Section 9 – METRICS

9 METRICS

9.1 INTRODUCTION

During the second half of 2010, SDG&E collaborated with the other California Investor Owned Utilities (IOUs) and the Environmental Defense Fund to define consensus metrics to be included with the IOUs' Smart Grid Deployment Plans.

D.10-06-047 found that "Smart Grid Deployment Plans should include metrics that permit the assessment of progress, but the adoption of specific metrics requires additional work by parties. A subsequent decision later this year will endorse specific metrics for inclusion in Smart Grid Deployment Plans and other reports."[76]

While that decision has not yet been issued by the Commission, it is SDG&E's assumption that the consensus metrics identified in the draft *Report on Consensus and Non-Consensus Smart Grid Metrics*[77] filed with the Commission on December 29, 2010, will be included in the Commission's future decision regarding metrics and have, therefore, included those metrics in this Smart Grid Deployment Plan.

SDG&E will continue working with the Commission, the Environmental Defense Fund, the other California IOUs, interested parties and key stakeholders in the development of additional Smart Grid-related metrics in additional topic areas such as environmental and cyber security.

[76] D.10-06-047 at p. 5
[77] The Report, which includes specific definitions of each metric herein, is http://docs.cpuc.ca.gov/efile/RULINGS/129001.pdf

9.2 SMART GRID-RELATED CONSENSUS METRICS

The Smart Grid-related metrics included in this plan are based on the consensus metrics proposed in the draft *Report on Consensus and Non-Consensus Smart Grid Metrics*. The objective of these consensus metrics is twofold.

First, the consensus metrics will be an initial source of information available to the Commission for use in meeting its obligation under Section 8367 of the Public Utilities Code to provide an initial annual report to the California Legislature about Smart Grid deployments in California.

Second, the consensus metrics will provide a useful initial guidance in measuring Smart Grid progress. These metrics should be reviewed on a regular basis to address their applicability and effectiveness as a measure of SDG&E's Smart Grid Deployment Plan. The Smart Grid consensus metrics included 19 metrics grouped into four topics: Customer/AMI (nine consensus metrics), Plug-In Electric Vehicle (one consensus metric), Energy Storage (one consensus metric) and Grid Operations (eight consensus metrics). Each Smart Grid consensus metric supports a policy goal as recommended by the Commission.

9.2.1 CUSTOMER/AMI METRICS

Metric 1 - The number of advanced meter malfunctions where service is disrupted.

Purpose/Policy Goal Supported: To measure improvements in grid reliability at the customer level and to measure the ability of the Smart Grid to avoid and identify outages, §8360(a).

Table 9-1: Customer/AMI Metric 1

Number of SDG&E Advanced Meter Malfunctions Where Service is Disrupted		
Metric	**Units**	**2010 Value**
Number of meters	Meters	37

Metric 2 - Load impact from Smart Grid-enabled, utility administered demand response (DR) programs (in total and by customer class, to the extent available)

Purpose/Policy Goal Supported: To measure the achievement of energy efficiency and demand response goals as listed in §454.5 and §454.55 -- §8366(d)

Table 9-2: Customer/AMI Metric 2

Load Impacts of SDG&E Administered DR Programs[78]		
Metric	**Units**	**2010 Value**
Residential	MW	14
C&I < 500 kW	MW	30
C&I > 500 kW	MW	0
Other	MW	6
Total by Customer Class		**50**

[78] As defined in the December 29, 2010 ALJ Ruling entitled "Administrative Law Judge's Ruling Seeking Comments on Proposed Interim Metrics to Measure Progress by PG&E, SCE and SDG&E in Implementing a Smart Grid", this includes PTR, CPP, TOU, A/C Cycling.

Metric 3 - Percentage of demand response enabled by AutoDR (Automated Demand Response) by individual DR impact program.

Purpose/Policy Goal Supported: The Smart Grid seeks to promote the use of demand response and is tied to §8366(d) and §8360(d).

Table 9-3: Customer/AMI Metric 3

Percentage of SDG&E DR enabled by AutoDR		
Metric	**Units**	**2010 Value**
Percentage of demand response enabled by AutoDR – Capacity Bidding Program (CBP)	%	6%
Percentage of demand response enabled by AutoDR – Critical Peak Pricing (CPP) program	%	4%

Metric 4 - The number of utility-owned advanced meters with consumer devices with Home Area Network (HAN) or comparable consumer energy monitoring or measurement devices registered with the utility by customer class, California Alternative Rates for Energy (CARE), and climate zone, to extent available.

Purpose/Policy Goal Supported: Some of the benefits of the Smart Grid are linked to customer usage of its capabilities, and this metric seeks to measure customer use of Smart Grid and advanced meter capabilities. Tied to §8360(f), (h), (i) and §8366(a).

Table 9-4: Customer/AMI Metric 4

SDG&E Owned Advanced Meters With HAN / Comparable Devices Registered		
Metric	**Units**	**2010 Value**
Residential	# meters	0
C&I < 500 kW	# meters	0
C&I > 500 kW	# meters	0
Other	# meters	0
Total by Customer Class		**0**
CARE	# meters	0
Non-CARE	# meters	0

SDG&E Owned Advanced Meters With HAN / Comparable Devices Registered		
Total by CARE/non-CARE		**0**
Coastal	# meters	0
Inland	# meters	0
Mountain	# meters	0
Desert	# meters	0
Total by Climate Zone		**0**

Metric 5 - Number of customers that are on a time-variant or dynamic pricing tariff (by customer class, CARE, and climate zone, to extent available.

Purpose/Policy Goal Supported: Some of the benefits of the Smart Grid are linked to customer usage of its capabilities, and this metric seeks to measure customer use of Smart Grid and advanced meter capabilities, §8360(f) (h) (i) and §8366(a).

Table 9-5: Customer/AMI Metric 5

Number of SDG&E Customers on a Time Variant or Dynamic Tariff[79]		
Metric	**Units**	**2010 Value**
Residential	# customers	1,886
C&I < 500 kW	# customers	23,495
C&I > 500 kW	# customers	688
Other	# customers	19
Total by Customer Class		**26,088**
CARE	# customers	0
Non-CARE	# customers	26,088

[79] As defined in the December 29, 2010 ALJ Ruling entitled "Administrative Law Judge's Ruling Seeking Comments on Proposed Interim Metrics to Measure Progress by PG&E, SCE and SDG&E in Implementing a Smart Grid", this includes CPP, TOU, RTP, and customers enrolled in PTR notifications and separately metered PEV rates.

Number of SDG&E Customers on a Time Variant or Dynamic Tariff[79]		
Total by CARE/non-CARE		**26,088**
Coastal	# customers	16,373
Inland	# customers	9,335
Mountain	# customers	315
Desert	# customers	65
Total by Climate Zone		**26,088**

Metric 6 - Number of escalated customer complaints related to (1) the accuracy, functioning, or installation of advanced meters or (2) or the functioning of a utility-administered HAN with registered consumer devices

Purpose/Policy Goal Supported: Linked to cost-effectiveness and provision of information to customers, §8360(a)(e)(h).

Table 9-6: Customer/AMI Metric 6

Number of Escalated SDG&E Customer Complaints Related to: **1 – Accuracy, Functioning or Installation of Advanced Meters, or** **2 – Functioning of an SDG&E Administered Home Area Network With Registered Devices**		
Metric	**Units**	**2010 Value**
Number of customer complaints	Complaints	2,123

Metric 7 - Number of utility-owned advanced meters replaced annually before the end of their expected useful life.

Purpose/Policy Goal Supported: Linked to cost-effectiveness and provision of information to customers §8360(a) (e) (h).

Table 9-7: Customer/AMI Metric 7

Number of SDG&E Owned Advanced Meters Replaced in 2010 Before the End of Their Expected Useful Life		
Metric	**Units**	**2010 Value**
# meters	meters	27,472[80]

[80] All meters counted in metric #7 were replaced under warranty by their manufacturer. Advanced meters owned by SDG&E have a 5 year warranty that covers the parts and labor costs of replacement.

Metric 8 - Number of advanced meter field tests performed at the request of customer pursuant to utility tariffs providing for such field tests

Purpose/Policy Goal Supported: Linked to cost-effectiveness and provision of information to customers. §8360(a) (e) (h).

Table 9-8: Customer/AMI Metric 8

Number of Advanced Meter Field Tests Performed at the Request of SDG&E Customers		
Metric	**Units**	**2010 Value**
Number of meters	Meters	329

Metric 9 - Number and percentage of customers with advanced meters using a utility-administered internet or web-based portal to access energy usage information or to enroll in utility energy information programs.

Purpose/Policy Goal Supported: Linked to cost-effectiveness and provision of information to customers, §8360(a) (e) (h).

Table 9-9: Customer/AMI Metric 9

Number / Percentage of SDG&E Customers With Advanced Meters Using SDG&E's Web-Based Portal to Access Energy Usage Information or to Enroll in SDG&E Energy Information Programs		
Metric	**Units**	**2010 Value**
Number of customers	Customers	0
Percentage of customers	%	0%

9.2.2 PLUG-IN ELECTRIC VEHICLES

Metric 1 - Number of customers enrolled in time-variant electric vehicles tariffs.

Purpose/Policy Goal Supported: Provides a view into the usage of plug in electric vehicles; consistent with §8362(g).

Table 9-10: Plug-in Electric Vehicles Metric 1

Number of SDG&E Customers Enrolled in a Time Variant Electric Vehicle Tariff		
Metric	**Units**	**2010 Value**
Number of customers	Customers	30

9.2.3 ENERGY STORAGE

Metric 1 - MW and MWh of grid connected energy storage interconnected at the transmission and distribution system level[81]

Purpose/Policy Goal Supported: Determine the number of units providing storage services to the network and their capability; §8362(g)

Table 9-11: Energy Storage Metric 1

SDG&E - MW and MWh of Grid Connected Energy Storage		
Metric	**Units**	**2010 Value**
Grid connected energy storage	MW	0
Grid connected energy storage	MWh	0

[81] Because storage systems are not 100 percent efficient and there are efficiency differences between different technologies, as storage comes online SDG&E will be measuring both the energy put into storage, and the energy taken out of storage, in order to understand the efficiencies of the various technologies.

9.2.4 GRID OPERATIONS

Metric 1 - The system-wide total number of minutes per year of sustained outage per customer served as reflected by the System Average Interruption Duration Index (SAIDI), shown by Major Events Included and Excluded

Purpose/Policy Goal Supported: Meet reporting requirements of §8366(e) and the policy goal of §8360(a)

Table 9-12: Grid Operations Metric 1

SDG&E System Average Interruption Duration Index (SAIDI) Major Events Included / Major Events Excluded		
Metric	**Units**	**2010 Value**
SAIDI - Major Events Included	SAIDI index	89.77
SAIDI - Major Events Excluded	SAIDI index	67.74

Metric 2 - How often the system-wide average customer was interrupted in the reporting year as reflected by the System Average Interruption Frequency Index (SAIFI), shown by Major Events Included and Excluded.

Purpose/Policy Goal Supported: Meet reporting requirements of §8366(e) and the policy goal of §8360(a).

Table 9-13: Grid Operations Metric 2

SDG&E System Average Interruption Frequency Index (SAIFI) Major Events Included / Major Events Excluded		
Metric	**Units**	**2010 Value**
SAIFI - Major Events Included	SAIFI index	0.863
SAIFI - Major Events Excluded	SAIFI index	0.543

Metric 3 - The number of momentary outages per customer system-wide per year as reflected by the Momentary Average Interruption Frequency Index (MAIFI), shown by Major Events Included and Excluded.

Purpose/Policy Goal Supported: Meet reporting requirements of §8366(e) and the policy goal of §8360(a).

Table 9-14: Grid Operations Metric 3

SDG&E Momentary Average Interruption Frequency Index (MAIFI) Major Events Included / Major Events Excluded		
Metric	**Units**	**2010 Value**
MAIFI - Major Events Included	MAIFI index	0.507
MAIFI - Major Events Excluded	MAIFI index	0.428

Metric 4 - Number of customers per year and circuits per year experiencing greater than 12 sustained outages

Purpose/Policy Goal Supported: Meet reporting requirements of §8366(e) and the policy goal of §8360(a)

Table 9-15: Grid Operations Metric 4

SDG&E Customers / Circuits Experiencing >12 Sustained Outages		
Metric	**Units**	**2010 Value**
Number of customers	Customers	15
Number of circuits	Circuits	8

Metric 5 - System load factor and load factor by customer class.

Purpose/Policy Goal Supported: Meet reporting requirements of §8366(e) and the policy goal of §8360(a).

Table 9-16: Grid Operations Metric 5

SDG&E Load Factors		
Metric	**Units**	**2010 Value**
System Load Factor	% load	51%
Load Factor - Residential	% load	46%
Load Factor - C&I < 500 kW	% load	46%
Load Factor - C&I > 500 kW	% load	77%
Load Factor - Other[82]	% load	53%

[82] Other is composed of small agriculture

Metric 6 - Number of and total nameplate capacity of customer-owned or operated, grid-connected distributed generation facilities.

Purpose/Policy Goal Supported: State policy seeks to promote both distributed generation and the use of renewables. The ability to integrate these resources is an expected benefit of the Smart Grid. This is tied to §8366(b) renewable and §8360(c) distributed generation.

Table 9-17: Grid Operations Metric 6

Number and Total Nameplate Capacity of SDG&E Customer-Owned or Operated Grid-Connected Distributed Generation Facilities		
Metric	**Units**	**2010 Value**
Number of distributed generation facilities (solar)	Distributed generation facilities (solar)	11,770
Number of distributed generation facilities (non-solar)	Distributed generation facilities (non-solar)	93
Total number of distributed generation facilities (solar and non-solar)		**11,863**
Capacity of Units (solar)	MW (solar)	90.4
Capacity of Units (non-solar)	MW (non-solar)	249.6
Total capacity of distributed generation facilities (solar and non-solar)	***MW***	**340**

Metric 7 - Total annual electricity deliveries from customer-owned or operated, utility grid-connected distributed generation facilities.

Purpose/Policy Goal Supported: State policy seeks to promote both distributed generation and the use of renewables. The ability to integrate these resources is an expected benefit of the Smart Grid. This is tied to §8366 (b) renewable and §8360(c) distributed generation.

Table 9-18: Grid Operations Metric 7

Total Annual Electricity Deliveries from SDG&E Customer-Owned or Operated Grid-Connected Distributed Generation Facilities		
Metric	**Units**	**2010 Value**
Total annual electricity deliveries from customer-owned DG	GWh	860

Metric 8 - Number and percentage of distribution circuits equipped with automation or control equipment, including Supervisory Control and Data Acquisition (SCADA) systems.

Purpose/Policy Goal Supported: Measure the extension/development of the Smart Grid.

Table 9-19: Grid Operations Metric 8

Number & Percentage of SDG&E Distribution Circuits Equipped with Automation or Control Equipment Including SCADA		
Metric	**Units**	**2010 Value**
Number of circuits	Circuits	725
Percentage of circuits	%	73%

9.3 ADDITIONAL SMART GRID RELATED METRICS

The consensus metrics defined and included in SDG&E's Smart Grid Deployment Plan are based on those identified in the draft *Report on Consensus and Non-Consensus Smart Grid Metrics* filed with the CPUC last December and permit the utility to benchmark and assess the progress achieved through its Smart Grid deployments.

SDG&E plans to continue working with the CPUC, stakeholders such as the Environmental Defense Fund, the other California IOUs and various interested parties in the development and adoption of additional Smart Grid related metrics in the near future.

10 CONCLUSION

SDG&E's Smart Grid Deployment Plan is intended to empower customers, increase renewable generation, integrate plug-in electric vehicles (PEVs) and reduce greenhouse gas (GHG) emissions while maintaining and/or improving system reliability and operational efficiency, ensuring security and protecting customer privacy.

SDG&E's customers have been early adopters of new clean technologies including rooftop solar and PEVs, and the state of California has set the bar in the U.S. for environment-friendly energy and environmental policies and regulations. SDG&E's deployment plan is a response to both the need to deliver customer value and meet such policy requirements. The utility evaluates its projects against these criteria, pursuing those projects where estimated benefits exceed costs wherever possible, even where a project is entirely policy-driven.

The SDG&E Smart Grid Deployment Plan is consistent with the utility's Smart Grid vision, which is to work collaboratively with key stakeholders to create the foundation for an innovative, connected and sustainable energy future. To that end, it has conducted exhaustive outreach to representative stakeholders from across its service territory, incorporated their input into its plan and established a process to continue engaging stakeholder input over the lifetime of the deployment plan and beyond.

SDG&E's Smart Grid baseline is fairly mature with previously deployed or in-flight automation and control technologies, operational process reengineering, microgrids, and SCADA and AMI installations. The utility opts for open standards, where cost effective and available, and pilots new technologies before full deployment in order to avoid stranded costs and remain open to capturing new benefits as its experience with the Smart Grid unfolds.

Maintaining and/or improving reliability remains a high priority for this utility as the grid is challenged by the two-way energy flow from distributed generation; the intermittent availability of solar and wind generated power; and the large, mobile and growing load

required by electric vehicle charging. Ultimately, SDG&E foresees a significant reduction in the environmental footprint of electricity generation and delivery in the region as well as a more resilient grid that offers customers greater convenience, more ways to generate and manage electricity and enjoy their electrical appliances as well as opportunities for them to participate actively in the electricity market and support for authorized third-party participants.

To enhance the customer's experience, the plan ensures that customer data will be protected by "designing in" privacy as a key and early component of all projects. Data will also be secured as part of the rigorous cyber and physical security protocols that SDG&E also plans to protect the Smart Grid and customers from threats.

SDG&E has developed a roadmap for its Smart Grid projects around nine program areas with costs and benefits estimated for each, where possible: 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.

Its adaptive management approach ensures that the roadmap will continually evolve in response 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.

Ultimately, the preliminary and conceptual costs of SDG&E's Smart Grid deployments for the years 2006–2020 are estimated at approximately $3.5 to $3.6 billion with the majority of the estimated costs attributable to previously authorized investments, Smart Grid projects included in its TY2012 General Rate Case (GRC) and other active applications before the Commission. The estimated incremental investments flowing from new projects are approximately 25 percent of the overall estimated costs.

The total estimated benefits associated with the Smart Grid deployments for the years 2006–2020 are between $3.8 and $7.1 billion. This calculation includes estimated

economic and reliability benefits as well as estimated societal and environmental benefits.

SDG&E's Smart Grid Deployment Plan is not a request for funding. The utility will not pursue funding requests for the plan's incremental projects until it can accurately project associated costs and benefits for a project.

SDG&E looks forward to realizing the potential of a more fully deployed Smart Grid and continuing to work in collaboration with all grid stakeholders to ensure its priorities are consistent with its stakeholders' priorities and that the benefits of the Smart Grid are shared broadly across society.