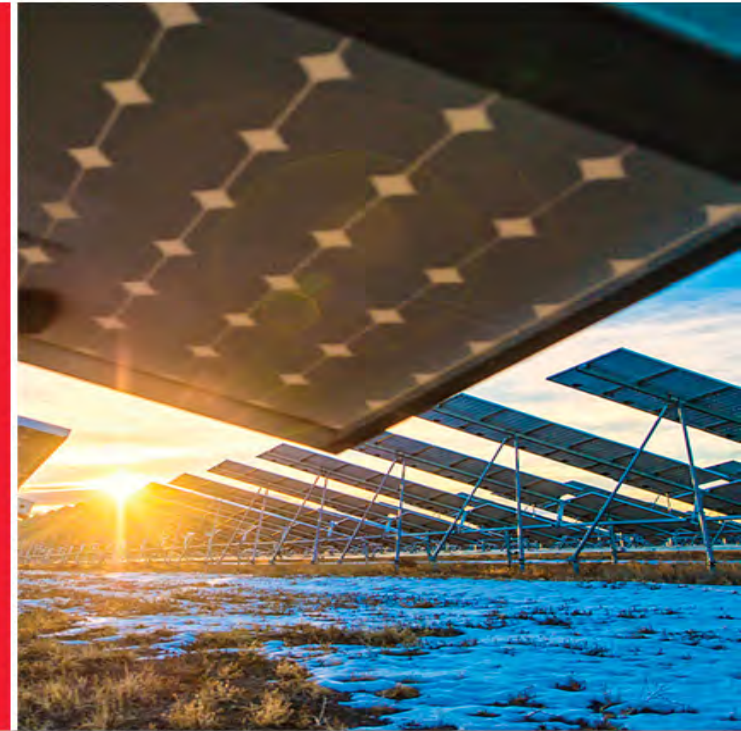




36th PLMA Conference
November 14, 2017

Peña Station NEXT

Integrating Renewables and Battery Storage Within a
Microgrid



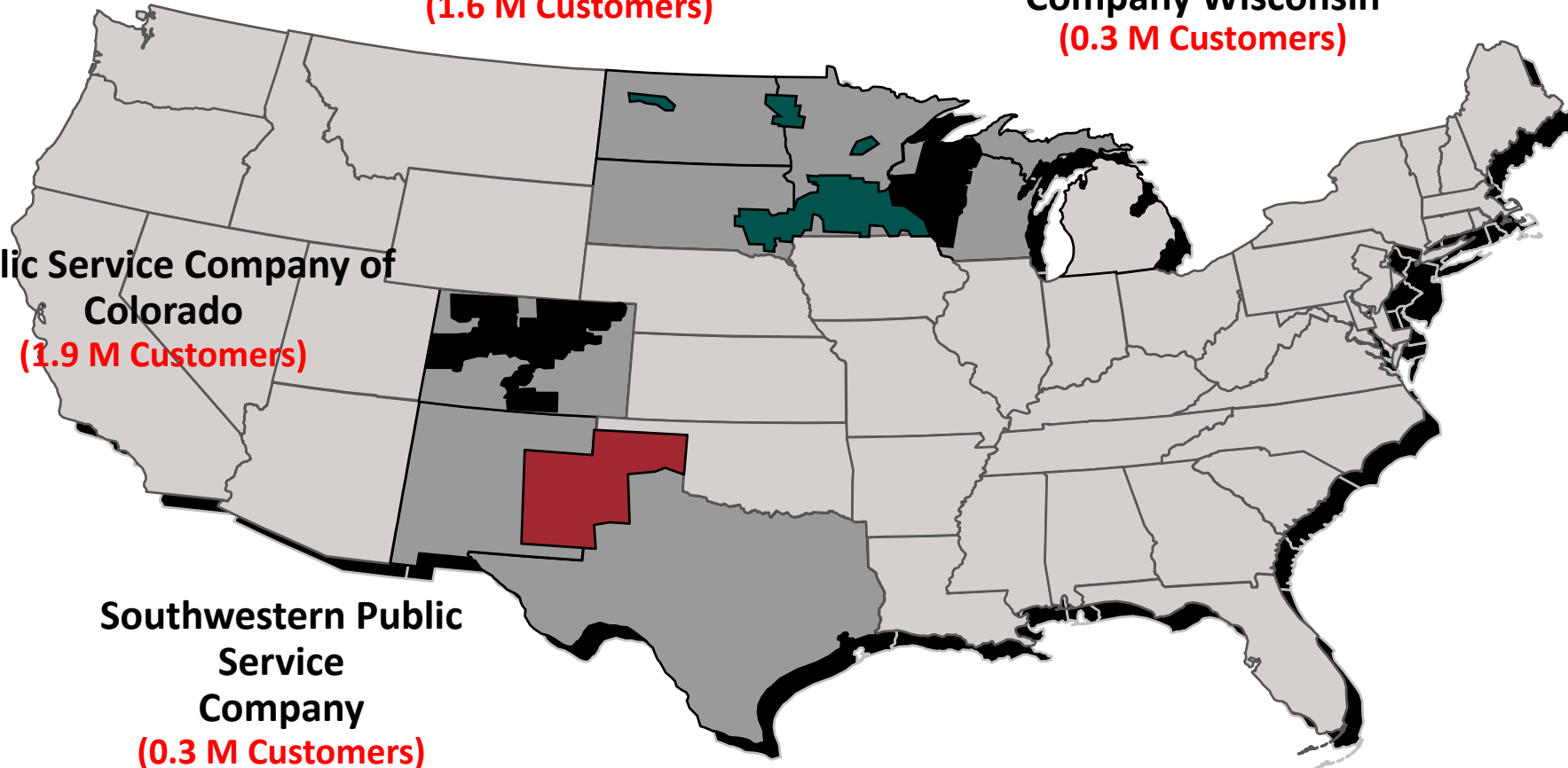
Xcel Energy Service Areas

Northern States Power Company
Minnesota
(1.6 M Customers)

Northern States Power
Company Wisconsin
(0.3 M Customers)

Public Service Company of
Colorado
(1.9 M Customers)

Southwestern Public
Service
Company
(0.3 M Customers)



Peña Station NEXT, CO – The Vision



Peña Station NEXT – how do we get there?



A Living Lab for Stakeholders

- **Microgrid (P3 with Xcel, DEN & Panasonic)**
 - Net power positive community
 - Carbon Neutral District Energy Plan
- **Smart Transportation**
 - Autonomous EV shuttles
 - *CDOT V2X test environment & demo*
- **Smart Lighting**
 - Street lights
 - Parking lot
- **Smart Parking**
 - Parking lot
 - Streets
- **Interactive Digital Signage**
 - Iconic entrance signage & kiosks
- **Community Wi-Fi**
 - Optimized for ultra-dense user networks

Partner Objectives

1. Maximize property value for investors
2. Create compelling user experiences
3. Improve community operations
4. Deploy and evaluate cutting-edge solutions



Panasonic Microgrid Demonstration



Grid Value

Value Propositions

1. Integration of high-penetration PV
2. DR (system & feeder level)
3. Energy arbitrage
4. Ancillary Services

Customer Value

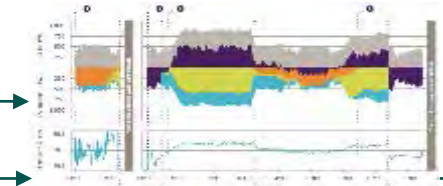
5. Back-up service to an end-use customer (Panasonic)

Cost Effective?

6. Stacking – utilizing a single battery storage asset to enable multiple value propositions



Control Center



Management Software



1.6MW Solar Canopy



1MW / 2MWh Li-ion



259kW Panasonic HIT Rooftop Solar Array



Building Controls

System Specifications

Carport PV System

- System size – 1,678 kW (DC), 1,191 kW (AC)
- Modules – Canadian Solar, 320W, 5,244 modules
- Inverters – SMA Sunny Tripower String Inverters 20 kW – 30 kW
- Racking System – Solaire by Sunpower, 360D, 7.2°/1°
- Data Acquisition System – Also Energy
- Interconnection Voltage – 13.2 kV



Battery Energy Storage System

- System Size DC (kWh) – 2,216 kWh
- System Size AC – 1,000 kW
- Structure Configuration – Younicos Y.Cubes (4), modular enclosures
- Battery Type – Li NMC
- Battery Rack Quantity – 20
- Inverter Type – Younicos Y.Converter 250 kVa (4)
- Interconnection Voltage – 13.2 kV



Peña Station NEXT, CO – Where we are Today



Panasonic



Younicos



1.6 MW_{dc} carport solar



Anchor load + 259 kW_{dc} rooftop solar



Islanding switch



1 MW / 2 MWh battery system

NREL + Xcel + Panasonic: Net-Zero Energy District

Goal: Design a net-zero energy development, Peña Station NEXT, with much greater than 50% DER penetration, to achieve sustainability, reliability and affordability.

Impact

Develop an integrated planning tool for a net-zero energy district which will be employed in future efforts with other utilities and zero energy district developers.

Technologies

Solar, smart inverters, storage, building efficiency, condenser heat recovery, district heating and cooling

Partners



FY17 Notable Outcome

Develop and demonstrate innovative open source simulation models combining URBAOpt and OpenDSS to evaluate DER penetrations over 50% in a new 400-acre mixed use development.



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