Application No.: A.25-12-012

Exhibit No.: SDG&E-07-E

Witness: N. Richardson, D. Thai, M. Woodruff

**SUPPLEMENTAL TESTIMONY OF**

**NICOLE RICHARDSON, DAVID THAI, AND MICHAEL R. WOODRUFF**

**ON BEHALF OF SAN DIEGO GAS & ELECTRIC COMPANY**

**CHAPTER 7**

**(COST BENEFIT ANALYSIS)**

**ERRATA**

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

**~~June 4~~ August 4, 2026**

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**ERRATA SUPPLEMENTAL TESTIMONY OF NICOLE RICHARDSON, MICHAEL R. WOODRUFF, AND DAVID H. THAI (COST BENEFIT ANALYSIS)**

# I. INTRODUCTION

The purpose of this testimony is to supplement the opening testimony offered by San Diego Gas & Electric Company (SDG&E) in support of its application filed December 18, 2025, seeking approval of its proposed Smart Meter 2.0 (SM 2.0) replacement program (Application). This supplemental testimony provides a cost-benefit analysis (CBA) of a limited set of SM 2.0 "NextGen" capabilities included in SDG&E's proposed SM 2.0 framework. NextGen capabilities are a suite of advanced metering, analytics, and grid modernization features designed to improve operational efficiency and reliability and improve the customer experience.[1] NextGen capabilities are incremental to base features of the SM 2.0 solution (Base Features)[2] and can be selectively added to enable new enhanced electric capabilities through applications, similar to smartphone apps. This flexible platform allows for easy updating and replacement of applications over time to adapt to market demands, customer needs, and regulatory changes.

The Application requests approval to implement a limited set of NextGen capabilities on top of SM 2.0 Base Features. Specifically, SDG&E seeks to add the following NextGen capabilities, which will improve residential customers' access to real-time energy data and provide SDG&E with improved situational awareness and the ability to monitor and manage the local grid with greater precision:

1 *See* Exhibit (Ex.) SDG&E-03, Prepared Direct Testimony of David H. Thai and Bradley M. Baugh on Behalf of SDG&E, Chapter 3 (Smart Meter 2.0 Proposal and Options Evaluated) (December 18, 2025) (Ex. SDG&E-03 (Thai-Baugh)) at DT/BB-8:10 – DT/BB-9:15.

2 The Base Features include the functions and capabilities essential to operation of the SM 2.0 system.

- **Customer Insights: Real-Time Energy Monitoring**: Provides customer visibility into behind the meter devices driving customer energy consumption. This capability will be available to residential customers but would only be enabled for those customers who opt-in to activate this functionality in their account.
- **Transformer Health & Load Management Bundle (includes Transformer Health & Load Management, Meter Transformer Mapping and Phase Identification)**: Enhanced grid operation with smart sensors through the collection of advanced grid insights and analytics. Upstream, it improves planning and maintenance. Downstream, utility operations and customers benefit from improved identification of overload risks and customer power quality issues.

As noted above, these NextGen capabilities are distinct from the SM 2.0 Base Features, which are the key components of the SM 2.0 solution that are necessary to preserve the functionality and benefits received under the *existing* SM 1.0 system. In other words, the SM 2.0 Base Features will replace the end-of-life SM 1.0 system. The proposed NextGen capabilities are offered by the proposed SM 2.0 vendor as separate "add-on" capabilities.

Because SDG&E's SM 2.0 proposal generally does not involve transition to a new or untested technology whose costs and benefits have yet to be defined, an extensive cost-benefit analysis of SM 2.0 Base Features similar to that presented in support of SDG&E's initial SM 1.0 implementation is not warranted. In the opening testimony supporting the Application, SDG&E presents a robust and comprehensive analysis of both the costs and the benefits (expressed as avoided cost) of its proposed SM 2.0 implementation and extensive analysis demonstrating the cost-effectiveness of its recommended solution.[3] While there is not a need to relitigate the costs/benefits of the existing SM 1.0 functionality that will be replaced by the SM 2.0 Base Features, SDG&E recognizes that incremental NextGen capabilities involve incremental investments. Accordingly, SDG&E provides this focused CBA to support the Commission's evaluation of whether the incremental costs of enabling specific NextGen capabilities are reasonable and justified by their incremental benefits.

This supplemental testimony is organized as follows:

- Section I – Introduction.
- Section II – Description of the CBA framework and key methodological principles.
- Sections III and IV – Description of the proposed SM 2.0 NextGen capabilities proposed in the Application (*i.e.,* Electric Grid Operations: Transformer Health & Load Management Bundle and Customer Insights: Real-Time Energy Monitoring) and the incremental costs and benefits associated with enabling each capability.
- Section V – Cost-benefit evaluation of the proposed SM 2.0 NextGen capabilities. The analysis evaluates incremental costs and benefits over the study period and assesses cost effectiveness on a present value basis to determine whether the proposal provides net value to customers.

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[3] Ex. SDG&E-03 (Thai-Baugh) at DT/BB-14 – DT/BB-24 (presenting a detailed breakdown of the costs of SDG&E's proposed SM 2.0 solution); *id*. at DT/BB-28 – DT/BB-35 (a structured options analysis comparing the costs and benefits of each vendor option considered); *id*. at DT/BB-36 – DT/BB-42 (evaluation of other alternatives including delaying SM 2.0 implementation in favor of like-for-like replacement, battery replacement for gas modules, and relying on non-metering technologies such as smart inverters); *see also* Reply of San Diego Gas & Electric Company to Protests Responses (February 2, 2026) at Attachment A (comparative analysis in table form with citations to the supporting discussion in testimony) and Attachment B (comparison of SDG&E's recommended solution against the two identified delay options discussed in Ex. SDG&E-03 (Thai-Baugh)).

- Section VI – Conclusion.

## II. COST BENEFIT ANALYSIS FRAMEWORK

This Section describes the CBA framework used by SDG&E to evaluate the incremental value enabled by the SM 2.0 NextGen capabilities. The framework translates the benefit descriptions presented in the Application into an analytic structure for assessing whether the incremental costs of enabling the NextGen capabilities proposed in the Application (*i.e.*, the additional cost above and beyond the costs necessary to preserve the functionality and benefits received under the existing SM 1.0 system) are reasonable and justified by the incremental benefits those NextGen capabilities are expected to deliver to customers.

### A. Distinction Between Baseline Replacement and Incremental NextGen Capabilities

As noted above, SDG&E's SM 2.0 solution focuses primarily on essential Base Features that are necessary to preserve the baseline functionality and benefits of the existing SM 1.0 system. The NextGen capabilities proposed in the Application are incremental to the Base Features included in the SM 2.0 solution and would involve additional investment. Accordingly, the CBA focuses specifically on whether the NextGen capabilities proposed in the Application are reasonable and justified by their incremental benefits. In doing so, the CBA distinguishes between:

- <u>Baseline Replacement</u>: replacement of aging SM 1.0 metering infrastructure and foundational systems necessary to maintain existing billing, meter operations, and core utility functions; and
- <u>NextGen Capabilities</u>: incremental enablement of specific NextGen capabilities that extend beyond baseline functionality.

This distinction is necessary to avoiding attribution of "incremental" benefits to investments that are required simply to maintain *current* functionality available under SM 1.0 and preserved through the SM 2.0 Base Features.

The quantified benefits described in this supplemental testimony are limited to those operational and customer outcomes that are incremental to baseline replacement and that can be reasonably linked to NextGen capability enablement. If an outcome can be achieved with existing SM 1.0 systems, already-approved programs, or baseline metering functions (and preserved through SM 2.0 Base Features), it is excluded from the incremental benefits consideration in this analysis. For example, benefits associated with continued interval billing and outage notification functionality already available under the existing SM 1.0 system, or routine meter reading and maintenance activities, are treated as part of the baseline and receive no incremental benefit credit. Only those benefits that depend on NextGen capabilities are included in the CBA results presented here.

**B. Scope of Benefits Included in the Cost Benefits Analysis**

The CBA focuses on the NextGen capabilities proposed in the Application, which fall into two main categories:

1) Electric Grid Operations – "Transformer Health & Load Management Bundle" (THLM), which includes the following capabilities:
   - ➢ Transformer Health and Load Management
   - ➢ Meter-to-Transformer Mapping
   - ➢ Phase Identification
2) Residential Customer Energy Consumption Data – "Customer Insights: Real-Time Energy Monitoring"

Within each category, SDG&E has identified specific NextGen capabilities that enable observable changes in utility operations or customer behavior, resulting in measurable impacts. SDG&E categorizes benefits as:

- **Operational Cost Reductions:** represents measurable decreases in SDG&E's ongoing operating expenses that result from changes in how work is performed. Examples include reduced field visits or truck rolls, lower labor hours, and other efficiency gains that will flow through to future revenue requirements.
- **Avoided Future Costs:** represents costs that SDG&E would have otherwise incurred in the absence of a given investment or capability. These avoided costs reflect reductions in future utility expenditures. Avoided costs included in this analysis are limited to those that directly affect SDG&E.
- **Customer and Community Benefits:** represents benefits that are experienced by customers or the broader community and do not reduce SDG&E's operating costs or revenue requirements. These benefits include customer impacts such as reduced customer disruptions from shorter outages and potential reductions in customer electricity bills resulting from customer-driven behavior changes.

### C. Benefit Quantification Methodology and Key Considerations

The CBA quantifies benefits using a combination of historical operational data, forward-looking deployment assumptions, internal subject-matter expertise, and benchmarking against publicly available studies, where appropriate.

Consistent with the phased deployment approach described in the Application, the benefits associated with SM 2.0 NextGen capabilities are not assumed to begin immediately upon installation of the first meter. Rather, benefit realization increases over time as SM 2.0

deployment reaches sufficient penetration and supporting systems and customer access capabilities are enabled. Accordingly, the CBA reflects a ramp-up of benefits during the deployment period, with full benefit realization occurring following deployment completion and continuing through 2045 in alignment with the expected life of the SM 2.0 electric meters.

The timing and ramp-up of benefits reflected in the CBA are aligned with SM 2.0 deployment progression, the timing of work that is being displaced, and the supporting information technology and network enablement schedule, as described in Ex. SDG&E-05 (Information Technology and Network Requirements). This approach avoids assuming immediate or full realization of benefits and ensures that projected benefits are tied to demonstrated operational readiness and system integration milestones.

**D. Exclusion and Avoidance of Double Counting**

To prevent double-counting of benefits, SDG&E excludes the following benefits from the analysis presented in the CBA:

- Benefits already reflected in SDG&E's Advanced Metering Infrastructure (AMI) 1.0 investment and preserved through the SM 2.0 Base Features; and
- Benefits attributable to customer actions that are already incentivized through existing tariffs or programs.

Where multiple capabilities contribute to a shared operational outcome, SDG&E bundles them and attributes quantified savings to the category (*e.g.*, Electric Grid Operations), rather than attempting to allocate the same savings across multiple enablers. This is the reason, for example, that ~~Transform~~ Transformer Health & Load Management, Meter-to-Transformer Mapping and Phase Identification are quantified as part of the Electric Grid benefits rather than as separate, additive benefit streams.

### E. Time Horizon and Cost Treatment

All costs and benefits are evaluated over a 20-year analysis period, consistent with the manufacturer specified design life of the SM 2.0 electric meters. For purposes of this analysis, the 20-year timeframe begins in 2026 and extends through 2045 (2026 – 2027 system implementation period, 2027 – 2031 meter deployment period, 2032 – 2045 benefits realization period). End-of-period cash flows are applied, consistent with standard utility planning and evaluation practices.

This supplemental testimony introduces no new cost categories[4] beyond those presented in the Application. The CBA includes only those costs required to enable and operate the specific NextGen capabilities discussed here, as reflected in SDG&E's testimony and workpapers supporting the Application. The CBA evaluates the impact of benefits associated with the incremental costs directly attributable to the proposed NextGen capabilities. This comparison of costs to benefits reflects the net impact, providing the Commission with a transparent view of how the proposed NextGen capabilities affect the overall cost to customers.

## III. ELECTRIC GRID OPERATIONS BENEFITS

### A. NextGen Capability Overview

The THLM is a NextGen capability designed to support electric grid operations. It is comprised of three functions, Transformer Health & Load Management, Meter-to-Transformer Mapping, and Phase Identification, which are integrated and function together operationally. Given the interdependencies of the functions within the THLM bundle, the CBA evaluates these capabilities as a single, bundled operational capability and attributes quantified benefits once at the category level, rather than individual components.

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[4] *See* Ex. SDG&E-03 at Workpaper 2.

### B. Benefit Overview

The THLM bundle would enhance SDG&E's ability to plan, operate, and maintain the electric distribution system by enabling timely, automated, and system validated visibility into distribution level conditions that are currently supported through a combination of manual processes, inferred assumptions, and field verification. The THLM bundle replaces reliance on periodic field surveys and static records with continuous, meter derived visibility into: (i) which customer meters are associated with specific distribution transformers, (ii) phase connectivity and phase level loading, and (iii) evolving transformer loading conditions over time. Improved visibility into system conditions will enable SDG&E to accurately assess transformer utilization, identify imbalance or emerging overload conditions, and plan targeted operational responses.

This reflects the importance of transformer level observability and phase level load visibility in enabling utilities to manage localized impacts of electrification. The benefits of the THLM bundle become increasingly important as localized load dynamics grow more complex due to vehicle electrification, adoption of electric appliances, and more variable demand profiles at both the customer and distribution circuit level. The THLM NextGen capability provides the operational foundation necessary to manage these evolving conditions by enabling transformer level and phase level insights.

For the THLM NextGen capability, SDG&E identified 3 benefit categories: (i) Operational Cost Reductions, (ii) Avoided Future Costs, and (iii) Customer and Community Benefits as shown in Table III-1 below.

**<u>TABLE III-1</u>**
**Summary of THLM NextGen Capability Benefits ($M)**

| | **Benefits** |
|---|---|
| Operational Cost Reductions | 9.5 |
| Avoided Future Costs | 39.0 |
| Customer and Community Benefits | 106.0 |
| **Total THLM Bundle Benefits** | **154.5** |

The following section describes how these benefits were derived. Detailed calculations supporting each category of benefits are provided in the workpapers supporting this supplemental testimony.

### 1. Operational Cost Reductions

The THLM bundle NextGen Capability is projected to deliver $9.5 million (loaded and escalated) in operational cost reductions over 20 years. These savings reflect four distinct benefit streams, summarized in the formula below:

The four benefit streams that make up the Operational Cost Reductions are discussed in more detail below.

1) <u>Truck Roll Reduction from Corrected Mapping for Unplanned Outages</u>: Improving Transformer Health and Load Management, Meter-to-Transformer Mapping and Phase Identification will result in the elimination of unnecessary crew dispatches and associated back-office labor that today stem from incorrect meter-to-transformer information. Incorrect meter mapping can lead to crews

being sent to non-issue locations, increasing investigative effort and requiring multiple truck rolls to locate the actual source of the problem.  This benefit stream is calculated using the following formula:

***Truck Roll Reduction from Corrected Mapping for Unplanned Outages Annual Savings = (Avoided truck rolls per year) × (Hours per work order) × (Cost per hour)***

Definition of each element of the formula:

- Avoided truck rolls per year: The annual number of unnecessary field crew dispatches avoided due to improved meter-to-transformer mapping that reduces misidentification of the affected asset during unplanned outage response.
- Hours per work order: The average total labor hours required per outage-related work order, including both field crew time and associated back-office or control-center support labor, as applicable.
- Cost per hour: The fully loaded hourly labor cost, including field crew labor, back-office support labor, and associated overheads, as applicable.

2) <u>Reduction in Field Service Visits for Planned Outages</u>: Improving Transformer Health and Load Management, Meter-to-Transformer Mapping and Phase Identification will reduce cancelled planned outages and subsequent work that results. These occurrences often stem from inaccurate transformer-meter associations, which can prevent customers from receiving proper advance notification. This benefit stream is calculated using the following formula:

***Reduction in Field Service Visits for Planned Outages Annual Savings = (Avoided incidents per year) × (Hours per work order) × (Cost per hour)***

Definition of each element of the formula:

- Avoided incidents per year: The annual number of incidents avoided where field service visits would reoccur because customers were not properly identified as part of a planned outage due to inaccurate meter-to-transformer associations.
- Hours per work order: The average total labor hours required per field service visit, including both field crew time and any associated back-office coordination or follow-up labor, as applicable including hours to replan the work for a future date.
- Cost per hour: The fully loaded hourly labor cost, reflecting field crew labor, back-office labor, and overheads, as applicable.

3) Planned Outage Execution Efficiency: Improving Transformer Health and Load Management, Meter-to-Transformer Mapping and Phase Identification will allow SDG&E to avoid various activities that are conducted today in preparation for a planned outage. This includes field truck rolls to evaluate the impacted circuit and associated back-office labor to update the network model in the back-office systems. This benefit stream is calculated using the following formula:

| |
|---|
| ***Planned Outage Execution Efficiency Annual Savings = (Avoided incidents per year)* × *(Hours per work order)* × *(Cost per hour)*** |

Definition of each element of the formula:

- Avoided incidents per year: The annual number of planned-outage preparation and execution activities avoided due to improved meter-to-transformer mapping, including reduced need for corrective field assessments and back-office model updates.

- Hours per work order: The average total labor hours associated with each planned-outage preparation or corrective activity, including field crew labor and back-office engineering, planning, and systems labor, as applicable.
- Cost per hour: The fully loaded hourly labor cost, inclusive of field crew, engineering, planning, and other back-office labor costs, as applicable.

4) <u>Phase Balancing Work Order Efficiency</u>: Improving Transformer Health and Load Management , Meter-to-Transformer Mapping and Phase Identification improves the efficiency of phase balancing activities by providing more accurate phase connectivity information. This improved visibility enables more targeted identification of phase imbalances and reduces unnecessary or duplicative work orders associated with incomplete mapping data. This benefit stream is calculated using the following formula:

| ***Phase Balancing Work Order Efficiency Annual Savings = (Average annual cost of phase balancing work) × (Efficiency gained)*** |
|---|

Definition of each element of the formula:

- Average annual cost of phase balancing work orders: The baseline annual fully loaded cost of phase balancing activities, including field crew labor and associated engineering, analysis, and back-office support labor.
- Expected efficiency gains: The estimated percentage reduction in labor effort and associated cost enabled by improved transformer-to-meter and phase connectivity information, allowing more targeted phase balancing and fewer work orders.

Table III-2 reflects loaded and escalated annual operations and maintenance (O&M) savings of approximately $9.5M in operational costs below.

**<u>TABLE III-2</u>**
**Summary of Operational Cost Reductions for THLM NextGen Capability (Loaded and Escalated $M)**

| Loaded and Escalated Benefits | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | Total Application Period | 2032-2045 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Operational Cost Reductions | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** | 9.5 | **9.5** |

Detailed calculations are provided in the workpapers supporting this supplemental testimony.

The benefits are allocated over multiple years, consistent with the timing of the future work they are intended to offset.

### 2. Avoided Future Costs

In the context of a heavily electrified future grid, improved transformer loading visibility, phase-level accuracy, and meter-to-asset connectivity enabled by the THLM NextGen capability reduce the need to undertake a dedicated, resource-intensive effort to validate that each installed meter is correctly associated with the serving transformer and mapped to the appropriate phase. Such an effort would require the formation of a stand-alone project team to perform corrective work across both field operations and back-office systems.

By enabling this NextGen capability, SDG&E avoids the need for a separate corrective mapping initiative and the associated costs. The avoided future cost calculation presented below reflects the categories of field and back-office activities that would otherwise have been required to achieve the same level of system accuracy through manual or project-based efforts:

***Avoided Future Costs = Avoided Remediation Execution Cost + Avoided Program Management Cost***

The two components of Avoided Future Cost are described below:

1) Avoided Remediation Execution Cost: The avoided cost estimate reflects the reduction in incremental field verification visits (truck rolls) that would otherwise be required to confirm meter-to-transformer connectivity as part of a territory-wide remediation effort. The estimate also reflects the reduction in incremental back-office effort that would otherwise be required to research discrepancies and update mapping records in the Company's systems to complete the remediation. This is calculated using the following formula:

| |
|---|
| ***Avoided Remediation Execution Cost = (Percentage of transformers with potentially incorrect mapping) × (Total number of transformers. by overhead vs. underground) × (Average remediation labor hours per transformer) × (Fully loaded labor cost per hour)*** |

Definition of each element of the formula:

- Percentage of transformers with potentially incorrect mapping: The estimated share of the transformer population with inaccurate or outdated meter-to-transformer associations that would require verification and correction absent the proposed THLM NextGen capability.
- Total number of transformers, by overhead vs. underground: The total population of distribution transformers within the service territory, inclusive of both overhead and underground transformers, where overhead transformers generally require lower verification effort and underground transformers require higher verification effort due to access constraints.
- Average remediation labor hours per transformer: The average total labor hours required to verify and correct meter-to-transformer mapping for a transformer, with labor effort varying by transformer type (overhead versus underground), and

inclusive of both field verification labor and associated back-office analysis and system-of-record updates, as applicable.

- Fully loaded labor cost per hour: The fully loaded hourly labor cost used for remediation activities, including field crew labor, back-office labor (*e.g.*, engineering, Geographic Information System, records management), and applicable overheads.

2) Avoided Program Management Cost: Since the remediation initiative would be executed as a discrete project, the avoided-cost estimate includes associated program management and coordination activities (*e.g.*, workstream leadership, reporting, risk/issue management, centralized scheduling, and coordination of crew waves, customer access etc.). This is calculated using the following formula:

| |
|---|
| ***Avoided Program Management Cost = (Annual program management cost) × (Duration of remediation program in years)*** |

Definition of each element of the formula:

- Annual program management cost: The estimated annual cost required to support a territory-wide transformer mapping remediation program, including program management, scheduling and coordination support, analytics support, and IT/system support roles.
- Duration of remediation program in years: The assumed length of time over which the remediation program would be executed absent the proposed solution.

**TABLE III-3**
**Summary of Avoided Future Costs for THLM NextGen Capability**
**(Loaded and Escalated $M)**

| Loaded and Escalated Benefits | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | Total Application Period | 2032-2045 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Avoided Future Costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** | 39.0 | **39.0** |

Detailed calculations are provided in the workpapers supporting this supplemental testimony.

### 3. Customer and Community Benefits

In addition to operational cost reductions and avoided cost benefits, THLM provides broader customer benefits by enabling faster and more accurate outage detection and response. Improved meter-to-transformer connectivity and phase identification allow SDG&E to more quickly validate outage conditions and identify the affected equipment, reducing the time required to initiate restoration activities. This improved situational awareness contributes to fewer customer minutes of interrupted (CMI) service during outage events, enhancing overall service reliability for customers and the broader community without directly affecting the utility's revenue requirement.

CMI represents the aggregate duration of outages experienced by customers and is a commonly used reliability metric in utility planning and regulatory proceedings. In this application, SDG&E estimates the subset of historical outage minutes for which improved outage detection and asset identification, enabled by the THLM NextGen capability would reasonably be expected to reduce restoration time. Consistent with industry practice, a modest reduction in outage duration is applied only to this addressable subset of outages, reflecting incremental improvements. The customer and community benefits associated with reduced outage duration are monetized using the Interruption Cost Estimate (ICE) calculator, a publicly available tool that estimates the economic costs customers experience due to power interruptions.

SDG&E applies the ICE methodology using SDG&E-specific inputs, including customer mix and reliability characteristics, to derive a weighted average dollar value per avoided customer-minute of interruption. Importantly, SDG&E's use of the ICE calculator does not introduce a novel valuation framework nor rely on proprietary assumptions. Rather, it reflects a standard and transparent industry approach for quantifying customer and community impacts from changes in outage duration, consistent with how similar benefits have been evaluated in other Commission proceedings. The formula below shows the calculations for the customer and community reliability benefit:

| |
|---|
| ***Customer and Community Benefits - Electric Grid= (Total Addressable Customer Minutes Interrupted (CMI) - Total Customer Minutes Interrupted (CMI) After Improvement) × (ICE2.2 calculator-based $ per CMI)*** |

Definition of each element of the formula:

- **ICE2.2 calculator:** The ICE version 2.2 is a tool that has been developed by the Lawrence Berkeley National Laboratory to determine the impact of electric interruptions to communities.[5]
- **Total Addressable CMI**: SDG&E estimated avoided customer outage minutes by analyzing historical outage data from 2025 and identifying a subset of outages

[5] *See* Decision (D.) 18-12-014. The Commission has adopted the ICE calculator as the standard tool for quantifying electric reliability risk in dollar terms for use in the Risk-Based Decision-Making Framework.

for which improved outage detection and asset identification would have reduced restoration time.

- **Total CMI After Improvement:** For these outages, outage durations were reduced by 2%, reflecting earlier fault identification enabled by improved meter-to-transformer mapping and AMI-based detection.
- **$/Customer Minutes Interrupted**: The total avoided cost of CMI were valued using customer interruption cost values from the ICE calculator, populated with California-specific and SDG&E-specific inputs, including customer mix and reliability metrics. A weighted average interruption cost was calculated using residential and commercial customer interruption costs, which was then multiplied by total avoided CMI to estimate total societal benefits.

**Table III-4**
**Summary of Customer and Community Benefits for THLM NextGen Capability ($M)**

| Estimated Benefits | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | Total Application Period | 2032-2045 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Customer and Community Benefits | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.0** | 106.0 | **106.0** |

## C. Cost Overview

The costs associated with the THLM bundle are not incurred as standalone expenditures, but rather as part of SDG&E's broader Smart Meter 2.0 NextGen capabilities investment, which include business systems, information technology, network enablement, integrations and analytics necessary to support these functions. The CBA evaluates total incremental NextGen capabilities costs over the same long-term horizon as the benefits and reflects both capital and

O&M components. The CBA includes $26.6 million in total incremental NextGen Capabilities costs, comprised of $25.5 million in capital costs and $1.1 million in O&M costs, evaluated over the same 20-year period as the benefits, as shown in Table III-5.

**Table III-5**
**Summary of Costs for THLM NextGen Capability (Loaded and Escalated Costs $M)**

| Years | **2026** | **2027** | **2028** | **2029** | **2030** | **2031** | **Total Application Period** | **2032-2045** | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| Capital Expenditures | 0.4 | 18.8 | 0.7 | 0.8 | 4.7 | 0.2 | 25.5 | 0 | 25.5 |
| O&M Expenditures | 0 | 0 | 0 | 0.2 | 0.3 | 0.5 | 1.1 | 0 | 1.1 |
| Total Costs | **0.4** | **18.8** | **0.7** | **1.0** | **5.0** | **0.7** | **26.6** | **0** | **26.6** |

## IV. CUSTOMER INSIGHTS: REAL-TIME ENERGY MONITORING BENEFITS

### A. NextGen Capability Overview

Consistent with the Commission's Real Time Usage Data Access Orders (D.09-12-046, D.11-07-056, and Resolution E-4527), SDG&E proposes the Customer Insights: Real-Time Energy Monitoring NextGen capability to provide customers with near-real-time access to usage data.

The Commission has previously directed the investor-owned utilities (IOUs) to provide customers with access to their electricity usage information on a real-time or near-real-time basis, including through customer-accessible technologies. The Customer Insights NextGen capability is SDG&E's proposed approach to meeting this requirement within the Smart Meter 2.0 framework. Because this functionality is not included in the selected Smart Meter 2.0 vendor's base offering, it is proposed as incremental NextGen functionality.

The Customer Insights capability provides customers with more timely and granular visibility into how and when electricity is consumed than is available through legacy interval data. This enhanced access to usage information allows customers who choose to engage with the capability to better understand consumption patterns and potential bill impacts, particularly as rate designs become more time-sensitive and electrification contributes to higher and more variable household electricity demand.

In this way, the Customer Insights capability supports transparency and customer engagement consistent with Commission policy objectives, while helping customers prepare for an evolving grid. As discussed below, SDG&E evaluates the cost-effectiveness of this capability based solely on the quantified customer and community benefits presented in this supplemental testimony. For purposes of this analysis, the Customer Insights NextGen capability, including references to real-time load disaggregation, is intended to describe customer access to more timely and granular electricity usage information. The quantified benefits in this analysis are based on customers having access to real-time usage information, rather than any specific level of appliance-level disaggregation.

**B. Benefit Overview**

The Customer Insights NextGen capability enables customers to access more timely and granular information regarding their electricity usage than is available under legacy interval data. This increased visibility provides customers with improved insight into when and how electricity is consumed and how those usage patterns may influence their monthly bills, particularly under more time-sensitive rate structures, consistent with the Commission's emphasis on improving customer access to usage information.

By improving transparency of usage information, the capability supports customers' ability to make more informed decisions regarding their electricity consumption. Customers who choose to engage with this capability may adjust discretionary energy usage, modify consumption patterns, or take other actions that better align their energy use with their financial objectives. This capability does not assume or require specific behavioral changes but instead provides the information necessary to support voluntary, customer-driven decision-making.

To the extent customers act on this information, reductions in customer bills may occur. SDG&E's analysis reflects this relationship through measured adoption assumptions and conservative estimates of customer response, recognizing that customer engagement and outcomes will vary.

In this context, the primary benefit of the Customer Insights capability is improved customer understanding of energy usage and enablement of voluntary actions that can help manage and reduce electricity costs. This benefit is evaluated in the CBA based on quantified customer bill impacts, as described below.

The CBA evaluates the Customer Insights capability over the 20-year analysis period, resulting in $~~276.4~~ 226 million in estimated benefits. These benefits are categorized entirely as customer and community benefits.

The benefits associated with this NextGen capability are derived from providing customers with more timely and granular access to their electricity usage information. This enhanced visibility allows customers who choose to engage with the capability to better understand consumption patterns and how those patterns may influence their bills, particularly under more time-sensitive rate structures.

To the extent customers act on this information, changes in consumption behavior may occur, including reductions in overall electricity usage or adjustments to usage patterns that lower customer bills. SDG&E's quantification reflects this relationship through measured adoption assumptions and conservative estimates of customer response, consistent with the voluntary and customer-driven nature of this capability.

SDG&E has taken a measured and disciplined approach to quantifying these benefits. Customer bill impacts are included only where three conditions are met, in order to avoid potential double counting: (i) the savings mechanism is clearly defined and directly attributable to customer use of the capability, (ii) customer adoption is bounded by realistic engagement assumptions, and (iii) the identified savings are not already reflected in, or credited to, other programs or tariffs. The formula below provides an overview of the methodology used to calculate the benefits associated with this NextGen capability:

| |
|---|
| ***Annual Customer and Community Benefits - Customer Insights = (Eligible customers)* × *(Adoption rate)* × *(Average % Bill Savings per Customer)* × *(Average Yearly Electric Bill)*** |

Definition of below explain each element of the formula:

- Eligible Customers: Eligible customers are residential customers who receive a SM 2.0 electric meter with the Customer Insights: Real-Time Energy Monitoring NextGen capability for real-time load disaggregation.
- Adoption Rate: The adoption rate represents the percentage of the eligible customer population expected to utilize the real-time load disaggregation capability. SDG&E assumes an adoption rate of 20% of eligible customers, reflecting a measured estimate of customer engagement for an opt-in, information-based capability and is not intended to represent full participation or universal engagement.
- Average % Bill Savings per Customer: This parameter reflects the average percentage reduction in a customer's energy consumption (and corresponding

bill) achieved by participating customers through use of the real-time load disaggregation capability. In developing this estimate, SDG&E considered the findings of a publicly available study conducted by Cadmus[6] to inform its projection of the potential customer energy savings associated with this capability.

- Typical Monthly Electric Bill[7]: This represents the typical monthly electric bill for residential customers as a representation for the calculation of the benefits.

Table IV-1 below provides a summary of the benefit calculation for the Customer Insights: Real-time Energy Monitoring NextGen capability.

**Table IV-1**
**Summary of Customer and Community Benefits for Customer Insights: Real-time Energy Monitoring ($M)**

| Estimated Benefits | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | Total Application Period | 2032-2045 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Customer and Community Benefits | 0.0 | 0.0 | 0.0 | 6.8 | 11.2 | 13.0 | **31.1** | 194.9 | **226.0** |

### C. Cost Overview

The costs associated with enabling the Customer Insights NextGen capability are included within SDG&E's total Smart Meter 2.0 NextGen Capabilities costs of $52.4 million, consisting of $43.0 million in capital costs and $9.4 million in operations and maintenance costs.

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6 Cadmus, Home Energy Monitoring Report. Prepared for Alliant Energy on behalf of the Public Service Commission of Wisconsin (December 17, 2024).

7 SDG&E's estimate of an 'typical monthly electric bill' is derived from March 2026, San Diego Gas & Electric Company filed Advice Letters 4791-E and 4791-E-A to change electric rates.

These costs encompass business systems, information technology, network capacity, integration and analytics necessary to support Customer Insights capabilities. These elements are required for the capability to be fully enabled. Costs projected to be incurred in the years 2032-2045 are included in the 20-year CBA analysis; however, SDG&E is not requesting funding for those costs as part of this proceeding. Table IV-2 below shows the loaded and escalated costs for the Customer Insights: Real-time Energy Monitoring NextGen capability.

**Table IV-2**
**Summary of Costs for Customer Insights: Real-time Energy Monitoring (Loaded and Escalated Costs $M)**

| Loaded and Estimated Costs | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | Total Application Period | 2032-2045 | Total |
|---|---|---|---|---|---|---|---|---|---|
| Capital Expenditures | 0.8 | 5.0 | 8.5 | 1.5 | 1.1 | 0.4 | **17.3** | 25.7 | **43.0** |
| O&M | 0.0 | 0.0 | 1.6 | 1.5 | 1.5 | 1.6 | **6.2** | 3.2 | **9.4** |
| **Total Customer Capability Costs** | 0.8 | 5.0 | 10.1 | 3.0 | 2.6 | 2.0 | **23.5** | 28.9 | **52.4** |

## V. COST-BENEFIT EVALUATION AND RESULTS

This section describes SDG&E's cost-benefit evaluation of the SM 2.0 NextGen capabilities. The purpose of this evaluation is to assess whether the proposed investment produces benefits that exceed costs over the service life of the assets.

SDG&E performed this analysis using a cost-benefit framework that first values each incremental cost and benefit using an approach consistent with how the impact is realized and then normalizes those values to present-value terms for comparison. Cost-effectiveness is determined by comparing the total present value of benefits to the total present-value of costs and expressing that comparison as a Cost Benefit Ratio (CBR).

The benefits reflected in this analysis include estimated operational cost reductions, avoided future costs, and quantified customer and community benefits associated with authorizing SM 2.0 System NextGen capabilities. All cost and benefit components included in this evaluation are described in detail in preceding sections of this supplemental testimony.

### A. Cost-Benefit Framework

SDG&E's cost-benefit framework evaluates whether the proposed SM 2.0 System NextGen capabilities provide net value to customers by producing incremental benefits that exceed incremental costs. The analysis considers both rate-impacting costs and benefits as well as quantified impacts that do not directly flow through customer rates.

All costs and benefits included in the evaluation are assessed over the full service life of the assets.

### B. Valuation of Costs and Benefits

SDG&E values each incremental cost and benefit using the method most appropriate to how the impact is realized by customers.

For impacts that flow through customer rates, SDG&E calculates the associated revenue requirement, which reflects the full cost to customers, including operating expenses, return of capital, return on investment, taxes, and other required components. Please see direct testimony of Casey Butler for additional details related to revenue requirement methodology.[8] This approach is used to value:

[8] Ex. SDG&E-06, Prepared Direct Testimony of Casey W. Butler on Behalf of SDG&E, Chapter 6 (Finance and Rates) (December 18, 2025).

- NextGen capabilities costs
- Operational cost reductions
- Avoided future costs

For impacts that do not flow through utility rates, including certain customer and community benefits, SDG&E estimates the expected value of those benefits directly based on quantified assumptions described earlier in this supplemental testimony.

At this stage of the analysis, costs and benefits have been valued consistently based on how the impacts are realized by customers but have not yet been discounted.

### C. Present-Value Normalization

Because costs and benefits occur at different times over the service life of the assets, SDG&E normalizes all valued impacts to present-value terms to ensure comparability. Present value represents the value today of future costs or benefits discounted using SDG&E's authorized cost of capital used for purposes of this proceeding.[9] All present-value results are normalized to a 2026 base year.

For rate-impacting items valued through revenue requirements, SDG&E calculates the present value of revenue requirements. For other quantified benefits, SDG&E discounts the estimated benefit streams directly to present value using the same discount rate.

### D. Cost Benefit Ratio Results

After aggregating all present-value costs and benefits, SDG&E evaluates cost-effectiveness by comparing the total present value of benefits to the total present value of costs. This comparison is expressed as a CBR, calculated as follows:

| |
|---|
| ***Cost Benefit Ratio = Present Value of Incremental Benefits / Present Value of Incremental Costs*** |

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[9] *Id*. at Section III.D (addressing authorized capital structure and rate of return applied in the instant proceeding).

A CBR greater than 1.0 indicates that the proposed SM 2.0 System NextGen capabilities produce benefits that exceed costs on a present-value basis. The resulting CBRs for each major component of the proposal are summarized below.

As shown in Tables V-1 and V-2 below, both the Electric Grid Operations and Customer Insights components of the proposed SM 2.0 System NextGen capabilities produce CBRs greater than 1.0.

### 1. Electric Grid Operations/THLM Bundle NextGen Capability

For the Electric Grid Operations/THLM Bundle NextGen Capability component, SDG&E estimates revenue requirement benefits of $4.0 million from incremental operational cost reductions, $22.2 million in revenue requirement benefits from avoided future costs, and $41.9 million in customer and community benefits, all on a present-value basis. The present value of revenue requirements associated with incremental costs is $(24.9) million.

Based on these inputs, the Electric Grid Operations/THLM Bundle NextGen Capability component yields net benefits of $43.2 million and a CBR of 2.7x, as shown in Table V-1.

**TABLE V-1**
**Cost-Benefit Summary for Electric Grid Operations ($M)**

| | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032-2048 | Total | Present Value |
|---|---|---|---|---|---|---|---|---|---|
| NextGen Capabilities Costs | 0.0 | (4.7) | (5.0) | (5.0) | (4.2) | (7.2) | (9.0) | (35.2) | (24.9) |
| Operational Cost Reductions | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.0 | 10.0 | 4.0 |
| Avoided Future Costs | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.9 | 40.9 | 22.2 |
| Customer and Community Benefits | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 106.0 | 106.0 | 41.9 |
| Total Benefits | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 156.9 | 156.9 | 68.1 |
| Net Benefit/(Cost) | 0.0 | (4.7) | (5.0) | (5.0) | (4.2) | (7.2) | 147.9 | 121.7 | 43.2 |
| **CBR** | | | | | | | | | **2.7x** |

Note: Revenue requirements extend beyond the CBA timeframe of 2045, hence final aggregated column of 2032-2048.

### 2. Customer Insights

For the Customer Insights NextGen capability component, SDG&E estimates $100.9 million in present-value customer and community benefits associated with real-time energy monitoring, while the present-value of revenue requirements associated with incremental costs is $(35.0) million.

Based on these inputs, the Customer Insights component yields net benefits of $65.9 million and a CBR of 2.9x.

**TABLE V-2**
**Cost-Benefit Summary for Customer Insights ($M)**

| | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032-2048 | Total | Present Value |
|---|---|---|---|---|---|---|---|---|---|
| NextGen Capabilities Costs | 0.0 | (1.2) | 0.0 | (5.2) | (6.2) | (6.1) | (49.7) | (68.4) | (35.0) |
| Customer and Community Benefits | 0.0 | 0.0 | 0.0 | 6.8 | 11.2 | 13.0 | 194.9 | 226.0 | 100.9 |
| Net Benefit/(Cost) | 0.0 | (1.2) | 0.0 | 1.6 | 5.1 | 6.9 | 145.2 | 157.5 | 65.9 |
| **CBR** | | | | | | | | | **2.9x** |

Note: Revenue requirements extend beyond the CBR timeframe of 2045, hence final aggregated column of 2032-2048.

## VI. CONCLUSION

As demonstrated herein, the incremental costs of enabling the NextGen capabilities included as part of SDG&E's proposed SM 2.0 solution are reasonable and justified by their incremental benefits. While the Commission could elect to approve these NextGen capabilities at a later point, rather than as part of the SM 2.0 solution approved in the instant proceeding, SDG&E submits that given the benefits of the NextGen capabilities identified in the Application, approval at this time is warranted and would serve the public interest.

## VII. WITNESS QUALIFICATIONS

My name is Nicole Richardson. My business address is 9060 Friars Rd, San Diego, California 92108. I am employed by San Diego Gas & Electric (SDG&E) as the Director of Electric Distribution Operations. In my current role, I set the strategic direction for activities impacting SDG&E's electric distribution system, including 24/7 emergency response for gas and electric operations. I lead cross functional teams to implement transformational solutions across process, operating models, and technology, and have developed SDG&E's grid modernization strategy, including the integration of distributed energy resource management. I have been employed by SDG&E since 2009 and have held positions of increasing responsibility in Substation Construction and Maintenance, Electric Operations and Engineering, Electric Regional Operations and Field Service Delivery. I hold a Bachelor of Science degree in Electrical Engineering from San Diego State University and am a licensed professional engineer in the State of California.

I have not previously testified before California Public Utilities Commission.

My name is David Thai. I am employed by San Diego Gas & Electric Company (SDG&E) as the Strategic Initiatives Manager. My business address is 4949 Greencraig Lane, San Diego, California, 92123. My current responsibilities include overseeing SDG&E's next generation smart meter strategy and program and providing engineering expertise in the areas of AMI networks and metering engineering. I assumed my current position in 2024. I have been employed by SDG&E since 2008 and have held engineering positions of increasing responsibility in Substation Construction and Maintenance, Distribution Planning, Transmission Engineering and Project Management. I have held numerous leadership positions as Grid Operations Technical Support Manager, Electric and Fuel Procurement Origination Analytics Manager, and Smart Meter Operations Manager. I hold a Bachelor of Science degree in Electrical and Electronic Engineering from California State University, Sacramento, and a Master of Science degree in Electrical Engineering from San Diego State University. I am also a licensed Professional Engineer in the State of California.

I have previously testified before the California Public Utilities Commission.

My name is Michael R. Woodruff. My business address is 8330 Century Park Court, San Diego, California 92123. I am employed by SDG&E as a corporate and financial planning senior lead. I am responsible for overseeing the financial analysis and development of revenue requirements for SDG&E projects. I joined SDG&E in 2011. Prior to SDG&E, I was employed by Wells Fargo & Co. for twelve years, six years as a Financial Analyst and six years as a Finance Manager. I hold a Bachelor of Science degree in Liberal Arts and Sciences from Iowa State University and a Master of Business Administration degree, with an emphasis in Finance, from the University of Iowa.

I have previously testified before California Public Utilities Commission.