



**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE
STATE OF CALIFORNIA**

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Order Instituting Rulemaking Regarding Policies, Procedures and Rules for Development of Distribution Resources Plans Pursuant to Public Utilities Code Section 769.	Rulemaking 14-08-013 (Filed August 14, 2014)
And Related Matters.	Application 15-07-002 Application 15-07-003 Application 15-07-006
(NOT CONSOLIDATED)	
In the Matter of the Application of PacifiCorp (U 901-E) Setting Forth its Distribution Resource Plan Pursuant to Public Utilities Code Section 769.	Application 15-07-005 (Filed July 1, 2015)
And Related Matters.	Application 15-07-007 Application 15-07-008

**MOTION OF SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E)
TO ESTABLISH A GRID MODERNIZATION
MEMORANDUM ACCOUNT**

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Pursuant to Rule 11.1 of the Rules of Practice and Procedure of the California Public Utilities Commission (Commission or CPUC), Southern California Edison Company (SCE) respectfully submits this Motion to Establish a Grid Modernization Memorandum Account (Motion) and requests authorization to file a Tier 1 advice letter establishing a memorandum account to track the revenue requirement for Grid Modernization¹ costs for 2017 (GM Memo Account).

I.

REQUEST TO ESTABLISH THE GM MEMO ACCOUNT

California, as led by this Commission, is spearheading a transformative energy policy to assure both the widespread deployment of distributed energy resources (DERs) and the innovative use of these resources to provide services and benefits to the grid. SCE is committed to this vision and recognizes that it must take concrete steps towards transforming its distribution system so that the company can accelerate the full integration of DERs.

It is with this responsibility in mind that SCE is proposing to begin a multi-year process necessary to lay the foundation for realizing the Commission's environmental goals and policies in advance of a Commission decision in SCE's next General Rate Case (GRC). SCE is concerned that delays in laying this important distribution system foundation could present multiple challenges to meeting both the goals and the time horizons laid out by the Commission for the implementation of the Distribution Resources Plan (DRP). SCE, therefore, would like to begin the initial work to support the DRP objectives and is respectfully seeking Commission authority to file a Tier 1 advice letter establishing the GM Memo Account to record the 2017 revenue requirement for Grid Modernization capital costs. As is explained in more detail herein, the process of modernizing and reinforcing the distribution grid to enable the accelerated

¹ For purposes of this Motion, SCE uses the term "Grid Modernization" to refer to the suite of modernization and grid reinforcement expenditures that SCE plans to make in 2015-2018 and beyond, as further described herein.

penetration of DERs while supporting reliable and affordable service to all customers requires building upon sequential planning, engineering, procurement and installation of distribution system components and upgrades before and during the 2018 SCE GRC period.

A. California Is in the Midst of Shaping Its Clean Energy Future

California is in the midst of broad policy efforts, through both legislation and regulation, to assure the growth of DERs by creating new opportunities for both DER market participation and revenue streams that could support DER proliferation. At the Commission, in particular, the work to promote the growth of renewable and distributed resources includes this DRP proceeding, the Integrated Distributed Energy Resources (IDER) proceeding, net energy metering, myriad energy efficiency and demand-side management programs, the Renewables Portfolio Standard, and the ongoing initiatives to integrate electric vehicles and energy storage.² These efforts are also echoed at the federal level. For example, since the inception of the DRP, the California Independent System Operator Corporation (CAISO) made a Distributed Energy Resources Program (DERP) filing to revise its tariff³ that was recently approved by the Federal Energy Regulatory Commission (FERC). The DERP is intended “to facilitate participation of distribution-connected or ‘distributed’ energy resources in the CAISO’s [wholesale] energy and ancillary services markets,” and CAISO has noted that “[t]he number and types of distributed energy resources are growing and represent an increasingly important and larger part of the future resource mix.”⁴ Similarly, FERC Staff initiated an inquiry to determine “whether barriers exist to the participation of electric storage resources in the capacity, energy, and ancillary

² For a list, see *Assigned Commissioner’s Ruling on Guidance for Public Utilities Code Section 769 – Distribution Resource Planning*, dated February 6, 2015 (DRP Ruling), Final Guidance attached, at pp. 8-10 for an illustrative list.

³ FERC Docket No. ER16-1085-000, CAISO Tariff Amendment - Distributed Energy Resource Provider Initiative (March 4, 2016), at p. 1 (DERP Filing).

⁴ *Id.*, see also, FERC Presentations on Grid Modernization, including Department of Energy (DOE) Grid Modernization Presentation “*Grid Modernization Initiative*” (describing DOE’s aggressive grid modernization strategy over the next five years) dated April 21, 2016. Available at <http://ferc.gov/industries/electric/indus-act/smart-grid/DOE.pdf>.

service markets in the RTOs and ISOs” and whether “any tariff changes are warranted” to address such barriers.⁵

Ongoing regulatory efforts to support the proliferation and market opportunities for DERs can accelerate DER penetration, and there is evidence that adoption of DERs is increasing at a rapid rate. According to the annual utility solar market survey conducted by the Smart Electric Power Alliance (SEPA), SCE connected 1,258 new MWs of residential, commercial and utility-scale solar power to the grid in 2015, more than any other utility in the United States.⁶ In recent years, behind-the-meter solar photovoltaic (Solar PV) growth has increased more than SCE could have anticipated. In SCE’s 2015 GRC, SCE forecasted annual Solar PV growth (residential and commercial & industrial) of around 21% system-wide.⁷ In fact, Solar PV growth has increased 40% percent per year from 2013-2015.⁸ SCE is forecasting this rate of growth to continue. This growth rate is higher than even the “very high potential growth in DERs” scenario (scenario 3) forecasted in SCE’s July 2015 DRP Application. Under that scenario, SCE forecasted 4,770 MW of Solar PV (nameplate AC) by 2025 within SCE’s service territory.⁹ SCE’s most current forecast, which will be included in SCE’s upcoming 2018 GRC filing, predicts over 6,400 MW of Solar PV in SCE’s territory by 2025.¹⁰ In addition, we have seen high numbers of customers applying under the Net Energy Metering (NEM) tariff to install solar PV, averaging 5,000 applications per month since 2015.¹¹

⁵ See FERC Docket No. AD16-20-000, Electric Storage Participation in Regions with Organized Wholesale Electric Markets.

⁶ See *SEPA's 2015 Utility Solar Top 10: Utilities Make Solar Smart*, dated April 12, 2016, available at: [https://www.solarelectricpower.org/about-sepa/sepa-news/press-releases/sepas-2015-utility-solar-top-10-utilities-make-solar-smart-\(1\).aspx](https://www.solarelectricpower.org/about-sepa/sepa-news/press-releases/sepas-2015-utility-solar-top-10-utilities-make-solar-smart-(1).aspx).

⁷ See Appendix A for underlying data.

⁸ *Id.*

⁹ See SCE’s DRP Application, Table II-6, Scenario 3 SCE Territory Amounts of DER Deployment by 2025 at p. 80.

¹⁰ See Appendix A for underlying data.

¹¹ This is based on monthly NEM applications received.

In addition to accelerated growth in distributed solar, the grid is also seeing dramatic growth in distributed storage. Through SCE's Local Capacity Resources (LCR) solicitation and SCE's first stand-alone storage solicitation, SCE has procured over 200MW of distribution and customer-connected storage.¹² Additionally, SCE has forecasted 50 MW of customer-connected storage will be deployed through customer-incentive programs.¹³ And this does not include the several ongoing procurement activities that may deploy additional distributed storage, such as SCE's Preferred Resources Pilot, SCE's 2016 stand-alone storage solicitation, and the Aliso Canyon energy storage solicitation.

Hawaii serves an example of the problems that can arise when the grid is not prepared to handle high penetrations of solar and other DERs. In Hawaii, large penetrations of customer-owned generation, over which utility system operators lack adequate visibility and control, have been interconnecting to the system at a rapid rate. The electric utility, which has not had sufficient time to modernize its system to facilitate this trend, has instead had to slow DER interconnections and place strict limits on incentives programs in order to maintain system reliability.¹⁴ The lesson from the Hawaii experience is that California should prioritize modernization of the grid to support timely, unhindered integration of DERs.

The DRP, which is a critical component of California's clean energy and technology innovation policies, aims to undertake the important and what "may be considered ground-breaking"¹⁵ process of "moving the IOUs towards a more full integration of DERs into their distribution system planning, operations, and investment."¹⁶ This requires the investor-owned utilities (IOUs) to chart a path forward that would:

¹² See A.16-03-002 et al., *SCE's 2016 Energy Storage Procurement Plan*, SCE-01 Opening Testimony of G. Stern, p. 28, Table III-9.

¹³ *Id.*

¹⁴ See St. John, Jeff, *Hawaii's Solar-Grid Landscape and the 'Nessie Curve'*, Greentech Media, (February 10, 2014) available at: <http://www.greentechmedia.com/articles/read/hawaiis-solar-grid-landscape-and-the-nessie-curve>

¹⁵ DRP Ruling at p. 5.

¹⁶ *DRP Order Instituting Rulemaking* (DRP OIR) at p. 4.

- 1) modernize the electric distribution system to accommodate two-way flows of energy and energy services throughout the IOUs' networks;
- 2) enable customer choice of new technologies and services that reduce emissions and improve reliability in a cost efficient manner; and
- 3) animate opportunities for DERs to realize benefits through the provision of grid services.¹⁷

As SCE understands this vision, the DRP charges the utilities with modernizing the grid in a way that enables DER proliferation and customer choice of energy usage and provides revenue and service opportunities for DER providers. That is an important and comprehensive task, made all the more pressing and necessary by the various State and Federal initiatives aimed at DER growth and the timetable envisioned by the Commission for the DRP implementation.

B. The Commission's DRP Vision Serves As the Impetus for SCE's Grid Modernization Proposal

The Final Guidance attached to the DRP Ruling, issued on February 6, 2015, contemplated a ten-year phase-in for the DRP.¹⁸ As SCE understands this vision, by the 2025-2026 time period, a significant amount of work must take place to create an infrastructure that will support widespread DER deployment, create opportunities for DERs to provide grid services and enable the development of new markets for DERs. SCE supports this bold timeline and the potential broad benefits that Grid Modernization can hold for its customers and the State of California.

However, this time horizon poses two challenges in SCE's view. First, SCE's 2015 GRC, which predated the DRP, did not contemplate the kind of Grid Modernization work that, as described below, SCE believes it must undertake to support both the vision and the time horizon set forth in the DRP. As such, SCE is not currently collecting revenues through customer rates

¹⁷ DRP Ruling at p. 3.

¹⁸ DRP Ruling, Attachment, Guidance for Section 769 – Distribution Resource Planning, (Final Guidance) at p. 11 (“Commission Staff have developed recommendations for a phased approach to the DRP process over a 10-year time horizon and synchronized with GRC, LTPP and TPP processes.”).

to support the potential level and pace of Grid Modernization described in this Motion. Second, is the sheer size of the physical system that must be modernized within the next ten years. SCE's distribution grid includes 4,636 distribution circuits fed by 790 substations across approximately 50,000 square miles – even on an accelerated basis and starting right away, SCE will need to take action between now and 2020 to set the foundation for the type of changes contemplated by the Commission and the rate of DER growth SCE is seeing on its system to make modifications and upgrades to a meaningful portion of these circuits by 2025.

1. **In 2015 and 2016, SCE Began Planning and Preparing for Grid Modernization**

Transforming the distribution grid requires careful planning, architecture design, development of vendor and supplier relationships, and preparation in order to have the appropriate personnel and sufficient resources in place to execute needed work. Because SCE is well aware of these practical realities, SCE began the initial work on Grid Modernization in 2015 and 2016. This work included efforts to start designing a distribution system architecture that leverages state-of-the art distribution and substation automation devices to gather data on system and DER conditions, communication systems to transport that data, and analytics systems to make that data useful for planning and operations activities.

In 2016, SCE has deployed and will continue deploying small amounts of this kind of distribution automation equipment to test, on a limited scale, new automation technologies for anticipated deployment on a widespread basis required to support the pace of DER penetration that is underway and expected to grow. SCE also developed design and construction standards for substation automation and initiated projects to test the new automation technology. Finally, SCE developed specific business requirements for communications infrastructure, operational and planning tools, and initiated procurement and implementation activities. All told, SCE anticipates expending approximately \$37 million on Grid Modernization capital projects in

2016 – which projects will go into service in 2017 and beyond – as an important step to more extensive system improvement needs in 2017 and through the 2018 GRC period.

2. In 2017, SCE Intends to Embark on More Widespread Grid Modernization Efforts

Building on the groundwork laid in 2016, and as described in more detail below, in 2017, SCE proposes to engage in more widespread automation across its system, continue to procure and design operational tools and communication systems, and implement planning tools to further develop the capabilities necessary to integrate DERs into SCE’s system. SCE forecasts that its 2017 Grid Modernization capital expenditures will more than double from 2016 levels as SCE’s grid modernization projects are spread across more of SCE’s distribution system and as the planning work done in 2016 enables SCE to begin implementing Grid Modernization projects. The approximately \$100 million of capital expenditures that SCE expects to place in service in 2017 (and that SCE seeks to track in the GM Memo Account)¹⁹ are necessary for the large-scale grid transformation work that SCE intends to implement in 2018 and beyond to meet the pace of DER penetration SCE is seeing on its system and as envisioned by the Commission.

3. In 2018 and Beyond, SCE Intends to Place Many More of These Grid Modernization Projects Into Service and Engage in Large-Scale Grid Transformation

In addition to the 2017 expenditures that are the subject of this Motion, there are many more capital expenditures planned for 2017 that would not enter service until 2018 and beyond. SCE’s planned schedule for this work – both the system modification and upgrades that enter

¹⁹ The GM Memo Account would only track the revenue requirement for capital expenditures, not O&M. Moreover, only the revenue requirement for capital expenditures that go into service within the period of the GM Memo Account (2017) would be tracked. However, there are many other Grid Modernization projects that may start in 2017, but because these projects do not go into service until 2018 or perhaps beyond, the revenue requirement for these expenditures will not be tracked in the GM Memo Account.

service in 2017 and work that may begin soon or even be underway, but will not go into service until 2018 and beyond – includes incremental steps that enable the Commission’s vision to be implemented in a timely manner. SCE expects that its efforts to modernize and reinforce the distribution system will continue to build each year, requiring substantially more effort in the 2018 timeframe and beyond to meet the DRP vision of unhindered integration of expected DERs.

SCE needs to secure additional construction resources needed to execute Grid Modernization improvements. This, in coordination with other infrastructure replacement and distribution upgrade work over SCE’s vast service territory, cannot be achieved through a quick step-up of work upon receipt of a final decision in SCE’s test year 2018 GRC. A more gradual, multi-year approach is needed to enable steady and sustainable progress. For this reason, implementation needs to begin in earnest now to adhere to the DRP timeframe.

Broadly speaking, the work in 2018 and beyond includes the continued and expanded effort into system automation that began in 2016. This includes accelerated and widespread installation of state-of-the art automation and control capabilities, which will allow SCE to safely interconnect, enable, and optimize DERs due to additional switching and restoration capabilities. These automation efforts will increase the visibility and control that system operators have over the distribution grid. This visibility is imperative to maintaining grid reliability in light of the increasing numbers of DERs. These capabilities will evolve into a platform for a distribution system market in which DERs will be able to operate in a manner that is beneficial to distribution system operations and at times meet wholesale energy needs in the CAISO market. Likewise, through installation of fiber optic cable, wireless communications, and adoption of internet-based connectivity protocols,²⁰ SCE will update telecommunications so vital to its other

²⁰ The current protocols are based on 1980’s technology and are typically proprietary to the equipment manufacturer, which limits interoperability and sharing of the communications channel with third parties. Internet based protocols allow for flexibility in implementing additional requirements such as cybersecurity and system upgrades.

Grid Modernization efforts. SCE will also be transforming its system planning process to consider how DERs can be expanded while supporting, or not adversely impacting, reliability on the system.

Additionally, the expected growth in DER connections requires reinforcement of SCE's grid infrastructure to enable customers to more rapidly deploy DERs. This is a proactive approach designed to upgrade the grid infrastructure to accommodate DER growth and address SCE's aging infrastructure. As part of this work, SCE will accelerate conversion and cut-over of 4kV circuits to higher voltages. Similarly, whereas under the current grid configuration, circuits tend to be more robust near the substation, SCE will upgrade circuits through reconductoring and adding circuit ties to accommodate distributed resources which may be located anywhere along a circuit. These features are important to maintain operational flexibility of the grid and are utilized, in conjunction with distribution automation, to reconfigure circuitry during abnormal conditions such as maintenance activity or outage conditions. Through these efforts, customers will be less constrained in their ability to deploy DERs, or to have third parties do so, simply due to existing voltage or other system constraints. As an increasing number of generation sources and energy storage devices are added to the grid, and as SCE further automates its distribution system to create greater situational awareness, distribution circuit ties and increased capacity will be needed closer to DERs to maximize flexibility, improve reliability, and convey the compatibility of DERs and their associated value to the grid. While SCE's grid reinforcement activities will not go into service before 2018, the long-lead time required of these important projects means that SCE needs to begin accelerating the work today.

C. SCE Seeks to Establish the GM Memo Account for 2017 to Enable Grid Modernization

The DRP Ruling recognized that an "inevitable consequence of these rapidly evolving changes to utility distribution" is "the need to add new infrastructure, enhance existing networks and adopt new analytical tools to allow consumers to be active managers of their electricity

consumption through the adoption of DERs.”²¹ SCE is respectfully proposing to track the 2017 revenue requirement in the GM Memo Account so that it can begin this work in earnest without retroactive ratemaking concerns, as opposed to reprioritizing other important capital projects or delaying the ability to enable the distribution system to accommodate more DER penetration by waiting for its 2018 GRC to be decided. SCE anticipates that it would need to track the revenue requirement associated with capital expenditures of approximately \$100 million for automation and IT expenditures placed-in-service in 2017.²² The capital investments specifically at issue for this GM Memo Account are scheduled to begin service in 2017 and are described in more detail below.²³ As explained, there are more capital expenditures planned for 2017 that would not enter service until 2018 and beyond, many of which will be addressed in the 2018 GRC. At this time, based on the pace of Grid Modernization envisioned in its 2018 GRC filing and subsequent GRC filings, SCE expects Grid Modernization capital expenditures to continue on significant portions of its system beyond 2025.

1. Substation Automation

The technology historically deployed in SCE’s substations was designed to provide sufficient data to operators and engineers to support a one-way power flow system. The next generation of substation automation includes installing computing systems, enhancing telemetry, and creating the capability to collect and modify relay settings and operate circuit breakers remotely. Substation automation, when combined with distribution automation technology, and the improvement of our communications networks (which SCE is planning to install in the

²¹ DRP Ruling at p. 3.

²² These numbers represent only a forecast of the expenditures that would be recorded in the GM Memo Account and are intended to give the Commission a general sense of the scope of the investments contemplated by SCE. Also, the investments to be tracked in the GM Memo Account represent only a portion of the foundational investments.

²³ As explained more fully below, the revenue requirement recorded in the GM Memo Account could only be considered for inclusion in rates, in a separate proceeding, if the expenditures are incremental to 2015 authorized amounts.

2018-2019 timeframe) will allow SCE operators to coordinate the operation of grid devices and DERs. For example, the operation of a substation circuit breaker could be closely coordinated with the operation of multiple remote-controlled switches located along a distribution circuit to isolate the effect of a system disturbance to a minimal number of customers and at the same time optimize the output from DERs to support grid reliability. Properly planned and installed in advance, substation automation will provide necessary analytics and controls to enable DERs to perform, and be compensated for, grid services, while providing utility operators with the ability to manage reliability using both load and DERs.

2. Remote Fault Indicators

SCE currently has an aged fleet of fault indicators – devices that passively monitor for fault current on conductors and, upon sensing fault current, activate a flashing light to alert company personnel. Newer models of remote fault indicators can provide dual benefits of remotely providing two-way power flow data and remote indication of system failure locations, resulting in decreased time to respond to abnormal conditions. The new remote fault indicators will monitor current along the distribution line and remotely communicate this information to the Distribution Management System used by SCE’s operators. This will provide operators with information about real-time conditions so they may make accurate decisions about necessary actions to maintain system reliability. These devices are individually relatively inexpensive and easy to install in a variety of locations, serving as a very versatile solution to improve grid insight and promote system reliability.

Installation of new remote fault indicators is particularly necessary as more DERs increase the complexity of the grid. DERs can mask load and create backflow situations that are unknown to operators and could pose safety risks to customers and utility workers absent the improved visibility into subsections of circuits. For example, the power flow along a distribution circuit will likely fluctuate during the day, and often change direction on various sections of distribution circuits, as customer energy use and customer-sited generation fluctuates. These

types of fluctuations are not visible to the distribution operator today. If an abnormal condition were to take place, such as a car hitting an electrical pole, the operator would be unable to predict the power flow as a result of switching operations given possible reverse power flows from DERs and would not be able to open and close switches readily to restore power. This circumstance would increase the duration of outages to customers.

To support the increasing levels of DERs, a large number of these remote fault indicators can be placed along a distribution line to provide greater visibility to operators about the current flows along the distribution line. SCE is proposing to accelerate replacement of outdated controls and sensors with newer, more sophisticated versions geared to addressing system issues and opportunities associated with the growing numbers of DERs. SCE will prioritize the deployment of these devices on circuits where DERs can, in SCE's view, provide grid benefits and those in greatest need of reliability upgrades, however, it will take many years to deploy these devices even on a subset of our 4,636 circuits, so it is important that SCE begin the replacements and deployment of many new devices as soon as possible and to do so in areas where DERs are most likely to be deployed.

3. Remote Switching Equipment

Switches create the ability for operators to assess the bidirectional power flow and to disconnect a line segment from one circuit and move it to another, thus changing the source of energy for that circuit. Switches also allow line segments to be isolated from the grid entirely when there is a problem on that segment. Remote control switches increase the flexibility available to grid operators. This flexibility is important to maintain reliability as DERs proliferate on the distribution system. These are especially needed in urban locations where multiple circuits are interconnected to allow reconfigurations to take place during conditions caused by planned or unplanned outages. Additionally, this flexibility can minimize outages and other reliability impacts to customers when performing repair and maintenance activities.

The added flexibility enabled by remote switching capability will continue to be a critical tool in operating the grid in light of new demands being placed upon it. With increasing levels of DERs, reconfiguring distribution circuits becomes more complex. As DER levels increase, these reconfigurations will not only include power consuming customers, but will also include power producing customers and dynamic energy storage devices, which can deliver energy to meet customer demand, potentially in lieu of distribution upgrades and consume and store excess energy when a surplus exists. Adding more remote switches to the system will create more visibility and flexibility for grid operators to reliably operate the system in these dynamic conditions. Providing more granular options for reconfiguration will limit the potential negative impacts from moving large amounts of distributed generation or energy storage.

As with remote fault indicators, SCE plans to begin installing these switches in targeted locations where DERs may provide grid benefits and in areas in the greatest need of reliability upgrades. The number of locations where DER benefits can be realized and where such improved operations can or will be needed will grow as DER penetration, and experience with their operation, increases. In addition to providing system flexibility, remote-controlled switches will be augmented with sensors to give operators real-time visibility into DER operations and their impacts on system performance such as voltage, current, and power flow. Installation of remote-controlled switches with advanced telemetry capabilities will replace SCE's ongoing deployment of similar devices that lack these capabilities. This will allow grid operators to quickly and remotely reconfigure the distribution system in response to abnormal or emergency situations. Fast response capability for grid reconfiguration will be necessary to maintain system reliability and resiliency and optimize the compatibility of DERs and their associated value to the grid.

4. Information Technology Systems Upgrades

SCE intends to develop the following information technology systems to connect and integrate DERs.

Distribution Resource Plan External Portal (DRPEP) – SCE intends to develop the DRPEP, a user-friendly, web-based interface that provides customers with immediate access to available information regarding circuit interconnection capacities, such as the information included in SCE’s Integration Capacity Analysis (ICA) required by the Commission in the DRP. The DRPEP builds upon the Distributed Energy Resource Interconnection Maps (DERiM) proposed by SCE in its DRP Application filed in compliance with the requirements of the DRP Ruling and will support informed DER interconnection decisions.

Grid Interconnection Processing Tool (GIPT) – The GIPT is intended to be a single, web-based user interface that allows customers to submit interconnection requests for generation, load, and combinations thereof connecting under any of SCE’s interconnection tariffs or connecting as load. The GIPT, when combined with the other Grid Modernization programs, will allow customers to track the status of their interconnection application, enable SCE to provide more accurate interconnection responses in a shorter time period, and reduce the backlog of interconnection requests, which will be critical as DER penetration increases.

System Modeling Tool (SMT) – The DRP requires utilities to make available, through the ICA, information regarding the ability of each circuit “node” to accommodate DER generation without requiring infrastructure upgrades, or to better identify where upgrades are needed to accommodate DERs. This requirement is currently being satisfied with SCE’s DERiM maps, which are available on SCE’s website. However, the data currently available through DERiM are approximate values based on extrapolations of analyses performed on a limited number of statistically representative circuits. SCE intends to develop the SMT and leverage additional data from smart meters and automated equipment; this will enable SCE engineers to perform accurate and near-real time power-flow analyses of the electric system to provide grid operators with detailed information to ensure that voltage limits, thermal limits, and protection settings continue to be met as DER penetration increases. This tool will be used to provide

generators with information about upgrade costs associated with interconnection requests.²⁴ The CAISO's DERP initiative to create wholesale energy revenue streams for qualifying DERs will also contribute to the need for greater numbers and types of such analyses, beyond the efforts of the Commission-initiated DER penetration acceleration efforts in the DRP and IDER proceedings.

Grid Analytics Application (GAA) – The addition of DERs throughout the distribution grid will present challenges in planning new circuits, extending existing circuits, or designing work orders for infrastructure replacement. Without access to real-time information regarding loading and generation throughout each distribution circuit, planners will not be able to accurately size conductor or line transformers to meet the combination of customer load changes and DER penetration increases. Without such information, planners will be compelled to utilize conservative, and unnecessarily expensive, assumptions in their planning, or conservatively constrain the level of DER penetration on a specific circuit.

To address this issue, SCE intends to develop the GAA tool, software that will (1) provide the necessary user interface between engineers, operators, and distribution grid designers in using large data, including smart meter data, weather data, outage data and SCADA data, and (2) enable system planners to perform statistical analyses of data on historical field measurement trends, circuit voltage degradation, line transformer utilization, phase identification, operating circuit violations and accuracy of transformer to meter relationships in order to more accurately plan the system.

Long Term Planning Tool (LTPT) – SCE's current set of planning tools cannot facilitate the analyses required to plan for the future grid, such as development of load and DER profiles, more granular forecasting, and evaluation of where DERs can enhance grid reliability. SCE requires a new set of tools to develop long-term load, DER and generation forecasts and to

²⁴ SCE will design the SMT to accommodate the various methodologies being considered in the ICA Working Group in the DRP.

perform various technical studies and analyses. The LTPT is a set of software tools that will enable SCE engineers to plan future circuit modifications given the challenges and complexities of the evolving grid.

Grid Connectivity Model – The current process for analyzing distribution circuits requires extensive manual verification and validation and is time consuming. Given this current condition, it is impractical for SCE to manually model each of its distribution circuits. SCE intends to develop the Grid Connectivity Model, a software model of the complete SCE electrical grid. This model will replace existing disparate and disconnected models and will serve as the single centralized source of connectivity data for all assets from bulk generation down to the distribution line transformer level and will promote data consistency, centralization, and maintenance of up-to-date information.

D. Establishment of the GM Memo Account Will Not Prejudge or Impede the Outcome of Important Policy Decisions

SCE recognizes that such underlying issues as “[g]rid modernization investment/deferral framework,” “grid modernization function need to be deployed to support full DER integration” and “[i]ntegration of DRP into distribution infrastructure, planning, and investment,” are part of Track 3 and will be the subject of further Commission guidance.²⁵ SCE looks forward to working with all parties and the Commission on these issues, but believes that the Grid Modernization work it proposes to undertake is foundational to any Commission resolution of these policy matters and will neither prejudge nor preclude any outcome ultimately directed by the Commission.²⁶ Rather, the Grid Modernization work will enable the actualization of the

²⁵ *Scoping Memo and Ruling of Assigned Commissioner and Administrative Law Judge, Including Deconsolidation of Certain Proceedings and a Different Consolidation of Other Proceedings*, at pp. 11-12 (January 27, 2016) (DRP Scoping Memo).

²⁶ The GM Memo Account proposed in this filing is intended only to record general grid modernization investments, which is part of Track 3 of this proceeding. In SCE’s DRP Application, SCE requested authorization to establish a Distributed Energy Resources Memorandum Account, separate from this proposed GM Memo Account. If the requested account had been authorized, its scope may have

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Commission guidance in Track 3 and that is why SCE believes it is important to begin the initial work on modernizing its grid.

E. The GM Memo Account Comports With Commission Precedent

As noted above, SCE's 2015 GRC predated issuance of the DRP. Therefore, activities and expenditures of the scope, specific nature, and volume contemplated in the DRP were not included in SCE's 2015 GRC. SCE's 2015 GRC did not foresee the need for nor did it include a forecast of the Grid Modernization expenditures described in Section C so SCE is not currently recovering any of those costs in currently authorized customer rates. As such, SCE is proposing to make the Grid Modernization investments described in Section C and seeks authorization to establish the GM Memo Account to record the revenue requirement associated with Grid Modernization expenditures going in service in 2017 for future Commission review.

The GM Memo Account will be used to track the recorded revenue requirement on Grid Modernization expenditures which begin service in 2017. SCE could then seek recovery of any incremental revenue requirement in a future ratemaking proceeding without violating the prohibition on retroactive ratemaking. The Commission has a long history of using memorandum accounts to avoid retroactive ratemaking problems so that "if recorded costs are

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included the interim revenue requirement funding for the demonstration projects. The Commission's DRP Scoping Memo designated Track 2 focusing on the specific Demonstration Projects as ratesetting because it may need to "identify and authorize funding to conduct these demonstration projects." (DRP Scoping Memo at pp. 8-10.) The Commission also indicated that Track 1 and Track 3 would be quasi-legislative. (*Id.* at 13) Therefore, SCE's request for a memo account to record the interim revenue requirement on Track 3 Grid Modernization investments and all communications pertaining to this request fall within a quasi-legislative proceeding. This Commission has previously authorized establishing memorandum accounts in quasi-legislative proceedings (*see, e.g., Rulemaking 10-02-005, Scoping Memo of Assigned Commissioner*, at p. 2 and n. 2 explaining that utilities authorized to establish memo accounts using Tier 1 advice letters in that quasi-legislative proceeding). This is consistent with Commission precedent that memo accounts do not set rates (*see SCE v. CPUC*, 85 Cal. App. 4th 1086, 1102 (December 29, 2000)). To the extent, however, the Commission believes that this Motion transforms any part of this Track 3 into a ratesetting matter, SCE would welcome such clarification.

subsequently approved for recovery in rates, there will be no confusion or entanglement of issues regarding retroactive ratemaking.”²⁷

SCE will include the rate base forecasts for these investments as a part of its 2018 GRC, to be filed September 1, 2016. Assuming the Commission finds those forecasts reasonable, SCE would begin to recover the revenue requirement on the remaining undepreciated balance of our 2017 Grid Modernization capital additions as part of the 2018 rate base. These additions to rate base for the projects entering service in 2017 will be accompanied by a complete evidentiary showing, as with any rate case.

Establishing the GM Memo Account will not allow SCE to add the costs recorded in the GM Memo Account to customer rates. Nor will the GM Memo Account prejudge SCE’s right to recover the recorded costs. Rate recovery for the costs recorded in the GM Memo Account will require SCE to provide sufficient evidence of the reasonableness of the expenditures in a subsequent ratemaking proceeding. As such, the GM Memo Account in no way limits the Commission’s ability to review the reasonableness of SCE expenditures and the 2017 revenue requirement.²⁸ The GM Memo Account is also limited in scope and duration – because most of

²⁷ D.03-05-076 at pp. 6-7, citing D.99-11-057, 1999 Cal PUC LEXIS 769. *See, e.g.*, D.13-11-002 and SCE Advice 2985-E at p. 3 (authorizing utilities to establish memorandum accounts to track costs related to the plug-in electric vehicle submetering pilots because of the uncertainty of total costs for the submetering pilots and to ensure timely implementation of the pilot program); D.09-09-029 and Advice 2389-E (authorizing the Smart Grid memorandum account to track DOE-approved project costs associated with its proposed Tehachapi Wind Energy Storage Project, among others); and D.06-06-034 and 2345-E (authorizing establishment of a memo account to record O&M expenses and investment-related costs associated with Eldorado Ivanpah Transmission Project studies and project development activities needed to support renewable integration and the RPS, in the event FERC refused to approve such costs).

²⁸ The criteria used by the Commission for amortization of GM Memo Account costs will require SCE to demonstrate that: 1) The costs recorded in the memorandum account are not covered by other authorized rates; 2) SCE acted prudently when it incurred these costs; 3) SCE paid reasonable amounts for these costs; and 4) it is appropriate for ratepayers to pay for these costs in addition to otherwise authorized rates. Resolution W-5037, *Ordering Authorizing Request To Implement A Surcharge To Amortize And Recover The Balance Of \$74,102 Recorded In Its Single Audit Act Memorandum Account*, 2015 WL 3397178 (Cal.P.U.C.) (May 21, 2015). SCE bears the burden of proof and must demonstrate that it meets the above criteria by a preponderance of the evidence. *See* Decision 11-12-023, *In the Matter of the Application of San Diego Gas & Electric Company (U902E)*

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the assets have significant tax benefits in the first year, the forecast revenue requirement for 2017 is not expected to exceed \$5 million.

Not only are memorandum accounts not determinative of cost recovery, they are a matter within Commission discretion and this Commission has denied requests to establish them for such reasons as lack of a way to establish that the costs at issue would actually be incremental or where the expenditures in question were not unforeseen.²⁹ SCE believes that neither of these two concerns is present in this case. First, as explained above, SCE could not have foreseen the need for Grid Modernization projects, because they are directly related to a statute and Commission policy developed after SCE's 2015 rate case was filed. Second, the Commission here can clearly determine whether or not the expenditures recorded in the GM Memo Account will be incremental to SCE's previously authorized forecasts adopted in the 2015 GRC. In fact, SCE bears the burden to demonstrate that the specific capital items recorded in the memo account are incremental to the forecasts authorized in SCE's 2015 GRC.

Given the importance of the need to ramp-up to levels of Grid Modernization envisioned in 2018 and given the practical reality that certain capital additions must begin soon to reach the important goals of the DRP but do not go into service until 2018 or beyond, it is appropriate and important for the Commission to authorize the GM Memo Account.

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for Authorization to Recover Unforeseen Liability Insurance Premium and Deductible Expense Increases as a Z-Factor Event, pp. 1-2 (December 2, 2011).

²⁹ Resolution G-3441, Southern California Gas Company (SoCalGas) and San Diego Gas & Electric Company (SDG&E) request authority to establish a Low Income Energy Efficiency (LIEE) Natural Gas Appliance Testing (NGAT) Memorandum Account. Available at http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_RESOLUTION/114240.PDF and 2010 WL 834443 (Cal.P.U.C.) at p. *4 (February 25, 2010).

II.

CONCLUSION

For the reasons stated herein, SCE respectfully requests authorization to file a Tier 1 advice letter to establish a GM Memo Account for the purpose of tracking the revenue requirement of its 2017 Grid Modernization capital expenditures.

ANNA J. VALDBERG
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/s/ Claire E. Torchia

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Dated: July 13, 2016

Appendix A

**Declaration of Hongyan Sheng in Support
of the Solar Photovoltaic Data**

Declaration of Hongyan Sheng In Support of the Solar Photovoltaic Data

I, Hongyan Sheng, declare and state:

1. I am the Manager of Demand and DER Forecasting Group within the Integrated Planning and Analysis Organization at Southern California Edison (SCE). As such, I have the responsibility for preparing the solar PV historical and forecast analysis. I have personal knowledge of the facts and representations herein and, if called upon to testify, could and would do so, except for those facts expressly stated to be based upon information and belief, and as to those matters, I believe them to be true.

2. The table below shows the historical and forecast solar photovoltaic amounts (in MWs) referenced on page 3 of the Motion in more detail.

Solar PV Historical and Forecast Amounts for SCE Service Territory

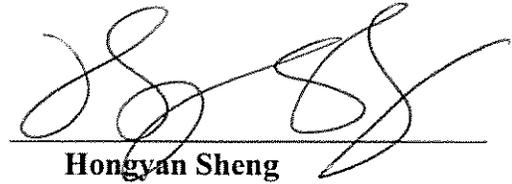
Year	Winter 2016 vintage Solar PV forecast and history		April 2013 vintage Solar PV forecast and history	
	MW	Annual Growth Rates	MW	Annual Growth Rates
2012	448.6152		441.5607	
2013	632.1572	41%	574.2557	30%
2014	868.0512	37%	704.8675	23%
2015	1234.025	42%	834.9239	18%
2016	1704.09	38%	971.332	16%
2017	2282.929	34%	1086.053	12%
2018	2935.25	29%	1187.877	9%
2019	3631.164	24%	1276.098	7%
2020	4355.954	20%	1353.117	6%
2021	4984.961	14%	1420.669	5%
2022	5486.799	10%	1481.957	4%
2023	5887.985	7%	1535.319	4%
2024	6203.162	5%	1588.681	3%
2025	6453.429	4%	1641.887	3%
CAGR 2013-2015:		40%		21%

Annual growth rates are calculated by $100\% * [(Current\ year\ MW - Last\ year\ MW) / (Last\ year\ MW)]$.

CAGR (Compound annual growth rate) is calculated by $100\% * \left\{ \left[\frac{\text{Final year MW}}{\text{Initial year MW}} \right]^{\frac{1}{\text{Final year}-\text{Initial year}}} - 1 \right\}$.

3. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on July 12, 2016, at **Rosemead**, California.



Hongyan Sheng