Distributed Resource Planning and Implementation
DISTRIBUTION SYSTEM PLANNING PROCESS

- Load Forecast
- Risk Analysis
- Mitigation Plans
- Create Budget
- Memo
- Design & Construct
• Forecasting impacts
  • Quantity and dependability of Distributed Energy Resources (DER)
  • Electric vehicle adoption
  • New types of conservation & load control
• Move from “peak only” forecasting to 24/7
• Improve planning & forecasting tools
• Hosting capacity analysis
• Grid modernization efforts
• Integrated with energy supply and transmission
PEÑA STATION PROJECT OVERVIEW

- Utility-sited 1 MW, 2 MWh Battery
- 1.6 MW carport solar PV system
- 260 kW customer-sited rooftop solar PV system
- Microgrid capabilities
PEÑA STATION SITE DETAILS
PEÑA STATION
PARTNERSHIP DETAILS

• Denver International Airport:
  – Land for PV system
  – Carport structure

• Panasonic
  – Site location
  – Rooftop PV
  – Preferential pricing

• Xcel Energy
  – Battery storage system
  – PV system
  – Islanding switch
PEÑA STATION OBJECTIVES

Xcel Energy objectives:
• Gain experience operating a microgrid
• Understand value stacking and operational performance of batteries
• Integrate renewable energy
• Understand costs and capabilities

Regulatory background:
• Recovered through Innovative Clean Technologies (ICT) Program
PEÑA STATION MICROGRID

• During a grid outage, battery powers Panasonic facility
• Panasonic’s building management system prioritizes energy usage based on:
  – Battery state of charge
  – Expected length of outage
• Panasonic’s 240 kW rooftop PV also able to operate
• 10% of battery capacity reserved for Panasonic
STAPLETON PROJECT OVERVIEW

• 6 utility-sited batteries
• 6 customer-sited, utility-owned, behind-the-meter batteries
• Recovered through Innovative Clean Technologies (ICT) Program
STAPLETON UTILITY-SITED OVERVIEW

• **Battery System:**
  - 2 x 18 kW/69 kWh
  - 2 x 36 kW/138 kWh
  - 2 x 54 kW/207 kWh

• **Use Cases:**
  - Peak Demand Reduction
  - Voltage Regulation
  - Solar Time Shifting
  - Energy Arbitrage
STAPLETON RESIDENTIAL OVERVIEW

• Battery System:
  – 6 x 6 kW/15.5 kWh

• Use Cases:
  – Providing Residential Backup Power
  – Peak Demand Reduction
  – Solar Time Shifting
References:
Innovative Clean Technologies Program, Colorado PUC Docket 15A-047E
Grid Modernization/Distribution Planning, Minnesota PUC Docket E999/CI-15-556
Grid Modernization Plan and Hosting Capacity, Minnesota PUC Docket E002/M-15-962

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