Tehachapi Wind Energy Storage (TSP) Project

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Outline

• Policy Challenges
  – The challenge/opportunity

• Testing a Solution: Tehachapi Storage Project Overview
  – Description of the project & objectives
  – Operational uses
  – Conceptual layout
CA 2020: Energy Policy Initiatives

Highlighting potential areas for storage applications:

• High penetration of Solar and Wind generation
  – Executive order requiring 33% of generated electricity to come from renewable sources by 2020

• Zero Net Energy (ZNE) residential construction standard
  – “ZNE home” Title 24 in 2020

• Plug-in Electric Vehicle (PEV)
  – Up to 54,000 PEV’s by 2012 & 1 Million by 2020

• Renewable Portfolio Standard (RPS)
  – Distributed PV (1-2 MW PV rooftop): Up to 250 MW of SCE-owned solar photovoltaic capacity and up to 250 MW owned and maintained by Independent Power Producers (IPP)
  – California Solar Initiative (CSI) - 3,000 MW of customer-side solar photovoltaic capacity by 2017

• SCE’s Energy Efficiency Goals
  – Load Control: 1000 MW of Demand Response (DR) by 2017.
  – Conservation: Forecasted 10% of energy consumption reduction using in-home display.
SCE Leadership in Energy Initiatives

• SCE is a long-time leader in renewable energy:
  – 17% of its 2009 energy portfolio was made of renewable energy\(^1\)
  – SCE procures:
    • ~10% of all U.S. renewable energy\(^2\)
    • Over 65% of U.S. solar energy\(^2\)
    • Over half of U.S. geothermal energy\(^2\)

• SCE’s EV Technical Center facility is unique among utilities:
  – Industry leading energy storage testing facility
  – BEV/PHEV/FCEV testing, evaluation and maintenance capability
  – ISO 9001:2008 registered
  – Visited by President Barack Obama in 2009

• SCE’s Smart Grid vision is helping to shape the discussion on Smart Grid implementation

\(^1\) – CPUC RPS Procurement Plan Update, April 2010
\(^2\) – Statistics from 2008
Tehachapi Area

- Tehachapi is a uniquely suited location for wind development:
  - California’s largest wind resource
  - Massive wind development potential driving grid infrastructure upgrades and expansion

- Facts:
  - Second largest wind park in the world with \( \sim 5,000 \) wind turbines
  - 660 MW of installed wind energy, with potential for thousands more\(^1\)
  - \( \sim 350 \) square miles (Washington DC is \( \sim 68 \) square miles)
  - \( \sim 100 \) miles from major So-Cal load center (LA basin)

\(^1\) - 4,500 MW of generation capacity may be available. California Energy Commission, “Renewable Resources Development Report”, November 2003
Project Objective

• Demonstrate the performance of a Lithium-ion energy storage system for 13 specific operational uses, both individually and stacked
• Share data and results with CAISO, DOE, and other interested parties
• Test and demonstrate Smart Inverter technology
• Assess performance and life cycle of large grid-connected Lithium-ion energy storage system
• Potentially resolve key issues with wind-integration and/or remote generating sources
• Expand expertise in energy storage technologies and operations

TSP will test the largest ever grid-connected Lithium-ion Energy Storage System (8MW - 32MWh) coupled with a Smart Inverter
Potential Operational Uses

• Transmission
  – Provide Voltage Support/Grid Stabilization
  – Decrease Transmission Losses
  – Diminish Congestion
  – Increased System Reliability
  – Provide Future T&D Investment Opportunity
  – Enhance Value and Effectiveness of Renewable Energy-related Transmission

• System
  – Provide System Capacity/Resource Adequacy
  – Integrated Renewable Energy (smoothing)
  – Shift Wind Generation Output
Additional Potential Uses

- Large-scale energy storage can also offer additional benefits to the grid
  - Frequency Regulation
  - Spin/Non-Spin/Replacement Reserves
  - Ramp Management
  - Energy Price Arbitrage
  - Black Start and System Restoration (not part of this project)
  - Phasor Measurement System Participation (not part of this project)
Conceptual Layout
The DOE award negotiations are complete and the agreement was accepted by SCE on October 13, 2010.
Next Steps

• Starting the design phase
• Battery system will be installed in early 2012
• Testing will take place through the end of 2014
• Project results will be made available in early 2015
Contact Information

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