FILED
12/19/25
04:59 PM
R2106017

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Modernize the Electric Grid for a High Distributed Energy Resource Future.	R.21-06-017

SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) SECOND SET OF COMMENTS ON ASSIGNED COMMISSIONER'S RULING ON FLEXIBLE CONNECTIONS

WILLIAM YU

Attorney for
SOUTHERN CALIFORNIA EDISON COMPANY

2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770
Telephone: (626) 302-1634
E-mail: William.W.Yu@sce.com

Dated: **December 19, 2025**

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Modernize the Electric Grid for a High Distributed Energy Resource Future.	R.21-06-017

SOUTHERN CALIFORNIA EDISON COMPANY'S (U 338-E) SECOND SET OF COMMENTS ON ASSIGNED COMMISSIONER'S RULING ON FLEXIBLE CONNECTIONS

Pursuant to the November 3, 2025 Assigned Commissioner's Ruling and the November 19, 2025 Email Ruling Modifying Party Response Dates in Rulemaking (R.)21-06-017, Southern California Edison Company hereby submits its Second Set of Comments on Flexible Connections.

Respectfully submitted,

WILLIAM YU

/s/ William Yu

By: William Yu

Attorney for
SOUTHERN CALIFORNIA EDISON COMPANY

2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770
Telephone: (626) 302-1634
E-mail: William.W.Yu@sce.com

December 19, 2025

Attachment

SCE's Second Set of Comments on

Assigned Commissioner Ruling on Flexible Connections

High DER Track 3

Executive Summary:

SCE appreciates that the Commission has offered stakeholders the opportunity to share comments on a wide range of questions relating to topics within Track 3, Phase 1 of the High DER Futures Proceeding (R.21-06-017), which focuses on smart inverter operationalization (SIO). On November 25, 2025, SCE provided responses to the majority of the questions set forth in the "Assigned Commissioner's Ruling Seeking Additional Information on DER Enabled Near Term Flexible Connections," issued Nov. 3, 2025. For the sake of completeness, in these second-round comments, SCE provides newly-drafted responses to Questions 16-18, 20, and 23-28, and also includes its earlier responses to questions 1-15, 19, 21, and 22 in the Appendix.

The new responses focus on four discrete topics: (1) control of maximum capacity in emergent conditions, (2) application of current bridging programs to small single-phase customers, (3) application of current or future power control systems to single-phase customers for non-bridging (deferral) purposes, and (4) the use of dynamic rates to support direct load control systems. In summary, SCE notes the following:

- Capacity control in emergent conditions: there is considerable value in this application and SCE fully supports continued work and investment in this area.
- Bridging programs for single-phase customers: SCE has not identified significant opportunity in extending its current bridging pilot to single-phase customers, absent going through an aggregator, and thus direct-to-customer communications would be unnecessary.
- Long-term power control systems for single-phase customers: SCE does not believe there is a strong value proposition of deferral from the application of current, relatively complicated systems to these customers.
- Use of dynamic rates to support direct load control systems: SCE strongly believes that dynamic rates should exclusively be an opt-in offering, and therefore should not be mandated for customers who are separately enrolled in any dynamic control pilot. The risks and required levels of knowledge to participate in rates versus other types of programs are inherently different.

Questions and Direction for Large IOU Response Regarding ADMS/DERMS Capabilities that Unlock Non-Firm Capacity for Polyphase Customers

No later than November 25, 2025, each of the large IOUs are directed to respond to the following questions regarding ADMS/DERMS and their current technical capabilities. All other parties are also invited to provide responses to these questions, as they would like, no later than December 10, 2025. Response to these questions will allow us to gauge the status of capabilities that are foundational to establishing operating envelopes that provide non-firm capacity.

1. **Are IOU ADMS and DERMS currently capable of providing short-term (e.g., day-ahead or week-ahead) load and generation capacity forecasts suitable for variable operating envelopes for all locations on the polyphase distribution grid?**
    a. **If ADMS and DERMS are currently capable of providing short-term forecasts for variable operating envelopes, what is the maximum number of locations that can be forecast at the normal duration (e.g., day-ahead or week-ahead) with the current or planned level of resources?**

       Previously answered, response provided in Appendix.

    b. **For ADMS and DERMS that are not currently capable of providing short-term forecasts, what other systems or manual processes have been used (e.g., in research projects, pilots, or demonstrations) to provide this capability?**

       Previously answered, response provided in Appendix.

    c. **For ADMS and DERMS that are not currently capable of providing short-term forecasts, what is the planned timeline for developing this capability? Please note if this timeline differs from the timeline presented in the most recent IOU filing (e.g., Operational Flexibility or Bridging report, GRC work paper, etc.).**

       Previously answered, response provided in Appendix.

2. **Are IOU ADMS and DERMS currently capable of rapidly providing load and generation forecasts suitable for dynamic operating envelopes (e.g., hour ahead values) for all locations on the polyphase distribution grid?**
    a. **If ADMS and DERMS are currently capable of rapidly providing forecasts suitable for dynamic operating envelopes, what is the maximum number of locations that can be forecast at the normal duration (e.g., hour ahead) with the current or planned level of resources?**

       Previously answered, response provided in Appendix.

    b. **For ADMS and DERMS that are not currently capable of rapidly providing short-term forecasts suitable for dynamic operating envelopes, what is the planned timeline for developing this capability? Please note if this timeline differs from the timeline presented in the most recent IOU filing (e.g., Operational Flexibility or Bridging report, GRC work paper, etc.).**

       Previously answered, response provided in Appendix.

3. **Please articulate with specificity, as needed, any additional functionalities that must be developed for ADMS and DERMS to be capable of providing short-term load and generation capacity forecasts to all customers located on the polyphase grid of the Large IOUs.**
    a. **If needed, please articulate with specificity any planned or anticipated resources that will be required for these additional ADMS and DERMS functionalities.**

       Previously answered, response provided in Appendix.

4. **With the understanding that the Large IOUs are at different stages of implementing their ADMS and DERMS capabilities, how can the Commission ensure that near-term solutions are provided to customers in a timely fashion?**
    a. **Please provide an estimated timeline for how long it would take to implement these solutions.**

       Previously answered, response provided in Appendix.

5. **If needed, what solutions should the Large IOU(s) at an earlier stage of ADMS/DERMS capabilities employ as interim measures as their ADMS/DERMS capabilities are building up?**
    a. **Please provide an estimated timeline for how long it would take to implement these solutions**

    Previously answered, response provided in Appendix.

6. **Is there a limitation on the number of customers that can be provided day ahead variable operating envelopes (based on these short-term forecasts) through the Large IOUs' IEEE 2030.5 communications servers?**

    Previously answered, response provided in Appendix.

7. **Is there a limitation on the number of customers that can be provided dynamic operating envelopes (based on an assumption of hour ahead forecasts) through the Large IOUs' IEEE 2030.5 communications servers?**

    Previously answered, response provided in Appendix.

8. **Are there any communication functionalities required to provide variable or dynamic operating envelopes to customers on the polyphase electric grid that are not provided by the IOU CSIP/IEEE 2030.5 infrastructure?**

    Previously answered, response provided in Appendix.

9. **Please detail with specificity any plans, including projected timelines, to bring down the customer cost to receive variable or dynamic operating envelopes via direct communications[1] with IOU IEEE 2030.5 servers.**

    Previously answered, response provided in Appendix.

10. **Are there any existing arrangements with aggregators that would allow those aggregators to coordinate the response of multiple customers?**

[1] PG&E February 28, 2025 OpFlex Pilot Report at 23, "generally it is expected these costs to be in the $20k-$50k range."

Previously answered, response provided in Appendix.

11. **Please detail with specificity any plans, including projected timelines, for IOUs to enter into agreements with aggregators[2] that would reduce the per customer cost to receive variable or dynamic operating envelope data from IOU ADMS and DERMS.**

    Previously answered, response provided in Appendix.

12. **Please detail with specificity the level of data that is provided to Community Choice Aggregators about large customers within your service territory.**

    Previously answered, response provided in Appendix.

13. **Should Rules, Tariffs, or policies be modified in order to allow for the implementation of variable or dynamic operational envelopes for customers on the polyphase grid?**
    a. **If yes, please provide suggestions regarding the specific Rules, Tariffs, or policies, and any suggested modifications.**

    Previously answered, response provided in Appendix.

    b. **If no, what Commission guidance and IOU action is needed in order to implement variable or dynamic operational envelopes?**

    Previously answered, response provided in Appendix.

Questions for Large IOUs Regarding Directed Maximum Capacity Values during Abnormal Grid Operation

No later than November 25, 2025, the large IOUs are directed to respond to the following questions regarding abnormal grid operations.

14. **Please estimate the annual number of abnormal grid operations due to emergent situations which utilize operational flexibility actions such as switching or curtailment to ensure reliable operation.**

Previously answered, response provided in Appendix.

[2] https://www.pge.com/assets/pge/docs/about/doing-business-with-pge/TD-2306P-01.pdf, accessed on October 12, 2025; PG&E's COT lists the cost of integration with their 2030.5 system as $4,000, not including the customer side hardware, installation, and communications costs.

15. **Please estimate the annual number of abnormal grid operations due to planned events which require utilize [sic] operational flexibility actions such as switching or curtailment to ensure reliable operation.**

Previously answered, response provided in Appendix.

Questions for Parties Regarding Directed Maximum Capacity Values during Abnormal Grid Operation

No later than December 10, 2025, parties are directed to respond to the following questions regarding abnormal grid operations.

16. **Does the value provided by the ability to signal maximum import values via IEEE 2030.5 to sites on the polyphase grid during emergent abnormal grid operation justify the technical and contractual effort necessary to develop this ability?**

Yes, the benefits of signaling maximum import values justify the effort to develop this capability. This process is well underway, guided by the CPUC's approval of General Rate Case (GRC) funding for DERMS. With that said, signaling maximum import values via IEEE 2030.5 during normal and emergent abnormal grid operations is a critical function to ensure the constraints (Voltage & Thermal) within distribution systems are maintained. The use of a common standard such as IEEE 2030.5 ensures a consistent and cost effective method of communicating with polyphase resources. SCE also notes that the contractual effort may not be significant, given that many customers will use cloud services without need for direct contracts.

a. **How could such customer import direction be developed and implemented to maximize value and produce significant net benefit to the system?**

As indicated in previous responses, to maximize the value, customer/facility communication and control systems will need to operate in coordination with the direction provided by SCE via its DERMS connection. This will allow the customer/facility to maximize the use of grid capacity with ADMS/DERMS ensuring that the distribution grid is maintained withing operating limits, together maximizing the value to the grid.

SCE's future strategy for maximizing value and achieving substantial net benefits involves integrating real-time hosting capacity calculations into the dynamic operating envelope (DOE). The primary benefit of this approach is its support for

flexible interconnection, which requires a comprehensive understanding of grid-constrained parameters—including voltage, thermal, and protection considerations—particularly during abnormal system operation. The technical implementation of the DOE enables management of import levels that exceed those specified by contractual constraints, where such limits are defined.

17. **Does the value to the system provided by the ability to signal maximum import values via IEEE 2030.5 to sites on the polyphase grid in anticipation of potential or planned abnormal grid operation justify the technical and contractual effort necessary to develop this ability?**

    Yes, see responses to question 16, which covers both emergent and planned abnormal conditions.

18. **Should Rules, Tariffs, or policies be modified in order to allow for operator signaled maximum import capacity limits under abnormal grid operation?**
    a. **If yes, please provide suggestions regarding the specific Rules, Tariffs, or policies, and any suggested modifications.**

       Specific rules (Rule 21, Rule 16 and Rule 29) should be updated to allow the use of dynamic operational envelopes. However, changes to these rules need to be carefully considered based on pilot learnings. At this time, SCE cannot provide suggested changes as SCE has not yet spent sufficient time evaluating the necessary rule changes.

    b. **If no, what Commission guidance and IOU action is needed in order to allow for operator signaled maximum import capacity limits under abnormal grid operations?**

       Not applicable

    c. **Please describe what implementation considerations may differ between signaled response to emergent abnormal conditions and operating envelope adjustment in response to planned abnormal conditions.**

       The technology (DERMS, CSIP, 2030.5, PCSs) should be the same for either emergent or planned conditions. However, in implementation, the major

difference is that for emergent conditions, the signals would be provided without significant notice, and response will need to be immediate (as to alleviate the emergent grid condition). In contrast, for planned conditions, the signal can be provided in advance (potentially days ahead) so as to allow the customer to modify its operation for this period.

Questions Regarding Flexible Capacity for Single Phase Feeder Customers

No later than December 10, 2025, parties are directed to respond to the following questions regarding flexibility capacity for single phase feeder customers.

19. **Approximately what portion, in quartiles (e.g., 0-25%, 25-50%) of the Large IOU single phase customers have their service infrastructure modeled in power flow software?**

    Previously answered, response provided in Appendix.

20. **Do parties favor adapting existing approaches (e.g., LLL, FlexConnect) to serve single phase customers, or taking a different approach?**

    a. **If parties favor a mix of adaptation and different approaches, please detail which elements (e.g., computing static operating profile, communicating day ahead values, etc.) should be adapted and which should use a different approach.**

    SCE does not see value in extending existing flexible connection pilots to single phase customers. Individual single-phase customers (such as residential homes) do not significantly contribute to grid impacts. Instead, the aggregation of single-phase customers (such as new housing tracts) can significantly contribute to grid impacts. Therefore, SCE suggests that current load management approaches could be best applied by aggregators via demand flexibility management programs. This could then be used to flex power usage at the aggregation level, such as by adjusting EV charging and HVAC thermostats for participating homes within the specified electrical area.

21. **Are there any existing plans to expand ADMS and DERMS load and generation forecasting capabilities to single phase customers?**
    a. **If yes, please detail these plans.**

    Previously answered, response provided in Appendix.

b. If no, what is the reason for not pursuing inclusion of these portions of the grid?

Previously answered, response provided in Appendix.

22. Is there a lower cost communication pathway that can be leveraged to provide lower frequency[3] and longer response time[4] communication of short-term profile values to DER customers taking single phase service?

Previously answered, response provided in Appendix.

23. Should the Commission pursue non-bridging flexible connections as a way for single phase customers to avoid or defer grid upgrades? Please provide details as to how this could be implemented.

As mentioned previously, the technology to support non-bridging flexible connections will be available in the 2027-2028 timeframe, but there will need to be a determination of what value/compensation is sufficient for vendors/customers to enable such a program. It is not clear that such offerings will make sense for single phase customers, and as noted in response to question 20, single phase customers are not major drivers of grid upgrades.

With that said, SCE believes that this capability should be implemented via a mix of utility orchestration, i.e., where a utility would engage on direct dependable uses, while 3rd party aggregators would be utilized to reduce costs and complexity. SCE believes certain customers load profiles can be served with flexible connections, where the utility actively limits imports (example, EV charging) to avoid or defer grid upgrades. Key goals should be simple customer experience (i.e., zero actions post sign up), flexible programs and compensation schemes (i.e., based on load flexibility provided or the degree to which grid upgrades are deferred), and tiered incentives based on customer participations levels.

[3] PG&E currently communicates with FlexConnect customers at least once per day.
[4] Operational Flexibility events triggered under the Operational Flexibility functionality of the FlexConnect pilot have demonstrated responses on the order of 30 seconds.

SCE cautions that an overly complex system with insufficient compensation must be avoided; this was among the causes for the failure of the Distribution Investment Deferral Framework (DIDF).

24. **What current models or methodologies (e.g., AusNet Approximation algorithm, Asset Capacity Operating Envelopes, LV network approximation with AMI data, etc.) have the potential to provide low-cost static or variable operating envelopes for the purpose of minimizing or deferring distribution line or service upgrades on single phase feeders?**

    SCE's future operational capability for approximating a dynamic (variable) operating envelope is centered on our vendor's approximation forecasts. Initially, these forecasts of distributed energy resources (DER) and demand are constrained by both programming factors—such as flex-connection cost, aggregation cost, and optimization cost—and physical limitations, including voltage, thermal, and protection constraints. Subsequently, the forecasts are further optimized using controllable flexible assets via our Grid Management Optimization Engine, which incorporates both emergent and planned abnormal topology scenarios prior to the development of a full Dynamic Operating Envelope (DOE).

25. **Are there power control systems or smart inverter functions (e.g., voltage support or reactive power) that should be leveraged to maximize the available load and generation capacity for these low-cost options?**

    a. **If yes, are there existing solutions that can be quickly implemented without relying on ADMS/DERMS and communications?**

    SCE does not have a readily-available solution that would not rely on ADMS/DERMS. In order to maximize the available load and generation capacity, SCE must have visibility on real-time hosting capacity, and currently ADMS/DERMS is required for this visibility.

    b. **If yes, should we prioritize these solutions in addition to focusing on larger customers?**

    As noted above, SCE does not believe that prioritizing single phase customers is optimal at this point in the rollout of flexible connections.

26. **Are there aggregators/equipment manufacturers that have the capability to coordinate the power use of multiple single phase customer sites connected to shared infrastructure such that capacity can be safely shared within that infrastructure?**

    SCE does not have any specific recommendations in this regard.

    a. **If yes, what steps would be required to prove and scale the coordinated control of multiple sites for safe flexible connections?**

    Not applicable.

27. **Should Rules, Tariffs, or policies be modified in order to allow for the implementation of static or variable operational envelopes for single phase customers? If yes, please provide suggestions regarding the specific Rules, Tariffs, or policies, and any suggested modifications.**

    SCE submitted AL 5138-E on Nov. 9, 2023, requesting approval for the Load Control Management Systems (LCMS) Pilot, because SCE believed that certain Tariff changes were required to move forward with that pilot for large customers. While SCE has not looked specifically at expanding similar operational envelopes for single phase customers, it is possible that certain rule, Tariff, or policy changes would be appropriate.

Questions and Direction for Parties Regarding Dynamic Rates for Customers Utilizing Dynamic and Variable Operating Envelopes

No later than December 10, 2025, parties are directed to respond to the following question regarding alignment with dynamic rates.

28. **Should existing and new customers utilizing variable or dynamic operating envelopes be required to enroll in dynamic rate pilots, when available in their territory, and then be defaulted to dynamic rates when the pilots are no longer available? Please provide rationale for your response.**

    While there is merit to a deeper discussion on this topic, SCE does not endorse default enrollment of customers onto dynamic rates. Dynamic rate structures should remain opt-in rates for customers with advanced energy acumen who can effectively harvest load flexibility in response to dynamic price signals. Dynamic rates as proposed by SCE in its Dynamic Rate Applications are informed by day-

ahead grid conditions and vary on an hourly and daily basis[5] This variability means that customers have to manage the inherent risk of price changes, which can vary depending on how grid conditions fluctuate by hour each day. To manage this variability, customers are required to actively manage load response by deploying technology solutions to automatically adjust their electricity use. They can also choose to organically adapt their consumption habits in response to variable pricing. Such variability in load response makes such rate structures better suited as an offering in which customers proactively choose to participate.

Dynamic Operating Envelopes are likely to be informed by more recent data emerging from SCE's dynamic rates pilot. The generation and distribution components of SCE's dynamic rates are set algorithmically using historical relationships between CAISO load and distribution load. They are not informed by live distribution loading. Therefore, Dynamic Operating Envelopes, assuming they are informed by more recent operational data, will be more useful in providing distribution capacity when it is needed.

Depending on how incentives are provided for Dynamic Operating Envelopes, they may compensate for the same marginal distribution costs that are embedded within the pricing structure of SCE's pilot dynamic rates. This could result in double compensation. In the use case mainly focused in SCE territory, where the customers are enrolled in dynamic operating envelopes, supporting flex connections, there is a need to have localized dependability of direct control through dynamic operating envelopes. The only scenario where dynamic operating envelopes and dynamic rates can operate in the same location is where we have clear boundaries (between programs leveraging the same resources) and a clear dispatch priority (i.e., a resource may only be responding to a dynamic price when the dynamic operating envelope is not limiting import). SCE believes the pilots we are proposing will help the Commission and the IOUs understand whether it will be possible to structure dynamic pricing in coordination with dynamic operating envelopes as a way to stack resources' value.

[5] A.24-06-014 SCE's Application for a Large Power Dynamic Pricing Rate
A.24-12-008 SCE's Application for a Marginal Cost-Based Dynamic Pricing Rates In Compliance with Decision 22-10-022 And the CEC's Load Management Standards.

Appendix

SCE Comments on

Assigned Commissioner Ruling on Flexible Connections

R. 21-06-017, Track 3

Questions 1-15, 19, 21, and 22

Executive Summary:

SCE appreciates that the Commission has offered stakeholders the opportunity to share comments on a wide range of questions relating to topics within Track 3, Phase 1 of the High DER Futures Proceeding (R.21-06-017), which focuses on smart inverter operationalization (SIO). SCE understands that there is significant interest in using SIO to unlock non-firm capacity for larger customers, as well as operations during abnormal conditions. SCE agrees with these use cases.

Regarding unlocking non-firm capacity, SCE notes throughout these responses that development of its Advanced Distribution Management Systems (ADMS) and Distributed Energy Resource Management Systems (DERMS) are on track for full rollout in the 2027-28 timeframe. These technologies will underpin much of SCE's work on non-firm capacity.

Regarding abnormal conditions, SCE's Load Control Management System (LCMS) Pilot, approved under Advice 5138-E, has provided significant insights into current possibilities and potential near-term priorities. Thus far, the LCMS Pilot has used a static set of limits to allow for earlier energization. SCE anticipates using communication technologies and more dynamic controls in the future once available. SCE is open to exchanging best practices to inform the rollout of such bridging options.

SCE provides the following general observation regarding communication pathways from SCE's DERMS to the customer DER. Under the "direct connect" approach, a customer installs a 2030.5 "gateway" device allowing SCE to communicate directly to the customer via the 2030.5 protocol. The alternative pathway utilizes 2030.5 to communicate with a third party cloud service. Under this approach, SCE communicates with the cloud service provider (who will have a 2030.5 gateway), and the service provider communicates directly with the customer DER, translating signals if necessary into a different protocol. Within the context of 2030.5 communication, the cloud service provider is known as the "aggregator." This "aggregator" role can be performed by utilities or third-party aggregators.

SCE also offers a general observation regarding the function and role of aggregators. The term aggregator refers to multiple functions and roles: (1) the technical role of providing a

cloud service to serve as intermediary between DERMS and customer DERs, including translation of data, which appears to be the focus in Track 3 of the proceeding, or (2) a third-party program coordinator or operator, as is used commonly in customer programs. SCE recommends that the Commission clarify that for this Track, the term "aggregator" refers to the role of providing the 2030.5 cloud service and protocol translation, a function that may be provided by utilities or third parties. SCE notes that several questions appear to refer specifically to third-party aggregators; SCE has replied as such. Conversely, some responses refer generally to the 2030.5 cloud service role, to be performed either by the utility or third party.

While there will be a role for third-party aggregators in many situations, SCE anticipates that in some cases, the most cost effective approach is for the utility to utilize DERMS to make a direct connection via IEEE 2030.5. In this situation, there would be no "aggregator" at all. This would in part be due to cost: either it would be too high to make the service attractive to the customer, or the price for services will be set too low to attract third-party aggregator bids. Conversely, as discussed in various responses below, for many customers, connection via a 2030.5 cloud service (a.k.a. aggregator, either utility or third-party) will be more cost effective.

Questions and Direction for Large IOU Response Regarding ADMS/DERMS Capabilities that Unlock Non-Firm Capacity for Polyphase Customers

No later than November 25, 2025, each of the large IOUs are directed to respond to the following questions regarding ADMS/DERMS and their current technical capabilities. All other parties are also invited to provide responses to these questions, as they would like, no later than December 10, 2025. Response to these questions will allow us to gauge the status of capabilities that are foundational to establishing operating envelopes that provide non-firm capacity.

1. **Are IOU ADMS and DERMS currently capable of providing short-term (e.g., day-ahead or week-ahead) load and generation capacity forecasts suitable for variable operating envelopes for all locations on the polyphase distribution grid?**
    a. **If ADMS and DERMS are currently capable of providing short-term forecasts for variable operating envelopes, what is the maximum number of locations that can be forecast at the normal duration (e.g., day-ahead or week-ahead) with the current or planned level of resources?**

This capability is not currently available. However, this functionality is currently planned to be available in SCE's Grid Management system in the 2027-2028 timeframe.

b. **For ADMS and DERMS that are not currently capable of providing short-term forecasts, what other systems or manual processes have been used (e.g., in research projects, pilots, or demonstrations) to provide this capability?**

SCE demonstrated the use of short-term forecasting in SCE's Electric Assess System Enhancement (EASE) EPIC project.[1]

c. **For ADMS and DERMS that are not currently capable of providing short-term forecasts, what is the planned timeline for developing this capability? Please note if this timeline differs from the timeline presented in the most recent IOU filing (e.g., Operational Flexibility or Bridging report, GRC work paper, etc.).**

The capability to provide short term forecast capabilities is currently scheduled for 2027-2028. At the time of SCE's Bridging Strategies report in December 2024, the timeframe was stated as 2026-27.[2]

2. **Are IOU ADMS and DERMS currently capable of rapidly providing load and generation forecasts suitable for dynamic operating envelopes (e.g., hour ahead values) for all locations on the polyphase distribution grid?**
    a. **If ADMS and DERMS are currently capable of rapidly providing forecasts suitable for dynamic operating envelopes, what is the maximum number of locations that can be forecast at the normal duration (e.g., hour ahead) with the current or planned level of resources?**

[1] Information on EASE project can be found at: *Electric Access System Enhancement (EASE): Assessment of a Distributed Energy Resource Management System for Enabling Dynamic Hosting Capacity (Technical Report) | OSTI.GOV* and at *Electric Access System Enhancement: Assessment of a Distributed Energy Resource Management System for Enabling Dynamic Hosting Capacity | California Energy Commission*

[2] R.21-06-017, Southern California Edison Company's Plan and Compliance Report on Bridging Strategies and Solutions, Dec. 16, 2024, p. 7, a*vailable at*: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M550/K610/550610226.PDF

This capability is currently not available but currently planned for 2027-28, as with the capability discussed in question 1a.

b. **For ADMS and DERMS that are not currently capable of rapidly providing short-term forecasts suitable for dynamic operating envelopes, what is the planned timeline for developing this capability? Please note if this timeline differs from the timeline presented in the most recent IOU filing (e.g., Operational Flexibility or Bridging report, GRC work paper, etc.).**

See response to 1c.

3. **Please articulate with specificity, as needed, any additional functionalities that must be developed for ADMS and DERMS to be capable of providing short-term load and generation capacity forecasts to all customers located on the polyphase grid of the Large IOUs.**
   a. **If needed, please articulate with specificity any planned or anticipated resources that will be required for these additional ADMS and DERMS functionalities.**

SCE's ADMS and DERMS are currently anticipated to be capable of providing forecasts of short-term load and generation capacity in the 2027-2028 timeframe. SCE has already scoped out the plans for this rollout and does not anticipate additional resources not yet identified.

4. **With the understanding that the Large IOUs are at different stages of implementing their ADMS and DERMS capabilities, how can the Commission ensure that near-term solutions are provided to customers in a timely fashion?**
   a. **Please provide an estimated timeline for how long it would take to implement these solutions.**

See answer to 1a. SCE is willing to share its best practices and learnings, as well as learn from other IOUs. SCE therefore suggests that the CPUC set up a forum for exchange of these concepts if the CPUC is concerned about bringing all IOUs to the same level.

5. **If needed, what solutions should the Large IOU(s) at an earlier stage of ADMS/DERMS capabilities employ as interim measures as their ADMS/DERMS capabilities are building up?**

a. **Please provide an estimated timeline for how long it would take to implement these solutions.**

As interim measures, while ADMS/DERMS capabilities are functional and able to provide forecasted capacity, the SCE plans to continue to provide customers with the ability to use static LGP (for generation) in accordance with the LGP provisions in Rule 21.

Additionally, SCE hopes to continue providing flexible service connections using a static, scheduled firm capacity via SCE's Load Control Management System (LCMS) pilot. LCMS has been active since early 2024. The pilot is currently scheduled to end in January 2026, but SCE may seek an extension to continue the pilot until permanent guidelines are established in the Energization proceeding.

6. **Is there a limitation on the number of customers that can be provided day ahead variable operating envelopes (based on these short-term forecasts) through the Large IOUs' IEEE 2030.5 communications servers?**

SCE will employ scalable DERMS that can scale up as required. SCE's DERMS is designed to manage and dispatch up to 5 million DERs. Note that this does not mean direct communications with 5 million DERs, but rather orchestration of these DERs. For a majority of DERs, data collection and dispatch will be through third-party aggregators.

7. **Is there a limitation on the number of customers that can be provided dynamic operating envelopes (based on an assumption of hour ahead forecasts) through the Large IOUs' IEEE 2030.5 communications servers?**

Similar to the question above, SCE's DERMS is designed to manage and dispatch up to 5 million DERs, whether day ahead or hour ahead. SCE believes further analysis on performance as the programs scale up is warranted but notes that the DERMS vendor employed by SCE has been used by other utilities with millions of DER assets (e.g. in Australia) successfully. SCE can provide dynamic operating envelopes (DOE) with Common Smart Inverter Profile-Australia (CSIP-AUS), based on 2030.5, for DERMS right now. SCE would need aggregators to support CSIP-AUS if the DOE use case emerges before CSIP 2.0 is available and supported by DERMS and industry partners.

8. **Are there any communication functionalities required to provide variable or dynamic operating envelopes to customers on the polyphase electric grid that are not provided by the IOU CSIP/IEEE 2030.5 infrastructure?**

   CSIP is based on IEEE 2030.5-2018, and it is missing support for site export/import limits. SCE's DERMS supports the CSIP-AUS extension to provide these missing capabilities. IEEE 2030.5-2023 includes limit functions and SCE has requested their inclusion in the IEEE 2030.5.1 (CSIP 2.0) update.

9. **Please detail with specificity any plans, including projected timelines, to bring down the customer cost to receive variable or dynamic operating envelopes via direct communications[3] with IOU IEEE 2030.5 servers.**

   For most customers, SCE anticipates that the optimal communication solution will be via a 2030.5 cloud service platform ("aggregator"), which could be implemented by SCE or a third party. As discussed above, under this model, SCE DERMS connects to the cloud service via 2030.5, and the cloud service platform connects to customer DERs, translating to a different protocol as needed. This avoids the need for the customer to install the 2030.5 gateway, which should lower costs. SCE plans to enable third-party aggregators to provide this function. Direct communications with IOU IEEE 2030.5 servers will only be appropriate with larger customers that can cover the cost of the 2030.5 hardware. As noted previously, SCE will be able to support this capability in the 2027-28 timeframe.

   Another possible way to reduce cost is the integration of power control systems (PCS) with CSIP-approved devices such that only one device containing both communications and control directly to DERMS will be required. SCE notes that evolution of this technology is still necessary and may not yet be readily available, and may still only be applicable for larger customers.

10. **Are there any existing arrangements with aggregators that would allow those aggregators to coordinate the response of multiple customers?**

    The capability is currently not available, but SCE has several pilots in the design phase that will study flexible connections. Implementation of these pilots is expected to start in 2026.

[3] PG&E February 28, 2025 OpFlex Pilot Report at 23, "generally it is expected these costs to be in the $20k-$50k range."

11. **Please detail with specificity any plans, including projected timelines, for IOUs to enter into agreements with aggregators[4] that would reduce the per customer cost to receive variable or dynamic operating envelope data from IOU ADMS and DERMS.**

    Arrangements with aggregators are dependent on specific programs or pilots that include the use of capacity limits. Unlike with LCMS, it is expected that SCE would indeed need to contract with Aggregators in many types of programs to agree on what support they are providing with their fleet of contracted customers/DERs (and what benefits they receive from SCE for participation).

12. **Please detail with specificity the level of data that is provided to Community Choice Aggregators about large customers within your service territory.**

    SCE provides the same level of data about large customers that it provides regarding all customers. SCE provides a wide range of data on all types of customers to CCAs as required for CCAs to provide their customers with service. The data that SCE provides covers usage, billing, and program enrollment.

13. **Should Rules, Tariffs, or policies be modified in order to allow for the implementation of variable or dynamic operational envelopes for customers on the polyphase grid?**

    a. **If yes, please provide suggestions regarding the specific Rules, Tariffs, or policies, and any suggested modifications.**

    Changes to load rules (Rule 21, Rule 16 and Rule 29) will need to be updated to allow the use of dynamic operational envelopes. However, changes to these rules need to be carefully considered based on pilot learnings. At this time, SCE does not provide suggested changes as SCE has not spent sufficient time to evaluate the necessary rule changes.

    b. **If no, what Commission guidance and IOU action is needed in order to implement variable or dynamic operational envelopes?**

    As noted above, SCE is considering submission of an advice letter in the near future to extend its current LCMS pilot. The LCMS pilot currently includes only static FSC. However, as part of the extension to the pilot, SCE plans to propose implementation of dynamic operating envelopes. Approval of this advice letter

[4] https://www.pge.com/assets/pge/docs/about/doing-business-with-pge/TD-2306P-01.pdf, accessed on October 12, 2025; PG&E's COT lists the cost of integration with their 2030.5 system as $4,000, not including the customer side hardware, installation, and communications costs.

will enable SCE to being to implement dynamic operating envelopes within the pilot as soon as SCE's systems are ready.

Questions for Large IOUs Regarding Directed Maximum Capacity Values during Abnormal Grid Operation

No later than November 25, 2025, the large IOUs are directed to respond to the following questions regarding abnormal grid operations.

14. **Please estimate the annual number of abnormal grid operations due to emergent situations which utilize operational flexibility actions such as switching or curtailment to ensure reliable operation.**

SCE tracks approximately 50 instances (annually) where operational flexibility actions, such as switching or curtailment, have been performed to maintain grid safety or ensure reliability due to an emergent (non-planned) grid condition (such as due to equipment failure or car hit pole).

15. **Please estimate the annual number of abnormal grid operations due to planned events which require utilize [sic] operational flexibility actions such as switching or curtailment to ensure reliable operation.**

SCE tracks on average 20 instances annually (with 23 in the most recent year) where operational flexibility actions, such as switching or curtailment, have been performed to maintain grid safety/reliability due to a planned abnormal grid condition (such as for maintenance).

Questions for Parties Regarding Directed Maximum Capacity Values during Abnormal Grid Operation

No later than December 10, 2025, parties are directed to respond to the following questions regarding abnormal grid operations.

16. **Does the value provided by the ability to signal maximum import values via IEEE 2030.5 to sites on the polyphase grid during emergent abnormal grid operation justify the technical and contractual effort necessary to develop this ability?**

SCE to respond in second-round comments.

a. **How could such customer import direction be developed and implemented to maximize value and produce significant net benefit to the system?**

SCE to respond in second-round comments.

17. **Does the value to the system provided by the ability to signal maximum import values via IEEE 2030.5 to sites on the polyphase grid in anticipation of potential or planned abnormal grid operation justify the technical and contractual effort necessary to develop this ability?**

    SCE to respond in second-round comments.

18. **Should Rules, Tariffs, or policies be modified in order to allow for operator signaled maximum import capacity limits under abnormal grid operation?**
    a. **If yes, please provide suggestions regarding the specific Rules, Tariffs, or policies, and any suggested modifications.**

       SCE to respond in second-round comments.

    b. **If no, what Commission guidance and IOU action is needed in order to allow for operator signaled maximum import capacity limits under abnormal grid operations?**

       SCE to respond in second-round comments.

    c. **Please describe what implementation considerations may differ between signaled response to emergent abnormal conditions and operating envelope adjustment in response to planned abnormal conditions.**

       SCE to respond in second-round comments.

Questions Regarding Flexible Capacity for Single Phase Feeder Customers

No later than December 10, 2025, parties are directed to respond to the following questions regarding flexibility capacity for single phase feeder customers.

19. **Approximately what portion, in quartiles (e.g., 0-25%, 25-50%) of the Large IOU single phase customers have their service infrastructure modeled in power flow software?**

The next generation AMI system ("AMI 2.0"), with frequent disaggregated usage data updates provided to back office utility information systems (e.g. GMS), will enable more precise variable operating envelopes, in turn enabling more upgrade deferrals than would otherwise be practicable. For SCE, approximately 0-25% of single phase customers have their service infrastructure modeled in power flow software.

20. **Do parties favor adapting existing approaches (e.g., LLL, FlexConnect) to serve single phase customers, or taking a different approach?**
    a. **If parties favor a mix of adaptation and different approaches, please detail which elements (e.g., computing static operating profile, communicating day ahead values, etc.) should be adapted and which should use a different approach.**

    SCE to respond in second-round comments.

21. **Are there any existing plans to expand ADMS and DERMS load and generation forecasting capabilities to single phase customers?**
    a. **If yes, please detail these plans.**

    Per the answer to 1a, SCE will have this capability for single phase customers in the 2027-2028 timeframe.

    b. **If no, what is the reason for not pursuing inclusion of these portions of the grid?**

    Not appliable.

22. **Is there a lower cost communication pathway that can be leveraged to provide lower frequency[5] and longer response time[6] communication of short-term profile values to DER customers taking single phase service?**

    Using a third-party aggregator a 2030.5 cloud service platform (either managed by the utility or a third party) is the established cost-effective pathway for this use case. As discussed above, DERMS will connect to the cloud platform via 2030.5 and the cloud platform will connect to customer DERs. Once DERMS is operational in the 2027-28 timeframe, SCE would then orchestrate these DERs just as it would DERs to which it directly connects via 2030.5.

[5] PG&E currently communicates with FlexConnect customers at least once per day.
[6] Operational Flexibility events triggered under the Operational Flexibility functionality of the FlexConnect pilot have demonstrated responses on the order of 30 seconds.

23. **Should the Commission pursue non-bridging flexible connections as a way for single phase customers to avoid or defer grid upgrades? Please provide details as to how this could be implemented.**

    SCE to respond in second-round comments.

24. **What current models or methodologies (e.g., AusNet Approximation algorithm, Asset Capacity Operating Envelopes, LV network approximation with AMI data, etc.) have the potential to provide low-cost static or variable operating envelopes for the purpose of minimizing or deferring distribution line or service upgrades on single phase feeders?**

    SCE to respond in second-round comments.

25. **Are there power control systems or smart inverter functions (e.g., voltage support or reactive power) that should be leveraged to maximize the available load and generation capacity for these low-cost options?**

    SCE to respond in second-round comments.

    a. **If yes, are there existing solutions that can be quickly implemented without relying on ADMS/DERMS and communications?**

       SCE to respond in second-round comments.

    b. **If yes, should we prioritize these solutions in addition to focusing on larger customers?**

       SCE to respond in second-round comments.

26. **Are there aggregators/equipment manufacturers that have the capability to coordinate the power use of multiple single phase customer sites connected to shared infrastructure such that capacity can be safely shared within that infrastructure?**

    SCE to respond in second-round comments.

a. **If yes, what steps would be required to prove and scale the coordinated control of multiple sites for safe flexible connections?**

SCE to respond in second-round comments.

27. **Should Rules, Tariffs, or policies be modified in order to allow for the implementation of static or variable operational envelopes for single phase customers? If yes, please provide suggestions regarding the specific Rules, Tariffs, or policies, and any suggested modifications.**

SCE to respond in second-round comments.

Questions and Direction for Parties Regarding Dynamic Rates for Customers Utilizing Dynamic and Variable Operating Envelopes

No later than December 10, 2025, parties are directed to respond to the following question regarding alignment with dynamic rates.

28. **Should existing and new customers utilizing variable or dynamic operating envelopes be required to enroll in dynamic rate pilots, when available in their territory, and then be defaulted to dynamic rates when the pilots are no longer available? Please provide rationale for your response.**

SCE to respond in second-round comments.