Section 1 – EXECUTIVE SUMMARY

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The San Diego Gas & Electric Company (SDG&E) Smart Grid Deployment Plan advances the utility's vision for a smart energy future while delivering new value to its customers, meeting its public policy requirements and delivering societal and economic benefits that exceed project costs.

SDG&E views the Smart Grid as an end-to-end transformation of its electric delivery system that applies advances in technology to deliver a range of new benefits to all stakeholders. The Smart Grid empowers customers, increases renewable generation, integrates plug-in electric vehicles (PEVs) and reduces greenhouse gas (GHG) emissions while maintaining and improving system reliability, operational efficiency, security and customer privacy. SDG&E anticipates that investments in Smart Grid infrastructure will yield additional benefits as the transformation progresses and its customers, policy makers and the industry are able to leverage lessons learned and achieve the Smart Grid's full potential.

Customer choice is a potent driver of SDG&E's deployment plan for the Smart Grid. SDG&E customers are adopting rooftop solar and PEVs at rates that are among the highest in the nation. They are seeking real-time information about their energy usage and rates in order to make more informed decisions. Some are looking for opportunities to participate in energy markets through demand response, time of use rates, distributed generation (DG) and storage. Lastly, SDG&E customers have consistently shown their support for more electricity from renewable resources and other important environmental initiatives resulting in government and regulatory policies that are the other major drivers of SDG&E's Smart Grid Deployment Plan.

The state and federal policies accelerating planned Smart Grid investments include Senate Bill (SB) 17, Assembly Bill (AB) 32, California's 33 percent renewable portfolio standard (RPS), the state's distributed generation goals, demand response mandate, improved building and appliance efficiency standards, implementation of the electric

procurement loading order and national security standards such as the North American Electric Reliability Corporation's Critical Infrastructure Protection(NERC-CIP) program.

SDG&E's vision for its Smart Grid transformation is to work in collaboration with key stakeholders to create the foundation for an innovative, connected and sustainable energy future. Consistent with this vision, SDG&E has engaged the input of representative stakeholders from across its service territory in the development of this Smart Grid Deployment Plan. These include environmental, academic, business, municipal/regional government, ratepayer advocacy, consumer, large customer and workforce development organizations. In addition to engaging these external groups, internal stakeholders at SDG&E have aligned behind the utility's Smart Grid vision and strategy which now further integrates Smart Grid across all utility planning efforts and operations.

SDG&E's deployment baseline is bolstered by the utility's nearly-complete, customer-empowering smart meter rollout, which is already supporting new customer behaviors, such as the use of third-party applications to see energy interval usage data. Its prior Smart Grid investments either already deployed or in the process of deployment, stretch back 20 years and have laid the foundation for the utility of the future through improved efficiency and reliability and maximized customer value. These include early investments in automation and control technologies; the development of the Sustainable Communities program; its "OpEx 20/20" program to reengineer operational processes and associated software for Smart Grid support; installation of a microgrid in Borrego Springs; and full-scale Supervisory Control and Data Acquisition (SCADA) deployments which now control 95 percent of the SDG&E transmission system.

SDG&E's Smart Grid investments to date have been carefully chosen and deployed to allow the flexibility to leverage future innovations, address evolving or new policy requirements and to capture more benefits as new opportunities and challenges arise. Some of these challenges include addressing issues associated with the two-way energy

flow that results from distributed generation, the intermittent power of solar and wind generation and the unknown and potentially unpredictable load imposed by electric vehicle charging. SDG&E's Smart Grid investments are intended to manage such changes and transform the grid of the past into the smarter grid of the future that is increasingly needed today. Where technology innovations or energy markets are not mature enough to support a full deployment of a new or potentially promising Smart Grid investment, SDG&E's strategy is to leverage pilot and demonstration projects to improve the utility's understanding of likely costs and benefits before a full deployment decision is proposed.

SDG&E's Smart Grid strategy is guided by this vision, consistent with the goals of SB 17 and follows a decision-making framework that includes a five-pronged approach to ensure compatibility with SB 17's goals: a) identify applicable regulations; b) identify investment options that help meet policy requirements; c) determine if investment options aid SDG&E in meeting policy requirements; d) determine if investment options enhance customer value; and e) choose investments based on standard economic criteria, necessity for meeting policy requirements, and equity.

SDG&E's Smart Grid deployment strategy also prioritizes projects according to customer value, policy drivers or the need to pilot. Investments driven by customer value are those where the projected benefits outweigh costs or where the investment is necessary to effectively communicate with customers. For investments driven by state or federal policies, SDG&E still calculates the potential customer and societal benefits to pursue a least-cost and best-fit approach. By following this strategy, SDG&E's Smart Grid deployment efforts will significantly reduce the environmental footprint of electricity generation and delivery in the region; reduce energy dependence on foreign sources; enhance the grid's resilience to natural or manmade threats; provide customers with greater choice, convenience and value; mitigate risk; and ensure the provision of safe, reliable and secure electricity for its stakeholders.

In addition, SDG&E's strategy includes continued industry leadership in supporting General Order 156 with respect to including Diverse Business Enterprises (DBEs) in its supplier selection process. SDG&E has incorporated supplier diversity throughout all of its policies and procurement processes and has exceeded state targets for DBE spending and procurement, a trend it expects to continue with its Smart Grid Deployment Plan procurement practices.

Security is a priority impacting every component in SDG&E's Smart Grid Deployment Plan. Preventing or reducing physical and cyber security threats becomes more vital and complex in a Smart Grid; however, it also presents opportunities. With the new communications and control technologies for physical and cyber security, SDG&E anticipates the ability to integrate and correlate physical and cyber security monitoring and data to better protect grid assets and systems. SDG&E's Smart Grid security approach will begin at the earliest stages of system decision-making and design. It will also seek to prevent or isolate the impacts of any physical or cyber threats to one or multiple portions of the Smart Grid to maintain system reliability in the event of a threat.

Just as security is designed into Smart Grid systems and solutions, so too is privacy. SDG&E will ensure a robust approach to enterprise architecture and information modeling, leveraging the National Institute of Standards and Technology's (NIST) four dimensions of privacy as well as the seven "privacy by design" foundational principles as guidance for its privacy program.

SDG&E's deployment plan will also leverage open standards where possible to ensure interoperability and avoid stranded costs.

To build the capabilities required to realize Smart Grid benefits for customers and to meet the state's ambitious energy policy goals, SDG&E's portfolio of Smart Grid projects is structured around nine specific program areas:

1. **Customer Empowerment** – SDG&E is investing to ensure customers have the knowledge and necessary information to make informed energy management decisions to maximize their energy value and to support their access to third-party value-added services and offerings while protecting their privacy.

2. **Renewable Growth** – SDG&E is making Smart Grid investments that will mitigate the impact of distributed and other intermittent energy sources by increasing measurement, control, and management capabilities.

3. **Electric Vehicle Growth** – SDG&E is deploying new Smart Grid technologies in conjunction with traditional infrastructure upgrades to ensure the safe, reliable, and efficient integration of PEVs.

4. **Reliability and Safety** – SDG&E is maintaining and/or improving reliability by mitigating the challenges that intermittent resources and electric vehicles present to an aging electric infrastructure through implementation of advanced sensors and associated systems, and other capabilities that will improve employee and public safety.

5. **Security** – SDG&E is investing to address the increased physical and cyber security risks and threats associated with Smart Grid system design, development, implementation, and operations.

6. **Operational Efficiency** – SDG&E is leveraging existing and developing new capabilities to improve the efficiency of planning processes and system operations through remote monitoring and real-time responsiveness enabled by the deployment of advanced sensors and management systems.

7. **Smart Grid Research, Development and Demonstration (RD&D)** – SDG&E is improving its capabilities by researching new technologies, integrating emerging technology solutions, testing for interoperability and providing proof-of-concept demonstrations.

8. **Integrated and Cross-cutting Systems** – SDG&E is deploying systems in areas such as application platform development, data management and analytics and communications that support Smart Grid functionalities across multiple business units.

9. **Workforce Development** – SDG&E is investing to develop its current workforce and to transition to a future workforce that will meet the unique requirements of Smart Grid through implementation of effective organizational change management and workforce planning.

By applying an adaptive management strategy to the projects listed under each of these program areas, SDG&E expects to continually evolve its roadmap to leverage or respond to future technology breakthroughs, changing state and federal policies, shifting stakeholder priorities and other unanticipated events that the utility considers as a given over the coming 10-year period.

SDG&E has defined and included consensus metrics for its Smart Grid Deployment Plan, which permit the utility to benchmark and assess the progress achieved through its Smart Grid deployments. SDG&E plans to continue working with the California Public Utilities Commission, the Environmental Defense Fund, the other California Investor Owned Utilities (IOUs), interested parties and key stakeholders in the development and adoption of additional Smart Grid-related metrics.

SDG&E has identified, quantified, and monetized associated cost and benefit estimates for all of the projects in its nine Smart Grid program areas, including in-flight and planned roadmap projects. SDG&E will not request authorization for funding of projects that are not necessary to comply with policy unless the estimated benefits exceed the associated costs or where they are required to effectively communicate with the utility's customers.

SDG&E's analysis of the costs and benefits is intended to be as accurate as possible, given currently available information. However, due to the nascent state of much Smart Grid technology and the fact that actual deployment will be based on future events, lessons learned and pilots, these estimates are subject to change and are presented as conceptual for 2011-2015 and preliminary for 2016-2020. In addition, a range is provided to allow for more conservative cost and benefit scenarios. SDG&E will file supporting applications only when sufficiently precise estimates are available.

SDG&E's estimated cost of Smart Grid deployments for the years 2006 – 2020 described in this plan are approximately $3.5 to $3.6 billion and include previously authorized investments such as SDG&E's Smart Meter and OpEx 20/20 programs, Smart Grid projects included in its Test Year 2012 (TY2012) General Rate Case (GRC), other active applications such as SDG&E's proposed Demand Response and Dynamic Pricing projects, and estimated incremental investments, which are approximately 25 percent of the overall estimated costs.

The total benefits associated with the Smart Grid deployments discussed in this plan are estimated to be between $3.8 and $7.1 billion. This calculation includes estimated societal and environmental benefits of $760 million - $1.9 billion based on avoided emissions through the integration of renewable energy and PEVs as well as the estimated avoided fuel costs PEV owners realize by the successful integration of PEVs. They also include economic and reliability benefits of $3.0 - $5.1 billion resulting from previously authorized investments such as Smart Meter, TY2012 GRC and other active applications as well as incremental investments.

Because the majority of benefits derive from maintaining and/or improving reliability in the face of a more complex grid, avoided costs, reduction of commodity cost, environmental and other societal and "soft" benefits, they minimally reduce operating costs and so are not projected to significantly impact rates, although customers who

leverage Smart Grid technologies and data will have the capabilities they need to manage and reduce their bills.

As with its cost estimations, SDG&E's economic and reliability benefits calculations extend back to 2006 to include the historical benefits realized from previously authorized Smart Grid projects. Because benefits will also accrue after 2020, SDG&E has included forecasted benefits based on the associated terminal value of its Smart Grid projects.

The SDG&E Smart Grid Deployment Plan is not a static document. Consistent with its Smart Grid vision, SDG&E intends to continue engaging with stakeholders in order to align its Smart Grid strategy to their priorities. The utility also plans to update its roadmap as its customers, stakeholders, available technologies, and services evolve; adopt new security strategies as new threats or best practices emerge; and adjust its cost and benefit estimates as its pilot and deployment experiences and new information bring greater certainty to anticipated inputs, timelines and outcomes.