance and implementation.

License implementation will begin when the new License is issued by FERC, and is expected to include: 1) physical modifications to the existing dams to allow and measure the new instream flow conditions in the license; and 2) recreation and fishing access improvements; 3) road improvements.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades. New FERC license conditions are uncertain until the

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

new license order has been issued by FERC; however the licensee's cost forecasts (capital and expense) for compliance with anticipated new license requirements are based on engagement with regulatory agencies and stakeholders during the relicensing proceeding, various environmental reviews (NEPA and CEQA) and regulatory processes and intermediate steps. Cost estimates to implement new license requirements are refined by the licensee throughout the relicensing process based on growing availability of information as the regulatory proceeding matures. Due to many layers of regulatory processes, the schedule for FERC's issuance of a New License can be uncertain and subject to regulatory and agency activities beyond the licensee's control.

The McCloud-Pit FERC 2106 relicensing and new license conditions work was also forecast in the 2020 GRC. Relicensing work has begun, but the projects have later operating dates because the expected license issuance date is now September 2021. In the 2020 GRC, the expected license issuance date was January 2020. A licensee cannot always accurately forecast the scope and costs of license implementation because the measures that will be required are not known in advance and often take years of study of potential impacts before new operating conditions can be specified. This is why PG&E has requested and the Commission has approved that this work be subject to balancing account treatment.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

The new FERC License Conditions are uncertain until the license is issued by FERC; however, the cost forecasts are based study results and discussions held with the regulatory agencies and stakeholders throughout the relicensing process, and on the Company's experience with implementing recent similar License conditions.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5215768	McCloud- Pit License Conditions – Expense	n.a.	n.a.	3,000	5,600	5,800	5,600	6,100	10,300	36,400
5720688	McCloud-Pit License Conditions - Capital	Dec-2026	n.a.	1,120	6,300	28,900	46,200	10,500	9,500	102,520

Benefits

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

The benefits of this project include a new FERC license extending the operational life of the James B. Black, Pit #6, Pit #7 powerhouses by 30-50 years.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: UNFFR FERC 2105 Relicensing and New License Conditions

Major Work Categories: IG, 3H

Planning Order Numbers: 5741504, 5215856, 5236368, 5236369

Project Start Date: 1999

Project Completion Date: various

Operative Date:

P.O. 5215856, 5236368, 5236369 - n.a. these are expense

P.O. 5741504 December 2026

Project Description

The Upper North Fork Feather River (UNFFR) Project includes 5 powerhouses located in the upper reaches of the North Fork Feather River. The UNFFR powerhouses produce an average of about 1,154 GWh of electricity per year.

The long-term FERC license for the UNFFR Project expired in 2004. FERC has issued annual licenses since then, and will continue to do so provided the Company continues to relicense the Project. PG&E has been in the relicensing process for the UNFFR since 1999. The forecast cost includes the work necessary to complete the relicensing process and to implement the anticipated license conditions in the new license.

License implementation will begin when the new License is issued by FERC, and is expected to include: 1) Building campgrounds, boat launch, day use areas, trails, scenic overlook, and access points; 2) Constructing improved flow release facilities at Canyon Dam Outlet Tower and Belden Forebay Dam; 3) Removing Caribou Camp swimming pool and tennis court; and 4) Installing new road signs on Butt Valley Caribou Roads.

In addition to the aforementioned capital improvements, PG&E expects to pay the Forest Service for recreation improvements; maintain various rest stops, trails, boat launch, water access, day use areas, and campgrounds; to file project boundary drawings to include all recreation improvements; to make various license required recurring payments to Forest Service and CA Department of Fish and Game; and to develop and implement plans for the management of roads and traffic, vegetation, cultural resources, invasive weeds, and bald eagles; and develop, and implement plans for water quality.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

New FERC license conditions are uncertain until the new license order has been issued by FERC; however the licensee's cost forecasts (capital and expense) for compliance with anticipated new license requirements are based on engagement with regulatory agencies and stakeholders during the relicensing proceeding, various environmental reviews (NEPA and CEQA) and regulatory processes and intermediate steps. Cost estimates to implement new license requirements are refined by the licensee throughout the relicensing process based on growing availability of information as the regulatory proceeding matures. Due to many layers of regulatory processes, the schedule for FERC's issuance of a New License can be uncertain and subject to regulatory and agency activities beyond the licensee's control.

The UNFFR FERC 2105 relicensing and new license conditions work was also forecast in the 2020 GRC. Relicensing work has begun, but the projects have later operating dates because the expected license issuance date is now September 2021. In the 2020 GRC, the expected license issuance date was January 2020. A licensee cannot always accurately forecast the scope and costs of license implementation because the measures that will be required are not known in advance and often take years of study of potential impacts before new operating conditions can be specified. This is why PG&E has requested and the Commission has approved that this work be subject to balancing account treatment.

Cost

The new FERC License Conditions are uncertain until the license is issued by FERC; however, the cost forecasts are based study results and discussions held with the regulatory agencies and stakeholders throughout the relicensing process, and on the Company's experience with implementing recent similar License conditions.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Record ed	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5741504	UNFFR LC-Capital Projects	Dec-2026	n.a.	1,827	14,977	3,129	6,430	5,550	2,750	34,662
5215856	UNFFR LC- Lake Almanor Payment to FS	n.a.	n.a.	1,000	1,000	1,000	1,000	1,000	1,000	6,000
5236368	UNFFR LC-Bio Mon Stand	n.a.	n.a.	n.a.	970	490	796	408	973	3,637
5236369	UNFFR LC-Land Spec	n.a.	n.a.	280	1,527	818	n.a.	n.a.	n.a.	2,625

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Benefits

The benefits of this project include a new FERC license extending the operational life of the Butt Valley, Caribou #1, Caribou #2, Oak Flat, and Belden powerhouses by 30-50 years.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Inundation Maps
Major Work Categories: IG
Planning Order Numbers: 5272077
Project Start Date: 2013
Project Completion Date: n.a.
Operative Date: n.a. This is expense.

Project Description

PG&E is responsible for completing dam breach inundation mapping required by the state of California as result of the 2017 Oroville Dam incident. The California State Legislature amended the water code (2017 SB92) requiring inundation maps for non-low hazard dams and associated critical appurtenant structures (CASs). Emergency regulations from the DSOD, effective October 19, 2017, provides criteria for maps and supporting technical studies.

The required work scope is to submit inundation mapping and supporting technical studies for all PG&E dams classified as extremely high, high, and significant hazard by DSOD and associated CASs. State criteria is different from FERC regulation and requires updates to meet criteria established by emergency regulations dated October 19, 2017. Funding is needed to complete inundation mapping and supporting technical studies for all PG&E dams classified by DSOD as extremely high hazard by January 2018, high hazard by January 2019 and significant hazard by January 2020. After that, funding is needed to support response to DSOD review and comments of inundation maps and supporting technical studies. In the 2020 GRC, it has been approved to be categorized as non earnings expense.

Justification

This is to comply with the state of California regulation for emergency preparedness with regard to the potential for loss of life and property resulting from the failure of a dam, or a CAS.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5272077	Inundation Maps	n.a.	n.a.	500	431	569	500	500	500	3,000

Benefits

Inundation map updates are needed to comply with state of California regulation.

Alternatives Considered

N/A. Must comply with DSOD regulations to remain in compliance with operating licenses.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: AM: Turbine / Runner Program

Major Work Categories: 2M

Planning Order Numbers: 5720588

Project Start Date: 2019

Project Completion Date: Various

Operative Date: September 2026*

* specific projects become operative individually starting with the dates given

Project Description

The Hydro turbine/runner program work focuses on aged and deteriorated equipment that is exhibiting lower generation efficiency and higher maintenance requirements due to out of date hydraulic design, older, weaker, and more corrosion prone material, and loss of the original hydraulic profile designed to produce maximum power with the least amount of water.

The program follows typical industry practice of renewing equipment when its continued operation is determined to be less reliable, less economical, or higher risk than new equipment would be. Problems associated with the wear of the turbine and its supporting equipment include more frequent repairs that cost more, less power output, increased leakage internally and externally, and greater probability of forced outages. Excessive wicket gate or nozzle leakage can and has resulted in problems stopping the turbines from spinning when shut down, requiring the closure of safety-oriented valves upstream. It also creates problems when attempting to synchronize to the grid as poor speed control makes it difficult to match the turbine/generator speed to the grid.

PG&E has been replacing this equipment over time in a manner that focused on the worst condition equipment and the equipment with the most potential for generating more power. The continuation of the practice will allow the upgraded hydro turbines to continue operating reliably and efficiently for another 40 years or more. Efficiency improvements that result from these replacements lower bearing loads, reduce destructive cavitation, and provide more hydropower to support the grid.

Justification

The Turbine / Runner program improves the overall system reliability and availability by renewing worn and degraded equipment that has reached or exceed its design life. The new equipment is better designed and made from better material than used when the original equipment was made.

As the turbine fleet has aged, erosion caused by hard particles of granite and other local rock types have combined with corrosion and cavitation to wear and damage the runners, wicket gates, and other equipment in the water passage. Wear rates increase over time as the smooth and carefully designed hydraulic profile is altered and degraded, creating discontinuities that cause flow disruptions that lead to increased rates of cavitation. To minimize the effects of these processes, extensive and costly weld repairs must be performed on a more frequent

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

basis. The downward quality cycle is exacerbated by the heat input of the welding that further distorts the shape of the runner. This damaging process is slowed greatly by procurement and installation of new equipment like runners, wicket gates, and facing plates. New parts are made of corrosion and cavitation resistant stainless steel, greatly increasing equipment life while reducing maintenance requirements to simple inspections and minor repairs and adjustments. Higher efficiency is gained by use of stronger material that allows thinner wicket gates and runners. This creates a smoother water path that is more efficient.

Runner and turbine equipment replacement lowers risk several ways. If allowed to degrade to the point of failure, runners, wicket gates, and supporting equipment would stop operating, and output would stop completely. Replacing the aged equipment in a planned outage allows the carefully planned and scheduled work to proceed in an efficient, cost-effective and timely manner. Because turbines are mostly custom made to suit the unique location each occupies, getting a replacement is a slow process, requiring from 12 to 18 months after contracting with a supplier. The unit would not generate power for up to 2 years, potentially requiring costly replacement power, and requiring more money to replace the equipment in an emergency situation.

This work is ongoing and programmatic with funding transferred to individual projects as needed.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Record ed	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5720588	AM: Turbine/Runner Replcmnt Prgm Capital	Sep-2026	n.a.	n.a.	n.a.	n.a.	n.a.	4,000	8,000	12,000

Benefits

This program will ensure that the Hydro generating facilitates continue to provide safe, economic, and reliable electricity.

Alternatives Considered

- As specific work is identified, alternatives are considered as part of the review and analysis process.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: AM: High Voltage Transformer Program

Major Work Categories: 2M

Planning Order Numbers: 5720600

Project Start Date: 2019

Project Completion Date: Various

Operative Date: Sep-2026*

* specific projects become operative individually starting with the dates given

Project Description

Hydro Generation's step-up High Voltage transformers program develops and monitors a comprehensive inventory of 225 transformers with a variety of sizes and configuration. The program has condition assessments in place to monitor the aging of the Generation Step-Up (GSU) transformer banks.

The HV transformer program prioritizes the need to replace obsolete transformers on a system-wide basis. The Program intends to replace transformer banks each year based on condition assessment and powerhouse priority.

Justification

Currently 53% of PG&E's hydro system transformers are under 50 years in operation, 36% are between 50 and 80 years, and 11% are over 80 years in service. Approximately 45% of the transformers are beyond their standard industry life expectancy. Spare parts are no longer readily available, and the transformers may not be capable of operating safely. Failure of the transformers may also result in forced outages. A catastrophic failure may have environmental, fire and life safety consequences.

The replacement projects will help: 1) optimize expenditure of capital funding; 2) forecast the probable failure of high-risk transformers and take appropriate actions prior to interruption of services, i.e. preventive maintenance or transformer replacement; 3) prevent outages; 4) ensure continuity of water operations and 5) reduce the likelihood of catastrophic failure and any resulting consequences. This Program will help to mitigate the risks associated with Transformers and Voltage Regulators.

The AM: High Voltage Transformer program was also forecast in the 2020 GRC. This work is ongoing and programmatic with funding transferred to individual projects as needed.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5720600	AM: HV Transformer Capital	Sep-2026	n.a.	n.a.	n.a.	n.a.	n.a.	4,000	8,000	12,000

Additional Cost Information

The estimates include engineering, procurement, manufacturing, disassembly, installations, testing, and PG&E's support organizations' cost. Several specific projects have already been identified, with some in-flight and others planned for future years outage plans. These are included in the forecast as separate individual projects. Funding from this program will be transferred to other not yet identified specific projects once condition data is gathered and risk assessments are completed.

Benefits

The following benefits are justified to prepare long term plan for transformer replacements:

- Reduce forced outages; while increasing powerhouse efficiency.
- Increase the reliability of continuity of water operations
- Reduces the economic impact of long lead procurement, manufacturing, and installation.
- Reduces the unexpected cost of emergency transformer replacement.

Alternatives Considered

As specific work is identified, alternatives are considered as part of the review and analysis process.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Dam Remediation – Capital

Major Work Categories: 2N

Planning Order Numbers: 5720633

Project Start Date: 2020

Project Completion Date: Various

Operative Date: September 2024*

* specific projects become operative individually starting with the dates given

Project Description

The Dam Safety Program is capital work that implements refurbishments and replacements to PG&E's Hydro dams and associated equipment as a result of issues identified and prioritized through on going analysis and inspections within the Facility Safety Program. This program includes dam modifications that are constructed to: mitigate unacceptable levels of leakage; strengthen abutments, foundations, embankments, and other dam structures to improve static and seismic stability; raise the height of the dam or increase spillway capacity to address increased potential flood levels; restore the functionality of existing radial gates, drum gates, and low level outlets; and to rebuild deteriorated spillways, outlets, and other dam structures. It can also include replacing or repairing damage to Hydro dams that occurs as a result of extreme events such as earthquakes, landslides, and floods. As specific dam modifications are identified, they will be budgeted as specific projects and removed from the Dam Safety Program forecast.

This program additionally addresses findings and mandates from FERC and DSOD. FERC and DSOD conduct inspections of PG&E dams and require PG&E to conduct formal dam safety reviews and studies to determine the condition of PG&E dams and to assess their suitability for continued safe and reliable operation. PG&E, under the purview of FERC and DSOD, prepares action plans and designs and implements the necessary remedial measures to mitigate the risk of failure. Dam remediation projects typically address a dam's performance under static, earthquake, and flood loading. The safe operation of PG&E's hydro dams depends on the successful completion of these studies, the acceptance of the results by the agencies, and the implementation of the remediation efforts.

Justification

The objective of this Program is to minimize the probability and consequences associated with catastrophic or unplanned failure of a dam by systematically mitigating identified dam safety and reliability risks. An in-service failure of a dam can have serious consequences to public and employee safety, third party property damage, collateral damage to Hydro facilities, and environmental damage. In addition, failure to properly maintain and upgrade dam facilities in accordance with FERC and DSOD requirements can lead to non-compliance notices, fines, and potential loss of the FERC license or water storage rights.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

The capital Dam Remediation program was also forecast in the 2020 GRC. This work is ongoing and programmatic with funding transferred to individual projects as needed.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5720633	Dam Remediation - Capital	Sep-2024	n.a.	n.a.	n.a.	n.a.	4,000	7,000	10,000	21,000

Benefits

The benefits of this program are to mitigate the safety and reliability risks noted above.

Alternatives Considered

This Program is for future work. When specific projects are identified, PG&E considers various alternatives to meet the project objectives.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Rock Creek License Condition - Water Temperature Control

Major Work Categories: 3H

Planning Order Numbers: 5700287

Project Start Date: 2002

Project Completion Date: 2024

Operative Date: December 2024

Project Description

Rock Creek is a two-unit, 119 MW powerhouse located on the North Fork Feather River. Cresta is a two-unit, 70 MW powerhouse located on the North Fork Feather River.

FERC issued a new license for Rock Creek-Cresta (RCC) Project FERC 1962 in 2001. The new license for the UNFFR Project, upstream of RCC, is pending. FERC requires the upper reaches of the Feather River to support a cold water fishery habitat. This cold water fishery habitat includes the Upper North Fork Feather River (UNFFR) and RCC reaches of the North Fork Feather River. This FERC mandated License condition for RCC requires PG&E to fund water temperature improvement measures which are yet to be determined and will be dependent on the conditions included in the new UNFFR license.

Justification

This project is required by FERC in a license condition for the Rock Creek-Cresta Project.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5700287	RCC LC: River Water Temp Control	Dec-2024	4,115	200	2,500	2,500	2,500	n.a.	n.a.	11,815

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Benefits

This project will enable PG&E to meet the licensing requirements and continue to operate the facilities under both the Rock Creek-Cresta and UNFFR FERC Licenses.

Alternatives Considered

- *Do Nothing* – Doing nothing would violate the current Rock Creek-Cresta FERC license and would likely violate the pending UNFFR FERC license.
- *Comply with Licenses* – The Rock Creek-Cresta FERC License requires PG&E to fund water temperature improvements. The specific water temperature improvement measures are yet to be determined and will be dependent on the conditions included in the new UNFFR FERC License.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Bucks Creek FERC 619 Relicensing and New License Conditions

Major Work Categories: IG, 3H

Planning Order Numbers: 5271616, 5779306

Project Start Date: 2013

Project Completion Date: Various

Operative Date:

P.O. 5271616 n.a. This is expense.

P.O. 5779306 December 2028

Project Description

Bucks Creek is a two-unit, 65 MW powerhouse located in the Bucks Creek and Upper North Fork Feather River watersheds. The Bucks Creek powerhouse has a normal operating capacity of 65 MW

This relicensing project is expected to result in the Company obtaining a new long-term Federal Energy Regulatory Commission (FERC) license for the Project and to provide safe and reliable electric generation to our customers in a responsible and environmentally sensitive manner. FERC's Integrated Licensing Process is being used to obtain a new 40 to 50-year operating license. FERC's procedural schedule is forecast to continue beyond the current license expiration date. The Project will operate after that time under annual licenses until a new license is issued by FERC consistent with completion of both federal and state-level environmental review processes. The forecast cost includes the work necessary to complete the relicensing process and to implement the anticipated license conditions in the new license. Ongoing relicensing work includes preparations for license acceptance and implementation.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

New FERC license conditions are uncertain until the new license order has been issued by FERC; however the licensee's cost forecasts (capital and expense) for compliance with anticipated new license requirements are based on engagement with regulatory agencies and stakeholders during the relicensing proceeding, various environmental reviews (NEPA and

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

CEQA) and regulatory processes and intermediate steps. Cost estimates to implement new license requirements are refined by the licensee throughout the relicensing process based on growing availability of information as the regulatory proceeding matures. Due to many layers of regulatory processes, the schedule for FERC's issuance of a New License can be uncertain and subject to regulatory and agency activities beyond the licensee's control.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5271616	Bucks Creek Relicensing - Expense LC	Jul-2021	n.a.	n.a.	807	1,306	1,212	1,396	1,435	6,156
5779306	Bucks Creek Relicensing - Capital LC	Dec-2028	n.a.	n.a.	321	1,272	979	598	3,866	7,036

Benefits

The benefits of this project include a new FERC license that will authorize the continued operation of the Bucks Creek powerhouse by 30-50 years.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Salmon Habitat Expansion Agreement

Major Work Categories: 3H

Planning Order Numbers: 5781662, 5793127

Project Start Date: 2009

Project Completion Date: 2024

Operative Date:

P.O. 5781662 December 2022

P.O. 5793127 December 2023

Project Description

Effective November 20, 2007, PG&E entered into the “Habitat Expansion Agreement For Central Valley Spring-Run Chinook Salmon and California Central Valley Steelhead” (HEA) with the following parties: American Rivers, Arthur G Baggett, Jr, California Department of Fish and Game, California Department of Water Resources (DWR), State Water Contractors, Inc., US Department of Agriculture Forest Service, US Department of Commerce National Marine Fisheries Service (NMFS), and the US Fish and Wildlife Service. Under the agreement, PG&E and DWR had to jointly identify, evaluate, and select proposed actions to expand spawning, rearing, and adult holding habitat for Spring-Run and Steelhead in the Sacramento River Basin. Once selected by PG&E and DWR, the proposed actions have to be approved by NMFS with input from the other parties, and then PG&E and DWR will implement the approved actions.

PG&E and DWR submitted a Final Habitat Expansion Plan in November 2009 for NMFS review and approval which has yet to be received and is required before implementation of the plan can occur.

Justification

The HEA is a collaborative effort by PG&E and DWR. The specific goal of the HEA is to expand spawning habitat sufficiently to accommodate a net increase of 2,000 to 3,000 spring-run Chinook salmon, a threatened and endangered species. The HEA was negotiated to provide an alternative to NMFS’ exercising its Section 18 mandatory conditioning authority for fish passage under the Federal Power Act in the ongoing FERC relicensing proceedings for DWR’s Oroville Facilities and PG&E’s Upper North Fork Feather River Project and Poe Project, all of which are located in the Feather River sub-basin of the Sacramento River basin. NMFS had prescribed a trap-and-transport program for spring-run Chinook salmon for DWR’s and PG&E’s facilities. PG&E and DWR pursued the HEA alternative due to concerns over the high estimated cost of the trap-and-transport program and its low potential for success.

This project is necessary for compliance with The Habitat Expansion Agreement For Central Valley Spring-Run Chinook Salmon and California Central Valley Steelhead.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Cost

The cost assumptions for this project are based on the professional judgment of the engineers and licensing professional familiar with this type of work.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5781662	Salmon HEA Implement - PoeLC	Dec-2022	n.a.	n.a.	2,400	1,400	n.a.	n.a.	n.a.	3,800
5793127	Salmon HEA Implement – UNFFR LC	Dec-2023	n.a.	n.a.	7,000	4,300	n.a.	n.a.	n.a.	11,300

Benefits

The benefit of this project is a lower customer cost to relicense and meet the expected new license conditions for PG&E's Upper North Fork Feather River and Poe Projects.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Kerckhoff 1 and 2 Relicensing

Major Work Categories: 3H

Planning Order Numbers: 5760695

Project Start Date: 2017

Project Completion Date: 2026

Operative Date: November 2022

Project Description

The Kerckhoff Project includes two powerhouses located on the San Joaquin Rivers in Central California. The Kerckhoff powerhouses have a combined normal operating capacity of 180.4 MW.

The current Project license expires in 2022. This relicensing project is expected to result in the Company obtaining a new long-term Federal Energy Regulatory Commission (FERC) license for the Project, which will allow PG&E to continue to provide safe and reliable electric generation to our customers in a responsible and environmentally-sensitive manner. FERC's Integrated Licensing Process is being used to obtain a new 40 to 50-year operating license. FERC's procedural schedule is forecast to continue beyond the current license expiration date. The Project will operate after that time under annual licenses until a new license is issued by FERC consistent with completion of both federal and state environmental review processes.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5760695	Kerckhoff 1 and 2 Relicensing	Nov-2022	11,883	3,150	1,800	600	800	800	600	19,633

Benefits

The benefit of this project is to obtain new FERC license for the Kerckhoff #1 and #2 FERC Project.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Phoenix FERC 1061 Relicensing

Major Work Categories: 3HPlanning Order Numbers: 5760704, 5793129

Project Start Date: 2017

Project Completion Date: 2024

Operative Date:

P.O 5760704 August 2022

P.O. 5793129 December 2029

Project Description

Phoenix is a one-unit powerhouse located in the Southfork Stanislaus River watersheds. The Phoenix powerhouse has a normal operating capacity of 2 MW. The current Project license expires in 2022. This relicensing project is expected to result in the Company obtaining a new long-term Federal Energy Regulatory Commission (FERC) license for the Project in order to continue providing safe and reliable electric generation to PG&E's customers in a responsible and environmentally-sensitive manner. FERC's Traditional Licensing Process is being used to obtain a new 40 to 50-year operating license. FERC's procedural schedule is forecast to continue beyond the current license expiration date. The Project will operate after that time under annual licenses until a new license is issued by FERC consistent with completion of both federal and state-level environmental review processes.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5760704	Phoenix Relicensing	Aug-2022	6,592	1,334	1,084	819	629	n.a.	n.a.	10,458
5793129	Phoenix Relicensing – Capital LC	Dec-2029	n.a.	n.a.	n.a.	n.a.	n.a.	1,530	1,572	3,102

Benefits

The benefits of this project include a new FERC license extending the operational life of the Phoenix powerhouse by 30-50 years.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Balch 1 and 2 Relicensing

Major Work Categories: 3H

Planning Order Numbers: 5767854

Project Start Date: 2020

Project Completion Date: 2026

Operative Date: April 2026

Project Description

The Balch #1 & #2 Project includes two powerhouses located in the Kings River Watershed in Central California. The Balch #1 & #2 powerhouses have a combined normal operating capacity of 139 MW.

The current Project license expires in 2026. This relicensing project is expected to result in the Company obtaining a new long-term Federal Energy Regulatory Commission (FERC) license for the Project, which will allow PG&E to continue to provide safe and reliable electric generation to our customers in a responsible and environmentally-sensitive manner. FERC's Integrated Licensing Process is the default process to obtain a new 40 to 50-year operating license.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5767854	Balch 1 & 2 Relicensing	Apr-2026	286	1,600	4,400	4,500	2,300	2,100	950	16,136

Benefits

The benefit of this project is to obtain new FERC license for the Balch #1 & #2 FERC Project.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Helms Relicensing
Major Work Categories: 3H
Planning Order Numbers: 5779438
Project Start Date: 2020
Project Completion Date: 2026
Operative Date: April 2026

Project Description

The Helms Pumped Storage Project FERC 2735 is a three-unit pumped storage powerhouse located in the Kings River watershed. The Helms powerhouse has a normal operating capacity of 1212 MW.

The current Project license expires in 2026. This relicensing project is expected to result in the Company obtaining a new long-term Federal Energy Regulatory Commission (FERC) license for the Project, which will allow PG&E to continue to provide safe and reliable electric generation to our customers in a responsible and environmentally-sensitive manner. FERC's Integrated Licensing Process is the default process to obtain a new 40 to 50-year operating license.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5779438	Helms Relicensing FERC #2735	Apr-2026	319	1,400	4,900	5,100	2,300	2,800	1,900	18,719

Benefits

The benefit of this project is to obtain new FERC license for the Helms Pumped Storage FERC Project.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Drum-Spaulding FERC 2310 License Conditions

Major Work Categories: IG, 3H

Planning Order Numbers: 5215606, 5720508

Project Start Date: 2008

Project Completion Date: 2027

Operative Date:

PO 5215606 n.a. This is expense

5720508 December 2026.

Project Description

The Drum-Spaulding (DS) Project includes 12 powerhouses located in the Bear and Yuba River watersheds. The twelve DS Project powerhouses have a combined normal operating capacity of 189.1 MW.

The long-term FERC license 2310 authorizing the operation of the DS Project expired in 2013. FERC has issued annual licenses since then, and will continue to do so provided the Company continues to relicense the Project. PG&E has been in the relicensing process since 2008. The forecast cost includes the work necessary to continue the relicensing process. PG&E's FERC relicensing application and amendments filed in 2011 through 2013 proposed that the Project be separated into three licenses. FERC issued the Final Environmental Impact Statement (FEIS) for relicensing the projects on December 19, 2014. Ongoing relicensing work includes support for FERC's ESA Section 7 processes, acquisition of a Water Quality Certificate from the State Water Resources Control Board (SWRCB), and preparations for license acceptance and implementation.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

The Drum-Spaulding FERC 2310 relicensing work was also forecast in the 20207 GRC. Relicensing work has begun, but the projects have later operating dates because the expected license issuance date is now April 2023. A licensee cannot always accurately forecast the scope

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

and costs of license implementation because the measures that will be required are not known in advance and often take years of study of potential impacts before new operating conditions can be specified. This is why PG&E has requested and the Commission has approved that this work be subject to balancing account treatment.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Record ed	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5215606	Drum Spaulding – Expense LC	n.a.	n.a.	n.a.	n.a.	1,463	2,849	4,966	7,049	16,327
5719538	Drum Spaulding – Capital LC	Dec-2026	n.a.	n.a.	n.a.	18,057	16,920	17,758	9,196	61,932

Benefits

The benefits of this project include a new FERC license extending the operational life of the Spaulding #1, Spaulding #2, Spaulding #3, Drum #1, Drum #2, Alta, Dutch Flat, Halsey, Wise, Wise #2, Deer Creek, and New Castle powerhouses by 30-50 years.

Alternatives Considered

N/A. Must comply with relicensing

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Powerhouse Automation

Major Work Categories: 2M

Planning Order Numbers: 5792878

Project Start Date: 2020

Project Completion Date: n.a.

Operative Date: n.a.*

* specific projects become operative individually starting in 2021

Project Description

The Powerhouse Automation Program will provide an automation/control platform that is simple and easy for operators to use. Standards will be developed to upgrade Remote Terminal Units (RTUs) with Programmable Logic Controllers (PLCs). This improves data acquisition from increasing instrumentation and provides the foundation for automated control. The level of control will be dependent on the ability to add controllers to currently manual devices and increase instrumentation.

Cresta Powerhouse (PH) has been selected as the pilot PH to be automated to the new Power Generation Automation standards.

Justification

PG&E Power Generation – Hydro is preparing to make a digital transition of its powerhouse automation infrastructure. An Automation Program has been established to develop baseline standards, baseline specifications, system requirements, and templates for use in subsequent phases by operations and project teams. The new system is to be designed to improve operational reliability and visibility, increase system availability, provide data for predictive maintenance and analytics, and enhance operational safety.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5792878	Scada Powerhouse Automation	n.a.	n.a.	4,000	4,000	7,000	7,000	7,000	7,000	36,000

Benefits

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Increasing the level of automation and data collection will allow for remote troubleshooting and will decrease miles driven by O&M and support staff, improving operational safety. Moving toward a predictive maintenance model will improve reliability and availability to the benefit of customers.

Alternatives Considered

N/A. This is not a project with alternatives.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Decommissioning Study Program

Major Work Categories: AB

Planning Order Numbers: 5261153

Project Start Date: n.a.

Project Completion Date: n.a.

Operative Date: n.a. This is expense.

Project Description

The Decommissioning Study Program project is looking to develop a standard approach for estimating the potential decommissioning scope and costs for UOG assets. The information generated by the process will inform policy and strategic planning decisions, stakeholder and agency engagement, and regulatory filings. The primary deliverables associated with the program are project-specific decommissioning studies and a cost model with unit costs based on PG&E studies, as well as industry benchmark data.

Justification

In the 2020 General Rate Case (GRC), The California Public Utilities Commission (CPUC) authorized PG&E to begin accruing \$16M per year in a decommissioning reserve for its Utility Owned Generation (UOG) assets not currently supported by a decommissioning fund¹. The CPUC also approved the expenditure of \$1M in 2020 to refine the decommissioning estimates that would be presented in future rate cases by conducting more detailed decommissioning studies. To accomplish this, Generation Asset Strategy is establishing a Decommissioning Study Process.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

¹ Includes \$10 million per year for hydroelectric assets and \$6 million per year for solar and fuel cell facilities.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5261153	Powerhouse Decommissioning Studies	n.a.	n.a.	500	500	500	500	500	500	3,000

Benefits

Utilizing identified projects to inform development of a standardized and robust process to estimate future decommissioning costs for various decommissioning scenarios for each utility-owned hydroelectric generation project in PG&E's Power Generation's portfolio. PG&E's strategic planning efforts, as well as stakeholder and agency outreach, will be strengthened by having a standard process in place.

Alternatives Considered

N/A

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Data Governance
Major Work Categories: AB
Planning Order Numbers: 5272412
Project Start Date: 2022
Project Completion Date: n.a.
Operative Date: n.a. This is expense.

Project Description

Implement Enterprise Data Management (EDM) governance requirements per enterprise data management standards, beginning with GOV-9001S, Enterprise Critical Data Management Asset Identification and Ownership Standard. This project includes new and/or expanded data aggregation and data management software tools that are needed to support the EDM requirements. To manage the PGEN data governance effort, a fulltime Principal Data Steward position will be staffed to lead the creation of implementing data governance procedures, close asset information gaps identified during implementation and support the ongoing ISO 55000 Asset Information improvement process.

Justification

Along with the PG&E-wide EDM governance initiative, PGEN has also made a commitment coming out of bankruptcy to obtain ISO 55001, Asset Management – Management Systems, certification for our dams, hydro generation, fossil, solar and physical data assets. These commitments require additional focus on data management and data resources to better understand the risks associated with the condition of our assets. Specific gaps to be closed include, updating asset inventories in our system of record (SAP), digitizing hard copy records, managing our Asset Information asset management plan and developing data governance implementing procedures.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work. Initial forecasted cost includes additional personnel (permanent and temporary supplemental), annual software licensing/services fees and future software implementation.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5272412	Data Governance	n.a.	n.a.	0	2,800	2,800	2,800	2,800	2,800	14,000

Benefits

Strong data management and data governance leads to better understanding of our assets, more predictability and better risk-informed data-driven decision making. Risk-informed data-driven decision making is foundational to achieving ISO-55001 certification. Ancillary benefits include ease of knowledge transfer and information sharing with well-organized complete and accurate data for business decisions.

Alternatives Considered

EDM and ISO 55000 requirements do not permit status quo as an alternative. Several higher cost software solutions alternatives are being evaluated at the Enterprise level. The resources and effort to manage our data as an asset will require funding regardless of the software solution that is ultimately picked.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: ISO 55000
Major Work Categories: IG
Planning Order Numbers: 5269273
Project Start Date: 2020
Project Completion Date: n.a.
Operative Date: n.a. This is expense.

Project Description

This project will establish the Power Generation Asset Excellence program to meet the strategic objectives and policies of the Enterprise and Generation organization within the ISO 55000 framework.

Justification

In the 2020 GRC settlement, A.18-12-009, section 2.2.4 (Safety Management System Framework for Hydroelectric Facilities), PG&E committed to making a good faith effort to attain an ISO 55000 certification from an accredited organization for its “dams” (it’s hydroelectric generation facilities) by the end of 2022. Additionally, PG&E is committed to sustaining its certification status. This project will fulfill these commitments.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5269273	ISO 55000	n.a.	n.a.	1,943	2000	450	450	450	450	5,743

Benefits

The asset management policies are expected to deliver operational benefits through an intentionally designed asset management system. Additionally, a certification and sustainability plan under ISO 55001 will provide assurance to our regulators and other external stakeholders that Power Generation is realizing value from our assets by managing risk and opportunity, in order to achieve the desired balance of cost, risk and performance.

Alternatives Considered

N/A – the commitment has no alternative.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: AM Exciter Program Capital

Major Work Categories: 2M

Planning Order Numbers: 5760607

Project Start Date: 2025

Project Completion Date: Various

Operative Date: Sep-2026*

* specific projects become operative individually starting with the dates given

Project Description

Hydro Generation's Exciter program develops and monitors a comprehensive inventory of 100 exciters of various sizes and configurations.

The Exciter program prioritizes the need to replace obsolete exciters on a system-wide basis. The Program intends to replace exciters based on age, condition and powerhouse priority.

Justification

Currently 50% of PG&E's hydro system exciters are under 20 years in operation, 10% are between 20 and 40 years, and 40% are over 40 years in service. Approximately 46% of the exciters are beyond their standard industry life expectancy. Spare parts for exciters more than are increasingly unavailable. Failure of the exciters may result in extended forced outages.

The replacement projects will help: 1) optimize expenditure of capital funding; 2) forecast the probable failure of exciters and take appropriate actions prior to interruption of services, i.e. preventive maintenance or exciter replacement; 3) prevent outages; 4) ensure continuity of water operations and 5) reduce the likelihood of catastrophic failure and any resulting consequences. This Program will help to mitigate the risks associated with Excitation Systems.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates

(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5760607	AM: Exciter Program Capital	Sep-2026	0	0	0	0	0	1,623	2,000	3,623

Additional Cost Information

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

The estimates include engineering, procurement, manufacturing, disassembly, installations, testing, and PG&E's support organizations' cost. Several specific projects have already been identified, with some in-flight and others planned for future years outage plans. These are included in the forecast as separate individual projects. Funding from this program will be transferred to other not yet identified specific projects once condition data is gathered and risk assessments are completed.

Benefits

The following benefits are justified to prepare long term plan for exciter replacements:

- Reduce forced outages; while increasing powerhouse efficiency.
- Increase the reliability of continuity of water operations
- Reduces the economic impact of long lead procurement, manufacturing, and installation.
- Reduces the unexpected cost of emergency exciter replacement.

Alternatives Considered

As specific work is identified, alternatives are considered as part of the review and analysis process.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Public Safety Early Warning System– Capital

Major Work Categories: 2L

Planning Order Numbers: 5792879

Project Start Date: 2021

Project Completion Date: n.a.*

Operative Date: December 2022

* specific projects become operative individually starting 2022

Project Description

In accordance with FERC Ch 6 engineering guidelines, in 2019 PG&E performed Sudden Failure Assessments (SFAs) for time sensitive dams. The goal of performing SFA's is to determine if the dam is time sensitive, meaning that in the event of a dam failure, the time it takes to detect, verify, notify and evacuate the public is greater than the time of arrival of a flood wave to a location of significant impact.

2019 SFA Overview

Time to Impact: PG&E re-examined all updated Emergency Action Plans (EAPs) and inundation maps to confirm the first significant impact and the time to impact for all previously approved SFAs. Previous SFAs used a mix of time of arrival and time to peak inundation data. In 2019, the SFAs were standardized to include only time of arrival for sunny day inundation.

Detection/Verification/Notification Time: PG&E EAPs, Emergency Operating Plans, and Combined Dam Safety Surveillance and Monitoring Plans and Reports were reviewed and summarized for Operations and Maintenance (O&M) Staff. O&M staff reviewed the previous detection, verification, and notification times and descriptions along with the plan summaries to determine if updated language or times were needed. Several updates were implemented. In addition, detection times for dams with remote terminal units were changed to 15 minutes at every location to more accurately reflect the existing PG&E system. Notification times were also standardized to 10 minutes to reflect recent phone drill results.

Emergency Management Agencies (EMA) Response Time: PG&E sent an electronic survey to all County Office of Emergency Services and Sheriff's offices and National Weather Service to request updated information on response methods, timing, and recommendations for improvements. Many jurisdictions have recently implemented large scale electronic notification systems and the National Weather Service can provide rapid notification via the Emergency Alert System (EAS) and the Wireless Emergency Alert (WEA) System. In addition, EMA response times were adjusted to reflect the time it would take to warn the first significant impact downstream instead of the time it would take to evacuate the first significant impact downstream. Many of the first impacts are in rural areas where evacuations by County officials would take hours to days and County officials recommended residents be given information directly for self-evacuation.

Results: The updated SFA's resulted in reduced excess response times in 26 of the 33 PG&E dams with approved SFAs. Seven dams with approved SFAs have increased excess response times in 2019. Two dams with approved SFAs no longer have excess response times.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Resulting Project Work: If an EAP dam is determined to be Time Sensitive, FERC Ch 6 guidelines state the licensee should develop a plan and schedule for implementing measures to improve the excess response time calculated by the Sudden Failure Assessment.

The table below shows the plan and schedule that PG&E developed to reduce excess response time for time sensitive dams:

Justification

In accordance with FERC CH 6 engineering guidelines, If an EAP is Time Sensitive, the licensee should develop a plan and schedule for implementing measures to improve the excess response time calculated by the Sudden Failure Assessment.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5792879	Public Safety Early Warning System	n.a.	n.a.	735	2,000	2,000	2,000	2,000	2,000	10,035

Benefits

With the implementation of this work, in the event of a dam failure there is a higher probability the public will be warned/evacuated prior to arrival of a flood wave.

Alternatives Considered

Speeding up the detection, verification, notification times were considered. However, for the sites where capital project work is identified, the excess response time still exists and could not be overcome by speeding up those variables. As a result, early warning technologies, such as sirens are needed to warn the public in a timely manner.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Caribou 1 & 2 Powerhouse Reliability Projects

Major Work Categories: 2M

Planning Order Numbers: 5720659, 5734298, 5767980, 5788238, 5720656, 5720657, 5720725, 5720726, 5720727

Project Start Date: Various

Project Completion Date: Various

Operative Date: Various, see table below

Project Description

The Caribou 1 & 2 Powerhouses are part of the Upper North Fork Feather River (UNFFR) Project FERC License 2105 and located on the North Fork of the Feather River. Caribou 1 has three turbine-generator units and produces an average of approximately 148 GWh of electricity per year. Caribou 2 Powerhouse has two turbine-generator units with a normal operating capacity of 60 MW per unit. This group of projects consists of turbine, shaft, and bearing replacements, generator rewinds, transformer bank replacement, and governor control upgrades.

Justification

These projects will improve the reliability of the Caribou 1 & 2 Powerhouse units. It is no longer feasible to make temporary repairs to these components since they have reached the end of their useful lives.

The current Caribou 1 turbines contain the original 1920-vintage runners which are made of cast steel and require extensive welding repairs to keep the units in acceptable operating condition. After decades of performing welding repairs, the runners' profiles have degraded resulting in reduced performance of the turbines. These projects were forecast in the 2020 GRC filing, but were rescheduled due to delays in upgrading the gantry crane to support the work.

Caribou 1 Generation Step Up Transformer Bank 8 has been in service since 1957 and inspections show signs of significant degradation. Caribou Bank 8 is a critical component for transmission along the 60kV Caribou-Westwood line, especially during island situations when the 230kV line is not in service (Public Safety Power Shutoffs and other general line outages). Replacement is necessary to ensure safe, reliable service to PG&E customers.

Caribou 1 Powerhouse Unit 1 was last rewound in 1960 and the windings have a history of failure after extended service and operation, putting the reliability of the generators at risk. Additionally, the stator core iron is original to the unit and has exceeded its useful life. Caribou 1 Unit 2 generator was last rewound in the 1960s as well, and PDA testing indicates that the windings are in poor condition and trending toward failure. Asset Management's Generator and Stator Program identified Caribou 2 Unit 5 as having a high risk of generator winding failure. Age of generator, date of last rewind and class of insulation suggests that the windings may be approaching the end of their useful life. The unit was last rewound in 1979.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

The existing electronic governor controls for Caribou 1 Unit 1 & Unit 2 were supplied by the GEC Alstom Company in 1995. Spare parts are no longer available and service for the electronic components is difficult to obtain. The current scope of work is to eliminate the obsolete electronic governor controls and replace them with PLC based governor controls supplied by a hydroelectric generation governor manufacturer with standard application software.

Cost

The cost assumptions for these projects are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5720656	Caribou 1 PH Rewind U1	Oct-2021	3,002	5,300	n.a	n.a	n.a	n.a	n.a	8,302
5720657	Caribou 1 PH Rewind U2	Oct-2025	2,039	89	93	98	1,250	5,000	n.a	8,569
5720659	Caribou 2-5 Rewind	Feb-2023	879	900	3,275	2,984	n.a	n.a	n.a	8,038
5720725	Caribou 1 U1 Repl Runners-Bearings-Shaft	Oct-2021	8,451	5,000	n.a	n.a	n.a	n.a	n.a	13,451
5720726	Caribou 1 U2 Repl Runners-Bearing-Shaft	Oct-2025	3,677	122	128	2,135	3,000	2,500	n.a	11,562
5720727	Caribou 1 U3 Repl Rnnr, Brng, Shft & Ndl	Oct-2026	n.a	n.a	n.a	n.a	n.a	3,001	1,935	4,935
5734298	Caribou 1 PH Upg U2 Governor Controls	Jul-2025	134	6	7	7	750	2,150	n.a	3,054
5767980	Caribou 1 U1 Upgrade Gov Controls	Nov-2021	1,096	2,500	n.a	n.a	n.a	n.a	n.a	3,596
5788238	Caribou 1 Replace Bank 8A-B-C-SP	Aug-2022	135	2,324	2,000	n.a	n.a	n.a	n.a	4,459

Benefits

Performing this work along with additional minor work during the planned outages will increase the reliability and availability of the units.

Alternatives Considered

- Status Quo – Do nothing. This alternative assumes that no action is taken other than minimal maintenance until unplanned turbine, governor, or generator failure. A very long forced outage would occur until new components could be fabricated and installed resulting in additional costs for expedited work and replacement power.
- Complete Reliability Projects – This is the recommended alternative.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

- Reschedule One Year – This alternative assumes the projects are rescheduled one year. This alternative ultimately has the same long-term benefits as the recommended alternative; however, in the short-term, this alternative is not recommended for the same reasons discussed in status quo.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Cresta Powerhouse Reliability Projects

Major Work Categories: 2M

Planning Order Numbers: 5760655, 5720663, 5760650, 5781162, 5778266

Project Start Date: Various

Project Completion Date: Various

Operative Date: Various – see table below

Project Description

Cresta is a two-unit, 70 MW powerhouse located on the Feather River. The Cresta powerhouse produces an average of approximately 328 GWh of electricity per year. Unit 1 was commissioned on November 23, 1949 and Unit 2 was commissioned on January 15, 1950. Units 1 & 2 are similar having Pelton vertical Francis type turbines and General Electric generators. Unit 1 generator was last rewound in 2006.

This group of projects consists of upgrading the powerhouse gantry crane to support the generator rewinds and wicket gate replacements; rewinding the Unit 2 generator and installing temperature and vibration monitoring equipment; replacing the wickets, facing plates for Units 1 and 2; and refurbishing the Cresta Tunnel liner.

Justification

These projects will improve the reliability of the Cresta units. It is no longer feasible to make temporary repairs to these components since they have reached the end of their useful lives.

Reliable and safe operation of the powerhouse crane will be critical in these upcoming complex projects. The crane replacement project will serve to modernize the crane to include modern technology and meet current safety standards.

Unit 2 was last rewound in the early 1980s. Failure of a generator coil could result in a lengthy and costly forced outage to repair or replace. Wicket gates and facing plates are over 65 years old and have been subjected to deterioration due to age and the various debris that travels through the system. If the wicket gates were to fail, the unit would likely be forced into an extended outage while replacements were designed, fabricated, delivered and installed. Refurbishment of the tunnel liner is required to ensure safe and reliable operation of the powerhouse.

Some of these projects were forecast in the 2020 GRC. Due to concerns with the logistics of performing all of the planned work during one extended outage, some of the projects were rescheduled to future years to allow for additional planning to support efficient execution.

Cost

The cost assumptions for these projects are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5720663	Cresta U2 Replace Wickets & FPs	Apr-2023	83	1,000	4,000	2,000	n.a.	n.a.	n.a.	7,083
5760650	Cresta PH Crane Upgrade	May-2022	344	1,000	3,898	n.a.	n.a.	n.a.	n.a.	5,242
5760655	Cresta U1 Replace Wicket Gates & FPs	Feb-2026	430	33	20	21	1,000	4,000	2,000	7,504
5778266	Cresta Tunnel Refurbish Liner	Apr-2026	26	n.a.	n.a.	n.a.	50	2,215	825	3,116
5781162	Cresta PH U2 Rewind	Apr-2023	909	976	2,580	3,323	n.a.	n.a.	n.a.	7,788

Benefits

Performing this work along with additional minor work during the planned outages will increase the reliability and availability of the units.

Alternatives Considered

- **Status Quo** – Do Nothing. This alternative assumes that no action is taken other than minimal maintenance until unplanned failure. A very long forced outage would occur until new components could be fabricated and installed resulting in additional costs for expedited work and replacement power.
- **Complete Reliability Projects** – This is the recommended alternative.
- **Reschedule One Year** – This alternative assumes the project is rescheduled one year. This alternative ultimately has the same long-term benefits as the recommended alternative; however, in the short-term, this alternative is not recommended for the same reasons discussed in status quo.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Poe Powerhouse Reliability Projects

Major Work Categories: 2M

Planning Order Numbers: 5779526, 5788247

Project Start Date: 2023

Project Completion Date: 2027

Operative Date:

P.O. 5779526 November 2026

P.O. 5788247 February 2027

Project Description

Poe is a two-unit, 120 MW powerhouse located on the North Fork Feather River. The Poe powerhouse produces an average of about 554 GWh of electricity per year.

These projects will improve the reliability of the Poe Powerhouse GSU Transformer. Scope of work includes replacement of existing with 86 MVA transformer banks and associated supporting components as necessary (e.g., control cabinet) Concrete base, Grounding modifications, ISO phase bus duct and all of its components, raceway conduits & wiring, bushings, protection and control components, “real-time” monitoring system, and Dissolved Gas Analyzer (DGA) monitoring system.

Justification

It is no longer feasible to make temporary repairs to these components since they have reached the end of their useful lives. Poe Transformer is a 3-phase transformer that has been in service since 1965. Spares are not readily available and refurbishment is not feasible due to age and elevated gas levels as shown in oil analysis. A failure of the transformer could result in an extended forced outage while replacements were designed, fabricated delivered and installed.

Cost

The cost assumptions for these projects are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5779526	Poe PH Replace GSU Transformer Bank 1	November 2026	n.a	n.a	n.a	100	1,500	2,000	1,000	4,600
5788247	Poe PH Replace GSU Transformer Bank 2	February 2027	n.a	n.a	n.a	n.a	100	1,500	2,000	3,600

Benefits

Performing this work along with additional minor work during the planned outage will increase the reliability and availability of the transformer.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo – Do Nothing. This alternative assumes that no action is taken other than minimal maintenance. This is not considered a viable alternative due to high likelihood of failure and the extensive generation loss associated with a lengthy forced outage.
- Reschedule One Year – This alternative assumes the project is rescheduled one year. This alternative ultimately has the same long-term benefits as the recommended alternative; however, in the short-term, this alternative is not recommended for the same reasons discussed in status quo.
- Repair – Not feasible due to age and elevated gas levels as shown in transformer oil analysis.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Bucks Creek Powerhouse Reliability Projects

Major Work Categories: 5747177, 5760038, 5766253

Planning Order Numbers: 2M

Project Start Date: Various

Project Completion Date: Various

Operative Date:

P.O.	5747177	June 2021
P.O.	5760038	April 2021
P.O.	5766253	January 2021

Project Description

Bucks Creek is a 2-unit, 65 MW powerhouse located on the Feather River. The Bucks Creek powerhouse produces an average of approximately 224 GWh of electricity per year.

This project is to rewind the generators, refurbish field poles, and replace stator core iron for Units 1 & 2; replace the turbine shaft and bearings for Unit 2.

Justification

These projects will improve the reliability of the Bucks Creek Powerhouse units. It is no longer feasible to make temporary repairs to these components since they have reached the end of their useful lives.

Replacement of the shaft and bearings is necessary to remove the operating restriction on Unit 2.

The Unit 1 generator coils were last rewound in 1989. The Unit 2 generator coils were last rewound in 1990. Recent megger readings and pole drop tests indicate winding deterioration and failure is expected within 3 years.

Some of these projects were forecast in the 2020 GRC. Bucks outage rescheduled to 2020 to align with drawing down the water at Lower Bucks for the liner project. Extension of the outage into 2021 was due to crane as found conditions requiring replacement of bridge wheels; rewind as found conditions on both units (stator key bar repairs), and rotor repairs required on Unit 2.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5747177	Bucks Cr PH Repl U2 Turb Brg / Shaft	June 2021	8,514	600	n.a	n.a	n.a	n.a	n.a	9,115
5760038	Bucks Creek U2 Generator Rewind	April 2021	6,375	2,000	n.a	n.a	n.a	n.a	n.a	8,375
5766253	Bucks Creek U1 Generator Stator Rewind	Jan 2021	7,937	44						7,981

Benefits

Performing this work along with additional minor work during the planned outage will increase the reliability and availability of the unit.

Alternatives Considered

- Status Quo – This alternative assumes that the generator fails in service. A failure of the generator would result in a prolonged forced outage (minimum 2 years) and higher repair costs than the recommended alternative.
- Complete Reliability Projects – This is the recommended alternative.
- Reschedule One Year – Delaying the project is not recommended for the same reason the status quo is not recommended.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Lower Bucks Dam Resurface DS Face

Major Work Categories: 2L

Planning Order Numbers: 5783541

Project Start Date: 2019

Project Completion Date: 2024

Operative Date: Various – October 2023

Project Description

The Bucks Diversion Dam (also known as Lower Bucks Diversion Dam and Lower Bucks Dam) is a part of the Bucks Creek Hydroelectric Project in the northern Sierra Nevada Mountains in Plumas County, California (FERC Project No. 619-CA). The dam is under the jurisdiction of the Federal Energy Regulatory Commission (FERC) and the California Division of Safety of Dams (DSOD), and is a “high hazard” dam (Dam No. 94-000). The dam is a slender, concrete arch dam, with a substantial right-abutment thrust block and a left-abutment thrust block that also serves as the service spillway.

PG&E performed a condition assessment of the dam from 2015-2018. The results of the condition assessment were that the spalling and delamination of the concrete on the downstream face is caused by seepage through the dam and the freeze-thaw process over the winter seasons. To mitigate seepage driven by freeze-thaw conditions and extend the life of the dam, it is recommended to install a geomembrane liner on the upstream face, and resurface the downstream face of the dam.

Justification

Failure to repair in a timely manner could result in an order to shut down or restrict use of the dam. A failure could result in severe damage to life and property downstream, as well as have an extensive impact to reliability.

This project was forecast in the 2020 GRC. The scope increased, and the project was rescheduled into 2 phases: installing a geomembrane liner on the upstream face in 2020 (Phase 1); and resurfacing the downstream face in 2023 (Phase2).

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5783541	Lower Bucks Dam Resurface DS Face	October 2023	321	300	400	9,000	9,000	n.a.	n.a.	19,021

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Benefits

Performing this work will return the Lower Bucks Dam to reliable and safe operating condition.

Alternatives Considered

- Status quo – Do Nothing. The Status Quo is not recommended because failure to repair in a timely manner could result in a FERC order to shutdown or restrict use of the dam. A failure could result in severe damage to life and property downstream, as well as have an extensive impact to reliability.
- Single Phase Upstream Liner Install – Recommended
- Two Phase Upstream Liner Install – This alternative is not recommended due to the two-year approach.
- Two-Phase Upstream Liner Install with Wet Dredge - This alternative is not recommended due to the two-year approach.
- Remove & Replace-in-Kind Downstream Facing – Alternative selection pending completion of structural analysis.
- Install Reinforced Cast-In-Place Concrete Downstream Facing – Alternative selection pending completion of structural analysis.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Belden PH Refurbish TSV

Major Work Categories: 2M

Planning Order Numbers: 5779423

Project Start Date: 2020

Project Completion Date: 2022

Operative Date: March 2022

Project Description

Belden is a one-unit, 125 MW powerhouse located in the Feather River watershed. The Belden powerhouse produces an average of 349 GWh of electricity per year. The Francis turbine is rated 158,000 hp, 225 rpm, 690-ft net head and is equipped with a 75% capacity 55-inch Howell-Bunger type pressure regulator and a 138-inch butterfly type turbine shutoff valve (TSV). The original seal design for the TSV was a metal to metal type similar to Butt Valley, Rock Creek, and Cresta Powerhouses. At some point in the late 1990s it was decided to upgrade the seal to a SCI design with sectioned retainer plates and a rubber seal. The Belden TSV has been consistently unreliable as a clearance point, necessitating dewatering the entire 6 miles of tunnel, plus a 1,100 foot penstock and 1,800 feet of siphon piping. This has been known to be a costly and time-consuming issue for this facility. This project proposes addressing the ongoing TSV issues by refurbishing the valve.

Justification

The refurbishment will address the leakage and restore the TSV to a safe and reliable clearance point.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5779423	Belden PH Refurbish TSV	March 2022	110	716	2,240	n.a	n.a	n.a	n.a	3,066

Benefits

Performing this work along with additional minor work during the planned outages will increase the reliability and availability of the unit.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo: Replace TSV Seat In-Kind - Rubber seal design not recommended due to premature wear and excessive leakage.
- Restore the TSV with Modified Seats – Recommended.
- Replace TSV – Not recommended due to cost.
- Install PSV – Not recommended due to cost.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Project Title: Rock Cr U2 Repl Upper Thrust Bracket;
Project Title: Rock Cr PH U1 & U2 Repl Wicket Gates & Seals
Major Work Categories: 2M
Planning Order Numbers: 5788242; 5772744
Project Start Date: 2024
Project Completion Date: 2027
Operative Date:
 P.O. 5788242 December 2026
 P.O. 5772744 October 2026**

Project Description

In 2009, PG&E authorized a project to upgrade both units at Rock Creek Powerhouse. Unit 2 was upgraded and returned to service in April 2013; and Unit 1 was upgraded and returned to service in July 2015. During the Unit 1 upgrade, cracking was discovered on the upper thrust bracket and weld repairs were made. During a subsequent inspection of Rock Cr Unit 2 in 2017, it was discovered the upper thrust bracket had also developed significant cracking. The cracks could lead to structural issues with the bracket system. The longer the bracket is run with flaws such as these, the more likely it is there will be distortion of the structure. It is recommended to replace the upper thrust bracket during the next planned extended outage in 2026.

The wicket gates on both Unit 1 and 2 are also experiencing a very high rate of erosion, despite being relatively new. After inspection and analysis, it is believed the wicket gates and the seals should be replaced on both units during the same outage.

Justification

Performing both these projects would improve the reliability of the units.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5788242	Rock Cr U2 Repl Upper Thrust Bracket	December 2026	n.a	n.a	n.a	n.a	500	1,000	2,000	3,500
5772744	Rock Cr PH Repl Wicket Gates & Seals	October 2026	1,264	n.a	n.a	n.a	100	1,000	3,000	5,364

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Benefits

Performing this work along with additional minor work during the planned outages will increase the reliability and availability of the units.

Alternatives Considered

- Status Quo – Not viable. Failure of either unit would result in a costly and extended forced outage.
- Repair – Not recommended. The cost to repair the upper thrust bracket is more costly than replacement. At the current rate of erosion, the wicket gates are expected to be beyond repair by 2026.
- Replace – Recommended. This option is the most cost effective and practical solution to restore safe and reliable operation of the units.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: PV Scott Dam Replace Radial Gate Hoist

Major Work Categories: 2

Planning Order Numbers: 5773911

Project Start Date: 2018

Project Completion Date: 2021

Operative Date: December 2020

Project Description

The radial gate hoist at Scott Dam is a self-contained custom rail cart with mechanical components inside that can be used for raising and lowering the gates. It was originally constructed and put in place in the 1970s along with significant modification to the top of the dam. The mechanical components include a propane powered engine, gearing, clutch, and chain drum. The hoist is nearing end of useful life and there are concerns about its reliability for future operation. In 2015 FERC performed their Part 12D inspections and made several recommendations. Three dealt directly with the Radial Gate Hoist requesting an additional hoist installed to increase reliability, gates be openable to 13 ft, and one gate be modified to be remote operated from Potter Valley powerhouse.

This project will include replacement of the existing radial gate hoist with a new, 15 ton capacity hoist including new chain and bridle. The new hoist is designed to open the gate 13 ft and will support remote operation in the future.

Justification

Regulatory; FERC Part 12D Inspection Recommendation; Reliability

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5773911	PV Scott Dam Replace Radial Gate Hoist	December 2020	3,177							3,117

Benefits

Performing this work will allow for continued safe and reliable operation of the spillway gates.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo – Due to age and reliability concerns, as well as requests from FERC to make improvements to the system, maintaining the status quo is not recommended.
- Repair – Not applicable. The current system is not broken, it's just worn and obsolete.
- Refurbish – Not feasible. Due to the age, technical information on the existing hoist is limited and modifications to the existing design to the existing design would likely be more costly than replacement.
- Replace – Replacement of the existing hoist with an upgraded hoist designed to meet the requirements requested by FERC is the recommended course of action.
- Retire – Not viable. The equipment is mandatory for safe and reliable operation of the radial gates at Scott Dam.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Potter Valley U1 Replace Runner & Wicket

Major Work Categories: 2M

Planning Order Numbers: 5760715

Project Start Date: 2024

Project Completion Date: 2027

Operative Date: October 2026

Project Description

The Potter Valley Project, located approximately 15 miles northeast of Ukiah, CA in Mendocino County, was licensed in 1922 by the Federal Power Commission as Project No. 77 and re-licensed in 1983 by FERC. The Potter Valley Powerhouse has 3 generating units with an installed generation capacity of 9.2 MW. Due to age and deterioration from gravel entrainment from past use of intake bypass valves, unit 1 has reached the end of its useful life and needs to be refurbished to return it to reliable, safe, and productive condition. This project proposes to replace the unit 1 turbine runner and wickets and associated minor components.

Justification

Performing this work along with additional minor work during the planned outage will increase the reliability and availability of the unit.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5760715	Potter Valley U1 Replace Runner & Wicket	October 2026	n.a	n.a	n.a	n.a	507	1,100	1,500	3,107

Benefits

Performing this work along with additional minor work during the planned outage will increase the reliability and availability of the unit.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo – Running until failure is not recommended; system will continue to deteriorate the risk of a costly forced outage would increase.
- Repair – Not feasible. Unit is beyond useful life and components can no longer be repaired for reliable or efficient operation.
- Replace – Recommend replacement of runner, wicket gate system, and all associated equipment.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Caribou Camp Capital Improvements

Major Work Categories: 11

Planning Order Numbers: 5766283

Project Start Date: 2023

Project Completion Date: 2025

Operative Date: December 2024

Project Description

Caribou Camp is located on United States Forest Service (USFS) property and is adjacent to the Caribou 1 and 2 Powerhouses. PG&E has a land use agreement with USFS for the camp, which was originally used as company housing. The camp consists of several structures – a main lodge, offices, and residential cabins. Due to a lack of necessity, age, and condition of the facilities, most of the structures have not been utilized for many years. However, as part of the land use agreement with USFS, PG&E is required to maintain the camp per State Historical Preservation Office (SHPO) standards. The facilities are deteriorated beyond maintenance and repair, requiring significant improvements to meet SHPO requirements.

Justification

Regulatory; Required for SHPO compliance and land use agreement with USFS.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5766283	Caribou Camp Capital Improvements	December 2024	n.a	n.a	n.a	2,500	2,500	n.a	n.a	5,000

Benefits

Performing this work will allow continued use of the land, which is adjacent to Caribou 1 & 2 Powerhouses and is required for access to the facilities.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo – Not a viable option. Non-compliance with USFS land use agreement, and/or SHPO requirements could result in violations, fines, and/or loss of land use agreement.
- Repair – Not viable option. Condition of facilities is beyond repair to meet minimum requirements.
- Refurbish – Recommended. Facilities will be refurbished to necessary health, safety, and SHPO requirements.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Rock Creek VH Replace Roof

Major Work Categories: 2P

Planning Order Numbers: 5786858

Project Start Date: 2019

Project Completion Date: 2022

Operative Date: August 2022

Project Description

Civil assessments in 2018 revealed excessive spalling, delaminating and damage to the Rock Creek Valvehouse concrete roof. The extensive damage warranted an Analysis of Alternatives (AoA) to determine the best course of action to repair or replace. An AoA was conducted in 2019 and determined that replacement was the most effective and affordable option to resolve the issue. It is recommended to remove and replace the existing roof and install drainage behind the retaining wall to mitigate water seepage into the structure.

Justification

Regulatory; FERC Part 12D Inspection Recommendation.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5786858	Rock Creek VH Replace Roof	August 2022	267	200	3,000	n.a	n.a	n.a	n.a	3,467

Benefits

Replacement of the roof and the addition of drainage will increase the life of the valvehouse structure and greatly reduce the risk of personnel injury, damage to the penstocks, penstock shutoff valves, and associated equipment that could occur as a result of concrete failure.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo/Do Nothing - This alternative suggests not doing anything and continues a condition where the valvehouse roof will continue to deteriorate and eventually result in structural concrete failure.
- Repair – This alternative is not recommended as it does not resolve the root cause of the delamination and would require additional repairs at regular intervals.
- Replace in Kind - This method would leave the existing concrete structural beams which would require that they receive additional reinforcement to support a new roof deck. This alternative is not recommended as it is estimated to take longer than the proposed option and may require additional powerhouse outage time for curing the reinforced concrete beams and roof deck.
- Replace Roof (RECOMMENDED) - This alternative involves removing the existing valve house roof structure in its entirety and replacing it with a new, reinforced concrete roof deck supported on a steel form deck and a steel framing system. This is the most cost effective and shortest duration solution while providing long term benefits and mitigating the root cause of damage.
- Defer by One Year - This alternative assumes deferral of work by one year. Scope involves removing the existing valve house roof structure in its entirety and replacing it with a new, reinforced concrete roof deck supported on a steel form deck and a steel framing system. Deferral would require an extension approval from FERC. This option is not recommended.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Butt Valley PH Replace GSU Bank & Spare

Major Work Categories: 2M

Planning Order Numbers: 5792671

Project Start Date: 2024

Project Completion Date: 2027

Operative Date: November 2026

Project Description

Butt Valley PH GSU Transformers A, B, C, Spare have been in service since 1958 and have reached the end of their useful life. Oil analyses have indicated poor oil quality, and offline test results indicate slight reduction in overall power factor. Due to the age of the transformer, condition, and long lead time of a replacement transformer, it is recommended to replace the transformer bank and spare within the next 5 years.

Justification

It is no longer feasible to make temporary repairs to the transformer bank. Spares are not readily available, and refurbishment is not feasible due to age and elevated gas levels as shown in oil analysis. A failure of the transformer could result in an extended forced outage while replacements were designed, fabricated delivered and installed.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5792671	Butt Valley PH Replace GSU Bank & Spare	November 2026	n.a	n.a	n.a	n.a	250	2,000	4,000	6,250

Benefits

Performing this work along with additional minor work during the planned outage will reduce the risk of a forced outage and increase the reliability and availability of the unit.

Alternatives Considered

Status Quo – Do Nothing. Not a feasible option as running to failure will result in an extended forced outage and loss of generation.

Repair – Not feasible due to age and poor condition as shown in oil analysis and offline electrical testing.

Refurbish – Not feasible due to age and poor condition as shown in oil analysis and offline electrical testing.

Replace – (Recommended). Transformer has reached the end of its useful life.

Defer One year – Not recommended for the same reasons discussed in status quo.

Retire – Transformer is necessary for plant operations. Not a feasible option.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Grizzly Cr Xing Assessment and Cresta Tunnel/ Tailrace Erosion Repair

Major Work Categories: AX

Planning Order Numbers: 5236324; 5261877

Project Start Date: 2018

Project Completion Date: 2023

Operative Date: n.a. This is expense.

Project Description

Damage and erosion have been identified in two locations along the Cresta tailrace. Repair will require installation of concrete and rip rap to mitigate further deterioration and restore structural integrity and stability of the tailrace structure.

In July 2016, a crack and leakage was observed on the top/back (southern exposure) at the Grizzly Cr Crossing for the Cresta Tunnel. The tunnel is planned to be drained during the next extended planned outage in 2023, and a thorough inspection and assessment of tunnel condition at elevated crossing will be necessary to determine scope of the repairs. It is anticipated that filling and patching voids in the tunnel liner will be required to ensure structural integrity and stability of the Cresta tunnel.

Justification

Regulatory compliance as a result of a Part12D recommendation; and FERC license requirement to maintain infrastructure for safe, reliable operation of hydro assets

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5236324	Cresta Repair Tailrace Erosion	n.a.	n.a.	100	750	500	n.a.	n.a.	n.a.	1,350
5261877	Grizzly Cr Xing Assess & Repair Cresta Tunnel	n.a.	n.a.	n.a.	100	1,000	50	n.a.	n.a.	1,150

Benefits

These projects will mitigate further deterioration and restore structural integrity and stability of the tailrace structure and Cresta Tunnel, allowing continued safe and reliable operation of the facilities.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo – Do Nothing. This alternative assumes that no action is taken. Not a viable option as operating until failure is not a practical solution and poses safety risks.
- Reschedule One Year – This alternative assumes the project is rescheduled one year. This alternative ultimately has the same long-term benefits as the recommended alternative; however, in the short-term, this alternative is not recommended for the same reasons discussed in status quo.
- Replace – Replacement of the entire tailrace is costly and not considered a viable alternative.
- Repair – This is the recommended alternative. Repairing damaged portions of the tailrace is the most cost-effective solution to mitigate further deterioration and restore structural integrity and stability of the tailrace structure.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Poe Dam Repair Toe Voids

Major Work Categories: AX

Planning Order Numbers: 5258852

Project Start Date: 2018

Project Completion Date: 2023

Operative Date: n.a. This is expense.

Project Description

This project is to repair foundation voids along edge of the Poe Dam discharge apron.

Justification

Regulatory compliance as a result of a Division of Safety of Dams (DSOD) recommendation.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWIP Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5258852	Poe Dam Repair Toe Voids	n.a.	n.a.	n.a.	3,192	640	n.a.	n.a.	n.a.	3,832

Benefits

This project will ensure the continued safe and reliable operation of the Poe Powerhouse Dam by repairing the voids and mitigating further damage which, if continues, could potentially jeopardize the structural integrity of the dam.

Alternatives Considered

Status Quo - Doing nothing would allow continued erosion and deterioration. This would result in increased dam safety concerns. This alternative is not recommended.

Repair Voids – The project initiated in 2018 to allow for permitting; and is expected to be completed by end of 2022. Repairing the existing damage will reduce any dam safety issues, fulfill a DSOD recommendation and stop further deterioration. This alternative is recommended.

Defer Repairs 1 Year – This alternative suggests delaying the repair work by 1 year. This would result in delaying the construction work until 2023; increasing the risk of safety concerns as well as further deterioration. This alternative is not recommended.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Bucks Creek Pnstk Erosion Mitigation

Major Work Categories: AX

Planning Order Numbers: 5263407

Project Start Date: 2020

Project Completion Date: 2026

Operative Date: n.a. this is expense

Project Description

This project is to remove debris which has built-up along the penstock, supports, drainage, and footings; evaluate potential drainage improvements to mitigate future debris build-up and erosion along penstock; and perform on-going debris removal until improvements can be completed.

Justification

Performing this work will reduce risk of slope failure and damage to the penstock, and increase the reliability of the Bucks Powerhouse units.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planni ng Order	Description	Est Operati ve Date	2020 CWI P Actu al	2021 Foreca st	2022 Foreca st	2023 Foreca st	2024 Foreca st	2025 Foreca st	2026 Foreca st	Total Project Foreca st
526340 7	Bucks Creek Pnstk Erosion Mitigation	n.a.	n.a.	1,820	250	250	250	250	250	3,070

Benefits

This project will reduce the risk of slope failure resulting in penstock and/or powerhouse damage.

Alternatives Considered

- Status Quo – Do nothing and allow additional erosion and debris to impact the safety of the penstock and powerhouse. Not recommended.
- Defer One Year – This alternative assumes the project is rescheduled one year. This alternative ultimately has the same long-term benefits as the recommended alternative; however, in the short-term, this alternative is not recommended for the same reasons discussed in status quo.
- Perform Debris Removal & Evaluation – Recommended. Removal of debris along penstock, supports, drainage, and footage is necessary to evaluate potential drainage and improvements to prevent future debris build-up and erosion along penstock.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Belden PH Rebuild WG Upthrust Assembly

Major Work Categories: KH

Planning Order Numbers: 5267613

Project Start Date: 2020

Project Completion Date: 2022

Operative Date: n.a. this is expense

Project Description

It is believed that the 2016 Andritz design of the upthrust assembly was defective and allowed the wicket gates to rise under pressure and make contact with the upper facing plate, causing galling. This project is to modify the wicket gate upthrust assembly to mitigate damage to the wicket gates and facing plates, reducing the risk of unit failure.

Justification

Reliable and safe operation of Belden Powerhouse.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Est Operative Date	2020 CWI P Actual	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Total Project Forecast
5267613	Belden PH Rebuild WG Upthrust Assembly	n.a.	n.a.	312	1,200	n.a.	n.a.	n.a.	n.a.	1,512

Benefits

This project will reduce the risk of unit failure and a forced outage; ensuring safe and reliable operation of Belden Powerhouse.

Alternatives Considered

- **Status Quo** – Do Nothing. This alternative is not recommended as damage to the wicket gates and facing plates will continue. There is also risk of the clearance increasing to the point where the unit will not be able to be stopped with the use of the TSV, possibly resulting in a forced outage of 3 to 4 months.
- **Reschedule One Year** – This alternative is not recommended for the same reasons discussed in status quo.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

- Rebuild WG Upthrust Assembly – This is the recommended alternative. Rebuilding the upthrust assembly in 2022 will reduce the risk of further damage to the unit and forced outage.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Pit 5 PH Surge Chamber & Valve House Slide

Major Work Category: 2P

Planning Order No. 5776830

Project Start Date: 2017

Project Completion Date: 2023

Operative Date: January 2018

Description

Pit 5 is a 4-unit powerhouse located on the Pit River. Pit 5 powerhouse produces an average of about 846 GWh of electricity per year and provides 160 MW of dependable capacity to help meet our customers' summertime demand for electricity.

Beginning in January 2017 the area known as Big Bend, CA where Pit 5 Powerhouse is located experienced progressive storm systems producing significant snow fall followed by heavy rainfall. According to the United States Geological Survey (USGS) the Pit 5 Powerhouse received 100+ inches of rain this season. Snow accumulation from January 2017 storms combined with progressively increasing rainfall caused accelerated snow melt and led to landslides as well as washouts on the roads. Three landslide locations were identified that compromised the hillside above the Pit 5 Powerhouse. Two slides near the surge chamber and another slide near the valve house. All three areas are currently under monitoring.

Justification

Slide repair is necessary to restore stability to the slopes adjacent to critical Hydro Electric Infrastructure (Tunnel, Surge Chamber, Valve House & Penstocks).

Costs

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5776830	Pit 5 PH Surge Chmbr & VH Slide Strm Dmg	Jan-2018	n.a.	200	3,000	100	n.a.	n.a.	n.a.	3,300

Benefits

Restoring the hillside slope stability and regaining access to the valve house and surge chamber is required to allow for reliable operation of the Pit 5 Powerhouse.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Alternatives Considered

- Status Quo – do nothing. Leave the Pit 5 hillside slope adjacent to critical hydro-electric infrastructure (tunnel, surge chamber, valve house and penstocks) compromised. The surge chamber and valve house roads would remain closed and impassible to vehicles or equipment.
- Restore the Pit 5 Surge Chamber & Valve House Slides – This is the preferred alternative.
- Defer by 2 years –Deferring mitigation efforts by two years would leave critical Hydro Electrical Infrastructure at risk as well as not having vehicle or equipment access to the surge chamber and valve house. This is not a viable alternative

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Helms - Repave McKinley Grove Road

Major Work Categories: 2P/2P1

Planning Order Numbers: 5772624

Project Start Date: 2024

Project Completion 2026

Operative Date: May 2026

Project Description

McKinley Grove Road is the main access road to Helms Powerhouse. The road is owned by the U.S. Forest Service but is under a road use permit for snow removal and maintenance for PG&E only access for 9 months out of the year. The road is nearing the end of the useful service life and it is recommended that the 16 miles (32 lane miles) is repaved along with other drainage and road feature installations.

Justification

Being the only access to Helms Powerhouse the road condition and the safety of the road is critical to PG&E, PG&E. employees and the public. The road use agreement has not been renewed since the 1980's.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work, (b) historic PG&E cost data for similar work and or (c) secured proposal cost from the OEM along with estimated installation overheads.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Forecast
5772624	Helms - Repave McKinley Grove Road	May - 2026	n.a.	n.a.	n.a.	n.a.	500	6,000	6,000	12,500

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Benefits

Restoring the road to like new condition will ensure continued safe access to and from Helms Powerhouse and Power Generation Facilities.

Alternatives Considered

- A. Replace: Repave 32 lane miles of asphalt road including drainage improvements and road safety improvements. Recommended alternative.
- B. Status Quo: Patch pave the road on annual basis instead of a re-pavement.
- C. Repair: Patch pave the road on annual basis instead of a re-pavement.
- D. Do Nothing: Allow the pavement to continue to degrade and breakdown. Do not repair potholes.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: UOG Hydro DTT Installation Program

Major Work Categories: 2L

Planning Order Numbers: 5793128

Project Start Date: 2022

Project Completion Date: 2026

Operative Date: December 2026

Project Description

It is proposed to implement Direct Transfer Trip (DTT) infrastructure, or other capital mitigations recommended by System Protection, for PG&E's Hydro Generation Facilities that pose a non-desired islanding or fault protection risk. DTT enables automatic response when a fault condition occurs and sends a breaker trip signal from the substation to the generation facility, quickly de-energizing the electric line. Hydroelectric engineering will need to work with System Protection to evaluate and prioritize the generation facilities that should be addressed by this program.

Justification

PG&E's transmission and distribution electric grid characteristics have changed significantly over the years. New generation resources continue to interconnect and customer loads shift over time, requiring modifications of existing infrastructure to ensure that energy can be delivered safely and reliably to our customers. Currently PG&E has automatic protection schemes and remote operator capability to trip any of its generation facilities off-line when needed, but with the increasingly complicated grid, it can be difficult at times for an operator to recognize the need to remote trip a generation facility. DTT addresses that risk.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5793128	UOG Hydro DTT Installation Program	Dec - 2026	n.a.	n.a.	1,680	1,680	1,680	1,680	1,680	8,400

Benefits

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Installation of DTT at facilities identified to be at risk for non-desired islanding or adequate fault protection will enable automatic response when a fault condition occurs, quickly de-energizing the generation facility and electric line. This will reduce the demand upon grid operators and minimize the risk of human error when it comes to recognizing a fault condition and determining which facilities need to remote trip.

Alternatives Considered

N\A

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: AM: Shut Off Valves and Gates

Major Work Categories: 2M

Planning Order Numbers: 5720593

Project Start Date: 2025

Project Completion Date: Various

Operative Date: Sep-2026*

* specific projects become operative individually starting with the dates given

Project Description

Hydro Generation's Shut Off Valve and Gate program developed and monitored a comprehensive inventory of 164 valves and gates with a variety of sizes and configuration.

The Shut Off Valve and Gate program prioritized the need to repair and/or replace valves and gates on a system-wide basis.

Justification

Managing the valve and gate fleet is essential to ensure the safety of our systems. The valves and gates are utilized to isolate water conveyance components, penstocks, and shut off flow to turbines for maintenance tasks as well as ensure safety for employees, equipment, and the public in the event an unsafe situation arises that would require the water flow to be restricted.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

Major Project Spending Estimates

(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	2026 Fore-cast	CWIP + 2021-2026 Fore-cast
5720593	AM: Shut Off Valves and Gates CAP	Sep-2026	0	0	0	0	0	1,750	3,500	5,250

Additional Cost Information

The estimates include engineering, procurement, manufacturing, disassembly, installations, testing, inspections, and PG&E's support organizations' cost. Several specific projects have already been identified, with some in-flight and others planned for future years outage plans. These are included in the forecast as separate individual projects. Funding from this program

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

will be transferred to other not yet identified specific projects once condition data is gathered and risk assessments are completed.

Benefits

The following benefits are justified to prepare the long term plan for shut off valve and gate replacement:

- Reduce forced outages; while increasing powerhouse safety.
- Increase the reliability of continuity of water operations
- Reduces the economic impact of long lead procurement, manufacturing, and installation.
- Reduces the unexpected cost of emergency shut off valve or gate replacement.

Alternatives Considered

As specific work is identified, alternatives are considered as part of the review and analysis process.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: DeSabra Centerville Relicensing

Major Work Categories: 3H

Planning Order Numbers: 5716718

Project Start Date: 2004

Project Completion Date: 2027

Operative Date: January 2027

Project Description

DeSabra-Centerville Project includes 3 powerhouses located on the West Branch of the Feather River (WBFR), and Butte Creek watersheds. Together, Toadtown, DeSabra and Centerville powerhouses produced an average of about 149 GWh of electricity per year.

The long-term FERC license for DeSabra-Centerville expired in 2009, and PG&E is operating the Project under annual licenses. PG&E had been in the relicensing process for DeSabra-Centerville since 2004. In February 2017, PG&E withdrew its relicensing application for DeSabra-Centerville because the facility is no longer economically viable for PG&E's electric customers. The relicensing spending to date is included in CWIP. There is no forecast work for relicensing.

Justification

The current Project license expired in 2009, and these powerhouses currently operate under an annual license. Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year duration collaborative process includes extensive stakeholder involvement, performance of comprehensive natural resource studies, and balancing of complex societal and environmental issues. Failure to operate the Project in compliance with the FERC License subjects the Licensee to fines of up to \$10,000 per day and loss of the License.

The DeSabra Centerville relicensing costs were also forecast in the 2020 GRC. Relicensing costs have accrued because PG&E began the relicensing process for DeSabra-Centerville in 2004 before withdrawing its relicensing application in 2017. This project is subject to balancing account treatment.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	CWIP + 2021-2026 Forecast
5716718	DeSabra Centerville Relicensing	Jan-2027	26,425	0	0	0	0	0	26,425

Benefits

The facilities included in the DeSabra-Centerville license are no longer economically viable for PG&E's electric customers. Withdrawing the license application is more beneficial to electric customers than relicensing the project.

Alternatives Considered

N/A.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Project Title: Potter Valley FERC 77 Relicensing

Major Work Categories: 3H

Planning Order Numbers: 5760714

Project Start Date: 2016

Project Completion Date: 2027

Operative Date: January 2027

Project Description

Potter Valley is a three-unit, 9.2 MW powerhouse located in the Eel River and East Fork Russian River watersheds. The Potter Valley powerhouse has a normal operating capacity of 9.2 MW.

The current Project license expires in 2022. This relicensing project is expected to result in the Company obtaining a new long-term FERC license for the Project and in order to continue providing safe and reliable electric generation to our customers in a responsible and environmentally sensitive manner. FERC's Integrated Licensing Process is being used to obtain a new 40 to 50-year operating license. FERC's procedural schedule is forecast to continue beyond the current license expiration date. The Project will operate after that time under annual licenses until a new license is issued by FERC consistent with completion of both federal and state-level environmental review processes.

Justification

Under the Federal Power Act (FPA), the owner of a hydropower project must obtain a license from FERC to operate its project. At the end of the license term, a licensee may apply to relicense its project. The FPA and FERC's implementing regulations specify a comprehensive and rigorous process a licensee must complete to successfully renew its license. The minimum 5-year regulatory process, which often takes substantially longer to complete, includes extensive stakeholder involvement, performance of comprehensive resource studies and balancing of complex societal and environmental issues. Licensees must be highly engaged with stakeholders and plan relicensing activities prior to the relicensing process beginning with filing of a Notice of Intent and Pre-Application Document, and must continue relicensing activities through filing the License Application and subsequent environmental review processes leading to issuance of the new license by FERC. The schedule for issuance of a new license is generally uncertain and can take decades.

Cost

The cost assumptions for this project are based on: (a) the professional judgment of the engineers and licensing professionals familiar with this type of work; and/or (b) historic PG&E cost data for similar work.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Record ed	2021 Fore-cast	2022 Fore-cast	2023 Fore-cast	2024 Fore-cast	2025 Fore-cast	CWIP + 2021-2026 Forecast
5760714	Potter Valley Relicensing	Jan-2027	7,417	n.a.	n.a.	n.a.	n.a.	n.a.	7,417

Benefits

The benefits of this project include a new FERC license extending the operational life of the Potter Valley powerhouse by 30-50 years.

Alternatives Considered

N/A. Must comply with relicensing and new license conditions to continue operating.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Pit 1 LLO & Replace Radial Gate Retrofit

Major Work Category: 2N

Planning Order: 5766145

Project Start Date: 2016

Project Completion Date: 2021

Operative Date: February 2021

Description

Pit 1 is a two-unit, 62 MW powerhouse located in the upper reach of the Pit River Hydroelectric system. Pit 1 powerhouse produces an average of about 290 GWh of electricity per year and provides 62 MW of dependable capacity to help meet our customers' summertime demand for electricity.

The Pit 1 Diversion Dam is located in Fall River Mills, CA. The dam diverts water into a tunnel and penstock system to supply the Pit 1 Powerhouse. The LLO gate is located at the bottom of a concrete pier that is located between two radial gates.

A FERC required upstream dive inspection of the Pit 1 LLO and radial gates reported leakage Gates 4 and 5 due to deteriorated gate seals and impacted debris. The LLO slide no longer seals properly and is stuck in a partially open position

This project will replace the LLO slide gate, the actuator used to operate the slide gate and the protective grizzly, returning the LLO to fully operable condition as required by FERC. The Gate 4 radial gate seals will be replaced to stop leakage resulting from deterioration and damage by debris.

Justification

Regulatory Compliance: Comply with FERC inspection report requirements to restore the LLO to operable condition and reduce the risk of dam reliability issues.

Benefits

Ensure dam reliability. Restore the Pit 1 LLO to fully operable condition as required by FERC.

Costs

**Major Project Spending Estimates
(Thousands of Nominal Dollars)**

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	CWIP + 2021-2026 Forecast
5760705	Pit 1 LLO & Replace Radial Gate Retrofit	Feb-2021	8,613	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	8,613

Benefits

Ensure dam reliability. Restore the Pit 1 LLO to fully operable condition as required by FERC.

PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary

Alternatives Considered

- **Status Quo** – run to failure. Make no improvements. The current conditions were identified by a FERC inspection and replacement is required. This is not a viable alternative.
- **Replace the LLO Slide Gate and Radial Gate Seals** – This alternative would replace the seals on Radial Gate 4 and return the LLO to fully operable condition in compliance with FERC requirements. This is the preferred alternative.
- **Repair the Existing LLO Slide Gate and Radial Gate Seals** – This alternative considers the impact of a repair to the seals on Radial Gate 4 and LLO gate on the Pit 1 Dam to return proper function to the equipment. Due to the nature of the failures, no repair scope could be executed to effectively address the gate seals. The LLO gate might be repairable, but limited visibility where the guide stem enters the concrete makes it impossible to determine if repair is feasible until the cofferdam is installed and the area dewatered. This alternative would have a cost and level of effort comparable to the preferred alternative of replacement.
- **Refurbish the Existing LLO Slide Gate and the Radial Gate Seals** – This alternative considers the impact of a refurbishment of the radial gate seals and LLO on the Pit 1 Dam to return proper function to the equipment. Due to the nature of the failures, no refurbishment scope could be executed to effectively address the gate seals. The LLO gate might be repairable, but limited visibility where the guide stem enters the concrete makes it impossible to determine if repair is feasible until the cofferdam is installed and the area dewatered. This alternative would have a cost and level of effort comparable to the preferred alternative of replacement.
- **Retire the Existing LLO Slide Gate and the Radial Gate Seals**- This alternative would retire the radial gate seals and LLO on the Pit 1 Dam. Due to the impact to the operation of the dam, this is not a viable alternative.

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Project Title: Battle Cr Salmon Restoration FERC Lic Amendment

Major Work Category: 3H

Planning Order: 5718898

Project Start Date: 2005

Project Completion Date: 2027

Operative Date: July 2026

Project Description

The Company has agreed with the MOU signatories to file two separate FERC license amendments for the Battle Creek Hydroelectric Project, FERC No. 1121 with FERC. The first license amendment, Phase 1, will cover restoration activities on the North Fork of Battle Creek, as well as, at the Inskip Powerhouse on the South Fork. This will allow the Company and its partners to begin detailed engineering, contracting and construction on Phase 1 activities. The first license amendment will be filed when the Restoration Project funding is secured. The second license amendment will cover the remaining restoration activities on the South Fork of the Hydroelectric Project. The second license amendment will be filed when the Project funding is secured and all of the land use issues on the South Fork of Battle Creek have been resolved.

Justification

A Memorandum of Understanding (MOU) by and among Reclamation, National Marine Fisheries Service, U.S. Fish and Wildlife Service, California Department of Fish and Game, and Pacific Gas and Electric Company (PG&E) was signed in February 1999 to establish a restoration program for Chinook Salmon and Steelhead habitat in the reaches of Battle Creek below the natural water falls on the forks of Battle Creek that act as absolute barriers to fish passage.

PG&E agreed to pay internal costs associated with FERC license amendment and its own costs required to implement the Restoration Project. The Reclamation will fund the design, permitting, and construction related costs.

Cost

Major Project Spending Estimates

(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	CWIP 2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	CWIP + 2021-2026 Forecast
5718898	Battle Cr Salmon Restoration FERC Lic Am	Jul-2026	3,377	750	n.a.	n.a.	n.a.	n.a.	4,127

**PACIFIC GAS AND ELECTRIC COMPANY
HYDRO GENERATION
Project Summary**

Benefits

Establish a restoration program for critical Chinook salmon and steelhead habitat in the reaches of Battle Creek below the natural water falls on the forks of Battle Creek that act as absolute barriers to fish passage while ensuring the continued operation of 38 MWs of air emission-free, RPS-eligible renewable source of electricity.

Alternatives Considered

PG&E may choose to continue applying for and pursuing a FERC amendment in accordance with its agreement or postpone the filing of the agreement, those are the only two options.