Application: 18-02-016

Exhibit: SDGE-

REBUTTAL TESTIMONY OF

TED REGULY

ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

AUGUST 24, 2018

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REBUTTAL TESTIMONY OF TED REGULY

I. INTRODUCTION

I submitted prepared direct testimony in support of this application.

My rebuttal testimony regarding SDG&E's 2018 Biennial Energy Storage Procurement and Investment Plan ("2018 Plan") addresses intervenors' concerns surrounding utility ownership, and, in so doing, describes more explicitly how SDG&E plans to operate the seven circuit-level microgrid energy storage investments to support grid resiliency and statutory goals through energy storage multiple-use applications. This section also addresses contentions concerning cost recovery for SDG&E's proposed seven circuit-level projects.

II. UTILITY OWNERSHIP

A. SDG&E ownership is well-justified for these proposed investments

SDG&E highlighted the unique benefits of utility ownership in its 2018 Plan for the seven circuit-level microgrid projects providing resiliency benefits due to the tight integration with SDG&E's other distribution assets. The lessons derived from these proposed seven circuit-level energy storage system ("ESS") microgrids will prove out a novel and needed use case that is increasingly necessary in the face of climate change. Specifically, coupling resiliency benefits from energy storage, with participation in the wholesale Resource Adequacy ("RA"), energy and ancillary service markets will help meet system and local reliability needs while integrating intermittent renewable resources and reducing greenhouse gases ("GHGs"), thereby creating a cleaner and more resilient electric system.

Assembly Bill ("AB") 2868 directed the Commission to require utilities to "file applications for programs and investment to accelerate the deployment of distributed energy

storage systems."[1] In the near term, SDG&E's investments will accelerate distributed energy storage development, create new market opportunities and generally increase industry experience. Additionally, through multiple-use applications, distributed energy storage resources will provide additional resiliency benefits for SDG&E's electric distribution system while meeting the other goals of the statute such as reducing dependence on petroleum, improving air quality, reducing GHGs and prioritizing low-income and public sector customers.

ORA recommends that the Commission dismiss SDG&E's seven circuit-level microgrid energy storage projects under AB 2868, claiming SDG&E has not justified utility ownership.[2] SDG&E strongly disagrees with this claim. ORA is incorrect because the statute itself encourages utility ownership, so no justification is needed unless one asserts that such ownership somehow frustrates the statute.[3] Furthermore, ORA ignores the distinct benefits of utility ownership in SDG&E's testimony supporting the application, which demonstrates how utility operation of energy storage on the distribution grid will provide system resiliency while offsetting costs, which will benefit not just individual customers but the entire San Diego region. The benefits of adding flexible storage resources extend beyond the San Diego region. The entire CAISO Balancing Authority area benefits from the ability of storage resources to provide

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1 AB 2868, Stats. 2016, ch.681, *codified at* California Public Utilities ("P.U.") Code §§ 2838.2 and 2838.3.

2 Office of Ratepayer Advocates, *Prepared Testimony on Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison's Application for Approval of Their 2018 Energy Storage Procurement and Investment Plans* (August 10, 2018) ("ORA Testimony") at 5:20. testimony will be as follows: [Party nickname] (witness surname) [page number(s):line number(s)]. Note that the citations to ORA will include the hyphens in the page numbers.

3 AB 2868 requires the Commission to direct the state's three largest electrical corporations to file applications for programs and investments to accelerate widespread deployment of distributed energy storage systems. P.U. Code § 2838.2(b).

ramping and balancing services in a system with large amounts of non-dispatchable intermittent resources. The benefits of reduced GHG emissions extend to everyone.

LS Power Development, LLC ("LS Power") counters that "SDG&E's exclusive focus on utility ownership results in it overlooking the possibility of contracting with existing large third-party owned storage projects for microgrid services at the lowest possible cost to ratepayers."[4] SDG&E disagrees. The design of the seven circuit-level microgrid investments within our existing substation land enables the storage to be more seamlessly integrated within SDG&E's existing operations and control systems than would be possible with large third-party owned storage facilities located on other properties. By doing this, these ESS resources for this proposed specific use case, will be better and more quickly optimized to provide customer benefits in both times of normal conditions, maintenance, contingency scenarios, and emergencies. For instance, because of its integration with other SDG&E distribution assets, the proposed energy storage resources will be able to seamlessly create islands during planned or unplanned outage events. The SDG&E distribution operations team will be able to island the distribution circuit-level microgrid to provide resiliency to critical public sector infrastructure as well as to non-critical customers located on the same distribution circuit.

It would impede the resiliency operation to insert a third-party into the process. SDG&E has the responsibility to serve, safely and reliably, the existing and foreseeable load of all of its customers, but third parties are not under such a fundamental obligation. And, unlike non-utility operators, SDG&E cannot profit on electricity sales in CAISO markets. No matter how well-motivated, a third-party operator would add a layer of decision-making and dilute responsibility for actions which could take seconds to implement in emergency circumstances. Adding such

[4] LS Power 4:2-5.

complexity would frustrate the resiliency goal. And, in this case, the resiliency will be provided to critical public sector facilities that are especially important to public safety during emergencies, so the operational value of utility ownership is both prudent and sensible. Moreover, a third party would be conflicted in fulfilling the resiliency mission because it is incented to maximize profit by charging and discharging the storage into the CAISO market based solely on market opportunity. No amount of creative contracting or good intentions can avoid these inherent drawbacks of third-party ownership for this specific application, especially given the novelty of the proposed operations.

Today, California leads the way in addressing climate change through utilizing energy storage, California's energy storage capacity already currently makes up a sizeable fraction of global installations. The California storage market shows enormous potential for development among the customer, distribution, and transmission domains.[5] In the near term, SDG&E's investments will help advance storage development on the distribution system, help reduce costs (for both local installers and global manufacturers) and add to industry operating and project development insight.

B. AB 2828 investment is not procurement

AB 2868 requires the utilities to propose "programs and investments" for up to 500 MW (in total for all three utilities) of additional distributed energy storage resources. Specifically, to implement AB 2868, Decision ("D.") 17-04-039 directs each investor-owned utility ("IOU") to incorporate programs and investments of up to 166.66 MW per utility of distributed energy storage systems ("ESS") into their 2018 energy storage and investment plans. D.17-04-039

[5] The market for storage installations is relatively small today but is expected grow rapidly to help meet California's emission goals for 42 MMT by 2030.

stated that, in "recognition that AB 2868 includes proposals for investments in storage, *and not just procurement*, the biennial 2018 and 2020 applications cycles will now be referred to as the 2018 and 2020 energy storage procurement *and investment* plans" (emphasis added).[6] Since, the Commission explicitly added the term "investment" to the 2018 Plan, and more broadly, because the AB 2868 statute explicitly contemplates direct utility investment, my layperson's understanding is that the statute intended utility ownership.[7] Therefore, I address not whether SDG&E should own energy storage under the proposed investments under AB 2868, but rather whether the programs and investments proposed by the utility meet the statutory criteria, including whether such investments "unreasonably limit or impair the ability of nonutility enterprises to market and deploy energy storage systems."[8]

The Utility Reform Network ("TURN") believes that the Commission should require AB 2868 programs and investments to be spread equally across third-party owned storage and utility-owned storage. Specifically, TURN recommends "for all AB 2868 procurement, 50% of the storage facilities should be utility-owned and 50% owned by third parties."[9] Despite the Commission defining procurement and investment as separate tracks for the utility applications in this proceeding, TURN purposefully interchanges the term procurement with investment throughout their testimony.

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[6] D.17-04-039 at 20.

[7] I am not a lawyer, and will leave it to the lawyers to argue on briefs the interpretation of this statute.

[8] AB 2868, P.U. Code § 2838.2(c)(1).

[9] TURN 4:18-20, 18:2-3.

ORA also conflates procurement and investments.[10] The Track 2 energy storage decision (D.17-04-039) set forth the process for AB 2868 implementation, as well as whether to modify the existing energy storage procurement target established pursuant to AB 2514.[11] While I will let the lawyers discuss in briefing the details of statutory interpretation, a plain reading of D.17-04-039 shows that decision acknowledges the AB 2868 proposals for investments and programs as a separate vehicle to help accelerate the deployment of energy storage resources "*above and beyond* the 1,325 MW target for energy storage" set under AB 2514.[12] Put differently, any utility investment under AB 2868 would be incremental to the AB 2514 utility-owned subset. There is simply no basis in AB 2838 to impute any limit of 50% utility ownership of the storage facilities. Notably, AB 2514 specifically disclaims any intent to disadvantage utility ownership.[13]

C. These projects do not unreasonably limit or impair third-party competition

1. There is no evidence that utility ownership harms non-utility enterprises in deploying ESS, and ample evidence that non-utility participation in the ESS market is thriving

Small Business Utility Advocates ("SBUA") also conflates procurement with utility ownership arguing that: "Utility procurement and ownership of ESS will impair non-utility

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[10] ORA states, "that the Legislature used the terms 'procurement' and 'investment' interchangeably." ORA (O'Brien) 1-7:22 – 1-8:1.

[11] P.U. Code § 2836 directs the Commission to adopt and routinely reevaluate the energy storage mandated procurement target.

[12] D.17-04-039 at 63, Findings of Fact ("FoF") ¶ 11.

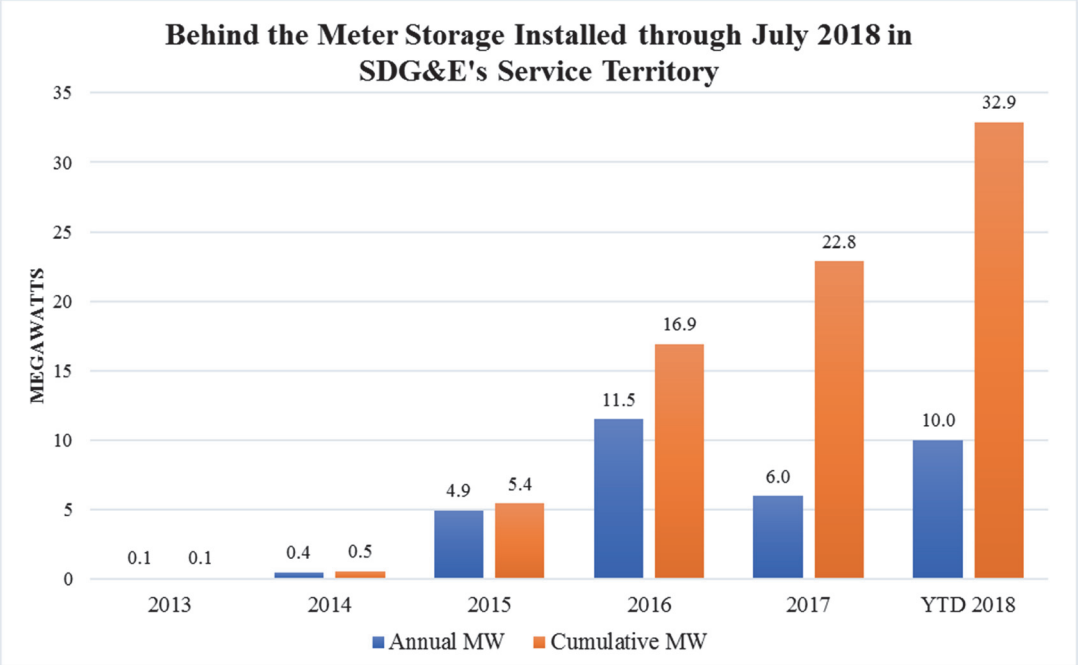
[13] P.U. Code § 2835(f). "Procure" and "procurement" means, in reference to the procurement of an energy storage system, to acquire by ownership or by a contractual right to use the energy from, or the capacity of, including ancillary services, an energy storage system owned by a load-serving entity, local publicly owned electric utility, customer, or third party. *Nothing in this chapter, and no action by the commission, shall discourage or disadvantage development and ownership of an energy storage system by an electrical corporation.* [emphasis added]

enterprises from marketing and deploying ESS. Utility preference for fewer, larger deployments mean that fewer parties will likely be able to participate in the learning."[14] SDG&E disagrees, and SBUA offers nothing to support its assertion. Because of existing well-funded and competitively-sourced programs, customer adoption of behind-the-meter ("BTM") ESS is already flourishing in SDG&E's service territory for residential and commercial and industrial ("C&I") customers alike. More specifically, beyond AB 2514 and AB 2868 energy storage procurement and investment targets, the Integrated Resource Plan ("IRP") and Distribution Resources Plan ("DRP") direct the utilities to consider distributed energy resources, including energy storage, to defer traditional utility investment and help meet the state's climate goals and other policy objectives. Separately, there is the Electric Program Investment Charge ("EPIC"), which funds research and development of distributed energy storage resources and the Self-Generation Incentive Program ("SGIP"), which provides subsidies directly to electric customers who install distributed ESS behind-the-meter. There is also the Federal Investment Tax Credit ("ITC") for qualifying energy storage collocated with solar as well as ratepayer-funded Net Energy Metering ("NEM") and demand response programs, which are other forms of ratepayer subsidies that directly benefit qualifying BTM customer distributed energy resources, including ESS.

As costs continue to decline and subsidies remain steady, the trend of BTM ESS adoption will most likely continue and even accelerate going forward, as can be seen in the most recent uptick in BTM ESS in SDG&E's service territory. Below is a graph that shows the recent increase in BTM ESS adoption:

[14] SBUA 21:16-19.

Exhibit 1: SDG&E Behind the Meter Energy Storage Adoption (MW)



Contrary to SBUA's assertion, smaller, localized energy storage programs are already blossoming in the market, with a generous amount of funding now being provided to create incentives for deployment of behind-the-meter ESS. The exception to this growth is among low-income customers and in the public sector, which AB 2868 and the public workshop stakeholder process highlighted as a key priority.

Thus, AB 2868 specifically intended for the utilities to pursue additional investment and programs for these two neglected sectors. SDG&E filed its seven circuit-level microgrid projects in support of providing resiliency to critical public infrastructure and a pilot for energy storage incentive for Expanded CARE customers. SDG&E developed these proposed investments and programs because these use cases and markets were highlighted as areas of unique capability of utilities to serve while also not unreasonably limiting or impairing third-party opportunities. In addition to the seven proposed circuit-level projects, SDG&E proposed in its applications service-level energy storage microgrid projects as part of SDG&E's AB268 Framework as

described in Stephen Johnston's testimony. These future projects will be generally smaller energy storage systems interconnected at secondary distribution voltages and designed to serve individual or multiple critical public sector facilities if connected to the same service-level transformer. No specific service-level projects were proposed in the 2018 Plan, but, if this application is approved, SDG&E anticipates following up with the projects in a later advice letter filing.

In the workshop process leading to this application, SDG&E worked in concert with the energy storage industry and other stakeholders, including low-income representatives to better focus proposed investments and programs that met currently underserved markets with little potential for third parties to monetize.[15] The California Energy Storage Alliance ("CESA") stated in its presentation during the first CPUC AB 2868 Workshop that "AB 2868 allows an opportunity to explore storage-related solutions to grid problems that may not currently have monetizable benefit streams."[16] As a result of the workshops, resiliency was underlined as a key area of focus for the utilities to pursue as it is challenging third-parties to monetize benefits in these underserved markets. With that intention, resiliency for public critical infrastructure was underlined as a key role for IOU investment and an important source of learning. Third-party ESS projects are not active in these spaces.

The SDG&E distribution operations team will be able to island the distribution circuit-level microgrids to provide resiliency to critical public infrastructure as well as customers located on those microgrid sections of the distribution circuits. By providing microgrid

[15] As noted in George Katsufrakis' Rebuttal Testimony, SDG&E consulted with low-income representatives such as The Low Income Oversight Board, GRID Alternatives, Everyday Energy, RAHD Group ("Affordable Housing provider"). *See* SDG&E (Katsufrakis) GK-3:3-7.

[16] ORA at PDF p. 272.

resiliency targeting critical public infrastructure that serves the community, and by also using the ESS to integrate intermittent renewable resources through participation in the CAISO energy and ancillary markets, and while in the microgrid configuration, these investments will meet the goal of the statute to achieve ratepayer benefits while not unreasonably limit or impair the ability of nonutility enterprises to market and deploy energy storage systems. LS Power's allegation that SDG&E interfered with its Vista project lacks merit.

LS Power claims that SDG&E is interfering with their Vista project, which is already online stating that:

> SDG&E is aware, through many avenues including the information made available in interconnection facility coordination, that LS Power has constructed and is operating a 40 MW energy storage facility with a direct connection to the Melrose substation (the Vista project) at a site across the street from the Melrose substation. Moreover, the Vista project is already in operation and is available today, a year and a half before SDG&E's proposed storage project, to provide storage services and benefits to SDG&E's ratepayers.[17]

There are a few things incorrect or misleading with this statement. First, the proximity of the LS Power's existing Vista project to SDG&E's proposed Melrose project[18] does not change the fact that it will be easier to seamlessly integrate the Melrose project with SDG&E's distribution operations, especially considering that the Vista project is already connected to the transmission system, not the distribution system. The Melrose project will not interfere with Vista project's participation in the CAISO market any more than any addition of an energy storage project in the northern San Diego county that participates in that market. The Vista project is similar to the proposed Melrose project only to the extent that they are both ESS

[17] LS Power 5:21 – 6:3.

[18] The Melrose project is one of the seven ESS proposed in this application. *See* SDG&E (Reguly) TR-15.

projects. For instance, the Vista project is much larger and is transmission-connected, while the Melrose project will be connected to the distribution system. LS Power asserts that "by limiting storage projects to those owned by SDG&E, directly limits LS Power's ability to compete with SDG&E and other independent storage developers."[19] This assertion lacks logical and factual support. LS Power, along with other nonutility storage developers, was invited to compete in the ongoing competitive solicitations where SDG&E will select vendors to supply equipment and build SDG&E's proposed seven circuit-level energy storage projects. LS Power has been an active participant in the RFP process, which includes an independent evaluator to assess which bids are the most economic. Therefore, SDG&E's ownership of these specific proposed projects cannot unreasonably limit or impair LS Power, or other third-parties, from marketing or deploying energy storage. SDG&E focuses on delivering the highest value to its customers at the lowest cost and therefore, vendor selection should be based on the results of the ongoing competitive solicitation process is open to LS Power and other nonutility developers.

Nor will SDG&E ownership of the seven circuit-level energy storage microgrid projects reduce opportunities for distributed storage owner/operators, who primarily serve the behind-the-meter markets. In fact, the proposed seven circuit-level projects provide new opportunities to the energy storage market to supply equipment and, indeed, complete projects. As stated in its direct testimony, SDG&E has and will conduct Request for Proposals ("RFPs") for Engineering, Procurement and Construction ("EPC"), Build-Own-Transfer ("BOT") projects and acquisitions through a competitive and independently evaluated process with wide participation from the energy storage industry. This enables selection of the optimal technology solutions at the lowest

[19] LS Power 5:17-18.

cost. Therefore, SDG&E's proposed ownership does not unreasonably impair the ability for a third party to market and deploy energy storage.

III. MARKET PARTICIPATION WILL NOT COMPROMISE RESILIENCY

A. Dynamically managing the state-of-charge to reserve capacity for resiliency purposes can accommodate robust market participation

ORA brings up some important questions regarding how SDG&E plans to provide resiliency benefits during times of planned and unplanned outages and how SDG&E will do this while also demonstrating GHG benefits and earning CAISO revenues to help offset the costs of these resources. ORA states that SDG&E's:

> … storage systems will provide resiliency but its revenue and GHG emission reduction forecasts assume that the system is never islanded, and no minimum State of Charge (SOC) is maintained in order to reserve capacity for resiliency. In doing so, SDG&E is claiming benefits from two scenarios that cannot exist simultaneously. If the systems provide resiliency by islanding the circuit, the extent to which the systems can participate in the wholesale market will be reduced, as will revenues and GHG emission reductions. Outages on the circuits served by the projects, or the choice to reserve some capacity for resiliency could both make capacity unavailable for whole market participation. Alternatively, if the systems do not provide resiliency, SDG&E cannot claim the benefits associated with resiliency.[20]

ORA's point and subsequent questions merit further explanation.

SDG&E's operational control of distribution resources and unique awareness of locational and forecast conditions on the distribution system will enable SDG&E to use dynamic management of the energy storage unit's state-of-charge to preserve resiliency. SDG&E did not assume a specific residual amount of capacity that would be reserved at all times for resiliency benefits. Rather, SDG&E has been working internally and in coordination with CAISO to

[20] ORA (Peterson) 4-5:13 – 4-6:3.

develop an approach to dynamically manage the state of charge of SDG&E's owned and operated ESS circuit-level microgrids.

SDG&E's operations team routinely monitors current and forecast grid and weather conditions, including red flag warning events. It will use this information to actively manage the state of charge for the proposed projects. The ESS will be charged and available as necessary when a planned outage occurs for grid maintenance. When circuit conditions are expected to be normal (which will be the majority of the time), and when loads are light, the ESS will be managed to maximize revenues in the wholesale market. I describe in further detail below how SDG&E intends to provide resiliency benefits: (1) if forecast conditions indicate an elevated risk of unplanned outages; (2) if real time conditions change to indicate an elevated risk of unplanned outages; and (3) if conditions on the distribution circuit are forecasted to be normal. Finally, I will explain why SDG&E believes that reserving an arbitrary amount of discharge capability on the ESS will not maximize benefits and minimize costs for ratepayers and why SDG&E recommends dynamically managing the state of charge of the seven circuit-level energy storage devices.

B. If conditions indicate a planned outage or risk of an unplanned outage, the ESS will be taken out of the market, and have a sufficient state of charge in case of an outage

The ESS will be charged and available to discharge or (discharged and available to charge) as necessary when a planned outage occurs. When a circuit outage is planned for the next day due to maintenance being performed on the distribution grid, SDG&E will inform the CAISO that the ESS resource will be unavailable in the Day-Ahead market.[21] If it qualifies for

[21] This means, that on the following day, there will be no *scheduled* discharges or charges in any hour that could compromise the resource's ability to provide the required islanding service.

resource adequacy, then replacement capacity will be found to meet the resources must-offer obligation. At time of planned outage, EDO group will initiate the islanding event.

Similarly, the ESS will be charged and available as necessary when next day conditions indicate elevated risk of an unplanned circuit outage.[22] SDG&E will actively manage the ESS capacity to provide backup capacity year-round. ORA questions how SDG&E can guarantee resiliency benefits year-round. ORA expresses concern that:

> … [i]f SDG&E chooses not to reserve any energy for resiliency services, the storage system's ability to island the distribution circuit is limited to the energy that happens to be stored in the storage system at the time of the outage. There may not be any energy available, or the storage system may only be able to power the circuit for a short period of time.[23]

ORA misunderstands how the microgrid resiliency projects will work. SDG&E clarifies that it will monitor forecasted load, generation, and system state, and manage charging (or discharging) accordingly. For example, if next day conditions indicate the potential for planned outages with limited advance notice, or elevated risks of unplanned outages, the ESS will be taken out of the Day-Ahead market and charged to help ensure there is an elevated state of charge to provide emergency resiliency. Specifically, these energy storage resources will provide resiliency and (microgrid) services which are defined as "load-modifying or supply services capable of improving local distribution reliability and/or resiliency."

While there is no perfect foresight into when an outage can occur, SDG&E sought to devise an operating plan for these multiple-use applications that considers the probability of an

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[22] SDG&E will define an Elevated Risk of Unplanned Outage to include the following situations: NWS declares a red flag warning; SDG&E's system loads are forecast to exceed 4000 MW; meteorology forecasts an Extreme Fire Potential Index without a declared red flag warning; transmission outage may result in an overloaded element that can be mitigated by islanding a circuit and supplying the critical loads on the islanded circuit with the ESS.

[23] ORA (Peterson) 4-8:7-10.

outage, while also maximizing benefits and minimizing the costs of the seven circuit-level energy storage projects.[24]

In most instances, SDG&E will have forward visibility into weather events such as red flag warnings and high temperature days when the distribution system is stressed and is more likely to experience an unplanned outage. SDG&E's meteorology begins tracking potential fire or heat risk events as early as seven to ten days in advance using state-of-the-art long-range forecast models. Potential events are closely monitored. For instance, from three days in advance to the day of the weather event, high-resolution forecast models are used to further refine the forecast details, including locations and strength of wind gusts, maximum temperatures and humidity levels.

When an outage occurs, distribution operations will initiate the islanding event through the Distributed Energy Resource Management System ("DERMS").

C. If real time conditions change to indicate elevated risk of an unplanned outage, distribution operations will manage the resource to ensure a satisfactory state of charge

The seven circuit-level energy storage resources will be utility-owned/controlled and tightly integrated with our distribution management systems. Based on the Enovation model referenced in Evan M. Bierman's direct testimony, the available state-of-charge will unlikely be zero, and in most instances will be higher than 25 percent.[25] In case of an unplanned outage,

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[24] *Decision on Multiple-Use Application Issues*, D.18-01-003 (January 11, 2018) at 2. The Commission provided direction to the utilities on how to promote the ability of storage resources to realize their full economic value when they can provide multiple benefits and services to the electricity system, including the adoption of eleven rules and definitions to govern evaluation of these multiple-use energy storage applications. The Commission "encourage[d] the utility to maximize value to ratepayers by providing multiple services, consistent with the rules we adopt here." *Id.* at 24.

[25] ORA at PDF p. 388, citing SDG&E's response to Data Request ORA-SDG&E DR-04 Supplement, which demonstrates based on the Enovation study that the energy storage unit at least 80% of the time had a state of charge greater than 25%. Based on Enovation model which formulated forward

SDG&E will immediately inform the CAISO that the ESS resource will be taken out of the market to ensure the resource is available.

When SDG&E becomes aware of an elevated risk of outage at some point in the near future, SDG&E will immediately charge the resource, if necessary, in anticipation of the potential islanding event. If and when an outage occurs, distribution operations will initiate the islanding event through the Distributed Energy Resource Management System ("DERMS").

D. If next-day conditions on the distribution circuit are expected to be normal, the ESS will be managed in the day-ahead market to maximize net revenues

As islanding events are infrequent and are not forecasted years in advance, the Enovation study referenced in Evan M. Bierman's direct testimony did not assume any resiliency reservation periods, but, as stated in the testimony, the purpose of the study was to illustrate the scope of potential economic benefits in the CAISO market.[26] In periods of normal circuit conditions, the ESS will participate in the CAISO ancillary and energy market to better integrate renewables and lower GHG emissions, while also managing resiliency needs dynamically. Under dynamic management, if conditions change following the day-ahead market deadline, SDG&E will notify the CAISO that the ESS will be removed from the market as necessary to charge (or discharge) the ESS in preparation for the changed conditions.

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projections of how the AB 2868 ESS projects will operate in the CAISO energy and ancillary service markets.

ORA at PDF p. 388, citing SDG&E's response to Data Request ORA-SDG&E DR-04 Supplement, which demonstrates based on the Ennovation study that the energy storage unit at least 80% of the time had a state of charge greater than 25%. Based on Enovation model which formulated forward projections of how the AB 2868 ESS projects will operate in the CAISO energy and ancillary service markets.

[26] SDG&E (Bierman) EB-7:16-17.

To the extent these ESS qualify for Resource Adequacy, the full amount of qualifying capacity will be bid into the CAISO's day-ahead market to satisfy the RA must offer obligation. Similarly, 100% of the capacity will be eligible to participate in the CAISO's energy and ancillary service market during normal periods. The net-of-market costs paid and market the revenues earned will go to offset the project's fixed costs. Having the full capacity of the ESS participate in the CAISO market will better help integrate renewables. As stated in Evan Bierman's testimony, the energy storage devices can charge at periods of when there is abundant renewable energy on the electric system and discharge at times when that energy at relatively high times of GHG intensity, potentially abating less efficient natural gas production coming online. This can reduce GHG emissions and save our customers money.[27] In addition, by providing ancillary services in the CAISO market, the energy storage resources will smooth the intermittency of renewable resources on to the electric grid.

E. SDG&E believes that reserving a fixed amount capacity on the ESS will not maximize benefits and minimize costs

Conversely, SDG&E could have the ESS maintain a fixed state of charge year around to provide microgrid resiliency for these proposed seven circuit level ESS. In order to maximize benefits and minimize costs, SDG&E is not advocating fixed capacity reservation levels for this type of multiple-use application. If the ESS were charged year-round at a pre-determined fixed level for the exclusive purpose of providing resiliency benefits, most days this stored energy would go unused. This would forego revenues from sales in CAISO markets which would otherwise offset project costs, and therefore would not "minimize overall costs and maximize overall benefits" for ratepayers. Instead, given SDG&E's unique insight into the distribution

[27] SDG&E (Bierman) EB-10:7-8.

system, and SDG&E's ability to directly control the ESS, charging (and discharging) should be dynamically managed – *i.e.,* the charging level should not be set a certain minimum. Put differently, SDG&E intends to dynamically manage a state of charge at all times so that resiliency can be provided when events occur with little or no warning. However, the precise level of this state of charge will not be a predetermined fixed amount but rather will be adjusted in the day-ahead market and/or as real-time conditions warrant (*e.g.*, as next-day and/or next-hour forecast loads on the sensitive circuits increase or decrease). This dynamic management approach (i) recognizes that resiliency is the primary objective for the ESS, and (ii) maximizes the economic value of the ESS given this objective.

Flexibility in the use cases is what the multiple-use application policy and framework aims to achieve. In the future, more distributed energy storage devices, coupled with renewable energy located on the distribution circuit, may help serve load in times of system distress. Flexible ESS integrate intermittent renewables, reduces GHGs and can island/microgrid sections of the distribution circuit to support critical public services during outages. This will lead to a more clean and resilient distribution system.

IV. THE PROPOSED CIRCUIT-LEVEL PROJECTS ARE BEST SUITED TO MEET THE GOALS AND OBJECTIVES OF AB 2868

Intervenors suggest smaller numerous distributed energy storage systems would be preferred to meet customers' resiliency needs. LS power states that SDG&E pursue:

> … an alternative strategy of procuring numerous storage connected at many different points on the SDG&E distribution system, serving dozens of additional critical customers with microgrids.[28]

[28] LS Power 3:15-19.

SDG&E disagrees. As part of SDG&E's AB 2868 Framework, SDG&E is also proposing service-level microgrid projects to provide resiliency benefits for individual public sector customers and meet the statute's goals as mentioned in Stephen Johnston direct testimony.[29] As one example, if a critical customer is located towards the end of a distribution circuit, SDG&E may seek to provide through a service-level microgrid offering when its more prudent to do so. That being said, the seven proposed circuit-level energy storage projects were chosen and designed to maximize benefits and minimize costs for ratepayers by the benefits more widely than would smaller, numerous, disaggregated energy storage.

Prioritizing circuit-level projects for public sector customers broadens access to energy storage systems and ensures system and local resiliency to critical facilities that serve the San Diego area. This not only supports public health in emergencies, but it also helps all customers manage their energy costs by helping to reduce the overall system peak energy demands, and assisting in achieving greenhouse gas emissions goals. In contrast, behind-the-meter energy storage systems are managed to the individual customers' benefit alone.

SDG&E's proposed circuit-level projects enhance electric service resiliency for a larger portion of customers located on the distribution circuit, including some non-critical customers. The seven energy storage devices will be tightly-controlled within the distribution system. SDG&E's core mission is to provide reliable service to its customers, and therefore these resources will be prioritized to achieve this aim. The circuit-level energy storage projects proximity to the distribution substation will allow for seamless transition from normal circuit operations to islanding when an outage occurs.

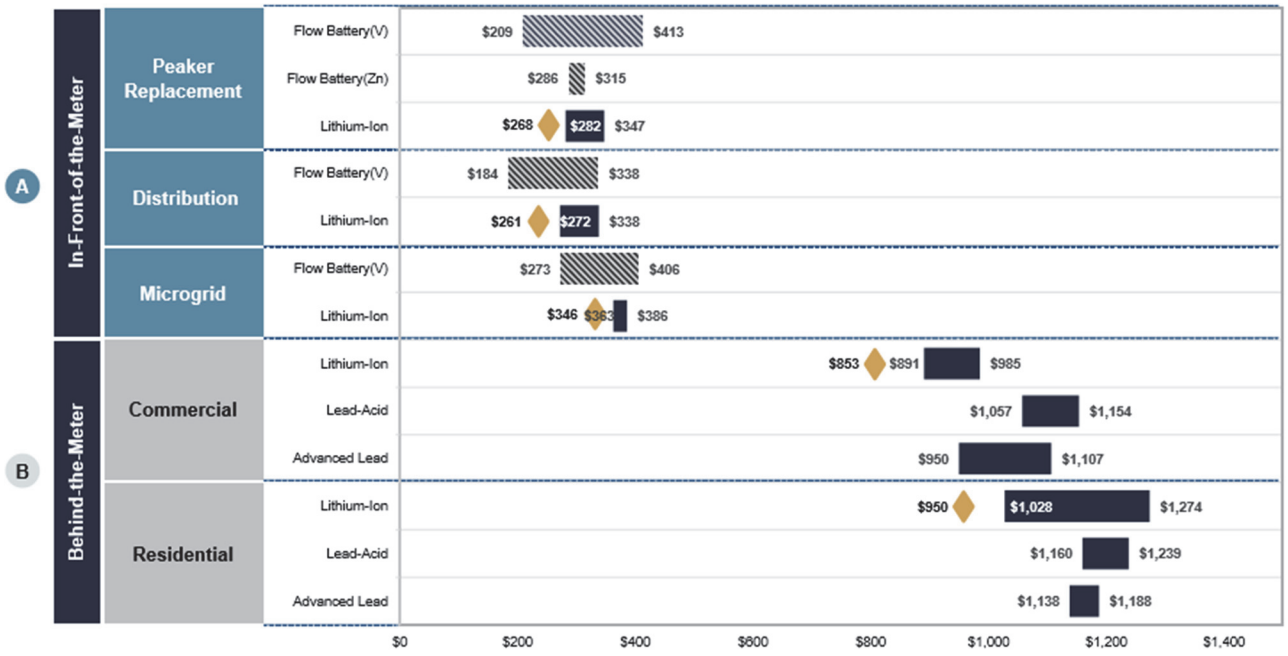
[29] SDG& (Johnston) SJ-10:9 – SJ-13:11.

SBUA makes a similar point:

> SDG&E offers no evidence that storage at substations would be preferable to storage sited at one or more of the targeted facilities. SDG&E does not address the incremental resilience benefits found only with behind-the-meter storage.[30]

SBUA inappropriately focuses on resiliency alone. The seven circuit-level energy storage projects will be managed and optimized, consistent with the resiliency mission, to in the CAISO market, which will also help integrate renewable generation. Additionally, according to the Lazard 2017 report on storage costs, behind-the-meter system costs are higher than in-front-of-the-meter due to higher unit costs.[31]

Exhibit 2: Lazard's Unsubsidized Levelized Cost of Storage Comparison ($/MWh)



[30] SBUA 20:9-12.

[31] *Lazard's Levelized Cost of Storage Analysis – Version 3.0* (November 2017) at 12, *available at* https://www.lazard.com/media/450338/lazard-levelized-cost-of-storage-version-30.pdf.

SDG&E's utility-scale energy storage systems provide ratepayer benefits and achieve greater economies of scale as described in Steven Prsha' testimony.[32] Furthermore, the microgrids proposed in SDG&E's AB 2868 application will not preclude either SDG&E or third-party distributed energy resource systems from being installed on the same circuits and any additional renewable energy on that circuit would be integrated with these energy storage devices.

V. RECOVERING INVESTMENT THROUGH DISTRIBUTION RATES

A. SDG&E's proposed cost recovery approach is reasonable

The Alliance for Retail Energy Markets ("AReM"), the Direct Access Customer Coalition ("DACC") and five community choice aggregators ("CCA") (Marin Clean Energy, the California Choice Energy Authority, Peninsula Clean Energy, Silicon Valley Clean Energy, and Sonoma Clean Power) object that by SDG&E seeking to recover all costs through distribution rates, SDG&E's "cost allocation proposals for their multi-use energy storage projects deviate from the Commission's direction to adopt either the usage-based mechanism or another alternative with costs recovered through both generation *and* distribution rates."[33] SDG&E disagrees with this conclusion.

AB 2868 requires an electric corporation's proposed energy storage programs and investments to contain a "reasonable mechanism for cost recovery."[34] AB 2868 further states that "… the commission, in authorizing an electric corporation to recover the costs of approved

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[32] "SDG&E's 'utility-scale' approach achieves greater economies of scale by providing circuit-level redundancy by only requiring one island controller, one communications system, one grid-synching switch, and a more condensed set of fire suppression systems, compared to the numerous control systems that would be required with more disaggregated microgrids." *See* SDG&E (Prsha) SP-5:3-6.

[33] AReM/DACC/CCA 8:6-10.

[34] P.U. Code § 2838.2(c)(1).

energy storage programs and investments from all customers … shall ensure that the costs for the programs and investments are recovered in proportion to the benefits received, consistent with Section 451."[35] SDG&E believes a "reasonable mechanism for cost recovery" is that the proposed energy storage projects should be recovered in distribution rates, like other SDG&E distribution system assets, because these projects will augment SDG&E's distribution system, and their primary purpose and function is to provide distribution resiliency to distribution circuits. Nothing in the intervenors testimony suggests otherwise.

Further, AReM/DACC/CCA fails to recognize the approach SDG&E outlines in its direct testimony. Specifically, they ignore how a new balancing account will be established to capture the CAISO market costs and market revenues associated with operation of the proposed projects, and will use the net of those market costs and market revenues to offset the fixed costs of the project. Any remaining costs will be collected from all ratepayers (bundled and unbundled) as is the case for all distribution assets.[36] In addition, per the direct testimony of Evan M. Bierman, any resource adequacy ("RA") capacity credits would be shared amongst the other load serving entities in SDG&E's service territory by share of coincident peak, adjusted monthly.[37] In short, RA capacity credits, CAISO costs and revenues and resiliency benefits will be shared among bundled and unbundled customers alike.

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[35] P.U. Code § 2838.3. P.U. Code § 451 requires "[a]ll charges demanded or received by any public utility … for any product or commodity furnished or to be furnished or any service rendered or to be rendered shall be just and reasonable."

[36] SDG&E (Jasso) NJ-2:11-18. It is possible that instead of a remaining cost, there would be a remaining surplus. In this case all customers (both bundled and unbundled) would receive a credit.

[37] SDG&E (Bierman) EB-7:7-13.

B. A usage-based approach would lead to bundled customers subsidizing unbundled customers

AReM/DACC/CCA propose a usage-based cost allocation policy for multi-use storage, such that project costs would be allocated between generation and non-generation rate, components based upon the time the project is operating in the market versus performing other functions.[38] Such an approach as applied to SDG&E's proposed circuit-level energy storage microgrid projects would have the effect of project costs being split between generation rates (bundled customers) and distribution rates (bundled and unbundled customers) depending on the amount of time SDG&E's proposed multi-use circuit-level energy storage microgrid projects are performing a market function, versus providing distribution resiliency in the form of microgrids. Such an approach is without merit, unreasonable and would have bundled customers subsidizing unbundled customers.

SDG&E's proposed circuit-level energy storage projects will truly be multi-use. They will provide distribution resiliency microgrid services, wholesale market services, greater renewable integration, and reduce the amount of load that will be unserved in the event of a wide-spread system outage (such as occurred on September 8, 2011). While SDG&E cannot forecast the percentage of time the proposed energy storage projects will be carrying out a particular function, assume for a moment that SDG&E's proposed circuit-level energy storage projects will provide distribution resiliency microgrid services 10% of the time, and will provide wholesale market services the remaining time (90%). Under AReM/DACC/CCA's usage-based approach, unbundled and bundled customers would be responsible via distribution rates for 10% of the project costs (for the time the energy storage was providing distribution resiliency

[38] AReM/DACC/CCA 10:27-11:1-6.

microgrid services), while bundled customers alone would be responsible for 90% of the project costs (for the time the energy storage was providing wholesale market services).

Such an approach is akin to having bundled customers paying the ongoing insurance premium for distribution resiliency, while limiting unbundled customers to only paying a portion of the deductible for when a grid disturbance happens and distribution resiliency is required. SDG&E's proposed circuit-level energy storage microgrid projects will provide distribution resiliency to fire stations, police stations, and emergency operations centers. Both bundled and unbundled customers equally benefit from such facilities remaining operational despite potential grid disturbances. Therefore, it makes little sense to bifurcate costs in such a manner to create inequities between bundled and unbundled customers.

AReM/DACC/CCA also propose to count a portion of the energy storage installed by the IOUs for integrated resource planning (IRP), GHG emissions reduction, and disadvantaged community purposes (DAC).[39] What is not clear from AReM/DACC/CCA's proposed counting of energy storage installed by the IOUs is whether such counting of energy storage for these purposes would be subject and proportional to the usage-based cost allocation proposed by AReM/DACC/CCA. If AReM/DACC/CCA is inconsistent in their approach in payment of costs and the claiming of benefits, then this would be another instance in which bundled customers are subsidizing unbundled customers. Such an unbalanced outcome is avoided if SDG&E's proposed cost recovery mechanism is adopted.

VI. CONCLUSION

I have previously included my qualifications with my direct testimony submitted in this proceeding. This concludes my prepared rebuttal testimony.

[39] AReM/DACC/CCA 27:1-14.