# Smart Grid Demonstration Grant Overview

ADVANCED TECHNOLOGY
Transmission & Distribution Business Unit

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# Irvine Smart Grid Demonstration Project

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# Project Overview

- SCE's Irvine Smart Grid Demonstration (ISGD) Project is a comprehensive demonstration:
  - Deep Situational Awareness using phasor measurement
  - Latest generation of distribution automation
    - Looped 12 kV distribution circuit topology
    - Advanced voltage control
    - Self-healing technologies
  - Into the home with
    - Smart appliances
    - Electric vehicles
    - Energy storage
    - Photovoltaic solar Generation
  - Secure Energy Network (SENet)

# Project Overview (cont'd)

- Expected Results
  - Scalable model of a Smart Grid System
  - Validate the interoperability of emerging NIST and NERC standards
  - Blueprint to build the Smart Grid workforce of the future
- Project Funding
  - Total Project Cost: $80.2 million
  - SCE and partner funding: $40.1 million

# Project Goals

List specific goals and purposes relative to NASPI:

- Subproject 6: Deep Situational Awareness
- Subproject 7: Secure Energy Network

# Subproject 6: Deep Situational Awareness

- As California implements the Market Redesign and Technology Upgrade (MRTU)8 and other legislative energy market rules are promulgated, third party energy and service providers will begin to enter the market to provide services to utilities at the distribution level. For load flow planning purposes, the California Independent System Operator (CAISO will need an accurate and reliable, "real-time method" to monitor load shifts resulting from services rendered by third party providers. Under present market conditions, such load shifts can only be verified after the fact from actual recorded interval load data available from the customer's (or energy provider's) monitoring system. This sub-project will demonstrate that the real-time data collected by the transmission level Phasor Monitoring Unit (PMU) sensors can provide this information with the accuracy, timeliness and reliability needed by energy market managers, like CAISO.

# Subproject 7: Secure Energy Network

- Communications between Smart Grid devices and the utility that incorporates the appropriate level of cyber-security is a basic requirement. The Smart Grid requires linkage between more than 3,100 utilities across eight electric reliability regions to support U.S. energy policy as described in the 2007 EISA, Title XIII. A secure communications infrastructure to link regional transmission and utility operations across the U.S. to provide the essential information technology backbone for a Smart Grid is needed. Finally, establishing secure computer networks between the regional transmission operators and utility operations using commercially available Internet technology is essential. If successful, this project will provide the basis for utilizing commercially available internet technologies for secure communications with and between Smart Grid technologies. The nationally deployable architecture can inform standards and accelerate Smart Grid deployment efforts. With this demonstration, SCE and its team members will be able to test and optimize network communications among multiple, integrated Smart Grid technologies.

# System Design Elements

Summarize key system design considerations:

- 2 PMU/DFRs one at a 500kV station, one at a 230kV station
- Phasor capable relays at demonstration site
- PDCs will be part of SCE's Wide Area Situational Awareness System
- Communications based on SENet

# This project is special because…

- SCE proposes to demonstrate a "suite of use cases" that will be truly representative of the heavily populated Southern California region. The objectives of SCE's Smart Grid demonstration are:
  - To demonstrate technologies that embody essential and salient characteristics of our region
  - To present a suite of use cases for national implementation and replication
  - Quantification of Smart Grid costs and benefits in terms of overall energy consumption, operational efficiencies, and societal/environmental benefits
  - Verification of the viability of a full array of Smart Grid technologies
  - Validation of SCE's Smart Grid Business Model to provide measured results that are scaleable to other heavily populated regions of the country

# Tehachapi Wind Energy Storage Project

# Project Overview

- The Tehachapi Wind Energy Storage Project (TSP) is a demonstration project focused on the integration of intermittent or variable energy sources
- Project goal:
  - Improving grid performance
  - 13 specific operational uses derived from the Electric Power Research Institute's (EPRI) energy storage market research
  - Refining utility load shifting
  - Increasing dispatchability of wind generation
  - Enhancing ramp rate control
- Technology
  - 8 MW – 4 hour (32 MWh) lithium-ion battery
  - Inverter that is cutting-edge in scale and application
- Project Funding
  - Total Project cost $53.5 million
  - SCE and Partner funding $28.5 million

# System Design Elements

- Summarize key system design considerations relevant to NASPI:
  - PMUs will be used to monitor baseline and operational information.
  - Potential for use of phasor data to control battery charging
  - Phasor data will be collected by SCE's Wide Area Situational Awareness System

# Synchrophasor Applications

List the types of synchrophasor data applications:

- Measurement and validation of system performance
- Potential Closed loop equipment control.

# This project is special because…

- Use of synchrophasor data to provide measurement and verification of the performance of the battery system
- Use of synchrophasor data as an input to the control action for battery charge and discharge. The demonstration of this function is critical in the migration of variable generation to dispatchable generation.

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For more information on SCE's Smart Grid strategy, news, and updates, go to: **www.sce.com/smartgrid**

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