Transforming the Grid
Through Community-Based Demonstrations

NREL AES Workshop
May 10, 2022
Agenda

- PGE at a Glance
- Market Drivers
- Grid Modernization Overview
- Integrated Grid Roadmap
- Priorities for Rapid Progress
- SALMON
- Building a New Business Function
PGE at a Glance

Quick Facts:

- Vertically integrated utility including generation, transmission and distribution. Serving 4,000 mi²
- PGE customers:
  - Residential 773,514
  - Commercial 110,028
  - Industrial 200
- Serves 46% of Oregonians, 51 incorporated cities
- Total number of employees ~3,000
PGE is operating in an increasingly complex & changing environment

We need to evolve our grid capabilities to best meet our customer and community needs
## Integrated Grid Roadmap – 5 Year View

<table>
<thead>
<tr>
<th>Year</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
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<tbody>
<tr>
<td>Grid Management Systems</td>
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<td>Field Area Network (FAN)</td>
<td>Distribution Automation (DA)</td>
<td>Integrated Operations Center (IOC)</td>
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<td>Strategic Programs &amp; Foundational Comms</td>
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<td>Electrification</td>
<td>Residential EV</td>
<td>PGE Workplace Charging Infrastructure &amp; Fleet</td>
<td>Tri-Met Traction Power Substations</td>
<td>Commercial EV (e.g. School Buses, Daimler)</td>
<td>Building Electrification</td>
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Strategic Priorities for Rapid Progress

**CRAWL**
- Scale over the next 1-2 years
  - Generation Capacity
  - Contingency Reserves
  - Frequency Response
  - Hourly Economic Dispatch
- Operational Integration, Standardize and Coordinate Program Components

**WALK**
- Scale in Years 2-3
  - Distribution Locational Benefits
  - Regulation
  - Volt/Var Control
  - Sub-hourly Economic Dispatch
- Capability Building and Testing Over 1-2 years

**RUN**
- Scale in Years 3-5 and beyond
  - Islanding (Utility Scale Microgrid)
  - Defer Transmission & Distribution Upgrades
  - Bulk System Voltage Support
- Complex Services, Build on Earlier Capabilities

Key VPP Grid Services
- Bulk System Voltage Support
- Defer Transmission & Distribution Upgrades
- Islanding (Utility Scale Microgrid)

Near-term activities
- Operational Integration, Standardize and Coordinate Program Components
SmartGrid Asset Load Management & Optimized Neighborhood - SALMON

Project Team:
- Portland General Electric (PGE)
- Energy Trust of Oregon
- Northwest Energy Efficiency Alliance (NEEA)
- Community Energy Project (CEP)
- National Renewable Energy Laboratory (NREL)

Goals:
- Build a flexible load resource consisting of EE, connected devices, solar, storage, and EV charging
- Demonstrate bulk services (energy, capacity and frequency response) and distribution services (capacity relief, power quality, and Volt/Var optimization)

Building Retrofits:
The project will retrofit ~580 buildings, improving the energy efficiency by an average of 10%, while building 1.4 MW of flexible load.

Project Learning:
- Program Design
- Customer Engagement Strategies, focus on Underserved Communities
- New Partnership Models
- ADMS/DERMS Assessment
- DER/EE Valuation and Co-Benefits
- Building on Regional Sharing
Building a new business function.

PGE enables and scales a fully-integrated, system (people, processes, tools) that can effectively plan, manage, and optimize a network of dispatchable distributed energy resources (utility-owned or not) to achieve a safe, reliable, and resilient clean energy future where all customers are enticed to participate and benefit.

STRATEGIC PILLARS

DECARBONIZE:
Zero GHG Emission by 2040; 80% reduction by 2030

ELECTRIFY:
Leverage DERs and flexible load to meet customers’ needs and keep the grid resilient as load growth increases

PERFORM:
Continue to meet customer needs and expectations by keeping power affordable and reliable and leveraging human-centered design principles
Thank you!

Timothy Treadwell
Manager, Customer Technology Demonstration
Portland General Electric