Leading the Way in Electricity℠

SOUTHERN CALIFORNIA EDISON®

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Building the Distribution Grid of the Future

Ronald L. Litzinger
President, Southern California Edison

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Southern California Edison

- One of the largest utilities in the U.S. providing electric service to nearly 14 million people in 50,000 square miles of service area
- 22.5 GW peak demand and 7.4B KWh delivered in 2013
- Industry leader in renewable energy procurement, electric transportation, demand response, energy efficiency and Smart Grid
- Significant system investments 2014 – 2017 driven by:
  - ❑ System reliability and infrastructure replacement
  - ❑ California Renewables Portfolio Standard
  - ❑ Technology improvements

Key California Energy Goals

Greenhouse Gas Emissions

- State law enacted in 2006 requires GHG emissions to be reduced to 1990 levels by 2020
- **Cap-and-Trade** program established in 2011

Renewable Generation

- Renewables Portfolio Standard Requirement of 33% by 2020 **(SCE reached 21.6% in 2013)**

Prioritizing "Preferred Resources"

- Energy Efficiency and Demand Response at top of State "Loading Order"

Distributed Generation & Energy Storage

- California Solar Initiative – 1,940 MW residential solar installations by 2017
- Energy Storage – 1,300 megawatts by 2020
- Distribution Resources Plan – Investor owned utilities to submit plan that identifies **optimal locations, additional investment, and barriers to deployment of distributed energy resources**

Future Distribution Grid Must Be Reliable And Smart

Safe	• Improved situational awareness • Advanced protection schemes • Cyber mitigation
Reliable	• Circuits isolate faults automatically (self heal) • Integrated real time Grid Assessment Tool for Operators • Technology to safely ride through system disturbances
Resilient	• Interaction with customer equipment to manage two-way power flows • Advanced voltage control (more dynamic)
Flexible	• Technology platform supports increasing use of distributed resources as grid assets • Enable further advancement to adapt to changing business and system models

The Utility's Role: Building the Grid of the Future

Grid Readiness

- **Modernization** of planning, design, and operations by increasing flexibility and **interoperability**
- Planning changes are required to enable the utility to **orchestrate distributed energy resources** as grid assets
- Future grid will include monitoring and voltage regulation enhancements, followed by **increasing investments in monitoring, control,** and **communication** systems

The Future Grid

- Provide the **backbone distribution system**
- Create a "plug and play" system capable of **two-way electricity flows**
- Facilitate **integration of distributed energy** resources
- Ensure grid **reliability** and power quality
- Support continued **growth and investment**

Utilities will play the key role in designing, building, and operating the distribution grid of the future