

SolarTAC Overview



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Xcel Energy

Northern States
Power Company
Minnesota

Northern
States Power
Company
Wisconsin

Public Service
Company of
Colorado

Southwestern
Public Service
Company

- ▶ No. 1 wind energy provider
- ▶ No. 5 in solar capacity on system
- ▶ 4TH largest DSM program
- ▶ Industry-leading voluntary emission reductions
- ▶ Leader in pursuit of new technologies

Gas Customers	1.9 M
Electric Customers	3.4 M

SolarTAC Overview

A World-Class Solar Technology Research,
Testing, and Demonstration Facility



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Solar Technology Acceleration Center
Aurora Campus for Renewable Energy, Colorado



SolarTAC
Technology Acceleration Center

SolarTAC Objectives

- ▶ Provide a real-world testing environment
 - Fine tune nearly commercial technologies
 - Demonstrate reliability
 - Optimize performance
 - Secure financial backing
- ▶ Accelerate Solar Technology and market adoption

SolarTAC 
Technology Acceleration Center



SolarTAC Highlights

- ▶ 74 acres in operation, expansion to 200+ acres
- ▶ ~\$30 million invested in site
- ▶ Good location
- ▶ “Laboratory” status of site
- ▶ Expedited approvals of local permits



Current Participants



ABENGOA SOLAR



Project Highlights

- ▶ **Sun Edison**
 - Module and inverter technologies
 - Tracking, control, monitoring systems
- ▶ **Abengoa**
 - Concentrated Solar Power testing
 - Optimizing system
- ▶ **NREL**
 - Thermal Storage, PV
- ▶ **Electric Power Research Institute**
 - Multi-client PV testing



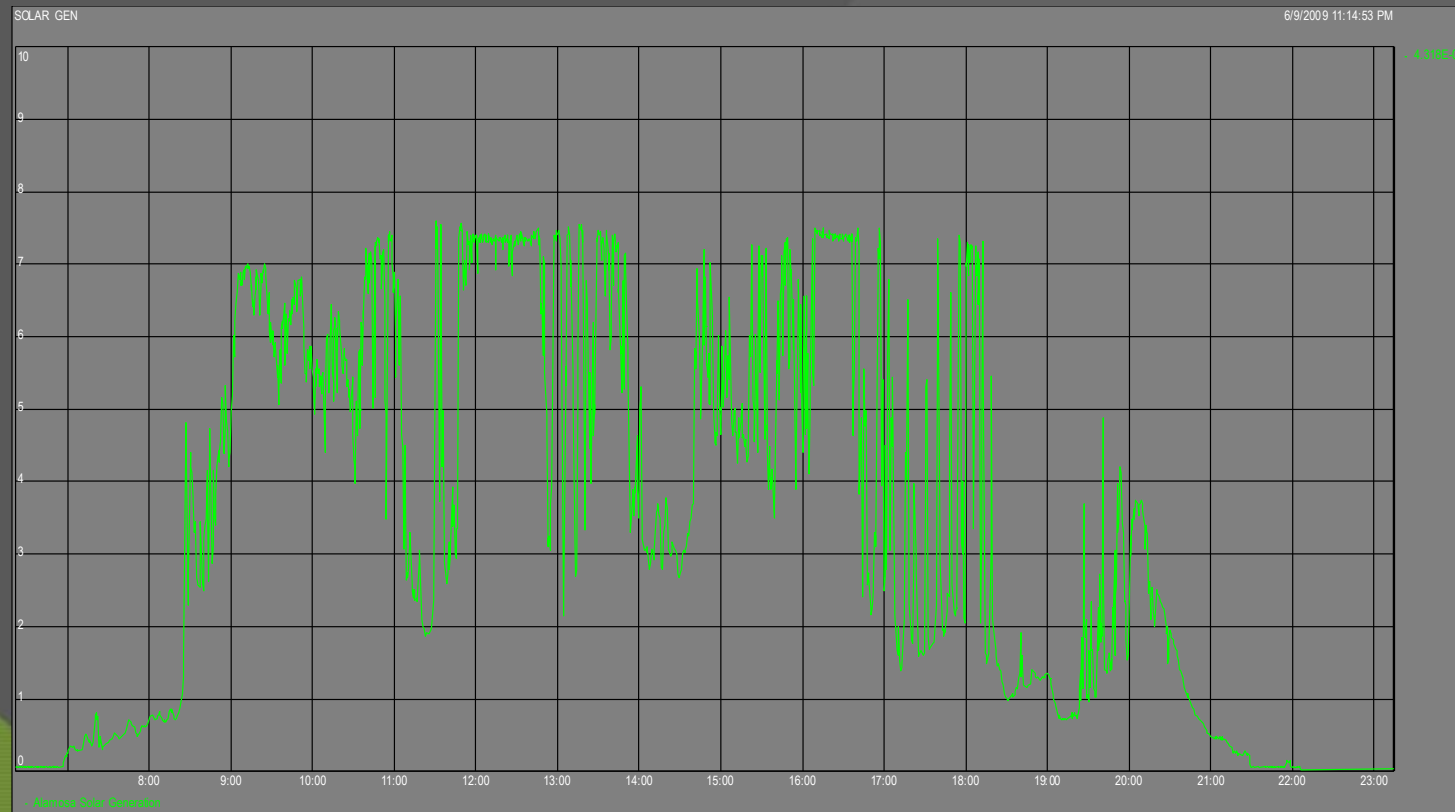
Xcel Energy's SolarTAC Focus

- ▶ Study PV integration issues
- ▶ Use of battery storage
 - To manage integration issues
 - To manage voltage fluctuation



Research Focus: Grid Integration

Why Be Concerned with Solar PV Grid Integration?

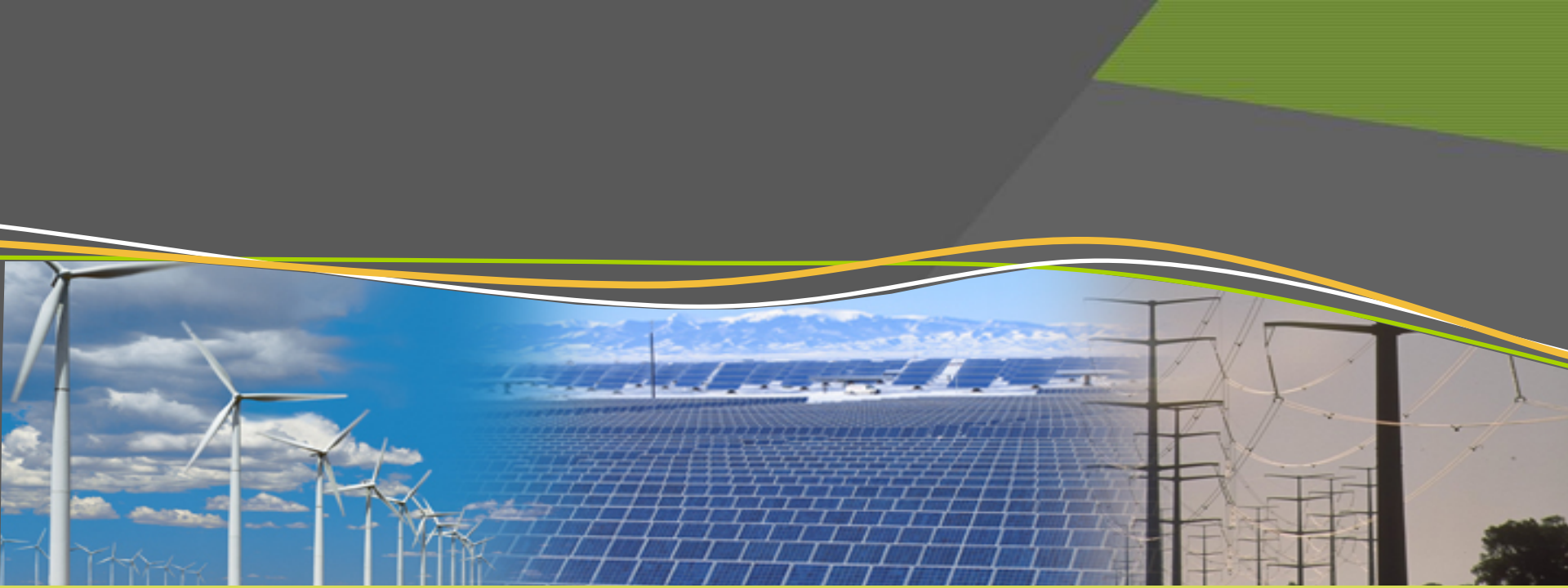


Data from 8 MW Solar PV Facility in Alamosa, CO

Overview of Xcel Energy Integration Research



- ▶ **Solar-to-Battery**
 - Large battery (Xtreme Power 1.5 MW, 1 MWh)
 - Integrated with large-scale Amonix solar installation
- ▶ **Community Energy Storage**
 - Smaller battery (FIAMM 25 kW, 50 kWh)
 - Integrated with smaller-scale solar installation
 - Simulated residential loads
- ▶ **Smart Inverter Project**
 - EPRI-led research
 - Addressing integration challenges through smarter inverters rather than storage



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