





# Smart Grid Deployment Plan 2011-2020

June 6, 2011

Smart Grid OIR R.08-12-009

## CONTENTS

<b>1</b>	<b>EXECUTIVE SUMMARY</b>	<b>2</b>
<b>2</b>	<b>VISION</b>	<b>11</b>
<b>2.1</b>	<b>A Smart Energy Future</b>	<b>11</b>
<b>2.2</b>	<b>SDG&amp;E’s Smart Grid Vision</b>	<b>17</b>
<b>2.3</b>	<b>“Smart Customer”</b>	<b>21</b>
<b>2.4</b>	<b>“Smart Market”</b>	<b>27</b>
<b>2.5</b>	<b>“Smart Utility”</b>	<b>29</b>
<b>2.6</b>	<b>Implementing the Policies of SB 17</b>	<b>33</b>
A.	Create a Self-Healing and Resilient Grid	34
B.	Empower Consumers to Actively Participate in Operations of the Grid	35
C.	Resist Attack	37
D.	Provide Higher Quality of Power and Avoid Outages	40
E.	Accommodate All Cost-Effective Generation and Energy Storage Options	42
G.	Run the Grid More Efficiently	45
H.	Enable Penetration of Intermittent Power Generation Sources	48
I.	Create a Platform for Deployment of a Wide Range of Energy Technologies and Management Services	48
J.	Enable and Support the Sale of Demand Response, Energy Efficiency, Distributed Generation, and Storage into Wholesale Energy Markets as a Resource, on Equal Footing with Traditional Generation Resources	50
K.	Significantly Reduce the Total Environmental Footprint of the Current Electric Generation and Delivery System as well as Vehicle Emissions in California	51
<b>3</b>	<b>DEPLOYMENT BASELINE</b>	<b>55</b>
<b>3.1</b>	<b>Introduction</b>	<b>55</b>
<b>3.2</b>	<b>Current State of SDG&amp;E’S Grid</b>	<b>57</b>
3.2.1	Generation	57
3.2.2	Transmission	59
3.2.3	Distribution	60
3.2.4	Substations	64
3.2.5	Data transport	65
<b>3.3</b>	<b>San Diego Smart Grid Study</b>	<b>66</b>
<b>3.4</b>	<b>Smart Technology Deployments and Investments</b>	<b>67</b>
3.4.1	Overview	67
3.4.2	Major Technology Deployments	68

3.4.3	Major Inflight Projects _____	71
3.4.4	Inventory of Other Smart Grid Investments _____	77
<b>3.5</b>	<b>Customer Data Privacy and Security _____</b>	<b>78</b>
3.5.1	Customer Data Collection, Sharing, and Retention _____	78
3.5.2	Data Accuracy and Reliability _____	80
3.5.3	Protection Against Data Loss or Misuse _____	81
3.5.4	Sharing Customer Information and Energy Data _____	82
3.5.5	Third Party Data Usage Purpose _____	83
3.5.6	Information Security and Privacy for Shared Data _____	83
3.5.7	Limitations and Restrictions on Third-Party Data _____	84
3.5.8	Enforcement of Limitations and Restrictions _____	85
3.5.9	Individuals’ Access to Their Data _____	85
3.5.10	Audit, Oversight, and Enforcement Mechanisms _____	85
<b>3.6</b>	<b>Conclusion _____</b>	<b>86</b>
<b>4</b>	<b>SMART GRID STRATEGY _____</b>	<b>88</b>
<b>4.1</b>	<b>Introduction _____</b>	<b>88</b>
<b>4.2</b>	<b>Strategic Decision Making Process _____</b>	<b>92</b>
<b>4.3</b>	<b>SDG&amp;E’s Strategic Priorities _____</b>	<b>96</b>
4.3.1	State and Federal Policies _____	96
4.3.2	Customer Value _____	98
4.3.3	Pilots _____	99
<b>4.4</b>	<b>Strategy to Ensure Alignment with State and Federal Policy Goals _____</b>	<b>99</b>
4.4.1	SB 17 Alignment _____	99
<b>4.5</b>	<b>Technology Selection _____</b>	<b>111</b>
<b>4.6</b>	<b>U.S. Department of Energy (DOE) Modern Grid Alignment _____</b>	<b>114</b>
<b>4.7</b>	<b>General Order 156 Alignment _____</b>	<b>117</b>
<b>4.8</b>	<b>Smart Grid Maturity Model Alignment _____</b>	<b>118</b>
<b>4.9</b>	<b>NIST Model Alignment _____</b>	<b>119</b>
<b>4.10</b>	<b>Privacy Considerations _____</b>	<b>120</b>
4.10.1	Interoperability and Privacy _____	121
4.10.2	Standards and Privacy _____	122
<b>4.11</b>	<b>Interoperability Considerations _____</b>	<b>123</b>
4.11.1	Interoperability Standards _____	123
4.11.2	Standards and Minimizing Risk of Stranded Costs _____	126
4.11.3	OpenADR and Smart Energy Profile Coexistence _____	127
<b>4.12</b>	<b>Customer Benefits Delivery _____</b>	<b>128</b>

<b>4.13</b>	<b>Evaluating Third Party Communications Networks</b>	<b>131</b>
<b>4.14</b>	<b>Conclusion</b>	<b>132</b>
<b>5</b>	<b>GRID SECURITY AND CYBER SECURITY STRATEGY</b>	<b>134</b>
<b>5.1</b>	<b>Introduction</b>	<b>134</b>
5.1.1	Security Vision and Approach	135
<b>5.2</b>	<b>Security Risks in the Smart Grid</b>	<b>136</b>
<b>5.3</b>	<b>Privacy and Smart Grid</b>	<b>139</b>
5.3.1	Evolving the Customer Privacy Program	141
<b>5.4</b>	<b>Alignment to Security Guidance Documents from NIST and Others</b>	<b>141</b>
<b>5.5</b>	<b>SDG&amp;E’s Grid and Cyber Security Strategy</b>	<b>143</b>
5.5.1	Adhere to Security Principles	143
5.5.2	Broaden Awareness	144
5.5.3	Converge Security Governance	145
5.5.4	Disaggregate Security Controls	146
5.5.5	Comply with Federal Critical Infrastructure Protection Standards and Requirements	147
5.5.6	Smart Grid Security Strategic Expectations	148
5.5.7	Apply a “Secure by Design” Approach	149
5.5.8	Evolve Existing Security Capabilities to Support the Smart Grid	152
<b>5.6</b>	<b>SDG&amp;E’s Information Security Program</b>	<b>158</b>
5.6.1	Information Security Governance	159
5.6.2	Information Management	167
5.6.3	Compliance Process	172
5.6.4	Security Awareness & Training	177
5.6.5	Security Strategy and Enterprise Risk Architecture	178
5.6.6	Security Requirements in Contracts	179
5.6.7	Solutions Development and Implementation Lifecycle	180
5.6.8	Operational Security	183
<b>5.7</b>	<b>SDG&amp;E’s Physical Security Program</b>	<b>187</b>
5.7.1	Investigations	188
5.7.2	Site Security Reviews and Vulnerability Assessments	188
5.7.3	Physical Security Management	188
5.7.4	Security Compliance	188
5.7.5	Access Administration	189
5.7.6	Security Awareness and Training	189
5.7.7	Threat Monitoring, Global Event Notification and Alerts	189
<b>5.8</b>	<b>SDG&amp;E Responses to Commission Questions Regarding Privacy</b>	<b>190</b>
5.8.1	Information Collected Via Smart Meters, Purposes, Minimization	190
5.8.2	Expected Devices and Associated Information	192
5.8.3	Expected Information from Smart Meters and HAN Gateway	193

5.8.4	Frequency of Information Collection from Smart Meters _____	194
5.8.5	Information Usage / Purposes _____	194
5.8.6	Information Retention Periods / Purpose of Retention _____	195
5.8.7	Data Sharing and Associated Issues _____	196
5.8.8	Audit and Security Practices _____	202
<b>5.9</b>	<b>Conclusion _____</b>	<b>204</b>
<b>5.10</b>	<b>Appendix _____</b>	<b>205</b>
5.10.1	Sample Matrix of Unified Security Controls Framework to Various Security Guidelines _	205
5.10.2	Listing of Possible Smart Meter Data Elements _____	206
<b>5.11</b>	<b>Reference Materials _____</b>	<b>207</b>
<b>6</b>	<b>ROADMAP _____</b>	<b>209</b>
<b>6.1</b>	<b>Introduction _____</b>	<b>209</b>
<b>6.2</b>	<b>Statutory and Policy Alignment _____</b>	<b>212</b>
6.2.1	Greenhouse Gases Emissions Reduction _____	213
6.2.2	Renewable Portfolio Standard (RPS) _____	214
6.2.3	Distributed Energy Resources _____	214
6.2.4	Energy Efficiency _____	215
6.2.5	Reliability _____	216
6.2.6	Electric Transportation _____	217
6.2.7	Water Use: Once-Through Cooling _____	218
<b>6.3</b>	<b>Policy Achievement _____</b>	<b>219</b>
6.3.1	Global Warming Solutions Act of 2006 (AB 32) _____	219
6.3.2	The California Long Term Energy Efficiency Strategic Plan _____	220
6.3.3	Achievement of the energy efficiency and demand response goals as required by Sections 454.5 and 454.55 of the California Public Utilities Code _____	221
6.3.4	Essential infrastructure steps to provide customers with access to consumption and pricing data pursuant to D.09-12-046 _____	222
<b>6.4</b>	<b>Functionality and Technology Roadmap _____</b>	<b>224</b>
6.4.1	Customer Empowerment _____	225
6.4.2	Renewable Growth _____	232
6.4.3	Electric Vehicle Growth _____	236
6.4.4	Reliability and Safety _____	239
6.4.5	Security _____	243
6.4.6	Operational Efficiency _____	247
6.4.7	Smart Grid Research, Development and Demonstration (RD&D) _____	252
6.4.8	Integrated and Cross-cutting Systems _____	255
6.4.9	Workforce Development _____	260
<b>6.5</b>	<b>Conclusion _____</b>	<b>263</b>
<b>7</b>	<b>COST ESTIMATES _____</b>	<b>265</b>

<b>7.1</b>	<b>Introduction</b>	<b>265</b>
<b>7.2</b>	<b>Approach</b>	<b>268</b>
7.2.1	Project Classifications	269
7.2.2	Conceptual and Provisional Estimates	269
7.2.3	Costs per Customer	271
<b>7.3</b>	<b>Cost Estimates by Program</b>	<b>272</b>
7.3.1	Customer Empowerment	272
7.3.2	Renewable Growth	274
7.3.3	Electric Vehicle Growth	275
7.3.4	Reliability and Safety	276
7.3.5	Security	278
7.3.6	Operational Efficiency	279
7.3.7	Smart Grid Research, Development, and Demonstration	280
7.3.8	Integrated and Cross-Cutting Systems	281
7.3.9	Workforce Development	283
<b>7.4</b>	<b>Conclusion</b>	<b>284</b>
<b>8</b>	<b>BENEFITS ESTIMATES</b>	<b>286</b>
<b>8.1</b>	<b>Introduction</b>	<b>286</b>
<b>8.2</b>	<b>Approach</b>	<b>293</b>
<b>8.3</b>	<b>Societal and Environmental Benefits</b>	<b>298</b>
8.3.1	Estimated Avoided emissions from energy reductions and peak load shifting	299
8.3.2	Estimated Avoided Emissions Reduction by Reliably Integrating Centralized Renewable Energy	300
8.3.3	Estimated Avoided Emissions Reduction by Integrating Distributed Generation	300
8.3.4	Estimated Avoided Net Emissions Reduction by Integrating Electric Vehicles	301
8.3.5	Estimated Avoided Fuel Cost by Integrating Electric Vehicles	302
<b>8.4</b>	<b>Economic and Reliability Benefits Estimates By Program Area</b>	<b>302</b>
8.4.1	Customer Empowerment	302
8.4.2	Renewable Growth	303
8.4.3	Electric Vehicle Growth	304
8.4.4	Reliability and Safety	305
8.4.5	Security	306
8.4.6	Operational Efficiency	307
8.4.7	Smart Grid Research, Development, and Demonstration	308
8.4.8	Integrated and Cross-Cutting Systems	309
8.4.9	Workforce Development	311
<b>8.5</b>	<b>Conclusion</b>	<b>312</b>
<b>9</b>	<b>METRICS</b>	<b>314</b>
<b>9.1</b>	<b>Introduction</b>	<b>314</b>

<b>9.2</b>	<b>Smart Grid-Related Consensus Metrics</b>	<b>315</b>
9.2.1	Customer/AMI Metrics	316
9.2.2	Plug-in Electric Vehicles	327
9.2.3	Energy Storage	328
9.2.4	Grid Operations	329
<b>9.3</b>	<b>Additional Smart Grid Related Metrics</b>	<b>336</b>
<b>10</b>	<b>CONCLUSION</b>	<b>337</b>

**FIGURES**

Figure 4-1:	SB 17 to SDG&E Smart Grid Deployment Plan Program Mapping	106
Figure 4-2:	Smart Grid Maturity Model Results	118
Figure 4-3:	NIST Conceptual Model and Additional Cross-cutting Domains	119
Figure 4-4:	GridWise Architecture Council Interoperability Model	124
Figure 5-1:	Maturity Levels of Shared Security Capabilities	157
Figure 5-2:	SDG&E (SEU/CC) Information Security Policy Framework	164
Figure 5-3:	Enterprise Information Risk Management Phases	166
Figure 6-1:	California Energy Policy Elements	213
Figure 6-2:	Assessment of SDG&E Electric Vehicle Market Population	218
Figure 6-3:	Alignment between SDG&E Programs and SB 17 Policy Goals	224
Figure 6-4:	Customer Empowerment Program Roadmap	231
Figure 6-5:	Renewable Growth Program Roadmap	235
Figure 6-6:	Electric Vehicle Growth Program Roadmap	238
Figure 6-7:	Reliability and Safety Program Roadmap	242
Figure 6-8:	Security Program Roadmap	246
Figure 6-9:	Operational Efficiency Program Roadmap	251
Figure 6-10:	Smart Grid RD&D Program Roadmap	254
Figure 6-11:	Integrated and Cross-cutting Systems Program Roadmap	259
Figure 6-12:	Workforce Development Program Roadmap	262



## TABLES

Table 3-1: SDG&E Electric System Reliability 2010 Statistics .....	63
Table 3-2: SDG&E Electric System Reliability Historical Indices .....	63
Table 3-3: SDG&E Historical System Reliability Data (using IEEE 1366 Exclusion Criteria).....	64
Table 4-1 IT Product Lifecycle Phases.....	113
Table 4-2 DOE Modern Grid and CPUC Smart Grid Characteristic Alignment.....	116
Table 4-3: NIST Interoperability Standards Roadmap List.....	125
Table 5-1: Security Roles & Responsibilities.....	162
Table 5-2: Sample Matrix of Unified Security Controls Framework to Various Security Guidelines.....	205
Table 5-3: Smart Meter Data Elements.....	206
Table 7-1: Smart Grid Deployments Total Estimated Costs 2006-2020 .....	268
Table 7-2: Summary of Provisional Range Factors .....	271
Table 7-3: Customer Empowerment Program Conceptual and Provisional Cost Estimates .....	273
Table 7-4: Renewable Growth Program Conceptual and Provisional Cost Estimates.....	275
Table 7-5: Electric Vehicle Growth Program Conceptual and Provisional Cost Estimates .....	276
Table 7-6: Reliability and Safety Program Conceptual and Provisional Cost Estimates .....	278
Table 7-7: Security Program Conceptual and Provisional Cost Estimates .....	279
Table 7-8: Operational Efficiency Conceptual and Provisional Cost Estimates .....	280
Table 7-9: Research, Development and Demonstration Program Conceptual and Provisional Cost Estimates .....	281
Table 7-10: Integrated and Cross-cutting Systems Program Conceptual and Provisional Cost Estimates	282
Table 7-11: Workforce Development Program Conceptual and Provisional Cost Estimates .....	284
Table 8-1: Societal and Environmental Benefits 2011 – 2020 .....	290
Table 8-2: Potential Fuel Cost Savings for Adopting Electric Vehicles.....	291
Table 8-3: Economic and Reliability Benefits 2006 – 2020.....	292
Table 8-4: SDG&E Benefits Framework .....	295

Table 8-5: Conceptual and Provisional Range Factors for 2011-2020 Benefits Estimates .....	298
Table 8-6: Customer Empowerment Program Conceptual and Provisional Benefits Estimates .....	303
Table 8-7: Renewable Growth Program Conceptual and Provisional Benefits Estimates .....	304
Table 8-8: Electric Vehicle Growth Program Conceptual and Provisional Benefits Estimates .....	305
Table 8-9: Reliability and Safety Program Conceptual and Provisional Benefits Estimates .....	306
Table 8-10: Security Program Conceptual and Provisional Benefits Estimates .....	307
Table 8-11: Operational Efficiency Conceptual and Provisional Benefits Estimates .....	308
Table 8-12: Research, Development and Demonstration Program Conceptual and Provisional Benefits Estimates .....	309
Table 8-13: Integrated and Cross-cutting Systems Program Conceptual and Provisional Benefits Estimates .....	310
Table 9-1: Customer/AMI Metric 1.....	316
Table 9-2: Customer/AMI Metric 2.....	317
Table 9-3: Customer/AMI Metric 3.....	318
Table 9-4: Customer/AMI Metric 4.....	319
Table 9-5: Customer/AMI Metric 5.....	321
Table 9-6: Customer/AMI Metric 6.....	323
Table 9-7: Customer/AMI Metric 7.....	324
Table 9-8: Customer/AMI Metric 8.....	325
Table 9-9: Customer/AMI Metric 9.....	326
Table 9-10: Plug-in Electric Vehicles Metric 1 .....	327
Table 9-11: Energy Storage Metric 1 .....	328
Table 9-12: Grid Operations Metric 1.....	329
Table 9-13: Grid Operations Metric 2.....	330
Table 9-14: Grid Operations Metric 3.....	331
Table 9-15: Grid Operations Metric 4.....	332
Table 9-16: Grid Operations Metric 5.....	333

Table 9-17: Grid Operations Metric 6.....	334
Table 9-18: Grid Operations Metric 7.....	335
Table 9-19: Grid Operations Metric 8.....	336



Michael R. Niggli  
President & Chief Operating Officer

8330 Century Park Court  
San Diego, CA 92123-1530

Tel: 858.650.6175  
Fax: 858.650.6106  
mniggli@semprautilities.com

June 6, 2011

Commissioner Michael R. Peevey, President  
California Public Utilities Commission  
505 Van Ness Avenue  
San Francisco, CA 94102

Dear President Peevey:

At SDG&E, we define the Smart Grid as an end-to-end transformation of our electric system that applies advances in technology to deliver a range of new benefits to all stakeholders. Our Smart Grid empowers customers, increases renewable generation, integrates plug-in electric vehicles (PEVs) and reduces greenhouse gas emissions. We expect to do this while maintaining or improving system reliability and operational efficiency, and ensuring security while protecting customer privacy. We anticipate that investments in a smarter grid will yield substantive and as yet unidentified benefits as the transformation progresses and our customers, employees, policy makers and the industry are able to leverage lessons learned and achieve the Smart Grid's full potential.

There is one observation that is crystal clear: Our customers are driving our deployment plan.

- Over 13,000 of our customers have installed a total of over 100 megawatts of photovoltaics.
- Our customers are adopting PEVs at rates that are among the highest in the nation – 300 vehicles purchased and increasing by over 100 per month.
- Our customers are already leveraging real-time information about their energy usage from third-party software applications in order to make more informed decisions about how and when they use electricity.

- Our customers and SDG&E support environment-friendly policies from the *California Global Warming Solutions Act (AB 32)* to a 33 percent renewable portfolio standard, to which we committed over two years prior to it being signed into law.

Our vision is to work collaboratively with key stakeholders to create the foundation for an innovative, connected and sustainable energy future. We have engaged the input of representative stakeholders from across our service territory and around the globe, including environmental, academic, business, municipal/regional government, ratepayer advocacy, consumer, large customer, and workforce development organizations. Their valuable insights have shaped our approach to the Smart Grid Deployment Plan. And we will continue to seek and incorporate their input as our plan develops.

Our connected grid will leverage technology advancements so that customers can manage their energy bills with minimal complexity and invested time. Products for the home such as appliances, air conditioners, plug-in electric vehicles, electric generation, and products yet to be developed or not widely available, such as home energy storage, will automatically work in concert with a grid enabled by advanced technology to improve reliability, while integrating the increasing variability produced by an ever-growing level of intermittent renewable generation.

The Smart Grid Deployment Plan was developed by SDG&E employees across the whole company, driving broad internal alignment around the exciting changes associated with the energy industry evolution. We are working with employees internally and partnering externally to ensure a Smart Grid-ready workforce. Outreach to Diverse Business Enterprises is another key element in our Smart Grid supplier selection process to ensure SDG&E continues to exceed state targets for supplier diversity.

SDG&E's Smart Grid activities over the past two decades have developed a baseline that is the foundation for the utility of the future. From automation and control technologies, to re-engineering operational processes, microgrids, our nearly-complete Smart Meter program, advanced sensing technologies and many others; our

investments are already benefiting our customers by improving safety, reliability, and efficiency. SDG&E's choice of open standards, where cost effective, available, and applicable allows the flexibility to incorporate new technologies, respond to evolving and new policy requirements and capture new benefits as opportunities arise.

Reliable electric service to customers is a key driver for SDG&E as evidenced by having been named "most reliable utility in the west" for the last five years and the honor of best reliability excellence in the nation for 2009. Our Smart Grid investments are intended to maintain or improve reliability as the grid is challenged by the two-way energy flow from distributed generation; the intermittent power generation of solar and wind generators; and the large, mobile and growing load imposed by electric vehicle charging. Ultimately, the Smart Grid will also enable a significant reduction in the environmental footprint of electricity generation and delivery in the region; reduce energy dependence on foreign sources; enhance the grid's resilience to natural and manmade threats; and most importantly meet our customers' needs and provide them with greater choice, convenience and value.

To ensure our customers trust an electric grid that relies on significantly more technology, privacy and security must be a foundational element of Smart Grid systems and solutions. Customer data must be protected by "designing in" privacy from the beginning and leveraging the security of our systems. We have partnered with global leaders in this area to develop a smarter approach to privacy and security.

SDG&E's roadmap for Smart Grid projects from 2011 – 2020 as well as associated cost and benefit estimates are structured around nine program areas: Customer Empowerment; Renewable Growth; Electric Vehicle Growth; Reliability and Safety; Security; Operational Efficiency; Smart Grid Research, Development and Demonstration; Integrated and Cross-cutting Systems; and Workforce Development.

While we have presented a detailed roadmap with specified estimated costs and benefits for our Smart Grid Deployment Plan, we plan to take an adaptive management

approach on an ongoing basis. We will continually evolve our roadmap to leverage and 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.

Our plan today estimates the preliminary and conceptual costs of SDG&E's Smart Grid deployments for the years 2006–2020 at approximately \$3.5 to \$3.6 billion with the majority of the estimated costs attributable to previously authorized investments and active applications. These previously authorized programs include SDG&E's Smart Meter and Operational Excellence 20/20 programs. Active applications include our Test Year 2012 General Rate Case (GRC) as well as other programs such as SDG&E's proposed Demand Response and Dynamic Pricing projects. The estimated investments for projects incremental to these previously authorized and active applications 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 economic and reliability benefits as well as estimated societal and environmental benefits such as avoided emissions through the integration of renewable energy and PEVs as well as the estimated avoided fuel costs PEV owners realize by their successful integration.


The majority of benefits derive from societal and “soft” benefits such as maintaining or improving reliability in the face of a more complex grid, avoided costs, reduction of commodity cost, environmental and others, and so they minimally reduce operating costs and 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. Smart Grid technologies and applications will enable the future – and the exciting achievement of benefits to society.

SDG&E's Smart Grid Deployment Plan is not a request for funding. While many of the costs have been previously authorized or submitted as part of the 2012 GRC, we will not pursue funding requests for incremental projects in this plan until we can accurately project associated costs and benefits for a project.

We are pleased to submit this foundational industry plan and share our vision for the next decade of Smart Grid transformation in our region and beyond. While this document is already based on broad stakeholder input, we anticipate that its publication will attract additional input and help SDG&E continue to enhance and improve its Smart Grid plans and thought leadership, as evidenced by President Obama's recognition of SDG&E in the *U.S.-Russia Bilateral Presidential Commission's Energy Working Group Joint Action Plan* and *Intelligent Utility Magazine's* most intelligent utility in the U.S. designation for the last two years. SDG&E is excited about the better customer service, reliability, efficiency and environmental benefits enabled by Smart Grid investments. We are proud to do our part to deliver these benefits to customers, to California and to society as a whole.

Sincerely,

SAN DIEGO GAS & ELECTRIC CO.

A handwritten signature in black ink, reading "Michael R. Niggli". The signature is written in a cursive style with a large initial "M" and "N".

Michael R. Niggli, President and COO