



A  Sempra Energy® utility



11-IEP-1H

DOCKET

11-IEP-1G

DATE Jun 22 2011

RECD. Jun 29 2011

**IEPR Committee Workshop
Sacramento, California
June 22, 2011**



- **Transmission**

- Implement project to improve speed of response to grid issues
- Better utilization of data to proactively avoid issues
- More efficient utilization of resources

- **Distribution**

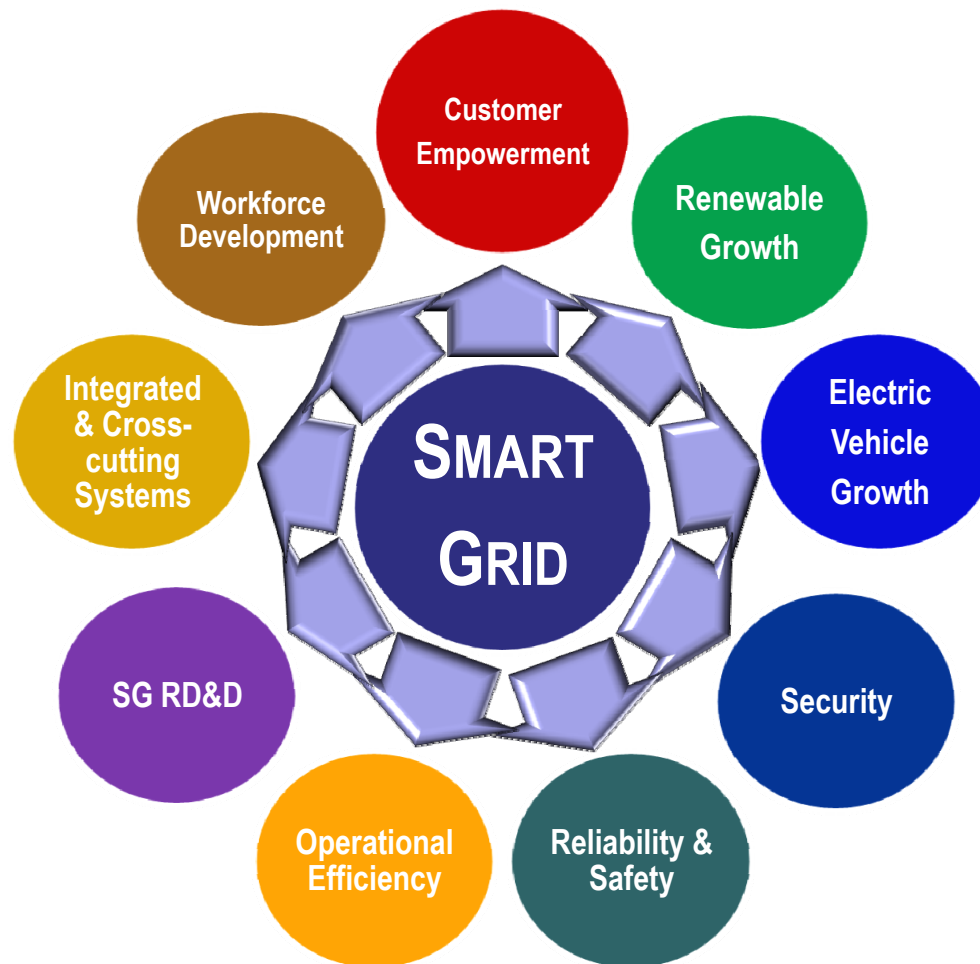
- Create a self-healing and resilient grid via real-time information
- Expand communications and remote control of devices
- Provision of balancing, storage, reliability and integration services to customers

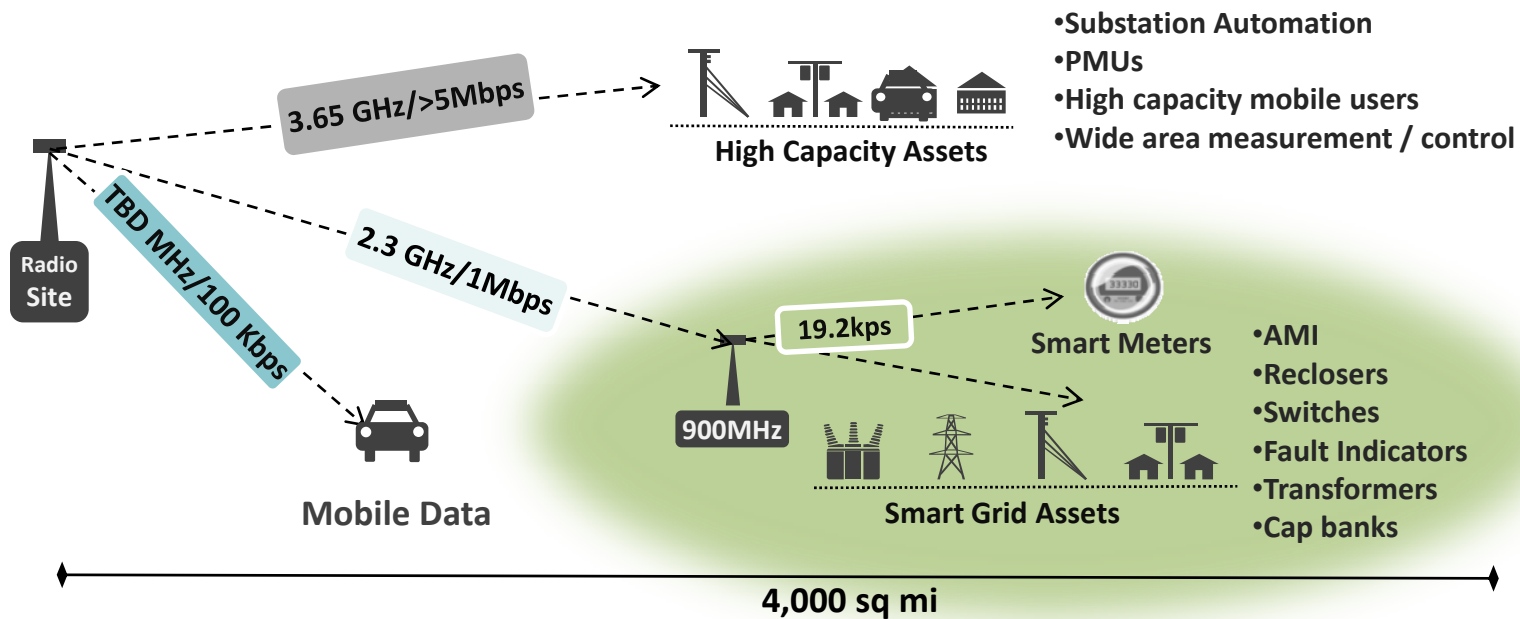


- Lays out the timeline for our 9 programs from 2011-2020 and their alignment to policy goals
- Shows by project, by year, and policy / value / pilot
 - Includes brief descriptions of all projects including “Enterprise” projects – those not being done because of smart grid, but including smart grid requirements.
- Total number of projects – 64
 - Enterprise – 18 (not included in costs/benefits)
- Includes 2015 and 2020 Vision statements in Program timelines for context



Roadmap includes smart grid investments in 9 programs:





INTEGRATED SECURITY



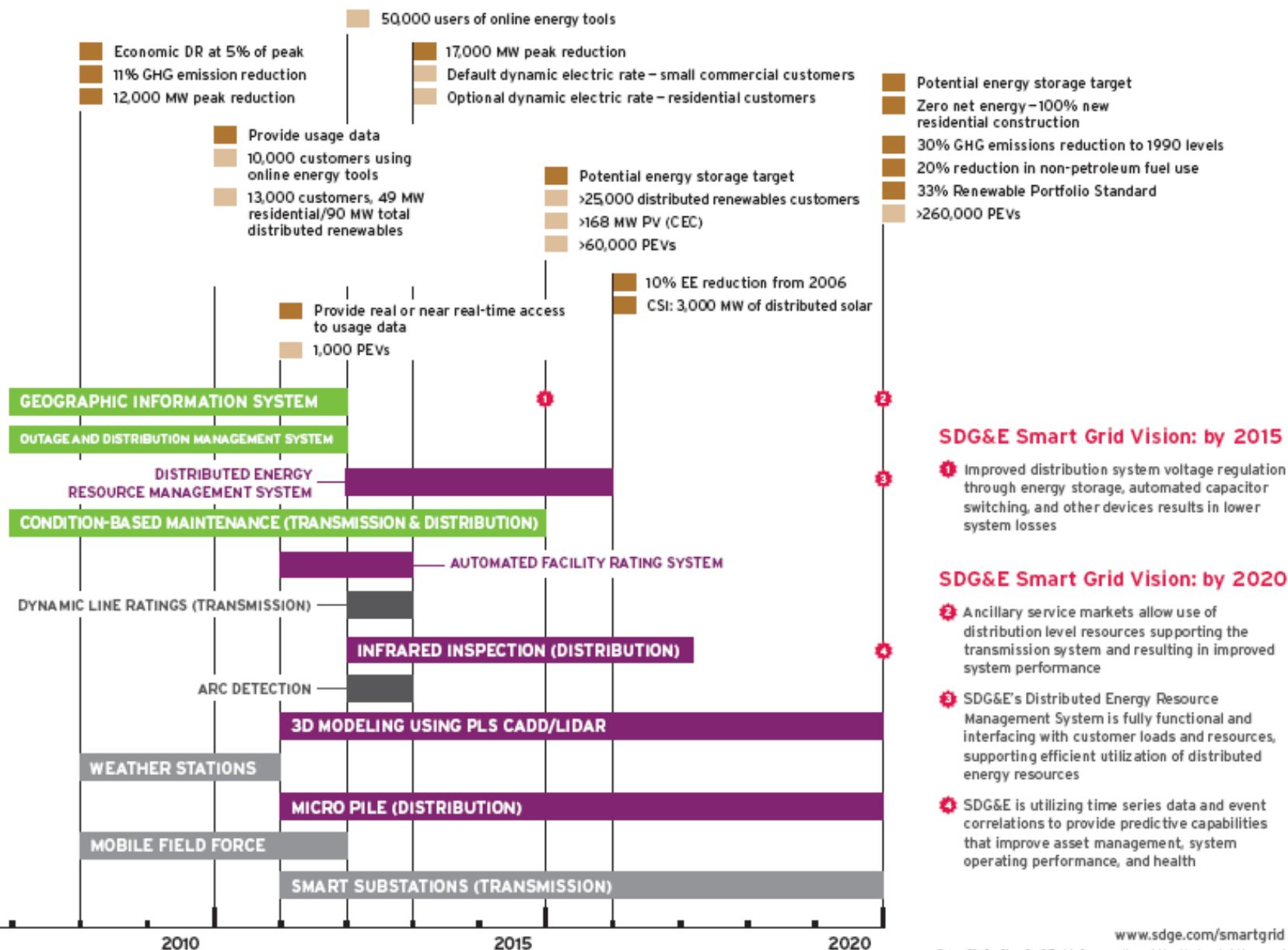
INTEGRATED MANAGEMENT & RF CONTROL

OPERATIONAL EFFICIENCY

Key

- Policy Goal
- Forecast
- SDG&E Smart GridVision
- In Flight Project
- New Project - Policy
- New Project - Value
- New Project - Pilot
- Enterprise Project

Figure 6-9

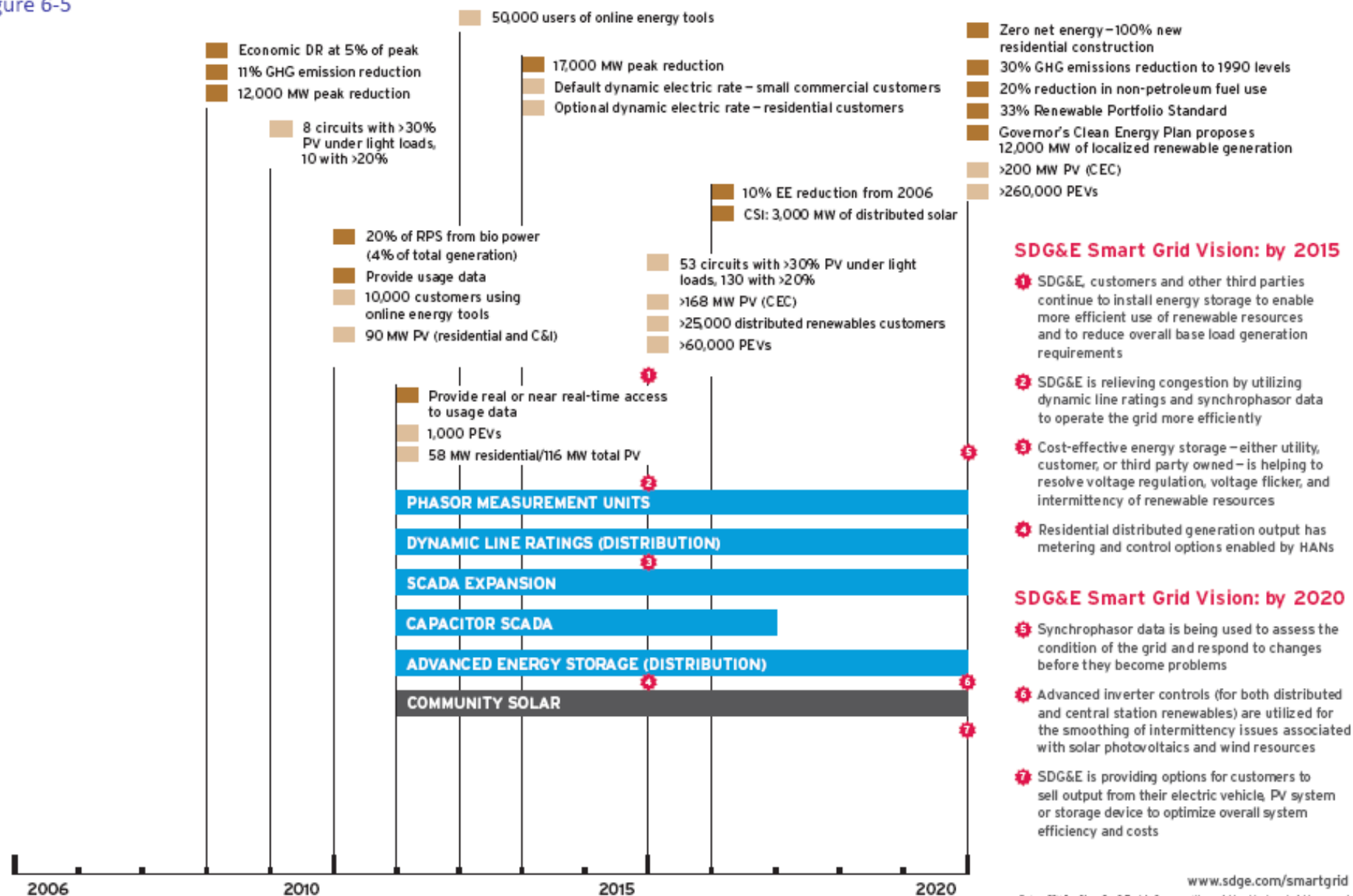


RENEWABLE GROWTH

Key

- Policy Goal
- Forecast
- SDG&E Smart GridVision
- In Flight Project
- New Project - Policy
- New Project - Value
- New Project - Pilot
- Enterprise Project

Figure 6-5

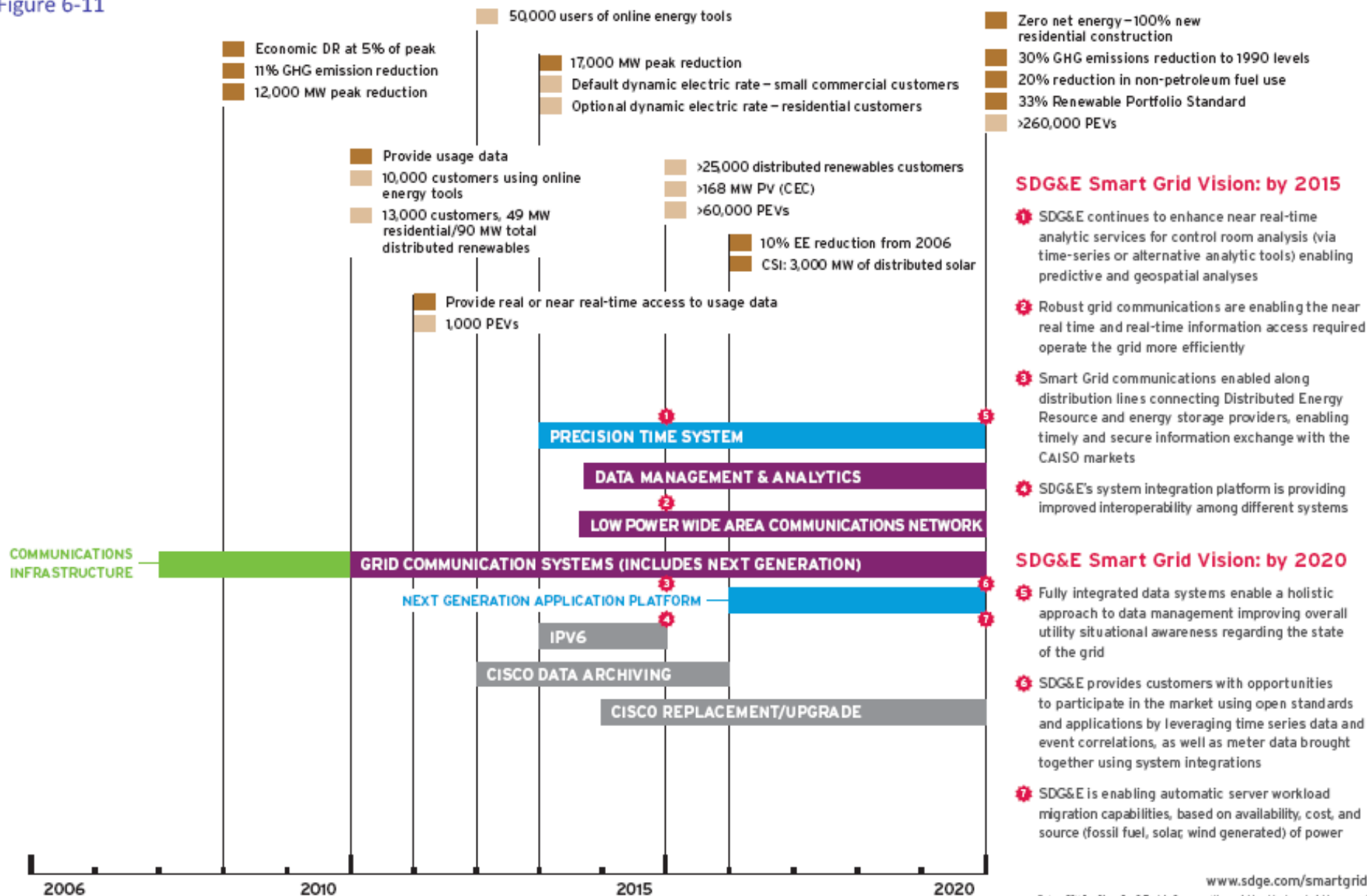


INTEGRATED AND CROSS-CUTTING SYSTEMS

Key

- Policy Goal
- Forecast
- SDG&E Smart GridVision
- In Flight Project
- New Project - Policy
- New Project - Value
- New Project - Pilot
- Enterprise Project

Figure 6-11





Category	Cost Estimates 2006 - 2020	Benefits Estimates 2011 – 2020 and Terminal Values
Previously authorized investments (Smart Meter, OpEx 20/20 Smart Grid projects)	\$1,042 MM	\$1,378 MM
2012 Test Year General Rate Case	\$1,424 MM	\$966 MM - \$2,263 MM
Other active applications (Demand Response, Dynamic Pricing)	\$237 MM	\$29 MM - \$139 MM
Estimated incremental investments – CPUC	\$299 MM - \$364 MM	\$253 MM - \$491 MM
Estimated incremental investments – FERC	\$466 MM - \$555 MM	\$434 MM - \$906 MM
Societal and Environmental Benefits (see following slide for details)		\$760 MM - \$1,939 MM
Totals	\$3,468 MM - \$3,622 MM	\$3,820 MM - \$7,116 MM



Societal / Environmental Benefit Source	Societal / Environmental Benefit Range	Estimated tons of CO ₂ e Avoided
Estimated Avoided Emissions from Energy Reductions and Peak Load Shifting	\$12 MM - \$83 MM	~ 0.7 million
Estimated Avoided Emissions Reduction by Integrating Centralized Renewable Energy	\$85 MM - \$612 MM	~ 5.4 million
Estimated Avoided Emissions Reduction by Integrating Distributed Generation	\$10 MM - \$79 MM	~ 0.7 million
Estimated Avoided Net Emissions Reduction		
Benefit Source	Benefit Range	Purchased Gallons of Gasoline Avoided
Estimated Avoided Fuel Cost by Integrating Electric Vehicles	\$369 MM - \$615 MM	~ 207 million
Total Societal & Environmental Benefits		\$760 MM - \$1,939 MM

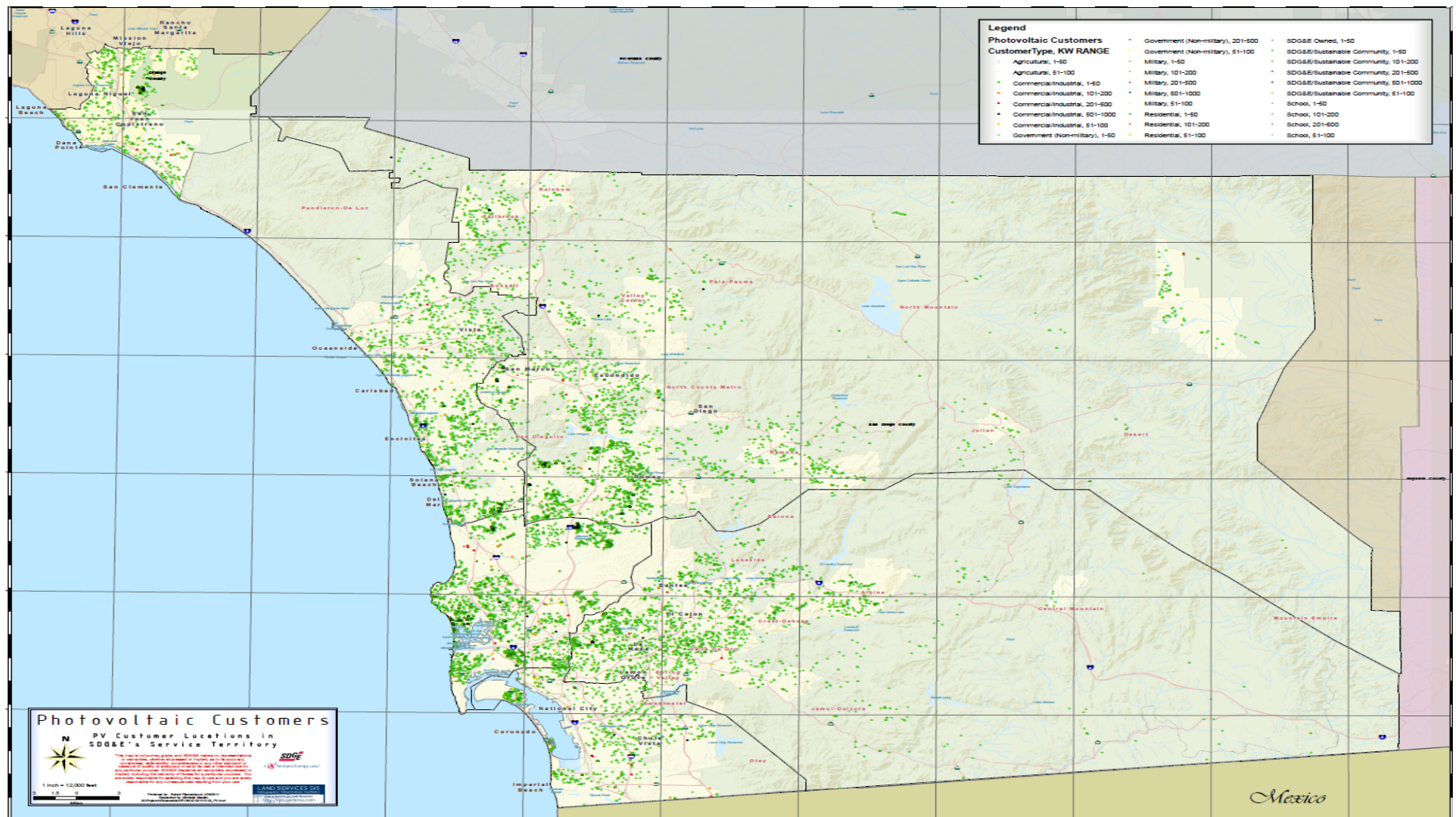


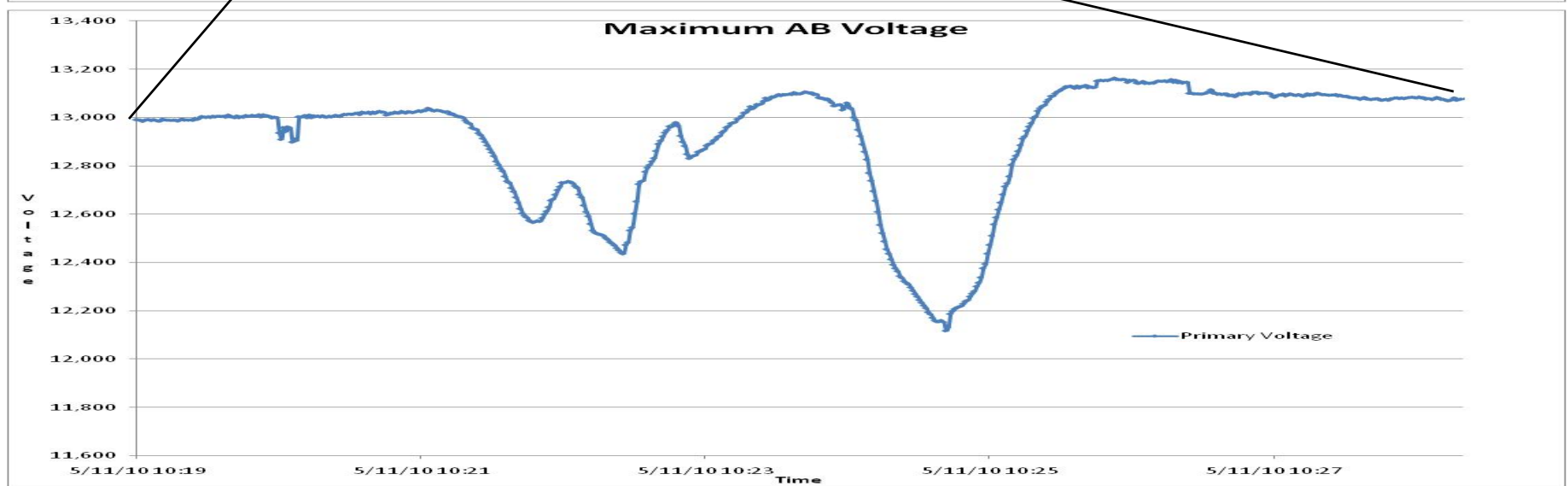
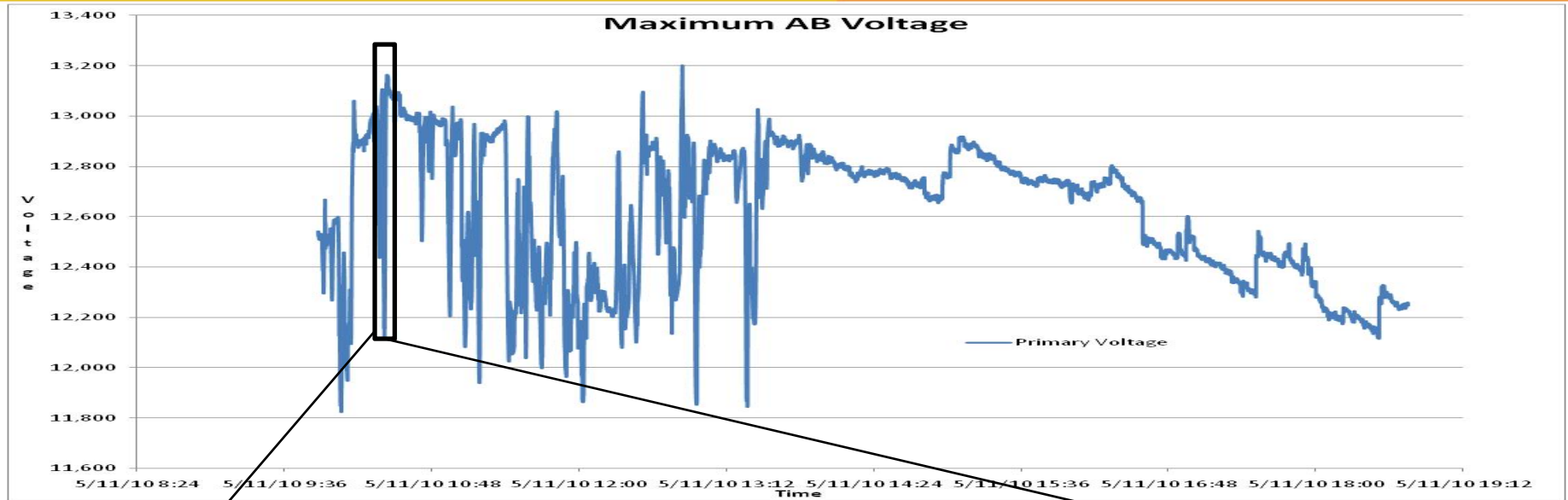
- **Operational Concerns (PV Power Variability)**
 - Monitoring and ensuring resource adequacy
 - Frequency regulation
 - Voltage regulation
 - Impact is highly location dependent (urban vs rural)
 - O&M impacts
- **Engineering / Planning**
 - Capacity planning (size, location, time, guaranteed production)
 - Volt/ VAr planning
 - Conservation Voltage Reduction impacts
 - Electrical models
 - Transient analysis tools
- **Regulatory**
 - Rule 21
 - Rule 2
 - Cost causation



- **General Rate Case Smart Grid Projects (\$ 54 Million* – Yr 2012)**
 - Distributed Energy Storage (\$ 34 Million*)
 - Dynamic Line Ratings for distribution (\$ 4 Million*)
 - Synchrophasors for distribution (\$ 8 Million*)
 - Dynamic Voltage support (\$ 3 Million*)
 - Distributed Energy Resource Management System (\$ 5 Million*)
- **Smart Grid Deployment Plan**

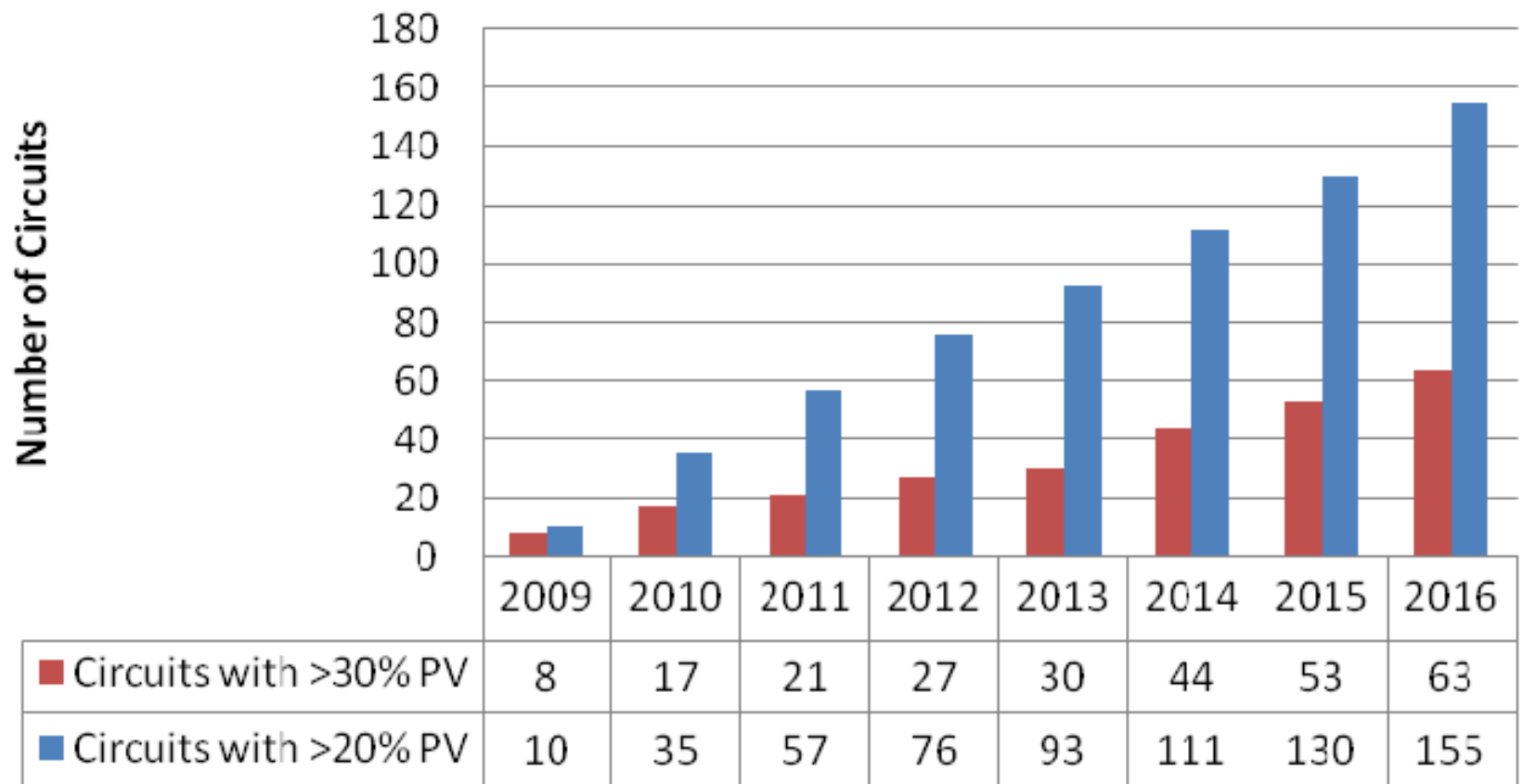
* Costs shown in 2009 dollars, unloaded. Cost to mitigate 120 – 130 MW of PV on SDG&E system in yr 2012, does not include T&D costs of meeting 12,000 MW PV goal by 2020.







%PV per Circuit - Light Load



Values are for illustration only and do not represent forecasts



- **Regulatory**

- Interconnection Tariffs (Rule 21, WDAT) modification
 - Threshold for periods of low load high PV output
 - Low voltage ride through
 - Frequency droop requirements
- **Rule 2 modification**
 - Harmonics
 - Voltage
- **Cost Causation**
 - Rates & incentives
- **Smart Inverters**
 - IEEE 1547.8
 - Modify WDAT to accept smart inverters



- Increased DG Levels are expected to have significant impacts and resulting costs for the Electric T&D System
- Technical studies and demonstration projects are underway to quantify impacts of additional DG, and help design mitigation of impacts
- Actual field measurements indicate significant impacts to system performance on distribution circuits with high levels of conventional DG
- Changes in Regulatory and Technical standards are also required to accommodate increased levels of DG
- Adopt lessons learned in European countries



Thank you.

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