

Docket : A.23-05-010
Exhibit Number : CA-06
Commissioner : Douglas
ALJs : Seybert/Park
Witnesses : Neal



PUBLIC ADVOCATES OFFICE
CALIFORNIA PUBLIC UTILITIES COMMISSION

Report on the Results of Operations
for
Southern California Edison Company
General Rate Case
Test Year 2025

Grid Modernization, Grid Technology,
and Energy Storage

(Part 4 of 7)

San Francisco, California
February 29, 2024

(INTENTIONALLY LEFT BLANK)

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. SUMMARY OF RECOMMENDATIONS.....	3
III. OVERVIEW OF CAL ADVOCATES' ANALYSIS	9
IV. DISCUSSION / ANALYSIS OF GRID TECHNOLOGY ASSESSMENT PROGRAMS.....	9
A. Overview of SCE's Request.....	9
B. Cal Advocates' Analysis.....	13
V. DISCUSSION / ANALYSIS OF CAPITAL PILOT PROJECTS.....	14
A. Overview of SCE's Request.....	14
B. Analysis of the Pilot Projects.....	18
VI. DISCUSSION / ANALYSIS OF GRID SCALE ENERGY STORAGE PROJECTS	34
A. Overview of SCE's Request.....	34
B. Analysis of Grid Scale Energy Storage Programs.....	37
VII. WITNESS QUALIFICATIONS – S. NEAL.....	43

- 1 • Grid Technology Laboratories Programs – capital expenditures
2 associated with upgrades to the Energy Storage and Transportation
3 Electrification Test Facility, the Fenwick Test Facility, and the
4 Equipment Demonstration and Evaluation Facility.
- 5 • Capitol Pilot Projects – capital expenditures used to establish the
6 Smart City Pilot Project, the Virtual Programmable Automation
7 Controller (PAC) Pilot Project, the Virtual Protection Pilot Project, the
8 Adaptive Protection Pilot Project, the DC Link Pilot Project, and the
9 Service Center of the Future Pilot Project.
- 10 • Energy Storage Programs – capital expenditures used to complete the
11 Distribution Energy Storage Integration Pilot Program and establish the
12 Long Duration Energy Storage Program.

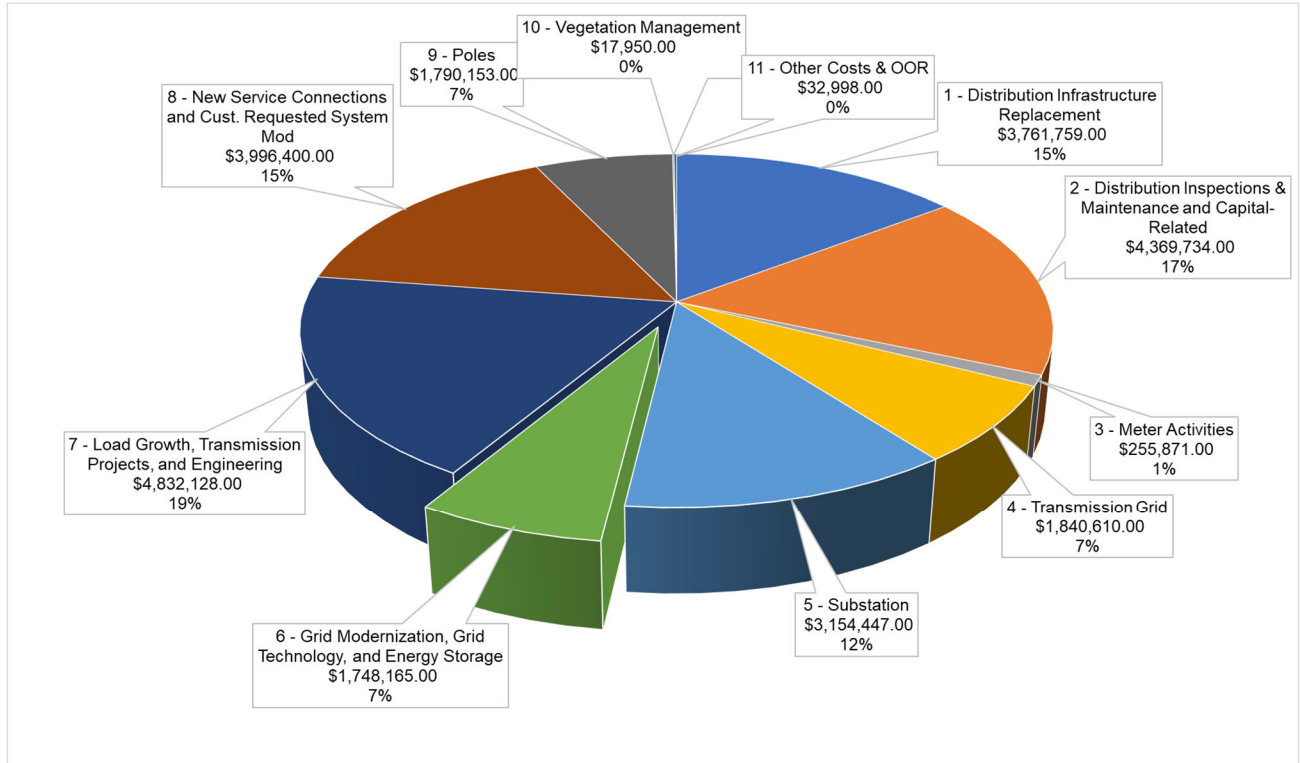
13 SCE’s proposals regarding its T&D capital expenditures associated with other
14 areas are addressed in Exhibits CA-03 through CA-05 and CA-07 through CA-09.

15 The figure below shows how SCE has subdivided T&D capital expenditures into
16 numerous parts. The figure also shows the cumulative amounts that SCE has proposed
17 spending for each part over the six-year period 2023 through 2028, as well as the
18 percentage of the total expenditures each part constitutes.

19

1
2
3
4
5
6

Figure 06-013
SCE's T&D Capital Expenditure Request
Grid Modernization, Grid Technology & Energy Storage
CPUC Jurisdictional, 2023-2028 Forecast
(in Millions of Nominal Dollars)



7

8 Source: Ex. SCE-02, Vol. 06, p. 3.

9 **II. SUMMARY OF RECOMMENDATIONS**

10 In Section III of Volume 6, SCE requests \$71.668 million over 2023-2028 for
11 Distribution Grid capital expenditures discussed in this exhibit associated with Grid
12 Technology Assessment Programs and Capital Pilots.⁴ In Section IV of Volume 6, SCE
13 requests \$121.202 million over 2023-2028 for Distribution Grid capital expenditures

³ Ex. SCE-02, Vol. 06, p. 3.

⁴ Ex. SCE-02, Vol. 06, p. 140, Figure III-41.

1 discussed in this exhibit associated with Energy Storage Programs.⁵ SCE utilized a
2 variety of methods to forecast its Distribution Grid capital expenditures, and these
3 methods are further discussed below.

4 Cal Advocates recommends capital expenditures of \$23.874 million for 2023,
5 \$21.699 million for 2024, \$10.535 million for 2025, \$4.707 million for 2026, \$1.264
6 million for 2027, and \$1.282 million for 2028. Cal Advocates' recommendation is \$2.814
7 million less than SCE's forecast in 2023, \$2.671 million less than SCE's forecast in
8 2024, \$20.231 million less than SCE's forecast in 2025, \$23.746 million less than SCE's
9 forecast in 2026, \$30.326 million less than SCE's forecast in 2027, and \$49.721 million
10 less than SCE's forecast in 2028.

11 To derive its forecast, Cal Advocates utilized SCE's 2022 recorded adjusted
12 capital expenditures, as well as SCE's historical capital expenditure levels and SCE's
13 TY forecasts. The methods utilized by Cal Advocates are also further discussed below.

14 The following summarizes Cal Advocates' recommendations associated with
15 Grid Technology Laboratories, Capital Pilot Projects, and Energy Storage:

- 16 • Cal Advocates does not oppose SCE's request of \$24.714 million for
17 capital expenditures for Grid Technology Laboratories in 2023-2028.
- 18 • Cal Advocates recommends \$0 for capital expenditures for Capital
19 Pilot Projects, which is \$46.954 million lower than SCE's request of
20 \$46.954 million.
- 21 • Cal Advocates recommends \$38.647 million for capital expenditures
22 for Energy Storage in 2023-2028, which is \$82.555 million lower than
23 SCE's request of \$121.202 million.

24 Tables 06-01a and 06-01b compare SCE's 2023-2028 request, Cal Advocates'
25 recommendation, and the difference between the two for Grid Technology Laboratories,
26 Capital Pilot Programs, and Energy Storage capital expenditures.

⁵ Ex. SCE-02, Vol. 06, p. 186, Figure IV-46.

1
2
3
4

Table 06-01a
Grid Technology and Energy Storage
Capital Expenditures for 2023-2025
(\$000)

Description	SCE Proposed ⁶			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
Grid Technology Laboratories	\$9,057	\$3,680	\$4,724	\$9,057	\$3,680	\$4,724	\$0	\$0	\$0
Capitol Pilot Projects	\$1,642	\$505	\$11,035	\$0	\$0	\$0	\$1,642	\$505	\$11,035
Grid Scale Energy Storage	\$15,989	\$20,185	\$15,007	\$14,817	\$18,019	\$5,811	\$1,172	\$2,166	\$9,196

5
6
7
8
9

Table 06-01b
Grid Technology and Energy Storage
Capital Expenditures for 2026-2028
(\$000)

Description	SCE Proposed ⁷			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2026	2027	2028	2026	2027	2028	2026	2027	2028
Grid Technology Laboratories	\$4,707	\$1,264	\$1,282	\$4,707	\$1,264	\$1,282	\$0	\$0	\$0
Capitol Pilot Projects	\$11,141	\$11,238	\$11,393	\$0	\$0	\$0	\$11,141	\$11,238	\$11,393
Grid Scale Energy Storage	\$12,605	\$19,088	\$38,328	\$0	\$0	\$0	\$12,605	\$19,088	\$38,328

10
11
12
13

Table 06-02 provides SCE’s requests on a yearly basis for Section III (Grid Technology Assessments and Capital Pilots) and Section IV (Energy Storage).

⁶ Ex. SCE-02, Vol. 06, p. 140, Figure III-41 and p.186, Figure IV-46.

⁷ Ex. SCE-02, Vol. 06, p. 140, Figure III-41 and p.186, Figure IV-46.

Table 06-02
Grid Technology Assessment Programs
SCE Forecast Capital Cost
(\$000)

Description	2023	2024	2025	2026	2027	2028
Section III ⁸	\$10,699	\$4,185	\$15,759	\$15,848	\$12,502	\$12,675
Section IV ⁹	\$15,989	\$20,185	\$15,007	\$12,605	\$19,088	\$38,328
Total	\$26,688	\$24,370	\$30,766	\$28,453	\$31,590	\$51,003

Table 06-03 provides SCE’s recorded capital expenditures on a yearly basis for Section III and Section IV.

Table 06-03
Grid Technology Assessment Programs
SCE Recorded Capital Cost
(\$000)

Description	2018	2019	2020	2021	2022
Section III ¹⁰	\$2,566	\$776	\$4,496	\$1,937	\$3,778
Section IV ¹¹	\$9,687	\$2,959	\$8,068	\$6,218	\$9,304
Total	\$12,253	\$3,735	\$12,564	\$8,155	\$13,082

Figure 06-02 illustrates SCE’s requests on a yearly basis for 2023-2028 in comparison to the recorded costs for 2018-2022.

⁸ Ex. SCE-02, Vol. 06, p. 140, Figure III-41.

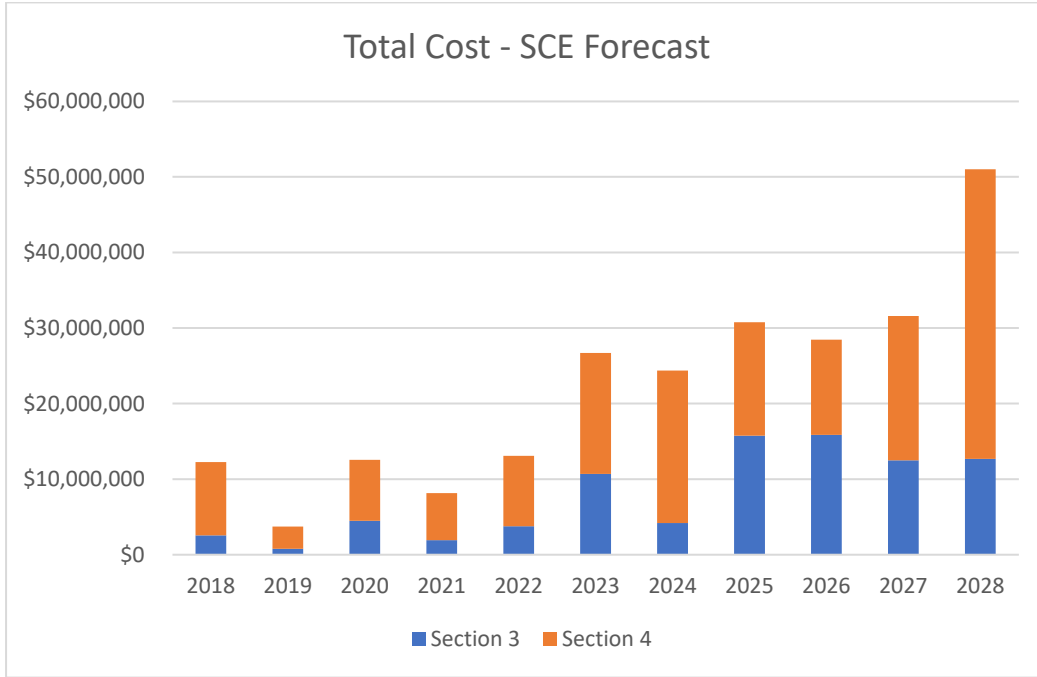
⁹ Ex. SCE-02, Vol. 06, p. 186, Figure IV-46.

¹⁰ Ex. SCE-02, Vol. 06, p. 140, Figure III-41.

¹¹ Ex. SCE-02, Vol. 06, p. 186, Figure IV-46.

1
2
3
4
5

Figure 06-02
SCE's T&D Capital Expenditure Request
Grid Technology, Capitol Pilot Projects, & Energy Storage
2018-2022 Recorded and 2023-2028 Forecast

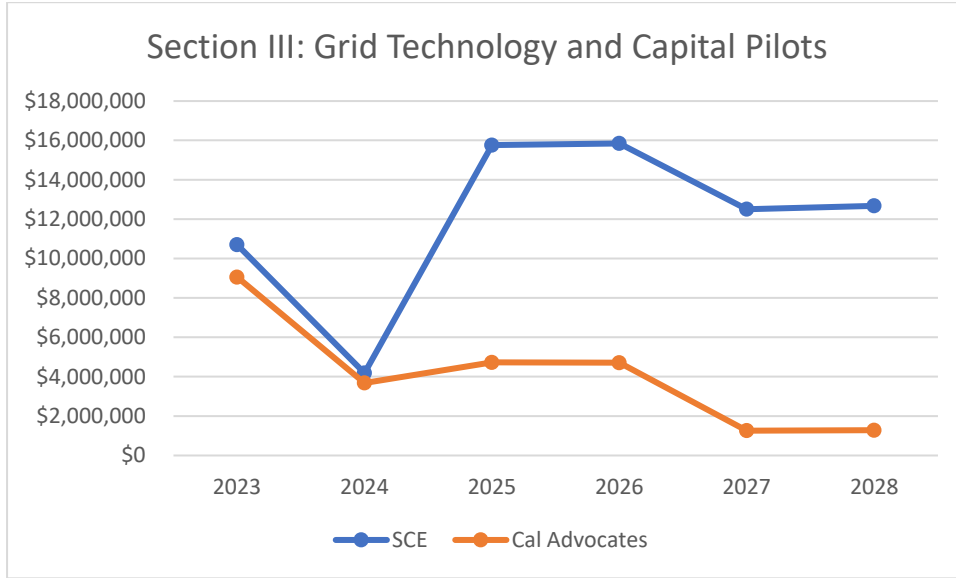


6
7
8
9
10

Figure 06-03 illustrates a comparison between SCE's capital expenditure requests for Volume III and Cal Advocates' recommendation for 2023-2028.

1
2
3
4
5

Figure 06-03
SCE's T&D Capital Expenditure Request vs. Cal Advocates'
Section III: Grid Technology and Capitol Pilot Projects
2023-2028 Forecast

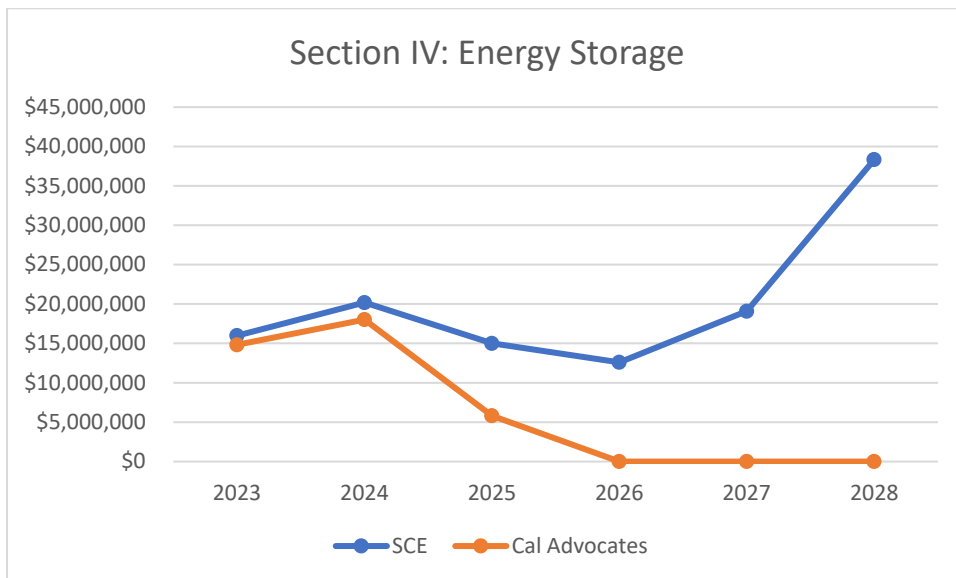


6
7
8
9

Figure 06-04 illustrates a comparison between SCE's capital expenditure requests for Volume IV and Cal Advocates' recommendation for 2023-2028.

10
11
12
13
14
15

Figure 06-04
SCE's T&D Capital Expenditure Request vs. Cal Advocates'
Section IV: Energy Storage
2023-2028 Forecast



16
17

1 **III. OVERVIEW OF CAL ADVOCATES' ANALYSIS**

2 Cal Advocates conducted its analysis by reviewing SCE's testimony and
3 workpapers and by issuing data requests and analyzing responses. Cal Advocates also
4 had a meeting on January 8, 2024 with SCE to obtain additional information and to
5 clarify forecast requests. Cal Advocates reviewed SCE's historical recorded adjusted
6 capital expenditures and its forecast estimates to calculate its recommendations. Cal
7 Advocates reviewed SCE's testimony, workpapers, and data request responses. Cal
8 Advocates develops different TY forecasts relative to SCE for the cost categories that
9 are discussed below.

10 **IV. DISCUSSION / ANALYSIS OF GRID TECHNOLOGY ASSESSMENT**
11 **PROGRAMS**

12 **A. Overview of SCE's Request**

13 SCE proposes \$24.714 million in capital expenditures over the 2023-2028 period
14 for upgrades to its Grid Technology Laboratories.¹² These upgrades include \$6.091
15 million worth of upgrades to its Energy Storage and Transportation Electrification Test
16 Facility at Pomona, \$17.818 million worth of upgrades to its Fenwick Test Facility at
17 Westminster, and \$0.805 million worth of upgrades to its Equipment Demonstration and
18 Evaluation Facility.¹³

19 Cal Advocates recommends \$24.714 million in capital expenditures over the
20 2023-2028 period for upgrades to SCE's Grid Technology Laboratories. Tables 06-04a
21 and 06-04b compare SCE's 2023-2028 request, Cal Advocates' recommendation, and
22 the difference between the two for Grid Technology Assessment Program capital
23 expenditures.
24

¹² Ex. SCE-02, Vol. 06, p. 141E, Table III-20

¹³ Ex. SCE-02, Vol. 06, p. 141E, Table III-20

1
2
3
4

Table 06-04a
Grid Technology Assessment Programs
Capital Expenditures for 2023-2025
(\$000)

Description	SCE Proposed ¹⁴			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
Energy Storage and Transportation Test Facility	\$3,301	\$0	\$1,102	\$3,301	\$0	\$1,102	\$0	\$0	\$0
Fenwick Test Facility	\$5,636	\$3,550	\$3,491	\$5,636	\$3,550	\$3,491	\$0	\$0	\$0
Equipment Demonstration and Evaluation Facility	\$120	\$130	\$132	\$120	\$130	\$132	\$0	\$0	\$0

5
6
7
8
9

Table 06-04b
Grid Technology Assessment Programs
Capital Expenditures for 2026-2028
(\$000)

Description	SCE Proposed ¹⁵			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2026	2027	2028	2026	2027	2028	2026	2027	2028
Energy Storage and Transportation Test Facility	\$556	\$561	\$571	\$556	\$561	\$571	\$0	\$0	\$0
Fenwick Test Facility	\$4,010	\$563	\$568	\$4,010	\$563	\$568	\$0	\$0	\$0
Equipment Demonstration and Evaluation Facility	\$139	\$141	\$143	\$139	\$141	\$143	\$0	\$0	\$0

10

11 SCE had requested \$9.128 million in capital expenditures over the 2019-2021
12 period for upgrades to its Grid Technology Laboratories in its previous General Rate
13 Case Application. The Energy Storage and Transportation Electrification Test Facility at
14 Pomona was allotted no money, as SCE planned to decommission the facility. Instead,
15 SCE planned to expand the Fenwick Test Facility at Pomona to build an Energy
16 Storage and Transportation Electrification Test Facility there. SCE also planned to add
17 new test asset hardware to its Equipment Demonstration and Evaluation Facility. No

¹⁴ Ex. SCE-02, Vol. 06, p. 141E, Table III-20.

¹⁵ Ex. SCE-02, Vol. 06, p. 141E, Table III-20.

1 parties contested SCE's requests and the Commission found them reasonable.¹⁶ SCE
2 later decided after the Commission's decision was issued to remain at the Pomona
3 facility and not move the transportation electrification testing to the Fenwick Test
4 Facility.¹⁷

5 SCE's 2023-2028 forecasts for its Distribution Grid capital activities for Grid
6 Technology Assessment programs were based mostly on existing contracts, recent
7 purchases, and engineering estimates.¹⁸ SCE's 2023 forecast includes proposed
8 expansions in the Energy Storage and Transportation Electrification Test Facility to
9 support the Research Hub for Electrical Technologies in Truck & Transportation
10 Application (RHETTA) Electric Truck Research and Utilization Center (eTRUC)
11 program, which was awarded to the Electric Power Research Institute in 2021.¹⁹ SCE's
12 2023-2026 forecasts also include updates of the Real-Time Digital Simulators to the
13 latest NovaCor racks to perform Hardware-in-the-loop modeling and simulations at the
14 Fenwick Test Facility.²⁰

15 Table 06-05 provides SCE's requests on a yearly basis for Grid Technology
16 Assessment programs.

17

¹⁶ Decision (D.)21-08-036, Decision on Test Year 2021 General Rate Case for Southern California Edison Company, pp. 117-120.

¹⁷ Ex. SCE-02, Vol. 06, p. 143, Lines 2-20.

¹⁸ Ex. SCE-02, Vol. 06, p. 144, Line 31-p.145, Line 1; p.147, Lines 9-10; and p.149, Lines 21-22.

¹⁹ Ex. SCE-02, Vol. 06, p. 144, Lines 2-5.

²⁰ Ex. SCE-02, Vol. 06, p. 146, Lines 23-27.

Table 06-05
Grid Technology Assessment Programs
SCE Forecast Capital Cost
(\$000)

Description	2023	2024	2025	2026	2027	2028
Energy Storage and Transportation Electrification Test Facility	\$3,301	\$0	\$1,102	\$556	\$561	\$571
Fenwick Test Facility	\$5,636	\$3,550	\$3,491	\$4,010	\$563	\$568
Equipment Demonstration and Evaluation Facility	\$120	\$130	\$132	\$139	\$141	\$143
Total	\$9,057	\$3,680	\$4,725	\$4,705	\$1,265	\$1,282

Source: Ex. SCE-02, Vol. 06, p. 141E.

Table 06-06 provides SCE’s recorded capital expenditures on a yearly basis for Grid Technology Assessment programs.

Table 06-06
Grid Technology Assessment Programs
2017-2022 Recorded Capital Expenditures
(\$000)

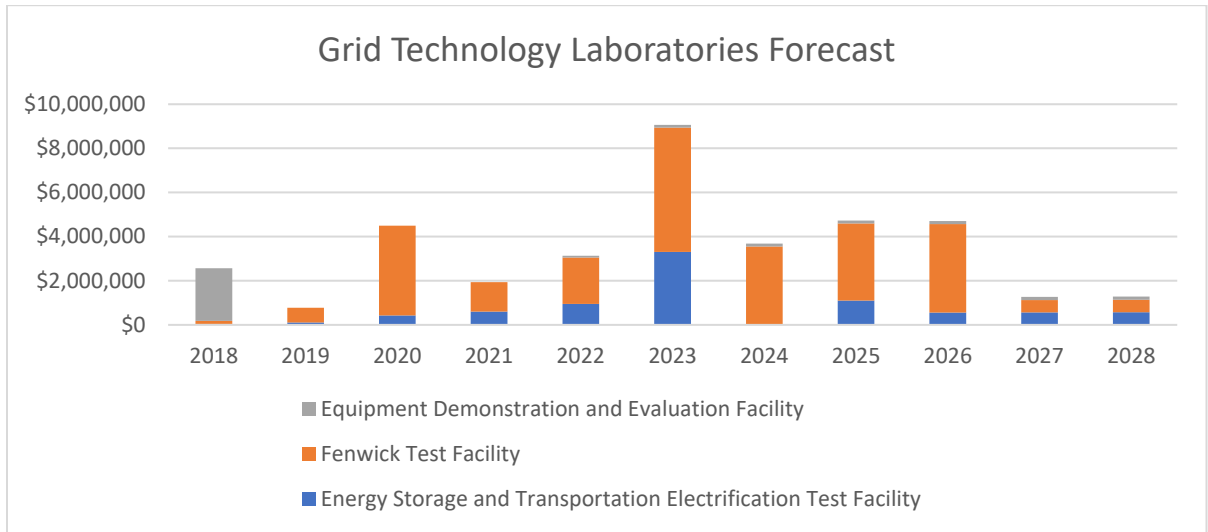
Description	2018	2019	2020	2021	2022
Energy Storage and Transportation Electrification Test Facility	\$40	\$108	\$425	\$600	\$946
Fenwick Test Facility	\$140	\$668	\$4,071	\$1,337	\$2,107
Equipment Demonstration and Evaluation Facility	\$2,386	\$0	\$0	\$0	\$80
Total	\$2,566	\$776	\$4,496	\$1,937	\$3,133

Source: Cal Advocates data request PubAdv-SCE-177-STN, Q.1.

Figure 06-05 illustrates SCE’s requests on a yearly basis for 2023-2028 in comparison to the recorded costs for 2018-2022.

1
2
3
4

**Figure 06-05
Grid Technology Assessment Program
2018-2022 Recorded and 2023-2028 Forecast**



5
6

B. Cal Advocates' Analysis

8 Cal Advocates reviewed and evaluated SCE's testimony describing the capital
9 expenditures for Grid Technology Assessment Program. Cal Advocates undertook
10 discovery in respect to this program. For each test facility, Cal Advocates made broad
11 requests for additional details on the planned upgrades and expansions, including dollar
12 amounts for supporting contracts and purchases,²¹ planned operational dates,²² any
13 cost-benefit analyses performed,²³ the technical problems unique to SCE that these
14 upgrades would address,²⁴ steps taken to identify cheaper alternative options to solve
15 those technical problems,²⁵ and the upgrade cycle for facility equipment.²⁶ For the

²¹ Cal Advocates data request PubAdv-SCE-177-STN, Q.3., Q.5., and Q.6.

²² Cal Advocates data request PubAdv-SCE-297-STN, Q.1.a., Q.2.a., and Q.3.a.

²³ Cal Advocates data request PubAdv-SCE-297-STN, Q.2.b. and Q.3.b.

²⁴ Cal Advocates data request PubAdv-SCE-339-STN, Q.1.a., Q.2.a., and Q.3.a.

²⁵ Cal Advocates data request PubAdv-SCE-339-STN, Q.1.b., Q.2.b., and Q.3.b.

²⁶ Cal Advocates data request PubAdv-SCE-369-STN, Q.2., Q.3., and Q.4.

1 Energy Storage and Transportation Electrification Facility, Cal Advocates also reviewed
2 the Letter of Intended Commitment for its role in eTRUC RHETTA submitted to the
3 California Energy Commission.²⁷

4 Cal Advocates does not oppose the proposed capital expenditures for the Grid
5 Technology Assessment Program. Cal Advocates does not oppose SCE's request of
6 \$6.091 million over the 2023-2028 period for upgrades and expansions to the Energy
7 Storage and Transportation Electrification Test Facility. Cal Advocates does not oppose
8 SCE's request of \$17.818 million over the 2023-2028 period for upgrades and
9 expansions to the Fenwick Test Facility. Cal Advocates does not oppose SCE's request
10 of \$0.805 million over the 2023-2028 period for upgrades to the Equipment
11 Demonstration and Evaluation Facility.

12 **V. DISCUSSION / ANALYSIS OF CAPITAL PILOT PROJECTS**

13 **A. Overview of SCE's Request**

14 SCE proposes \$46.953 million in capital expenditures over the 2023-2028 period
15 to initiate various Capitol Pilot Projects.²⁸ These capital expenditures include \$6.351
16 million for the Smart City Pilot Project, \$3.940 million for Virtual Programmable
17 Automation Controller (PAC) Pilot Project, \$8.725 million for the Virtual Protection Pilot
18 Project, \$6.220 million for Adaptive Protection Pilot Project, \$14.607 million for the DC
19 Link Pilot Project, and \$7.111 million worth of upgrades to the Service Center of the
20 Future Pilot Project. SCE made no request for capital expenditures over the 2019-2021
21 period for Capital Pilot Projects in its previous General Rate Case Application.²⁹

22 Cal Advocates recommends \$0 million in capital expenditures over the 2023-
23 2028 period to initiate SCE's Capital Pilot Projects, in comparison to SCE's request for
24 \$46.955 million over the same period. Specifically, Cal Advocates recommends a
25 downward adjustment of \$1.642 million for 2023, \$0.505 million for 2024, \$11.035

²⁷ Cal Advocates data request PubAdv-SCE-177-STN, Q.4.b.

²⁸ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

²⁹ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

1 million for 2025, \$11.141 million for 2026, \$11.238 million for 2027, and \$11.393 million
 2 for 2028 for a total downward adjustment of \$46.955 million.

3 Tables 06-07a and 06-07b compare SCE’s 2023-2028 request, Cal Advocates’
 4 recommendation, and the difference between the two for Grid Technology Assessment
 5 Program capital expenditures.

6
 7
 8
 9
 10

**Table 06-07a
 Capital Pilot Programs
 Capital Expenditures for 2023-2025
 (\$000)**

Description	SCE Proposed ³⁰			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
Smart Cities	\$1,642	\$505	\$3,090	\$0	\$0	\$0	\$1,642	\$505	\$3,090
Virtual PAC	\$0	\$0	\$2,152	\$0	\$0	\$0	\$0	\$0	\$2,152
Virtual Protection	\$0	\$0	\$2,538	\$0	\$0	\$0	\$0	\$0	\$2,538
Adaptive Protection	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DC Link	\$0	\$0	\$1,655	\$0	\$0	\$0	\$0	\$0	\$1,655
Service Center of the Future	\$0	\$0	\$1,600	\$0	\$0	\$0	\$0	\$0	\$1,600

11
 12
 13
 14
 15

**Table 06-07b
 Capital Pilot Programs
 Capital Expenditures for 2026-2028
 (\$000)**

Description	SCE Proposed ³¹			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2026	2027	2028	2026	2027	2028	2026	2027	2028
Smart Cities	\$1,114	\$0	\$0	\$0	\$0	\$0	\$1,114	\$0	\$0
Virtual PAC	\$1,114	\$674	\$0	\$0	\$0	\$0	\$1,114	\$674	\$0
Virtual Protection	\$3,008	\$787	\$2,393	\$0	\$0	\$0	\$3,008	\$787	\$2,393
Adaptive Protection	\$668	\$2,248	\$3,304	\$0	\$0	\$0	\$668	\$2,248	\$3,304
DC Link	\$3,899	\$4,495	\$4,557	\$0	\$0	\$0	\$3,899	\$4,495	\$4,557
Service Center of the Future	\$1,337	\$3,034	\$1,139	\$0	\$0	\$0	\$1,337	\$3,034	\$1,139

16

³⁰ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

³¹ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

1 SCE's 2023-2025 forecasts for its Distribution Grid capital activities for capital
2 pilot projects were based mostly on Electric Program Investment Charge (EPIC)
3 program projects.³² The Smart City Project uses microgrids to provide grid resiliency to
4 essential community facilities.³³ The Virtual PAC Project seeks to reduce reliance on
5 proprietary legacy substation control hardware in favor of modern standardized
6 technologies.³⁴ The Virtual Protection Project focuses on the virtualization of
7 appliance-based protection equipment to utilize the flexibility and interoperability of
8 substation process busses.³⁵ The Adaptive Protection Project focuses on adaptive
9 protection to enhance grid operational reliability under changing conditions.³⁶ The DC
10 Link Project is focused on battery energy storage connectivity with DC Link to improve
11 operational flexibility between load circuit transfers.³⁷ The Service Center of the Future
12 Project is focused on advanced alternative service and control methods for high-power
13 and high-energy electric transportation fleet depots.³⁸
14

³² Ex. SCE-02, Vol. 06, p. 150, Lines 5-17.

³³ Ex. SCE-02, Vol. 06, p. 150, Lines 18-19.

³⁴ Ex. SCE-02, Vol. 06, p. 150, Lines 19-21.

³⁵ Ex. SCE-02, Vol. 06, p. 150, Line 21-p.151, Line 1.

³⁶ Ex. SCE-02, Vol. 06, p. 151, Lines 1-2.

³⁷ Ex. SCE-02, Vol. 06, p. 151, Lines 3-4.

³⁸ Ex. SCE-02, Vol. 06, p. 150, Lines 4-5.

1 Table 06-08 provides SCE's requests on a yearly basis for Capital Pilot Projects.

2

3

4

5

6

Table 06-08
Capital Pilot Projects
SCE Forecast Capital Cost
(\$000)

Description	2023	2024	2025	2026	2027	2028
Smart Cities	\$1,642	\$505	\$3,090	\$1,114	\$0	\$0
Virtual PAC	\$0	\$0	\$2,152	\$1,114	\$674	\$0
Virtual Protection	\$0	\$0	\$2,538	\$3,008	\$787	\$2,393
Adaptive Protection	\$0	\$0	\$0	\$668	\$2,248	\$3,304
DC Link	\$0	\$0	\$1,655	\$3,899	\$4,495	\$4,557
Service Center of the Future	\$0	\$0	\$1,600	\$1,337	\$3,034	\$1,139
Total	\$1,642	\$505	\$11,035	\$11,141	\$11,238	\$11,393

7 Source: Ex. SCE-02, Vol. 06, p. 150, Table III-23.

8 Figure 06-06 illustrates SCE's requested capital expenditure on a yearly basis for
9 2023-2028.

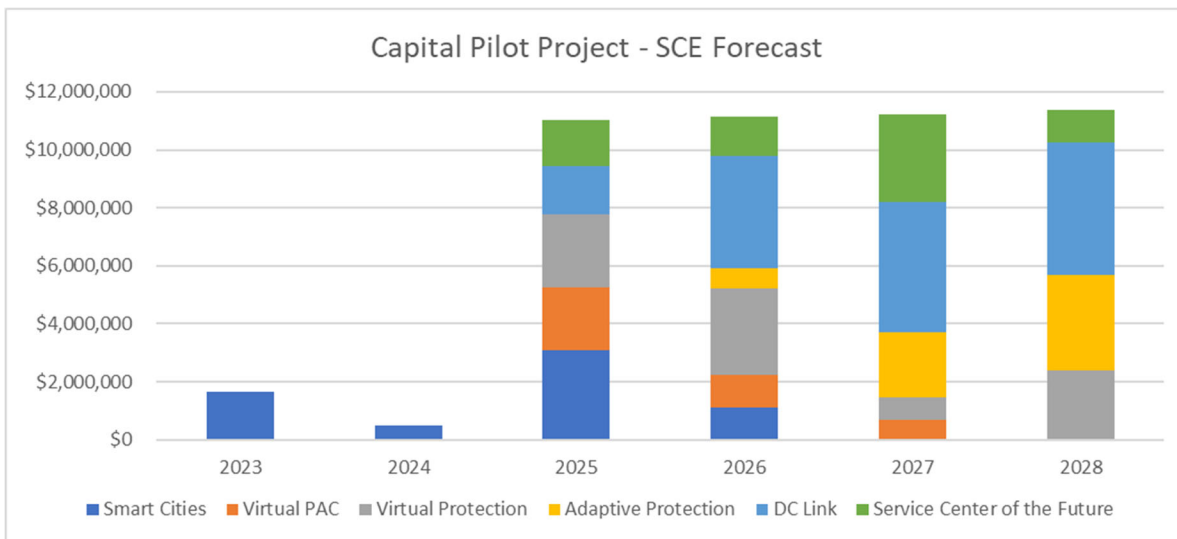
10

11

12

13

Figure 06-06
Capital Pilot Project
2023-2028 Forecast



14

1 **B. Analysis of the Pilot Projects**

2 Cal Advocates reviewed and evaluated SCE’s testimony³⁹ describing the capital
3 expenditures for Capital Pilot Projects. Cal Advocates undertook discovery with respect
4 to this program. Cal Advocates made broad requests for additional details on each
5 project, including the recorded cost for precursor projects,⁴⁰ any projected cost
6 savings,⁴¹ planned operational dates,⁴² any cost-benefit analyses performed,⁴³ cost
7 estimates for any alternative solutions considered,⁴⁴ the technical problems unique to
8 SCE that these projects would address,⁴⁵ steps taken to identify cheaper alternative
9 options to solve those technical problems,⁴⁶ and the purpose of the project.⁴⁷

10 For these new projects, Cal Advocates examined each project using the following
11 criteria:

- 12 1. Did SCE demonstrate that the project would be used and useful before
13 the end of 2028?⁴⁸
- 14 2. Did SCE demonstrate that the benefits of the project would meet or
15 exceed the cost to the ratepayers?
- 16 3. Did SCE demonstrate that the project would address problems that are
17 unique to SCE?⁴⁹

³⁹ Ex. SCE-02, Vol. 06, pp. 150-162.

⁴⁰ Cal Advocates data request PubAdv-SCE-177-STN, Q.7.-Q12.

⁴¹ Cal Advocates data request PubAdv-SCE-177-STN, Q.7.-Q12.

⁴² Cal Advocates data request PubAdv-SCE-297-STN, Q.4.-Q9.

⁴³ Cal Advocates data request PubAdv-SCE-297-STN, Q.4.-Q9.

⁴⁴ Cal Advocates data request PubAdv-SCE-326-STN, Q.1.-Q6.

⁴⁵ Cal Advocates data request PubAdv-SCE-339-STN, Q.4.-Q9.

⁴⁶ Cal Advocates data request PubAdv-SCE-339-STN, Q.4.-Q9.

⁴⁷ Cal Advocates data request PubAdv-SCE-369-STN, Q.5.-Q.10.

⁴⁸ D.21-08-036, p. 209. “Generally speaking, the Commission has determined that plant which is not used and useful should be excluded from rate base.”

⁴⁹ D.21-08-036, p. 119. “Consistent with D.15-11-021, we continue to consider whether the facilities would address problems that are unique to SCE, and that other more cost-effective options do not exist for doing this research.”

1 4. Did SCE demonstrate that other more cost-effective options do not
2 exist for doing this research?⁵⁰

3 **a) Smart City Pilot Project**

4 SCE requests \$6.351 million over the 2023-2026 period for the Smart City Pilot
5 Project.⁵¹ The Smart City Pilot Project partners SCE with the city of Porterville, CA to
6 advance a community microgrid for grid resiliency.⁵² Cal Advocates recommends \$0
7 for SCE's Smart City Pilot Project. Table 06-09 provides SCE's requested capital
8 expenditures on a yearly basis for the Smart City Pilot Project.

9
10
11
12
13

**Table 06-09
Smart City Pilot
SCE Forecast Capital Cost
(\$000)**

Description	2023	2024	2025	2026	2027	2028	Total
T&D Hardware & Software	\$400	\$125	\$600	\$200	\$0	\$0	\$1,325
IT Hardware & Software	\$500	\$125	\$550	\$0	\$0	\$0	\$1,175
T&D Engineering	\$300	\$125	\$1,000	\$200	\$0	\$0	\$1,625
IT Engineering & Architecture	\$300	\$130	\$300	\$200	\$0	\$0	\$930
Construction	\$142	\$0	\$350	\$400	\$0	\$0	\$892
Total	\$1,642	\$505	\$2,800	\$1,000	\$0	\$0	\$5,947

14 Source: Ex. SCE-02, Vol. 06, p. 153, Table III-24.

15 Note that the breakdown of expenditures provided by SCE equals \$5.947 million,
16 \$0.404 million less than the \$6.351 million requested.

17 Figure 06-07 illustrates SCE's requested capital expenditure on a yearly basis for
18 the Smart Cities Pilot Project.

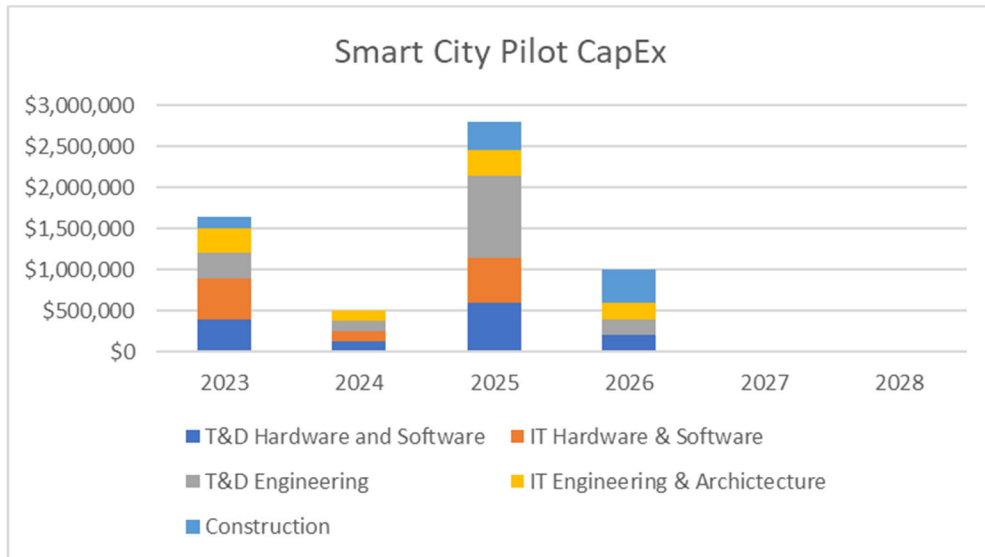
⁵⁰ D.21-08-036, p. 119.

⁵¹ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

⁵² Ex. SCE-02, Vol. 06, p. 151, Lines 22-23.

1
2
3

**Figure 06-07
Smart City Pilot
2023-2028 Forecast**



4

5 SCE has indicated that the Smart City Pilot Project will be used and useful by
 6 2027 but cannot ensure that date. SCE asserts that the Smart City Pilot Project will be
 7 operational by December 31, 2026.⁵³ SCE provides the caveat that the operational
 8 date is dependent on approval of the EPIC project.⁵⁴ Further, SCE is in the process of
 9 negotiating with the city of Porterville, CA to host the Smart City Pilot Project, but has
 10 not finalized the agreement.⁵⁵ SCE anticipates the agreement will be finalized in Q2 of
 11 2024.⁵⁶ While SCE is asserting that the Smart City Pilot Project will be used and useful
 12 within the 2023-2028 period, it provides no assurance to that effect.

13 SCE has failed to demonstrate that the benefits of the project would meet or
 14 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
 15 cost-benefit analysis for this pilot, asserting that such scoping cannot occur until such

⁵³ Cal Advocates data request PubAdv-SCE-297-STN, Q.4a.

⁵⁴ Cal Advocates data request PubAdv-SCE-297-STN, Q.4a.

⁵⁵ Cal Advocates data request PubAdv-SCE-369-STN, Q.5a.

⁵⁶ Cal Advocates data request PubAdv-SCE-369-STN, Q.5.a.

1 time as the EPIC project has been completed.⁵⁷ This indicates that this project is not
2 fully mature. SCE can file an application to recover its expected costs at such a time
3 that the EPIC project is completed.

4 Further, SCE has not applied lessons gleaned from the Microgrid Incentive
5 Program to the Smart City Pilot Project. The Commission has ruled that SCE has
6 access to \$83.340 million to establish microgrids, along with \$8 million in administrative
7 costs, from the Microgrid Incentive Program.⁵⁸ With these microgrids already funded by
8 the ratepayer, SCE has not demonstrated a further advantage to the ratepayer by
9 spending an additional \$5.947 million on another microgrid.

10 SCE has failed to demonstrate that the Smart City Pilot Project would address
11 problems that are unique to SCE. SCE asserts that the Smart City Pilot Project
12 addresses the required infrastructure improvements to integrate microgrids to the SCE
13 grid and enable SCE to establish standards and processes.⁵⁹ As shown by the
14 Redwood Coast Airport Microgrid served by Pacific Gas and Electric Company (PG&E)
15 and the Borrego Springs Microgrid served by San Diego Gas and Electric Company
16 (SDG&E), these concerns are not unique to SCE. Further, SCE will have the same
17 opportunity to address these issues with the Microgrid Incentive Program.

18 SCE has failed to demonstrate that the other cost-effective alternatives do not
19 exist. In fact, SCE admits that it did not consider any alternatives to the Smart City Pilot
20 Project.⁶⁰ Moreover, as previously discussed, the Microgrid Incentive Program already
21 provides SCE the opportunity to solve the issues that the Smart City Pilot Project would
22 address.

⁵⁷ Cal Advocates data request PubAdv-SCE-177-STN, Q.7.c. and PubAdv-SCE-297-STN, Q.4.c.

⁵⁸ D.23-04-034, Decision Adopting Implementation Rules for the Microgrid Incentive Program. p. 86, Ordering Paragraph (OP) 8.

⁵⁹ Cal Advocates data request PubAdv-SCE-339-STN, Q.4.a.

⁶⁰ Cal Advocates data request PubAdv-SCE-326-STN, Q.1.d.

1 Therefore, Cal Advocates recommends a downward adjustment of \$1.642 million
 2 in 2023, \$0.505 million in 2024, \$3.090 million in 2025, and \$1.114 million in 2026 for a
 3 total downward adjustment of \$6.351 million.

4 **b) Virtual PAC Pilot Project**

5 SCE requests \$3.940 million over the 2025-2027 period for the Virtual PAC Pilot
 6 Project.⁶¹ The Virtual PAC Pilot Project installs a virtual IEC 61850 capable PAC onto
 7 the common substation platform that also hosts the substation Human Machine
 8 Interface (HMI).⁶² Cal Advocates recommends \$0 for SCE’s Virtual PAC Pilot Project.
 9 Table 06-10 provides SCE’s requested capital expenditures on a yearly basis for the
 10 Virtual PAC Pilot Project.

11 **Table 06-10**
 12 **Virtual PAC**
 13 **SCE Forecast Capital Cost**
 14 **(\$000)**

Description	2023	2024	2025	2026	2027	2028	Total
T&D Hardware & Software	\$0	\$0	\$441	\$223	\$0	\$0	\$664
IT Hardware & Software	\$0	\$0	\$441	\$0	\$0	\$0	\$441
T&D Engineering	\$0	\$0	\$607	\$223	\$0	\$0	\$830
IT Engineering & Architecture	\$0	\$0	\$662	\$0	\$0	\$0	\$662
Construction	\$0	\$0	\$0	\$668	\$674	\$0	\$1,343
Total	\$0	\$0	\$2,152	\$1,114	\$674	\$0	\$3,940

15 Source: Ex. SCE-02, Vol. 06, p. 155, Table III-25.

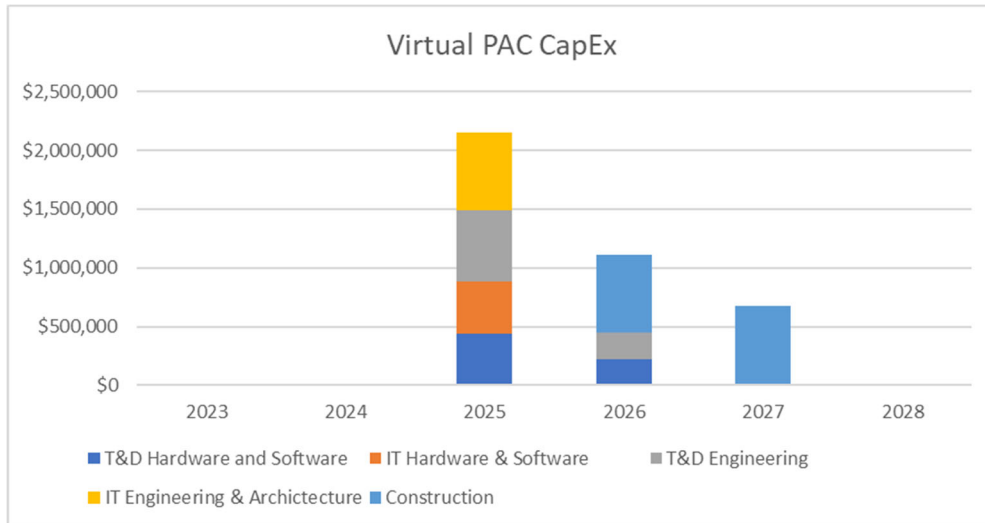
16 Figure 06-08 illustrates SCE’s requested capital expenditure on a yearly basis for
 17 the Virtual PAC Pilot Project.

⁶¹ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

⁶² Ex. SCE-02, Vol. 06, p. 153, Lines 10-12.

1
2
3
4

**Figure 06-08
Virtual PAC Pilot
2023-2028 Forecast**



5
6

7 SCE has indicated that the Virtual PAC Pilot Project will be used and useful by
8 2028 but cannot confirm that date. SCE asserts that the Virtual PAC Pilot Project will
9 be operational by December 31, 2027.⁶³ SCE provides the caveat that the operational
10 date is dependent on completion of the EPIC project.⁶⁴ While SCE asserts that the
11 Virtual PAC Pilot Project will be used and useful within the 2023-2028 period, it does not
12 provide assurance that this will occur.

13 SCE has failed to demonstrate that the benefits of the project would meet or
14 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
15 cost-benefit analysis for this pilot, asserting that such scoping cannot occur until such
16 time as the EPIC project has been completed.⁶⁵ This indicates that this project is not
17 fully mature. SCE can file an application at such time that the EPIC project is
18 completed.

⁶³ Cal Advocates data request PubAdv-SCE-297-STN, Q.5a.

⁶⁴ Cal Advocates data request PubAdv-SCE-297-STN, Q.5a.

⁶⁵ Cal Advocates data request PubAdv-SCE-177-STN, Q.8.c. and PubAdv-SCE-297-STN, Q.5.c.

1 SCE has failed to demonstrate that the Virtual PAC Project would address
2 problems that are unique to SCE. SCE asserts that the Virtual PAC Pilot Project
3 enables SCE to establish standards and processes for integration of the Virtual PAC
4 technology.⁶⁶ The establishing of standards for the integration of the Virtual PAC
5 technology is not a concern unique to SCE. SCE is a customer of the Virtual PAC
6 technology, not a seller in the Virtual PAC business.

7 SCE has failed to demonstrate that other cost-effective alternatives do not exist.
8 In fact, SCE admits that it did not consider any alternatives to the Virtual PAC Pilot
9 Project.⁶⁷

10 Therefore, Cal Advocates recommends a downward adjustment of \$2.152 million
11 in 2025, \$1,114 million in 2026, and \$0.674 million in 2027 for a total downward
12 adjustment of \$3.940 million.

13 c) Virtual Protection Pilot Project

14 SCE requests \$8.725 million over the 2025-2028 period for the Virtual PAC Pilot
15 Project.⁶⁸ The Virtual Protection Pilot Project validates the capabilities of a process bus
16 implementation and virtualization of protection equipment.⁶⁹ Cal Advocates
17 recommends \$0 for SCE's Virtual PAC Pilot Project. Table 06-11 provides SCE's
18 requested capital expenditures on a yearly basis for the Virtual Protection Pilot Project.
19

⁶⁶ Cal Advocates data request PubAdv-SCE-339-STN, Q.5.a.

⁶⁷ Cal Advocates data request PubAdv-SCE-326-STN, Q.2.b.

⁶⁸ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

⁶⁹ Ex. SCE-02, Vol. 06, p. 155, Lines 11-13.

1
2
3
4

**Table 06-11
Virtual Protection
SCE Forecast Capital Cost
(\$000)**

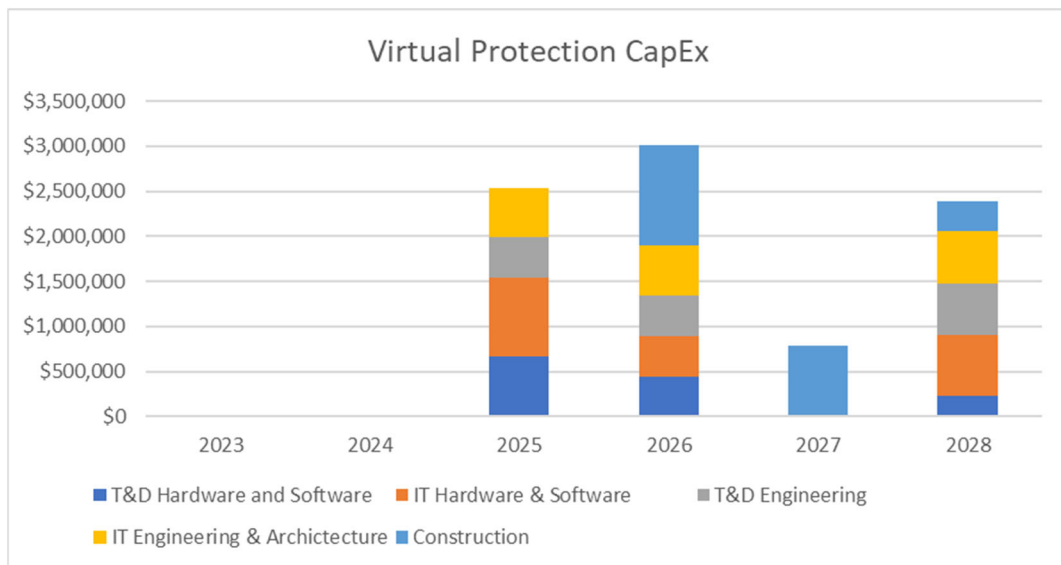
Description	2023	2024	2025	2026	2027	2028	Total
T&D Hardware & Software	\$0	\$0	\$662	\$446	\$0	\$228	\$1,336
IT Hardware & Software	\$0	\$0	\$883	\$446	\$0	\$684	\$2,012
T&D Engineering	\$0	\$0	\$441	\$446	\$0	\$570	\$1,457
IT Engineering & Architecture	\$0	\$0	\$552	\$557	\$0	\$570	\$1,678
Construction	\$0	\$0	\$0	\$1,114	\$787	\$342	\$2,243
Total	\$0	\$0	\$2,538	\$3,008	\$787	\$2,393	\$8,725

5 Source: Ex. SCE-02, Vol. 06, p. 156, Table III-26.

6 Figure 06-09 illustrates SCE’s requested capital expenditure on a yearly basis for
7 the Virtual Protection Pilot Project.

8
9
10
11

**Figure 06-09
Virtual Protection Pilot
2023-2028 Forecast**



12
13

14 SCE has indicated that the Virtual Protection Pilot Project will be used and useful
15 by 2028 but cannot ensure that date. SCE projects an in-service date for the Virtual
16 Protection Pilot Project of December 31, 2028.⁷⁰ SCE provides the caveat that the

⁷⁰ Cal Advocates data request PubAdv-SCE-297-STN, Q.6.a.

1 operational date is dependent on completion of the related EPIC project.⁷¹ Any delay
2 on this project would push its used and useful date outside the 2023-2028 period.

3 SCE has failed to demonstrate that the benefits of the project would meet or
4 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
5 cost-benefit analysis for this pilot, asserting that such scoping cannot occur until such
6 time as the EPIC project has been completed.⁷² This indicates that this project is not
7 fully mature. SCE can file an application at such time that the EPIC project is
8 completed.

9 SCE has failed to demonstrate that the Virtual Protection Project would address
10 problems that are unique to SCE. SCE asserts that the Virtual Protection Pilot Project
11 enables SCE to establish standards and processes for integration of the Virtual
12 Protection technology.⁷³ The establishing of standards for the integration of Virtual
13 Protection technology is not a concern unique to SCE. SCE is a customer of Virtual
14 Protection, not a seller in the Virtual Protection business.

15 SCE has failed to demonstrate that other cost-effective alternatives do not exist.
16 In fact, SCE admits that it did not consider any alternatives to the Virtual Protection
17 Pilot.⁷⁴

18 Therefore, Cal Advocates recommends a downward adjustment of \$2.538 million
19 in 2025, \$3.008 million in 2026, \$0.787 million in 2027, \$2.393 million for a total
20 downward adjustment of \$8.725 million.

21 **d) Adaptive Protection Pilot Project**

22 SCE requests \$6.220 million over the 2026-2028 period for the Adaptive
23 Protection Pilot Project.⁷⁵ The Adaptive Protection Pilot Project would enable SCE to

⁷¹ Cal Advocates data request PubAdv-SCE-297-STN, Q.6.a.

⁷² Cal Advocates data request PubAdv-SCE-177-STN, Q.9.c. and PubAdv-SCE-297-STN, Q.6.c.

⁷³ Cal Advocates data request PubAdv-SCE-339-STN, Q.6.a.

⁷⁴ Cal Advocates data request PubAdv-SCE-326-STN, Q.3.b.

⁷⁵ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

1 validate the scalability of adaptive protection technology and evaluate the interaction of
 2 this technology with the back-office applications that manage the operation of the grid.⁷⁶
 3 Cal Advocates recommends \$0 for SCE’s Adaptive Protection Pilot Project. Table 06-
 4 12 provides SCE’s requested capital expenditures on a yearly basis for the Adaptive
 5 Protection Pilot Project.

6
7
8
9

**Table 06-12
 Adaptive Protection
 SCE Forecast Capital Cost
 (\$000)**

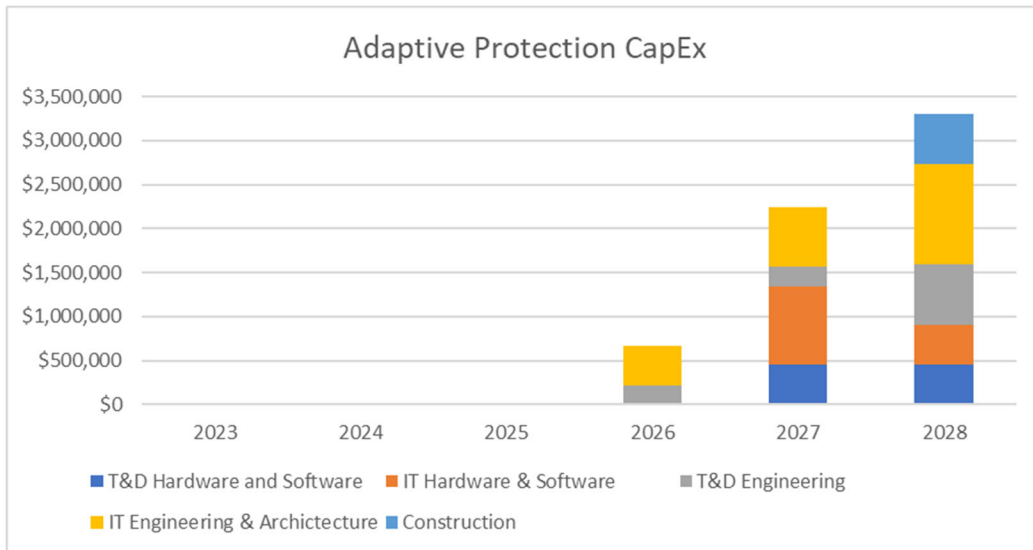
Description	2023	2024	2025	2026	2027	2028	Total
T&D Hardware & Software	\$0	\$0	\$0	\$0	\$450	\$456	\$905
IT Hardware & Software	\$0	\$0	\$0	\$0	\$899	\$456	\$1,355
T&D Engineering	\$0	\$0	\$0	\$223	\$225	\$684	\$1,131
IT Engineering & Architecture	\$0	\$0	\$0	\$446	\$674	\$1,139	\$2,259
Construction	\$0	\$0	\$0	\$0	\$0	\$570	\$570
Total	\$0	\$0	\$0	\$668	\$2,248	\$3,304	\$6,220

10 Source: Ex. SCE-02, Vol. 06, p. 158, Table III-27.

11 Figure 06-10 illustrates SCE’s requested capital expenditure on a yearly basis for
 12 the Adaptive Protection Pilot Project.

13
14
15

**Figure 06-10
 Adaptive Protection Pilot
 2023-2028 Forecast**



16

⁷⁶ Ex. SCE-02, Vol. 06, p. 157, Lines 19-21.

1 SCE has indicated that the Adaptive Protection Pilot Project will not be used and
2 useful by 2028. SCE projects an in-service date for the Adaptive Protection Pilot
3 Project of December 31, 2029.⁷⁷ SCE provides the caveat that the operational date is
4 dependent on completion of the related EPIC project.⁷⁸

5 SCE has failed to demonstrate that the benefits of the project would meet or
6 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
7 cost-benefit analysis for this pilot, asserting that such scoping cannot occur until such
8 time as the EPIC project has been completed.⁷⁹ This indicates that this project is not
9 fully mature. SCE can file an application at such time that the EPIC project is
10 completed.

11 SCE has failed to demonstrate that the Adaptive Protection Pilot Project would
12 address problems that are unique to SCE. SCE asserts that the Adaptive Protection
13 Pilot Project enables SCE to establish standards, training, and operational guidance for
14 integration of the Adaptive Protection technology.⁸⁰ The establishing of standards for
15 the integration of Virtual Protection technology is not a concern unique to SCE. SCE is
16 a customer of machine learning applications, not a seller in this market.

17 SCE has failed to demonstrate that other cost-effective alternatives do not exist.
18 In fact, SCE admits that it did not consider any alternatives to the Adaptive Protection
19 Pilot Project.⁸¹

20 Therefore, Cal Advocates recommends a downward adjustment of \$0.668 million
21 in 2026, \$2.248 million in 2027, \$3.304 million for a total downward adjustment of
22 \$6.220 million.

⁷⁷ Cal Advocates data request PubAdv-SCE-297-STN, Q.7.a.

⁷⁸ Cal Advocates data request PubAdv-SCE-297-STN, Q.7.a.

⁷⁹ Cal Advocates data request PubAdv-SCE-177-STN, Q.10.c. and PubAdv-SCE-297-STN, Q.7.c.

⁸⁰ Cal Advocates data request PubAdv-SCE-339-STN, Q.7.a.

⁸¹ Cal Advocates data request PubAdv-SCE-326-STN, Q.4.b.

1 **e) DC Link Pilot Project**

2 SCE requests \$14.607 million over the 2025-2028 period for the DC Link Pilot
 3 Project.⁸² The DC Link Pilot Project implements one or more battery energy storage
 4 systems capable of connecting two adjacent circuits.⁸³ Cal Advocates recommends \$0
 5 for SCE’s DC Link Pilot Project. Table 06-13 provides SCE’s requested capital
 6 expenditures on a yearly basis for the DC Link Pilot Project.

7
 8
 9
 10
 11

Table 06-13
DC Link
SCE Forecast Capital Cost
(\$000)

Description	2023	2024	2025	2026	2027	2028	Total
T&D Hardware & Software	\$0	\$0	\$0	\$2,785	\$2,810	\$570	\$6,164
IT Hardware & Software	\$0	\$0	\$0	\$0	\$562	\$0	\$562
T&D Engineering	\$0	\$0	\$1,104	\$557	\$0	\$0	\$1,661
IT Engineering & Architecture	\$0	\$0	\$552	\$557	\$0	\$0	\$1,109
Construction	\$0	\$0	\$0	\$0	\$1,124	\$3,988	\$5,111
Total	\$0	\$0	\$1,655	\$3,899	\$4,495	\$4,557	\$14,607

12 Source: Ex. SCE-02, Vol. 06, p. 160, Table III-28.

13 Figure 06-11 illustrates SCE’s requested capital expenditure on a yearly basis for
 14 the DC Link Pilot Project.

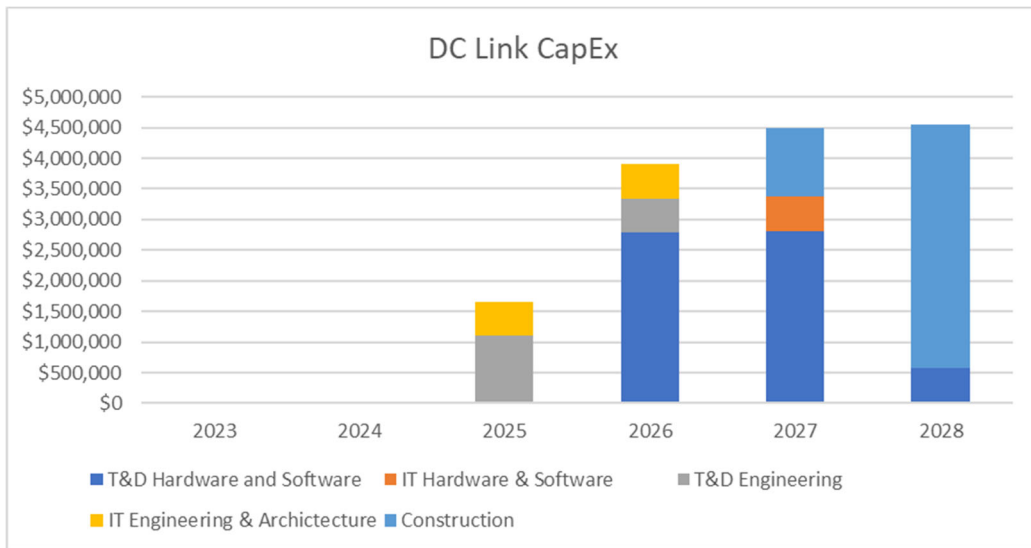
15

⁸² Ex. SCE-02, Vol. 06, p. 150, Table III-23.

⁸³ Ex. SCE-02, Vol. 06, p. 159, Lines 3-4.

1
2
3

**Figure 06-11
DC Link Pilot
2023-2028 Forecast**



4
5

6 SCE has indicated that the DC Link Pilot Project will be used and useful by the
7 end of 2028 but cannot ensure that date. SCE projects an in-service date for the DC
8 Link Pilot Project of December 31, 2028.⁸⁴ SCE provides the caveat that the
9 operational date is dependent on completion of the related EPIC project.⁸⁵ Any delay in
10 this project would push its used and useful date outside the 2023-2028 period.

11 SCE has failed to demonstrate that the benefits of the project would meet or
12 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
13 cost-benefit analysis for this pilot, asserting that such scoping cannot occur until such
14 time as the EPIC project has been completed.⁸⁶ This indicates that this project is not
15 fully mature. SCE can file an application at such time that the EPIC project is
16 completed.

⁸⁴ Cal Advocates data request PubAdv-SCE-297-STN, Q.8.a.

⁸⁵ Cal Advocates data request PubAdv-SCE-297-STN, Q.8.a.

⁸⁶ Cal Advocates data request PubAdv-SCE-177-STN, Q.11.c. and PubAdv-SCE-297-STN, Q.8.c.

1 SCE has failed to demonstrate that the DC Link Pilot Project would address
2 problems that are unique to SCE. SCE asserts that the DC Link Pilot Project enables
3 SCE to establish standards, maintenance, and operating practices of the DC Link
4 technology.⁸⁷ The establishing of standards for the integration of DC Link technology is
5 not a concern unique to SCE. SCE is a battery customer, not a seller in the battery
6 market.

7 SCE has failed to demonstrate that the other cost-effective alternatives do not
8 exist. In fact, SCE admits that it did not consider any alternatives to the DC Link Pilot
9 Project.⁸⁸

10 Therefore, Cal Advocates recommends a downward adjustment of \$1.655 million
11 in 2025, \$3.899 million in 2026, \$4.495 million in 2027, \$4.557 million for a total
12 downward adjustment of \$14.607 million.

13 **f) Service Center of the Future Pilot Project**

14 SCE requests \$7.111 million over the 2025-2028 period for the Service Center of
15 the Future Pilot Project.⁸⁹ The Service Center of the Future Pilot Project will enable
16 SCE to develop a new standard for providing service to large transportation load
17 centers.⁹⁰ Cal Advocates recommends \$0 for SCE's Service Center of the Future Pilot
18 Project. Table 06-14 provides SCE's requested capital expenditures on a yearly basis
19 for the Service Center of the Future Pilot Project.

20

⁸⁷ Cal Advocates data request PubAdv-SCE-339-STN, Q.8.a.

⁸⁸ Cal Advocates data request PubAdv-SCE-326-STN, Q.5.b.

⁸⁹ Ex. SCE-02, Vol. 06, p. 150, Table III-23.

⁹⁰ Ex. SCE-02, Vol. 06, p. 160, Lines 9-11.

1
2
3
4

Table 06-14
Service Center of the Future
SCE Forecast Capital Cost
(\$000)

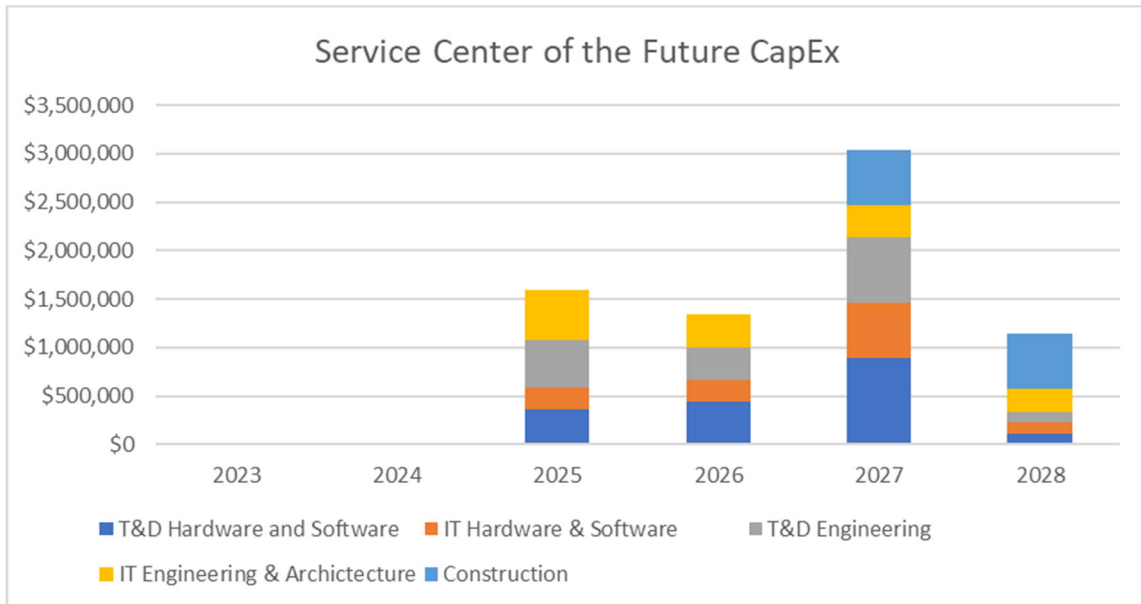
Description	2023	2024	2025	2026	2027	2028	Total
T&D Hardware & Software	\$0	\$0	\$364	\$446	\$899	\$114	\$1,823
IT Hardware & Software	\$0	\$0	\$221	\$223	\$562	\$114	\$1,119
T&D Engineering	\$0	\$0	\$497	\$334	\$674	\$114	\$1,619
IT Engineering & Architecture	\$0	\$0	\$519	\$334	\$337	\$228	\$1,418
Construction	\$0	\$0	\$0	\$0	\$562	\$570	\$1,132
Total	\$0	\$0	\$1,600	\$1,337	\$3,034	\$1,139	\$7,111

5 Source: Exh. SCE-02, Vol. 06, p. 161, Table III-29.

6 Figure 06-12 illustrates SCE’s requested capital expenditure on a yearly basis for
7 the Service Center of the Future Pilot Project.

8
9
10
11

Figure 06-12
Service Center of the Future Pilot
2023-2028 Forecast



12
13

1 SCE has indicated that the Service Center of the Future Pilot Project will be used
2 and useful by the end of 2028 but cannot ensure that date. SCE projects an in-service
3 date for the Service Center of the Future Pilot Project of December 31, 2028.⁹¹ SCE
4 provides the caveat that the operational date is dependent on completion of the related
5 EPIC project.⁹² Any delay to this project would push its used and useful date outside
6 the 2023-2028 period. One possible cause of delay could be the recent site change
7 from the El Monte Transit Center to the SCE Service Center in Domingos Hills, although
8 SCE asserts that this change will result in no delay or change in cost estimate.⁹³

9 SCE has failed to demonstrate that the benefits of the project would meet or
10 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
11 cost-benefit analysis for this pilot, asserting that such scoping cannot occur until such
12 time as the EPIC project has been completed.⁹⁴ Further, SCE may have difficulty
13 scoping the exact cost, as the site of the project is in flux.⁹⁵ This indicates that this
14 project is not fully mature. SCE can file an application at such time that the EPIC
15 project is completed.

16 SCE has failed to demonstrate that the Service Center of the Future Pilot Project
17 would address problems that are unique to SCE. SCE asserts that the Service Center
18 of the Future Pilot Project enables SCE to establish standards to support these
19 installations, while addressing roles and responsibilities.⁹⁶ The establishing of
20 standards for the support of service fleet centers is not a concern unique to SCE. SCE
21 should not use ratepayer dollars for research and development in an ancillary market.

⁹¹ Cal Advocates data request PubAdv-SCE-297-STN, Q.9.a.

⁹² Cal Advocates data request PubAdv-SCE-297-STN, Q.9.a.

⁹³ Cal Advocates data request PubAdv-SCE-369-STN, Q.10.a.

⁹⁴ Cal Advocates data request PubAdv-SCE-177-STN, Q.12.c. and PubAdv-SCE-297-STN, Q.9.c.

⁹⁵ Cal Advocates data request PubAdv-SCE-369-STN, Q.10.a.

⁹⁶ Cal Advocates data request PubAdv-SCE-339-STN, Q.6.a.

1 SCE has failed to demonstrate that the other cost-effective alternatives do not
2 exist. In fact, SCE admits that it did not consider any alternatives to the Service Center
3 of the Future Pilot Project.⁹⁷

4 Therefore, Cal Advocates recommends a downward adjustment of \$1.600 million
5 in 2025, \$1.337 million in 2026, \$3.034 million in 2027, \$1.139 million for a total
6 adjustment of \$7.111 million.

7 **VI. DISCUSSION / ANALYSIS OF GRID SCALE ENERGY STORAGE** 8 **PROJECTS**

9 **A. Overview of SCE's Request**

10 SCE proposes \$121.202 million in capital expenditures over the 2023-2028
11 period for the expansion of SCE's Grid Scale Storage Projects. These expenditures
12 include \$41.985 million for capital upgrades of four operational systems and project
13 close out of six additional systems to be deployed in SCE's Distribution Energy Storage
14 Integration (DESI) Projects through 2025, and \$79.217 million to launch SCE's Long
15 Duration Energy Storage (LDES) Project beginning in 2025.⁹⁸

16 Cal Advocates recommends \$38.647 million in capital expenditures over the
17 2023-2028 period for SCE's Grid Scale Storage Projects, in comparison to SCE's
18 request for \$121.202 million over the same period. Specifically, Cal Advocates
19 recommends a downward adjustment of \$1.172 million for 2023, \$2.166 million for
20 2024, \$9.196 million for 2025, \$12.605 million for 2026, \$19.088 million for 2027, and
21 \$38.328 million for 2028 for a total downward adjustment of \$82.555 million.

22 Tables 06-15a and 06-15b compare SCE's 2023-2028 request, Cal Advocates'
23 recommendation, and the difference between the two for Grid Technology Assessment
24 Program capital expenditures.
25

⁹⁷ Cal Advocates data request PubAdv-SCE-326-STN, Q.3.b.

⁹⁸ Ex. SCE-02, Vol. 6, p. 186, Figure IV-46.

1
2
3
4

Table 06-15a
Grid Scale Storage Projects
Capital Expenditures for 2023-2025
(\$000)

Description	SCE Proposed ⁹⁹			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2023	2024	2025	2023	2024	2025	2023	2024	2025
DESI	\$15,989	\$20,185	\$5,811	\$14,817	\$18,019	\$5,811	\$1,172	\$2,166	\$0
LDES	\$0	\$0	\$9,196	\$0	\$0	\$0	\$0	\$0	\$9,916

5
6
7
8
9

Table 06-15b
Grid Scale Storage Projects
Capital Expenditures for 2026-2028
(\$000)

Description	SCE Proposed ¹⁰⁰			Cal Advocates Recommended			Difference (SCE Proposed - Cal Advocates Recommended)		
	2026	2027	2028	2026	2027	2028	2026	2027	2028
DESI	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
LDES	\$12,605	\$19,088	\$38,328	\$0	\$0	\$0	\$12,605	\$19,088	\$38,328

10
11
12
13
14
15
16
17
18
19

The Commission approved SCE’s request for three DESI pilots in its 2015 GRC Decision.¹⁰¹ In its 2108 GRC Decision, the Commission approved funding to expand the DESI Pilot Program to 13 DESI pilots, including two of the pilots approved in the 2015 GRC Decision. In its 2021 GRC Decision, the Commission approved SCE’s request for \$31.903 million in capital expenditures over the 2019-2021 period to continue deployment of the DESI Project, with the DESI Pilot Projects to be operational by 2021. No party contested SCE’s 2021 requests for funding to complete the deployment.¹⁰² In 2021, SCE recorded capital expenditures that were \$5.945 million less than authorized.¹⁰³

⁹⁹ Ex. SCE-02, Vol. 6, p. 186, Figure IV-46.

¹⁰⁰ Ex. SCE-02, Vol. 6, p. 186, Figure IV-46.

¹⁰¹ Ex. SCE-02, Vol. 6, p. 166, Lines 5-9.

¹⁰² D.21-08-036, p. 122.

¹⁰³ Ex. SCE-02, Vol. 6, p. 143, Lines 2-20.

1 In the current GRC Application, SCE requested funding for the DESI Pilot
 2 Program to complete system repairs for the four operational pilot projects (DESI 1, DESI
 3 2, Mercury 4, and Gemini 2) and complete six others (Mercury 1, Mercury 2, Gemini 1,
 4 Gemini 3, Apollo 1, and Apollo 2).¹⁰⁴ These forecasts are based on Request for
 5 Proposal (RFP) quotes, recent project costs, and accounting/engineering estimates.¹⁰⁵

6 SCE’s requested \$78.158 million in funding to initiate a LDES Project to facilitate
 7 adoption of novel non-lithium-ion energy storage technologies.¹⁰⁶ These forecasts are
 8 based on industry studies, vendor conversations, and accounting/ engineering
 9 estimates from subject matter experts.¹⁰⁷ Additionally, SCE applied to the United
 10 States Department of Energy (DOE) for \$70 million in Infrastructure Investment and
 11 Jobs Act (IIJA) funding to be matched by SCE in a IIJA Memorandum Account.¹⁰⁸ SCE
 12 was notified on September 22, 2023 that SCE was not a successful candidate for the
 13 grant.¹⁰⁹

14 Table 06-16 provides SCE’s capital expenditure forecast for the Grid Scale
 15 Energy Storage Program.

16 **Table 6-16**
 17 **Grid Scale Energy Storage**
 18 **SCE Forecast Capital Cost**
 19 **(\$000)**

Description	2023	2024	2025	2026	2027	2028
DESI	\$15,989	\$20,185	\$5,811	\$0	\$0	\$0
LDES	\$0	\$0	\$9,196	\$12,605	\$19,088	\$38,328
Total	\$15,989	\$20,185	\$15,007	\$12,605	\$19,088	\$38,328

20 Source: Ex. SCE-02, Vol. 06, p. 186, Figure IV-46.

¹⁰⁴ Ex. SCE-02, Vol. 06, p. 187, Lines 7-11.

¹⁰⁵ Ex. SCE-02, Vol. 06, p. 197, Lines 28-29.

¹⁰⁶ Ex. SCE-02, Vol. 06, p. 172, Lines 8-26.

¹⁰⁷ Ex. SCE-02, Vol. 06, p. 204, Lines 22-24.

¹⁰⁸ Ex. SCE-02, Vol. 06, p. 172, Lines 17-23.

¹⁰⁹ Cal Advocates data request PubAdv-SCE-177-STN, Q.14a.

1 Table 06-17 provides SCE’s recorded capital expenditures for the Grid Scale
 2 Energy Storage Program.

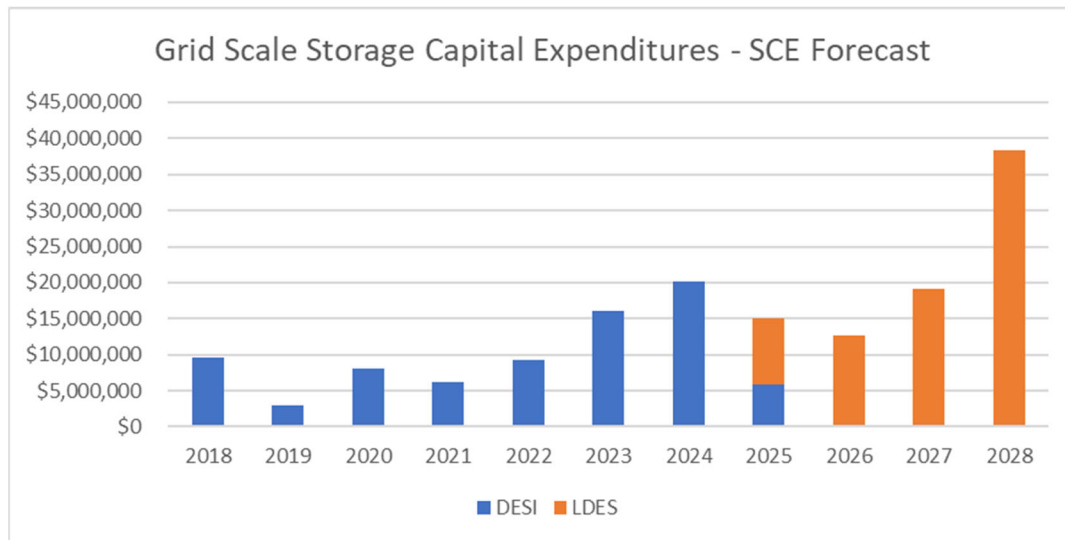
3 **Table 6-17**
 4 **Grid Scale Energy Storage**
 5 **2017-2022 Recorded Capital Expenditures**
 6 **(\$000)**

Description	2018	2019	2020	2021	2022
DESI	\$9,687	\$2,959	\$8,068	\$6,218	\$9,304
LDES	\$0	\$0	\$0	\$0	\$0
Total	\$9,687	\$2,959	\$8,068	\$6,218	\$9,304

7 Source: Ex. SCE-02, Vol. 06, p. 186, Figure IV-46.

8 Figure 06-13 illustrates SCE’s forecasted capital expenditures for 2023-2028 in
 9 comparison to the recorded costs for 2018-2022.

10 **Figure 06-13**
 11 **Grid Scale Energy Storage Program**
 12 **2018-2022 Recorded and 2023-2028 Forecast**
 13



14 **B. Analysis of Grid Scale Energy Storage Programs**

15 Cal Advocates reviewed and evaluated SCE’s testimony¹¹⁰ describing the
 16 capital expenditures for the Grid Scale Energy Storage Program. Cal Advocates
 17 undertook discovery with respect to this program. Cal Advocates made broad requests
 18

¹¹⁰ Ex. SCE-02, Vol.6, pp. 186-204.

1 for additional details on this program, including planned operational dates,¹¹¹ any cost-
2 benefit analyses performed,¹¹² cost estimates for any alternative solutions
3 considered,¹¹³ the technical problems unique to SCE that these projects would
4 address,¹¹⁴ and steps taken to identify cheaper alternative options to solve those
5 technical problems.¹¹⁵

6 Cal Advocates examined each program using the following criteria:

- 7 1. Did SCE demonstrate that the project would be used and useful before
8 the end of 2028?¹¹⁶
- 9 2. Did SCE demonstrate that the benefits of the project would exceed the
10 cost to the ratepayers?
- 11 3. Did SCE demonstrate that the project would address problems that are
12 unique to SCE?¹¹⁷
- 13 4. Did SCE demonstrate that other more cost-effective options do not
14 exist for doing this research?¹¹⁸

15 **a) DESI Pilot Program**

16 SCE requests \$41.985 million over the 2023-2025 period for the DESI Pilot
17 Program. Cal Advocates recommends \$38.647 million for SCE's DESI Pilot Program.
18 Table 06-18 provides SCE's capital expenditures forecast for the DESI Pilot Program.
19

¹¹¹ Cal Advocates data request PubAdv-SCE-297-STN, Q10.-Q11.

¹¹² Cal Advocates data request PubAdv-SCE-297-STN, Q.11.

¹¹³ Cal Advocates data request PubAdv-SCE-326-STN, Q.1.-Q6.

¹¹⁴ Cal Advocates data request PubAdv-SCE-339-STN, Q.10.

¹¹⁵ Cal Advocates data request PubAdv-SCE-339-STN, Q.10.

¹¹⁶ D.21-08-036, p. 209.

¹¹⁷ D.21-08-036, p. 119.

¹¹⁸ D.21-08-036, p. 119.

1
2
3
4

Table 06-18
DESI Pilot Program
SCE Forecast Capital Cost
(\$000)

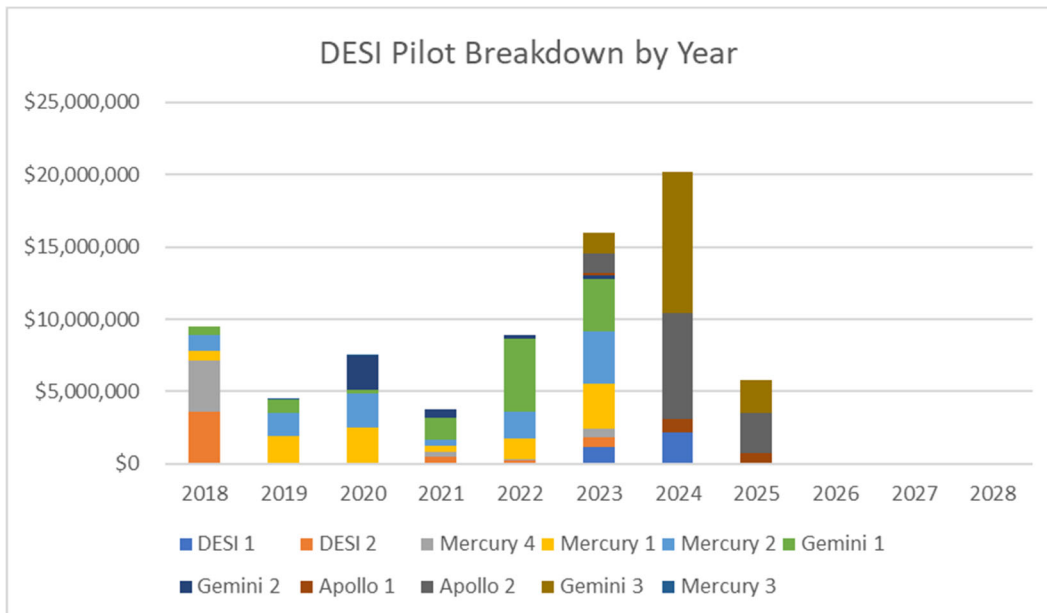
Description	2023	2024	2025	2026	2027	2028	Total
DESI 1	\$1,172	\$2,166	\$0	\$0	\$0	\$0	\$3,338
DESI 2	\$638	\$0	\$0	\$0	\$0	\$0	\$638
Mercury 4	\$608	\$0	\$0	\$0	\$0	\$0	\$608
Mercury 1	\$3,130	\$0	\$0	\$0	\$0	\$0	\$3,130
Mercury 2	\$3,578	\$0	\$0	\$0	\$0	\$0	\$3,578
Gemini 1	\$3,661	\$0	\$0	\$0	\$0	\$0	\$3,661
Gemini 2	\$248	\$0	\$0	\$0	\$0	\$0	\$248
Apollo 1	\$159	\$908	\$765	\$0	\$0	\$0	\$1,832
Apollo 2	\$1,385	\$7,311	\$2,787	\$0	\$0	\$0	\$11,483
Apollo 3	\$1,409	\$9,800	\$2,258	\$0	\$0	\$0	\$13,467
Total	\$15,989	\$20,185	\$5,811	\$0	\$0	\$0	\$41,983

5 Source: Ex. SCE-02, Vol. 06, p. 187, Table IV-34.

6 Figure 06-14 illustrates SCE's recorded costs and forecasted capital
7 expenditures for the DESI Pilot Program.

8
9
10

Figure 06-14
DESI Pilot Program
2018-2022 Recorded Cost and 2023-2028 Forecast



11
12

1 In general, Cal Advocates does not oppose the DESI Pilot Program, which has
 2 previously been approved by the Commission. However, on January 23, 2024, SCE
 3 informed Cal Advocates that SCE now plans to decommission DESI 1 rather than
 4 undertake upgrades.¹¹⁹ To reflect the fact that the originally planned upgrades to DESI
 5 1 have been removed from the schedule, Cal Advocates recommends a downward
 6 adjustment of \$1.172 million in 2023 and \$2.166 million in 2024 for a total downward
 7 adjustment of \$3.338 million.

8 **b) LDES**

9 SCE requests \$79.217 million over the 2025-2028 period for the LDES Pilot
 10 Program. Cal Advocates recommends a downward adjustment of \$9.196 million for
 11 2025, \$12.254 million for 2026, \$18.730 million for 2027, \$37.977 million for 2028 for a
 12 total downward adjustment of \$79.217 million. Table 06-19 provides SCE’s capital
 13 expenditures forecast for the LDES Pilot Program.

14
 15 **Table 06-19**
 16 **LDES Pilot Program**
 17 **SCE Forecast Capital Cost**
 18 **(\$000)**

Description	2023	2024	2025	2026	2027	2028
CapEx	\$0	\$0	\$9,196	\$12,254	\$18,730	\$37,977

19 Source: Ex. SCE-02, Vol. 06, p. 203, Table IV-35.

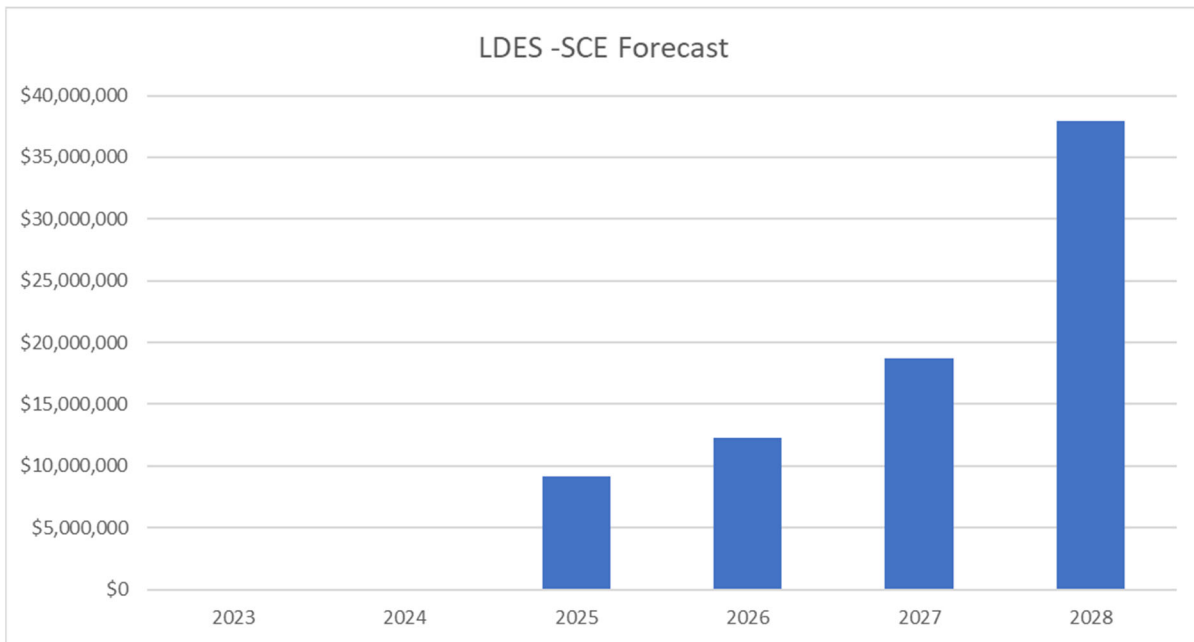
20 Figure 06-15 illustrates SCE’s forecasted capital expenditures for the LDES Pilot
 21 Program.

22

¹¹⁹ Cal Advocates data request PubAdv-SCE-369-STN, Q.11a.

1
2
3

**Figure 06-15
LDES Pilot Program
2023-2028 Forecast**



4
5

6 SCE has indicated that the LDES Pilot will be used and useful by the end of
7 2028. In light of the DOE’s denial for funding, SCE projects deployment of a scaled
8 down LDES pilot over the 2025-2026 period, with additional pilots to follow over the
9 2027-2028 period.¹²⁰

10 SCE has failed to demonstrate that the benefits of the project would meet or
11 exceed the cost to the ratepayers. SCE has not conducted any cost savings analysis or
12 cost-benefit analysis for this pilot, asserting that the benefits of the emerging technology
13 could not be quantified.¹²¹ This indicates that this technology is not fully mature. SCE
14 can file an application at such time that the technology ripens. Further, SCE has failed
15 to demonstrate the benefit to ratepayers of SCE performing research and development
16 into this technology instead of a company that specializes in energy storage technology.
17 SCE is an energy storage customer, not a vendor of storage technology. SCE should
18 not be using ratepayer dollars for research and development in an ancillary market.

¹²⁰ Cal Advocates data request PubAdv-SCE-297-STN, Q.11.a.

¹²¹ Cal Advocates data request PubAdv-SCE-297-STN, Q.11.d.

1 SCE has failed to demonstrate that the LDES Pilot Project would address
2 problems that are unique to SCE. SCE asserts that LDES technology is specific to the
3 needs of the SCE service area, particularly due to the heat waves driving the need for
4 extended storage.¹²² Heat waves, and any accompanying wildfires, are not unique to
5 SCE.

6 SCE has failed to demonstrate that other cost-effective alternatives do not exist.
7 SCE references existing Li-ion storage technologies without demonstrating why these
8 existing and mature technologies are insufficient.¹²³

9

¹²² Cal Advocates data request PubAdv-SCE-369-STN, Q.12.a.

¹²³ Cal Advocates data request PubAdv-SCE-339-STN, Q.10.b.

1 **VII. WITNESS QUALIFICATIONS – S. NEAL**

2 My name is Stephen Neal. My business address is 505 Van Ness Avenue, San
3 Francisco, California. I am employed by the Public Advocates Office (Cal Advocates)
4 as a Public Utilities Regulatory Analyst II in the Distribution Planning & Policy Branch.

5 I received a Master of Public Affairs degree from the Goldman School of Public
6 Policy at the University of California, Berkeley. My capstone project examined methods
7 of improving the safety culture at California's public utilities for the Office of Energy
8 Infrastructure Safety. I hold a Bachelor of Science Degree in Electrical Engineering with
9 a minor in Mathematics from Iowa State University. Additionally, I hold a Juris Doctorate
10 from the University of Iowa. I was a patent attorney focused on the telecommunications
11 and computer sectors for twenty years. I am a member in good standing with the
12 California State Bar and the United States Patent Bar, with admission to federal courts
13 in the Northern, Central, and Eastern Districts of California.

14 I have been employed by Cal Advocates since October of 2022. As the lead
15 microgrids analyst for Cal Advocates, I have submitted written comments on behalf of
16 Cal Advocates, protested advice letters, and participated in workshops in the *Order*
17 *Instituting Rulemaking Regarding Microgrids Pursuant to Senate Bill 1339 and*
18 *Resiliency Strategies* (R.19-09-009). I have represented Cal Advocates as an analyst in
19 settlement negotiations with Liberty Utilities (CalPeco Electric) LLC related to
20 *Application of Liberty Utilities (CalPeco Electric) LLC (U 933 E) for Commission*
21 *Approval of the Customer Resiliency Program* (A.22-02-008). I have participated in
22 workshops for the *Order Instituting Rulemaking to Modernize the Electric Grid for High*
23 *Distributed Energy Resources Future* (R.21-06-017). I have protested advice letters in
24 the *Application for Approval of Pacific Gas and Electric Company's (U39-E) Electric*
25 *Vehicle Charging Pilots for Schools and Parks Pursuant to Assembly Bills 1082 and*
26 *1083* (A.18-07-020 et al).

27 This completes my prepared testimony.