



Defining the Pathway to the California Smart Grid of 2020 **SCE's Smart Grid Definition & Strategy**

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SmartGrid Planning Process



SmartGrid Energy Policy



Federal Smart Grid Policy

"It is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure..."

(2007 EISA, Title XIII)



State Smart Grid Policy

"The bill would require that the smart grid improve overall efficiency, reliability, and cost-effectiveness of electrical system operations, planning, and maintenance."

(SB 1438, Proposed)



New Efforts

CPUC: Opening a SmartGrid OIR to comply with 2007 EISA & anticipated SB 1438

CEC: Launching an effort to comply with anticipated SB 1438 provisions regarding defining standards

SmartGrid Drivers

Business Drivers

- Aging asset base
- Increasing complexity managing the bulk power grid
- Difficulty forecasting load growth
- Challenges with selecting and deploying new technologies and processes
- Increasing workload and aging workforce
- Growing demands on IT information management and infrastructure

Federal Drivers

- U.S. Energy Independence & Security Act 2007 (Title XIII)

Safety Drivers

- Employee and customer safety

Regulatory/Legal Drivers

- Increasing environmental concerns (e.g. global warming)
- CA Renewable Portfolio Standard (RPS)
- Proposed CA Smart Grid Legislation (SB 1438)
- CPUC Order Instituting Investigation on Smart Grids
- New reporting requirements

Customer Drivers

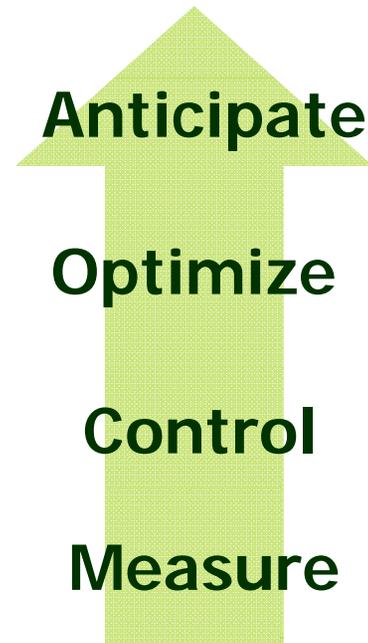
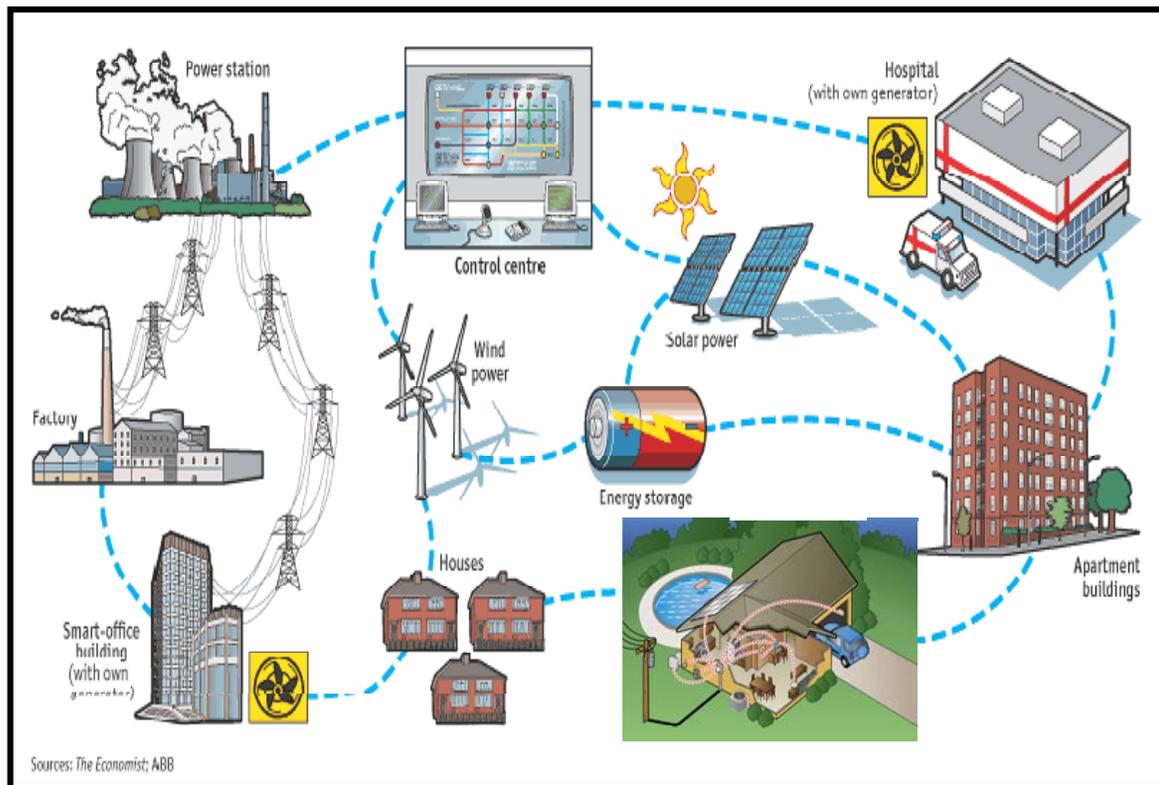
- Changing customer needs and behaviors

Financial Drivers

- Rising energy costs
- Optimize resources within GRC constraints

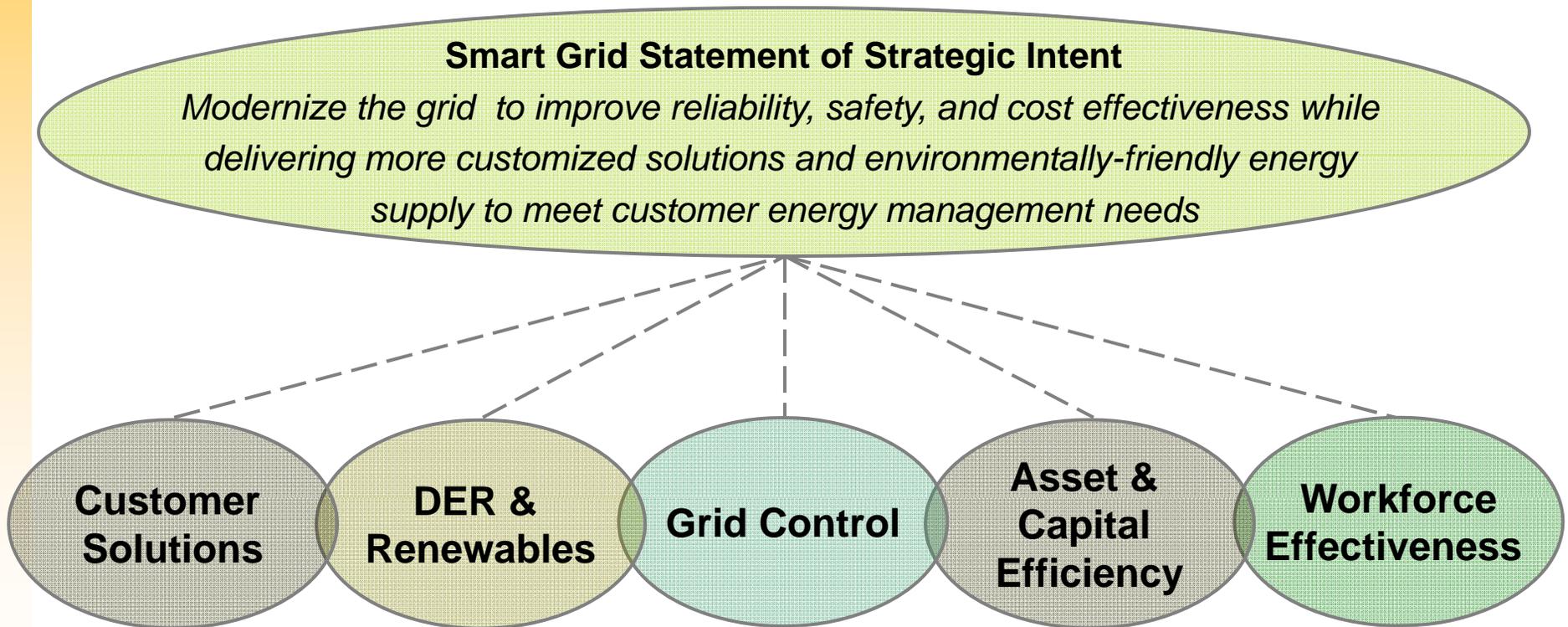
SCE SmartGrid Vision Statement

Smart Grid combines energy and information technology to create a resilient network that links an increasingly clean and diverse supply of generation and storage with customers who are using electricity more wisely, and in more ways.



SCE's SmartGrid Strategy

Our strategy encompasses five key strategic themes to better position SCE to meet both current and future power delivery challenges



SmartGrid Initiatives

Phasor Measurement

- ▶ 19 PMUs installed – 1.2M data points per min.
 - Real-time Grid Monitoring (SMART)
 - Phasor Wind Penetration
 - Phasor Black-Start Capabilities

FACTS Deployments

- ▶ 2 Static VAR Compensators (SVCs) installed
 - Rector Control Algorithm using PMU data

Centralized Remedial Action Scheme (CRAS)

- ▶ 28 RAS schemes utilizing high-speed fiber/microwave communications

Advanced Conductors

Substation Automation

- ▶ Over 500 Automated Substations – 132k data points every 4 sec.
 - 270 LAN based w/ Intelligent Relays

Advanced EMS w/ State-Estimation Data Beyond SCADA

- ▶ Condition-based Monitoring using IEDs

Edison SmartConnect™

- ▶ 5.3M meters w/ plans to incorporate Smart Appliances & Thermostats

Plug-in Electric Vehicles

Demand Response/Energy Eff.

- ▶ 1,600MW enrolled capacity

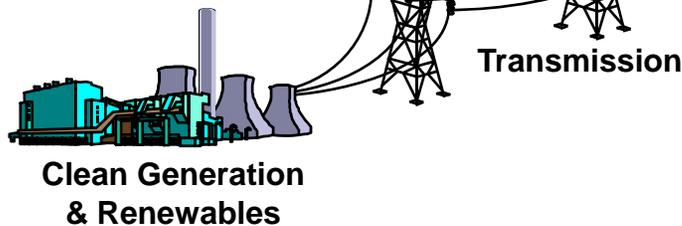
DER Interconnections

- ▶ 4,000 projects totaling 270MW

Customer



Distribution



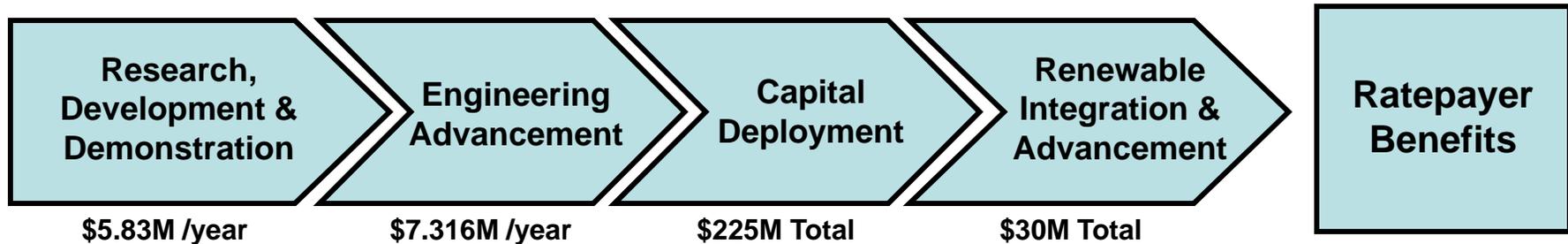
Distribution Automation

- ▶ Extensive DA Deployments
 - 1,600 circuits automated
 - 10,000 automated capacitor controllers, 4,000 switches
 - 34,000+ 900MHz NetComm Packet Radios

“Circuit of the Future”

- ▶ Nationally recognized distribution circuit pilot program
 - Advanced protection – RCIs w/ high-speed centralized control
 - Fault Current Limiting technology

SmartGrid Programs and Investment in the 2009 – 2011 Timeframe



- Ongoing SmartGrid Capital Deployments:
 - Distribution Control and Monitoring System: \$20M
 - Distribution Automation: \$39.3M
 - Centralized Remedial Action Schemes: \$111.2M
 - Phasor Measurement and Grid Stability System: \$34M
 - Substation Security Video Surveillance: \$ 7M
 - Energy Management System Upgrade: \$ 7.4M
 - Other: \$6.1
- Electric Transportation (Compliance, System Impact, Load Management, Safety, Outreach/Education): \$12.8M
- Proposed Renewables Integration and Advancement Program (A.08-03-014) \$30M