

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 5-8

[INCLUDES ERRATA THROUGH

FEBRUARY 28, 2022]

VOLUME 2 OF 2

(PUBLIC)



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

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**Pacific Gas and Electric Company
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Workpapers Supporting
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Natural Gas and Solar Generation Operations
(Public Version)
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Natural Gas & Solar Generation Operation
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	AK	Manage Environmental Oper	2,289	2,397	2,166	2,266	2,400	2,653	2,724	2,807	
2	KK	Operate Fossil Generation	12,675	11,949	11,544	12,497	13,662	13,528	13,895	14,314	
3	KL	Maint Fossil Generating Equip	30,506	30,131	32,061	27,486	27,785	27,208	28,002	29,543	
4	KM	Maint Fossil Bldg, Grnd, Infrast	2,166	2,308	2,127	2,397	2,238	2,878	2,956	3,045	
5	KQ	Operate Alternative Gen	1,102	1,156	1,062	986	1,080	639	454	467	
6	KR	Maint AltGen Generating Equip	1,263	2,156	1,273	1,404	1,608	1,609	1,232	1,268	
7	KS	Maint AltGen Bldg, Grnd, Infrast	786	371	680	92	430	501	506	521	
8	OM	Operational Management	391	265	904	242	137	277	284	293	
9	OS	Operational Support	207	668	142	217	21				
10	Total		51,385	51,400	51,959	47,588	49,360	49,293	50,054	52,258	Lines 1-9

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Natural Gas & Solar Generation Operation
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	Reference
1	AK	Manage Environmental Oper	2,497	2,555	2,226	2,270	2,400	2,639	2,641	2,643	
2	KK	Operate Fossil Generation	14,069	12,885	12,056	12,644	13,662	13,359	13,337	13,324	
3	KL	Maint Fossil Generating Equip	32,954	31,882	32,708	27,370	27,785	27,029	27,101	28,117	
4	KM	Maint Fossil Bldg, Grnd, Infrast	2,328	2,434	2,164	2,382	2,238	2,891	2,904	2,913	
5	KQ	Operate Alternative Gen	1,209	1,238	1,102	993	1,080	633	434	433	
6	KR	Maint AltGen Generating Equip	1,374	2,284	1,305	1,403	1,608	1,605	1,196	1,196	
7	KS	Maint AltGen Bldg, Grnd, Infrast	849	392	698	92	430	503	497	498	
8	OM	Operational Management	438	290	961	249	137	269	267	266	
9	OS	Operational Support	229	731	147	224	21				
10	Total		55,947	54,692	53,368	47,627	49,360	48,927	48,377	49,390	Lines 1-9

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Natural Gas and Solar Generation Operations
Recorded and Forecast Expense by Planning Order

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
1	AK	5015792	GGs Manage Environmental Operations	668,353	686,357	701,631	356,184	627,130	635,000	652,228	671,891	
2	AK	5016229	GGs Manage Environmental Operations	597,613	670,589	493,025	726,705	467,107	709,000	728,173	750,125	
3	AK	5016233	HBGS Manage Environmental Operations	1,022,675	1,040,010	971,263	1,183,129	1,305,866	1,308,600	1,344,024	1,384,542	
4	AK Total			2,288,642	2,396,956	2,165,919	2,266,018	2,400,103	2,652,600	2,724,425	2,806,558	Lines 1-3
5												
6	KK	5015793	GGs Operate Fossil Generation Facilities	4,094,771	3,803,089	3,769,817	3,651,542	4,139,828	3,783,608	3,886,028	4,003,180	
7	KK	5015949	HBGS Operate Fossil Generation Facilities	3,817,346	3,271,682	3,492,951	3,132,254	3,537,760	3,731,999	3,832,959	3,948,511	
8	KK	5015950	GGs Operate Fossil Generation Facilities	4,164,948	3,968,748	3,355,757	4,005,730	4,988,982	4,942,410	5,076,136	5,229,165	
9	KK	5025053	Fossil SCV - MWC KK Operate Fossil Gen	197,762	185,345							
10	KK	5027013	Fossil HEP Inspection Program	392,568	720,113	555,059	919,997	675,996	1,025,300	1,053,010	1,084,755	
11	KK	5034775	PG O&M North Dir - Contract & Consulting	121								
12	KK	5043611	PCC 15860 - Portfolio Strategy - Fossil			35,844	51,957	47,617	44,974	46,724	48,132	
13	KK	5043758	SCV - 13959 - Gateway Gen Sta - MWC KK			139,350	196,654	184,795				
14	KK	5043760	SCV - 14535 - Humboldt Bay GS - MWC KK			92,938	212,652	167,762				
15	KK	5043761	SCV - 14536 - Colusa Gen Sta - MWC KK			102,261	325,852	-80,692				
16	KK	5204212	AMOK Fossil Unsold Properties	8,022								
17	KK	5244313	Fossil - Non PG Prelim Engineering	-687								
18	KK Total			12,674,850	11,948,977	11,543,977	12,496,639	13,662,048	13,528,291	13,894,857	14,313,743	Lines 6-17
19												
20	KL	5015794	GGs Maint Fossil Generating Equip	4,715,852	3,539,873	4,094,424	4,214,119	4,086,847	4,622,403	4,747,480	4,890,601	
21	KL	5016230	GGs Maint Fossil Generating Equip	4,902,367	4,402,763	3,301,578	3,489,866	4,851,574	4,739,201	4,867,465	5,014,203	
22	KL	5016234	HBGS Maint Fossil Generating Equip	3,383,455	2,423,015	3,599,680	2,988,752	2,776,621	2,353,399	2,417,138	2,490,007	
23	KL	5021910	CGS Piping Repair/Mitigation					64,262	108,700	111,683	115,050	
24	KL	5021917	GGs Piping Repair/Mitigation				102,897	84,572	118,900	122,107	125,788	
25	KL	5025054	Fossil SCV - MWC KL Maint Fossil Gen	65,921	61,782	78,777	-132					
26	KL	5025869	GGs Auxiliary Equip Maintenance	-5,505								
27	KL	5236248	HBGS Major Overhaul	831,882	1,082,989	1,884,235	705	1,924,041	1,533,000	1,574,555	2,667,900	
28	KL	5245434	HBGS Level 3 Generator Inspections	68,282	200,011			266,502	109,200	112,168	115,544	
29	KL	5245447	CGS 2015 Non LTSA Expense	-277								
30	KL	5245780	GGs CT Inlet House Repairs	71,408								
31	KL	5245783	GGs HRSG Ammonia Salt Cleaning	25,988								
32	KL	5247633	GGs Spring Outages	1,817,627	854,551	1,279,057	1,079,718	1,020,478	1,238,800	1,272,382	1,545,700	
33	KL	5247634	GGs Fall Outages	364,221								
34	KL	5247923	CGS Spring Outages	1,358,321	926,153	3,157,475	2,122,192	1,279,321	986,800	1,013,581	1,280,100	
35	KL	5247924	CGS Fall Outages	234,540	378,517	-13,971						
36	KL	5249715	GGs 2016 HRSG Repairs	679,390								
37	KL	5254672	HBGS Annual Coupling Maintenance		128,812		16,656	25,200	326,000	334,873	344,953	
38	KL	5254673	HBGS Annual Turbo Charger Maintenance		183,463		65,165	27,187	105,800	108,636	111,906	
39	KL	Various	CGS LTSA	5,190,316	6,919,794	6,286,144	5,812,955	5,459,457	5,241,135	5,410,123	5,146,728	
40	KL	Various	GGs LTSA	7,166,312	8,665,236	8,268,423	7,593,417	5,918,477	5,724,389	5,909,892	5,694,939	
41	KL Total			30,505,879	30,131,181	32,061,319	27,486,310	27,784,538	27,207,727	28,002,083	29,543,420	Lines 20-40
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Natural Gas and Solar Generation Operations										
Recorded and Forecast Expense by Planning Order										
43 KM	5015796	GG5 Maint Fossil Bldg, Grnd, Infrast.	177,882	272,634	59,850	27,000	8,703	473,200	485,981	500,631
44 KM	5016232	CG5 Maint Fossil Bldg, Grnd, Infrast.	1,834,022	1,902,719	1,903,664	2,037,063	2,038,944	2,119,300	2,176,647	2,242,266
45 KM	5016236	HBG5 Maint Fossil Bldg, Grnd, Infrast.	154,212	132,434	163,171	333,210	190,190	285,700	293,460	302,307
46 KM Total			2,166,115	2,307,787	2,126,685	2,397,273	2,237,837	2,878,200	2,956,087	3,045,204
47										Lines 43-45
48 KQ	5021615	Westside PV Operations (KQ)	115,605							
49 KQ	5021617	Stroud PV Operations (KQ)	136,964							
50 KQ	5021619	Five Points PV Operations (KQ)	69,007							
51 KQ	5021622	Giffen PV Operations (KQ)	53,530							
52 KQ	5021624	Cantua PV Operations (KQ)	75,075							
53 KQ	5021626	Huron PV Operations (KQ)	62,801							
54 KQ	5021915	CSUEB Fuel Cell Operations (GRC)	189,644	247,375	129,892	230,472	142,200	84,700		
55 KQ	5021926	SF State Fuel Cell Operations (GRC)	209,803	325,740	257,698	243,968	262,677	112,400		
56 KQ	5021929	Vaca-Dixon PV Operations (GRC)	27,545	26,513	30,371	37,209	107,842	29,000	29,754	30,623
57 KQ	5024109	Gates 1 PV Operations (KQ)	36,351							
58 KQ	5024110	Guernsey PV Operations (KQ)	97,152							
59 KQ	5024111	West Gates PV Operations (KQ)	25,877							
60 KQ	5029754	Cantua PV Operations GRC		63,177	41,083	46,376	81,076	42,600	43,729	45,006
61 KQ	5029757	Five Points PV Operations GRC		63,970	74,716	57,725	59,023	35,500	36,404	37,468
62 KQ	5029760	Gates 1 PV Operations GRC		29,503	35,884	49,400	39,487	57,900	59,412	61,148
63 KQ	5029763	Giffen PV Operations GRC		46,689	43,481	38,976	64,281	31,400	32,231	33,172
64 KQ	5029766	Guernsey PV Operations GRC		79,946	190,920	39,957	41,858	72,600	74,493	76,669
65 KQ	5029789	Huron PV Operations GRC		66,213	59,963	61,975	70,019	27,800	28,555	29,389
66 KQ	5029792	Stroud PV Operate GRC		96,234	79,928	74,058	102,128	58,300	59,768	61,514
67 KQ	5029795	West Gates PV Operations GRC		16,824	43,254	40,211	30,701	28,200	28,950	29,796
68 KQ	5029798	Westside PV Operations GRC		93,481	73,474	65,717	78,449	59,000	60,487	62,254
69 KQ	5037624	Cost Model Adjustment-KQ			1,223	84	325			
70 KQ	5244312	Other Gen (PV) Non-PG Prelim Eng	2,938							
71 KQ Total			1,102,293	1,155,665	1,061,887	986,128	1,080,067	639,400	453,782	467,039
72										Lines 48-70
73 KR	5014670	AT&T Solar Maintenance	17,262	45,670	37,749	34,632	50,485	60,500	62,059	63,872
74 KR	5014671	SFSC Solar Maintenance	17,695	15,447	6,252					
75 KR	5019089	Westside PV Maintain Gen Eq (KR)	42,436							
76 KR	5019090	Stroud PV Maintain Gen Eq (KR)	93,358							
77 KR	5019091	Five Points PV Maintain Gen Eq (KR)	105,655							
78 KR	5021030	Giffen PV Maintain Gen Eq (KR)	63,945							
79 KR	5021031	Cantua PV Maintain Gen Eq (KR)	50,884							
80 KR	5021032	Huron PV Maintain Gen Eq (KR)	42,465							
81 KR	5021914	CSUEB Fuel Cell Maintenance (GRC)	254,176	374,094	166,927	299,120	183,191	214,000		
82 KR	5021925	SF State Fuel Cell Maintenance (GRC)	300,760	495,360	280,480	424,445	345,810	193,300		
83 KR	5021928	Vaca-Dixon PV Maintain Gen Fac (GRC)	32,659	11,059	6,026	44,289	16,193	66,300	67,951	69,936
84 KR	5024089	Gates 1 PV Maintain Gen Eq (KR)	26,807							
85 KR	5024090	Guernsey Maintain Gen Eq (KR)	169,202	-3						
86 KR	5024091	West Gates PV Maintain Gen Eq (KR)	25,361							
87 KR	5025055	AltGen SCV - MWC KR Maint Alt Gen Gen	20,423	17,051	-368	-1,050	-49			

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88 KR	5029753	Cantua PV Maint Gen Eq GRC	46,130	65,762	60,748	94,405	143,000	146,656	150,940
89 KR	5029756	Five Points PV Maint Gen Eq GRC	48,476	46,696	106,287	52,567	60,200	61,739	63,543
90 KR	5029759	Gates 1 PV Maint Gen EQ GRC	38,855	26,642	64,329	22,476	93,500	95,890	98,692
91 KR	5029762	Giffen PV Maint Gen EQ GRC	52,725	23,035	65,019	21,280	154,700	158,655	163,290
92 KR	5029764	Guernsey PV Maint Gen EQ GRC	144,208	151,990	79,190	68,204	187,100	191,883	197,489
93 KR	5029768	Huron PV Maint Gen EQ GRC	21,842	200,108	71,842	38,926	108,100	110,864	114,102
94 KR	5029791	Stroud PV Maint Gen EQ GRC	383,677	89,042	71,767	658,733	141,100	144,707	148,935
95 KR	5029794	West Gates PV Maint Gen EQ GRC	8,329	31,751	33,802	13,052	119,900	122,965	126,558
96 KR	5029797	Westside PV Maint Gen EQ GRC	453,285	140,831	49,861	42,360	67,200	68,918	70,931
97 KR	5037614	Cost Model Adjustment-KR				102			
98 KR Total			1,263,089	2,156,183	1,272,922	1,404,278	1,608,900	1,232,287	1,268,288 Lines 73-97
99									
100 KS	5021616	Westside PV Maintain Bldgs & Grnd (KS)	77,330						
101 KS	5021618	Stroud PV Maintain bldgs & Grnd (KS)	85,505						
102 KS	5021620	Five Points PV Maint Bldgs & Grnd (KS)	78,055						
103 KS	5021623	Giffen PV Maintain Bldgs & Grnd (KS)	81,190						
104 KS	5021625	Cantua PV Maintain Bldgs & Grnd (KS)	87,149						
105 KS	5021627	Huron PV Maintain Bldgs & Grnd (KS)	72,707						
106 KS	5021913	CSUEB Fuel Cell Maintain Buildings (GRC)	15,888	7,673	1,030	0	2,300		
107 KS	5021924	SF State Fuel Cell Maintain Buildings (G	17,444	7,698	469	0	5,400		
108 KS	5021927	Vaca-Dixon PV Maintain Buildings (GRC)	49,210	9,081	6,081	0	11,500	11,797	12,142
109 KS	5024112	Gates 1 PV Maintain Bldgs & Grnd (KS)	73,960						
110 KS	5024113	Guernsey PV Maintain Bldgs & Grnd (KS)	90,990						
111 KS	5024114	West Gates PV Maintain Bldgs & Grnd (KS)	56,932						
112 KS	5029752	Cantua PV Maint Bldgs & Grnd GRC	54,246	295,033	7,946	54,628	30,100	30,884	31,786
113 KS	5029755	Five Points PV Maint Bldgs & Grnd GRC	51,022	51,174	14,034	53,900	51,000	52,319	53,848
114 KS	5029758	Gates 1 Maint Bldgs & Grnds GRC	28,906	42,562	7,751	39,596	42,300	43,467	44,778
115 KS	5029761	Giffen PV Maint Bldgs & Grnds GRC	23,791	37,273	7,069	34,856	27,500	28,207	29,031
116 KS	5029765	Guernsey PV Maint Bldgs & Grnds GRC	52,585	62,148	7,257	60,413	143,200	146,836	151,126
117 KS	5029767	Huron PV Maint Bldgs & Grnds GRC	37,770	49,187	7,989	56,865	46,900	48,131	49,538
118 KS	5029790	Stroud PV Maint Bldgs & Grnds GRC	41,046	47,093	11,636	51,727	43,200	44,343	45,639
119 KS	5029793	West Gates PV Maint Bldgs & Grnds GRC	16,865	36,429	7,318	23,687	43,200	44,290	45,583
120 KS	5029796	Westside PV Maint Bldg & Grnds GRC	40,333	52,242	12,699	54,811	54,500	55,860	57,492
121 KS Total			786,360	371,014	679,691	91,915	501,100	506,135	520,962 Lines 100-120
122									
123 OM	5033726	Oper Mgmt Oth PGEN PCC 15814	82,163	22,859	17,377	8			
124 OM	5033727	Oper Mgmt Oth PGEN PCC 11615	34,741	34,402	-201				
125 OM	5033728	Oper Mgmt Oth PGEN PCC 12676	278,790	222,873	717,002	160,350	276,698	284,187	292,754
126 OM	5034339	Oper Mgmt Oth PGEN Cap OH Cr	-33,923	-42,328	-118,574	-29,307			
127 OM	5034340	Oper Mgmt Oth PGEN NE OH Cr	-18,453						
128 OM	5034341	Oper Mgmt Oth PGEN OBS OH Cr	-282						
129 OM	5043269	Oper Mgmt Steam 12676	26,714	239,001	51,761	21,695			
130 OM	5043270	Oper Mgmt Steam 15813	2,405	4,965	2				
131 OM	5043310	Oper Mgmt Steam Cap OH Cr	-9,935	-58,661	-6,280	-2,441			
132 OM	5043944	Oper Mgmt Oth PGEN PCC 15042		54,383	4,170				

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Recorded and Forecast Expense by Planning Order									
133 OM	5044312	Oper Mgmt Oth PGEN PCC 11566	47,834	7,812	48,928	15,239	15,945		
134 OM	5047672	Oper Mgmt PGEN PCC 13733				-353			
135 OM	5047673	Oper Mgmt PGEN PCC 12692				46,880	34,637		
136 OM	5050912	Oper Mgmt Steam 11566					5,315		
137 OM Total			390,871	264,802	904,221	242,471	136,627	276,698	284,187
138									292,754 Lines 123-136
139 OS	5033934	Oper Suppt Oth PGEN PCC 14703	60,167	60,957	100,418	118,969	133,044		
140 OS	5033935	Oper Suppt Oth PGEN PCC 15056	936,085	479,201	438,212	60,924	21,912		
141 OS	5033936	Oper Suppt Oth PGEN PCC 15059	45,918	63,139					
142 OS	5033937	Oper Suppt Oth PGEN PCC 15062	102,534	98,949					
143 OS	5033938	Oper Suppt Oth PGEN PCC 15063	123,446	105,307					
144 OS	5033939	Oper Suppt Oth PGEN PCC 15202	98,345	108,852					
145 OS	5033940	Oper Suppt Oth PGEN PCC 15205	56,231	60,681	-8				
146 OS	5034369	Oper Suppt Oth PGEN Cap OH Cr	-1,086,416	-363,006	-473,818	-150,720	-285,543		
147 OS	5034370	Oper Suppt Oth PGEN NE OH Cr	-122,369	-28,607	-29,757	-10,977			
148 OS	5034371	Oper Suppt Oth PGEN OBS OH Cr	-7,175						
149 OS	5043213	Oper Suppt Steam 14703		7,531	25,104	1,757			
150 OS	5043214	Oper Suppt Steam PCC 15056		150,936	591,586	85,778			
151 OS	5043215	Oper Suppt Steam PCC 15063		11,823					
152 OS	5043216	Oper Suppt Steam PCC 15202		10,554					
153 OS	5043217	Oper Suppt Steam PCC 15205		7,194	-3				
154 OS	5043218	Oper Suppt Steam PCC 15059		7,305					
155 OS	5043219	Oper Suppt Steam PCC 15062		10,351					
156 OS	5043311	Oper Suppt Steam Cap OH Cr		-123,635	-509,740	-14,653	-37,828		
157 OS	5047671	Oper Suppt Oth PGEN PCC 14705				125,710	132,397		
158 OS	5050913	Oper Suppt Steam PCC 14703					57,019		
159 OS Total			206,764	667,531	141,994	216,787	21,001	0	0
160									0 Lines 139-158
161 Solar Sub Total			3,151,742	3,682,862	3,014,500	2,482,321	3,118,285	2,749,400	2,192,204
162									2,256,289
163 Total			51,384,863	51,400,096	51,958,616	47,587,820	49,360,438	49,292,915	50,053,844
									52,257,969

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Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	2,400,103		5-3, Line 4
2		Escalation	18,942	Includes labor and non-labor escalation	5-22, Line 4
3		Adjustment	233,556	Misc O&M	5-3, Lines 1-3
4		Total Net Change	252,497		Lines 2 + 3
5					
6	2021	Forecast	2,652,600		5-3, Line 4
7		Escalation	71,794	Includes labor and non-labor escalation	5-22, Line 4
8		Adjustment	31	Misc O&M	5-3, Lines 1-3
9		Total Net Change	71,825		Lines 7 + 8
10					
11	2022	Forecast	2,724,425		5-3, Line 4
12		Escalation	82,133	Includes labor and non-labor escalation	5-22, Line 4
13		Total Net Change	82,133		Line 12
14					
15	2023	Forecast	2,806,558		Lines 11 + 13

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Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	13,662,048		5-3, Line 18
2		Escalation	107,821	Includes labor and non-labor escalation	5-22, Line 4
3		Adjustment	-174,387	Charges to MWC KK in 2020 that should have been to MWC KM	5-3, Lines 6-8
4		Adjustment	-67,191	Misc O&M	5-3, Lines 6-8
5		Total Net Change	-133,757		Lines 2 + 3 + 4
6					
7	2021	Forecast	13,528,291		5-3, Line 18
8		Escalation	366,151	Includes labor and non-labor escalation	5-22, Line 4
9		Adjustment	415	Misc O&M	5-3, Lines 6-8
10		Total Net Change	366,566		Lines 8 + 9
11					
12	2022	Forecast	13,894,857		5-3, Line 18
13		Escalation	418,886	Includes labor and non-labor escalation	5-22, Line 4
14		Total Net Change	418,886		Line 13
15					
16	2023	Forecast	14,313,743		Lines 12 + 14

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Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	27,784,538		5-3, Line 41
2		Escalation	129,481	Includes labor and non-labor escalation on Non LTSA	5-22, Line 4
3		Adjustment	-412,410	Reduction in LTSA Costs	5-3, Lines 39 and 40
4		Adjustment	-406,226	Reduction in HBGS Major Overhaul Costs	5-3, Line 27
5		Adjustment	-226,730	Charges to MWC KK in 2020 that should have been to MWC KM	5-3, Lines 20-22
6		Adjustment	316,037	One time credit to warehouse inventory from MWC KL	5-11, Line 99
7		Adjustment	-92,348	Change in GGS and CGS Spring Outage Costs	5-3, Lines 32 and 34
8		Adjustment	115,386	Misc O&M	5-3, Lines 20-22
9		Total Net Change	-576,811		Lines 2 + 3 + 4 + 5 + 6 + 7 + 8
10					
11	2021	Forecast	27,207,727		5-3, Line 41
12		Escalation	439,605	Includes labor and non-labor escalation on Non LTSA	5-22, Line 4
13		Adjustment	354,491	Increase in LTSA Costs	5-3, Lines 39 and 40
14		Adjustment	126	Change in GGS and CGS Spring Outage Costs	5-3, Lines 32 and 34
15		Adjustment	134	Misc O&M	5-3, Lines 20-22
16		Total Net Change	794,356		Lines 12 + 13 + 14 + 15
17					
18	2022	Forecast	28,002,083		5-3, Line 41
19		Escalation	502,911	Includes labor and non-labor escalation on Non LTSA	5-22, Line 4
20		Adjustment	-478,348	Reduction in LTSA Costs	5-3, Lines 39 and 40
21		Adjustment	1,045,877	HBGS 1 additional Engine overhaul	5-3, Line 27
22		Adjustment	470,923	Change in GGS and CGS Spring Outage Costs	5-3, Lines 32 and 34
23		Adjustment	-26	Misc O&M	5-3, Lines 20-22
24		Total Net Change	1,541,337		Lines 19 + 20 + 21 + 22 + 23
25					
26	2023	Forecast	29,543,420		Lines 18 + 24

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Ln. No.		Worksheet for MWC KL adjustment: One time credit to warehouse inventory from MWC KL			Posting Date	Quantity Entered	Amount
1	Planning Order	Material					
2	5015794	GGs Maint Fossil Generating Equip	M022854	PLUG TUBE 1-1/4" X 1-1/2" A-105 #05-112	02/11/2020	-1	-\$47.38
3	5015794	GGs Maint Fossil Generating Equip	M022856	PLUG TUBE 1-1/4" X 1-1/2" F-22 #22-112	02/11/2020	-1	-\$55.62
4	5015794	GGs Maint Fossil Generating Equip	M041099	FILTER MELT BLOWN NOMINAL	10/28/2020	-2	-\$86.52
5	5015794	GGs Maint Fossil Generating Equip	M041099	FILTER MELT BLOWN NOMINAL	04/08/2020	-31	-\$1,015.56
6	5015794	GGs Maint Fossil Generating Equip	M050500	SWITCH PRESSURE LOW COMBUSTION AIR	05/14/2020	-1	-\$355.45
7	5015794	GGs Maint Fossil Generating Equip	M050549	CONTROLLER ELECTRONIC FA 1.4	09/16/2020	-1	-\$300.54
8	5015794	GGs Maint Fossil Generating Equip	M050688	ELEMENT FILTER KIT AFCD ANALYZER	09/16/2020	-1	-\$422.56
9	5015794	GGs Maint Fossil Generating Equip	M050962	RING ANTI-EXTRUSION # 23B6125X012	03/12/2020	-1	-\$593.78
10	5015794	GGs Maint Fossil Generating Equip	M050988	RING SEAT #23A5802X022	03/12/2020	-1	-\$3,924.47
11	5015794	GGs Maint Fossil Generating Equip	M051292	THRUST BEARING #112016X012	02/11/2020	-1	-\$1,296.30
12	5015794	GGs Maint Fossil Generating Equip	M051372	CAGE A7 CAV111 2 # 24A6559X012	03/12/2020	-1	-\$6,793.59
13	5015794	GGs Maint Fossil Generating Equip	M051585	PUMP KIT #9267	02/11/2020	-1	-\$111.33
14	5015794	GGs Maint Fossil Generating Equip	M053809	PLUG SPARK SPRING 358A3213P001	02/11/2020	-1	-\$305.70
15	5015794	GGs Maint Fossil Generating Equip	M053819	PLUG SPARK IGNITER ASSY 362A3952P001	06/23/2020	-4	-\$13,964.07
16	5015794	GGs Maint Fossil Generating Equip	M054361	SHIM THRUST #28C6704P0003	07/22/2020	-1	-\$1,974.19
17	5015794	GGs Maint Fossil Generating Equip	M054365	VALVE GAS FUEL STOP	05/14/2020	-1	-\$89,678.93
18	5015794	GGs Maint Fossil Generating Equip	M054606	BOARD INTERFACE MD #IS200EXMDG1B	09/10/2020	-2	-\$3,314.20
19	5015794	GGs Maint Fossil Generating Equip	M061462	NUT CASTLE 3-9/16" DIA ALLOY STEEL	10/28/2020	-1	-\$181.25
20	5015794	GGs Maint Fossil Generating Equip	M064217	VALVE SERVO #351A7620P0102	08/26/2020	-4	-\$17,400.16
21	5015794	GGs Maint Fossil Generating Equip	M064231	FITTING #U236X00P0230	02/10/2020	-4	-\$456.06
22	5015794	GGs Maint Fossil Generating Equip	M064245	FITTING THERMOCOUPLE #295A2948P0001	02/11/2020	-1	-\$192.87
23	5015794	GGs Maint Fossil Generating Equip	M064246	TCPL T/3 #U252E085U0032	02/10/2020	-2	-\$445.36
24	5015794	GGs Maint Fossil Generating Equip	M064248	TCPL #U252E088U0030	04/30/2020	2	\$495.54
25	5015794	GGs Maint Fossil Generating Equip	M064251	GAUGE/SWITCH DIFF PRESSURE 354A3224P0	09/11/2020	-4	-\$3,814.36
26	5015794	GGs Maint Fossil Generating Equip	M064251	GAUGE/SWITCH DIFF PRESSURE 354A3224P0	04/29/2020	2	\$1,776.22
27	5015794	GGs Maint Fossil Generating Equip	M064293	PANEL MIST ELIMINATOR #8PP-30068-04	10/15/2020	-6	-\$369.04
28	5015794	GGs Maint Fossil Generating Equip	M064327	TC TYPE K WITH STUDS #361A2289P135	04/30/2020	-3	-\$1,345.83
29	5015794	GGs Maint Fossil Generating Equip	M064377	CARTRIDGE PURIFIER # HA0139P02	03/12/2020	-1	-\$362.64
30	5015794	GGs Maint Fossil Generating Equip	M064397	TUBE SHRINKABLE #286A6364P002	11/17/2020	-10	-\$20.35
31	5015794	GGs Maint Fossil Generating Equip	M064397	TUBE SHRINKABLE #286A6364P002	09/11/2020	-10	-\$20.35
32	5015794	GGs Maint Fossil Generating Equip	M064414	TUBE SHRINKABLE #286A6364P002	04/30/2020	10	\$18.29
33	5015794	GGs Maint Fossil Generating Equip	M064414	PROBE & BRG ASSY PROXIMITY 109E3763G00	11/17/2020	-1	-\$1,886.64
34	5015794	GGs Maint Fossil Generating Equip	M064417	NOZZLE TOTAL FLOODING #287A7403P565	02/10/2020	-1	-\$331.77
35	5015794	GGs Maint Fossil Generating Equip	M064498	PS 24V 2A PHOENIX GE # PTB#2938730	09/10/2020	-1	-\$176.01
36	5015794	GGs Maint Fossil Generating Equip	M064510	INTERFACE ETHERNET VERSAMAX IC200EBI0	09/10/2020	-1	-\$847.60
37	5015794	GGs Maint Fossil Generating Equip	M064534	ESWB ETHERNET SWITCH # IS420ESWBH3A	11/12/2020	-2	-\$3,827.26
38	5015794	GGs Maint Fossil Generating Equip	M064620	GASKET COOLER 31683866P0001	08/12/2020	-5	-\$274.60
39	5015794	GGs Maint Fossil Generating Equip	M064931	LOCKNUT STEEL # N265BP00037	10/28/2020	-14	-\$13.30
40	5015794	GGs Maint Fossil Generating Equip	M065149	GASKET TURBINE GAS #233C1848P0003	03/12/2020	-3	-\$33.23
41	5015794	GGs Maint Fossil Generating Equip	M065214	GASKET STYLE "R" TURBINE GAS	07/27/2020	-2	-\$179.46
42	5015794	GGs Maint Fossil Generating Equip	M065243	GASKET TURBINE GAS #320B5992P0001	10/20/2020	-5	-\$179.46
43	5015794	GGs Maint Fossil Generating Equip	M065243	GASKET TURBINE GAS #320B5992P0001	05/14/2020	-2	-\$45.67
44	5015794	GGs Maint Fossil Generating Equip	M065243	GASKET TURBINE GAS #320B5992P0001	02/10/2020	2	\$45.67
45	5015794	GGs Maint Fossil Generating Equip	M065404	HOSE FLEXIBLE METAL #356A1793P003	10/28/2020	-1	-\$874.15
46	5015794	GGs Maint Fossil Generating Equip	M065413	HOSE FLEXIBLE METAL #356A1793P111	08/13/2020	-1	-\$522.10
47	5015794	GGs Maint Fossil Generating Equip	M065424	GASKET TURBINE GAS #357A2304P0001	12/28/2020	-4	-\$1,580.92
48	5015794	GGs Maint Fossil Generating Equip	M065424	GASKET TURBINE GAS #357A2304P0001	11/18/2020	4	\$743.30
49	5015794	GGs Maint Fossil Generating Equip	M065424	GASKET TURBINE GAS #357A2304P0001	02/10/2020	-2	-\$371.65
50	5015794	GGs Maint Fossil Generating Equip	M065439	HOSE FLEXIBLE METAL #366A2336P024	08/13/2020	-1	-\$842.68
51	5015794	GGs Maint Fossil Generating Equip	M065446	HOSE FLEXIBLE METAL #366A2336P032	08/26/2020	-2	-\$1,465.33
52	5015794	GGs Maint Fossil Generating Equip	M065459	HOSE FLEXIBLE METAL #366A2336P045	11/06/2020	-1	-\$871.73

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53	5015794	GGG Maint Fossil Generating Equip	M065468	HOSE FLEXIBLE METAL #366A2336P053	08/13/2020	-1	-\$797.15
54	5015794	GGG Maint Fossil Generating Equip	M065471	HOSE FLEXIBLE METAL #366A2336P056	07/27/2020	-1	-\$683.83
55	5015794	GGG Maint Fossil Generating Equip	M065493	GASKET SPIRAL WOUND #N5605P02501G1	09/04/2020	-3	-\$18.95
56	5015794	GGG Maint Fossil Generating Equip	M065511	GASKET TURBINE GAS #U336W034D0156	03/12/2020	-10	-\$75.40
57	5015794	GGG Maint Fossil Generating Equip	M065512	GASKET (B8AAC2) #U336W060D0178	02/11/2020	-10	-\$236.63
58	5015794	GGG Maint Fossil Generating Equip	M065540	VALVE SOLENOID #354A1617P001	05/14/2020	-1	-\$3,635.13
59	5015794	GGG Maint Fossil Generating Equip	M065541	TRANSMITTER PRESSURE #385A4245P002	09/30/2020	-2	-\$5,863.33
60	5015794	GGG Maint Fossil Generating Equip	M065542	VALVE VENT AY #363A5550P003	10/27/2020	-2	-\$6,094.64
61	5015794	GGG Maint Fossil Generating Equip	M065590	WEIGHT & SCREW BALANCE #323B7411G0004	03/12/2020	-20	-\$1,996.65
62	5015794	GGG Maint Fossil Generating Equip	M065593	WEIGHT & SCREW BALANCE #323B7411G0004	02/11/2020	-12	-\$2,039.64
63	5015794	GGG Maint Fossil Generating Equip	M065594	WEIGHT & SCREW BALANCE #323B7410G0003	06/09/2020	-25	-\$7,197.12
64	5015794	GGG Maint Fossil Generating Equip	M065600	TRANSDUCER -42 L08- TURBINE STEAM	06/08/2020	-1	-\$692.36
65	5015794	GGG Maint Fossil Generating Equip	M065634	ACCUMULATOR HYDRAULIC #354A3299P002	07/22/2020	-1	-\$3,484.81
66	5015794	GGG Maint Fossil Generating Equip	M067455	HEX-NUT (1.00-8NC-2B) # U613X000P0208	03/12/2020	-10	-\$334.30
67	5015794	GGG Maint Fossil Generating Equip	M067476	LOCKWASHER EXT TOOTH #N403P00062	03/12/2020	-4	-\$7.04
68	5015794	GGG Maint Fossil Generating Equip	M067623	PIPE VIGV ARR #298A8538P003 TURBINE ST	09/10/2020	-1	-\$15.27
69	5015794	GGG Maint Fossil Generating Equip	M067642	STUD TE 1.5-8 X 10" #35383538P009	10/20/2020	-2	-\$84.58
70	5015794	GGG Maint Fossil Generating Equip	M067680	TERMINATION UNIT #NTCF23	09/10/2020	-1	-\$9,238.84
71	5015794	GGG Maint Fossil Generating Equip	M067766	FILTER ELEMENT	03/23/2020	-6	-\$1,128.65
72	5015794	GGG Maint Fossil Generating Equip	M067789	TC CABLE ASSY (4 COND) #224C5607G0006	03/12/2020	-2	-\$932.92
73	5015794	GGG Maint Fossil Generating Equip	M067794	BOLT JACKING N846 #336A9107P001	03/12/2020	-2	-\$852.84
74	5015794	GGG Maint Fossil Generating Equip	M067829	RELAY #RL4RD040TK STEAM GENERATOR	09/10/2020	-1	-\$215.74
75	5015794	GGG Maint Fossil Generating Equip	M067830	RELAY AUXILIARY C2000 STEAM GENERATOR	09/10/2020	-1	-\$105.60
76	5015794	GGG Maint Fossil Generating Equip	M069832	POWER SUPPLY MKVe # 259B2451EZG01	11/12/2020	-1	-\$10,097.26
77	5015794	GGG Maint Fossil Generating Equip	M069880	BRACKET MOUNTING 3300 XL 50MM#33087903	03/12/2020	-4	-\$957.00
78	5015794	GGG Maint Fossil Generating Equip	M069906	THRUST PROBE # 351A9623P950	09/11/2020	-2	-\$4,399.72
79	5015794	GGG Maint Fossil Generating Equip	M069920	BOARD POWER DISTRIBUTION # IS200JPDVG	09/10/2020	-2	-\$5,511.75
80	5015794	GGG Maint Fossil Generating Equip	M069921	MODULE MARKVE MVRA # IS210MVRH2A	09/10/2020	-1	-\$9,864.35
81	5015794	GGG Maint Fossil Generating Equip	M069922	MODULE MARKVE MVRA # IS210MVRH1A	09/10/2020	-2	-\$18,896.92
82	5015794	GGG Maint Fossil Generating Equip	M069923	MODULE MARKVE MVRA # IS210MVRCH1A	09/10/2020	-1	-\$10,596.29
83	5015794	GGG Maint Fossil Generating Equip	M069924	MODULE MARKVE MVRA # IS210MVRFH1A	09/10/2020	-1	-\$11,723.50
84	5015794	GGG Maint Fossil Generating Equip	M072012	REPAIR KIT ACTUATOR CDT&S-040 720-009914	02/11/2020	-1	-\$71.21
85	5015794	GGG Maint Fossil Generating Equip	M072031	ELEMENT AFTER FILTER 16D33 #240-494-000	04/30/2020	-2	-\$628.59
86	5015794	GGG Maint Fossil Generating Equip	M072035	FILTER 1/4" INLINE #230-041-440	02/11/2020	-2	-\$738.70
87	5015794	GGG Maint Fossil Generating Equip	M073301	SCANNER AIR BLOWER # 2BH18000AK06-Z	07/01/2020	-1	-\$4,626.74
88	5015794	GGG Maint Fossil Generating Equip	M232480	PROBE 3300 8MM BENTLY 3/8-24 UNF	02/10/2020	-2	-\$467.12
89	5015794	GGG Maint Fossil Generating Equip	M232482	CABLE EXTENSION 8MM & 3300 5MM	02/10/2020	-1	-\$374.98
90	5015794	GGG Maint Fossil Generating Equip	M232509	EXPANSION DIFFERENTIAL BRACKET KIT	05/07/2020	-1	-\$236.97
91	5015794	GGG Maint Fossil Generating Equip	M234198	RESISTOR 10W - 120 OHM	05/12/2020	-10	-\$717.35
92	5015794	GGG Maint Fossil Generating Equip	M270697	BRUSH EXCITER # 323B7988P0005	06/03/2020	-120	-\$3,597.00
93	5015794	GGG Maint Fossil Generating Equip	M270712	FILTER STEEL 30X10X2	07/08/2020	-2	-\$508.71
94	5015794	GGG Maint Fossil Generating Equip	M330184	FUSE	05/28/2020	-1	-\$8.74
95	5015794	GGG Maint Fossil Generating Equip	M343704	RELAY # D15C931	03/12/2020	-3	-\$639.76
96	5015794	GGG Maint Fossil Generating Equip	M376821	RELAY MULTILIN 750 FEEDER PROTECTION S	11/06/2020	-1	-\$8,576.94
97	5015794	GGG Maint Fossil Generating Equip	M376821	RELAY MULTILIN 750 FEEDER PROTECTION S	06/23/2020	-4	-\$34,307.76
98	5015794	GGG Maint Fossil Generating Equip	M490802	COMPOUND SEALING #164A7363P0009	03/12/2020	-8	-\$2,731.08
99							-\$316,036.57

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Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	2,237,837		5-4, Line 46
2		Escalation	17,661	Includes labor and non-labor escalation	5-22, Line 4
3		Adjustment	401,117	Charges to MWC KK and KL in 2020 that should have been to MWC KM	5-3 and 4, Lines 43-45
4		Adjustment	221,585	Misc O&M	5-3 and 4, Lines 43-45
5		Total Net Change	640,363		Lines 2 + 3 + 4
6					
7	2021	Forecast	2,878,200		5-4, Line 46
8		Escalation	77,900	Includes labor and non-labor escalation	5-22, Line 4
9		Adjustment	-13	Misc O&M	5-3 and 4, Lines 43-45
10		Total Net Change	77,887		Lines 8 + 9
11					
12	2022	Forecast	2,956,087		5-4, Line 46
13		Escalation	89,117	Includes labor and non-labor escalation	5-22, Line 4
14		Total Net Change	89,117		Line 13
15					
16	2023	Forecast	3,045,204		Lines 12 + 14

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Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	1,080,067		5-4, Line 71
2		Escalation	7,730		
3		Adjustment	-210,973	Includes labor and non-labor escalation for fossil and solar	5-22, Line 5
4		Adjustment	-237,425	Fuel Cells retirement	5-4, Lines 54-55
5		Total Net Change	-440,667	Misc O&M	5-4, Lines 60-68
6					Lines 2 + 3 + 4
7	2021	Forecast	639,400		5-4, Line 71
8		Escalation	6,043	Includes labor and non-labor escalation for fossil and solar	5-22, Line 5
9		Adjustment	-202,435	Fuel Cells retirement	5-4, Lines 54-55
10		Adjustment	10,774	Misc O&M	5-4, Lines 60-68
11		Total Net Change	-185,618		Lines 8 + 9 + 10
12					
13	2022	Forecast	453,782		5-4, Line 71
14		Escalation	13,257	Includes labor and non-labor escalation for solar	5-22, Line 5
15		Total Net Change	13,257		Line 14
16					
17	2023	Forecast	467,039		Lines 13 + 15

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 5
 Natural Gas and Solar Generation Operations
 Expense Walk by Major Work Category KR
 (Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	1,607,734		5-5, Line 98
2		Escalation	10,862	Includes labor and non-labor escalation for fossil and solar	5-22, Line 5
3		Adjustment	-125,876	Fuel Cells retirement	5-4, Lines 81-82
4		Adjustment	116,180	Misc O&M	5-4 and 5, Lines 88-96
5		Total Net Change	1,166		Lines 2 + 3 + 4
6					
7	2021	Forecast	1,608,900		5-5, Line 98
8		Escalation	51,626	Includes labor and non-labor escalation for fossil and solar	5-22, Line 5
9		Adjustment	-418,324	Fuel Cells retirement	5-4, Lines 81-82
10		Adjustment	-9,916	Misc O&M	5-4 and 5, Lines 88-96
11		Total Net Change	-376,613		Lines 8 + 9 + 10
12					
13	2022	Forecast	1,232,287		5-5, Line 98
14		Escalation	36,001	Includes labor and non-labor escalation for solar	5-22, Line 5
15		Total Net Change	36,001		Line 14
16					
17	2023	Forecast	1,268,288		Lines 13 + 15

Pacific Gas and Electric Company
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Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Expense Walk by Major Work Category KS
(Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	430,484		5-5, Line 121
2		Escalation	1,626	Includes labor and non-labor escalation for fossil and solar	5-22, Line 5
3		Adjustment	68,990	Misc O&M	5-5, Lines 112-120
4		Total Net Change	70,616		Lines 2 + 3
5					
6	2021	Forecast	501,100		5-5, Line 121
7		Escalation	13,098	Includes labor and non-labor escalation for fossil and solar	5-22, Line 5
8		Adjustment	-7,908	Fuel Cells retirement	5-5, Lines 106-107
9		Adjustment	-155	Misc O&M	5-5, Lines 112-120
10		Total Net Change	5,035		Lines 7 + 8 + 9
11					
12	2022	Forecast	506,135		5-5, Line 121
13		Escalation	14,787	Includes labor and non-labor escalation for solar	5-22, Line 5
14		Adjustment	40	Misc O&M	5-5, Lines 112-120
15		Total Net Change	14,827		Lines 13 + 14
16					
17	2023	Forecast	520,962		Lines 12 + 15

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

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	136,627		5-6, Line 137
2		Escalation	1,078	Includes labor and non-labor escalation	5-22, Line 4
3		Adjustment	138,993	Misc O&M	5-5, Lines 123-126
4		Total Net Change	140,071		Lines 2 + 3
5					
6	2021	Forecast	276,698		5-6, Line 137
7		Escalation	7,489	Includes labor and non-labor escalation	5-22, Line 4
8		Total Net Change	7,489		Line 7
9					
10	2022	Forecast	284,187		5-6, Line 137
11		Escalation	8,567	Includes labor and non-labor escalation	5-22, Line 4
12		Total Net Change	8,567		Line 11
13					
14	2023	Forecast	292,754		Lines 10 + 12

Pacific Gas and Electric Company
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 Exhibit (PG&E-5), Chapter 5
 Natural Gas and Solar Generation Operations
 Expense Walk by Major Work Category OS
 (Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	21,001		5-6, Line 159
2		Adjustment	-21,001	Misc O&M	5-6, Line 159
3		Total Net Change	-21,001		Line 2
4					
5	2021	Forecast	0		5-6, Line 159
6		Escalation	0	Includes labor and non-labor escalation	5-22, Line 4
7		Total Net Change	0		Line 6
8					
9	2022	Forecast	0		5-6, Line 159
10		Escalation	0	Includes labor and non-labor escalation	5-22, Line 4
11		Total Net Change	0		Line 10
12					
13	2023	Forecast	0		Lines 9 + 11

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation 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	5	AK	Manage Environmental Oper	2,289	2,387	108	no	5%	no	no	no	
2	5	5	KK	Operate Fossil Generation	12,675	11,949	(726)	no	-6%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
3	5	5	KL	Maint Fossil Generating Equip	30,506	30,131	(375)	no	-1%	no	no	no	
4	5	5	KM	Maint Fossil Bldg, Grnd, Infrast	2,166	2,308	142	no	7%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
5	5	5	KQ	Operate Alternative Gen	1,102	1,156	53	no	5%	no	no	no	
6	5	5	KR	Maint AltGen Generating Equip	1,263	2,156	893	no	71%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
7	5	5	KS	Maint AltGen Bldg, Grnd, Infrast	786	371	(415)	no	-53%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
8	5	5	OM	Operational Management	391	265	(126)	no	-32%	yes	yes	yes	Changes in Overhead cost allocations
9	5	5	OS	Operational Support	207	668	461	no	223%	yes	yes	yes	Changes in Overhead cost allocations

Pacific Gas and Electric Company

2023 General Rate Case

Exhibit (PG&E-5), Chapter 5

Natural Gas and Solar Generation 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	5	AK	Manage Environmental Oper	2,397	2,166	(231)	no	-10%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
2	5	5	KK	Operate Fossil Generation	11,949	11,544	(405)	no	-3%	no	no	no	
3	5	5	KL	Maint Fossil Generating Equip	30,131	32,061	1,930	yes	6%	yes	no	no	
4	5	5	KM	Maint Fossil Bldg, Grnd, Infrast	2,308	2,127	(181)	no	-8%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
5	5	5	KQ	Operate Alternative Gen	1,156	1,062	(94)	no	-8%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
6	5	5	KR	Maint AltGen Generating Equip	2,156	1,273	(883)	no	-41%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
7	5	5	KS	Maint AltGen Bldg, Grnd, Infrast	371	680	309	no	83%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
8	5	5	OM	Operational Management	265	904	639	no	241%	yes	yes	yes	Changes in Overhead cost allocations
9	5	5	OS	Operational Support	668	142	(526)	no	-79%	yes	yes	yes	Changes in Overhead cost allocations

Pacific Gas and Electric Company

2023 General Rate Case

Exhibit (PG&E-5), Chapter 5

Natural Gas and Solar Generation 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	5	AK	Manage Environmental Oper	2,166	2,266	100	no	5%	no	no	no	
2	5	5	KK	Operate Fossil Generation	11,544	12,497	953	no	8%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
3	5	5	KL	Maint Fossil Generating Equip	32,061	27,486	(4,575)	yes	-14%	yes	yes	no	Routine O&M cost category always fluctuates year to year.
4	5	5	KM	Maint Fossil Bldg, Grnd, Infrast	2,127	2,397	271	no	13%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
5	5	5	KQ	Operate Alternative Gen	1,062	986	(76)	no	-7%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
6	5	5	KR	Maint AltGen Generating Equip	1,273	1,404	131	no	10%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
7	5	5	KS	Maint AltGen Bldg, Grnd, Infrast	680	92	(588)	no	-86%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
8	5	5	OM	Operational Management	904	243	(662)	no	-73%	yes	yes	yes	Changes in Overhead cost allocations
9	5	5	OS	Operational Support	142	217	75	no	53%	yes	yes	yes	Changes in Overhead cost allocations

Pacific Gas and Electric Company

2023 General Rate Case

Exhibit (PG&E-5), Chapter 5

Natural Gas and Solar Generation 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	5	AK	Manage Environmental Oper	2,266	2,400	134	no	6%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
2	5	5	KK	Operate Fossil Generation	12,497	13,662	1,165	yes	9%	yes	no	no	
3	5	5	KL	Maint Fossil Generating Equip	27,486	27,785	298	no	1%	no	no	no	
4	5	5	KM	Maint Fossil Bldg, Grnd, Infrast	2,397	2,248	(150)	no	-6%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
5	5	5	KQ	Operate Alternative Gen	986	1,080	94	no	10%	yes	no	yes	Routine O&M cost category always fluctuates year to year.
6	5	5	KR	Maint AltGen Generating Equip	1,404	1,608	203	no	14%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
7	5	5	KS	Maint AltGen Bldg, Grnd, Infrast	92	431	339	no	368%	yes	yes	yes	Routine O&M cost category always fluctuates year to year.
8	5	5	OM	Operational Management	243	137	(106)	no	-44%	yes	yes	yes	Changes in Overhead cost allocations
9	5	5	OS	Operational Support	217	21	(196)	no	-90%	yes	yes	yes	Changes in Overhead cost allocations

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Expense Escalation

Line No. 1 Standing Order Escalation Rates for GRC

	2021	2022	2023	2024	2025	2026
Fossil Expense	0.79%	2.71%	3.01%	2.77%	2.64%	2.71%
Solar Expense	0.38%	2.56%	2.92%	2.63%	2.48%	2.56%

6 7 01. GRC 2023 Planning Guidelines Q1 2020

Table 15
Forecast Labor Escalation Rates 2021 - 2026

	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 Company	3.03%	3.47%	3.47%	3.47%	3.47%	3.47%

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

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

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

Line No.	Year	Gas Plant			Electric Plant			Fossil		Common	
		Gas	Dist.	Storage	Electric	Trans	Nuclear	Hydro	Gen	Plant	Plant
37	2013	1.70%	1.70%	-0.70%	3.60%	1.90%	1.90%	1.70%	1.40%	4.90%	4.90%
38	2014	2.80%	2.80%	6.00%	3.10%	1.80%	1.50%	1.60%	3.30%	1.50%	1.50%
39	2015	2.30%	2.30%	-1.10%	2.40%	2.10%	5.30%	2.70%	2.60%	5.70%	5.70%
40	2016	2.40%	2.40%	-0.30%	1.60%	2.10%	3.60%	2.50%	3.10%	2.20%	2.20%
41	2017	2.60%	2.60%	5.20%	3.30%	1.80%	0.20%	1.60%	0.50%	0.30%	0.30%
42	2018	2.40%	3.00%	2.60%	3.10%	2.60%	1.90%	2.00%	2.20%	2.70%	2.70%
43	2019	3.10%	5.90%	4.00%	5.80%	5.80%	5.00%	4.60%	4.00%	3.60%	3.60%
44	2020	1.90%	0.00%	1.30%	3.30%	1.70%	1.50%	2.10%	1.90%	3.40%	3.40%
45	2021	1.10%	0.00%	0.90%	2.80%	1.70%	1.90%	2.10%	2.10%	2.50%	2.50%
46	2022	1.70%	3.10%	1.80%	2.60%	1.80%	1.90%	2.10%	1.70%	2.90%	2.90%
47	2023	2.30%	3.00%	2.20%	2.70%	2.20%	2.20%	2.20%	2.00%	3.40%	3.40%
48	2024	2.50%	2.50%	2.40%	2.70%	2.20%	2.20%	2.20%	2.20%	3.90%	3.90%
49	2025	2.30%	2.80%	2.30%	2.70%	2.00%	2.20%	2.20%	2.10%	3.80%	3.80%
50	2026	2.30%	3.10%	2.30%	2.70%	2.00%	2.20%	2.20%	2.10%	3.80%	3.80%

Row Labels	2019 Actual Fossil		Solar	
	EXPENSE \$	EXPENSE %	EXPENSE \$	EXPENSE %
Labor	7,413	38.38%	671	27.01%
Non-Labor	11,904	61.62%	1,813	72.99%
Grand Total	19,318	100.00%	2,483	100.00%

Labor Escalation Rates:

Line No.	Year	O&M	A&G	Total Company
1	2014	2.78%	2.99%	2.79%
2	2015	2.79%	2.97%	2.79%
3	2016	3.05%	3.14%	3.06%
4	2017	3.16%	3.36%	3.17%
5	2018	3.30%	3.28%	3.30%
6	2019	3.26%	3.28%	3.26%
7	2020	3.18%	3.08%	3.18%
8	2021	3.02%	3.06%	3.03%
9	2022	3.52%	3.28%	3.47%
10	2023	3.52%	3.28%	3.47%
11	2024	3.52%	3.28%	3.47%
12	2025	3.52%	3.28%	3.47%
13	2026	3.52%	3.28%	3.47%

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
O&M Expense Forecast Drivers
(Dollars)

Line No.	2020 Recorded	Amount	Reference
1		49,360,438	5-6, Line 163
2	Escalation	2,494,566	5-7, Lines 2, 7 and 12, 5-8 Lines 2, 8 and 13, 5-9, Lines 2, 12 and 19, 5-12, Lines 2, 8 and 13, 5-13, Lines 2, 8 and 14, 5-14, Lines 2, 8 and 14, 5-15, Lines 2, 7 and 13, 5-16, Lines 2, 7 and 11, 5-17, Lines, 6 and 10
3	Misc O&M	570,357	5-7, Lines 3 and 8, 5-8 Lines 3, 4 and 9, 5-9, Lines 5, 8, 15 and 23, 5-12, Lines 3, 4 and 9, 5-13 Lines 4 and 10, 5-
4	HBGS 1 additional Engine overhaul	639,651	14 Lines 4 and 10, 5-15 Lines 3, 9 and 14, 5-16, Line 3, 5-17, Line 2
5	Increase in GGS and CGS Spring Outage Costs	378,700	5-9, Lines 4 and 21
6	One time credit to warehouse inventory from MWC KL	316,037	5-9, Line 22
7	Fuel Cells retirement	(965,515)	5-9, Line 6
8	Reduction in LTSA Costs	(536,267)	5-13, Line 3 and 9, 5-14, Lines 3 and 9, 5-15, Line 8
9	2023 Forecast	52,257,967	5-9, Lines 3, 13 and 20
			5-6, Line 163

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation 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	5245434	HBGS Level 3 Generator Inspections	C3 - Assessment or Inspection of Systems	KL	116
3	5016230	CGS Maint Fossil Generating Equip	C5 - Maintaining the Systems	KL	5,014
4	5015794	GGs Maintain Fossil Generation Equipment	C5 - Maintaining the Systems	KL	4,891
5	5016234	HBGS Maintain Fossil Generation Equip.	C5 - Maintaining the Systems	KL	2,490
6	5016232	CGS Maint Fossil Bldg, Grnd, Infrast.	C5 - Maintaining the Systems	KM	2,242
7	5027013	ENG: Fossil High Energy Piping	C5 - Maintaining the Systems	KK	1,085
8	5015796	GGs Maint Fossil Bldg, Grnd, Infrast.	C5 - Maintaining the Systems	KM	501
9	5016236	HBGS Maintain Generation Facility Struct	C5 - Maintaining the Systems	KM	302
10	5015950	CGS Operate Fossil Generation Facilities	C6 - Operating the Facility Within Requirements	KK	5,229
11	5015793	GGs Operate Fossil Generation Facilities	C6 - Operating the Facility Within Requirements	KK	4,003
12	5015949	HBGS Operate Fossil Generation Facilities	C6 - Operating the Facility Within Requirements	KK	3,949
13	5016233	HBGS Manage Environmental Operations	C6 - Operating the Facility Within Requirements	AK	1,385
14	5016229	CGS Manage Environmental Operations	C6 - Operating the Facility Within Requirements	AK	750
15	5015792	GGs Manage Environmental Operations	C6 - Operating the Facility Within Requirements	AK	672
16	5033728	Oper Mgmt Oth, 12676, Fossil Director	C6 - Operating the Facility Within Requirements	OM	293
17	5236248	HBGS Major Overhauls	M3 - Component Replacement or Repair Mechanical	KL	2,668
18	5247633	GGs Spring Outages	M3 - Component Replacement or Repair Mechanical	KL	1,546
19	5247923	CGS Spring Outages	M3 - Component Replacement or Repair Mechanical	KL	1,280
20	5254672	HBGS Annual Coupling Maintenance	M3 - Component Replacement or Repair Mechanical	KL	345
21	5021917	GGs Piping Mitigation / Repair	M3 - Component Replacement or Repair Mechanical	KL	126
22	5021910	CGS Piping Mitigation / Repair	M3 - Component Replacement or Repair Mechanical	KL	115
23	5254673	HBGS Annual Turbo Charger Maintenance	M3 - Component Replacement or Repair Mechanical	KL	112
24	Varies	CGS LTSA	M3 - Component Replacement or Repair Mechanical	KL	5,147
25	Varies	GGs LTSA	M3 - Component Replacement or Repair Mechanical	KL	5,695
26					
27			Total		49,954

Gateway and Colusa Long Term Service Agreement

Confidential in its Entirety

WP 5-25 through WP 5-41

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

			Capital Expenditures											
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
No.	MWC	MWC Description	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Recorded Adjusted	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast	Reference
1	3	Office Furniture & Equipment	-	109	33	111	-	-	-	-	-	-	-	-
2	5	Tools & Equipment	359	273	264	114	153	382	389	397	405	414	423	-
3	2R	Instl/Rpl for Fossil Safety&Reg	2,664	1	52	30	454	-	-	-	-	-	-	-
4	2S	Instal/Repl Fossil Gnerating Eqp	9,771	4,495	4,822	4,252	12,480	11,756	7,175	6,640	7,929	8,568	6,196	-
5	2T	Instl/Repl Fossil BldgGrndInfrest	795	363	202	981	2,331	200	100	1,578	110	-	-	-
6	3A	Instl/Rpl for AltGen Safety&Reg	17	438	92	-	-	6	6	7	7	7	7	-
7	3B	Instal/Repl AltGen GneratingEqp	12	72	961	236	557	688	700	714	730	745	760	-
8	3D	Construct New Alternative Gen	868	-	-	-	-	-	-	-	-	-	-	-
9		Grand Total	14,486	5,753	6,427	5,723	15,375	13,033	8,370	9,335	9,181	9,733	7,386	Lines 1-8

Pacific Gas and Electric Company									
2023 GRC									
Exhibit (PG&E-5), Chapter 5									
Natural Gas & Solar Generation Operations									
Forecast Capital Expenditures Summary									
(Thousands of Nominal Dollars)									
Line No.	Description	Capital Expenditures							
		2020 CWIP	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	Projects > \$3 Million*	-	4,755	4,993	4,839	4,391	4,941	6,578	
2	Other Work	9,568	8,278	3,377	4,496	4,790	4,793	808	
3	Total	9,568	13,033	8,370	9,335	9,181	9,733	7,386	Lines 1-3

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 5 Natural Gas & Solar Generation 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							
						2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Subtotal	Reference
MWC - 2S Instal/Repl Fossil Gneratng Eqp													
1	5760804	HBSGS Engine Emissions Module Replacmnts	2S	Dec-2021	-	1,067	1,293	1,125	1,661	1,696	1,731	8,574	5-83
2	5767987	Fossil Emergent Capital Work	2S	Dec-2024	-	-	-	-	2,000	2,500	4,086	8,586	5-85
3	5794137	GGGS Evaporative Cooling	2S	May-2022	-	3,000	3,000	3,000	-	-	-	9,000	5-87
4	Total				-	4,067	4,293	4,125	3,661	4,196	5,817	26,160	Lines 1-3
MWC - 3B Instal/Repl AltGen GneratngEqp													
5	5524100	PV Cap Replace - Inverters & Panels	3B		-	688	700	714	730	745	760	4,337	5-89
6	Total				-	688	700	714	730	745	760	4,337	Line 5
7	Grand Total				-	4,755	4,993	4,839	4,391	4,941	6,578	30,496	Lines 4 and 6
8	* 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 5
Natural Gas & Solar Generation Operations
Recorded and Forecast Capital Expenditures Details - Other Work*
(Thousands of Nominal Dollars)

Line 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	3	Office Furniture & Equipment	-	109	33	111	-	-	-	-	-	-	-	
2	5	Tools & Equipment	359	273	264	114	153	382	389	397	405	414	423	
3	2R	Instl/Rpl for Fossil Safety&Reg	2,664	1	52	30	454	-	-	-	-	-	-	
4	2S	Instal/Repl Fossil Gneratng Eqp	8,221	3,474	3,160	3,054	10,926	7,690	2,882	2,515	4,268	4,372	379	
5	2T	Instl/Repl Fosl BldgGrndInfrst	795	363	202	981	2,331	200	100	1,578	110	-	-	
6	3A	Instl/Rpl for AltGen Sfty&Reg	17	438	92	-	-	6	6	7	7	7	7	
7	3B	Instal/Repl AltGen GneratngEqp	12	42	-	-	-	-	-	-	-	-	-	
8	3D	Construct New Alternative Gen	868	-	-	-	-	-	-	-	-	-	-	
9		Grand Total	12,936	4,701	3,804	4,288	13,864	8,278	3,377	4,496	4,790	4,793	808	Lines 1-8

10 * Excludes projects greater than \$3M

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 5

Natural Gas and Solar Generation Operations

Recorded and Forecast Capital Expenditures by Planning Order

Line No.	MWC	Planning Order	Description	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	05	5508459	GGG Purchase Capital Tools	7,930	128,064	130,241	132,846	135,769	138,620	141,531	
2	05	5509639	HBGS Capital Tools	144,099	118,450	120,464	122,873	125,576	128,214	130,906	
3	05	5509719	CGS Capital Tools	618	127,503	129,671	132,264	135,174	138,013	140,911	
4	05	5514039	Solar PV Purchase Capital Tools		8,349	8,491	8,661	8,852	9,038	9,227	
5	05	05 Total		152,648	382,367	388,867	396,644	405,371	413,883	422,575	Lines 1-4
6	2R	5778021	HBGS Rupture Disc Access Platforms	454,493							
8	2R	2R Total		454,493							Line 7
9	2S	5748139	CGS ZLD Spares	234			158,363				
11	2S	5760503	HBGS DCS/HMI Upgrade								
12	2S	5760751	CGS ACC Fan Vibration Mon Sys/Soft Start	-180,987			158,363	1,952,250			
13	2S	5760761	CGS Replace Unit 2 Catalyst					1,952,250			
14	2S	5760762	CGS Replace Unit 1 Catalyst								
15	2S	5760763	CGS STG Split Phase Monitoring SYS		150,000				2,000,515		
16	2S	5760788	GGG Replace CT UA Catalyst						2,000,515		
17	2S	5760790	GGG Replace CT UB Catalyst								
18	2S	5760804	HBGS Engine Emissions Module Replacmnts	1,554,509	1,066,725	1,293,359	1,125,226	1,660,981	1,695,862	1,731,475	
19	2S	5767987	Fossil Common Emergent Work					2,000,000	2,500,000	4,086,000	
20	2S	5771089	CGS 4Kv Bus Monitoring				181,590				
21	2S	5776428	CGS Blow Down External Drain				422,303				
22	2S	5776435	CGS Expansion Joint Replacement	50							
23	2S	5776440	GGG WSAC Chemical Controls		100,000						
24	2S	5776441	GGG HRSG Expansion Joints	-7,438							
25	2S	5777678	HBGS VAMP Relay Replacement	250,868							
26	2S	5781402	GGG PlantTrack Risk Evaluation Upgrade								
27	2S	5781403	GGG ACC Fan Blade Replacement				143,583				
28	2S	5781404	GGG Stack Doors and Duct Balloon System	39,371			462,375				
29	2S	5781458	CGS Hot-Reheat and Not-Return Valve Repl	2,731,337							
30	2S	5781459	GGG HRSG Stop Check Valve Replacement	-1,289							
31	2S	5781460	CGS HP to CRH Attenuator Header Repl	1,046							
32	2S	5782141	HBGS DCS WOIS	15,749							
33	2S	5784385	GGG 1st Stage HRH Bypass Desuperheater	-8,363							
34	2S	5784524	HBGS Battery and Charger Replacements	862							
35	2S	5785698	HBGS UNIC Upgrade	1,283,900	1,459,740						
36	2S	5787808	HBGS NOx and CO Analyzers	-1,396							
37	2S	5788540	HBGS Cylinder Sleeves	136,061							
38	2S	5788848	GGG Battery Bank Replacement	78,700							
39	2S	5789622	HBGG Stored Critical Capital Parts Repl	371,403	150,000	152,550	155,601	159,024	162,364	165,773	
40	2S	5790979	CGS HRSG 1 HP SH2 Tube Header Replacemen	180,489	1,900,000						
41	2S	5790980	CGS Unit 1 HRH Valve Replacement		600,000						
42	2S	5790981	CGS Replace Battery Banks	106,415							
43	2S	5790983	HBGS SCR Insulation		400,000	406,800	200,000	204,400	208,692	213,075	
44	2S	5790985	HBGS Switchyard Relay Power Supply Mod		300,000						
45	2S	5790986	HBGS GSU 115kV/60kV Gas Detectors		100,000						
46	2S	5790988	HBGS Telehandler		45,000						
47	2S	5791420	HBGS PLC Upgrade		200,000						
48	2S	5791798	CGS GE HMI System Upgrade	132,474	800,000						

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 5

Natural Gas and Solar Generation Operations

Recorded and Forecast Capital Expenditures by Planning Order

Line No.	MWCC	Planning Order	Description	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
49	2S	5791821	GGG CO2 Fire System Control Panel	292,750	600,000						
50	2S	5791822	GGG GE HMI System Upgrade	144,070	800,000						
51	2S	5791823	GGG Motor Relay Replacements		85,000						
52	2S	5792375	GGG Op Flex Balance/Advantage	1,574,337							
53	2S	5793160	HBGS UNIC Upgrade 2022			1,860,100					
54	2S	5793161	HBGS UNIC Upgrade 2023				620,000				
55	2S	5793944	HBGS Engine 5 Repair	2,197,377							
56	2S	5794136	GGG AGP Flex and Peak Firing	944,255							
57	2S	5794137	GGG Evaporative Cooling		3,000,000	3,000,000	3,000,000				
58	2S	5794138	GGG AGP Flex and Peak Firing	643,433							
59	2S	2S Total		12,480,218	11,756,465	7,175,184	6,640,120	7,928,905	8,567,947	6,196,323	Lines 10-58
60											
61	2T	5760797	GGG Warehouse Barcode System					110,070			
62	2T	5776431	CGS Control Building HVAC	40							
63	2T	5776433	CGS HRSG Roof Access			100,000					
64	2T	5779868	HBGS Warehouse & Workshop	1,704,670	200,000						
65	2T	5782180	HBGS Engine Hall Natural Gas Detector	32,606							
66	2T	5785640	CGS CO2 Fire Sys Control Panel	555,508							
67	2T	5785641	HBGS Security Camera Upgrade				207,468				
68	2T	5785699	HBGS Warehouse Racking				103,734				
69	2T	5785701	HBGS Shop Crane				259,335				
70	2T	5787803	CGS ACC Bird Screens	-2,881							
71	2T	5790982	HBGS Warehouse Outside and Road Lighting				414,936				
72	2T	5790984	HBGS Units 5 to 6 Platform Extension				311,202				
73	2T	5790987	HBGS Forklift				25,934				
74	2T	5790990	HBGS Remodel E. End of Admin. Building				255,000				
75	2T	5791863	GGG Replace/Install Facil Infra	41,004							
76	2T	2T Total		2,330,946	200,000	100,000	1,577,609	110,070			Lines 61-75
77											
78	3A	5511230	Vaca-Dixon Safety & Regulatory		6,271	6,378	6,505	6,648	6,788	6,931	
79	3A	3A Total			6,271	6,378	6,505	6,648	6,788	6,931	Line 78
80											
81	3B	5524100	PV Cap Replace - Inverters & Panels	556,664	688,123	699,821	713,818	729,522	744,842	760,483	
82	3B	3B Total		556,664	688,123	699,821	713,818	729,522	744,842	760,483	Line 81
83											
84	Total			15,974,969	13,033,225	8,370,250	9,334,695	9,180,516	9,733,460	7,386,312	

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

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	152,648		5-42, Line 5
2		Escalation	3,206	Includes labor and non-labor escalation	5-22, Line 47
3		Adjustment	226,513	Adjust to future year forecast	5-42, Line 2
4		Total Net Change	229,719		Lines 2 + 3
5					
6	2021	Forecast	382,367		5-46, Line 5
7		Escalation	6,500	Includes labor and non-labor escalation	5-22, Line 48
8		Total Net Change	6,500		Line 7
9					
10	2022	Forecast	388,867		5-46, Line 5
11		Escalation	7,777	Includes labor and non-labor escalation	5-22, Line 49
12		Total Net Change	7,777		Line 11
13					
14	2023	Forecast	396,644		5-46, Line 5
15		Escalation	8,726	Includes labor and non-labor escalation	5-22, Line 50
16		Total Net Change	8,726		Line 15
17					
18	2024	Forecast	405,371		5-46, Line 5
19		Escalation	8,513	Includes labor and non-labor escalation	5-22, Line 51
20		Total Net Change	8,513		Line 19
21					
22	2025	Forecast	413,883		5-46, Line 5
23		Escalation	8,692	Includes labor and non-labor escalation	5-22, Line 52
24		Total Net Change	8,692		Line 23
25					
26	2026	Forecast	422,575		Line 22 + 24

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Capital Walk by Major Work Category 2R
(Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	454,493		5-46, Line 8
2		Escalation	0	Includes labor and non-labor escalation	5-22, Line 47
3		Total Net Change	0		Line 2
4					
5	2021	Forecast	0		5-46, Line 8
6		Escalation	0	Includes labor and non-labor escalation	5-22, Line 48
7		Total Net Change	0		Line 6
8					
9	2022	Forecast	0		5-46, Line 8
10		Escalation	0	Includes labor and non-labor escalation	5-22, Line 49
11		Total Net Change	0		Line 10
12					
13	2023	Forecast	0		5-46, Line 8
14		Escalation	0	Includes labor and non-labor escalation	5-22, Line 50
15		Total Net Change	0		Line 14
16					
17	2024	Forecast	0		5-46, Line 8
18		Escalation	0	Includes labor and non-labor escalation	5-22, Line 51
19		Total Net Change	0		Line 18
20					
21	2025	Forecast	0		5-46, Line 8
22		Escalation	0	Includes labor and non-labor escalation	5-22, Line 52
23		Total Net Change	0		Line 22
24					
25	2026	Forecast	0		Line 21 + 23

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Capital Walk by Major Work Category 2S
(Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	12,480,218		5-47, Line 59
2		Adjustment	-12,480,218	2020 completed projects	5-46 and 47 Lines 10-58
3		Adjustment	11,756,465	2021 planned projects	5-46 and 47 Lines 10-58
4		Total Net Change	-723,753		Lines 2 + 3
5					
6	2021	Forecast	11,756,465		5-47, Line 59
7		Adjustment	-11,756,465	Projects planned to be complete 2021	5-46 and 47 Lines 10-58
8		Adjustment	7,175,184	2022 planned projects	5-46 and 47 Lines 10-58
9		Total Net Change	-4,581,281		Lines 7 + 8
10					
11	2022	Forecast	7,175,184		5-47, Line 59
12		Adjustment	-7,175,184	Projects planned to be complete 2022	5-46 and 47 Lines 10-58
13		Adjustment	6,640,120	2023 planned projects	5-46 and 47 Lines 10-58
14		Total Net Change	-535,064		Lines 12 + 13
15					
16	2023	Forecast	6,640,120		5-47, Line 59
17		Adjustment	-6,640,120	Projects planned to be complete 2023	5-46 and 47 Lines 10-58
18		Adjustment	7,928,905	2024 planned projects	5-46 and 47 Lines 10-58
19		Total Net Change	1,288,786		Lines 17 + 18
20					
21	2024	Forecast	7,928,905		5-47, Line 59
22		Adjustment	-7,928,905	Projects planned to be complete 2024	5-46 and 47 Lines 10-58
23		Adjustment	8,567,947	2025 planned projects	5-46 and 47 Lines 10-58
24		Total Net Change	639,042		Lines 22 + 23
25					
26	2025	Forecast	8,567,947		5-47, Line 59
27		Adjustment	-8,567,947	Projects planned to be complete 2025	5-46 and 47 Lines 10-58
28		Adjustment	6,196,323	2026 planned projects	5-46 and 47 Lines 10-58
29		Total Net Change	-2,371,624		Lines 27 + 28
30					
31	2026	Forecast	6,196,323		Lines 26 + 29

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 5
 Natural Gas and Solar Generation Operations
 Capital Walk by Major Work Category 2T
 (Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	2,330,946		5-47, Line 76
2		Adjustment	-2,330,946	2020 completed projects	5-47, Lines 61-75
3		Adjustment	200,000	2021 planned projects	5-47, Lines 61-75
4		Total Net Change	-2,130,946		Lines 2 + 3
5					
6	2021	Forecast	200,000		5-47, Line 76
7		Adjustment	-200,000	Projects planned to be complete 2021	5-47, Lines 61-75
8		Adjustment	100,000	2022 planned projects	5-47, Lines 61-75
9		Total Net Change	-100,000		Lines 7 + 8
10					
11	2022	Forecast	100,000		5-47, Line 76
12		Adjustment	-100,000	Projects planned to be complete 2022	5-47, Lines 61-75
13		Adjustment	1,577,609	2023 planned projects	5-47, Lines 61-75
14		Total Net Change	1,477,609		Lines 12 + 13
15					
16	2023	Forecast	1,577,609		5-47, Line 76
17		Adjustment	-1,577,609	Projects planned to be complete 2023	5-47, Lines 61-75
18		Adjustment	110,070	2024 planned projects	5-47, Lines 61-75
19		Total Net Change	-1,467,539		Lines 17 + 18
20					
21	2024	Forecast	110,070		5-47, Line 76
22		Adjustment	-110,070	Projects planned to be complete 2024	5-47, Lines 61-75
23		Adjustment	0	2025 planned projects	5-47, Lines 61-75
24		Total Net Change	-110,070		Lines 22 + 23
25					
26	2025	Forecast	0		5-47, Line 76
27		Adjustment	0	Projects planned to be complete 2025	5-47, Lines 61-75
28		Adjustment	0	2026 planned projects	5-47, Lines 61-75
29		Total Net Change	0		Lines 27 + 28
30					
31	2026	Forecast	0		Lines 26 + 29

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 5
 Natural Gas and Solar Generation Operations
 Capital Walk by Major Work Category 3A
 (Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	0		5-47, Line 79
2		Escalation	0	Includes labor and non-labor escalation	5-22, Line 47
3		Adjustment	6,271	Adjust to future year forecast	5-43, Line 79
4		Total Net Change	6,271		Lines 2 + 3
5					
6	2021	Forecast	6,271		5-47, Line 79
7		Escalation	107	Includes labor and non-labor escalation	5-22, Line 48
8		Total Net Change	107		Lines 7
9					
10	2022	Forecast	6,378		5-47, Line 79
11		Escalation	128	Includes labor and non-labor escalation	5-22, Line 49
12		Total Net Change	128		Lines 11
13					
14	2023	Forecast	6,505		5-47, Line 79
15		Escalation	143	Includes labor and non-labor escalation	5-22, Line 50
16		Total Net Change	143		Lines 15
17					
18	2024	Forecast	6,648		5-47, Line 79
19		Escalation	140	Includes labor and non-labor escalation	5-22, Line 51
20		Total Net Change	140		Lines 19
21					
22	2025	Forecast	6,788		5-47, Line 79
23		Escalation	143	Includes labor and non-labor escalation	5-22, Line 52
24		Total Net Change	143		Lines 23
25					
26	2026	Forecast	6,931		Lines 22 + 24

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Capital Walk by Major Work Category 3B
(Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference From
1	2020	Recorded Adjusted	556,664		5-47, Line 84
2		Escalation	11,690	Includes labor and non-labor escalation	5-22, Line 47
3		Adjustment	119,769	Adjust to future year forecast	5-34, Line 82
4		Total Net Change	131,459		Lines 2 + 3
5					
6	2021	Forecast	688,123		5-47, Line 84
7		Escalation	11,698	Includes labor and non-labor escalation	5-22, Line 48
8		Total Net Change	11,698		Line 7
9					
10	2022	Forecast	699,821		5-47, Line 84
11		Escalation	13,996	Includes labor and non-labor escalation	5-22, Line 49
12		Total Net Change	13,996		Line 11
13					
14	2023	Forecast	713,818		5-47, Line 84
15		Escalation	15,704	Includes labor and non-labor escalation	5-22, Line 50
16		Total Net Change	15,704		Line 15
17					
18	2024	Forecast	729,522		5-47, Line 84
19		Escalation	15,320	Includes labor and non-labor escalation	5-22, Line 51
20		Total Net Change	15,320		Line 19
21					
22	2025	Forecast	744,842		5-47, Line 84
23		Escalation	15,642	Includes labor and non-labor escalation	5-22, Line 52
24		Total Net Change	15,642		Line 23
25					
26	2026	Forecast	760,483		Lines 22 + 24

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation 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	5	03	Office Furniture & Equipment	0	109	109	no	1093862%	yes	yes	yes	Annual Capital Projects started and completed
2	5	5	05	Tools & Equipment	359	273	(86)	no	-24%	yes	yes	yes	Routine O&M Capital cost category always fluctuates year to year
3	5	5	2R	Instl/Repl for Fossil Safety&Reg	2,664	1	(2,662)	yes	-100%	yes	yes	yes	Annual Capital Projects started and completed
4	5	5	2S	Instal/Repl Fossil Generating Eqp	9,771	4,495	(5,275)	yes	-54%	yes	yes	yes	Annual Capital Projects started and completed
5	5	5	2T	Instal/Repl Fossil BldgGrndInfrst	795	363	(432)	no	-54%	yes	yes	yes	Annual Capital Projects started and completed
6	5	5	3A	Instl/Repl for AllGen Safety&Reg	17	438	421	no	2494%	yes	yes	yes	Annual Capital Projects started and completed
7	5	5	3B	Instal/Repl AllGen GeneratingEcp	12	72	60	no	504%	yes	yes	yes	Annual Capital Projects started and completed
8	5	5	3D	Construct New Alternative Gen	868		(868)	no	-100%	yes	yes	yes	2016 Final year of new construction cost

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation 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	5	03	Office Furniture & Equipment	109	33	(76)	no	-70%	yes	yes	yes	Annual Capital Projects started and completed
2	5	5	05	Tools & Equipment	273	264	(9)	no	-3%	no	no	no	
3	5	5	2R	Instal/Rpl for Fossil Safety&Reg	1	52	50	no	3465%	yes	yes	yes	Annual Capital Projects started and completed
4	5	5	2S	Instal/Repl Fossil Generating Eqp	4,495	4,622	327	no	7%	yes	no	yes	Annual Capital Projects started and completed
5	5	5	2T	Instal/Repl Fossil Bldg Grnd/Infst	363	202	(161)	no	-44%	yes	yes	yes	Annual Capital Projects started and completed
6	5	5	3A	Instal/Rpl for AltGen Safety&Reg	438	92	(345)	no	-79%	yes	yes	yes	Annual Capital Projects started and completed
7	5	5	3B	Instal/Repl AltGen GeneratingEqp	72	961	889	no	1227%	yes	yes	yes	Annual Capital Projects started and completed
8	5	5	3D	Construct New Alternative Gen	0	0	0	no	0%	no	no	no	

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 5
 Natural Gas and Solar Generation 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	5	03	Office Furniture & Equipment	33	111	78	no	237%	yes	yes	yes	Annual Capital Projects started and completed
2	5	5	05	Tools & Equipment	264	114	(151)	no	-57%	yes	yes	yes	Routine O&M Capital cost category always fluctuates year to year
3	5	5	2R	Instl/Repl for Fossil Safety&Reg	52	30	(22)	no	-43%	yes	yes	yes	Annual Capital Projects started and completed
4	5	5	2S	Instal/Repl Fossil Generating Eqp	4,822	4,252	(570)	no	-12%	yes	yes	yes	Annual Capital Projects started and completed
5	5	5	2T	Instl/Repl Fossil BldgGrndInfrastr	202	981	778	no	385%	yes	yes	yes	Annual Capital Projects started and completed
6	5	5	3A	Instl/Repl for AltGen Safety&Reg	92	(92)	(92)	no	-100%	yes	yes	yes	Annual Capital Projects started and completed
7	5	5	3B	Instal/Repl AltGen GeneratingEqp	961	236	(725)	no	-75%	yes	yes	yes	Annual Capital Projects started and completed
8	5	5	3D	Construct New Alternative Gen	0	0	0	no	0%	no	no	no	Annual Capital Projects started and completed

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 5
 Natural Gas and Solar Generation 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	5	03	Office Furniture & Equipment	111		(111)	no	-100%	yes	yes	yes	Annual Capital Projects started and completed
2	5	5	05	Tools & Equipment	114	153	39	no	34%	yes	yes	yes	Routine O&M Capital cost category always fluctuates year to year.
3	5	5	2R	Instl/Rpl for Fossil Safety&Reg	30	454	425	no	1436%	yes	yes	yes	Annual Capital Projects started and completed
4	5	5	2S	Instal/Repl Fossil Generating Eqp	4,252	12,480	8,228	yes	194%	yes	yes	yes	Annual Capital Projects started and completed
5	5	5	2T	Instl/Repl Fossil BldgGndInfra	981	2,331	1,350	yes	138%	yes	yes	yes	Annual Capital Projects started and completed
6	5	5	3A	Instl/Rpl for AltGen Safety&Reg	0	0	0	no	0%	no	no	no	Annual Capital Projects started and completed
7	5	5	3B	Instal/Repl AltGen GeneratingEqp	236	557	321	no	136%	yes	yes	yes	Annual Capital Projects started and completed
8	5	5	3D	Construct New Alternative Gen	0	0	0	no	0%	no	no	no	Annual Capital Projects started and completed

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Capital Areas of Work
(Dollars)

Line No.	MWC	Planning Order	Capital Areas of Work	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	2021-2026 Forecast	Reference
1	Varies	Varies	Reliability	9,603,330	7,577,863	3,581,646	3,228,711	3,092,946	3,615,898	5,225,332	26,322,396	Line 49
2	Varies	Varies	Environmental Regulatory Compliance & Safety	2,855,864	1,872,996	1,299,737	1,442,933	5,572,129	5,703,679	1,738,405	17,629,879	Line 72
3	Varies	Varies	Critical Infrastructure	1,775,438	200,000	100,000	1,266,407	110,070	0	0	1,676,476	Line 89
4	Varies	Varies	Efficiency/Productivity	152,648	382,367	388,867	396,644	405,371	413,883	422,575	2,409,707	Line 97
5	Varies	Varies	Capacity Enhancement	1,587,888	3,000,000	3,000,000	3,000,000	0	0	0	9,000,000	Line 55
6	Varies	Varies										
7	Varies	Varies										
8	Varies	Varies										
9			Total	15,974,969	13,033,225	8,370,250	9,334,695	9,180,516	9,733,460	7,386,312	57,038,458	Lines 2-6
Support for Reliability Area of Work Category												
10	MWC	Planning Order	Project Description	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	2021-2026 Forecast	Reference
11	3B	5524100	PV Cap Replace - Inverters & Panels	556,664	688,123	699,821	713,818	729,522	744,842	760,483	4,336,608	5-47, Line 82
12	2S	5748139	CGS ZLD Spares	234			158,363				158,363	5-46, Line 10
13	2S	5760503	HBGS DCS/HMI Upgrade	-180,987							0	5-46, Line 11
14	2S	5760751	CGS ACC Fan Vibration Mon Sys/Soft Start		150,000		158,363				158,363	5-46, Line 12
15	2S	5760763	CGS STG Split Phase Monitoring SYS					2,000,000	2,500,000	4,086,000	150,000	5-46, Line 15
16	2S	5767987	Fossil Common Emergent Work								8,586,000	5-46, Line 19
17	2S	5771089	CGS 4Kv Bus Monitoring				181,590				181,590	5-46, Line 20
18	2S	5776428	CGS Blow Down External Drain				422,303				422,303	5-46, Line 21
19	2S	5776435	CGS Expansion Joint Replacement	50							0	5-46, Line 22
20	2S	5776441	CGS HRSG Expansion Joints	-7,438							0	5-46, Line 24
21	2S	5777678	HBGS VAMP Relay Replacement	250,868							0	5-46, Line 25
22	2S	5781402	HBGS PlantTrack Risk Evaluation Upgrade				143,583				143,583	5-46, Line 26
23	2S	5781403	CGS ACC Fan Blade Replacement			462,375	475,090				937,465	5-46, Line 27
24	2S	5781404	CGS Stack Doors and Duct Balloon System	39,371							0	5-46, Line 28
25	2S	5781458	CGS Hot-Reheat and Not-Return Valve Repl	2,731,337							0	5-46, Line 29
26	2S	5781459	CGS HRSG Stop Check Valve Replacement	-1,289							0	5-46, Line 30
27	2S	5781460	CGS HP to CRH Attenuator Header Repl	1,046							0	5-46, Line 31
28	2S	5782141	HBGS DCS WOIS	15,749							0	5-46, Line 32
29	2S	5784385	CGS 1st Stage HRH Bypass Desuperheater	-8,363							0	5-43, Line 33
30	2S	5784524	HBGS Battery and Charger Replacements	862							0	5-46, Line 34
31	2S	5785698	HBGS UNIC Upgrade	1,283,900	1,459,740						1,459,740	5-46, Line 35
32	2S	5788940	HBGS Cylinder Sleeves	136,061							0	5-46, Line 37
33	2S	5788848	CGS Battery Bank Replacement	78,700							0	5-46, Line 38
34	2S	5789622	HBGS Stored Critical Capital Parts Repl	371,403	150,000	152,550	155,601	159,024	162,364	165,773	945,312	5-46, Line 39
35	2S	5790979	CGS HRSG 1 HP SH2 Tube Header Replacemen	180,489	1,900,000						1,900,000	5-46, Line 40
36	2S	5790980	CGS Unit 1 HRH Valve Replacement		600,000						600,000	5-46, Line 41
37	2S	5790981	CGS Replace Battery Banks	106,415							0	5-46, Line 42
38	2S	5790983	HBGS SCR Insulation		400,000	406,800	200,000	204,400	208,692	213,075	1,632,967	5-46, Line 43
39	2S	5790985	HBGS Switchyard Relay Power Supply Mod		300,000						300,000	5-46, Line 44
40	2S	5790988	HBGS Telehandler		45,000						45,000	5-46, Line 46
41	2S	5791420	HBGS PLC Upgrade		200,000						200,000	5-46, Line 47
42	2S	5791798	CGS GE HMI System Upgrade	132,474	800,000						800,000	5-47, Line 48
43	2S	5791822	CGS GE HMI System Upgrade	144,070	800,000						800,000	5-47, Line 50
44	2S	5791823	CGS Motor Relay Replacements		85,000						85,000	5-47, Line 51
45	2S	5792375	CGS Op Flex Balance/Advantage	1,574,337							0	5-47, Line 52
46	2S	5793160	HBGS UNIC Upgrade 2022			1,860,100					1,860,100	5-47, Line 53
47	2S	5793161	HBGS UNIC Upgrade 2023				620,000				620,000	5-47, Line 54
48	2S	5793944	HBGS Engine 5 Repair	2,197,377							0	5-47, Line 55
49			Total	9,603,330	7,577,863	3,581,646	3,228,711	3,092,946	3,615,898	5,225,332	26,322,396	Lines 11-48
Support for Capacity Increase Area of Work Category												
50												
51	2S	5794136	GGG AGP Flex and Peak Firing	944,255							0	5-47, Line 56
52	2S	5794137	GGG Evaporative Cooling		3,000,000	3,000,000	3,000,000				9,000,000	5-47, Line 57
53	2S	5794138	CGS AGP Flex and Peak Firing	643,433							0	5-47, Line 58

WP 5-59

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

The Electric Distribution deferred work analysis follows the principles for determining if work was deferred set forth in PG&E's 2020 GRC Settlement Agreement. Each MAT or MWC in this

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	MAT CODE	Description	Check 2				Deferred Work	Explanation	Units Comparison			Dollar Comparison (\$000s)			Workpaper Reference
						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)	Difference	
1	5	Capital	5	N/A	Tools & Equipment	No	No	N/A	N/A	No	Work not utilized but includes discrete projects, none of which were required for safety and reliability.	N/A	N/A	N/A	\$ 924	\$ 741	\$ 183	5-46, Line 5
2	5	Capital	2R	N/A	Instl/Repl for Fossil Safety&Reg	No	No	N/A	N/A	No	Work not utilized but includes discrete projects. All projects needed for safety and reliability were completed.	N/A	N/A	N/A	\$ 454	\$ -	\$ 454	5-46, Line 7
3	5	Capital	2S	N/A	Instal/Repl Fossil Generating Equip	No	No	N/A	N/A	No	Work not utilized but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were rescheduled to the 2023 GRC period. All projects needed for safety and reliability were completed.	N/A	N/A	N/A	\$ 31,412	\$ 10,139	\$ 21,273	5-47, Line 59
4	5	Capital	2T	N/A	Instl/Repl Fossil BldgGrndInfstr	No	No	N/A	N/A	No	Work not utilized but includes discrete projects, none of which were required for safety and reliability.	N/A	N/A	N/A	\$ 2,631	\$ -	\$ 2,631	5-47, Line 76
5	5	Capital	3A	N/A	Instl/Repl for AltGen Safety&Reg	No	No	N/A	N/A	No	Work not utilized but includes discrete projects. All projects needed for safety and reliability were completed.	N/A	N/A	N/A	\$ 13	\$ 49	\$ (36)	5-47, Line 79
6	5	Capital	3B	N/A	Instal/Repl AltGen Generating Equip	No	No	N/A	N/A	No	Work not utilized but includes discrete projects. All projects needed for safety and reliability were completed.	N/A	N/A	N/A	\$ 1,945	\$ 1,391	\$ 553	5-47, Line 82
7	5	Expense	AB	N/A	Misc Expense	No	No	N/A	N/A	No	Work not utilized. No safety and reliability work.	N/A	N/A	N/A	\$ -	\$ 114	\$ (114)	N/A
8	5	Expense	AK	N/A	Manage Environmental Oper	No	No	N/A	N/A	No	Work not utilized. No safety and reliability work.	N/A	N/A	N/A	\$ 7,777	\$ 5,421	\$ 2,356	5-3, Line 4
9	5	Expense	KK	N/A	Operate Fossil Generation	No	No	N/A	N/A	No	Work not utilized. All critical safety and reliability work was completed.	N/A	N/A	N/A	\$ 41,085	\$ 26,477	\$ 14,608	5-3, Line 18
10	5	Expense	KL	N/A	Maint Fossil Generating Equip	No	No	N/A	N/A	No	Work not utilized but includes discrete projects. All projects needed for safety and reliability were completed.	N/A	N/A	N/A	\$ 82,994	\$ 63,514	\$ 19,481	5-3, Line 41
11	5	Expense	KM	N/A	Maint Fossil Bldg	No	No	N/A	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ 8,072	\$ 6,050	\$ 2,022	5-4, Line 46
12	5	Expense	KQ	N/A	Operate Alternative Gen	No	No	N/A	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ 2,173	\$ 1,704	\$ 469	5-4, Line 71
13	5	Expense	KR	N/A	Maint AltGen Generating Equip	No	No	N/A	N/A	No	Work not utilized. All critical safety and reliability work was completed.	N/A	N/A	N/A	\$ 4,449	\$ 6,866	\$ (2,407)	5-5, Line 98
14	5	Expense	KS	N/A	Maint AltGen Bldg	No	No	N/A	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ 1,438	\$ 1,041	\$ 396	5-5, Line 121
15	5	Expense	OM	N/A	Operational Management	No	No	N/A	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ 698	\$ 582	\$ 135	5-6, Line 137
16	5	Expense	OS	N/A	Operational Support	No	No	N/A	N/A	No	Work not utilized.	N/A	N/A	N/A	\$ 21	\$ 2,187	\$ (2,166)	5-6, Line 159
17											Capital Total	\$ 37,378	\$ 12,320	\$ 25,058				
18											Expense Total	\$ 148,707	\$ 113,927	\$ 34,780				

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Cancelled Work from 2020 GRC Forecast

Line	MWC	Planning Order	Description	Needed to Provide Safe and Reliable Service in 2020 GRC?	Reason Cancelled
1			None		

Rescheduled Work from 2020 GRC Forecast to 2023 GRC Forecast

Line	MWC	Planning Order	Description	Needed to Provide Safe and Reliable Service in 2020 GRC?	Reason Rescheduled
6					
7	2S	5760761	CGS Replace Unit 1 Nox Catalyst	No	Testing showed that catalyst replacement wasn't necessary during 2020 GRC time period. A proper working catalyst is required to adequately control air emissions and to be in compliance with the air permit. This is considered a regulatory compliance driven project.
8	2S	5760762	CGS Replace Unit 2 Nox Catalyst	No	Testing showed that catalyst replacement wasn't necessary during 2020 GRC time period. A proper working catalyst is required to adequately control air emissions and to be in compliance with the air permit. This is considered a regulatory compliance driven project.
9					
10					
11					

Rescheduled Work from 2020 GRC Forecast and may be included in a future GRC but not included in 2023 GRC Forecast

Line	MWC	Planning Order	Description	Needed to Provide Safe and Reliable Service in 2020 GRC?	Reason Rescheduled
15					
16			None		
17					
18					
19					
20					
21					

Note: All of the above projects were less than \$3 million.

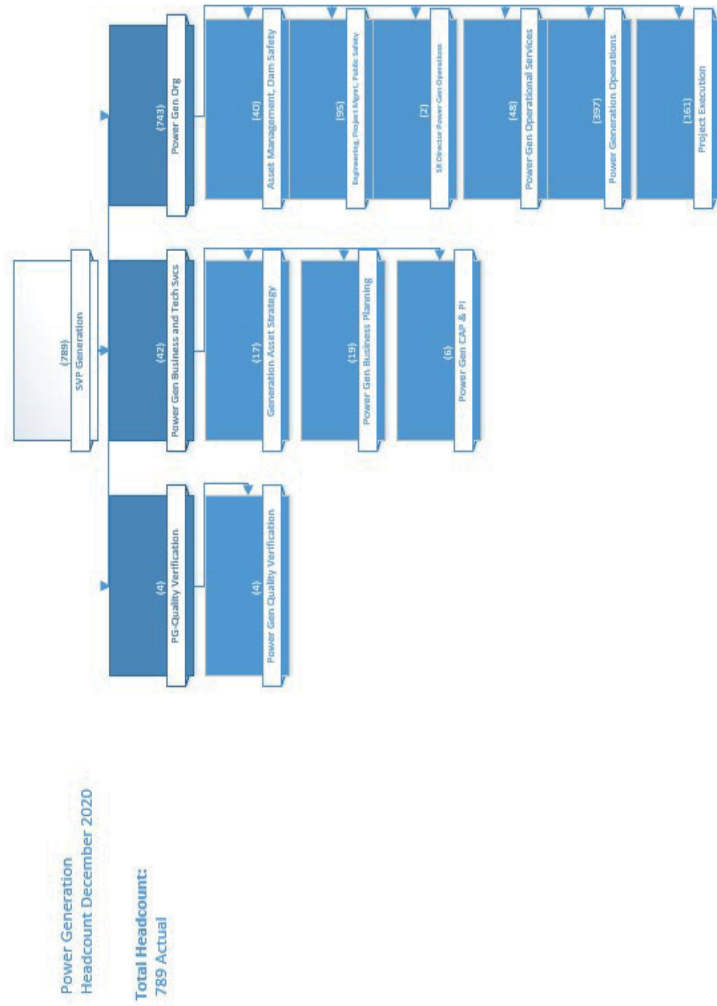
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Risk Register Mapping - Capital
(Thousands of Nominal Dollars)

Planning			2023		
Line No.	Order	Planning Order Description	Mitigation or Control Name	MWC	Forecast (\$000)
1	Extended Unplanned Shutdown of a Critical Power Generation Asset				
2	5771089	CGS 4Kv Bus Monitoring	M2 - Component Replacement or Repair Electrical	2S	182
3	5781402	GGs PlantTrack Risk Evaluation Upgrade	M2 - Component Replacement or Repair Electrical	2S	144
4	5793161	HBGS UNIC Upgrade 2023	M2 - Component Replacement or Repair Electrical	2S	620
5	5794137	GGs Evaporative Cooling	M3 - Component Replacement or Repair Mechanical	2S	3,000
6	5760804	HBGS Engine Emissions Module Replacmnts	M3 - Component Replacement or Repair Mechanical	2S	1,125
7	5781403	GGs ACC Fan Blade Replacement	M3 - Component Replacement or Repair Mechanical	2S	475
8	5776428	CGS Blow Down External Drain	M3 - Component Replacement or Repair Mechanical	2S	422
9	5790983	HBGS SCR Insulation	M3 - Component Replacement or Repair Mechanical	2S	200
10	5748139	CGS ZLD Spares	M3 - Component Replacement or Repair Mechanical	2S	158
11	5789622	HBGS Annual Stored Critical Capital Prts	M3 - Component Replacement or Repair Mechanical	2S	156
12	5785641	HBGS Security Camera Upgrade	M4 - External Event Mitigation	2T	207
13					
14					
Total					6,689

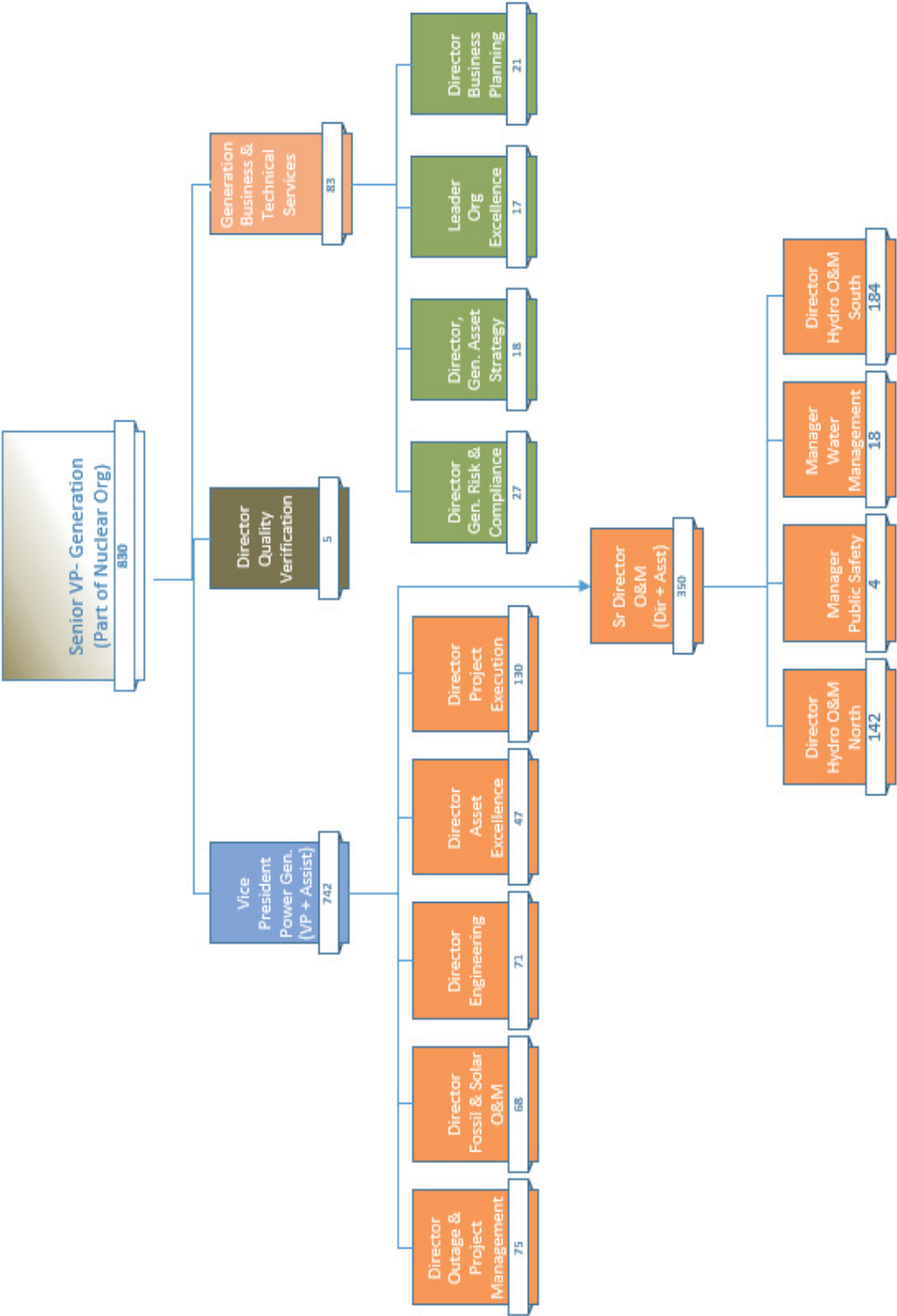
Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-5), Chapter 5
 Power Generation
 Headcount Forecast

Line No.	PG Quality Verification	Generation Asset Strategy	PG Business Planning	PG CAP & Performance Improvements (PI)	Asset Management, Dam Safety	Engineering, Project Mgmt, Public Safety	Senior Director PG Operation	PG Operational Services	PG Operations	Project Execution	Total
1	2020 Actual Headcount (as of December 31, 2020)	17	19	6	40	95	2	48	397	161	789
2											
3	Fill existing vacancies										
4		1	1	2	6	7	-	6	11	6	41
5	2021 Forecast Headcount	18	20	8	46	102	2	54	408	167	830
6											
7											
8	PG Quality Verification	Generation Asset Strategy	PG Business Planning	PG Risk & Compliance	Outage & Project Management	Engineering	PG SR Director O&M	PG Asset Excellence	Fossil & Solar	Project Execution	PG VP Immediate Office
9	2022 & 2023 New Organization Forecast Headcount	18	21	27	75	71	350	47	68	130	17
											830

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



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



Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 5
Natural Gas and Solar Generation Operations
Decommissioning Forecast (MWC 55)
Thousands of Dollars

Line No.		thru 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1	HBPP	30,136	1,262	1,438	22	22	22	22	0	0	0	0	0	0	0	0	0	0	0
2	Kern	9,139	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	HBPP	167,983	636	490	510	485	485	495	71	71	71	71	71	71	71	71	71	71	71
4	Gateway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Colusa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Humboldt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Fuel Cell	0	0	1,082	0	0	0	0	0	0	0	0	0	0	0	0	795	19,881	19,881
9	Total	207,258	1,998	3,010	532	507	507	517	71	71	71	71	71	71	71	71	866	19,952	19,952
10																			
11																			
12	HBPP	30,136	1,269	1,494	23	24	24	25	0	0	0	0	0	0	0	0	0	0	0
13	Kern Demo	9,139	102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	HBPP	167,983	650	509	541	525	537	559	82	84	85	85	87	89	90	92	94	96	100
15	Gateway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Colusa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	Humboldt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Fuel Cell	0	0	1,192	0	0	0	0	0	0	0	0	0	0	0	0	1,276	32,488	33,078
20	Total	207,258	2,041	3,195	564	549	561	584	82	84	85	87	89	90	92	94	1,372	32,586	33,177
21																			
22																			
23																			

	Total Cost	Total Spent Thru 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
HBPP	33,016	(30,136)	(1,289)	(1,494)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kern	9,241	(8,139)	(1,02)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HBPP	173,916	(167,983)	(650)	(509)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gateway	18,415	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colusa	19,374	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Humboldt	9,541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solar	101,310	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Cell	1,192	0	0	(1,192)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	366,005	(207,258)	(2,041)	(3,195)	564	549	561	584	82	84	85	87	89	90	92	94	1,372	32,586	33,177

	Total Cost	Remaining Liability at 1/1/2023	Check
HBPP	33,016	97	97
Kern	9,241	(0)	0
HBPP	173,916	4,774	4,774
Gateway	18,415	18,415	18,415
Colusa	19,374	19,374	19,374
Humboldt	9,541	9,541	9,541
Solar	101,310	101,310	101,310
Fuel Cell	1,192	0	0
Total	366,005	153,511	153,511

Pacific Gas and Electric Company
2023 General Rate Case
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Natural Gas and Solar Generation Operations
Decommissioning Forecast (MWC 55)
Thousands of Dollars

Line No.	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	Total	Reference From
1 HBPP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,924	5-68, Line 6
2 Kern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,239	5-68, Line 9
3 HBPP	71	71	71	71	71	71	71	71	71	71	71	71	71	71	172,859	5-68, Line 3
4 Gateway	0	0	9,201	0	0	0	0	0	0	0	0	0	0	0	9,201	5-70, Line 47
5 Colusa	0	0	0	10,552	0	0	0	0	0	0	0	0	0	0	10,552	5-72, Line 37
6 Humboldt	0	0	0	4,675	0	0	0	0	0	0	0	0	0	0	4,675	5-71, Line 39
7 Solar	20,347	0	0	0	0	0	0	0	0	0	0	0	0	0	60,905	5-74, Line 65
8 Fuel Cell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,082	5-75, Line 17
9 Total	20,418	71	9,272	15,208	71	71	71	71	71	71	71	71	71	71	301,437	Lines 1-8
10																
11																
12																
13 HBPP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,016	Line 1 * 5-77
14 Kern Demo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,241	Line 2 * 5-77
15 HBPP	102	104	106	108	110	112	114	117	119	121	124	126	126	126	173,916	Line 3 * 5-77
16 Gateway	0	0	18,415	0	0	0	0	0	0	0	0	0	0	0	18,415	Line 4 * 5-76
17 Colusa	0	0	0	19,374	0	0	0	0	0	0	0	0	0	0	19,374	Line 5 * 5-76
18 Humboldt	0	0	0	9,541	0	0	0	0	0	0	0	0	0	0	9,541	Line 6 * 5-76
19 Solar	34,468	0	0	0	0	0	0	0	0	0	0	0	0	0	101,310	Line 7 * 5-76
20 Fuel Cell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,192	Line 8 * 5-76
21 Total	34,570	104	18,521	25,022	110	112	114	117	119	121	124	126	126	126	386,005	Lines 13-20
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
32																
33																

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 5
Natural Gas and Solar Generation Operations
Remediation and Decommissioning Forecast (MWC 55)
Thousands of Dollars

Remediation Department - 2023 GRC MWC 55 Input and yearly forecast costs

Thousands of Dollars																													
Line No.	Project Name	Actual costs thru 2020			Forecasts			At Completion		Forecast																			
								Completion		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037			
1	Hunters Point Power Plant	Remediation	\$	89,539	\$	2,272	\$	91,811	\$	82	\$	82	\$	102	\$	77	\$	77	\$	77	\$	77	\$	71	\$	71	\$	71	
2		Decommissioning	\$	78,444	\$	2,604	\$	81,048	\$	554	\$	408	\$	408	\$	408	\$	418	\$	-	\$	-	\$	-	\$	-	\$	-	
3		Total	\$	167,983	\$	4,876	\$	172,859	\$	636	\$	490	\$	510	\$	485	\$	495	\$	71	\$	71	\$	71	\$	71	\$	71	
4																													
5	Humboldt Power Plant	Remediation	\$	30,136	\$	549	\$	30,684	\$	438	\$	22	\$	22	\$	22	\$	22	\$	22	\$	22	\$	71	\$	71	\$	71	
6		Decommissioning	\$	-	\$	2,240	\$	2,240	\$	824	\$	1,416	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	
7		Total	\$	30,136	\$	2,789	\$	32,924	\$	1,262	\$	1,438	\$	22	\$	22	\$	22	\$	22	\$	22	\$	71	\$	71	\$	71	
8																													
9	Kern Power Plant	Remediation	\$	7,360	\$	-	\$	7,360	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	
10		Decommissioning	\$	1,779	\$	100	\$	1,879	\$	100	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	
	Total	\$	207,258	\$	7,765	\$	215,022	\$	1,998	\$	1,928	\$	532	\$	507	\$	507	\$	517	\$	71	\$	71	\$	71	\$	71	\$	71

Remediation – Environmental Remediation of chemical impacts to the environment that are associated with the historic operation of the Power Plant
Decommissioning – Dismantling of the former power plant to remove above ground and below ground structures associated with the Power Plant

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 5
Natural Gas and Solar Generation Operations
Remediation and Decommissioning Forecast (MWC 55)
Thousands of Dollars

Remediation Department - 2023 GRC MWC 55 Inf

Thousands of Dollars																
Line No.	Project Name		2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
1	Hunters Point Power Plant	Remediation	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71
2		Decommissioning														
3		Total	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71
4																
5	Humboldt Power Plant	Remediation														
6		Decommissioning														
7		Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
8		Remediation														
9	Kern Power Plant	Decommissioning														
10		Total	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71	\$ 71

Remediation – Environmental Remediation of chem
Decommissioning – Dismantling of the former pow

Dismantling Cost Estimate presented in 2014 GRC

Gateway Generating Station

Project number 1609: Fossil Units - 2008 DCEs Incorporates 1-year average 2011 Scrap Prices

Line No.	Activities (Costs in 2008 dollars)	Unit 1	Unit 2	Unit 3	Common	Station	Station Total
1	Gateway Unit Rating (MW e)	180	180	250	610		
2	Plant / Unit used as a Cost Basis (adjusted for rating)	not used	not used	not used	not used		
3	Station "Basis" Unit Rating	180	180	250	610		
4							
5	Characterization / Temporary Services	76,000	76,000	88,000	0	75,000	315,000
6							
7	Scaffolding / Worker Access	0	0	0	0		0
8							
9	Asbestos Remediation	0	0	0	0		0
10							
11	Equipment Removal	1,213,121	1,213,121	841,058	1,409,401		4,676,701
12							
13	Boiler(s)	0	0	0	0		0
14							
15	Structures Demolition	576,317	576,317	1,008,054	1,649,361		3,810,049
16							
17	Backfill / Grade / Landscaping	191,318	191,318	214,307	429,457	-	1,026,400
18							
19	Activities currently under contract					0	0
20							
21	Ongoing environmental monitoring (quarterly for 5 years)					123,000	123,000
22							
23	Utility Management / Oversight					598,639	598,639
24							
25	Demolition Contractor Management / Supervisory / Safety Staff					908,494	908,494
26							
27	Security					278,206	278,206
28							
29	Property Taxes	-	-	-	-	-	0
30							
31	Project Expenses						
32	Shared Heavy Equipment / Operating Engineers					747,807	747,807
33	Small Tool Allowance	23,344	23,344	24,419	39,591	n/a	110,698
34	Utilities Allowance (Office Equip & supplies / Telephone, Electric etc.)					21,934	21,934
35	Permits					117,401	117,401
36	Demolition Contractors Insurance					343,274	343,274
37	Demolition Contractors Fee					1,396,158	1,396,158
38							
39	Sub-Total					14,473,760	
40							
41	Contingency						2,171,064
42							
43	Project Total (before scrap credit)						16,644,824
44							
45	Scrap Credit (Average 2011 Scrap Prices)	(2,001,317)	(2,001,317)	(1,883,891)	(1,557,065)	-	(7,443,590)
46							
47	Project Total						9,201,234

Dismantling Cost Estimate presented in 2014 GRC

PG&E - HBGS

Project number 1609: Fossil Units - 2008 DCEs Incorporates 1-year average 2011 Scrap Prices

Line No.	Activities (Costs in 2008 dollars)	Unit, each (typ. of 10)	Common	Station	Station Total
1	PG&E - Humboldt Unit Rating (MW/e)	16	160		
2	Plant / Unit used as a Cost Basis (adjusted for rating)	not used	not used		
3	Station "Basis" Unit Rating	160	160		
4					
5	Characterization / Temporary Services	13,000	0	50,000	180,000
6					
7	Equipment Removal	152,193	131,083		1,653,017
8					
9	Structures Demolition	189,212	85,157		1,977,274
10					
11	Backfill / Grade / Landscaping	14,353	261,313	-	404,846
12					
13	Ongoing environmental monitoring (quarterly for 5 years)			121,000	121,000
14					
15	Utility Management / Oversight			401,933	401,933
16					
17	Demolition Contractor Management / Supervisory / Safety Staff			852,479	852,479
18					
19	Security			225,790	225,790
20					
21	Property Taxes	-	-	-	0
22					
23	Project Expenses				
24	Shared Heavy Equipment / Operating Engineers			643,425	643,425
25	Small Tool Allowance	4,185	5,420	n/a	47,274
26	Utilities Allowance (Office Equip & supplies / Telephone, Electric etc.)			17,801	17,801
27	Permits			58,971	58,971
28	Demolition Contractors Insurance			172,429	172,429
29	Demolition Contractors Fee			644,380	644,380
30					
31	Sub-Total				7,400,620
32					
33	Contingency				1,110,093
34					
35	Project Total (before scrap credit)				8,510,713
36					
37	Scrap Credit (Average 2011 Scrap Prices)		(373,089)	(105,110)	(3,835,998)
38					
39	Project Total				4,674,715

Dismantling Cost Estimate presented in 2014 GRC

Colusa Generating Station Pacific Gas & Electric Company

By TLG

Line No.	Activities (Costs in 2012 dollars)	Unit 1	Unit 2	Unit 3	Common	Station	Station Total
1	Colusa Generating Station Unit Rating (MW/e)					657	
2							
3	Characterization / Temporary Services	82,000	82,000	96,000	0	75,000	335,000
4							
5	Equipment Removal	1,320,480	1,320,480	909,900	1,261,757		4,812,618
6							
7	Structures Demolition	610,582	610,582	1,075,659	1,521,620		3,818,443
8							
9	Backfill / Grade / Landscaping	225,937	225,937	247,544	550,983	-	1,250,402
10							
11	Ongoing environmental monitoring (quarterly for 5 years)					156,000	156,000
12							
13	Utility Management / Oversight					620,925	620,925
14							
15	Demolition Contractor Management / Supervisory / Safety Staff					938,336	938,336
16							
17	Security					287,598	287,598
18							
19	Property Taxes	-	-	-	-	-	0
20							
21	Project Expenses						
22	Shared Heavy Equipment / Operating Engineers					734,781	734,781
23	Small Tool Allowance	25,413	25,413	26,435	37,845	n/a	115,106
24	Utilities Allowance (Office Equip & supplies / Telephone, Electric etc.)					21,264	21,264
25	Permits					121,819	121,819
26	Demolition Contractors Insurance					356,194	356,194
27	Demolition Contractors Fee					1,445,703	1,445,703
28							
29	Sub-Total						15,014,189
30							
31	Contingency						2,252,128
32							
33	Project Total (before scrap credit)						17,266,318
34							
35	Scrap Credit	(1,883,151)	(1,883,151)	(1,794,154)	(1,153,972)	-	(6,714,428)
36							
37	Project Total						10,551,890

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Solar Demolition Summary

Line No.		Total	Per MW	Reference
Guernsey Decommissioning Study 2015 Dollars				
1	84,000 Panels	\$ 140,000	\$ 7,000	
2	12.5% for Overhead and Profit	\$ 136,014	\$ 6,801	
3				
4				
5	Mobilization, (Characterization/Temporary Services)	\$ 4,024,902	\$ 201,245	
6	Electrical Distribution, (Inverters, Transformers and Switchgear)	\$ 812,884	\$ 40,644	
7	Photovoltaic Array Removal,	\$ 66,936	\$ 3,347	
8	(Panels, Support Structures, Tracking Motors, Combiner Boxes and Associated Wiring)	\$ 507,228	\$ 25,361	
9	Excavation of Buried Cables	\$ 167,672	\$ 8,384	
10	Structures Demolition, (Buildings and Foundations)	\$ 359,203	\$ 17,960	
11	Backfill/Grade/Landscaping	\$ 148,036	\$ 7,402	
12	Utility Management Oversight, (PG&E)	\$ 348,998	\$ 17,450	
13	Demolition Contractor Management/Supervision/Safety Staff	\$ 111,759	\$ 5,588	
14	Security	\$ 29,309	\$ 1,465	
15	Heavy Equipment/Operating Engineers	\$ 81,715	\$ 4,086	
16	Small Tool Allowance, (2% of Craft Labor)	\$ 192,280	\$ 9,614	
17	Utilities Allowances	\$ 806,503	\$ 40,325	
18	Permits			
19	Demolition Contractors Insurance			
20	Demolition Contractors Fee			
21		Sub Total \$ 7,933,440	\$ 396,672	Lines 5-20
22	Contingency, (15%)	\$ 1,203,617	\$ 60,181	
23		Total Before Scrap Credit \$ 9,137,057	\$ 456,853	Line 21 + Line 22
24	Scrap Credit	\$ (718,311)	\$ (35,916)	
25		Total \$ 8,418,746	\$ 420,937	Line 23 + Line 24
26				
Huron Decommissioning Study, Used for all Stations Except Guernsey				
27	90,500 Panels			
28	12.5% for Overhead and Profit			
29				
30				
31	Mobilization, (Characterization/Temporary Services)	\$ 140,000	\$ 7,000	
32	Electrical Distribution, (Inverters, Transformers and Switchgear)	\$ 136,014	\$ 6,801	
33				
34	Photovoltaic Array Removal,	\$ 4,010,076	\$ 200,504	
35	(Panels, Support Structures, Tracking Motors, Combiner Boxes and Associated Wiring)	\$ 878,448	\$ 43,922	
36	Excavation of Buried Cables	\$ 66,936	\$ 3,347	
37	Structures Demolition, (Buildings and Foundations)	\$ 541,774	\$ 27,089	
38	Backfill/Grade/Landscaping	\$ 167,672	\$ 8,384	
39	Utility Management Oversight, (PG&E)	\$ 359,203	\$ 17,960	
40	Demolition Contractor Management/Supervision/Safety Staff,	\$ 148,036	\$ 7,402	
41	Security	\$ 348,998	\$ 17,450	
42	Heavy Equipment/Operating Engineers	\$ 113,465	\$ 5,673	
43	Small Tool Allowance, (2% of Craft Labor)	\$ 29,309	\$ 1,465	
44	Utilities Allowances	\$ 82,803	\$ 4,140	
45	Permits	\$ 194,839	\$ 9,742	
46	Demolition Contractors Insurance	\$ 817,833	\$ 40,892	
47	Demolition Contractors Fee			
48		Sub Total \$ 8,035,405	\$ 401,770	Lines 31-46
49	Contingency, (15%)	\$ 1,218,912	\$ 60,946	
50		Total Before Scrap Credit \$ 9,254,317	\$ 462,716	Line 47 + Line 48
51	Scrap Credit	\$ (1,301,857)	\$ (65,093)	
52		Total \$ 7,952,460	\$ 397,623	Line 49 + Line 50
53				
Calculation of the Solar Demo Cost				

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Solar Demolition Summary

Line No.	Station	MW's	Decommissioning		Total (2015 \$s)	Total (Nominal \$s)	Year for Decom	
			Cost by MW					
54	Guernsey	20	\$420,937		\$8,418,746	\$14,261,180	2038	Line 25
55	Cantua	20	\$397,623		\$7,952,460	\$13,231,058	2037	Line 51 * MW's
56	Five Points	15	\$397,623		\$5,964,345	\$9,746,323	2036	Line 51 * MW's
57	Giffen	10	\$397,623		\$3,976,230	\$6,615,529	2037	Line 51 * MW's
58	Huron	20	\$397,623		\$7,952,460	\$13,231,058	2037	Line 51 * MW's
59	Gates	20	\$397,623		\$7,952,460	\$13,471,302	2038	Line 51 * MW's
60	Gates	20	\$397,623		\$7,952,460	\$12,995,097	2036	Line 51 * MW's
61	Stroud	2	\$397,623		\$795,246	\$1,276,335	2035	Line 51 * MW's
62	Vaca Dixon	2	\$397,623		\$795,246	\$1,276,335	2035	Line 51 * MW's
63	West Gates	10	\$397,623		\$3,976,230	\$6,735,651	2038	Line 51 * MW's
64	Westside	15	\$397,623		\$5,964,345	\$9,746,323	2036	Line 51 * MW's
65	Total	152			\$60,904,982	\$101,309,856		Lines 55-64

Silverado Contractors Guernsey Decommissioning Study

	Mobilization Included		Total	Per MW
72	Removal of 2,500,000 LF-Cables, 90,000-Solar Panels, Frames and Posts	\$	4,141,900	\$ 207,095
73	Balance of Plant Which Includes:			
74	40-Inverters, 15-Transformers, 20-Switch Gears, 10-Distribution Gears, and 1-Communication Building	\$	500,000	\$ 25,000
75	Concrete Foundations and Pads, 850 Cubic Yards	\$	102,000	\$ 5,100
76	Excavate, Remove, Backfill 3-Vaults, 10-Overhead Lights, 30-Security Camera Posts, 27,000LF-Conduits and Pull Boxes	\$	742,500	\$ 37,125
77	19,579 CY-Crushed Rock Roadways and Walkways, 773, 122-SF-Geo Fabric, (must be separated)	\$	1,450,700	\$ 72,535
78	10,000 SF-4" Asphalt Paving and 8" Base	\$	15,000	\$ 750
79	10,400 If-Cyclone Fencing, 2-Gates, Posts, 62,400 LF, (6 Strands), Barbwire	\$	192,920	\$ 9,646
80	Grade the Site to Rough Grade, 6,924,652 SF	\$	145,417	\$ 7,271
81				
82				

Line	Station	MW's	Decommissioning		Total (2015 \$)	Total (Nominal \$)		Year for Decom	
			Cost by MW						
84	Guernsey	20	\$	364,522	\$7,290,437	\$12,349,849	2038	Line 25	
85	Cantua	20	\$	364,522	\$7,290,437	\$12,129,604	2037	Line 51 * MW's	
86	Five Points	15	\$	364,522	\$5,467,828	\$8,934,965	2036	Line 51 * MW's	
87	Giffen	10	\$	364,522	\$3,645,219	\$6,064,802	2037	Line 51 * MW's	
88	Huron	20	\$	364,522	\$7,290,437	\$12,129,604	2037	Line 51 * MW's	
89	Gates	20	\$	364,522	\$7,290,437	\$12,349,849	2038	Line 51 * MW's	
90	Stroud	20	\$	364,522	\$7,290,437	\$11,913,287	2036	Line 51 * MW's	
91	Vaca Dixon	2	\$	364,522	\$729,044	\$1,170,083	2035	Line 51 * MW's	
92	West Gates	10	\$	364,522	\$3,645,219	\$6,174,925	2038	Line 51 * MW's	
93	Westside	15	\$	364,522	\$5,467,828	\$8,934,965	2036	Line 51 * MW's	
94	Total	152			\$55,407,321	\$92,151,933		Lines 55-64	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Fuel Cell Demolition Summary

Line No.	Decommissioning Activities (Costs) 2018 Dollars, San Francisco State University	*Fuel Cell Energy	Bloom Energy	Station Total	Reference
1	Fuel Cell Rating (MWe)	2.8	0.2	3.0	
2	Characterization / Temporary Services	37,826	9,087	46,913	
3	Equipment Removal	435,628	86,928	522,556	
4	Transportation Allowance	71,700	11,950	83,650	
5	Utility Management / Oversight	51,286	12,321	63,607	
6	Dismantling Contractor Mgmt. / Super. / Safety Staff	40,072	9,627	49,699	
7	Heavy Equipment / Operating Engineers	72,132	17,329	89,461	
8	Small Tool Allowance	4,150	997	5,147	
9	Utilities Allowance	3,318	797	4,115	
10	Permits	7,922	1,903	9,825	
11	Demolition Contractors Insurance	18,640	4,478	23,118	
12	Demolition Contractors Fee	77,530	18,626	96,156	
13	Sub-Total	820,204	174,043	994,247	Lines 2-12
14	Contingency	123,032	26,106	149,138	
15	Project Total (before scrap credit)	943,236	200,149	1,143,385	Line 13 + Line 14
16	Scrap Credit	(50,970)	(10,064)	(61,034)	
17	Project Total	892,266	190,085	1,082,351	Line 15 + Line 16

*There are 2 Fuel Cell Energy Generating Units, one at San Francisco State University and one at California State University, East Bay, so the estimates in this column are doubled compared to the estimates in the TLG Cost Study.

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Decommissioning Escalation

Line No.						
1	Source:					
2	IHS Global Insight 2019 Fourth Quarter (trend 201)					
3						
4		Total Steam Production Plant: JUEPPF@PCF	%	Total Other Production Plant: JUEPPO@PCF	%	
5	2006	508.50		467.75		Recorded
6	2007	534.08	5.03%	527.96	12.87%	Recorded
7	2008	571.25	6.96%	585.75	10.95%	Recorded
8	2009	568.00	-0.57%	627.00	7.04%	Recorded
9	2010	592.75	4.36%	657.75	4.90%	Recorded
10	2011	614.50	3.67%	681.25	3.57%	Recorded
11	2012	635.00	3.34%	731.75	7.41%	Recorded
12	2013	643.75	1.38%	754.50	3.11%	Recorded
13	2014	653.00	1.44%	782.00	3.64%	Recorded
14	2015	682.75	4.56%	803.50	2.75%	Recorded
15	2016	704.25	3.15%	834.25	3.83%	Recorded
16	2017	707.60	0.48%	867.74	4.01%	Recorded
17	2018	723.50	2.25%	894.31	3.06%	Recorded
18	2019	752.75	4.04%	945.64	5.74%	Recorded
19	2020	767.14	1.91%	979.21	3.55%	Forecasted
20	2021	783.55	2.14%	1001.43	2.27%	Forecasted
21	2022	797.11	1.73%	1017.87	1.64%	Forecasted
22	2023	813.24	2.02%	1035.99	1.78%	Forecasted
23	2024	831.09	2.19%	1054.91	1.83%	Forecasted
24	2025	848.80	2.13%	1074.38	1.85%	Forecasted
25	2026	866.96	2.14%	1094.45	1.87%	Forecasted
26	2027	885.32	2.12%	1115.20	1.90%	Forecasted
27	2028	903.66	2.07%	1136.34	1.90%	Forecasted
28	2029	921.86	2.01%	1157.60	1.87%	Forecasted
29	2030	940.08	1.98%	1178.62	1.82%	Forecasted
30	2031	958.66	1.98%	1200.02	1.82%	Forecasted
31	2032	977.61	1.98%	1221.81	1.82%	Forecasted
32	2033	996.92	1.98%	1244.00	1.82%	Forecasted
33	2034	1016.63	1.98%	1266.58	1.82%	Forecasted
34	2035	1036.72	1.98%	1289.58	1.82%	Forecasted
35	2036	1057.21	1.98%	1313.00	1.82%	Forecasted
36	2037	1078.10	1.98%	1336.84	1.82%	Forecasted
37	2038	1099.40	1.98%	1361.11	1.82%	Forecasted
38	2039	1121.13	1.98%	1385.83	1.82%	Forecasted
39	2040	1143.29	1.98%	1410.99	1.82%	Forecasted
40	2041	1165.88	1.98%	1436.61	1.82%	Forecasted
41	2042	1188.92	1.98%	1462.70	1.82%	Forecasted
42	2043	1212.42	1.98%	1489.26	1.82%	Forecasted
43	2044	1236.38	1.98%	1516.30	1.82%	Forecasted
44	2045	1260.81	1.98%	1543.83	1.82%	Forecasted
45	2046	1285.73	1.98%	1571.86	1.82%	Forecasted
46	2047	1311.14	1.98%	1600.40	1.82%	Forecasted
47	2048	1337.05	1.98%	1629.46	1.82%	Forecasted
48	2049	1363.47	1.98%	1659.05	1.82%	Forecasted
49	2050	1390.42	1.98%	1689.17	1.82%	Forecasted
50	2052	1417.90	1.98%	1719.84	1.82%	Forecasted
51	To Convert 2008 to 2040		2.00			
52	To Convert 2008 to 2041		2.04			
53	To Convert 2012 to 2041		1.84			
54	To Convert 2018 to 2022		1.10		1.14	
55	To Convert 2015 to 2035				1.60	
56	To Convert 2015 to 2036				1.63	
57	To Convert 2015 to 2037				1.66	
58	To Convert 2015 to 2038				1.69	
59	To Convert 2018 to 2019		1.04			
60	To Convert 2018 to 2020		1.06			
61	To Convert 2018 to 2021		1.08			
62	To Convert 2018 to 2022		1.10			
63	To Convert 2018 to 2023		1.12			
64	To Convert 2018 to 2024		1.15			
65	To Convert 2018 to 2025		1.17			

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Line No.						
66	To Convert 2018 to 2026	1.20				
67	To Convert 2018 to 2027	1.22				
68	To Convert 2018 to 2028	1.25				
69	To Convert 2018 to 2029	1.27				
70	To Convert 2018 to 2030	1.30				
71	To Convert 2018 to 2031	1.33				
72	To Convert 2018 to 2032	1.35				
73	To Convert 2018 to 2033	1.38				
74	To Convert 2018 to 2034	1.41				
75	To Convert 2018 to 2035	1.43				
76	To Convert 2018 to 2036	1.46				
77	To Convert 2018 to 2037	1.49				
78	To Convert 2018 to 2038	1.52				
79	To Convert 2018 to 2039	1.55				
80	To Convert 2018 to 2040	1.58				
81	To Convert 2018 to 2041	1.61				
82	To Convert 2018 to 2042	1.64				
83	To Convert 2018 to 2043	1.68				
84	To Convert 2018 to 2044	1.71				
85	To Convert 2018 to 2045	1.74				
86	To Convert 2018 to 2046	1.78				
87	To Convert 2018 to 2047	1.81				
88	To Convert 2018 to 2048	1.85				
89	To Convert 2018 to 2049	1.88				
90	To Convert 2020 to 2021	1.02				
91	To Convert 2020 to 2022	1.04				
92	To Convert 2020 to 2023	1.06				
93	To Convert 2020 to 2024	1.08				
94	To Convert 2020 to 2025	1.11				
95	To Convert 2020 to 2026	1.13				
96	To Convert 2020 to 2027	1.15				
97	To Convert 2020 to 2028	1.18				
98	To Convert 2020 to 2029	1.20				
99	To Convert 2020 to 2030	1.23				
100	To Convert 2020 to 2031	1.25				
101	To Convert 2020 to 2032	1.27				
102	To Convert 2020 to 2033	1.30				
103	To Convert 2020 to 2034	1.33				
104	To Convert 2020 to 2035	1.35				
105	To Convert 2020 to 2036	1.38				
106	To Convert 2020 to 2037	1.41				
107	To Convert 2020 to 2038	1.43				
108	To Convert 2020 to 2039	1.46				
109	To Convert 2020 to 2040	1.49				
110	To Convert 2020 to 2041	1.52				
111	To Convert 2020 to 2042	1.55				
112	To Convert 2020 to 2043	1.58				
113	To Convert 2020 to 2044	1.61				
114	To Convert 2020 to 2045	1.64				
115	To Convert 2020 to 2046	1.68				
116	To Convert 2020 to 2047	1.71				
117	To Convert 2020 to 2048	1.74				
118	To Convert 2020 to 2049	1.78				
119	To Convert 2020 to 2050	1.81				
120	To Convert 2020 to 2051	1.85				

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 5
Natural Gas and Solar Generation Operations
Workpaper Supporting Solar PV Percent of Expected 2020 Generation

Program Years 1, 2 and 3 Utility-Owned Solar Stations

Line No.	Station	2020 Net Generation (MWh)	Expected Net Generation (MWh)	Recorded - Expected Net Generation	Capacity	Capacity Factor (Actual)	Capacity Factor (Expected)	CAISO Curtailments (MWh)	Net Gen plus Curtailments (MWh)	Capacity Factor (Adjusted)
1	Cantua	42,368	42,163	205	20				42,368	
2	Five Points	24,140	29,284	-5,144	15				24,140	
3	Gates	30,954	43,801	-12,847	20				30,954	
4	Giffen	19,036	21,081	-2,045	10				19,036	
5	Guernsey	41,822	50,321	-8,499	20				41,822	
6	Huron	37,664	42,459	-4,794	20				37,664	
7	Stroud	33,705	39,235	-5,530	20				33,705	
8	West Gates	19,002	21,554	-2,552	10				19,002	
9	Westside	24,389	29,423	-5,035	15				24,389	
10	Vaca Dixon	3,579	3,992	-414	2	Actual	Expected		3,579	Adjusted
11	Total	276,659	323,313	-46,655	152	20.78%	24.28%	21,162	297,821	22.37%
12	Percent of Expected Generation								92.12%	

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 5
Natural Gas and Solar Generation Operations
Fuel Oil Inventory

Line No. Description	Recorded		Forecast		Forecast	
	Ending Plant Balance 2020 Barrels	Dollars	Ending Plant Balance 2021 Barrels	Dollars	Ending Plant Balance 2022 Barrels	Dollars
Distillate Fuel						
1 Humboldt Bay Generating Station	9,953	1,378,183	9,953	1,378,183	9,953	1,378,183

Assumptions:

- 1. Inventory balance remains unchanged from end of year 2020.

Pacific Gas and Electric Company
2023 General Rate Case

Exhibit (PG&E-5), Chapter 5

Natural Gas and Solar Generation Operations

2015-2019 NERC GADS Generating Unit Statistical Brochure

Calculation of PG&E's Fossil Industry Averages

Line	Equivalent Availability Factor			NERC GADS Data			2017 Capacity (MW)		
1	Combined Cycle			84.95%			1,060.0		
2	Recips			92.43%			163.0		
3	Fossil Portfolio			85.95%			1,223.0		
	Forced Outage Factor			NERC GADS Data			2017 Capacity (MW)		
4	Combined Cycle			1.65%			1,060.0		
5	Recips			2.25%			163.0		
6	Fossil Portfolio			1.73%			1,223.0		

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 with 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	FW Trb/Gen Nameplate	# of Units	Unit-Years	ART	SR	NCF	NOF	SF	AF	EAF	FOR	EFOR	EFORD	SOF	FOF	UOF	EUOF	ELUOF	POF	MCF	
FOSSIL All Fuel Types	All Sizes	1326	5462	169.07	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	
FOSSIL All Fuel Types	All Sizes	1326	5462	123.15	99.29	29.52	63.72	44.11	64.83	81.97	10.56	13.11	9.08	10.13	4.94	8.35	10.2	19.24	8.72	3.41	
FOSSIL All Fuel Types	All Sizes	1326	5462	49.33	95.07	92.72	61.41	68.94	79.48	81.97	10.56	13.11	9.08	10.13	4.94	8.35	10.2	19.24	8.72	3.41	
FOSSIL All Fuel Types	All Sizes	1326	5462	49.33	95.07	92.72	61.41	68.94	79.48	81.97	10.56	13.11	9.08	10.13	4.94	8.35	10.2	19.24	8.72	3.41	
FOSSIL All Fuel Types	All Sizes	1326	5462	55.26	82.04	70.48	8.64	9.28	11.36	12.24	5.23	5.05	5.05	81.43	79	8.28	11.42	14.05	4.52	4.09	
FOSSIL All Fuel Types	All Sizes	1326	5462	50.05	81.43	79	8.28	11.42	14.05	4.52	4.09	4.09	4.09	81.43	79	8.28	11.42	14.05	4.52	4.09	
FOSSIL All Fuel Types	All Sizes	1326	5462	61.04	80.35	71.43	9.19	12.35	13.47	6.18	6.62	8.19	79.21	6.63	9.27	13.35	4.75	12.44	4.08	3.64	
FOSSIL All Fuel Types	All Sizes	1326	5462	65.3	82.51	80.39	5.84	8.11	13.45	4.05	66.79	74.07	70.79	8.49	10.64	19.73	6.2	19.73	6.2	6.2	
FOSSIL All Fuel Types	All Sizes	1326	5462	70.07	81.67	78.92	6.88	9.28	13.15	5.18	48.65	87.36	84.83	6.86	9.21	9.06	3.58	13.15	5.18	5.18	
FOSSIL All Fuel Types	All Sizes	1326	5462	55.85	83.46	79.93	7.94	10.94	11.73	4.82	61.78	81.33	78.61	8.63	10.91	12.84	5.84	11.73	4.82	4.82	
FOSSIL All Fuel Types	All Sizes	1326	5462	63.85	81.09	78.02	7.49	10.69	13.74	5.17	73.52	81.44	78.5	7.38	10.07	12.7	5.88	13.74	5.17	5.17	
FOSSIL All Fuel Types	All Sizes	1326	5462	74.06	82.96	80.38	5.85	8	12.44	4.18	73.47	81.15	71.32	5.23	8.2	13.62	4.08	12.44	4.18	4.18	
FOSSIL All Fuel Types	All Sizes	1326	5462	68.61	74.39	71.32	7.86	9.87	19.84	5.97	14.8	81.52	79.98	16.03	21.86	15.65	2.82	71.32	7.86	7.86	
FOSSIL All Fuel Types	All Sizes	1326	5462	58.2	82.97	78.42	5.5	11.9	13.65	3.99	20.79	82.49	80.82	21.34	26.61	11.87	5.64	13.65	3.99	3.99	
FOSSIL All Fuel Types	All Sizes	1326	5462	25.95	83.25	82.74	8.52	9.5	14.33	2.42	21.07	98.79	1.03	35.62	2.94	84.52	63.41	57	62.49	11.74	3.84
FOSSIL All Fuel Types	All Sizes	1326	5462	25.95	83.25	82.74	8.52	9.5	14.33	2.42	21.07	98.79	1.03	35.62	2.94	84.52	63.41	57	62.49	11.74	3.84
FOSSIL All Fuel Types	All Sizes	1326	5462	6.04	81.07	79.73	13.32	25.03	18.06	0.93	1.89	79.07	78.35	8.99	28.79	20.74	0.19	78.35	8.99	8.99	
FOSSIL All Fuel Types	All Sizes	1326	5462	29.1	78.86	76.46	15.85	20.51	15.66	5.48	27.66	82.17	80.5	19.99	22.24	10.92	6.91	15.85	20.51	20.51	
FOSSIL All Fuel Types	All Sizes	1326	5462	28.4	82.05	79.57	12.96	17.2	14.01	3.94	28.4	82.05	79.57	12.96	17.2	14.01	3.94	12.96	17.2	17.2	
FOSSIL All Fuel Types	All Sizes	1326	5462	30.41	82.68	80.38	5.85	8	12.44	4.18	30.41	82.68	80.38	5.85	8	12.44	4.18	5.85	8	8	
FOSSIL All Fuel Types	All Sizes	1326	5462	29.62	75.74	72.86	20.70	25.95	16.49	7.77	29.62	75.74	72.86	20.70	25.95	16.49	7.77	72.86	20.70	20.70	
FOSSIL All Fuel Types	All Sizes	1326	5462	26.23	70.5	67.16	21.61	29.29	22.27	7.23	26.23	70.5	67.16	21.61	29.29	22.27	7.23	67.16	21.61	21.61	
FOSSIL All Fuel Types	All Sizes	1326	5462	25.05	84.33	83.61	4.94	6.42	14.37	1.3	25.05	84.33	83.61	4.94	6.42	14.37	1.3	83.61	4.94	4.94	
FOSSIL Lignite Primary	All Sizes	124	392	83.45	88.16	83.77	4.49	8.94	7.92	3.92	83.45	88.16	83.77	4.49	8.94	7.92	3.92	83.77	4.49	4.49	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	33.53	82.32	80.1	15.67	19.17	11.44	6.23	33.53	82.32	80.1	15.67	19.17	11.44	6.23	15.67	19.17	19.17	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	25.88	82.09	79.7	13.7	18.03	13.8	4.11	25.88	82.09	79.7	13.7	18.03	13.8	4.11	13.7	18.03	18.03	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	28.26	82.75	80.5	9.08	13.47	14.99	3.9	28.26	82.75	80.5	9.08	13.47	14.99	3.9	9.08	13.47	13.47	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	28.26	81.12	79.43	12.12	15.56	14.99	3.9	28.26	81.12	79.43	12.12	15.56	14.99	3.9	12.12	15.56	15.56	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	20.06	76.87	74.26	21.74	26.95	20.99	5.3	20.06	76.87	74.26	21.74	26.95	20.99	5.3	21.74	26.95	26.95	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	23.01	73.71	71	20.91	28.91	20.99	5.3	23.01	73.71	71	20.91	28.91	20.99	5.3	71	20.91	20.91	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	18.43	82.83	82.11	5.06	7.27	16.19	0.98	18.43	82.83	82.11	5.06	7.27	16.19	0.98	82.11	5.06	5.06	
FOSSIL Oil/Gas Primary	All Sizes	493	1917	26.56	79.33	77.08	15.87	20.64	15.66	5.01	26.56	79.33	77.08	15.87	20.64	15.66	5.01	15.87	20.64	20.64	
NUCLEAR All Types	All Sizes	103	402	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	
NUCLEAR All Types	All Sizes	103	402	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	
NUCLEAR All Types	All Sizes	103	402	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	
NUCLEAR All Types	All Sizes	103	402	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	
NUCLEAR All Types	All Sizes	103	402	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	93.55	
NUCLEAR PWR	All Sizes	304	1173	51.7379	98.11	91.84	99.59	92.2	92.2	90.81	1.5	1.88	1.88	6.4	1.4	1.67	2.22	2.36	6.14	0.27	
NUCLEAR PWR	All Sizes	304	1173	4.756	60	100	90.2	90.99	90.99	89.03	2.26	2.43	2.43	6.91	2.1	3.14	3.5	3.72	5.88	1.04	
NUCLEAR PWR	All Sizes	304	1173	5.372	07	96.79	92.8	100.11	92.79	92.79	91.83	1.3	1.62	1.62	6.22	1.43	1.9	2.02	5.78	0.22	
NUCLEAR PWR	All Sizes	304	1173	5.134	22	98.13	91.48	99.37	91.97	91.97	90.38	1.53	1.99	1.99	6.59	1.43	1.64	2.27	2.42	6.39	

Pacific Gas and Electric Company
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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 with 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	FW Trb/Gen Nameplate	# of Units	Unit-Years	ART	SR	NCF	NDF	SF	AF	EAF	FOR	EFOR	EFORD	SCF	FOF	UCF	EUOF	EUOR	POF	MCF	WSF	WAF	WEAF	WFOR	WEOF	WSOF	WFOF
NUCLEAR BWR	AI Sizes	32	153	4,796.56	98.84	92.36	98.62	93.92	93.92	91.33	1.6	2.31	2.31	4.55	1.53	1.93	3.22	3.36	4.15	0.4	93.66	93.66	91.09	1.73	2.41	4.69	1.65
NUCLEAR BWR	400-799	4	18	3,607.55	93.13	90.36	96.38	93.88	93.88	90.94	2.37	3.61	3.61	3.84	2.28	2.75	4.54	4.7	3.37	0.47	93.76	93.76	90.8	2.47	3.72	3.87	2.37
NUCLEAR BWR	800-999	10	47	5,533.11	100	94.77	99.42	95.32	95.32	93	1.04	1.85	1.85	3.68	1	1.32	2.7	2.8	3.36	0.32	95.32	95.32	93.05	1.04	1.84	3.68	1
NUCLEAR BWR	1000 Plus	18	88	4,748.36	100	91.61	98.53	93.18	93.18	90.52	1.75	2.31	2.31	5.16	1.66	2.1	3.23	3.39	4.72	0.43	92.98	92.98	90.33	1.94	2.5	5.18	1.84
NUCLEAR CANDU	AI Sizes	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
JET ENGINE	AI Sizes	309	1196	4,74	98.86	4.74	79.96	4.31	90.13	88.11	34.07	36.82	9.61	6.88	2.99	6.3	6.82	53.76	3.57	3.31	5.93	89.81	86.85	30.2	34.02	6.9	3.29
JET ENGINE	001-019	36	137	5,72	98.79	0.23	27.28	0.93	91.04	90.99	70.48	70.66	19.09	6.74	2.22	5.44	5.48	85.23	3.52	3.22	0.83	90.87	90.82	72.24	72.45	6.96	2.17
JET ENGINE	20 Plus	273	1059	4,71	98.91	4.96	80.3	4.75	90.01	87.73	32.49	35.4	9.47	6.9	3.09	6.41	7	51.8	3.58	3.32	6.17	88.76	86.66	29.67	33.55	6.9	3.34
GAS TURBINE	AI Sizes	746	3352	8.43	98.42	4.8	71.13	4.69	89.22	86.94	46.44	48.04	10.6	6.71	4.07	6.56	6.83	59.34	4.23	2.49	6.75	89.88	87.39	31.37	33.14	7.03	3.09
GAS TURBINE	001-019	125	507	3.09	96.34	0.68	70.65	0.97	87.76	86.90	85.84	86.13	17.5	6.38	5.86	9.27	9.39	90.7	2.97	3.41	0.96	87.48	86.71	86.07	86.32	6.59	5.93
GAS TURBINE	020-049	156	664	5.45	99.01	3.83	83.93	3.07	89.63	86.88	62.67	63.46	10.92	5.22	5.15	7.1	7.25	70.38	3.27	1.95	4.56	89.75	86.88	48.92	49.98	5.88	4.37
GAS TURBINE	50 Plus	464	2180	9.84	98.52	5.05	70.37	5.98	89.41	86.94	35.97	38.11	9.4	7.23	3.36	5.81	6.15	50.73	4.78	2.45	7.17	89.98	87.46	28.49	30.38	7.16	2.86
COMBINED CYCLE	AI Sizes	350	1431	81.39	98.73	54.76	80.66	56.2	88.05	84.88	3.83	4.9	3.81	9.72	2.24	3.93	4.76	7.88	8.02	1.69	67.9	88.42	84.95	2.37	3.45	9.93	1.65
HYDRO	AI Sizes	1061	4602	33.1	99.94	36.36	58.09	61.72	80.47	79.96	8.92	9.13	7.73	13.24	6.29	8.16	8.33	11.49	11.38	1.86	62.6	82.01	81.58	4.51	4.64	14.95	3.04
HYDRO	001-029	403	1754	113.29	99.85	33.61	53.2	59.4	75.9	75.43	15.33	15.7	14.07	12.75	11.34	13.09	13.39	17.67	11	1.75	63.19	81.58	81.15	7.97	8.39	12.57	5.85
HYDRO	30 Plus	658	2848	23.55	99.95	36.55	58.43	63.13	83.25	82.72	4.7	4.81	3.95	13.54	3.22	5.15	5.25	7.45	11.6	1.93	62.56	82.03	81.61	4.25	4.36	15.12	2.85
PUMPED STORAGE	AI Sizes	111	553	9.72	99.91	8.05	46.53	28.96	81.39	81.15	7.51	7.60	5.39	15.07	3.54	5.63	5.68	11.54	12.98	2.09	17.30	76.98	76.33	9.45	9.80	17.41	3.61
MULTIBOILERMULTI-TURBINE	AI Sizes	24	104	336.51	98.50	31.91	61.08	63.56	85.87	77.94	4.31	11.62	9.36	11.26	2.87	5.49	11.16	16.04	8.63	2.63	52.23	83.50	79.32	3.75	7.74	14.46	2.03
DIESEL	AI Sizes	162	674	9.45	99.33	10.66	65.22	7.74	93.47	92.84	22.39	23.94	7.23	4.30	2.23	4.15	4.39	36.32	2.37	1.92	16.34	93.92	92.43	12.09	15.00	3.84	2.25

Project Title: HBGS Engine Emissions Module Replacements

Major Work Categories: 2S

Planning Order Numbers: 5760804

Project Start Date: Annual Program

Project Completion Date: N/A

Operative Date (only applies to Capital): Dec 2021

Project Description

This program replaces the different exhaust path catalysts used in the 10 Engines at the Station. to maintain emissions levels at or below those required by the that

Justification

HBGS is required to meet the North Coast Air Quality Management District air quality standards.

Cost

The planned costs are based on the average annual amount spent.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Recorded + 2021-2026 Forecast
5760804	HBGS Engine Emissions Module Replacements	Dec 2021		\$1,067	\$1,293	\$1,125	\$1,661	\$1,696	\$1,731	\$8,574

Benefits

This is a regulatory requirement. These costs will ensure that the Station will meet the Air Districts emissions requirements and maintain full availability.

Alternatives Considered

- Status Quo – Due nothing. Running the equipment to failure would result in prolonged forced outages and or cause the Station to exceed the Air Quality emissions requirements resulting in fines or other Agency actions.
- Identify specific equipment requiring placement – The level of uncertainty and ability to predict the specific when components will fail in years 3-5 is high, especially given the effect of plant cycling; this option would result in additional dollars being forecasted in years 3-5 since all potential components that could require replacement would need to be included.
- Programmatic Approach – This is the recommend alternative because it provides the best value to the customer while maintaining high levels of plant reliability.

Project Title: Fossil Emergent Capital Work
Major Work Categories: 2S
Planning Order Numbers: 5767987
Project Start Date: Annual Program
Project Completion Date: N/A
Operative Date (only applies to Capital): Dec 2024

Project Description

Fossil Emergent Capital Work forecasts the anticipated reliability expenditures that will be needed in future years to maintain reliable operations of Gateway, Colusa, and Humboldt Generating Stations. These costs capture equipment replacement that will be needed outside of the equipment covered in the LTSA contract. This includes station service and ancillary system equipment which are necessary for the operations of the plants.

Justification

During PG&E's long-term planning and annual budget process, specific reliability projects are typically identified 1-3 years out based on condition assessments, monitoring, and inspections. This project assures that a reasonable cost for expected reliability expenditures is reflected in rate case for years 3-5 for which identifying the specific components/equipment that will likely fail becomes less predictable.

Similar to the Combustion Turbines and Steam Turbine covered under the LTSA contract, this plant equipment needs to be maintained to prevent premature failure and/or unplanned failure resulting in extended forced outages.

Cost

The planned costs are based on the average annual amount spent and takes into consideration the life cycle of the plants and specific equipment not covered under the LTSA contract. As individual projects are identified and entered into the long term plan, the amount for this line item is adjusted accordingly during the long-term planning and annual budgeting process.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Recorded + 2021-2026 Forecast
5767987	Fossil Emergent Capital Work	Dec-2024	\$0	\$0	\$0	\$0	\$2,000	\$2,500	\$4,086	\$8,586

Benefits

Reliability investments on ancillary/support systems, switchyard, and station service equipment are critical to ensure ongoing plant reliability and prevent a loss of generation. As Colusa, Gateway, and HBGS plant equipment continues to age and therefore reasonable to expect that equipment will reach end of life and require replacement. Additionally, given the increased cycling the plants are experiencing, the effects and impact to the rate of specific equipment failure is less predictable. These costs will ensure PG&E has the appropriate level of reliability investment earmarked in the rate case to address equipment replacements prior to failing.

Alternatives Considered

- Status Quo – Running the equipment to failure would result in a prolonged forced outage and higher costs to replace the equipment on an expedited basis.
- Identify specific equipment requiring placement – The level of uncertainty and ability to predict the specific equipment/components that will fail in years 3-5 is high, especially given the effect of plant cycling; this option would result in additional dollars being forecasted in years 3-5 since all potential equipment that could require replacement would need to be included.
- Programmatic Approach – This is the recommend alternative because it provides the best value to the customer while maintaining high levels of plant reliability.

Project Title: GGS Evaporative Cooling

Major Work Categories: 2S

Planning Order Numbers: 5794137

Project Start Date: June 2021

Project Completion Date: May 2023

Operative Date (only applies to Capital): Operative at Completion

Project Description

Install an Evaporative Cooling System for the combustion turbines at Gateway Generating Station.

Justification

During the Summer of 2020 California experienced several high heat days that negatively impacted the State's overall energy supply. The State requested that PG&E identify and make modifications to increase the Generating Capacity at its Combined Cycle Generating Stations. The installation of Evaporative Cooling at Gateway will increase the Station's maximum output by approximately 17 MW's.

Cost

The planned costs are based on information supplied by the Original Equipment Manufacturer, General Electric.

Major Project Spending Estimates (Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Recorded + 2021-2026 Forecast
5794137	GGS Evaporative Cooling	May-2022	\$0	\$3,000	\$3,000	\$3,000	\$0	\$0	\$0	\$9,000

Benefits

Complying with the State's request to increase capacity, this project will add an additional 17 MW's to the overall energy supply of the State and help prevent supply related shortages on hot summer days.

Alternatives Considered

- Status Quo – Do nothing - This alternative would not meet the State's request to provide additional MW's during hot summer days.
- Install Evaporative Cooling – This alternative will provide an additional 17MW's of energy supply to the State.
- Programmatic Approach – This is the recommend alternative because it provides the best service to the customer and meets the State's request to increase the Generating capacity at Gateway.

Project Title: Solar PV Replace Capital Equipment

Major Work Categories: 3B

Planning Order Numbers: 5524100

Project Start Date: Annual Program

Project Completion Date: N/A

Operative Date (only applies to Capital): Operative as installed

Project Description

This annual program replaces major prime mover components that fail over time at the solar stations. These components include solar panels, inverters and transformers which are needed to harvest, convert, condition, and deliver solar energy. Each have various life spans and failure rates. Replacement of failed components assures that the facilities stay at their designed production/efficiency ratings and serve their intended purpose. As an example, PG&E's experience has been that many of the component parts of the inverters have relatively short lives and must be replaced after just a few years of service.

Justification

PG&E's solar facilities have a minimum output requirement as specified in CPUC Decision 10-04-052. D.10 04 052 states that "Pacific Gas and Electric Company is authorized to recover its actual operations and maintenance costs in its General Rate Case subject to a reasonableness review. Should the average performance of Pacific Gas and Electric Company's Utility owned generation systems fall below 80% of expected output as provided in its compliance filings, it will weigh heavily in favor of disallowing or refunding some of the operations and maintenance costs to ratepayers."

Failure of any of the major prime mover components reduce the total output capacity of the stations and PG&E's ability to meet CPUC requirements. Additionally, the need to purchase replacement power as a result of increase forced outages are avoided.

Cost

The planned costs are based on OEM data, failure experiences, and life cycle expectations.

Major Project Spending Estimates
(Thousands of Nominal Dollars)

Planning Order	Description	Operative Date	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Recorded + 2021-2026 Forecast
5524100	Solar PV Replace Capital Equipment	As Installed	\$0	\$688	\$700	\$714	\$730	\$745	\$760	\$4,337

Benefits

Replacement of failed components assures that the stations stay at their designed production ratings and serve their intended purpose. Replacement power costs and the added cost to make repairs at premium rates, which would adversely impact the ratepayer, will be avoided.

Alternatives Considered

- Status Quo – Running the equipment to failure would result in a prolonged forced outage and higher costs to replace the equipment on an expedited basis.
- Identify specific equipment requiring placement – The level of uncertainty and ability to predict the specific equipment/components that will fail in years 3-5 is high, this option would result in additional dollars being forecasted in years 3-5 since all potential equipment that could require replacement would need to be included.
- Programmatic Approach – This is the recommend alternative because it provides the best value to the customer while maintaining high levels of plant reliability.

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

Testimony _____ Workpapers X SOQ _____

Exhibit Number: 5 Chapter Number: 5

Chapter Title: Natural Gas and Solar Generation Operations

Witness Name: Steve Royall

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of November 5, 2021				
WP 5-7 through WP 5-9, WP 5-12 through WP 5-17	Last line of the table header	Expense Walk from 2020-2023 by Major Work Category (9 tables)	(Thousands of Dollars)	(Dollars)

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

Testimony: ☐ **Workpapers:** ☒ **SOQ:** ☐
Exhibit Number: 5 **Chapter Number:** 5
Chapter Title: Natural Gas and Solar Generation Operations
Witness Name: Steve Royall

Page No.	Line No.	Item	As Filed	As Corrected
Errata as of February 28, 2022				
WP 5-23	Last line of the table header	O&M Expense Forecast Drivers	(Thousands of Dollars)	(Dollars)
WP 5-48 through WP 5-53	Last line of the table header	Capital Walk by Major Work Category	(Thousands of Dollars)	(Dollars)
WP 5-87	Project Completion Date	GGs Evaporative Cooling Project Summary	Project Completion Date: May 2022	Project Completion Date: May 2023

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

**WORKPAPERS SUPPORTING
CHAPTER 6, ENERGY PROCUREMENT ADMINISTRATION COSTS**

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Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement & Administration
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
1	AB	Misc Expense	950	1,172	1,017	367	678	300	310	801
2	CT	Acq & Manage Elect Supply	33,949	30,714	25,787	27,080	26,646	28,230	29,930	30,320
3	CV	Acq & Manage Gas Supply	3,174	2,834	2,612	2,489	2,151	2,570	2,850	3,130
4	CY	Manage Electric Grid Ops	5,154	8,280	12,608	8,890	11,260	9,400	10,010	10,220
5	Total		43,226	43,001	42,025	38,826	40,734	40,500	43,100	44,471

6 **Reference:** This is a PG&E standard workpaper.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement & Administration
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	1,072	1,269	1,065	376	678	298	300	753
2	CT	Acq & Manage Elect Supply	38,372	33,692	27,407	27,891	26,646	27,432	28,107	27,511
3	CV	Acq & Manage Gas Supply	3,593	3,111	2,776	2,563	2,151	2,498	2,677	2,841
4	CY	Manage Electric Grid Ops	5,784	9,022	13,317	9,126	11,260	9,205	9,501	9,398
5	Total		48,820	47,093	44,566	39,957	40,734	39,434	40,586	40,504

6 **Reference:** This is a PG&E standard worksheet.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-05) Chapter 6
2016-2017 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	6	AB	Misc. Expense	950	1,172	223	no	23%	yes	yes	yes	Increase driven by vendor spend in 2017 on outside consulting.
2	5	6	CT	Acq & Manage Elect Supply	33,949	30,714	(3,235)	yes	-10%	yes	no	no	
3	5	6	CV	Acq & Manage Gas Supply	3,174	2,834	(339)	no	-11%	yes	yes	yes	Decrease due to less internal labor in support of MWC CV, equivalent to approximately 2.4 FTEs.
4	5	6	CY	Manage Electric Grid Ops	5,154	8,280	3,126	yes	61%	yes	yes	yes	Increase due to re prioritized work from MWC CT to support the formation of Grid Integration & Innovation.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 6
 2017-2018 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	6	AB	Misc Expense	1,172	1,017	(155)	no	-13%	yes	yes	yes	Decrease driven by fewer FTEs/internal labor spend within Immediate Office
2	5	6	CT	Acq & Manage Elect Supply	30,714	25,787	(4,927)	yes	-16%	yes	yes	yes	Decrease due to reprioritized work to MWC CY to support the formation of Grid Integration & Innovation.
3	5	6	CV	Acq & Manage Gas Supply	2,834	2,612	(222)	no	-8%	yes	no	yes	Decrease primarily driven by less internal labor in support of MWC CV equivalent to approximately 3 FTEs.
4	5	6	CY	Manage Electric Grid Ops	8,280	12,608	4,328	yes	52%	yes	yes	yes	Increase due to reprioritized work from MWC CT to support the formation of Grid Integration & Innovation.

Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-05) Chapter 6
 2018-2019 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	6	AB	Misc Expense	1,017	367	(650)	no	-64%	yes	yes	yes	Decrease mostly due to reclassification of SVP salary out of LOB
2	5	6	CT	Acq & Manage Elect Supply	25,787	27,080	1,293	yes	5%	yes	no	no	GRC funded expense per SB901 ruling.
3	5	6	CV	Acq & Manage Gas Supply	2,612	2,489	(123)	no	-5%	no	no	no	
4	5	6	CY	Manage Electric Grid Ops	12,608	8,890	(3,718)	yes	-29%	yes	yes	yes	Decrease driven by reduced internal labor (higher vacancy rates) and employee related spend required for CY programs, as well as a re-organization of Clean Transportation work from EPP to Customer Care.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-05) Chapter 6
2019-2020 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	6	AB	Misc Expense	367	678	311	no	85%	yes	yes	yes	Increase due to consulting spend in 2020 for Carbon Neutrality Study.
2	5	6	CT	Acq & Manage Elect Supply	27,080	26,646	(434)	no	-2%	no	no	no	
3	5	6	CV	Acq & Manage Gas Supply	2,489	2,151	(338)	no	-14%	yes	yes	yes	Decrease primarily driven by higher vacancy rates within team who supports MWC CV, equivalent to approximately 2 FTEs.
4	5	6	CY	Manage Electric Grid Ops	8,890	11,260	2,370	yes	27%	yes	yes	yes	Increase driven by lower vacancy rates, equivalent to an approximate 13 FTE increase, as well as lower one-time consulting spend in 2020.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement Administration Costs
2020-2023 Forecast Expense Walk
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Detailed Description/Explanation	Reference
1	2020 Recorded	40,734		WP 6-1, line 5
2	Escalation	1,118	Assumes a 3.03% escalation rate on \$36.9M of labor spend in 2020.	
3	Non-Labor Costs	(1,352)	Reduction in one-time consulting expenditures and subscription type activities.	
4	Total Net Change	(234)		Total of lines 2 & 3
5	2021 Forecast	40,500		Total of lines 1 & 4
6	Escalation	1,319	Assumes a 3.47% labor escalation rate on \$38M of labor spend forecast in 2021.	
7	Staffing Additions	1,317	Assumes a decrease in forecast staffing vacancies (from 15% to 13%), along with additional staffing for the Biomethane Procurement mandate (SB 1440).	
8	Non-Labor Costs	(36)		
9	Total Net Change	2,600		Total of lines 6, 7, 8
10	2022 Forecast	43,100		Total of lines 5 & 9
11	Escalation	1,411	Assumes a 3.47% labor escalation rate on \$40.7M of labor spend forecast in 2022.	
12	Staffing Additions	913	Assumes additional staffing for the Biomethane Procurement mandate (SB 1440), and resumption of forecasting labor costs associated with the EPP SVP (in MWC AB).	
13	Non-Labor Costs	(953)	Reduction attributed to a shift in funding assumptions toward internal labor as opposed to contract spend.	
14	Total Net Change	1,371		Total of lines 11, 12, 13
15	2023 Forecast	44,471		Total of lines 10 & 14
16	Total Escalation Amount	3,848		Total of lines 2, 6, 11
17	Total Staffing Additions	2,230		Total of lines 7, 12
18	Total Non Labor Cost Reduction	(2,341)		Total of lines 3, 8, 13
19	Total Increase 2020 - 2023	3,737		Total of lines 16, 17, 18
20	Average escalation percentage	3.32%		Avg. percentages from lines 2, 6, 11

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement Administration Costs
Key Performance Metrics and Measures - Safety

Line #	Year	TRI % of Calls		DART # Incidents		Reference
		On Time %	FY Target	Actual	FY Target	
1	2021	TBD	57.4%	TBD	0	EPP 4/21 L3 Redbook
2	2020	23.1%	72.0%	3	3	EPP 12/20 L3 Redbook
3	2019	0.0%	72.0%	1	0	EPP 12/19 BPR Review
4	2018	43.8%	57.5%	1	1	EPP 12/18 BPR Review
5						
6	<u>Definitions:</u>					
7	TRI:	Timely Reporting of Injuries to Nurse Line				
8	DART:	Days Away Restricted and Transfer				

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement Administration Costs
Key Performance Metrics and Measures - Renewable Portfolio Standard (RPS)

Line #	Compliance Period (CP)	CP1: 2011-2013	CP2 2014-2016	CP3 2017-2020	CP4 2021-2024	Reference
1	RPS Targets (% Retail Sales)	20%	23%	30%	40%	March 16, 2021 PRG RNS update
2	RPS Deliveries (%)					
3	Retail Sales	20%	30%	34%	-	March 16, 2021 PRG RNS update
4	Source:	EPP Portfolio and Resource Forecasting Department				
5						
6	Addl RPS Targets Reference:					
7	CPUC	https://www.cpuc.ca.gov/RPS_Procurement_Rules/				

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement Administration Costs
Key Performance Metrics and Measures - ERRA Cost Recovery

Line #	ERRA Case Year	Total Disallowed Procurement Costs	Total Procurement Costs	Total Recovered Procurement Costs	Total % Recovered Procurement Costs (Rounded)	References	
						Disallowances: CPUC Decision	Procurement Costs: PG&E Annual ERRRA Compliance Workpapers
1	2014	\$ -	\$ 5,046,861,484	\$ 5,046,861,484	100.00%	D.16-12-045	Chapter 12
2	2015	\$ 1,751,919	\$ 4,573,362,768	\$ 4,571,610,849	99.96%	D.17-03-021	Chapter 12
3	2016	\$ 345,496	\$ 4,199,876,888	\$ 4,199,531,392	99.99%	D.18-05-004	Chapter 12
4	2017	\$ 162,123	\$ 3,879,187,619	\$ 3,879,025,496	100.00%	D.19-02-005	Chapter 11
5	2018	\$ 802,252	\$ 3,165,516,700	\$ 3,164,714,448	99.97%	D.20-02-006	Chapter 11
6							

Note: Total Procurement Costs do not include revenue and ratemaking related items such as PCIA & TBCC, GHG Deferred Cost, and PCIA Subaccount Imputed vs Record PCIA Revenue line items.

Note: The 2019 and 2020 ERRA filings are currently under CPUC review.

Source: EPP RCR Department

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement Administration Costs
Key Performance Metrics and Measures - PABA Collections

Line #	Month	(Actual) PABA Collections					Reference					
		Dec-20	Jan-21	Feb-21	Mar-21	Apr-21						
1	Amount (\$million)	\$	191	\$	226	\$	182	\$	136	\$	215	PG&EERRA Activity Report 2021-4 (CPUC filing)
2												
3	Note:											
4	The above amounts represent monthly cumulative undercollections											
5	(e.g., above market costs in excess of above market revenues).											
6	Bracketed amounts would indicate cumulative above market revenues in excess of											
7	cumulative above market costs.											

Workpaper Table 6-9
2023 General Rate Case
Exhibit (PG&E-5), Chapter 6
Energy Procurement Administration Costs
Key Performance Metrics and Measures - CPIM Costs to Benchmark

Line #	CPIM Year	Period	Actual Costs	Benchmark Costs	Actual Costs/ Benchmark	Reference: CPUC filings
1	Year 23	11/15 to 10/16	\$ 638,125,590	\$ 657,753,814	97.02%	AL 3955-G
2	Year 24	11/16 to 10/17	\$ 832,841,917	\$ 851,735,855	97.78%	AL 4100 -G
3	Year 25	11/17 to 10/18	\$ 686,197,723	\$ 708,877,016	96.80%	AL 4343-G
4	Year 26	11/18 to 10/19	\$ 792,059,959	\$ 845,298,026	93.70%	App. 96-08-043
5						
6	CPIM: Core Procurement Incentive Mechanism					

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE

WORKPAPERS SUPPORTING
EXHIBIT (PG&E-5), ENERGY SUPPLY
CHAPTER 7, ENERGY SUPPLY TECHNOLOGY PROGRAM COSTS

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Table 7-1
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
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	JV	Maintain IT Apps & Infra	1,337	1,885	2,595	1,540	1,628	1,770	2,690	2,793	WP 7-26; WP 7-28; WP 7-30; WP 7-33; WP 7-35; WP 7-37; WP 7-40
2	Total		1,337	1,885	2,595	1,540	1,628	1,770	2,690	2,793	

Table 7-2
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
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	JV	Maintain IT Apps & Infra	1,468	2,016	2,683	1,558	1,628	1,750	2,584	2,606
2	Total		1,468	2,016	2,683	1,558	1,628	1,750	2,584	2,606

Table 7-3
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
Expenses by Major Work Category by LOB
(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	JV	Hydro Generation	175	658	529	577	398	225	625	505	WP 7-30; WP 7-33; WP 7-35
2	JV	Nuclear Generation	472	507	1,056	542	623	597	1,007	777	WP 7-24; WP 7-26; WP 7-28
3	JV	Energy Procurement	691	720	1,010	421	607	948	1,058	1,511	WP 7-37; WP 7-40
4	Total		1,337	1,885	2,595	1,540	1,628	1,770	2,690	2,793	

Table 7-4
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Hydro Generation)
Forecast Expense Walk by Major Work Category
MWC JV - Maintain and Operate Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	398			WP 7-3 Line 1
2		All Programs	(173)		Decrease mainly due to the completion and/or partial completion of Technology projects such as Dam Safety SAP Data and Search Enhancements, Enterprise Portfolio and Project Management for Power Generation, and Minor Enhancements. Partially offset by the deployment and/or ongoing support of Technology projects such as Minor Enhancements.	
3	2021	Forecast	225			Line 1 + Line 2
4		All Programs	400		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Asset Management and Risk Analysis value stream.	
5	2022	Forecast	625			Line 3 + Line 4
6		All Programs	(120)		Decrease mainly due to the completion and/or partial completion of Technology projects within the Asset Management and Risk Analysis value stream. Partially offset by the deployment and/or ongoing support of Technology projects within the Field Work Management value stream.	
7	2023	Forecast	505			Line 5 + Line 6

Table 7-5
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Nuclear Generation)
Forecast Expense Walk by Major Work Category
MWC JV - Maintain and Operate Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Program/Activity	Amount	Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	623		WP 7-3 Line 2
2		All Programs	(26)	Decrease mainly due to the completion and/or partial completion of Technology projects such as DCPD Telephone System Replacement, SAP Work Management, DCPD Electronic Shift Operations Management System (eSOMS) Upgrade, and Minor Enhancements. Partially offset by the deployment and/or ongoing support of Technology projects such as System Operation and Control, and Minor Enhancements.	
3	2021	Forecast	597		Line 1 + Line 2
4		All Programs	410	Increase is mainly due to the deployment and/or ongoing support of Technology projects that support the Energy Management value stream. Partially offset by the completion and/or partial completion of Technology projects such as System Operation and Control.	
5	2022	Forecast	1,007		Line 3 + Line 4
6		All Programs	(230)	Decrease mainly due to the completion and/or partial completion of Technology projects within the Energy Management value stream.	
7	2023	Forecast	777		Line 5 + Line 6

Table 7-6
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Energy Procurement)
Forecast Expense Walk by Major Work Category
MWC JV - Maintain and Operate Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	607			WP 7-3 Line 3
2		All Programs	341		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream and Minor Enhancements. Partially offset by the completion and/or partial completion of Technology projects such as Endur Platform Compliance Program and Minor Enhancements.	
3	2021	Forecast	948			Line 1 + Line 2
4		All Programs	110		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
5	2022	Forecast	1,058			Line 3 + Line 4
6		All Programs	453		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream and Minor Enhancements.	
7	2023	Forecast	1,511			Line 5 + Line 6

Table 7-7
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Hydro Generation)
Historical Expense Walk by Major Work Category
MWC JV - Maintain and Operate Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	175				WP 7-3 Line 1
2		483	276%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as Relay Testing and Configuration Management and Watershed Infrastructure. Partially offset by the completion and/or partial completion of Technology projects such as Minor Enhancements.	
3	2017	658				Line 1 + Line 2
4		(129)	-20%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Relay Testing and Configuration Management and Watershed Infrastructure. Partially offset by the deployment and/or ongoing support of Technology projects such as Dam Safety SAP Data and Search Enhancements and Minor Enhancements.	
5	2018	529				Line 3 + Line 4
6		47	9%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as Enterprise Portfolio and Project Management for Power Generation. Partially offset by the completion and/or partial completion of Technology projects such as Dam Safety SAP Data and Search Enhancements and Minor Enhancements.	
7	2019	577				Line 5 + Line 6
8		(178)	-31%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Enterprise Portfolio and Project Management for Power Generation. Partially offset by the deployment and/or ongoing support of Technology projects such as Dam Safety SAP Data and Search Enhancements and Minor Enhancements.	
9	2020	398				Line 7 + Line 8

Table 7-8
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Nuclear Generation)
Historical Expense Walk by Major Work Category
MWC JV - Maintain and Operate Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	472				WP 7-3 Line 2
2		35	7%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as SAP Work Management. Partially offset by the completion and/or partial completion of Technology projects such as DCPD Mobility Application and Minor Enhancements.	
3	2017	507				Line 1 + Line 2
4		549	108%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as DCPD Equipment Reliability Suite Upgrade and DCPD Security Screening Information. Partially offset by the completion and/or partial completion of Technology projects such as Minor Enhancements.	
5	2018	1,056				Line 3 + Line 4
6		(513)	-49%		Decrease mainly due to the completion and/or partial completion of Technology projects such as DCPD Equipment Reliability Suite Upgrade and DCPD Security Screening Information. Partially offset by the deployment and/or ongoing support of Technology projects such as DCPD Telephone System Replacement and Minor Enhancements.	
7	2019	542				Line 5 + Line 6
8		80	15%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as DCPD Telephone System Replacement and Minor Enhancements. Partially offset by the completion and/or partial completion of Technology projects such as DCPD Electronic Shift Operations Management System (eSOMS) Upgrade.	
9	2020	623				Line 7 + Line 8

Table 7-9
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Energy Procurement)
Historical Expense Walk by Major Work Category
MWC JV - Maintain and Operate Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	691				WP 7-3 Line 3
2		29	4%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as Market Initiatives Implementation, Minor Enhancements, and Endur Upgrade. Partially offset by the completion and/or partial completion of Technology projects such as Outage and Dispatch Management System, Market Initiatives Implementation, and Minor Enhancements.	
3	2017	720				Line 1 + Line 2
4		291	40%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as ESTAR Weblogic Portal Replatform and Endur Upgrade. Partially offset by the completion and/or partial completion of Technology projects such as Outage and Dispatch Management System, Market Initiatives Implementation, and Minor Enhancements.	
5	2018	1,010				Line 3 + Line 4
6		(589)	-58%		Decrease mainly due to the completion and/or partial completion of Technology projects such as ESTAR Weblogic Portal Replatform, Endur Upgrade, and Minor Enhancements. Partially offset by the deployment and/or ongoing support of Technology projects such as Minor Enhancements.	
7	2019	421				Line 5 + Line 6
8		186	44%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as Endur Platform Compliance Program and Minor Enhancements. Partially offset by the completion and/or partial completion of Technology projects such as ESTAR Weblogic Portal Replatform, SQMD Replacement, and Minor Enhancements.	
9	2020	607				Line 7 + Line 8

Table 7-10
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
Capital Expenditures by Major Work Category
(Thousands of Nominal Dollars)

		Capital Expenditures												
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	1	IT - Desktop Computers	13	-	-	5	7	-	-	-	-	-	-	WP 7-24; WP 7-26; WP 7-28; WP 7-30; WP 7-33; WP 7-35; WP 7-37; WP 7-40
2	2F	Build IT Apps & Infra	21,823	21,956	20,902	16,527	19,295	12,320	15,000	14,100	13,900	13,700	13,500	
3	3M	Install/Repl Var Bal Acct	1,162	-	-	-	-	-	-	-	-	-	-	
4		Grand Total	22,997	21,956	20,902	16,532	19,302	12,320	15,000	14,100	13,900	13,700	13,500	

Table 7-11
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
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*	4,591	10,840	13,700	13,000	12,900	12,700	12,500
2	Other Work	7,071	1,480	1,300	1,100	1,000	1,000	1,000
3	Total	11,662	12,320	15,000	14,100	13,900	13,700	13,500

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

Table 7-12
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
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	
1	5783819	MII Initiative 2019 (Cap)	2F	Mar-2021	4,591	-	-	-	-	-	-	4,591 WP 7.37
2	5793218	Asset Mgt & Risk Analysis_HG (C)	2F	Operative as Installed	-	-	2,200	1,400	2,400	2,400	2,100	10,500 WP 7.33
3	5793232	Field Work Management_NG (C)	2F	Operative as Installed	-	-	2,100	1,200	-	-	-	3,300 WP 7.28
4	5793234	Safety Gov Reg & Compliance_NG (C)	2F	Operative as Installed	-	3,470	-	-	-	-	-	3,470 WP 7.24; WP 7.26
5	5793309	Energy Management_EP (C)	2F	Operative as Installed	-	7,370	9,400	10,400	10,500	10,300	10,400	58,370 WP 7.37; WP 7.40
6	Total				4,591	10,840	13,700	13,000	12,900	12,700	12,500	80,231
7	Grand Total				4,591	10,840	13,700	13,000	12,900	12,700	12,500	80,231

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

Line No. 3. Description planning order names vary from the planning order names listed in the Results of Operations (RO) Model due to errata. These planning order names do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Table 7-13
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
Recorded and Forecast Capital Expenditures Details - Other Work*
(Thousands of Nominal Dollars)

Line 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	IT - Desktop Computers	13	-	-	5	7	-	-	-	-	-	-	
2	2F	Build IT Apps & Infra	21,823	21,956	20,902	14,821	16,411	1,480	1,300	1,100	1,000	1,000	1,000	
3	3M	Install/Repl Var Bal Acct	1,162	-	-	-	-	-	-	-	-	-	-	
4	Grand Total		22,997	21,956	20,902	14,826	16,418	1,480	1,300	1,100	1,000	1,000	1,000	

5 * Excludes projects greater than \$3M

Table 7-14
Pacific Gas and Electric Company
2023 GRC
Exhibit (PG&E-5), Chapter 7
Energy Supply Technology Programs
Capital Expenditures by Major Work Category by LOB
(Thousands of Nominal Dollars)

Capital Expenditures														
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	2F	Hydro Generation	6,683	8,615	1,746	1,093	715	200	3,500	2,500	3,400	3,400	3,100	WP 7-30; WP 7-33; WP 7-35
2	2F	Nuclear Generation	3,642	3,154	4,178	6,378	10,130	4,750	2,100	1,200	-	-	-	WP 7-24; WP 7-26; WP 7-28
3	2F	Energy Procurement	11,498	10,188	14,977	9,056	8,450	7,370	9,400	10,400	10,500	10,300	10,400	WP 7-37; WP 7-40
4		Grand Total	21,823	21,956	20,902	16,527	19,295	12,320	15,000	14,100	13,900	13,700	13,500	

Table 7-15
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Hydro Generation)
Forecast Capital Walk by Major Work Category
MWC 2F - Develop and Enhance Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	715			WP 7-14 Line 1
2		All Programs	(515)		Decrease mainly due to the completion and/or partial completion of Technology projects such as Dam Safety SAP Data and Search Enhancements, Power Generation Remediate Vulnerable Operating Systems and IT Mobile Outage Trailers. Partially offset by the deployment and/or ongoing support of Technology projects within the Event Management value stream.	
3	2021	Forecast	200			Line 1 + Line 2
4		All Programs	3,300		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Asset Management and Risk Analysis, and Field Work Management value streams.	
5	2022	Forecast	3,500			Line 3 + Line 4
6		All Programs	(1,000)		Decrease mainly due to the completion and/or partial completion of Technology projects within the Asset Management and Risk Analysis, Field Work Management, and Event Management value streams.	
7	2023	Forecast	2,500			Line 5 + Line 6
8		All Programs	900		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Asset Management and Risk Analysis value stream. Partially offset by the completion and/or partial completion of Technology projects within the Field Work Management value stream.	
9	2024	Forecast	3,400			Line 7 + Line 8
10		All Programs	0		No variance.	
11	2025	Forecast	3,400			Line 9 + Line 10
12		All Programs	(300)		Decrease mainly due to the completion and/or partial completion of Technology projects within the Asset Management and Risk Analysis, Field Work Management value stream.	
13	2026	Forecast	3,100			Line 11 + Line 12

Table 7-16
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Nuclear Generation)
Forecast Capital Walk by Major Work Category
MWC 2F - Develop and Enhance Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	10,130			WP 7-14 Line 2
2		All Programs	(5,380)		Decrease mainly due to the completion and/or partial completion of Technology projects such as DCPD Telephone System Replacement, DCPD Storage Hardware VM Software Replacement, DCPD EDMS/RMS/FileNet Phase 3, and DCPD PIMS Nuclear Archival. Partially offset by the deployment and/or ongoing support of Technology projects within the System Operation and Control, and Safety, Governance, Regulatory, and Compliance value streams.	
3	2021	Forecast	4,750			Line 1 + Line 2
4		All Programs	(2,650)		Decrease mainly due to the completion and/or partial completion of Technology projects within the System Operation and Control, and Safety, Governance, Regulatory, and Compliance value streams. Partially offset by the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
5	2022	Forecast	2,100			Line 3 + Line 4
6		All Programs	(900)		Decrease mainly due to the completion and/or partial completion of Technology projects within the Energy Management value stream.	
7	2023	Forecast	1,200			Line 5 + Line 6
8		All Programs	(1,200)		Decrease mainly due to the completion and/or partial completion of Technology projects within the Energy Management value stream.	
9	2024	Forecast	0			Line 7 + Line 8
10		All Programs	0		No variance.	
11	2025	Forecast	0			Line 9 + Line 10
12		All Programs	0		No variance.	
13	2026	Forecast	0			Line 11 + Line 12

Table 7-17
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Energy Procurement)
Forecast Capital Walk by Major Work Category
MWC 2F - Develop and Enhance Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Program/Activity	Amount		Detailed Description/Assumptions	Reference
1	2020	Recorded Adjusted	8,450			WP 7-14 Line 3
2		All Programs	(1,080)		Decrease mainly due to the completion and/or partial completion of Technology projects such as Market Initiatives Implementation (MII) and Endur Platform Compliance Program. Partially offset by the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
3	2021	Forecast	7,370			Line 1 + Line 2
4		All Programs	2,030		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
5	2022	Forecast	9,400			Line 3 + Line 4
6		All Programs	1,000		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
7	2023	Forecast	10,400			Line 5 + Line 6
8		All Programs	100		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
9	2024	Forecast	10,500			Line 7 + Line 8
10		All Programs	(200)		Decrease mainly due to the completion and/or partial completion of Technology projects within the Energy Management value stream.	
11	2025	Forecast	10,300			Line 9 + Line 10
12		All Programs	100		Increase is mainly due to the deployment and/or ongoing support of Technology projects within the Energy Management value stream.	
13	2026	Forecast	10,400			Line 11 + Line 12

Table 7-18
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Hydro Generation)
Historical Capital Walk by Major Work Category
MWC 2F - Develop and Enhance Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	6,683				WP 7-14 Line 1
2		1,932	29%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as Watershed Infrastructure and Power Generation Records Management Partially offset by the completion and/or partial completion of Technology projects such as Power Generation Asset Risk Management Database and Linear Asset Management.	
3	2017	8,615				Line 1 + Line 2
4		(6,869)	-80%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Watershed Infrastructure and Linear Asset Management. Partially offset by the deployment and/or ongoing support of Technology projects such as Enterprise Portfolio and Project Management for Power Generation.	
5	2018	1,746				Line 3 + Line 4
6		(652)	-37%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Enterprise Portfolio and Project Management for Power Generation and Power Generation Records Management. Partially offset by the deployment and/or ongoing support of Technology projects such as Watershed Infrastructure and Dam Safety SAP Data and Search Enhancements.	
7	2019	1,093				Line 5 + Line 6
8		(378)	-35%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Enterprise Portfolio and Project Management for Power Generation and Power Generation Records Management. Partially offset by the deployment and/or ongoing support of Technology projects such as Dam Safety SAP Data and Search Enhancements, Power Generation Remediate Vulnerable Operating Systems and IT Mobile Outage Trailers.	
9	2020	715				Line 7 + Line 8

Table 7-19
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Nuclear Generation)
Historical Capital Walk by Major Work Category
MWC 2F - Develop and Enhance Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	3,642				WP 7-14 Line 2
2		(488)	-13%		Decrease mainly due to the completion and/or partial completion of Technology projects such as DCPD Mobility Application, DCPD Containment Radio, and DCPD Electronic Shift Operations Management System (eSOMS) Upgrade. Partially offset by the deployment and/or ongoing support of Technology projects such as DCPD Security Screening Information and DCPD EDMS/RMS/FileNet Replacement.	
3	2017	3,154				Line 1 + Line 2
4		1,024	32%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as DCPD Electronic Shift Operations Management System (eSOMS) Upgrade, DCPD Remediate Vulnerable Operation Systems, and DCPD Telephone System Replacement. Partially offset by the completion and/or partial completion of Technology projects such as DCPD EDMS/RMS/FileNet Replacement.	
5	2018	4,178				Line 3 + Line 4
6		2,200	53%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as DCPD Telephone System Replacement and DCPD Electronic Shift Operations Management System (eSOMS) Upgrade. Partially offset by the completion and/or partial completion of Technology projects such as DCPD Security Screening Information.	
7	2019	6,378				Line 5 + Line 6
8		3,752	59%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as DCPD Telephone System Replacement, DCPD Storage Hardware VM Software Replacement, and DCPD PIMS Nuclear Archival. Partially offset by the completion and/or partial completion of Technology projects such as DCPD Electronic Shift Operations Management System (eSOMS) Upgrade.	
9	2020	10,130				Line 7 + Line 8

Table 7-20
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs (Energy Procurement)
Historical Capital Walk by Major Work Category
MWC 2F - Develop and Enhance Applications and Infrastructure
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	11,498				WP 7-14 Line 3
2		(1,310)	-11%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Endur Platform (Power) and Market Initiatives Implementation (MII). Partially offset by the deployment and/or ongoing support of Technology projects such as Endur Upgrade and Market Initiatives Implementation (MII).	
3	2017	10,188				Line 1 + Line 2
4		4,790	47%		Increase is mainly due to the deployment and/or ongoing support of Technology projects such as Endur Upgrade and SQMD Replacement Phase 3. Partially offset by the completion and/or partial completion of Technology projects such as Market Initiatives Implementation (MII) and Outage and Dispatch Management System.	
5	2018	14,977				Line 3 + Line 4
6		(5,922)	-40%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Endur Upgrade and SQMD Replacement Phase 3. Partially offset by the deployment and/or ongoing support of Technology projects such as Market Initiatives Implementation (MII).	
7	2019	9,056				Line 5 + Line 6
8		(606)	-7%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Endur Upgrade and SQMD Replacement. Partially offset by the deployment and/or ongoing support of Technology projects such as Endur Platform Compliance Program.	
9	2020	8,450				Line 7 + Line 8

Table 7-21
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs
Historical Capital Walk by Major Work Category
MWC 1 - IT - Desktop Computers
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	13				WP 7-10 Line 1
2		(13)	-100%		Decrease mainly due to the completion and/or partial completion of deploying non-standard end user devices.	
3	2017	0				Line 1 + Line 2
4		0	0%		No recorded costs.	
5	2018	0				Line 3 + Line 4
6		5			Increase is mainly due to the deployment and/or ongoing support for non-standard end user devices.	
7	2019	5				Line 5 + Line 6
8		3	54%		Increase is mainly due to the deployment and/or ongoing support for non-standard end user devices.	
9	2020	7				Line 7 + Line 8

Table 7-22
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 5, Chapter 7, Energy Supply Technology Programs
Historical Capital Walk by Major Work Category
MWC 3M - Install/Repl Var Bal Acct
(Thousands of Nominal Dollars)

Ln. No.	Year	Amount	Percent Change		Detailed Description/Explanation	Reference
1	2016	1,162				WP 7-10 Line 3
2		(1,162)	-100%		Decrease mainly due to the completion and/or partial completion of Technology projects such as Smart Grid Short Term Demand Forecasting and Smart Grid Pilot - Cmmn Costs Gen P2.	
3	2017	0				Line 1 + Line 2
4		0	0%		No recorded costs.	
5	2018	0				Line 3 + Line 4
6		0	0%		No recorded costs.	
7	2019	0				Line 5 + Line 6
8		0	0%		No recorded costs.	
9	2020	0				Line 7 + Line 8

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7
Technology Programs
Deferred Work Analysis Summary

The Energy Supply 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 was checked against those principles by following the

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 was measured by units of work.

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

Check 3: PG&E continues to represent that the deferred 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)	2020 Rec. Adj. + 2021 to 2022 Forecast (A)	2020 to 2022 Imputed (B)	Difference	
1	7	Capital	ZF	N/A Build IT Apps and Infra (Energy Procurement)	No	No	N/A	N/A	No	Work not initiated but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were cancelled; and some of which were rescheduled to the 2023 GRC period. No work needed for safety and reliability.	N/A	N/A	\$ 25,220	\$ 32,607	\$ 7,387	Under/Over due to additional cancelled or rescheduled projects to accommodate higher priority projects
2	7	Capital	ZF	N/A Build IT Apps and Infra (Hydro)	No	No	N/A	N/A	No	Work not initiated but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were cancelled; and some of which were rescheduled to the 2023 GRC period. No work needed for safety and reliability.	N/A	N/A	\$ 4,415	\$ 20,343	\$ 15,928	Under/Over due to additional cancelled or rescheduled projects to accommodate higher priority projects
3	7	Capital	ZF	N/A Build IT Apps and Infra (Nuclear)	No	No	N/A	N/A	No	Work not initiated but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were cancelled; and some of which were rescheduled to the 2023 GRC period. No work needed for safety and reliability.	N/A	N/A	\$ 16,980	\$ 13,589	\$ (3,391)	Over/under due to projects being extended
4	7	Expense	JV	N/A Maintain IT Apps and Infra (Energy Procurement)	No	No	N/A	N/A	No	Work not initiated but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were cancelled; and some of which were rescheduled to the 2023 GRC period. No work needed for safety and reliability.	N/A	N/A	\$ 2,613	\$ 2,932	\$ 319	Under/Over due to additional cancelled or rescheduled projects to accommodate higher priority projects
5	7	Expense	JV	N/A Maintain IT Apps and Infra (Hydro)	No	No	N/A	N/A	No	Work not initiated but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were cancelled; and some of which were rescheduled to the 2023 GRC period. No work needed for safety and reliability.	N/A	N/A	\$ 1,248	\$ 1,470	\$ 222	Under/Over due to additional cancelled or rescheduled projects to accommodate higher priority projects
6	7	Expense	JV	N/A Maintain IT Apps and Infra (Nuclear)	No	No	N/A	N/A	No	Work not initiated but includes discrete projects, some of which were either completed during the 2020 GRC period; some of which were cancelled; and some of which were rescheduled to the 2023 GRC period. No work needed for safety and reliability.	N/A	N/A	\$ 2,227	\$ 2,040	\$ (187)	Over/under due to projects being extended

Note 1: The authorized imputed for this work was awarded at the MWC level (ZF for Capital and JV for Expense). For purposes of this analysis, the imputed amount was allocated across all departments using 2020 GRC forecasts as percentage base.

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Safety Gov Reg & Compliance - NG: PIMS Archiving and Retirement**

Project Title: Safety Gov Reg & Compliance - NG: PIMS Archiving and Retirement

Major Work Categories: 2F

Planning Order Numbers: 5793234, 5789335

Project Start Date: January 2020

Project Completion Date: December 2021

Operative Date (only applies to Capital): Operative as Installed

Project Description

This project falls under the Safety Governance, Regulation and Compliance Value Stream. The Safety, Governance, Regulatory, and Compliance value stream focuses on the technology solutions used to manage workforce health and safety; to manage public safety and environmental impacts; to manage Company records, compliance, and corrective action programs; to support regulatory and legal proceedings; and to manage relationships with external stakeholders.

NG's "Mainframe Archiving and Retirement" project (renamed to PIMS Archiving and Retirement for accuracy), described in the prior GRC, is rescheduled to the 2020-2021 timeframe.

NG's Plant Information Management System (PIMS) is one of the few remaining applications running on PG&E's mainframe computers.¹ Over the past 30-plus years, PIMS had been used for areas such as work management, radiation protection, access and badging, and storage of personnel qualifications and information. This project will archive the PIMS data into PG&E's enterprise record management system, Documentum, and retire the PIMS application.

Justification

The information in PIMS is considered company record and must be retained for compliance purposes. Quality Assurance Records as defined by NRC 10CFR50, Appendix B is an example of such a record.² This information must be archived into PG&E's enterprise record management system before PIMS can be decommissioned. Furthermore, the retirement of PIMS helps further PG&E's position to shut down its mainframe computers and ultimately reduce IT maintenance costs.

Cost

PG&E's forecast for this on-going project is based on the Job Estimates (JE) . PG&E can provide the specific Job Estimates output produced for this project upon request. Some key assumptions are as follows:

- Two-year project starts in 2020
- Project entails several application releases

¹ PG&E's mainframe computers house applications from various business groups thru out the company. Mainframes are considered legacy technology accompanied by high costs of maintenance. PG&E intends to decommission its mainframe and has been working toward that goal by gradually migrating applications to new technology.

² NRC 10CFR50, Appendix B - Quality Assurance Records: <https://www.nrc.gov/reading-rm/doc-collections/cfr/part050/part050-appb.html>

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Safety Gov Reg & Compliance - NG: PIMS Archiving and Retirement

Major Project Spending Estimates

(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							Workpaper Reference
	2020	2021	2022	2023	2024	2025	2026	Total	
EXPENSE									
MWC JV									
Expense Total									
CAPITAL									
5793234 (PIMS)		1720						1720	
5789335	1268							1268	
Capital Total	1268	1720						2988	
TOTAL PROJECT COST	1268	1720						2988	

Benefits

Benefit Areas	Project Benefits
Affordability	Further PG&E's position to shut down its mainframe computers. Approximate savings of \$3M per year in IT maintenance cost when the mainframes are ultimately decommissioned.
Compliance	Continued compliance with NRC record requirements, as well as PG&E's company record retention requirements.

Alternatives Considered

- No Action/ Delay retirement to the following GRC cycle
 - As mainframe technology continues to phase out in the industry, PG&E may lose its nuclear records and may face challenges in acquiring vendor support, hardware replacement parts, and individuals with mainframe skills. Thus, this option may increase the cost of the project significantly in the future, as well the ongoing cost of maintaining the mainframes.

**Pacific Gas and Electric Company
2023 General Rate Case**

Exhibit (PG&E-5), Chapter 7, Energy Supply Technology

Project Summary: Safety Gov Reg & Compliance - NG: Fatigue Management System Upgrade (Workforce Upgrade)

Project Title: Safety Gov Reg & Compliance - NG: Fatigue Management System Upgrade (Workforce Upgrade)

Major Work Categories: 2F / JV

Planning Order Numbers: 5793234, 5055045

Project Start Date: January 2021

Project Completion Date: December 2021

Operative Date (only applies to Capital): Operative as Installed

Project Description

This project falls under the Safety Governance, Regulation and Compliance Value Stream. The Safety, Governance, Regulatory, and Compliance value stream focuses on the technology solutions used to manage workforce health and safety; to manage public safety and environmental impacts; to manage Company records, compliance, and corrective action programs; to support regulatory and legal proceedings; and to manage relationships with external stakeholders.

NG uses Workforce Software's Workforce application suite to comply with fatigue management rules per NRC regulation 10CFR26, Subpart I.³ This regulation establishes requirements for ensuring that nuclear power plant personnel are fit to perform their duties safely and competently. Worker fatigue, brought on by excessive work hours and other factors, poses a safety risk for the plant. The Workforce application mitigates the risk by enforcing the rules defined in the regulation. The purpose of the project is to upgrade the Workforce system.

Justification

The current version of the application relies on an Oracle technology—Java 7—that is no longer supported. While non-supported technologies do not equate to security vulnerabilities, the risk of malicious individuals uncovering vulnerabilities does increase with time; especially widely adopted technologies developed by major technology corporations. PG&E plans to mitigate this risk by performing an upgrade.

Cost

PG&E's forecast for this on-going project is based on the Job Estimates (JE) . PG&E can provide the specific Job Estimates output produced for this project upon request. Some key assumptions are as follows:

Some key assumptions are as follows:

- One-year project starts in 2021
- Project entails several application releases

³ NRC 10CFR26 - Fitness For Duty Programs: <https://www.nrc.gov/reading-rm/doc-collections/cfr/part026/>

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Safety Gov Reg & Compliance - NG: Fatigue Management System Upgrade (Workforce Upgrade)

Major Project Spending Estimates
(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							
	2020	2021	2022	2023	2024	2025	2026	Total	Workpaper Reference
EXPENSE									
5055045 (Workforce)		10						10	
Expense Total		10						10	
CAPITAL									
5793234 (Workforce)		1750						1750	
Capital Total		1750						1750	
TOTAL PROJECT COST		1760						1760	

Benefits

Benefit Areas	Project Benefits
Compliance	Continued compliance with fatigue management rules per NRC regulation 10CFR26, Subpart I.

Alternatives Considered

- No Action: Delay upgrade to the following GRC cycle
 - This option puts PG&E at risk of cyber vulnerabilities and non-compliance with the NRC.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Field Work Management - NG: Scheduling System Upgrade

Project Title: Field Work Management - NG: Scheduling System Upgrade

Major Work Categories: 2F / JV

Planning Order Numbers: 5793232; 5055043

Project Start Date: January 2022

Project Completion Date: September 2023

Operative Date (only applies to Capital): Operative as Installed

Project Description

This project falls under the Field Work Management Value Stream. The Field Work Management value stream focuses on technology solutions used to plan and execute field work safely and efficiently, to document performed work completely and accurately, and to manage the flow of information between field crews and the back-office.

The Scheduling System Upgrade project, described in the prior GRC (Project Scheduling System Upgrade), is planned for 2022 and will complete in 2023. PG&E has conducted detailed analysis of the effort and concluded that the initial scope, upgrade of Oracle's Primavera P6 software, should expand to include all tools encompassing the schedule system; Knowledge Relay's Information Visualizer software and Pipeline Group's Maxavera and Syntempo software.

The DCPP Scheduling System has significant stability and cyber security risk problems, putting it at risk of show-stopping issues, and directly impacting DCPP compliance. Losing the system for any length of time would prevent DCPP from running their risk profile processes which ensure safe execution of the work being performed at DCPP, as well as prevent any work from being scheduled. The systems are past their lifecycle and are no longer supported by their vendors. They are out of cyber security compliance due to outdated Win 2008 operating systems and critical JAVA vulnerabilities that can only be remediated with a software upgrade, putting them at even greater risk, due to the threat of being shut down by cyber to protect the PG&E network. DCPP scheduling system is very critical to all DCPP's scheduling and management of daily and outage-related work. The DCPP Scheduling System is composed of a suite of 5 software applications. Work is scheduled based on a component matrix, pm frequency, priorities, and any other regulatory commitments. Scheduling is complex and requires multiple reviews to ensure commitments are met. The software is integrated with multiple sight software programs including operations clearance and tech spec tracking.

Justification

As with any software system, periodic upgrade is part of its lifecycle—to maintain stability and vendor support and remediate potential cyber vulnerabilities. The suite of software encompassing the scheduling system needs an upgrade, as current versions are no longer supported by vendors and stability issues have been surfacing; adversely affecting the productivity of its users.

Cost

PG&E used the IT Project/Program Estimating Tool (PET) to document estimate assumptions and generate labor and non-labor cost forecasts for this project. To calculate labor costs, the PET captures labor hours by activity and resource type, multiplies that by standard labor rates, and adds in standard overhead factors. To calculate non-labor costs, the PET captures contract costs by type (such as software licenses or third-party services), material costs by unit quantity and unit price, and standard overheads such as materials burden and AFUDC. Other factors, such as escalation and capital/expense ratios, are calculated based on standard rates and accounting guidance. See Exhibit

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Field Work Management - NG: Scheduling System Upgrade

(PG&E-7), Chapter 8 for additional information regarding the PET. PG&E can provide the specific PET output produced for this project upon request. Some key assumptions are as follows:

- Two-year project starts in 2022
- Project entails several application upgrades

Major Project Spending Estimates
(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							Workpaper Reference
	2020	2021	2022	2023	2024	2025	2026	Total	
EXPENSE									
5055043			550	320				870	
Expense Total			550	320				870	
CAPITAL									
5793232			2100	1200				3300	
Capital Total			2100	1200				3300	
TOTAL PROJECT COST			2650	1520				4170	

Benefits

Benefit Areas	Project Benefits
Risk Management	Cyber Security risk would be reduced by replacing the unsupported versions of Win 2008 and RedHat Linux servers, and an outdated version of JAVA, which are all risks to the PG&E network. 2) Software would be at a level that the vendor supports reducing risk of failure without the ability to restore the system. 3) "30-110-GEN Nuclear Operations and Safety - Core Damaging Event" - DCPD utilizes Primavera as a tool to monitor what work is being performed that could potentially lead to a "Core Damaging Event"
Compliance	1) Cyber Security compliance would be met by replacing the Win 2008 servers and the outdated JAVA and Redhat which are both risks to the PG&E network. 2) They DCPD has Surveillance Test Procedures (STPs) that are regulatory commitments for our licensing. STPs are scheduled and worked per the scheduling software. Without this, there is greater risk to missing a required surveillance placing DCPD out of compliance with regulators.
Reliability	DCPD teams rely heavily on these tools to efficiently perform routine and outage-related work, which contributes to the reliable operation of the plant. Improving stability of the tools reduces the probability of impacting such work, as well as reducing lost man-hours spent on technical holdups and workarounds.

Alternatives Considered

1. No Action: Delay upgrade to the following GRC cycle
 - The suite of software is already out of support by their respective vendors. Further delay comes with the risk of a higher probability of show-stopping issues or major security vulnerabilities surfacing.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Asset Management and Risk Analysis - PG: DamWatch (Civil Asset Expansion)

Project Title: Asset Management and Risk Analysis - PG: DamWatch (Civil Asset Expansion)

Major Work Categories: 2F / JV

Planning Order Numbers: 57932223; 5055034

Project Start Date: January 2022

Project Completion Date: December 2026

Operative Date (only applies to Capital): Operative as Installed

Project Description

This project falls under the Asset Management and Risk Analysis Value Stream. The Asset Management and Risk Analysis value stream focuses on technology solutions used to manage the lifecycle of utility assets; to track their location, condition, specifications, and relationships to other assets; and to understand and manage asset-related risks.

During 2019 and 2020 PG&E's Dam Safety Program implemented US Engineering's DamWatch Web-Based platform to support dam asset management. The platform was deployed as a tool for dam safety engineers to manage dam data for asset risk and compliance management purposes. During 2019 and 2020 PG&E's Dam Safety Program implemented US Engineering's DamWatch Web-Based platform to support dam asset management. The platform was deployed as a tool for dam safety engineers to manage dam data for asset risk and compliance management purposes. Recent Internal Audit findings related to gaps in the Water Conveyance and Powerhouse programs highlighted the lack of a systematic way of handling the asset and inspection data. The Management Action Plan for the High and Medium Risk IA findings directs expansion of DamWatch implementation for Water Conveyances and Powerhouses. The Root Cause Analysis for the PGEN Balch Camp SIF 120016608 similarly highlighted the lack of a system to manage data related to high, medium, and low risk roads and mitigation application. CAPR-2b directed "Implement tracking system for roads and bridges by classification and mitigation application. System must be available for access to Asset Management and Operations."

Cost

PG&E used the IT Project/Program Estimating Tool (PET) to document estimate assumptions and generate labor and non-labor cost forecasts for this project. To calculate labor costs, the PET captures labor hours by activity and resource type, multiplies that by standard labor rates, and adds in standard overhead factors. To calculate non-labor costs, the PET captures contract costs by type (such as software licenses or third-party services), material costs by unit quantity and unit price, and standard overheads such as materials burden and AFUDC. Other factors, such as escalation and capital/expense ratios, are calculated based on standard rates and accounting guidance. See Exhibit (PG&E-7), Chapter 8 for additional information regarding the PET. PG&E can provide the specific PET output produced for this project upon request. Some key assumptions are as follows:

- Project is a multi-year project
- Involves incremental deployment

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Asset Management and Risk Analysis - PG: DamWatch (Civil Asset Expansion)

Major Project Spending Estimates
(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							
	2020	2021	2022	2023	2024	2025	2026	Total	Workpaper Reference
EXPENSE									
5055034			40	70	70	70	70	320	
Expense Total			40	70	70	70	70	320	
CAPITAL									
5793223			400	500	500	500	500	2400	
Capital Total			400	500	500	500	500	2400	
TOTAL PROJECT COST			440	570	570	570	570	2720	

Benefits

Benefit Areas	Project Benefits
Safety	There are both public safety and employee safety risks addressed in a system to manage these assets.
Risk Management	- Powerhouses are associated with Enterprise Risk #1 Wildfire. - Water Conveyance Systems (WCS) are associated with Enterprise Risk #8. - Roads and bridges are associated with employee safety, especially around MVI.
Compliance	- Expanded implementation of DamWatch supports compliance with FERC and DSOD dam safety, especially for Water Conveyance Systems. - Implementation also addresses MAP for IA and Correction Action Plans for SIF.

Justification

The Civil Infrastructure Asset Family includes roads, bridges, and water conveyance (penstocks, canals, flumes). Managing our roads in a system is a corrective action from a recent SIF Apparent Cause. Managing our water conveyance assets (penstocks and canals) in a system is a high priority IA requirement from the management action plan that resulted from an Internal Audit finding on our high public safety risk assets.

The Powerhouse Asset Family includes the assets within the powerhouse as well as the electrical assets owned and operated by Power Generation in our switchyards that pose a wildfire risk to the company. Power Generation is currently executing on a plan to inspect and manage our powerhouse switchyard assets consistent with the requirements established by PG&E Electric Operations. PGEN will need a system to manage the data that results from these enhanced inspections that are being performed. Wildfire remains the number one risk to the company in 2021.

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Asset Management and Risk Analysis - PG: DamWatch (Civil Asset Expansion)**

Alternatives Considered

1. No Action: Failure to fund DamWatch expansion will leave management of some of the riskiest and reliability critical assets in Power Generation largely to one off local spreadsheets. Similarly, it will delay the implementation of SIF and IA corrective actions. The risk to employee safety for employees driving on PG&E roads and bridges as well as the public safety risks posed by PG&E's canals, flumes, penstocks, roads, bridges, and powerhouses will not be systemically managed - they will be ad hoc and spread sheet based. Previous business cases have not as clearly articulated the risk of failing to implement or deferring the implementation of DamWatch.

If this project is not approved Power Generation will not be able to meet the following business commitments/requirements:

- Root Cause Evaluation Corrective Action - PGEN Balch Camp SIF Actual Event (CAPR-2b)
- Internal Audit (20-051) Finding 1.13 - Water Conveyance
- Internal Audit (20-051) Finding 2.7 - Powerhouses
- Generation Operating Plan - Wildfire Focus Area to implement PG risk reduction to informed switchyard inspection and repair.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Asset Management and Risk Analysis- PG: Power Generation Data Integration

Project Title: Asset Management and Risk Analysis- PG: Power Generation Data Integration

Major Work Categories: 2F / JV

Planning Order Numbers: 5793218; 5055029

Project Start Date: January 2024

Project Completion Date: December 2026

Operative Date (only applies to Capital): Operative as Installed

Project Description

This project falls under the Asset Management and Risk Analysis Value Stream. The Asset Management and Risk Analysis value stream focuses on technology solutions used to manage the lifecycle of utility assets; to track their location, condition, specifications, and relationships to other assets; and to understand and manage asset-related risks.

Power Generation has data spread across multiple applications that inform business decisions. The data are not held in one repository making duplicative, out-of-date, missing data a significant challenge for the business operating teams. Power Generation needs a solution to manage own SQL database and to aggregate their data in one location.

Justification

Power Generation need to identify and create a data repository for all PGEN data which can be used for flexible reporting across project, asset, and work management functions.

Data need to be pulled in from different sources including multiple applications, spreadsheets, and Access data. A web-based mechanism to input additional, and maintain existing, data into a database needs to be developed. Interfaces, scripts across multiple applications need to be developed to collect data into the central repository database

Cost

PG&E used the IT Project/Program Estimating Tool (PET) to document estimate assumptions and generate labor and non-labor cost forecasts for this project. To calculate labor costs, the PET captures labor hours by activity and resource type, multiplies that by standard labor rates, and adds in standard overhead factors. To calculate non-labor costs, the PET captures contract costs by type (such as software licenses or third-party services), material costs by unit quantity and unit price, and standard overheads such as materials burden and AFUDC. Other factors, such as escalation and capital/expense ratios, are calculated based on standard rates and accounting guidance. See Exhibit (PG&E-7), Chapter 8 for additional information regarding the PET. PG&E can provide the specific PET output produced for this project upon request. Some key assumptions are as follows:

- Project is a multi-year project
- Involves getting data from multiple applications
- Involves incremental deployment

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Asset Management and Risk Analysis- PG: Power Generation Data Integration

Major Project Spending Estimates
(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							Workpaper Reference
	2020	2021	2022	2023	2024	2025	2026	Total	
EXPENSE									
5055029			360	130	330	330	330	1480	
Expense Total			360	130	330	330	330	1480	
CAPITAL									
5793218			2200	1400	2400	2400	2100	10500	
Capital Total			2200	1400	2400	2400	2100	10500	
TOTAL PROJECT COST			2560	1530	2730	2730	2430	11980	

Benefits

Benefit Areas	Project Benefits
Operational Improvement	Power Generation has data spread between multiple applications that inform business decisions that is not held in one repository making duplicative, out-of-date, missing data a significant challenge for our operating teams. Having to manually source data from the myriad of applications is time consuming and can lead to mistakes/missing data.
Compliance	Indirect benefits in support of compliance related projects. Single source information accessible from a common database would create more accessibility to leverage the data which will build trust in information/reporting and in turn lead to better coordination between supporting departments and operational stakeholders, as well as inform leadership for key decision making.
IT Footprint Optimization	Provide a data driven approach improved by database technology that can be optimized to handle vast amount of data quickly and effectively. The data improvement experience by the added technology will combined multiple systems to prevent data redundancy, Inaccuracy, and hours' worth of effort. Reporting of construction data and system records will be available by defined standards plus be available in multiple views through different software dash boards. In addition, Power Generation will be in line with other LOB's and the new technology structure would help optimize productivity.

Alternatives Considered

1. No Action: Access to centralized data doesn't exist for Power Generation which continues to require manual spreadsheets, labor intensive data manipulation and creates a risk for business decisions on incomplete or out-of-date data.
 - Current state is not sustainable for Power Generation.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Field Work Management - PG: SAP Work Management Enhancements

Project Title: Field Work Management - PG: SAP Work Management Enhancements

Major Work Categories: 2F / JV

Planning Order Numbers: 5793219; 5055030

Project Start Date: January 2023

Project Completion Date: December 2026

Operative Date (only applies to Capital): Operative as Installed

Project Description

This project falls under the Field Work Management Value Stream. The Field Work Management value stream focuses on technology solutions used to plan and execute field work safely and efficiently, to document performed work completely and accurately, and to manage the flow of information between field crews and the back-office.

This project is necessary for implementing work and inspections of all of Power Generation Assets, but in particular, its' highest risk assets: dams, reservoirs, canals, and water conveyance. As currently configured, SAP-WM does not provide the data collection, functionality, reporting, integration, and user interface experience required to successfully support Hydro's maintenance work management and project execution operations. Maintenance and project work activities include compliance with dam safety regulatory requirements, system protection, public and personnel safety, reliability, and outage planning. Enterprise required tools are not are not fully integrated (SAP WM, SAP BW, SAP EWM, SPSI, PPM, UI, P6, UNIFIER, Ariba, Contracts, PGEN forms and projects documentation) creating data gaps, multiple duplicate data entry requirements, data input errors, and document/record retention gaps.

Justification

SAP Work Management Modifications add data fields to organize work, compare planned work against completed, organize backlogs, provide performance dashboards. It reorganizes the Equipment Hierarchy to improve navigation. The system reorganizes Equipment types to be consistent between watersheds. It develops voice activated application interface to SAP WM on mobile devices to capture maintenance work on work orders, improve maintenance history, include actual hours worked on orders. The application creates User specific desktops. It creates one-page PM Project status update entry portal Eliminate data field duplication from enterprise tools. Create reports defined by PGEN. Integrate (SAP BW, SAP EWM, SPSI, PPM, UI, P6, UNIFIER, Ariba, Contracts, PGEN forms and projects documentation)

Cost

PG&E used the IT Project/Program Estimating Tool (PET) to document estimate assumptions and generate labor and non-labor cost forecasts for this project. To calculate labor costs, the PET captures labor hours by activity and resource type, multiplies that by standard labor rates, and adds in standard overhead factors. To calculate non-labor costs, the PET captures contract costs by type (such as software licenses or third-party services), material costs by unit quantity and unit price, and standard overheads such as materials burden and AFUDC. Other factors, such as escalation and capital/expense ratios, are calculated based on standard rates and accounting guidance. See Exhibit (PG&E-7), Chapter 8 for additional information regarding the PET. PG&E can provide the specific PET output produced for this project upon request. Some key assumptions are as follows:

- Project is a multi-year project
- Involves getting data from multiple applications
- Involves incremental deployment

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Field Work Management - PG: SAP Work Management Enhancements

Major Project Spending Estimates
(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							
	2020	2021	2022	2023	2024	2025	2026	Total	Workpaper Reference
EXPENSE									
5055030				80	150	200	200	630	
Expense Total				80	150	200	200	630	
CAPITAL									
5793219			700	600	500	500	500	2800	
Capital Total			700	600	500	500	500	2800	
TOTAL PROJECT COST			700	680	650	700	700	3430	

Benefits

Benefit Areas	Project Benefits
Operational Improvement	The successful completion of this project will result in compounded savings in several categories (both CAP/EXP). While no FTE reduction is initially expected, all resources involved in work plans, parts, and tools for all daily maintenance activities could see a 10-15% (estimated) efficiency gain as work can be aggregated in a logical manner to optimize how and where crews are deployed. Capital project execution and contract management activities will also show efficiency gains 3-8% depending on the scope of the work.
Safety	Improved utilization of the SAP WM tool will also enable crew members to better document safety issues, track completion of safety work, and document work completion that are non-contractor specific. In addition, the improvement to integration of our project tools will improve planning and execution of all safety related projects in future years.
Compliance	Improved utilization of SAP WM and reporting capability will improve the visibility and status compliance related work activities.

Alternatives Considered

1. No Action: Continue to require manual spreadsheets, added labor costs for data manipulation and increased safety and compliance risks for business decisions on incomplete, out-of-date, and disconnected data & systems.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: CAISO Market Initiatives Implementation (MII) Program

Project Title: Energy Management - EPP: CAISO Market Initiatives Implementation (MII) Program

Major Work Categories: 2F / JV

Planning Order Numbers: 5793309; 5055435; 5783819

Project Start Date: January 2022

Project Completion Date: December 2026

Operative Date (only applies to Capital): Operative as Installed

Project Description

This program falls under Energy Management Value Stream. The Energy Management value stream focuses on the technology solutions used to analyze and forecast PG&E customer energy demand, to trade and procure energy, and to manage PG&E's energy resources and generation facilities.

MII is a mandatory program that implements regulatory and reliability requirement changes in the electricity market which are initiated and/or mandated by FERC, the CPUC, and CAISO. FERC Order ER06-615-000 mandates that market participants in the wholesale market (like PG&E) need to continue to evolve with future market design changes to align with CAISO's market design changes.

The CAISO publishes an annual Initiatives Catalog and Initiatives Roadmap outlining proposed electric market redesign and enhancement initiatives. The initiatives address regulatory and reliability requirements mandated by the Federal Energy Regulatory Commission (FERC), as well as market efficiency or reliability issues deemed necessary by the CAISO with input from market participants. The MII program operates in lockstep with the CAISO proposed schedule to adapt the PG&E technology required to effectively participate in CAISO's wholesale electric market.

PG&E assessed the potential technology impacts of the proposed initiatives based on CAISO's estimated operative timeline (where available) and affected business processes.

For 2020-2022, the scope of CAISO Initiatives is expected to include:

- 15-Minute Day-Ahead Scheduling Granularity
- Frequency Response Phase 2
- Flexible Resource Adequacy Criteria and Must Offer Obligation Phase 2 (FRACMOO)
- Energy Storage and Distributed Energy Resources Phase 3 (ESDER)
- Real-time Market Enhancements
- Resource Adequacy Enhancements
- Multi-Stage Generator Regulation Refinements
- Flexible Ramping Product Enhancements
- Exceptional Dispatch Decremental Settlement
- Regulation Aggregated Pumps and Pumped Storage
- Multi-Day Unit Commitment
- Day-Ahead Flexible Reserve Product
- Fast Frequency Response
- Fractional Megawatt Regulation Awards
- FMM Block Scheduling of Demand Response Resources

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: CAISO Market Initiatives Implementation (MII) Program

For 2023-2026, the scope of CAISO Initiatives is expected to include:

- Ancillary Service Deliverability and Real-Time Re-optimization
- Day-Ahead Market Enhancements
- Dispatch Enhancements
- Energy Imbalance Market (EIM) Base Schedule Submission Deadline
- EIM Governance Review Phase 2
- Energy Storage and Distributed Energy Resources (ESDER) Enhancements
- Extend Day-Ahead Market to EIM Entities
- Frequency Response Measures
- Hybrid Resource Evolution
- Joint Owned Unit Model
- Multi Greenhouse Gas Area
- Non-Participating Scheduling Coordinator Option
- Real-Time Settlement Review
- Resource Adequacy Enhancements
- Scarcity Pricing Enhancement
- Storage as a Transmission Asset (SATA)
- Transmission Access Charge Structure Enhancements

Justification

As a Load Serving Entity, PG&E must invest in crucial technology platforms to efficiently participate in market operations. The MII program is considered mandatory as the program ensures that PG&E remain compliant with FERC mandated or CAISO dictated initiatives.

Cost

PG&E used the IT Project/Program Estimating Tool (PET) to document estimate assumptions and generate labor and non-labor cost forecasts for this program. To calculate labor costs, the PET captures labor hours by activity and resource type, multiplies that by standard labor rates, and adds in standard overhead factors. To calculate non-labor costs, the PET captures contract costs by type (such as software licenses or third-party services), material costs by unit quantity and unit price, and standard overheads such as materials burden and AFUDC. Other factors, such as escalation and capital/expense ratios, are calculated based on standard rates and accounting guidance. See Exhibit (PG&E-7), Chapter 8 for additional information regarding the PET. PG&E can provide the specific PET output produced for this program upon request. Some key assumptions are as follows:

- Program is multi-year involving multiple CAISO Initiatives
- CAISO Initiatives may affect multiple applications

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: CAISO Market Initiatives Implementation (MII) Program

Major Project Spending Estimates
(Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							Workpaper Reference
	2020	2021	2022	2023	2024	2025	2026	Total	
EXPENSE									
5055435 (CAISO MII)		249	258	266	277	285	295	1630	
Expense Total		249	258	266	277	285	295	1630	
CAPITAL									
5793309 (CAISO MII)		4305	4452	4603	4773	4921	5003	28057	
5783819	4591							4591	
Capital Total	4591	4305	4452	4603	4773	4921	5003	32648	
TOTAL PROJECT COST	4591	4555	4711	4870	5050	5207	5299	34278	

Note: In 2021, these planning orders were allocated across two programs as follows: CAISO Market Initiatives Implementation (MII) Program (49.6%) and Energy Trading Risk Management Compliance Program (50.4%). The appropriate amounts have been accounted for in the supporting cost table within this project summary.

Benefits

Benefit Areas	Project Benefits
Compliance	Continued compliance with mandated market initiatives and tariff changes.
Reliability	Effective participation in the CAISO's wholesale electric market ensures that PG&E is able to reliably serve its customer load.

Alternatives Considered

1. No Action
 - Not an option for a regulatory and compliance mandated project.
2. Handle Manually
 - This option is not possible as many of PG&E's systems are tightly coupled to CAISO systems and the regulatory rules that dictate its functionalities. These systems must change as CAISO systems change and as regulatory rules change.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: Energy Trading Risk Management Compliance Program

Project Title: Energy Management - EPP: Energy Trading Risk Management Compliance Program

Major Work Categories: 2F / JV

Planning Order Numbers: 5793309; 5055435

Project Start Date: January 2022

Project Completion Date: December 2026

Operative Date (only applies to Capital): Operative as Installed

Project Description

This program falls under Energy Management Value Stream. The Energy Management value stream focuses on the technology solutions used to analyze and forecast PG&E customer energy demand, to trade and procure energy, and to manage PG&E's energy resources and generation facilities.

PG&E's Enterprise Trading and Risk Management (ETRM) platform for managing electric, natural gas, and GHG procurement. The ETRM Platform is a front to back office solution including trade capture, scheduling, position management, risk management, compliance, reporting, settlement, and accounting and is the primary system the business relies on to demonstrate compliance with state and federal regulations in order to recover the cost of \$4 billion in transactions annually.

The ETRM Platform continuously requires new or modified functionality due primarily to Market and Regulatory changes from the following sources: CPUC, State of California, NERC, FERC, CAISO, CCA Market Changes, PG&E's Energy Portfolio Strategy changes in response to market changes, and PG&E's Interfacing Applications (FBS, RDC, MDR, EnSuite, SAP, ICE, ODMS) The current annual funding cycle and off-cycle process does not adequately fund all of these work categories.

CubeIntelligence (CubeLogic)

CubeIntelligence Credit System is a credit risk exposure aggregation tool for mitigation of counterparty credit risks. The system also integrates with trading systems (Endur and GTS INSIDetracc) to provide credit users with an analysis tool.

Currently, the software at PG&E is 4 versions behind, and PG&E is paying extra maintenance renewal cost every year to keep existing maintenance support contract from the vendor. In addition, the current software is using Microsoft Silverlight framework. Microsoft Silverlight will reach the end of support on October 12, 2021. Silverlight framework is currently only supported on Internet Explorer 10 and Internet Explorer 11, with support for Internet Explorer 10 ending on January 31, 2020

The project aims to implement the following:

- Migrate the end of support Microsoft Silverlight technology to HTML5 technology
- Remove Internet Explorer (IE) browser dependency
- Enabling higher performance and browser independence
- Enabling mobile devices accessibility
- Enabling SQL Server Always On High Availability feature

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: Energy Trading Risk Management Compliance Program

Risk Data Control (RDC)

The Utility's Risk Data Control (RDC) system is a critical application that tracks and manages transactional analytics such as mark to market, credit exposure and potential future exposure along with the vast majority of reports and controls associated with the trades captured in enterprise trading systems across power and gas portfolios.

RDC is an in-house developed legacy application initially deployed in 2005 and is approaching technological obsolescence. Furthermore, RDC lacks flexibility for future regulatory and market product and compliance needs. In absence of replacement of RDC, the Utility would have to resort to spreadsheets and manual processes to manage a changing portfolio of products—an outcome which could cost more in the long run.

The project aims to:

- Track and manage transactional analytics such as mark to market, credit exposure and potential future exposure
- Create and manage the vast majority of reports and controls associated with the trades captured in enterprise trading systems

Renewable Gas Mandate Implementation

This project falls under Energy Management Value Stream. The Energy Management value stream focuses on the technology solutions used to analyze and forecast PG&E customer energy demand, to trade and procure energy, and to manage PG&E's energy resources and generation facilities.

PG&E believes that a renewable natural gas (RNG) procurement mandate will become law during the 2023-2026 timeframe, requiring PG&E to meet certain levels of renewable procurement for core gas customers. Accordingly, and based on previous experience with procuring new types of energy products, PG&E anticipates the need to set up an appropriate IT solution by modifying its existing trade, scheduling, settlement, and related systems for capturing, settling, monitoring, and reporting on any RNG transactions for risk management and compliance purposes.

The project aims to:

- This project ensures PG&E compliance with mandated regulatory requirements, assuming the mandate occurs in the projected timeframe. The mandate is likely to require PG&E and other Load Serving Entities to meet certain renewable procurement requirements, similar to that of the Renewable Portfolio Standard (RPS). Past experience with procuring new types of energy products demonstrates the need for modifications of existing systems and/or implementing new IT solutions.
- Support PG&E's commitment to help the state meet its Green House Gas (GHG) reduction goals and to capture short-lived climate pollutants.

Justification

Establish an Endur Platform Program to cover Market and Regulatory changes throughout the year, rather than reactively look for funding. Current initiatives targeted for Endur include:

- Renewable Energy Credits (RECs) – Not included in the original implementation, now a priority due to market changes and a need for a comprehensive solution for overall compliance (transaction entry through accounting/reporting)
- Resource Adequacy (RA) – comprehensive solution to include position reporting and inventory currently managed in Excel

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: Energy Trading Risk Management Compliance Program

- GT&S rate case changes – the approved rate case requires a complete gas scheduling solution to effectively incorporate changes in the business from the decision
- Power Hedging – due to market changes it is necessary for Endur to capture a number of new power instruments
- GHG related compliance changes – new/reviewed instruments or back office changes to support new CARB regulations

Cost

PG&E used the IT Project/Program Estimating Tool (PET) to document estimate assumptions and generate labor and non-labor cost forecasts for this program. To calculate labor costs, the PET captures labor hours by activity and resource type, multiplies that by standard labor rates, and adds in standard overhead factors. To calculate non-labor costs, the PET captures contract costs by type (such as software licenses or third-party services), material costs by unit quantity and unit price, and standard overheads such as materials burden and AFUDC. Other factors, such as escalation and capital/expense ratios, are calculated based on standard rates and accounting guidance. See Exhibit (PG&E-7), Chapter 8 for additional information regarding the PET. PG&E can provide the specific PET output produced for this program upon request. Some key assumptions are as follows:

- Program includes the following major applications/ project
 - Endur Platform
 - Cube Intelligence
 - Risk Data Control
 - Renewable Gas Mandate Implementation
- Involves incremental deployment

Major Project Spending Estimates (Thousands of Nominal Dollars)

	CWIP 2020 Recorded	Forecasted							Workpaper Reference
	2020	2021	2022	2023	2024	2025	2026	Total	
EXPENSE									
5055435 (ETRM)		441	542	934	923	865	855	4560	
Expense Total		441	542	934	923	865	855	4560	
CAPITAL									
5793309 (ETRM)		3065	4948	5797	5727	5379	5397	30313	
Capital Total		3065	4948	5797	5727	5379	5397	30313	
TOTAL PROJECT COST		3505	5490	6731	6650	6244	6252	34873	

Note: In 2021, these planning orders were allocated across two programs as follows: CAISO Market Initiatives Implementation (MII) Program (49.6%) and Energy Trading Risk Management Compliance Program (50.4%). The appropriate amounts have been accounted for in the supporting cost table within this project summary.

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 7, Energy Supply Technology
Project Summary: Energy Management - EPP: Energy Trading Risk Management Compliance Program

Benefits

Benefit Areas	Project Benefits
Compliance	PG&E's electric, natural gas, and GHG procurement cost recovery requires detailed reports for over \$4 billion in transactions annually. The critical CPUC cost recovery proceedings include the Core Procurement Incentive Mechanism, Quarterly Compliance Review, Mark-to-Market reporting, and ERRR Annual Compliance Review. In addition, Endur supports compliance reports to the following agencies: SEC, ARB, CEC, CFTC, CPUC, EIA, and FERC.
Operational Improvement	The technical upgrade would bring the current outdated CubeIntelligence system back on Standard Support by removing Silverlight and IE dependency and enabling higher performance and browser independence, including on mobile devices. The new user interface design in v7 has vastly improved the performance, ergonomics, and usability of the application suite in addition to additional functionality enhancement
Environmental	Supports PG&E's commitment to a cleaner energy future for its customers.

Alternatives Considered

1. No Action
 - Not an option for a regulatory and compliance mandated project.
2. Manual Implementation:
 - Not a viable option, as manual processes are prone to error and cannot effectively handle large volumes of data and transactions, which puts the company at risk of non-compliance. It also creates complexity in reconciling manually tracked transactions with those processed thru existing systems.
3. Switching to Another Platform:
 - Alternative platforms were considered during the original Endur implementation. To date PG&E has invested more than \$60M in the platform to ensure reliable, consistent reporting to various regulators including the SEC, CFTC, FERC, ARB, and CPUC. Replacing Endur with another solution would require another \$60M+ project.

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

WORKPAPERS SUPPORTING
CHAPTER 8, ENERGY SUPPLY RATEMAKING

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Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 8
Energy Supply Rate-making
Hydroelectric Decommissioning Estimates

Line No.

Annual Costs with Probabilities Applied (2020\$)		Total Cost with Probability (2020 \$)					Reference From	
PH Name	Prob. of Decom.	Total Cost (2020 \$)	2021	2022	2023	2024	2025	
1 Battle Creek	100%	\$118,265,928	\$125,000	\$125,000	\$8,800,000	\$0	\$0	WP 8-4 Line 21 for Total Cost (2020\$)
2 Kerckhoff 1	100%	\$28,930,000	\$0	\$0	\$0	\$0	\$0	WP 4-11.7 Line 1-2 for 2021-2023 forecast
3 Hat Creek	100%	\$27,620,000	\$0	\$0	\$0	\$0	\$0	WP 8-4 Line 38 for Total Cost (2020\$)
4 Crane Valley	50%	\$89,730,000	\$0	\$0	\$0	\$0	\$0	WP 8-5 Line 48 for Total Cost (2020\$)
5 Hamilton Branch	50%	\$13,600,000	\$0	\$0	\$0	\$0	\$0	WP 8-5 Line 64 for Total Cost (2020\$)
6 Potter Valley	20%	\$93,180,223	\$0	\$0	\$0	\$0	\$0	WP 8-5 Line 77 for Total Cost (2020\$)
7 DeSaba - Centerville	10%	\$63,144,568	\$0	\$0	\$0	\$0	\$0	WP 8-6 Line 92 for Total Cost (2020\$)
8 Phoenix	10%	\$3,570,000	\$0	\$0	\$0	\$0	\$0	WP 8-6 Line 105 for Total Cost (2020\$)
9 Tule River	10%	\$11,040,000	\$0	\$0	\$0	\$0	\$0	WP 8-6 Line 116 for Total Cost (2020\$)
10 Miocene - Coal Canyon/Lime Saddle	0%	\$35,696,895	\$0	\$0	\$0	\$0	\$0	WP 8-7 Line 125 for Total Cost (2020\$)
11 Chili Bar	0%	\$46,400,000	\$1	\$0	\$0	\$0	\$0	WP 8-7 Line 146 for Total Cost (2020\$)
12 Deer Creek	0%	\$17,400,000	\$2	\$0	\$0	\$0	\$0	
13 TOTALS		\$548,577,614						
14		\$252,892,429						
15								

16 Annual Costs with Probabilities Applied (Nominal \$)

Annual Costs with Probabilities Applied (Nominal \$)		Total Cost with Probability					Reference From	
PH Name	Prob. of Decom.	Total Cost (Nominal \$)	2021	2022	2023	2024	2025	
17 Battle Creek	100%	\$161,800,648	\$125,000	\$125,000	\$8,800,000	\$0	\$0	WP 8-4 Line 21 for Total Cost (2020\$)
18 Kerckhoff 1	100%	\$35,914,385	\$0	\$0	\$0	\$0	\$0	WP 4-11.7 Line 1-2 for 2021-2023 forecast
19 Hat Creek	100%	\$43,503,258	\$0	\$0	\$0	\$0	\$0	WP 8-4 Line 38 for Total Cost (2020\$)
20 Crane Valley	50%	\$130,567,502	\$0	\$0	\$0	\$0	\$0	WP 8-5 Line 48 for Total Cost (2020\$)
21 Hamilton Branch	50%	\$16,538,300	\$0	\$0	\$0	\$0	\$0	WP 8-5 Line 64 for Total Cost (2020\$)
22 Potter Valley	20%	\$132,929,386	\$0	\$0	\$0	\$0	\$0	WP 8-5 Line 77 for Total Cost (2020\$)
23 DeSaba - Centerville	10%	\$88,314,716	\$0	\$0	\$0	\$0	\$0	WP 8-6 Line 92 for Total Cost (2020\$)
24 Phoenix	10%	\$5,092,904	\$0	\$0	\$0	\$0	\$0	WP 8-6 Line 105 for Total Cost (2020\$)
25 Tule River	10%	\$15,440,671	\$0	\$0	\$0	\$0	\$0	WP 8-6 Line 116 for Total Cost (2020\$)
26 Miocene - Coal Canyon/Lime Saddle	0%	\$35,680,000	\$0	\$0	\$0	\$0	\$0	WP 8-7 Line 125 for Total Cost (2020\$)
27 Chili Bar	0%	\$46,400,000	\$0	\$0	\$0	\$0	\$0	WP 8-7 Line 146 for Total Cost (2020\$)
28 Deer Creek	0%	\$17,400,000	\$0	\$0	\$0	\$0	\$0	
29 TOTALS		\$729,581,770						
30		\$352,241,899						

Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 8
Energy Supply Rate-making
Hydroelectric Decommissioning Estimates

Line No.	Annual Costs with Probabilities Applied (2020\$)	PH Name	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1														
2		Battle Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$21,843,186	\$21,843,186	\$21,843,186	\$21,843,186
3		Kerckhoff1	\$0	\$0	\$5,786,000	\$5,786,000	\$5,786,000	\$5,786,000	\$5,786,000	\$0	\$0	\$0	\$0	\$0
4		Hat Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5		Crane Valley	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,973,000	\$8,973,000
6		Hamilton Branch	\$0	\$1,360,000	\$1,360,000	\$1,360,000	\$1,360,000	\$1,360,000	\$0	\$0	\$0	\$0	\$0	\$0
7		Potter Valley	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
8		DeSabiá - Centerville	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,727,209	\$3,727,209	\$3,727,209
9		Phoenix	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,262,891	\$1,262,891	\$1,262,891	\$1,262,891
10		Tule River	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$71,400	\$71,400	\$71,400
11		Miocene - Coal Canyon/Lime Saddle	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$220,800	\$220,800	\$220,800	\$220,800
12		Chili Bar	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13		Deer Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14		TOTALS	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
15														
16		Annual Costs with Probabilities Applied (Nominal \$)												
17														
18		Battle Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$29,352,319	\$29,999,366	\$30,538,153	\$31,148,916
19		Kerckhoff 1	\$0	\$0	\$6,889,550	\$7,042,067	\$7,182,972	\$7,326,632	\$7,473,164	\$0	\$0	\$0	\$0	\$0
20		Hat Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
21		Crane Valley	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,544,821	\$12,795,717
22		Hamilton Branch	\$0	\$1,584,037	\$1,619,390	\$1,655,239	\$1,688,359	\$1,722,126	\$0	\$0	\$0	\$0	\$0	\$0
23		Potter Valley	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
24		DeSabiá - Centerville	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,108,699	\$5,210,873	\$5,315,091
25		Phoenix	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,697,041	\$1,730,982	\$1,765,602	\$1,800,914
26		Tule River	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$97,864	\$99,822	\$101,818
27		Miocene - Coal Canyon/Lime Saddle	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$296,705	\$302,640	\$308,692	\$314,866
28		Chili Bar	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
29		Deer Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
30		TOTALS	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

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Hydroelectric Decommissioning Estimates

Line
No. Annual Costs with Probabilities Applied (2020\$)

PH Name	2038	2039	2040	2041	2042	2043	2044	2045
1								
2 Battle Creek	\$21,843,186	\$0	\$0	\$0	\$0	\$0	\$0	\$0
3 Kerckhoff 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
4 Hat Creek	\$0	\$0	\$5,524,000	\$5,524,000	\$5,524,000	\$5,524,000	\$5,524,000	\$0
5 Crane Valley	\$8,973,000	\$8,973,000	\$8,973,000	\$0	\$0	\$0	\$0	\$0
6 Hamilton Branch	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7 Potter Valley	\$3,727,209	\$3,727,209	\$0	\$0	\$0	\$0	\$0	\$0
8 DeSable - Centerville	\$1,262,891	\$0	\$0	\$0	\$0	\$0	\$0	\$0
9 Phoenix	\$71,400	\$71,400	\$0	\$0	\$0	\$0	\$0	\$0
10 Tule River	\$220,800	\$0	\$0	\$0	\$0	\$0	\$0	\$0
11 Miocene - Coal Canyon/Lime Saddle	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
12 Chili Bar	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
13 Deer Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
14 TOTALS								

15
16 Annual Costs with Probabilities Applied (Nominal \$)

PH Name	2038	2039	2040	2041	2042	2043	2044	2045
17								
18 Battle Creek	\$31,771,894	\$0	\$0	\$0	\$0	\$0	\$0	\$0
19 Kerckhoff 1	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
20 Hat Creek	\$0	\$0	\$8,359,516	\$8,526,707	\$8,697,241	\$8,871,186	\$9,048,609	\$0
21 Crane Valley	\$13,051,631	\$13,312,664	\$13,578,917	\$0	\$0	\$0	\$0	\$0
22 Hamilton Branch	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
23 Potter Valley	\$5,421,393	\$5,529,821	\$0	\$0	\$0	\$0	\$0	\$0
24 DeSable - Centerville	\$1,836,932	\$0	\$0	\$0	\$0	\$0	\$0	\$0
25 Phoenix	\$103,855	\$105,932	\$0	\$0	\$0	\$0	\$0	\$0
26 Tule River	\$321,164	\$0	\$0	\$0	\$0	\$0	\$0	\$0
27 Miocene - Coal Canyon/Lime Saddle	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
28 Chili Bar	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
29 Deer Creek	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
30 TOTALS								

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Energy Supply Ratemaking
Project Specific Estimates**

Line No.			Reference From
1	Battle Creek Decommissioning Study		A. 18-12-009, WP 8-113, Exhibit (PG&E-5)
2	Asset Type	Total Cost	
3	Dams/Diversions	\$21,030,329	
4	Tunnel Bat Gatse	\$1,640,732	
5	Canals/Ditches	\$29,148,729	
6	Feeders	\$382,221	
7	Penstocks	\$8,069,847	
8	Pipelines	\$866,388	
9	Siphons	\$1,374,597	
10	Flumes	\$3,450,992	
11	Dam Gate House	\$39,454	
12	Powerhouses	\$4,598,831	
13	Other Buildings	\$83,980	
14	Inskip Domestic Water Supply	\$50,000	
15	Recreation Sites	\$322,550	
16	Gaging Stations	\$419,798	
17	Construction Costs	\$71,478,448	Sum of Line 3-16
18	Engineering and Permitting - 30% of Construction	\$21,443,534	Line 17 multiplied by 0.3
19	Contingency - 25% of Construction	\$17,869,612	Line 17 multiplied by 0.25
20	Total Cost at time of Study (2017)	\$110,791,594	Sum of Line 17-19
21	Total Cost 2020 \$	\$118,265,928	
22			
23			
24			
25	Kerckhoff 1 Physical Decommissioning		
26	Asset Type	Total Cost	Reference From
27	Intake Structure	\$250,000	
28	Underground Tunnel	\$5,000,000	
29	Adit 1 and Adit 2	\$500,000	
30	Surge Chamber	\$500,000	
31	Headworks	\$5,000,000	
32	Penstocks	\$500,000	
33	Switchyards	\$500,000	
34	Powerhouse	\$10,000,000	
35	Construction Costs	\$22,250,000	Sum of Line 27-34
36	Engineering and Permitting - 10% of Construction	\$2,225,000	Line 35 multiplied by 0.1
37	Contingency - 20% of Construction	\$4,450,000	Line 35 multiplied by 0.2
38	Total Cost at time of Estimate (2020)	\$28,930,000	Sum of Line 35-37

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Line No.

39 Hat Creek Physical Decommissioning

40 Asset Class	Total Cost	Reference From
41 Conveyance	\$9,400,000	
42 Dams	\$2,200,000	
43 Power Generation	\$5,640,000	
44 Radial Gates - 1% of Dam	\$20,000	
45 Construction Costs	\$17,260,000	Sum of Line 41-44
46 Engineering and Permitting - 30% of Construction	\$5,178,000	Line 45 multiplied by 0.3
47 Contingency - 30% of Construction	\$5,178,000	Line 45 multiplied by 0.3
48 Total Cost 2020 \$	\$27,620,000	Sum of Line 45-47

49

50

51

52 Crane Valley Physical Decommissioning

53 Asset Class	Total Cost	Reference From
54 Conveyances	\$17,440,000	
55 Dams	\$7,490,000	
56 Other Structures	\$10,000,000	
57 Power Generation	\$4,330,000	
58 Excessive Sediment Removal - 25% of Dam	\$1,870,000	
59 Steepness of Terrain - 50% of Conveyances	\$8,720,000	
60 Construction Costs	\$49,850,000	Sum of Line 54-59
61 Engineering and Permitting - 30% of Construction	\$14,955,000	Line 60 multiplied by 0.3
62 Contingency - 30% of Construction	\$14,955,000	Line 60 multiplied by 0.3
63 Political - 20% of Construction	\$9,970,000	Line 60 multiplied by 0.2
64 Total Cost 2020 \$	\$89,730,000	Sum of Line 60-63

65

66

67

68 Hamilton Branch Physical Decommissioning

69 Asset Class	Total Cost	Reference From
70 Conveyances	\$5,980,000	
71 Dams	\$770,000	
72 Power Generation	\$1,740,000	
73 Radial Gates - 1% of Dam	\$10,000	
74 Construction Costs	\$8,500,000	Sum of Line 70-73
75 Engineering and Permitting - 30% of Construction	\$2,550,000	Line 74 multiplied by 0.3
76 Contingency - 30% of Construction	\$2,550,000	Line 74 multiplied by 0.3
77 Total Cost 2020 \$	\$13,600,000	Sum of Line 74-76

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Line No.			Reference From
78	Potter Valley Decommissioning Study		A. 18-12-009, WP 8-36, Exhibit (PG&E-5)
79	Asset Type	Total Cost	
80	Scott Dam	\$18,000,000	
81	Cape Horn Dam	\$0	
82	Tunnel intake	\$4,800,000	
83	Tunnels	\$1,400,000	
84	Penstock	\$615,000	
85	Powerhouse	\$2,300,000	
86	Construction Costs	\$27,115,000	Sum of Line 80-85
87	Engineering and Permitting - 30% of Construction	\$8,134,500	Line 86 multiplied by 0.3
88	Political - 80% of Construction	\$21,692,000	Line 86 multiplied by 0.8
89	Environmental - 80% of Construction	\$21,692,000	Line 86 multiplied by 0.8
90	Contingency - 25% of Construction	\$6,778,750	Line 86 multiplied by 0.25
91	Total Costs at time of Study (2016)	\$85,412,250	Sum of Line 86-90
92	Total Cost 2020 \$	\$93,180,223	
93			
94			
95			
96	DeSabra-Centerville Decommissioning Study		A. 18-12-009, WP 8-160, Exhibit (PG&E-5)
97	Project Component	Total Cost	
98	Centerville Development	\$13,391,636	
99	DeSabra Development	\$21,512,197	
100	Toadtown Development	\$2,438,437	
101	Construction Costs	\$37,342,270	Sum of Line 98-100
102	Engineering and Permitting - 30% of Construction	\$11,202,681	Line 101 multiplied by 0.3
103	Contingency - 25% of Construction	\$9,335,568	Line 101 multiplied by 0.25
104	Total Cost at time of Study (2016)	\$57,880,519	Sum of Line 101-103
105	Total Cost 2020 \$	\$63,144,568	
106			
107			
108			
109	Phoenix Physical Decommissioning		
110	Asset Class	Total Cost	Reference From
111	Other Structures	\$1,500,000	
112	Power Generation	\$730,000	
113	Construction Costs	\$2,230,000	Sum of Line 111-112
114	Engineering and Permitting - 30% of Construction	\$669,000	Line 113 multiplied by 0.3
115	Contingency - 30% of Construction	\$669,000	Line 113 multiplied by 0.3
116	Total Cost 2020 \$	\$3,570,000	Sum of Line 113-115

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 8
Energy Supply Ratemaking
Project Specific Estimates**

Line No.

117	<i>Tule River Physical Decommissioning</i>		
118	Asset Class	Total Cost	Reference From
119	Conveyances	\$3,240,000	
120	Dams	\$3,300,000	
121	Power Generation	\$360,000	
122	Construction Costs	\$6,900,000	Sum of Line 119-121
123	Engineering and Permitting - 30% of Construction	\$2,070,000	Line 122 multiplied by 0.3
124	Contingency - 30% of Construction	\$2,070,000	Line 122 multiplied by 0.3
125	Total Cost 2020 \$	\$11,040,000	Sum of Line 122-124
126			
127			
128			
129	<i>Miocene Decommissioning Study</i>		Reference From
130	Asset Type	Total Cost	WP 8-10 Appendix D, page 19
131	Dams	\$21,108,625	
132	Tunnels	\$672,674	
133	Canals	\$10,077,600	
134	Feeders/Culvert Crossings	\$352,829	
135	Penstocks	\$3,264,247	
	Buried Conveyance		
136	Pipes/Siphons	\$299,037	
137	Flumes	\$5,411,917	
138	Switchyards	\$113,206	
139	Powerhouses	\$1,662,768	
140	Gauging Stations	\$67,352	
141	Bridges (Transfer)	-	
142	Potential Cost Reduction - Dams	-\$20,000,000	
143	Construction Costs	\$23,030,255	Sum of Line 131-142
144	Engineering and Permitting - 30% of Construction	\$6,909,077	Line 143 multiplied by 0.3
145	Contingency - 25% of Construction	\$5,757,564	Line 143 multiplied by 0.25
146	Total Cost at time of Study (2020)	\$35,696,895	Sum of Line 143-146

Pacific Gas and Electric Company
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Energy Supply Ratemaking
Hydroelectric Decommissioning Reserve

Line
No.

	Total Hydro Decomm Estimate	Total Recovered Thru 2020	2021	2022	Total Remaining Liability on 1/1/2023
1					
2	Hydro Decommissioning Reserve	(\$12,897,000)	(\$12,897,000)	(\$12,897,000)	
3	Battle Creek (Inskip removal)		\$125,000	\$125,000	
4					
5	TOTALS	(\$12,897,000)	(\$12,772,000)	(\$12,772,000)	313,800,000
6					

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 8
Energy Supply Ratemaking
Hydroelectric Decommissioning Escalation**

Line No.				
1	Source:			
2	IHS Global Insight 2019 Fourth Quarter (trend 201)			
3				
4		Total Hydro Production Plant	%	
5	2019	577.6	3.3%	Recorded
6	2020	589.7	2.1%	Forecasted
7	2021	602.5	2.2%	Forecasted
8	2022	615.3	2.1%	Forecasted
9	2023	628.6	2.2%	Forecasted
10	2024	642.7	2.2%	Forecasted
11	2025	657.0	2.2%	Forecasted
12	2026	671.7	2.2%	Forecasted
13	2027	686.8	2.2%	Forecasted
14	2028	702.1	2.2%	Forecasted
15	2029	717.7	2.2%	Forecasted
16	2030	732.0	2.0%	Forecasted
17	2031	746.7	2.0%	Forecasted
18	2032	761.6	2.0%	Forecasted
19	2033	776.8	2.0%	Forecasted
20	2034	792.4	2.0%	Forecasted
21	2035	808.2	2.0%	Forecasted
22	2036	824.4	2.0%	Forecasted
23	2037	840.9	2.0%	Forecasted
24	2038	857.7	2.0%	Forecasted
25	2039	874.9	2.0%	Forecasted
26	2040	892.4	2.0%	Forecasted
27	2041	910.2	2.0%	Forecasted
28	2042	928.4	2.0%	Forecasted
29	2043	947.0	2.0%	Forecasted
30	2044	965.9	2.0%	Forecasted
31	2045	985.2	2.0%	Forecasted
32	2046	1004.9	2.0%	Forecasted
33	2047	1025.0	2.0%	Forecasted
34	2048	1045.5	2.0%	Forecasted
35	2049	1066.4	2.0%	Forecasted
36		To Convert 2020 to 2021	1.02	
37		To Convert 2020 to 2022	1.04	
38		To Convert 2020 to 2023	1.07	
39		To Convert 2020 to 2024	1.09	
40		To Convert 2020 to 2025	1.11	
41		To Convert 2020 to 2026	1.14	
42		To Convert 2020 to 2027	1.16	
43		To Convert 2020 to 2028	1.19	
44		To Convert 2020 to 2029	1.22	
45		To Convert 2020 to 2030	1.24	
46		To Convert 2020 to 2031	1.27	
47		To Convert 2020 to 2032	1.29	
48		To Convert 2020 to 2033	1.32	
49		To Convert 2020 to 2034	1.34	
50		To Convert 2020 to 2035	1.37	
51		To Convert 2020 to 2036	1.40	
52		To Convert 2020 to 2037	1.43	
53		To Convert 2020 to 2038	1.45	
54		To Convert 2020 to 2039	1.48	
55		To Convert 2020 to 2040	1.51	
56		To Convert 2020 to 2041	1.54	
57		To Convert 2020 to 2042	1.57	
58		To Convert 2020 to 2043	1.61	
59		To Convert 2020 to 2044	1.64	
60		To Convert 2020 to 2045	1.67	
61		To Convert 2020 to 2046	1.70	
62		To Convert 2020 to 2047	1.74	
63		To Convert 2020 to 2048	1.77	
64		To Convert 2020 to 2049	1.81	

**Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-5), Chapter 8**

Hydroelectric Decommissioning Estimates

**Supporting Workpapers
for Decommissioning Estimates -
Miocene Decommissioning Study**

FINAL

EVALUATION FOR POTENTIAL MIOCENE PROJECT DECOMMISSIONING

Preliminary Construction Cost Estimate

B&V PROJECT NO. 405922.0300



PREPARED FOR

Pacific Gas & Electric

1 OCTOBER 2020



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APPENDICES

- APPENDIX A – SYSTEM MAP
- APPENDIX B – ASSET LIST
- APPENDIX C – QUANTITIES
- APPENDIX D – COST ESTIMATE

Introduction

PURPOSE

On June 30, 2020, PG&E retained Black & Veatch, in partnership with SR Diversified (SRD), to provide a construction cost estimate for decommissioning the Miocene Project (Project). The cost estimate is intended to serve as a basis for long-term planning for the Miocene Project as well as provide basic data for a decommissioning cost model being developed in parallel.

PROJECT HISTORY

Miocene Head Dam is located on the West Branch of the Feather River and diverts water for Kunkle Reservoir Dam through a 10-mile canal. Kunkle Reservoir in turn supplies water to Lime Saddle Powerhouse about 1.5 miles northwest of Lake Oroville. The Lime Saddle powerhouse tailrace discharges into an 11-mile canal terminating at Coal Canyon Powerhouse. Kunkle Reservoir Dam and Miocene Head Dam were originally constructed in 1907 and 1909. Miocene Head Dam was rebuilt in 1953 due to deterioration of the original dam. The Miocene Project is not FERC-regulated. An overall map of the project is found in Appendix A.

DECOMMISSIONING SCENARIOS

PG&E considered three decommissioning scenarios for the Project:

1. Ownership Transfer
2. Safe Abandonment
3. Complete Removal

Safe abandonment was selected for this study, but some specific assets were assumed to transfer.

Project Assets

Based on as-builts, other reports, and asset-specific inventories provided by PG&E Asset Management, Black & Veatch created an inventory of assets which might require construction to safely abandon. This inventory is found in Appendix B.

In agreement with PG&E, the following asset types were not costed:

1. Roads – Would normally require continued use after decommissioning
2. Electrical Transmission and Distribution – Impacts can best be estimated by PG&E

The inventory is summarized in Table 1 below.

ASSET TYPE	QUANTITY	UNIT
Dams	2	EA
Tunnels	4	EA
Canals	18.36	Mi
Feeders/Culvert Crossings	20	EA
Penstocks	7,502	LF
Buried Pipes/Siphons	4	EA
Flumes	11,832	LF
Switchyards	2	EA
Powerhouses	2	EA
Gauging Stations	10	EA
Bridges	10	EA

Table 1. Asset Type and Count

Cost Estimate Assumptions

No design was completed for this study. Consequently, this cost estimate is considered preliminary and corresponds to an American Association of Cost Estimators (AACE) Level 5. General and asset-specific assumptions made are indicated below.

GENERAL

1. Only construction costs are included. No “soft” costs, such as the following, are included:
 - a. Land Ownership and Easements
 - b. Environmental Permitting
 - c. Engineering
 - d. Construction Management
 - e. Quality Assurance/Special Inspections
 - f. Ownership Transfers
2. Mobilization included for each individual asset
3. Indirect costs estimated at 25% add-on to direct costs
4. Labor escalation estimated at 16% (escalated labor database rates to year 2022)
5. Overtime premium estimated at 16.67% (working Monday-Saturday, 10 hours/shift)
6. Home office overhead estimated at 10% add-on to direct and indirect costs
7. Contractor’s markup estimated at 10% add-on to direct and indirect costs
8. No overall contingency
9. No provision for post-project flood control
10. Transferring ownership of an asset is assumed to have no construction or “soft” costs; exception being modification or other construction necessary before an asset can be successfully transferred.

ASSET-SPECIFIC

Dams

1. Embankment dams removed to original grade, unless required for continuing water supply commitments.
2. Sediments excavated are off-hauled assuming disposal on PG&E owned land near major facilities. Trucking only, no disposal fees.

3. Concrete demolition assumes disposal on PG&E owned land near major facilities. Trucking only, no disposal fees.
4. Instream dams include cofferdams and water bypass systems
5. Off-stream dams assumes cofferdams/bypasses not required
6. No hazardous materials in sediments

Tunnels

1. Bat gates for tunnels at each tunnel end
2. Helicopter support included for Upper and Middle Miocene Tunnel bat gates

Canals/Ditches

1. Linings remain in place and buried
2. Backfilled with local material
3. Remove gates, demolish and bury concrete

Feeders/Culvert Crossings

1. Remove all

Penstocks

1. Pipe removed. Saddles/concrete foundations remain in place.

Buried Conveyance Pipes/Siphons

1. Pipe ends plugged with concrete, remain buried in place

Flumes

1. All flumes removed
2. Concrete foundations remain in place
3. Helicopter support for Miocene flumes

Switchyards

1. Abandon in place, with removal of hazardous material up to first bus

Powerhouses/Other Buildings

1. Complete removal
2. Utilities abandoned in place

3. Hazardous materials, e.g. oil, mitigated
4. Powerhouse pits filled with Controlled Low-Strength Material (CLSM)
5. Yard surfacing left in place

Gauging Stations

1. Removal of 5 gauging stations on Upper Miocene
2. Assumed removal of 5 gauging stations on Middle Miocene

Bridges

1. Transfer ownership for public or private access

Cost Estimate Summary

Quantities for each asset type are calculated based on typical sections found on PG&E drawings, data from PG&E's Dam and Water Conveyance Asset Management Program inventories, and information from the Miocene Head Dam and Kunkle Dam Supporting Technical Information Documents (STID). Quantities are shown in Appendix C. Construction costs, based on the assumptions in the previous section, were calculated using SR Diversified's standard estimating spreadsheets. The total estimated construction cost for the Project decommissioning is approximately \$43 million. A breakdown of cost by asset, using average indirect costs "markups", is provided in Appendix D. Breakdowns of cost by asset type is found in the subsection below.

ASSET-SPECIFIC

Costs in dollars by asset type are shown in Table 2 below. Unit costs represent an average for all the units in the asset type.

Table 2. Cost by Asset Type

ITEM	ASSET TYPE	QUANTITY	UNIT	AVERAGE UNIT COST	TOTAL COST
1	Dams	2	EA	10,554,312	21,108,625
2	Tunnels	4	EA	168,169	672,674
3	Canals	18.36	Mi	548,889	10,077,600
4	Feeders / Culvert Crossings	20	EA	17,641	352,829
5	Penstocks	7,502	LF	435	3,264,247
6	Buried Conveyance Pipes/Siphons	4	EA	74,759	299,037
7	Flumes	11,832	LF	457	5,411,917
8	Switchyards	2	EA	56,603	113,206
9	Powerhouses	2	EA	831,384	1,662,768
10	Gauging Stations	10	EA	6,735	67,352
11	Bridges (Transfer)	10	EA	-	-
				TOTAL	\$43,030,256

The costs above were further grouped to present their relative contributions to total construction cost in Figure 1 below.

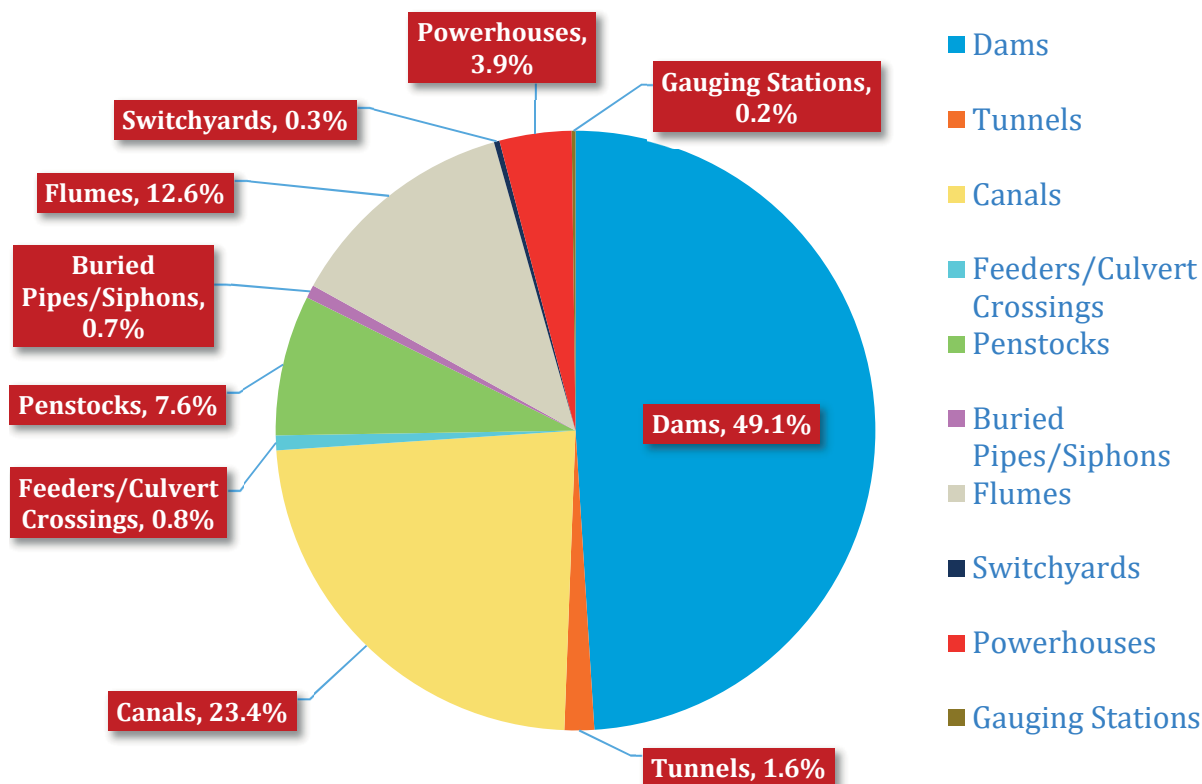


Figure 1. Cost by Asset Type

As seen above, the Dams asset category accounts for approximately half of the total decommissioning construction cost. The 18 miles of canals and 12,000 linear feet of flumes cumulatively make up just over a third of the total decommissioning cost.

Kunkle Reservoir Dam decommissioning accounts for most of the total cost for the Dams asset category (\$19.6 million). However, PG&E has stated that in the case of a decommissioning scenario, they would most likely transfer ownership of Kunkle Reservoir Dam. The removal cost estimate of Kunkle Reservoir Dam was requested for informational purposes. As a result, this skews the Dams average unit cost and total decommissioning cost.

POTENTIAL COST REDUCTIONS

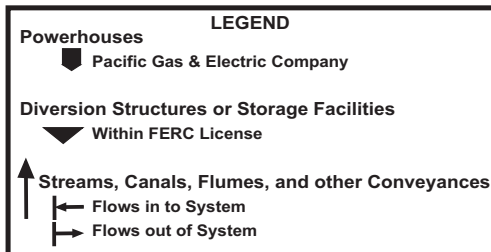
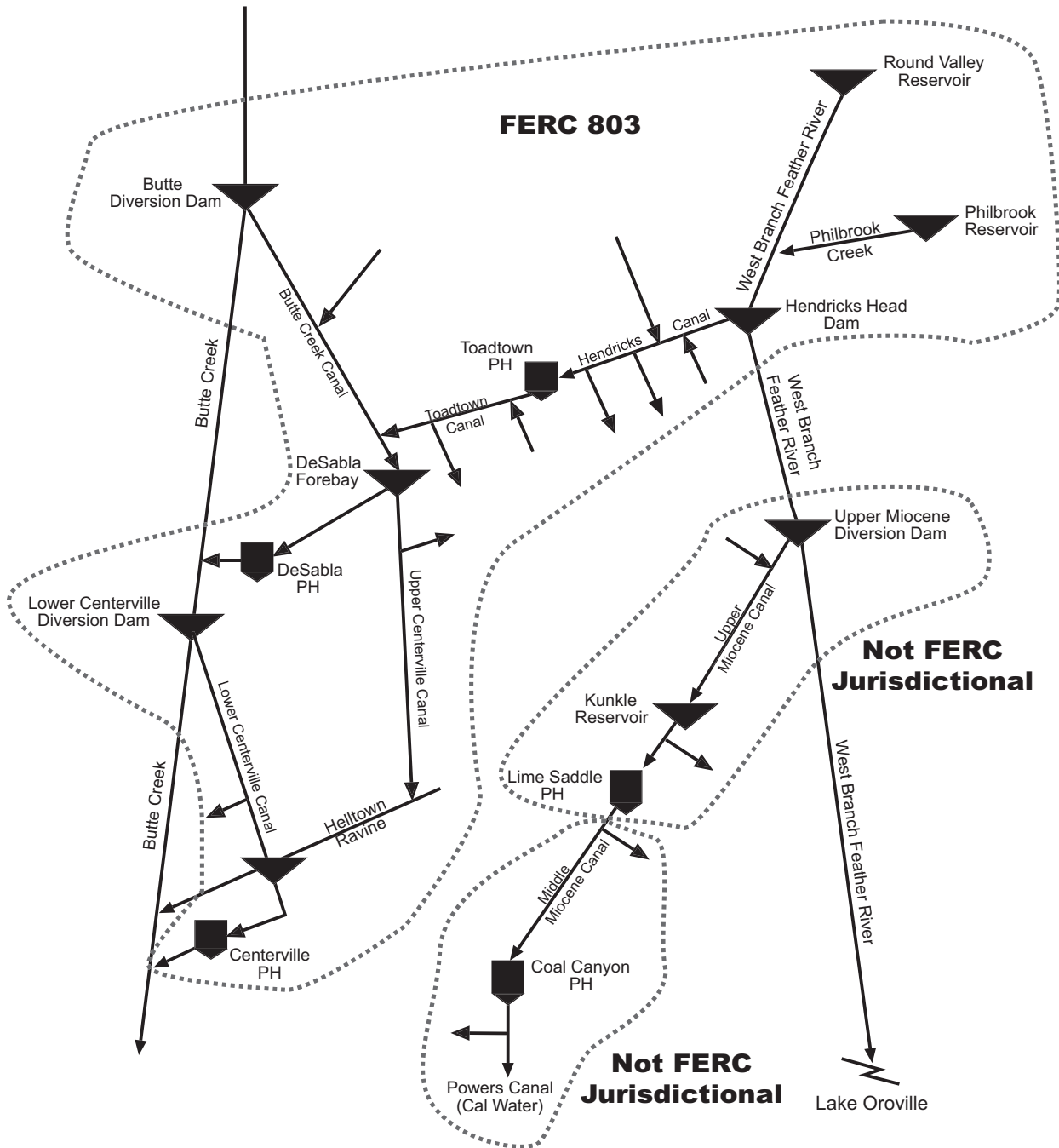
If less conservative decommissioning approaches were considered for the four highest-cost asset types, there is a potential for cost savings. Ranges of possible cost reductions are shown in Table 3 below.

Table 3. Potential Cost Reductions

ASSET TYPE	ALTERNATIVE ASSUMPTION	POTENTIAL SAVINGS
Dams (Transfer ownership scenario)	Transfer ownership of Kunkle Reservoir, rather than complete removal	\$20 million
	OR	
Dams (Complete removal scenario)	Confirm Kunkle Reservoir sediment removal quantity is less than conservatively calculated 48,400 cy. Volume was determined by assuming 15 ft of sediment in a 2-acre area.	\$1 to \$2 million
Canals	Limit backfill of canals to areas of high pedestrian use and/or locations not on PG&E property. All other canal sections to be breached to drain to natural drainages. Final scope TBD.	\$2 to \$6 million
Penstocks	Leave in place and plug ends	\$1 to \$2 million
Powerhouses	Leave building and non-hazardous equipment in place. Remove hazardous materials only.	\$1 million
	TOTAL	\$24 to \$29 million (assuming Kunkle Reservoir Transfer Ownership)

Changing the above approaches, excluding ownership transfer of Kunkle Reservoir Dam, could potentially reduce the decommissioning construction cost estimate for the Project to fall into the range of \$32 to \$38 million. If Kunkle Reservoir Dam undergoes ownership transfer rather than complete removal, then the Project (including the additional cost reductions above) could potentially fall into the range of \$14 to \$19 million.

APPENDIX A – SYSTEM MAP



Source: "Pacific Gas & Electric Company's PEA (Proponent's Environmental Assessment) Errata, June 8, 2000, Revision Errata Attachment 2, modified by Aspen Environmental Group, 2000.

Hydroinvestiture EIR

Figure 4.3-5
Schematic Diagram of the Flow
of Water in the DeSabra Regional
Bundle (Butte Creek)

Aspen
Environmental Group

APPENDIX B - ASSET LIST

Project Feature	Asset Attributes	PG&E Drawing #
Upper Miocene Head Dam	Concrete Arch with Gravity Right Abutment; 218 ft long, 20 ft high Ogee Spillway over entire concrete arch	Miocene Head Dam STID
Kunkle Reservoir Dam	Earth fill Dam; 48 ft high, 1040 ft crest - 24 ft wide 48x72" Radial spillway gate on the Miocene canal prior to Kunkle Res. No LLO; Lime Saddle Penstock intake can be used as LLO	Kunkle Dam STID
Miocene Canal Intake	One 4x4 Slide Gate (operated locally by portable gas winch)	Miocene Head Dam STID
Upper Miocene Canal	Water from Miocene Diversion intake; 8.45 miles @ 50 cfs, partially gunite lined and unlined; intermediate flume & tunnel sections	355440-355442
Middle Miocene Canal	Water from Lime Saddle Tailrace 9.91 miles @ 55 cfs, concrete lined & unlined; intermediate flume & tunnel sections	3001605
Coal Canyon Tailrace	Tailrace from Coal Canyon PH discharges into Power's Canal owned by CalWater. Power's Canal flows in CWSC water storage for the city of Oroville	-
Canal Side Spills and Gates	10 Total	-
Feeders/Culvert Crossings	20 Total	-
Upper Miocene Canal Tunnel	327 feet long; variable lining: Timber sets/lagging & unlined rock	3011415
Middle Miocene Tunnel	0.14 miles	3009249 & 50

Lime Saddle Penstock	5490 ft composed of riveted steel, 42"-30" diameter. Controlled by manual ring valve from a tower in Kunkle res.	Lime Saddle Cut Sheet
Coal Canyon Penstock	Concrete intake off of MMC; 2012 ft, 36"-30" - riveted steel 1030 ft, 40" - welded steel	PACE Eng. DWGs Shts 1-5
Lime Saddle PH	2 Pelton double overhung impulse turbines (462 ft head, 87 cfs combined flow); Total capacity - 2MW (1 MW each)	Lime Saddle Cut Sheet
Coal Canyon PH	1 Pelton double twin horizontal impulse turbine (365 ft head, 45 cfs); 0.9 MW Capacity Tailrace discharges into Power's Canal owned by CalWater	PACE Eng. DWGs Shts 1-5 & 42478
Lime Saddle Switchyard	Westinghouse 2,300 to 12,000 V step up transformer. 0.5 mi 12KV tap line to PG&E's Paradise Circuit 1105	Lime Saddle Cut Sheet
Coal Canyon Switchyard	Out of service	-
Upper Miocene Canal Flume	Several flume sections totalling 1.67 miles; Semi-circle flume with variable flume diameters: 2.25'-6.5' Camp fire burned many flumes- no longer serviceable	43377
Middle Miocene Flume	Multiple flume sections totaling 0.51 miles	3011415 & 3001609
Middle Miocene Pipe	0.62 miles of 36" steel pipe	-
Gauging Stations	10 Total	-

APPENDIX C – QUANTITIES

Dam/Diversion Name	Hazard Classification	Dam Type (Concrete, Rock Fill or Earthen)	Spillway Type	Dam Height (ft)	Dam Crest Length (ft)	Volumes of Concrete (cu yd)	Volumes of Earth (cu yd)	Volumes of Sediments (cu yd)	Estimated Flows for Bypass	Gate Description and Size	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Upper Miocene Head Dam	Low	Concrete Arch	Ogee	20	218	853	-	4630	0 LLO abandoned	4x4 slide gate, canal intake	-	-	STID	Full Removal to original grade, unless required for continuing water supply commitments. Assume no contamination of sediments.	Sediment volume assumes an average sediment depth of 5 ft & 25000 sq ft of area
Kunkle Reservoir Dam	Low	Earth fill	Canal Spillway	54	1040	25	122258	48400	Only through Lime Saddle Penstock	48"x72" radial gate-spillway	Kunkle res. Dr off of Pentz Rd.	-	STID	Full Removal to original grade, unless required for continuing water supply commitments. Assume no contamination of sediments.	Sediment volume assumes 10% of reservoir surface area under the Penstock Outlet (El. 1415) leaving 15 ft of sediment at a surface area of 2 acres

Tunnel Section Name	Length	Lined or Unlined	Size (ft)	Volume of Excavation	Volumes of Concrete to Plug Ends	Volumes of CLSM to fill	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Upper Miocene Tunnel	327	Unlined with timber supports	~5x7	-	2.6	-	Dean Rd. off of Pentz Rd.	-	-	Install Bat Gates (2)	-
Lower Miocene Tunnel	739	6' diameter precast concrete pipe	6' dia	-	6	-	-	-	-	Install Bat Gates (6)	There are three tunnel sections

Canal Section Name or Stationing	Length (mi)	Dimensions (sq ft)	Shotcreted or Bare Earth	Fill Volume (cy)	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Upper Miocene Canal	8.45	14	-	23349	-	-	-	Bury shotcrete lining. Install drainage (culverts, rip rap channels, channel breaches at 200' intervals, etc.) as part of canal decommissioning	Assumed 6 ft channel diameter
Middle Miocene Canal	9.91	14	-	27383	-	-	-	Bury shotcrete lining. Install drainage (culverts, rip rap channels, channel breaches at 200' intervals, etc.) as part of canal decommissioning	Assumed 6 ft channel diameter
Canal Side Spills and Gates	10 (EA)	-	-	-	-	-	-	-	Data provided by SRD
Feeders/Culvert Crossings	20 (EA)	-	-	-	-	-	-	-	Data provided by SRD

Penstock Name	Length (ft)	Type	Size	Penstock Weight (Lbs)	Buried or Above Ground	No. Saddles	Number of Anchors	Volumes of Concrete to remove	Volume of Excavation (cy)	Volumes of fill if removed	Volumes of CLSM to fill	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Lime Saddle Penstock	5490	Steel	42" to 30"	396298	-	-	-	-	7320	5883	-	-	-	-	Remove all steel penstocks. Fill intakes and leave footings.	Volume of excavation assumes 6 ft deep & 6 ft wide
Coal Canyon Penstock	2012	Steel	36" to 30"	71160	Buried typ. 2 ft	-	-	16	2683	2156	-	-	-	354214-7	Remove all steel penstocks. Fill intakes and leave footings.	Volume of excavation assumes 6 ft deep & 6 ft wide Concrete encasement and several saddles to be removed

Flume Name or Stationing	Length (ft)	Flume Size (sq ft)	Flume Type	Number of Bents	Average Bent Height	Footing Type	Footing Size	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Upper Miocene Flume	6328	14	Steel	422	20 ft	Concrete	2'x2'x2'	-	-	-	Remove all wood and steel flumes. Leave footings and headwalls.	Assume bent every 15 ft & all flume dia = 6ft
Upper Miocene Flume	2811	14	Wood	187	20 ft	Concrete	2'x2'x2'	-	-	-	Remove all wood and steel flumes. Leave footings and headwalls.	Assume bent every 15 ft & all flume dia = 6ft
Middle Miocene Flume	2693	14	-	180	20 ft	Concrete	2'x2'x2'	-	-	-	Remove all wood and steel flumes. Leave footings and headwalls.	Assume bent every 15 ft & all flume dia = 6ft

Powerhouse Name	Roof type	Material Type	Overhead Crane?	Wall Volumes (cu yd)	Floor Concrete Volumes (cu yd)	Volumes of CLSM in Voids	Square Feet of AC to Remove	Mechanical Equipment Description	Electrical Equipment Description	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Lime Saddle Powerhouse	Corrugated Metal	CMU	-	180	162	-	-	2 Pelton double overhang impulse 1 Pelton double twin horizontal	2 Generators - General Electric Co. Horizontal Indoor 1 Westinghouse generator (900 kW, 2,300 V)	-	421174	Full removal with pits filled with CLSM	-
Coal Canyon Powerhouse	Corrugated Metal	Masonry	-	300	134	-	-	-	-	-	-	Full removal with pits filled with CLSM	-

Switchyard Name	Switchyard size	Wall Concrete Volumes	Footing or Slab Concrete Volumes	Mechanical Equipment Description	Electrical Equipment Description	Square Feet of AC to Remove	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Lime Saddle Switchyard	4,300 sq ft	-	-	-	Westinghouse 2,300 to 12,000 V step up transformer. 0.5 mi 12KV tap line to PG&E's Paradise Circuit 1105	-	-	-	Leave as is, only removal hazardous materials up to first bus.	-
Coal Canyon Switchyard	620 sq ft	-	-	-	-	-	-	-	Leave as is, only removal hazardous materials up to first bus.	-

Piping Section Name	Length (mi)	Type	Size	Number of Saddles	Volumes of Concrete to Plug Ends (cy)	Volume of Excavation	Volumes of fill if removed	Volumes of CLSM to fill	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Middle Miocene Pipe	0.62	Concrete	6' precast concrete	-	2	-	-	-	-	-	-	Remove piping if above ground. If below ground plug openings and leave as is. Fill intakes and leave footings.	Assumed same pipe as used in Middle Miocene Tunnel. Missing required data on this to calculate weight.

Bridge Name	Length	Wide	Bridge type	Volumes of Concrete to remove	Access	Restoration Description	Key Drawing Numbers	Decommission Assumptions	Notes/Comments
Upper Miocene - Kunkle Reservoir	16	14	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - Lime Saddle PH Access Rd	50	12	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - Below 1/1 Spill	12	-	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - Siphon Access	12	10	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - Fosters Residence	12	-	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - U/S #1 Diversion	18	15	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - D/S Burnt Flume	15	8	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - Sarah Miles Access	16	12	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - 11 Mile, U/S Coal Canyon Headerbox	12	-	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-
Middle Miocene - Flag Canyon	40	14	-	-	-	-	-	Leave as is for public or private access, unless needed for safe abandonment clear	-

APPENDIX D – COST ESTIMATE

Miocene Decommissioning Cost Table - by Facility Asset Type

Item	Description	Quantity	Unit	Avg Unit Cost	Total Cost	
1*	Dams	2	EA	10,554,312.25	21,108,625	49.1%
2	Tunnels	4	EA	168,168.59	672,674	1.6%
3	Canals	18.36	Mi	548,888.91	10,077,600	23.4%
4	Feeders / Culvert Crossings	20	EA	17,641.45	352,829	0.8%
5	Penstocks	7,502	LF	435.12	3,264,247	7.6%
6	Buried Conveyance Pipes/Siphons	4	EA	74,759.25	299,037	0.7%
7	Flumes	11,832	LF	457.40	5,411,917	12.6%
8	Switchyards	2	EA	56,603.12	113,206	0.3%
9	Powerhouses	2	EA	831,384.17	1,662,768	3.9%
11	Gaging Stations	10	EA	6,735.15	67,352	0.2%
12	Bridges (Leave as is)	10	EA	-	-	0.0%
TOTAL					43,030,256	100.0%

*Note: Kunkle Reservoir Dam decommissioning makes up the majority of the total cost for the Dams asset category (\$19.6 million). However, PG&E has stated that in the case of a decommissioning scenario, they would transfer ownership and maintain Kunkle Reservoir Dam. The demolition cost estimate of Kunkle Reservoir was requested for informational purposes. This skews the Dams Avg Unit Cost.

PROJECT NAME: Mocane Decommissioning

Bid Item No.	Description	Qty	Unit	Labor	Materials	Constr Materials & S	Sub-Contractor	SRC EQ	O/S Rental EQ	Gas & Oil	Other	Total	Remarks
				U.C.	Totals	U.C.	Totals	U.C.	Totals	C.U.	Totals	U.C.	Totals
1	Dams / Diversions	2	EA										
	<i>Full Removal to Original Grade</i>												\$21,108.625
	Upper Mocane Head Dam												
	Mobile/Demob Men & Equipment	40	hr	463.91	\$ 18,556								
	BMPs	500	lf	1.98	\$ 992								
	Cofferdam / Streamflow Bypass (Canal flows + 60 cfs)	1	ls	100,000	\$ 100,000	4.00	\$ 2,145	0.14	\$ 70	6.700	\$ 25,125		\$ 385,825
	Access Ramp to Dam	300	lf	20.24	\$ 6,073			1.87	\$ 560	32.70	\$ 9,811		\$ 17,719
	Excavate and Remove Sediments	4,630	cy	15.46	\$ 71,597			0.93	\$ 4,321	17.35	\$ 60,338		\$ 172,461
	Misc Metals / Other Misc Demolition (4x4 slide gate)	30	hr	278.46	\$ 8,354			54.00	\$ 1,620	4.00	\$ 1,200		\$ 10,424
	Concrete Demolition	853	cy	61.04	\$ 52,071			5.60	\$ 4,777	3.60	\$ 11,516		\$ 147,349
	Off-Haul / Dispose Concrete Demo	853	cy				30.00	\$ 25,500					\$ 25,500
	Off-Haul / Dispose Sediments	4,630	cy				30.00	\$ 135,900					\$ 135,900
	Hydroseal	2	ac				4.00	\$ 8,000					\$ 8,000
	M&S @ 5% of Labor	1	ls			12.882	\$ 13,816						\$ 13,816
	Asset Sub-Total w/Mark-ups	\$1,636,439											
	Kunkle Reservoir Dam												
	Mobile/Demob Men & Equipment	40	hr	463.91	\$ 18,556								
	BMPs	200	lf	1.98	\$ 397								
	Cofferdam / Streamflow Bypass (assume 40 cfs)	1.0	ls	100,000	\$ 100,000	4.00	\$ 898	0.14	\$ 28	6.700	\$ 25,125		\$ 365,825
	Misc Metals / Other Misc Demolition (48"x22" radial gate)	30	hr	278.46	\$ 8,354			54.00	\$ 1,620	4.00	\$ 1,200		\$ 10,424
	Concrete/Gunite Demolition (spill channel)	84	cy	61.04	\$ 5,128			5.60	\$ 470	3.60	\$ 1,134		\$ 14,510
	Rock Masonry Demolition	48	cy	20.35	\$ 977			1.87	\$ 90	30.87	\$ 1,482		\$ 2,764
	Excavate and Remove Sediments	48,400	cy	15.46	\$ 748,441			0.93	\$ 45,173	17.35	\$ 60,338		\$ 1,602,835
	Earth Excavation	122,258	cy	15.46	\$ 1,890,557			0.93	\$ 114,107	17.35	\$ 2,121,380		\$ 4,553,947
	Gravel Sediments (leave-on-site)							0.14	\$ 341	0.22	\$ 66		\$ 3,960
	Off-Haul / Dispose Concrete and Masonry Demo	132	cy	2.72	\$ 3,960		30.00	\$ 3,960					\$ 3,960
	Off-Haul / Dispose Sediments	48,400	cy				30.00	\$ 1,452,000					\$ 1,452,000
	Off-Haul / Dispose Earth Fill from Dam	122,258	cy				30.00	\$ 3,667,740					\$ 3,667,740
	Hydroseal	2.00	ac				4.00	\$ 8,000					\$ 8,000
	M&S @ 5% of Labor	1	ls			135.620	\$ 148,670						\$ 148,670
	Asset Sub-Total w/Mark-ups	\$19,572,195											
	Subtotal Bid Item Direct Costs			3,030,051		422,890	5,328,190	175,077	3,381,240	887,251	422,172	13,446,871	\$ -
	Labor Escalation Add-on	16.00%											\$ 484,808
	Labor O.T. Premium Add-on	16.67%											\$ 297,123
	Project Indirect Cost Add-on	25.00%											\$ 3,361,718
	Subtotal Direct + Indirect Costs			4,569,496		525,612	6,660,238	218,846	4,226,550	859,084	527,716	17,590,520	\$ -
	Home Office Overhead Cost Add-on	10.00%											\$ 1,759,052
	Markup			10.00%		10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	\$ 2,108,625
	Bid Item Totals	4	EA										\$ 21,108.625
2	Tunnels												
	<i>Install Tunnel Bait Gates</i>												\$ 672,674
	Upper Mocane, 1 as Tunnel, 327' long Need Helicopter Support												
	Mobile/Demob Men & Equipment	32	hr	463.91	\$ 14,845								\$ -
	Helicopter, P-1H UH 60A Utility Hawk, mob/demob	1	hr				6,500	\$ 6,500	520.55	28.00	\$ 3,360		\$ 35,759
	Helicopter, P-1H UH 60A Utility Hawk Sling Work	4	hr				6,500	\$ 26,000					\$ 26,000

Miocene Decommissioning

[illegible]

PROJECT NAME:

Bid Item No.	Description	Qty	Unit	Labor		Materials		Constr Materials & S		M	Sub-Contractor		SRC EQ		O/S Rental EQ		Gas & Oil		Other		Total	Remarks		
				Totals		Totals		Totals			Totals		Totals		Totals		Totals		Totals					
				U.C.		U.C.		U.C.			U.C.		U.C.		U.C.		U.C.		U.C.				U.C.	
	Receive Misc	10	hr	198.32	\$	1,983	\$	-	\$	-	\$	2,500	\$	45.00	\$	450	\$	6.00	\$	225	\$	2,658		
	Misc Disposal	2	ls		\$	-	\$	-	\$	-	2,200	\$	5,000							2,500	\$	10,000		
	Helicopter, Bel 207, mob/demob	1	hr		\$	-	\$	-	\$	-	2,200	\$	2,200								\$	2,200		
	Helicopter, Bel 207, sling loading	5	hr		\$	-	\$	-	\$	-	2,200	\$	11,000								\$	11,000		
	Daily Rate for Helicopter Fuel Truck	1	day		\$	-	\$	-	\$	-	750	\$	750								\$	750		
	M&S @ 5% of Labor	1	ls		\$	-	\$	-	1,231	\$	1,231										\$	1,231		
	Asset Sub-Total w/Mark-ups	\$4,806.037																						
	Middle Miocene Canal - 9.91 Miles																							
	Mob/Demob Men & Equipment	40	hr	463.91	\$	18,556	\$	-	\$	-	\$	28.00	\$	1,120	\$	520.55	\$	20.822	\$	4,200	\$	44,998		
	Improve Access Roads	5,280	ft	20.24	\$	106,378	\$	-	\$	-	\$	1.87	\$	9,856	\$	32.70	\$	1.13	\$	22,440	\$	311,847		
	Install SWPPP BMPs Along Canal	52,325	lf	1.98	\$	103,771	\$	-	4.00	\$	224,474	\$	0.14	\$	7,326	\$	-	0.02	\$	3,924	\$	339,495		
	Clearing and Grubbing @ 500 sf/ft-20' wide swath	1,046,500	sf	0.51	\$	533,464	\$	-	0.51	\$	533,464	\$	0.06	\$	58,604	\$	-	0.01	\$	28,829	\$	620,997		
	Remove Cribbing, Wood Liner and Foot Bridges	200	cy	72.04	\$	14,408	\$	-	\$	-	\$	5.60	\$	1,120	\$	11.19	\$	2,238	\$	1,425	\$	19,190		
	Demo Canal Liner (assume half of the canal is shotcreted)	26,163	ft	4.80	\$	125,646	\$	-	\$	-	\$	0.37	\$	9,767	\$	0.69	\$	17,986	\$	11,773	\$	185,173		
	Excavate and Backfill Canal @ 0.6 CY per Lineal Ft	27,383	cy	22.10	\$	605,055	\$	-	\$	-	\$	1.40	\$	38,336	\$	96.279	\$	0.63	\$	64,692	\$	804,362		
	Excavate Breaches @ 200' = 240 locations @ 10 cy ea	2,400	cy	56.01	\$	134,424	\$	-	\$	-	\$	5.60	\$	13,440	\$	3.27	\$	1.20	\$	10,800	\$	166,512		
	Fly In and Leap Frog Equipment Support Crew	80	hr	198.32	\$	15,866	\$	-	\$	-	\$	45.00	\$	3,600	\$	-	\$	6.00	\$	1,800	\$	21,266		
	Receive Timber Cribbing and Misc	80	hr	198.32	\$	15,866	\$	-	\$	-	\$	45.00	\$	3,600	\$	-	\$	6.00	\$	1,800	\$	21,266		
	Helicopter, P/H UH 60A, Utility Hawk, mobile/demob	8	hr		\$	-	\$	-	\$	-	6,500	\$	52,000								\$	52,000		
	Helicopter, P/H UH 60A, Utility Hawk Sling Work	36	hr		\$	-	\$	-	\$	-	6,500	\$	234,000								\$	234,000		
	Daily Rate for Helicopter Fuel Truck	8	day		\$	-	\$	-	\$	-	750	\$	6,000								\$	6,000		
	Off Haul Wood Cribbing, walkways etc.	200	cy		\$	-	\$	-	\$	-										30,000	\$	6,000		
	Disposal fee for wood cribbing, walkways etc.	200	cy		\$	-	\$	-	\$	-										25,000	\$	5,000		
	Hydroseed (48,080 lf x 40' Wide = 33 ac)	36.00	ac		\$	-	\$	-	\$	-	4,000	\$	144,000								\$	144,000		
	M&S @ 5% of Labor	1	ls		\$	-	\$	-	83,697	\$	83,697										\$	83,697		
	Middle Miocene Side Spill 1 Each (Assumed at Head of Penstock)				\$	-	\$	-	\$	-											\$			
	Mob/Demob Men & Equipment	10	hr	463.91	\$	4,639	\$	-	\$	-	\$	28.00	\$	280	\$	520.55	\$	5,206	\$	28.00	\$	11,175		
	BMPs (Covered on Canals)	-	lf	1.98	\$	-	\$	-	4.00	\$	-	0.14	\$	-	\$	-	0.02	\$	-	\$	\$	-		
	Mechanical Demolition	10	hr	279.46	\$	2,795	\$	-	\$	-	\$	54.00	\$	540	\$	-	\$	4.00	\$	150	\$	3,475		
	Concrete Demolition and Bury (Assumed 2 cy each)	2	cy	72.04	\$	144	\$	-	\$	-	\$	5.60	\$	11	\$	11.19	\$	22	\$	14	\$	192		
	M&S @ 5% of Labor	1	ls		\$	-	\$	-	378	\$	406										\$	406		
	Asset Sub-Total w/Mark-ups	\$5,271.563																			\$			
	Bonds @ 1.00%	1	ls		\$	-	\$	-	\$	-											\$			
	Insurance @ 1.00%	1	ls		\$	-	\$	-	\$	-											\$			
	Subtotal Bid Item Direct Costs			3,169,008	\$	-	\$	-	585,815	\$	876,950		280,688		628,937		292,218				6,064,168	\$		
	Labor Escalation Add-on	16.00%			\$	507,041	\$	-													\$	507,041		
	Labor O.T. Premium	16.67%			\$	310,749	\$	-													\$	310,749		
	Project Indirect Cost Add-on	26.00%			\$	792,252	\$	-													\$	1,516,042		
	Subtotal Direct + Indirect Costs			4,779,051	\$	-	\$	-	732,269	\$	1,095,688		350,860		786,171		157,234				285,690	\$	839,800	
	Home Office Overhead Cost Add-on	10.00%			\$	477,905	\$	-	10.00%	\$	109,869		109,869		10,00%	\$	78,617				36,527	\$	28,569	
	Markup			10.00%	\$	477,905	\$	-	10.00%	\$	109,869		109,869		10,00%	\$	78,617				36,527	\$	28,569	
	Bid Item Totals			\$5,734,461	\$	-	\$	-			\$	1,318,425		\$	421,032		\$	943,405		\$	438,326	\$	10,077,600	
4	Feeders / Culvert Crossings	20	EA		\$	-	\$	-														\$	352,229	
	Removal				\$	-	\$	-														\$		
	Upper Miocene Feeders and/Culvert Crossings 10 each	10	ea		\$	-	\$	-														\$		
	Mob/Demob Men & Equipment	10	hr	463.91	\$	4,639	\$	-	\$	-	\$	28.00	\$	280	\$	520.55	\$	5,206	\$	28.00	\$	1,050	\$	11,175
	BMPs (Covered on Canals)		lf	1.98	\$	-	\$	-	4.00	\$	-	0.14	\$	-	\$	-	0.02	\$	-	\$	-	\$	-	
	Remove Feeder or Culvert	100	hr	336.61	\$	33,661	\$	-				28.00	\$	2,800	\$	273.60	\$	27,360	\$	11.00	\$	4,125	\$	67,946
	Misc Disposal	5	ls		\$	-	\$	-			2,500	\$	12,500							2,500	\$	25,000		

Miocene Decommissioning

[illegible]

Miocene Decommissioning

(PG&E-5)

Mocene Decommissioning

PROJECT NAME:

Bid Item No.	Description	Qty	Unit	Labor		Materials		Constr Materials & S		Sub-Contractor		SRC EQ		O/S Rental EQ		Gas & Oil		Other		Total		Remarks
				U.C.	Totals	U.C.	Totals	U.C.	Totals	U.C.	Totals	U.C.	Totals	U.C.	Totals	C.U.	Totals	U.C.	Totals	U.C.	Totals	
	Upper Mocene Steel Flumes - 6328 feet																					
	Labor																					
	Mob/Demob Men & Equipment	40	hr	463.01	\$ 18,556																	
	Prep Laydown Area (sav 5 acres)	217,800	sf	0.48	\$ 104,599																	
	Initial SWPPP BMPs Along Flume Sections	6,328	lf	1.98	\$ 12,550																	
	Drop Flume Sheets, Partially Dismantle, Prep for Fly Out	6,328	lf	48.08	\$ 304,271																	
	Fly Out Flume Sections	6,328	lf	4.01	\$ 25,356																	
	Receive Flume Sections	6,328	lf	4.39	\$ 27,784																	
	Dismantle Flume at Laydown Area, Load in Dumpsters	6,328	lf	6.89	\$ 41,676																	
	Materials																					
	SWPPP Materials	6,328	lf					4.00	\$ 27,147													
	Fall Protection Equipment for 5 Men	5	ea					2,000	\$ 10,725													
	4-Way Slings	10	sets					250	\$ 2,681													
	M&S @ 5% of Labor	1	ls					26,740	\$ 28,678													
	Subcontract/Other																					
	Helicopter, PJH UH 60A Utility Hawk, mob/demob	35	hr							6,500	\$ 227,500											
	Helicopter, PJH UH 60A Utility Hawk Sling Work	88	hr							6,500	\$ 572,000											
	Daily Rate for Helicopter Fuel Truck	35	day							750	\$ 26,250											
	Upper Mocene Wood Flumes - 2811 feet																					
	Labor																					
	Mob/Demob Men & Equipment	40	hr	463.01	\$ 18,556																	
	Improve Access Trails	100	hr	331.10	\$ 33,110																	
	Initial SWPPP BMPs Along Flume Sections	2,811	lf	1.98	\$ 5,575																	
	Drop Flume Sheets and Fly Out	60	hr	288.50	\$ 17,310																	
	Demo Wood Structure and Fly Out	60	hr	288.50	\$ 17,310																	
	Receive Flume Sections	60	hr	231.94	\$ 13,916																	
	Dismantle Flume at Laydown Area, Load in Dumpsters	60	hr	231.94	\$ 13,916																	
	Clean Up Laydown Area and Prep for Hydroseeding	30	hr	463.91	\$ 13,917																	
	Materials																					
	SWPPP Materials	2,811	lf					4.00	\$ 12,059													
	Access Trail Lumber	1	ls					2064	\$ 2,214													
	Demo bags	1	ls					10000	\$ 10,725													
	Fall Protection Equipment for 5 Men	5	ea					2,000	\$ 10,725													
	4-Way Slings	10	sets					250	\$ 2,681													
	M&S @ 5% of Labor	1	ls					6,681	\$ 7,165													
	Subcontract/Other																					
	Asbestos Removal	1	ls							35,000.00	\$ 35,000											
	Dumpster for wood	6	ea							2,200	\$ 39,600											
	Helicopter, Bell 207, mob/demob	18	hr							2,200	\$ 310,200											
	Helicopter, Bell 207, sling loading	141	hr																			
	Daily Rate for Helicopter Fuel Truck	18	day							750	\$ 13,500											
	Hydroseed Laydown Area	5.00	ac							4,000	\$ 20,000											
	Asset Sub-Total w/Mark-ups \$ 3,827,824																					
	Middle Mocene Wood and Steel Flumes - 2693 feet																					
	Labor																					
	Mob/Demob Men & Equipment	40	hr	463.91	\$ 18,556																	
	Prep Laydown Area (sav 5 acres)	217,800	sf	0.48	\$ 104,599																	
	Initial SWPPP BMPs Along Flume Sections	2,693	lf	1.98	\$ 5,341																	
	Drop Flume Sheets, Partially Dismantle, Prep for Fly Out	2,693	lf	48.08	\$ 129,488																	
	Fly Out Flume Sections	2,693	lf	4.01	\$ 10,791																	

PROJECT NAME:

Bid Item No.	Description	Qty	Unit	Labor		Materials		Const Materials & S		M	Sub-Contractor		SRC EQ		O/S Rental EQ		Gas & Oil		Other		Total	Remarks
				U.C.	Totals	U.C.	Totals	U.C.	Totals		U.C.	Totals	U.C.	Totals	C.U.	Totals	U.C.	Totals				
	Receive Flume Sections	2,693	lf	4.39	\$ 11,824	\$ -	\$ -	\$ -	\$ -	-	\$ -	0.63	\$ 2,244	\$ -	\$ -	0.13	\$ 1,262	\$ -	\$ -	\$ 15,331		
	Diamonds Flume at Laydown Area. Load in Dumpsters	2,693	lf	6.59	\$ 17,786	\$ -	\$ -	\$ -	\$ -	-	\$ -	1.25	\$ 3,366	\$ -	\$ -	0.19	\$ 1,894	\$ -	\$ -	\$ 22,096		
	Clean Up Laydown Area and Prep for Hydrosceding	30	hr	463.91	\$ 13,917	\$ -	\$ -	\$ -	\$ -	-	\$ -	28.00	\$ 840	\$ 15,617	\$ 520.55	\$ 3,150	\$ -	\$ -	\$ -	\$ 33,524		
																				\$ -		
	Materials																			\$ -		
	SW/PPP Materials	10,467	lf		\$ -	\$ -	\$ -	4.00	\$ 44,903	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 44,903		
	Fall Protection Equipment for 5 Men	5	ea		\$ -	\$ -	\$ -	2,000	\$ 10,725	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,725		
	4-Way Slings	10	sets		\$ -	\$ -	\$ -	250	\$ 2,681	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,681		
	M&S @ 5% of Labor	1	lb		\$ -	\$ -	\$ -	15,613	\$ 16,745	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 16,745		
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	Subcontract/Other																			\$ -		
	Dumpster for wood	6	ea		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	800	\$ 4,800	\$ -	\$ -	\$ 4,800		
	Helicopter P/H UH 60A Utility Hawk mobilendob	14	hr		\$ -	\$ -	\$ -	6,500	\$ 91,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 91,000		
	Helicopter P/H UH 60A Utility Hawk Sling Work	36	hr		\$ -	\$ -	\$ -	6,500	\$ 234,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 234,000		
	Daily Rate for Helicopter Fuel Truck	14	day		\$ -	\$ -	\$ -	750	\$ 10,500	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,500		
	Hydrosced Laydown Area	5.00	ac		\$ -	\$ -	\$ -	4,000	\$ 20,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20,000		
	Asset Sub-Total w/Mark-ups \$ 1,584,093																			\$ -		
																				\$ -		
	Bonds @ 1.00%	1	lb		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	Insurance @ 1.00%	1	lb		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
	Subtotal Bid Item Direct Costs																			\$ 3,405,491		
	Labor Escalation Add-on	16.00%			\$ 136,905															\$ 136,905		
	Labor O.T. Premium	16.67%			\$ 96,162															\$ 96,162		
	Project Indirect Cost Add-on	25.00%			\$ 245,164															\$ 245,164		
	Subtotal Direct + Indirect Costs																			\$ 4,509,931		
	Home Office Overhead Cost Add-on	10.00%			\$ 147,880															\$ 147,298		
	Markup				\$ 147,880															\$ 147,298		
	Bid Item Totals																			\$ 4,730		
8	Switchyards	2	EA		\$ 1,774,687	\$ -	\$ -	10.00%	\$ 23,732	\$ 23,732	\$ 199,944	\$ 121,548	\$ 12,155	\$ 12,155	\$ 12,115	\$ 12,115	\$ 10,00%	\$ 10,00%	\$ 10,00%	\$ 14,730	\$ 450,993	
	Leave as Is. Remove Hazardous Material up to 1st Bus				\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Line Saddle Powerhouse Switchyard																			\$ -		
	Switchyard support crew	40	hr	254.88	\$ 10,195	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	45.00	\$ 1,800	\$ -	\$ -	6.00	\$ 900	\$ -	\$ -	\$ -	\$ 12,695	
	Line Saddle (Remove Hazardous Materials to 1st bus.)	1	lb		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	20,000.00	\$ 20,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20,000	
	Off-Haul+ Disposal Fees	6	lds		\$ -	\$ -	\$ -	600.00	\$ 3,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	500.00	\$ 3,000	\$ -	\$ -	\$ 6,600		
	M&S @ 5% of Labor	1	lb		\$ -	\$ -	\$ -	509.76	\$ 547	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 547		
	Asset Sub-Total w/Mark-ups \$ 65,201																			\$ -		
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Coal Canyon Powerhouse Switchyard																			\$ -		
	Switchyard support crew	30	hr	254.88	\$ 7,646	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	45.00	\$ 1,350	\$ -	\$ -	6.00	\$ 675	\$ -	\$ -	\$ -	\$ 9,671	
	Coal Canyon (Remove Hazardous Materials to 1st bus.)	1	lb		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	15,000.00	\$ 15,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 15,000		
	Off-Haul+ Disposal Fees	4	lds		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	600.00	\$ 2,400	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,400		
	M&S @ 5% of Labor	1	lb		\$ -	\$ -	\$ -	382.32	\$ 410	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 410		
	Asset Sub-Total w/Mark-ups \$ 48,005																			\$ -		
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Bonds @ 1.00%	1	lb		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Insurance @ 1.00%	1	lb		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Subtotal Bid Item Direct Costs																			\$ 7,264	\$ 2,855	
	Labor Escalation Add-on	16.00%																		\$ 7,264	\$ 2,855	

PROJECT NAME:

Bid Item No.	Description	Qty	Unit	Labor		Materials		Const Materials & S		M	Sub-Contractor		SRC EQ		O/S Rental EQ		Gas & Oil		Other		Total	Remarks												
				U.C.	Totals	U.C.	Totals	U.C.	Totals		U.C.	Totals	U.C.	Totals	C.U.	Totals	U.C.	Totals	U.C.	Totals														
	Labor O.T. Premium	16.67%		\$	1,750		\$	239				\$	10,250		\$	788		\$	-		\$	384		\$	1,816		\$	-		\$	1,750			
	Project Indirect Cost/Add-on	25.00%		\$	4,460				1,196			51,250		3,938		-		1,969		9,080					94,339					\$	17,947			
	Subtotal Direct + Indirect Costs				26,906							51,250		3,938		-									94,339						\$	9,434		
	Home Office Overhead Cost/Add-on	10.00%			\$	2,691		\$	-			5,125		10.00%		394		10.00%		908					9,434						\$	9,434		
	Markup				10.00%	\$	2,691		10.00%		120	10.00%		10.00%		394		10.00%		908					10.00%						\$	9,434		
	Bid Item Totals				\$	32,287		\$	-			\$	61,500		\$	4,725		\$	-		\$	2,863		\$	10,896						\$	113,206		
9	Paverhouses	2	EA																												\$	1,562,768		
	Full Removal with Pits Filled with CLSM																															\$	-	
	Line Saddle - Full Removal with Pits Filled with CLSM																															\$	-	
	M&S Demolish Men & Equipment	40	hr		463.91		\$	18,556		\$	-		28.00		\$	1,120		520.55		20,822				28.00		\$	4,200				\$	-	\$	44,698
	BMPs	500	lf		1.98		\$	992		\$	-		0.14		\$	70		-		-			0.02		\$	38						\$	3,244	
	Remove Roof/Equip Hatches	40	hr		500.94		\$	20,038		\$	-		54.00		\$	2,160		215.04		8,602			23.00		\$	3,450						\$	34,249	
	Remove Generator + Turbine	100	hr		419.21		\$	41,921		\$	-		54.00		\$	5,400		135.00		13,500			16.00		\$	6,000						\$	66,821	
	Drain/Recyle Oil Filled Equipment in PH (Assume 100 gal)	50	hr		419.21		\$	20,961		\$	-		54.00		\$	2,700		135.00		6,750			16.00		\$	3,000						\$	33,411	
	Remove Valves	50	hr		419.21		\$	20,961		\$	-		54.00		\$	2,700		135.00		6,750			16.00		\$	3,000						\$	33,411	
	Remove Overhead Crane	10	hr		419.21		\$	4,192		\$	-		54.00		\$	540		135.00		1,350			16.00		\$	600						\$	6,682	
	Remove Electrical Panels/Switchgear	50	hr				\$	-		\$	-		240		\$	12,000				-			16.00		\$	600						\$	12,000	
	Remove Battery Bank	10	hr		419.21		\$	4,192		\$	-		54.00		\$	540		135.00		1,350			16.00		\$	600						\$	6,682	
	Remove Misc.	75	hr		419.21		\$	31,441		\$	-		54.00		\$	4,050		16.00		10,125			16.00		\$	4,500						\$	50,116	
	Demo PH Concrete Walls	180	cy		61																													

[illegible]

PROJECT NAME:

[illegible]

Miocene Decommissioning

Notes:

1. Asset sub-totals, where shown, use a total asset type cost add-on and markup "factor" to multiply by each individual assets' direct costs to arrive at the individual "Asset Sub-Total w/Mark-up"