PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Agenda ID# 22491
ENERGY DIVISION **RESOLUTION E-5260**
May 9, 2024

R E S O L U T I O N

Resolution E-5260. Approving Pacific Gas and Electric Company's, San Diego Gas & Electric Company's, and Southern California Edison Company's Advice Letters providing Operational Flexibility Pilot proposals.

PROPOSED OUTCOME:

- This Resolution approves Pacific Gas and Electric Company's (PG&E), Southern California Edison Company's (SCE), and San Diego Gas & Electric Company's (SDG&E) Advice Letters (ALs) filed in compliance with Decision 21-06-002 proposing pilots to test whether a distributed energy resource (DER) operational alternative would be sufficient mitigation for Operational Flexibility (OpFlex) constraints.
- This Resolution orders PG&E, SDG&E and SCE to report findings and recommendations from their individual pilots and to convene a workshop to discuss the metrics of success, analyses, conclusions, and recommendations with stakeholders.

SAFETY CONSIDERATIONS:

- The proposed operational alternative could mitigate certain constraints and risks potentially leading to an increase in the use of DERs without compromising safety. This would address the problem of OpFlex constraints limiting the capacity of DER interconnections and under-utilization of existing hosting capacity.

ESTIMATED COST:

- There are no estimated costs.

By: PG&E Advice Letter (AL) 6612-E, SCE AL 4806-E, and SDG&E AL 4017-E filed on June 1, 2022; PG&E AL 6612-E-A, SCE AL 4806-E-A, and SDGE AL 4017-E-A filed on February 17, 2023; PG&E AL 6612-E-B filed on March 30, 2023; SCE AL 4806-E-B, and SDG&E AL 4017-E-B filed on January 26, 2024; and PG&E AL 6612-E-C filed on January 26, 2024.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

SUMMARY

Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E), collectively the Utilities, submitted Tier 3 ALs PG&E 6612-E, 6612-E-A, 6612-E-B, and 6612-E-C; SCE 4806-E, 4806-E-A, and 4806-E-B; and SDG&E 4017-E, 4017-E-A, and 4017-E-B, proposing Operational Flexibility Pilots (Pilots) pursuant to Decision 21-06-002 Ordering Paragraph (OP) 18.

OP 18 orders the Utilities to pilot Proposal F-1 from Rule 21 Working Group Four,[1] in an effort to determine whether a DER operational alternative would be sufficient mitigation for OpFlex constraints. The Pilot results are intended to determine whether OpFlex from DER operational alternatives should be implemented at scale, which would require further development of operational processes and engineering tools.[2]

This resolution approves these Advice Letters and directs the Utilities to undertake the Pilots individually, to report on Pilot findings and recommendations, and to convene a joint workshop to discuss the findings and recommendations with stakeholders. Protests that the Utilities should undertake Pilots collectively were later withdrawn.

Pilot reports with analysis, conclusions, and recommendations about the projects shall include but not be limited to what operational alternatives are a sufficient mitigant to OpFlex constraints, challenges and barriers, interconnection rules and feasible timelines, availability and/or capability of equipment to implement OpFlex solutions, scalability, economic viability, and analysis against metrics of success. Reports shall also

[1] D.21-06-002, at 67-68, describes Proposal F-1 from Rule 21 Working Group Four as: "Proposal F-1, a consensus proposal, would require the distribution provider to determine whether a distributed energy resources operational alternative would be a sufficient mitigation for operations flexibility constraints, if the output of a generating facility being interconnected is larger than the Interconnection Capacity Analysis values for that location with operational flexibility constraints taken into account but smaller than the Interconnection Capacity Analysis values without operational constraints taken into account."

[2] See, for example, PG&E AL 6612-E, at 6, "Operational processes and engineering tools will need to be developed to implement OpFlex at scale. These processes will need to instruct Operators and Engineers how to build OpFlex into their switching plans... Additionally, mitigation processes will need to be developed in the scenario where generation facilities do not respond, or inadequately respond, to controls from the utility."

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

recommend whether and how to scale the use of DER operational alternatives as a mitigation for operational flexibility constraints.

BACKGROUND

On June 4, 2021 the Commission issued Decision 21-06-002 (Decision) addressing the remaining issues from Phase 1 of proceeding R.17-07-007, to consider refinements to the interconnection of DERs under Electric Rule 21 as proposed by Rule 21 Working Group Four.[3]

Issue F of Rule 21 Working Group Four was:

> What interconnection rules should the Commission adopt to account for the ability of Distributed Energy Resource Management Systems (DERMS) and aggregator commands to address operational flexibility needs?[4]

Proposal F-1 by the Rule 21 Working Group Four proposed to "determine whether a DER operational alternative would be a sufficient mitigation for operational flexibility constraints."[5]

Rule 21 Working Group Four, in discussing Proposal F-1, explained operational flexibility in this manner:[6]

> The concept of operational flexibility within the ICA[7] context is that utilities need the flexibility to reconfigure circuits during maintenance or unplanned outages. Because customers sometimes get switched to adjacent circuits, the impact of DERs on circuits that they might be connected to must be studied, even if they are not connected to those circuits in normal circumstances . . ..

[3] The Rule 21 Working Groups were scoped in R.17-07-007 Amended Scoping Memo and Joint Ruling, November 16, 2018. The Final Report of Rule 21 Working Group Four was issued on August 12, 2020.
[4] Final Report of Rule 21 Working Group Four, Issue F, at 79.
[5] Final Report of Rule 21 Working Group Four, Proposal F-1, at 86.
[6] Final Report Rule 21 Working Group Four, at 82.
[7] Integration Capacity Analysis (ICA) is a tool developed in the Distribution Resources Plans (R.14-08-013) proceeding to inform developers of the DER hosting capacity on a circuit (how much capacity is available before a grid upgrade is required). ICA values vary over time and location depending on grid conditions.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

> When an actual project is studied, utility engineers take into account the likelihood of being connected to an adjacent circuit, the availability of other switching options, and the extent of the risk if a DER is connected to the circuit in question.

A DER operational alternative is a deliberate change to how a distributed energy resource operates to limit adverse grid impacts during a defined period or abnormal grid configurations. This can include limiting or eliminating exported energy, employing a variety of other advanced inverter functionalities, monitoring and reporting, or providing other functionality that supports grid operations.

The original ICA Working Group in 2016 explained the use of a DER operational alternative as follows:

> Working Group members additionally recognize that one possible solution to [OpFlex restrictions to interconnection] could be that a utility may in the future utilize communication means to send commands directly to DER systems or may send communication through third-party aggregators to DER systems as to mitigate the issues related to operational flexibility.[8]

Proposal F-1 addressed whether the use of a DER operational alternative could be a sufficient mitigation for OpFlex constraints in a particular circumstance: when the output of a generating facility being interconnected is larger than the ICA values for the location with OpFlex constraints taken into account (ICA-OF), but smaller than the ICA values without OpFlex constraints taken into account (ICA-SG).[9] Proposal F-1 also addressed what interconnection rules the Commission should adopt to account for the ability of DER Management Systems tools and aggregator commands to address flexibility needs.

OP 18 of the Decision directed the utilities to develop proposals for OpFlex Pilots to address the determination called for in Proposal F-1. The Commission determined that Proposal F-1 could potentially increase the use of DERs without compromising safety.[10] This would address the problem of ICA OpFlex constraints limiting the capacity of DER interconnection and under-utilization of existing hosting capacity. The Decision found,

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[8] ICA Working Group Final Report, at 27. The ICA Working Group was scoped in the DRP Rulemaking 14-08-013. https://drpwg.org/wp-content/uploads/2016/07/ICA-WG-Final-Report.pdf

[9] Final Report of Rule 21 Working Group Four, at 79.

[10] D.21-06-002, at 81.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

however, that neither PG&E nor SDG&E have a system in place to accommodate the operational alternatives anticipated in Proposal F-1, that evolution of operational alternatives may require re-evaluation, testing, or pilots, and that it is prudent to develop a pilot of Proposal F-1 to allow for re-evaluation and testing.[11]

OP 18 also directed the Utilities to develop implementation timelines, pilot objectives, and the method used to measure success or failure of the pilot.[12] These pilot proposals were to be submitted via a Tier 3 Advice Letter six months after the Utilities implemented IEEE 2030.5 Common Smart Inverter Protocol (CSIP)[13] compliant production servers but not later than June 1, 2022.[14]

On June 1, 2022, PG&E submitted AL 6612-E, SCE submitted AL 4806-E, and SDG&E submitted AL 4017-E to comply with OP 18.

PG&E's AL "proposes a three-stage pilot to meet the objective of Proposal F-1 in a timeline that is consistent with the guidance that 'we delay such piloting until utilities have implemented necessary equipment allowing the proposal capabilities.'"[15] Stage 1 proposes leveraging the Redwood Coast Airport Microgrid implementation to evaluate the manual process and implementation of control during abnormal switching. Stage 2 proposes testing in a laboratory environment of an already-deployed CSIP-certified IEEE server undertaken through an EPIC project.[16] Stage 3 proposes a field demonstration and rollout of Advanced Distribution Management Systems (ADMS) deployment.

SCE's AL proposes to "simulate sending commands to inverters to address lower ICA values and inverters' ability to respond to those commands."[17] SCE states it has already piloted certain functionalities necessary in its EPIC Integrated Grid Project II and its U.S. Department of Energy (DOE) Electric Access System Enhancement (EASE) project, and "accordingly, SCE intends to leverage the results of these completed projects to

[11] D.21-06-002, Findings of Fact 87, 88, and 89, at 81.
[12] D.21-06-002 OP 18 at 93.
[13] Institute of Electrical and Electronics Engineers standard 2030.5 for a Common Smart Inverter Protocol.
[14] D.21-060-002 OP 18 at 93.
[15] PG&E AL 6612-E at 6.
[16] The Electric Program Investment Charge (EPIC) is a California ratepayer funded program that supports the development of new, emerging, and pre-commercialized clean energy innovations.
[17] SCE AL 4806-E at 3.

avoid duplication of efforts. After reviewing these results, SCE will design and develop any additional testing necessary as required to adequately demonstrate ICA OpFlex."[18]

SDG&E's AL proposes to test four operational flexibility use cases using the IEEE 2030.5 protocol to control a mobile battery energy storage system. SDG&E proposes to evaluate the efficacy of these use cases and to test their integration and interoperability within SDG&E's IEEE 2030.5 environment. These four use cases cover several smart inverter functionalities whose use for OpFlex could be included in future interconnection agreements, including Set Active Power, Scheduling, Minimum Generation Export Requirement, Constant Reactive Power, and alternative settings for Volt-Var and Volt-Watt functions. SDG&E plans to incorporate the OpFlex Pilot into an existing EPIC project.

Supplemental ALs to Provide Pilot Progress Updates

On February 17, 2023, at the request of the Energy Division, the Utilities submitted Supplemental ALs (PG&E 6612-E-A, SCE 4806-E-A, and SDG&E 4017-E-A) to provide an update on the progress of the OpFlex Pilot proposals outlined in the Utilities' June 1, 2022, Advice Letters.

Those OpFlex Pilot proposals linked much of the OpFlex DER operational alternative testing to ongoing projects (such as through EPIC or DOE) that had pre-existing milestones in 2022. Because Energy Division revisited the proposals in early 2023, it seemed prudent to obtain updates on Pilot progress in order to incorporate the most recent understandings and developments into this resolution.

Updated summaries of the pilot projects from these Supplemental Advice Letters are provided in Appendix A.

In its Supplemental Advice Letter, PG&E provides updates on its three-stage approach. The pilot has developed and applied learnings from PG&E's EPIC 2.02 DERMS project.[19] Stage 1 has been in operation since June 2022. The lessons from Stage 2 testing are planned to be incorporated into PG&E's Stage 3 ADMS rollout, which is planned by the end of 2024.

[18] Ibid at 4.

[19] https://www.pge.com/pge_global/common/pdfs/about-pge/environment/what-we-aredoing/electric-program-investment-charge/PGE-EPIC-2.02.pdf.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

On March 30, 2023, PG&E submitted a further Supplemental AL 6612-E-B to clarify the timeline of the OpFlex pilots and the reasons why PG&E is extending the time needed for Stage 3 of the proposal provided in Supplemental AL 6612-E-A .[20] In addition, PG&E proposes an update to their OpFlex Pilot, provides a further update on the progress of the OpFlex pilot proposed in AL 6612-E, resolves typographical errors in the Decision number provided in the original AL, corrects the ADMS timeline and clarifies reporting requirements in AL 6612-E-A.[21] This Supplemental AL also clarifies that PG&E will file a comprehensive report of results and conclusions following completion of the OpFlex Pilot.[22]

In its Supplemental Advice Letter, SCE notes that it intends to leverage the results of completed projects, EPIC Integrated Grid Project II and the DOE EASE project to avoid duplication of efforts.[23] The EASE project implemented grid controls systems to support both lab and field demonstrations of simulated grid assets and DERs on a modeled SCE substation.

SCE also clarifies the timeline for its pilot. The original timeline in SCE's AL was to complete testing by the end of 2023 and deliver a report to CPUC by Q1 2024. SCE subsequently determined, however, that no additional testing is necessary. In its first Supplemental AL 4806-E-A, SCE stated it would provide a report to the CPUC's Energy Division by Q2 2023, but this timeline was later updated by SCE in its second Supplemental AL 4806-E-B (see section "Supplemental ALs to Further Update Pilot Timelines" below).

In its Supplemental Advice Letter, SDG&E describes the hardware procurement underway that is necessary to perform the pilot as proposed in its Advice Letter. SDG&E states it expects to complete the testing of its four proposed use cases by the end of Q3 2023.

Supplemental ALs to Clarify Pilot Metrics of Success

[20] Ibid.
[21] Ibid.
[22] Ibid at 4.
[23] SCE AL 4806-E-A at 2.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

On January 26, 2024, at the request of the Energy Division, the Utilities submitted Supplemental ALs (PG&E 6612-E-C, SCE 4806-E-B, and SDG&E 4017-E-B) clarifying the proposed metrics for pilot success or failure that are sufficient to determine whether and how to scale the use of DER operational alternatives as a mitigation for operational flexibility constraints. Energy Division determined, based on the previous Supplemental Advice Letters providing pilot project updates, that such metrics would be prudent and reasonable for ensuring the objectives of Proposal F-1.

The Utilities, together with Energy Division, jointly developed 37 Joint IOU Pilot Metrics of Success, which are provided in each of the Supplemental ALs.[24] In their Supplemental ALs, all three utilities adopt the Joint IOU Pilot Metrics of Success, with some caveats. Summaries of the individual metrics submissions and the list of Joint IOU Pilot Metrics of Success are provided in Appendix B.

Regarding caveats to the metrics, PG&E's Supplemental Advice Letter states:[25]

> Pilot success metrics were defined in collaboration with the CPUC and the other IOUs and are described in Attachment A . . .. As discussed with the CPUC, these metrics should be tested, or at a minimum discussed regarding hypothetical barriers to a specified metric, future testing needed to assess those metrics, level of effort required to test/implement the metrics, or other general commentary on a specific metric.

And SCE's Supplemental Advice Letter states:[26]

> Because the Joint IOU metrics are first being introduced through this supplemental advice letter in January 2024, and SCE's OpFlex Pilot restated in this Advice 4806-E-B was originally proposed on June 1, 2022, SCE's OpFlex Pilot may not provide necessary data to evaluate the pilot against all the metrics included in Attachment A.

<u>Supplemental ALs to Further Update Pilot Timelines</u>

[24] The Joint IOU Pilot Metrics of Success are provided in Attachments A of PG&E AL 6612-E-C, SCE AL 4806-E-B, and SDG&E AL 4017-E-B.
[25] PG&E AL 6612-E-C at 16.
[26] SCE AL 4806-E-B at 4.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

PG&E in its Supplemental AL 6612-E-C (submitted January 26, 2024) also provided further updates on timelines to implement its pilot. Since the filing of AL 6612-E-B, PG&E removed timeline dependencies on its ADMS roll-out schedule and plans field testing in mid-2024 and completion of Stage 3 of the OpFlex pilot in Q4 2024.

SCE in its Supplemental AL 4806-E-B (submitted January 26, 2024) states that it will submit an OpFlex Pilot report within 120 days after the Commission issues this Resolution, including results, recommended actions, and responses related to the Joint IOU Pilot Metrics of Success.

NOTICE

Notice of PG&E AL 6612-E, 6612-E-A, 6612-E-B, and 6612-E-C; SCE AL 4806-E, 4806-E-A, and 4806-E-B; and SDG&E AL 4017-E, 4017-E-A, and 4017-E-B were made by publication in the CPUC's Daily Calendar. PG&E, SCE and SDG&E state that copies of these ALs were sent electronically and via U.S. mail in accordance with Section IV of General Order 96-B to the interested parties on the GO-96-B and R.17-07-007 service list.

PROTESTS/RESPONSES

Cal Advocates Protest of Advice Letters

The Public Advocates Office (Cal Advocates) submitted a timely protest to PG&E AL 6612-E, SCE AL 4806-E, and SDG&E AL 4017-E on June 21, 2022.

Cal Advocates states that OP 18 of D.21-06-002 required the utilities to develop a single pilot, not three separate pilot programs.[27] Cal Advocates states OP 18 is clear and unambiguous in directing the utilities to submit a single AL, not three ALs. Cal Advocates points out that OP 18 refers to ALs, proposals and pilots singularly i.e., "the Advice Letter," and "a proposal," not "the Advice Letters" or "the Proposals" and that the language is mirrored in the discussion section referring to "a pilot," "the pilot," "the pilot proposal," and "a Tier 3 Advice Letter."[28] Further, the discussion section refers to "a pilot," "the pilot," "the pilot proposal," and "a Tier 3 Advice Letter."[29]

[27] Cal Advocates Protest of PG&E AL 6612-E, at 3; Cal Advocates Protest of SDG&E AL 4017-E, at 3; Cal Advocates Protest of SCE AL 4806-E, at 3.
[28] Ibid at 3.
[29] Ibid at 3.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

Cal Advocates makes reference to other Ordering Paragraphs of other Commission decisions, demonstrating that clarifying language is used when an order requires the utilities to act individually. For example, Cal Advocates notes that OPs 2 and 20 specified the utilities "shall each file a Tier 1 AL and PG&E and SDG&E and SCE shall each submit a Tier 2 AL.[30] Also, Cal Advocates notes that the Commission does not always use the word "jointly" when requiring a joint effort:[31] there are examples in OPs, where the word "jointly" is not used while using the word "jointly" in the corresponding discussion.

Cal Advocates argues that separating pilots will increase overhead, limit beneficial collaboration, and unnecessarily slow completion of the pilot.[32] Cal Advocates asserts that the utilities' failure to collaborate has already led to unnecessary expenditures through their preparation of multiple ALs, leading to less efficient review by intervenors and the Commission.[33]

Cal Advocates also expresses concern that conducting separate pilots would extend the pilot process, whereas collaboration may reduce the time to begin the next step earlier.[34]

Utilities' Replies to Cal Advocates Protest

PG&E, SDG&E, and SCE submitted timely responses to the Cal Advocates protest on June 28, 2022. Each utility disagreed with Cal Advocates, stating, for example, that Decision 21-06-002 "language was not unequivocally clear,"[35] or "does not specify the development of a single pilot."[36]

PG&E disagrees with Cal Advocates' assertion that the Decision makes it clear that a single joint IOU pilot was intended.[37] PG&E argues that the Decision 21-06-002 language was not unequivocally clear and the Decision "notes differences in where the

[30] Ibid at 3.
[31] Ibid at 3.
[32] Ibid at 4.
[33] Ibid at 4.
[34] Ibid at 4.
[35] PG&E Reply to the Protest to AL 6612-E June 28, 2022, at 2.
[36] SDG&E's Proposal for an IEEE 2030.5 Pilot of a DER Operational Alternative Pursuant to Decision 21-06-002, at 2-3.
[37] PG&E's Reply to the Protest to AL 6612-E. June 28, 2022, at 3.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

IOUs are, and in places references pilots"[38] not a pilot or a single pilot. Further, PG&E references Section 5.4.7, Resolution of Issue F, on pages 70 through 71 of the Decision noting references to testing or validation of pilots may be necessary[39] when referring to Proposal F-1. PG&E also noted that at workshops with stakeholders and Commission staff, they "made no secret of the fact it planned have its own pilot and that no impression was conveyed that there was to be a single pilot"[40] for all three IOUs. Further, PG&E asserts, the individual pilots allow the IOUs to work within their unique systems to optimize results and may bring to light new insights that might not become apparent if there was a single pilot.[41]

SDG&E's opposes Cal Advocates recommendation to combine the three pilots. SDG&E notes that OP 18 does not specifically use the words "each" or "jointly," after discussions with the other IOUs and Energy Division, determined that three separate pilots was permitted, and SDG&E is in compliance with OP 18.[42] Further, if the Energy Division pursues Cal Advocates' interpretation of OP 18, SDG&E requests that the Energy Division provide at least 120 business days for the development of a single pilot proposal.[43]

SCE notes that "OP 18 does not unambiguously require SCE, PG&E, and SDG&E to file a single pilot proposal. Unlike Cal Advocates' examples where the Commission used "jointly" in the discussion section but not in the corresponding OP, here the Commission did not indicate in either the discussion section or the OP that the pilot or AL were intended to be joint. Accordingly, SCE has fully complied with OP 18."[44] SCE requests that if the Energy Division accepts Cal Advocates interpretation of OP 18, SCE, PG&E, and SDG&E be provided 120 business days to develop a single pilot proposal.[45]

Cal Advocates Response to Supplemental Advice Letters on Pilot Progress Updates

[38] Ibid.
[39] Ibid at 2.
[40] Ibid.
[41] Ibid.
[42] SDG&E Reply to Protest of SDG&E AL 4014-E, June 28, 2022. p. 1.
[43] SDG&E Reply to Protest of SDG&E AL 4014-E, June 28, 2022. p. 2.
[44] SCE's Reply to Cal Advocates Protest of AL 4806-E. June 28, 2022, p.2.
[45] Ibid.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

Cal Advocates submitted a timely response to PG&E AL 6612-E-A on March 9, 2023. In this response, Cal Advocates reverses their earlier position from their June 21, 2022 protest, stating that their earlier recommendation to combine all utility efforts into a single pilot has lost relevancy due to the passage of nine months and PG&E's significant progress on its pilot. Cal Advocates states it would be unlikely that a single pilot project remains feasible. Cal Advocates' response recognizes that PG&E has made significant progress on its pilot option and concludes that at the present time (of submission), the cost of overhead associated with combining projects likely exceeds the benefits.[46]

Cal Advocates also points out that PG&E reports that implementation of Proposal F-1 will require a delay beyond what it had initially proposed and has not provided a justification for such a delay.[47] PG&E AL 6612-E-A explains that the OpFlex use case is subject to the implementation timelines of the DERMS and ADMS which have been extended. Cal Advocates' position is that "the Commission should require PG&E to operationalize Proposal F-1 and should not wait for further deployment of ADMS and DERMS unless the IOUs provide sufficient evidence that such a deployment is necessary."[48]

Cal Advocates recommends that if there is a delay associated with ADMS deployment that extends the annual costs or the total capital costs for the project, such costs should not be recoverable by PG&E unless they are shown to be reasonable.[49] Cal Advocates recommends expedient continuation of Proposal F-1 and that the Commission should not adopt PG&E's reasoning for postponement.[50]

<u>PG&E Reply to Cal Advocates Response to Supplemental Advice Letters on Pilot Project Progress Updates</u>

PG&E submitted a timely Reply to Cal Advocates on March 16, 2023. In this Reply, PG&E disagrees with the Cal Advocates assertion that implementation of PG&E's pilots has been delayed for over a year. PG&E AL 6612-E-A states that PG&E did not change the start date of Stage 3 (ADMS rollout) and has already demonstrated progress and

[46] Cal Advocates' Response to PG&E's Tier 3 Advice Letter 6612-E-A p. 1.
[47] Ibid at 4.
[48] Ibid.
[49] Ibid.
[50] Ibid.

dentified challenges via the first two stages of the proposal and is currently progressing within Stage 3.[51]

In response to Cal Advocates question about the ADMS timeline, PG&E states it will submit a supplemental AL to correct the record for the ADMS SCADA deployment timeline listed in AL 6612-E-A. PG&E reports that the ADMS SCADA roll-out is still expected to be completed by Q1 2024 and further explains that it still finds it prudent to have the time window for Stage 3 be Q1 2023 through Q4 2024.

In response to Cal Advocates interpretation of the timing of the OpFlex use case, PG&E states that Cal Advocates incorrectly interpreted AL 6612-E-A when they say that PG&E won't "fully operationalize the OpFlex use case" until after implementation of DERMS, beginning *after* deployment of ADMS by Q4 2024."[52] The DERMS functionality is being developed in parallel with the ADMS work, however DERMS relies on ADMS SCADA which is being rolled-out by area in the PG&E territory.[53]

Further, PG&E states that the DERMS system should not be limited by the ADMS SCADA deployment. The ADMS SCADA deployment expected completion timeframe is Q1 2024. PG&E states that it is planning to begin a limited field deployment of approximately 10 sites for DERMS / OpFlex in late 2023 through early 2024.[54]

To address the concern expressed by Cal Advocates that PG&E would seek to recover additional costs for delays in the ADMS program, PG&E states it will correct the record to show that there are no delays currently with the ADMS SCADA deployment timeframe. Also, in response to Cal Advocates' concern that PG&E will seek additional funding for additional costs if the project is delayed, PG&E notes that AL 6612-E-A did not specify any additional funding sources for the OpFlex Pilot. Instead, PG&E is using funds from related projects.

PG&E notes that Proposal F-1 from Working Group 4 and approved in D. 21-06-002 was to "determine whether a distributed energy resources operational alternative would be

[51] PG&E Reply to the Response from Cal Advocates to Advice Letter 6612-E-A-Supplemental: Operations Flexibility Pilot Proposal, at 1.
[52] Ibid at.2.
[53] Ibid at 2.
[54] Ibid at 2.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

a sufficient mitigation for operations flexibility constraints"[55] and did not specifically require PG&E to operationalize an operational alternative.[56]

DISCUSSION

We take note of Cal Advocates' original concerns about the Utilities conducting multiple and individual pilots in its protest of the Advice Letters. We also note that Cal Advocates withdrew those concerns in its responses to the Supplemental ALs.

We find that while the Decision language is not ambiguous, it appears the intent of the Decision is to direct each Utility to individually pilot Proposal F-1. We find that the IOU proposals to conduct three separate pilots complies with the direction given in OP 18.

We find that there is benefit from the experience and results of multiple pilots and it is likely that projects and approaches specific to the equipment and service areas will produce greater knowledge than implementing "shared or joint" pilots. For example, the primary focus of PG&E's OpFlex pilot is to demonstrate the ability to curtail participating generating facilities[57] while SDG&E's primary focus is to demonstrate how OpFlex can be accomplished using the IEEE 2030.5 protocol and the CSIP profile with as much of their production architecture as possible.[58]

Regarding the Cal Advocates' statement that "the Commission should require PG&E to operationalize Proposal F-1 and should not wait for further deployment of ADMS and DERMS unless the IOUs provide sufficient evidence that such a deployment is necessary," we find that the intent of OP 18 was to have the utilities pilot OpFlex DER operational alternatives, not operationalize them.

We find that all three utilities are in the process of piloting OpFlex DER operational alternatives with different characteristics and timing of expected results, as described in their Supplemental Advice Letters and summarized in Appendices A and B.

[55] D.21-06-002, at 67, emphasis added.
[56] PG&E Reply to the Response from Cal Advocates to AL 6612-E-A, at 3.
[57] PG&E AL 6612-E-A at 5.
[58] SDG&E AL 4017-E-A at 2.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

We find that pilots of all three utilities are expected to be completed by Q4 2024, according to the Utilities' Supplemental Advice Letters.

We further find that the Joint IOU Pilot Metrics of Success, as presented in Appendix B from Energy Division's compilation of the Supplemental Advice Letters, are a prudent and reasonable component of assessing the results of the OpFlex Pilots.

We also find that all three utilities have accepted the Joint IOU Pilot Metrics of Success, although some utilities may not be able to provide all metrics given that the metrics were developed after the original pilot proposals.

We find that prior to operationalization, further discussion will be needed as to whether Proposal F-1 warrants continuation based on the results of the pilots. If pilot results show that Proposal F-1 warrants continuation, parties should further discuss specifics of ADMS and DERMS development as they pertain to timely Proposal F-1 operationalization. Additionally, opportunities, advantages, and disadvantages of operationalizing Proposal F-1 prior to full ADMS and DERMS development should be reviewed.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review. Please note that comments are due 20 days from the mailing date of this resolution. Section 311(g)(2) provides that this 30-day review period and 20-day comment period may be reduced or waived upon the stipulation of all parties in the proceeding.

The 30-day review and 20-day comment period for the draft of this resolution was neither waived nor reduced.

FINDINGS

1. Decision 21-06-002, OP 18 directs each individual utility to individually test or pilot Proposal F-1 from Rule 21 Working Group Four.
2. There is benefit from the experience and results of multiple pilots and it is likely that projects and approaches specific to the equipment and service areas will produce greater knowledge than implementing shared or joint pilots.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

3. Decision 21-06-002, OP 18 ordered the Utilities to pilot OpFlex DER operational alternatives to mitigate OpFlex constraints, but did not direct the Utilities to operationalize DER operational alternatives.

4. All three utilities are in the process of piloting OpFlex DER operational alternatives with different characteristics and timing of expected results.

5. OpFlex Pilots of all three utilities are expected to be completed by Q4 2024.

6. The Joint IOU Pilot Metrics of Success in Appendix B are a prudent and reasonable component of assessing the results of the OpFlex Pilots.

7. Further discussion is prudent to determine whether and how to scale the use of DER operational alternatives as a mitigation for operational flexibility constraints, based on the results of the Pilots.

8. Further discussion is prudent on the specifics of ADMS and DERMS development as they pertain to whether and how to scale the use of DER operational alternatives as a mitigation for operational flexibility constraints, including the advantages, and disadvantages of scaling the use of DER operational alternatives prior to full ADMS and DERMS development.

THEREFORE IT IS ORDERED THAT:

1. The proposals of Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company to conduct OpFlex Pilots to test whether a DER operational alternative would be sufficient mitigation for OpFlex constraints, as requested in PG&E AL 6612-E, SCE AL 4806-E, and SDG&E AL 4017-E, and as updated in PG&E AL 6612-E-A, 6612-E-B, and 6612-E-C, SCE AL 4806-E-A and 4806-E-B, and SDG&E AL 4017-E-A and 4017-E-B, are approved.

2. Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company shall individually submit comprehensive reports on their respective pilot project, to be submitted by each utility within 60 days of the completion all OpFlex Pilots by that utility. The reports shall provide analysis, conclusions, and recommendations about the projects, to include but not be limited to the following:

    - What operational alternatives are a sufficient mitigant to OpFlex Constraints?

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

- What are the challenges and barriers to implementing operational alternatives?
- What interconnection rules are recommended to facilitate and/or support operational alternatives?
- What timelines are feasible for implementing the interconnection rules to facilitate and/or support operational alternatives?
- Analysis of the availability and or capability of equipment to implement OpFlex solutions;
- Analysis of the scalability of the OpFlex DER Operational Alternatives studied in the pilot;
- Commentary on the economic viability of the OpFlex DER operational alternatives studied in the pilot;
- Analysis of the pilots against the Joint IOU Pilot Metrics of Success given in Appendix B;
- Recommendations as to whether and how to scale the use of DER operational alternatives as a mitigation for operational flexibility constraints, including the constraints and timing of ADMS and DERMs development.

3. Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company shall convene a half-day joint workshop to discuss the analyses, conclusions, and recommendations with stakeholders, no later than 45 days after all Pilot reports have been issued. The workshop shall discuss whether and how to scale the use of DER operational alternatives as a mitigation for operational flexibility constraints, including the constraints and timing of ADMS and DERMs development.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed, and adopted at a conference of the Public Utilities Commission of the State of California held on May 9, 2024; the following Commissioners voting favorably thereon:

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RACHEL PETERSON
Executive Director

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

Appendix A: Summaries of Supplemental Advice Letters on Pilot Projects Progress

1. PG&E AL 6612-E-A Pilot Projects Update

PG&E AL 6612-E proposed a three-stage approach to pilot OpFlex. The proposal aligned with the projected readiness of technology at PG&E to address the different aspects of OpFlex to curtail generation to maintain grid safety and reliability during abnormal or emergency scenarios.[59] The pilot proposal applies learnings from PG&E's Electric Program Investment Charge (EPIC) 2.02 DERMS project.[60]

Three use cases (Stages) were developed and are in progress. The design, project timeline, project progress and lessons learned of each stage is reported and summarized in the AL Supplement.

The primary focus of PG&E's OpFlex pilot is to demonstrate the ability to curtail participating generating facilities.[61] To do so, PG&E will use Advanced Distribution Management System (ADMS) [62] to automate and optimize the amount of curtailment required because they are not confident in the off-the-shelf ability for CSIP-certified devices to properly receive and respond to controls without significant testing and verification.[63] They assert that it is likely that operational processes will only be able to scale effectively when new tools like ADMS and DERMS are introduced.[64]

Stage 1: **Redwood Coast Airport Microgrid (RCAM) pilot (Q3 2022 – Q2 2023)** commenced in the third quarter of 2022 and was scheduled to end the second quarter of 2023. PG&E reports that this OpFlex use case is technically possible to

[59] PG&E AL 6612-E-A at 4.
[60] https://www.pge.com/pge_global/common/pdfs/about-pge/environment/what-we-aredoing/electric-program-investment-charge/PGE-EPIC-2.02.pdf.
[61] PG&E AL 6612-E-A at 5.
[62] Advanced Distribution Management Systems (ADMSs) are computer systems used by distribution system operators to monitor the status of all devices on the electric distribution grid and to control these devices in a well-coordinated manner for optimal performance, reliability, and efficiency. The ADMS includes distribution System Control and Data Acquisition (SCADA) capabilities plus outage management software and advanced distribution system software applications, such as OPF, VVO, FLISR, and, in some cases DERMS.
[63] PG&E AL 6612-E-A at 5.
[64] Ibid at 9.

execute, but was not a scalable model of curtailment control to large numbers of DER customers. Among other things, the process is very manual, and automation of the processes require both ADMS and DERMS functionality as well as 24-hour support from the facility.

Stage 2: **CSIP-certified IEEE 2030.5 Controls Testing pilot (Q2 2022 – Q4 2022)** commenced in the second quarter of 2022 and ended in the fourth quarter 2022. This use case deployed a production CSIP-certified IEEE 2030.5 server for DER telemetry, completed interoperability testing with two CSIP-certified gateways from different manufacturers for the telemetry-only use case, with three additional aggregators soon to be certified as interoperable. PG&E noted that there were significant challenges to overcome through the EPIC 3.03 project related to vendor maturity with a new standard and interoperability between DER headend and CSIP-certified end devices and aggregators. As a result, only limited control testing was possible within the scope of the EPIC 3.03 project. PG&E identified 4 key lessons learned and anticipates a final report will be publicly available by the second quarter of 2023.

Stage 3: ADMS Rollout (CSIP IEEE 2030.5) – Q1 2023 – Q4 2024. The supplemental AL notes that PG&E's timeline has expanded since the issuance of AL 6612-E. The pilot intends to demonstrate capabilities for curtailing generating facilities in the case of abnormal switching conditions to avoid safety and/or reliability issues. It also seeks to evaluate whether the operationalization of these capabilities could allow participating interconnecting customers to bypass the supplemental review, and any associated costs and delays, while connecting to the as-built system at the ICA-SG value. This would allow for a better utilization of hosting capacity.[65]

2. SDG&E AL 4017-E-A Pilot Projects Update

The project plan proposed in SDG&E's AL 4017-E is intended to demonstrate how OpFlex can be accomplished using the IEEE 2030.5 protocol and the CSIP profile with as much of their production architecture as possible. For a primary test case, the project team will leverage IEEE 2030.5 to control a mobile battery energy storage system (MBESS) to demonstrate alleviating circuit OpFlex constraints under specific scenarios. The demonstration also intends to highlight the benefits and challenges

[65] PG&E AL 6612-E-A at 14.

with the communication protocol and profile and assess the extent to which it demonstrates the value proposition of using MBESS.[66]

SDG&E has identified the Promis battery, a component of EPIC-3 Project 7, for use as the DER and established contracts with grid support service provider, Kitu, as well as engineering, construction and maintenance provider, Quanta, to procure the hardware necessary to perform the pilot as proposed. The Kitu Citadel server will function as the IEEE 2030.5 server, and the Kitu gateway as the IEEE 2030.5 gateway. Hardware installation is expected to be completed by the end of Q1 2023.[67] Currently, the SDG&E team is working with Kitu and Quanta to develop a test plan. The plan will initially be executed at SDG&E's Integrated Test Facility (ITF) with further testing of the DER conducted at two field locations using the company's private 4G LTE communications system. The field sites have been selected and the capabilities of both the communications and electrical connection interfaces tested and verified. SDG&E intends to complete all testing by the end of Q3 2023. To accomplish the necessary additional piloting and testing, SDG&E will use future EPIC-funded projects, as well as projects funded from other sources, to test the functionalities necessary for Proposal F-1."[68]

Final Report Format

SDG&E plans to incorporate this pilot into an existing project – EPIC-3 Project 7, and final reports provided to the Commission Energy Division staff and served on interested parties in R.17-07-007 or subsequent rulemaking at the completion of the pilot. The reports[69] include project summaries, a discussion of the results, and recommendations.[70]

3. SCE AL 4806-E and AL 4806-E-A Project Progress Update

a. SCE AL 4806-E Proposed Timeline

SCE has already piloted certain of the functionalities necessary for Proposal F-1 in the EPIC Integrated Grid Project II. The U.S. Department of Energy (DOE)

[66] SDG&E AL 4017-E-A at 2.
[67] SDG&E AL 4017-E-A at 3.
[68] SDG&E AL 4017-E-A at 2-3.
[69] https://www.sdge.com/epic
[70] SDG&E AL 4017-E-A at 3.

Electric Access System Enhancement (EASE) project, which was completed in 2021, also included certain functionalities necessary for Proposal F-1. Accordingly, SCE intends to leverage the results of these completed projects to avoid duplication of efforts. The EASE project implemented grid control systems to support both lab and field demonstrations. The lab demonstration consisted of simulated grid assets and DERs on a modeled SCE substation. The field demonstration consisted of 31 DERs interconnected at customer sites. The objectives were to support the streamlining of the DER interconnections, improve access to grid assets and DERs, and to demonstrate the optimization of DERs for grid and market use cases.[71]

After reviewing these results, SCE will design and develop any additional testing necessary as required to adequately demonstrate ICA OpFlex. To accomplish the necessary additional piloting and testing, SCE may utilize existing and/or future EPIC-funded projects to test the functionalities necessary for Proposal F-1.[72]

SCE's Proposed Timeline:

- By Q4 2022, develop a testing plan, leveraging completed EPIC/DOE projects, and determine whether testing may be bundled with any ongoing or planned EPIC projects.
- By Q4 2023, all test elements of the pilot will be completed.

  By Q1 2024, deliver a report to the CPUC's Energy Division with a summary of the results and recommended actions.

b. SCE AL 4806-E-A Modified Timeline

Since that time, SCE has completed its review of the EASE project demonstration.[73] Based on that review, SCE has determined that no additional testing is necessary to pilot ICA OpFlex and once the necessary production systems are deployed and regulatory conditions met, SCE could support ICA OpFlex operations. SCE will provide a report to the CPUC's Energy Division by Q1 2024 that includes a summary of the results and recommended actions. SCE

[71] SCE AL 4806-E-A at 3.

[72] SCE AL 4806-E-A at 2.

[73] The April 26, 2022 EASE final report can be found at https://www.osti.gov/biblio/1864777

anticipates the technical details of this forthcoming report will largely reference the content of the April 26, 2022 EASE report.[74] [75]

Appendix B: Summaries of Supplemental Advice Letters on Pilot Metrics of Success

1. PG&E AL 6612-E-C Pilot Metrics of Success and Timeline Update

PG&E provides more information regarding success metrics for the proposed pilot beyond what was included in AL 6612-E-B. PG&E also removes the dependency on the ADMS deployment timeline.

For their pilot success metrics, PG&E adopts the Joint IOU Pilot Metrics of Success and notes that "as discussed with the CPUC, these metrics should be tested, or at a minimum discussed regarding hypothetical barriers to a specified metric, future testing needed to assess those metrics, level of effort required to test/implement the metrics, or other general commentary on a specific metric."[76]

Regarding updates to the timeline to implement this pilot, PG&E noted that they went live with the first phase of DERMS in late 2023, which included a cloud-based IEEE 2030.5 telemetry headend and initial forecasting capabilities. PG&E is implementing the next phase of DERMS to include a small-scale pilot to test communication and constraint management functions based on the real time and forecasted state of the grid, in line with goals of the Operational Flexibility Pilot. Since the filing of AL 6612-E-B, the DERMS team has removed timeline dependencies on the ADMS roll-out schedule. To remove this dependency, the DERMS and ADMS teams collaborated to create a special process to enable SCADA data input into DERMS for targeted locations prior to the full roll-out of ADMS. The current planned timeline for starting field testing is mid-2024. PG&E has updated the projected timeline for Stage 3 of the OpFlex pilot to end in Q4 2024 to reflect the estimated timeline of the overall Stage 3 effort more accurately.

2. SDG&E AL 4017-E-B Pilot Metrics of Success

[74] The April 26, 2022 EASE final report can be found at https://www.osti.gov/biblio/1864777.
[75] SCE AL 4806-E-A at 2-3.
[76] PG&E AL 6612-E-C at 16.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

SDG&E committed to incorporating a discussion of the Joint IOU Metrics in the final report detailing the success or failure of the pilot. SDG&E noted, however, that since their OpFlex Pilot completed in Q3 2023, there may be specific metrics among the Joint IOU Metrics that are not applicable in a retrospective analysis and evaluation of SDG&E's pilot.

Additionally, SDG&E presented the following metrics specific to SDG&E to measure the success or failure of their OpFlex Pilot:[77]

1. Test completion: Evaluate whether all planned tests were completed, both at SDG&E's Integrated Test Facility (ITF) and the two field locations.
2. Equipment installation and integration: Assess the successful completion of hardware installation by the end of Q1 2023 and the integration of the IEEE 2030.5 server and IEEE 2030.5 gateway within the production architecture.
3. Test plan development and execution: Examine the collaboration between SDG&E and team executing the test plan at the ITF and the field locations.
4. MBESS performance: Assess the performance of the effectiveness of the MBESS equipped with IEEE 2030.5 functionality as the chosen DER in alleviating circuit operational flexibility constraints under scenarios chosen as test cases.
5. Communication protocol and profile evaluation: Analyze the benefits and challenges associated with the IEEE 2030.5 protocol and the CSIP profile, including their impact on MBESS performance and Operational Flexibility.
6. Private LTE system performance: Evaluate the effectiveness of SDG&E's private LTE system for communications during field testing and its suitability for implementation in the context of IEEE 2030.5 related applications.

3. SCE AL 4806-E-B Pilot Metrics of Success and Schedule Update

SCE adopts the Joint IOU Metrics, noting that their OpFlex Pilot may not provide necessary data to evaluate all metrics given the nearly 1.5 years between the pilot proposal and introduction of the Joint IOU Metrics.

[77] SDG&E AL 4017-E-B at 4.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

Additionally, and in light of the now directed use of Joint IOU metrics for pilot evaluation, SCE proposes the following schedule to complete its OpFlex Pilot:

120 Days After Commission Issues Resolution on Advice 4806-E-B, SCE will provide an OpFlex Report to the CPUC's Energy Division that includes a summary of the results and recommended actions, including any necessary responses related to the use of Joint IOU metrics.[78]

4. Joint IOU Pilot Metrics of Success

The following metrics were developed in consultation with Energy Division and agreed to by the Utilities, and provided as Attachment A in each of the Supplemental Advice Letters (PG&E AL 6612-E-C, SCE AL 4017-E-B, and SDG&E AL 4806-E-B):

Over-Arching Metrics

1. Pilot adequately tests systems and scenarios to cover the DER Operational Alternatives discussed in Proposal F-1, such as limiting or eliminating exported energy, modifying advanced inverter functions, monitoring and reporting, and other functionality that supports grid operations.

2. Value engineering opportunities are considered throughout the process of piloting OpFlex DER operational alternatives.

3. Diversity, Equity, and Inclusion are considered in the creation and piloting of the systems to implement Proposal F-1 - such as ensuring that specific communities will not be disproportionately affected by curtailments, etc.

Demonstrate the Ability to Integrate Participating Generating Facilities into IOU Control Systems

4. DER locations and capabilities can be modeled in IOU systems.

[78] SCE AL 4806-E-B at 4.

5. DER systems can be provisioned on IOU systems based on IOU's technical requirements.

6. DER systems can provide status and telemetry to IOU systems as prescribed.

7. DER systems are interoperable with IOU systems.

8. IOU systems have near real time visibility of the grid and DER state (at maximum 1 minute granularity).

Demonstrate the Ability to Control Participating Generating Facilities

9. IOU can send control signals via IEEE 2030.5 for control commands, limits, or schedules to DER systems.

10. DER systems can receive the IEEE 2030.5 control signals from IOU and adhere to the commands.

11. IOU can send multiple control schedules to DER systems.

12. DER systems are capable of adhering to multiple control schedules, including responding properly to as-needed DER operational schedule changes.

13. DER systems can respond to control commands within 30 seconds (or prescribed response times).

14. Fail-safes for loss of communications or hardware failures are sufficient to avoid potential issues for the grid.

15. Control system uptime is similar to existing SCADA uptime metrics for reliability, including the control system Availability (Availability (%) = (Total Operational Time / Total Time) * 100); Mean Time Between Failures (MTBF) (MTBF = Total Operational Time / Number of Failures); Mean Time To Repair (MTTR) (MTTR = Total Downtime / Number of Failures), etc.

16. Contractual obligations are in place for DER systems to adhere to technical requirements for OpFlex mitigation (as necessary).

17. IOU systems can generate and implement DER management scenarios to support OpFlex objectives based on DER states, capabilities, and forecasts. When necessary, this can include temporarily overriding other DER control objectives such as market-based objectives from either the Distribution System Operator (DSO) or Independent System Operator (ISO).

18. IOU systems can determine when abnormal conditions are relieved and revert DER operations to default operations.

Identify Triggers for OpFlex DER Operational Alternatives (Curtailment, Increased Generation, etc.):

19. IOU System can identify or forecast abnormal switching scenarios and update DER constraints in near real-time (at maximum 1 minute granularity).

20. IOU System can adequately forecast the impacts of changes to the DER in relation to grid conditions.

21. Automation of trigger identification can be scaled across the system.

22. Informational systems are updated to provide the OpFlex capabilities of any particular facility.

Develop Methodology to Calculate DER Management Scenario Characteristics and Allocate Actions Appropriately (Curtailment, Increased Generation, etc.)

23. A process is developed to determine the amount of curtailment, increased generation, etc. required at each generating facility during an OpFlex event (circuit reconfiguration, etc.).

24. Automation is developed to determine the amount of curtailment, increased generation, etc. required at each generating facility during an OpFlex event to be able to scale system wide.

25. System-generated curtailment/generation set points do not create additional issues for the grid.

26. System-generated curtailment/generation set points are not overly restrictive to DER system customers based on grid behavior.

27. Functional requirements involved in the DER management scenarios are recorded for future discussion.

28. Develop Operational Processes to Implement OpFlex DER Operational Alternatives:

28. Develop engineering tools to analyze switching scenarios with various operational alternative capabilities of facilities.

29. Develop processes for Operators and Engineers to dispatch new settings to facilities.

30. Mitigation processes are in place and are adequate when facilities do not respond or inadequately respond to utility commands.

<u>Demonstrate Ability to Monitor and Report on OpFlex DER Operational Alternative Success</u>

31. IOU systems can determine when DER management scenarios do not achieve objectives and record information regarding why.

32. IOU systems have the capacity to store data on the characteristics, such as the length and operational alternatives executed, of the DER management scenarios during abnormal conditions for the purpose of reporting and/or using this data to assess the impacts of the scenarios.

PG&E AL 6612-E, SCE AL 4806-E, SDG&E AL 4017-E; PG&E AL 6612-E-A, SCE AL 4806-E-A, SDGE AL 4017-E-A; PG&E AL 6612-E-B; SCE AL 4806-E-B, SDG&E AL 4017-E-B; and PG&E AL 6612-E-C /FME, CGO & EM4

Evaluation Metrics--Reflect on Lessons Learned and Assess the Potential for Scaling Proposal F-1

33. Lessons learned: key lessons learned from the pilot are identified.

34. Stakeholder feedback: Collect feedback from relevant stakeholders, including utility personnel, DER owners, and regulators, to gain insights into the pilot's effectiveness, areas for improvement, and the value proposition for future use of IEEE 2030.5 in the context of Operational Flexibility.

35. Scalability: The potential and appropriateness of utilizing future EPIC-funded projects and/or GRC funds to expand the functionalities necessary for Proposal F-1 and scale up the pilot's results is assessed.

36. Additional DER operational alternatives that could assist in operationalizing and scaling proposal F-1 are considered for future testing.

37. Documentation and dissemination: Ensure that the learning outcomes, benefits, and challenges are well-documented through reports, technical papers, and input to standards development.