Notice: This meeting will be recorded

OREGON DEPARTMENT OF ENERGY

Small-Scale Renewable Energy Projects Study

Meeting #3: Benefits And Costs

June 28, 2022

Hornshuh Fire Station Solar - Banks, OR


OREGON
DEPARTMENT OF
ENERGY
Welcome
Harney County, Oregon

OREGON DEPARTMENT OF ENERGY

Leading Oregon to a safe, equitable, clean, and sustainable energy future.

Our Mission

The Oregon Department of Energy helps Oregonians make informed decisions and maintain a resilient and affordable energy system. We advance solutions to shape an equitable clean energy transition, protect the environment and public health, and responsibly balance energy needs and impacts for current and future generations.

What We Do

On behalf of Oregonians across the state, the Oregon Department of Energy achieves its mission by providing:

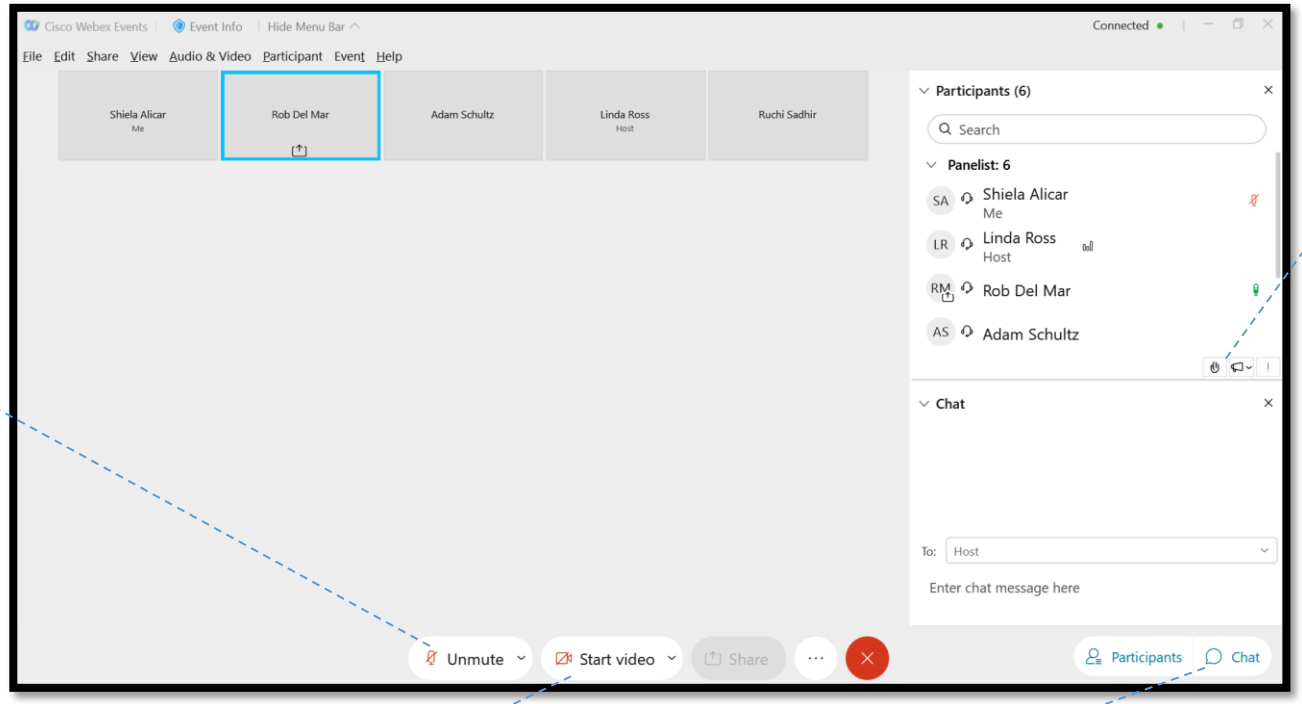
- A Central Repository of Energy Data, Information, and Analysis
- A Venue for Problem-Solving Oregon's Energy Challenges
- Energy Education and Technical Assistance
- Regulation and Oversight
- Energy Programs and Activities

Meeting Logistics

- **Logistics**
  - Note that we'll be recording this meeting and will post it online for reference
  - Please feel free to use the Chat to ask questions, ODOE staff will be monitoring the Chat
  - Please use the "raise hand" function to indicate interest in asking a question or making a comment
  - ODOE Staff will work with you on determining the date of the next Advisory Committee meeting
  - We have set aside time for Public Comment towards end of meeting

- **Next up – a few instructions on how to use WebEx to participate in this meeting**

WebEx Functionality



Audio Options

Mute — *Microphone On*

Unmute — *Microphone Off*

Video Options

Stop video — *Webcam On*

Start video — *Webcam Off*

Raise Hand

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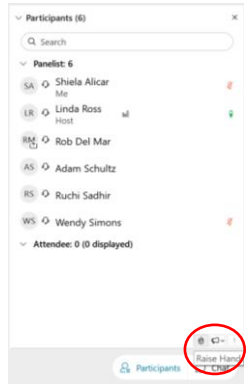
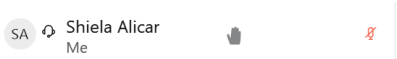
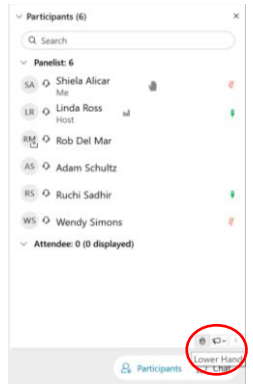
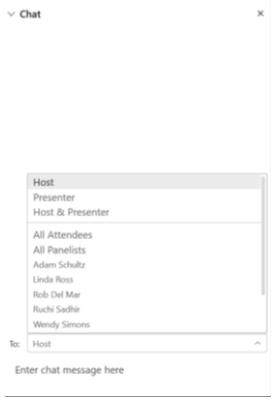






Click on the little hand icon to lower your hand.

Chat



Click in the box next to "To:" for options to send a message to the Host, Presenter, All Attendees, All Panelists or named individuals.

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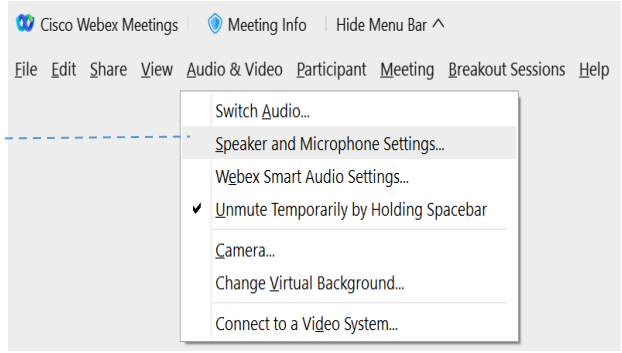
WebEx Audio and Webcam Settings

Select Speaker and Microphone Settings... to access the audio settings.



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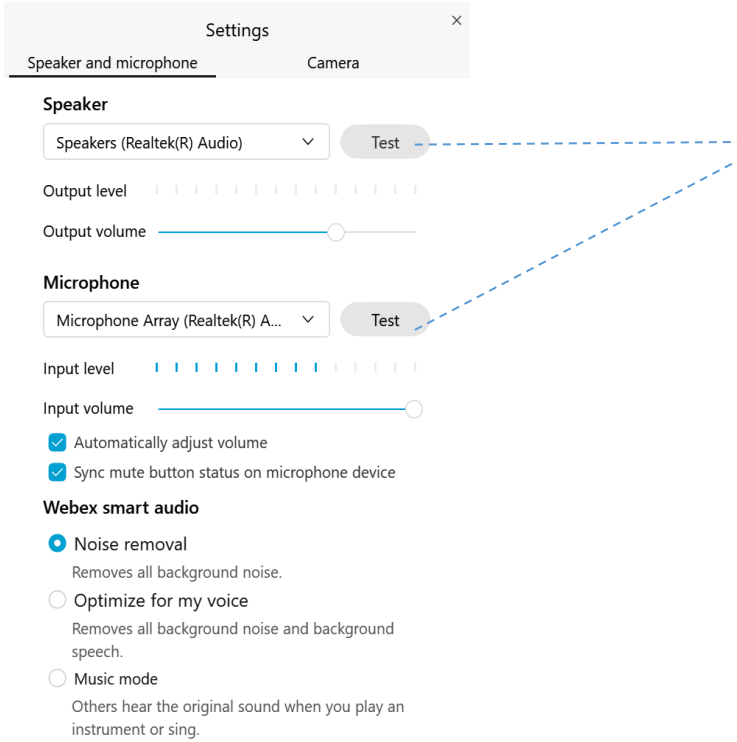
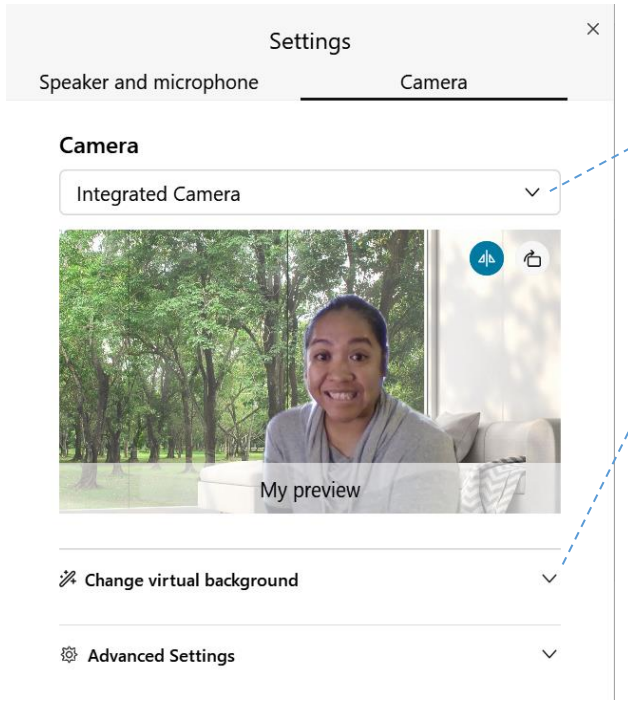


Select and Preview your Camera.

Click on Change virtual background to blur your background.



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How this meeting will be facilitated:

- **Panelists and Participants**
  - Panelists: Advisory Committee Members and ODOE Staff
  - Participants: There is time reserved at the end of the agenda for public comment, and you can send questions through chat throughout the meeting.
- **Workgroup Agreements:** Designed to foster inclusive and respectful meeting today
  - Be respectful to others
  - Respect time limitations
  - Learning happens outside of our comfort zones
  - Listen to learn and not to respond
  - Avoid speculations and accusations
  - Technical issues or questions: Contact **Linda Ross** in the chat

AGENDA

9:00	Welcome and Logistics
9:10	Background, Definitions and Key Questions
9:20	Stakeholder Perspectives, Six Speakers, Q&A as we go
11:15	Break
11:25	Breakout Discussion: Identify the benefits unique to small-scale renewable energy projects and categorize the benefits
11:45	Roundup from Breakout Discussion
12:10	Breakout Discussion: Identify the costs associated with small-scale renewable energy projects
12:30	Roundup from Breakout Discussion
12:45	Next Steps and Public Comments
1:00	Close of Meeting

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ODOE's Objectives

- First, thank you for serving!
- **Quick recap of HB 2021 Study on Small-Scale Renewable Energy Projects:** what does it ask ODOE to do?

ODOE Objective:
The State Department of Energy shall convene a work group to examine opportunities to encourage development of small scale and community-based renewable energy projects in this state that contribute to economic development and local energy resiliency.

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Key Questions

Yaquina Head Lighthouse, Newport, Oregon

Key Questions

Project Attributes

- What are the attributes that differentiate small-scale renewable energy projects from utility-scale, or large-scale, projects?

Economic Benefits

- What are the common economic benefits of small-scale and utility-scale renewable energy projects and what are those unique to small-scale?
- How can these economic benefits be valued?

Resilience Benefits

- What are the potential resilience benefits unique to small-scale and community-based renewable energy projects?
- Can we differentiate between resilience benefits that accrue to individual customers vs. communities vs. the grid?
- How can these resilience benefits be valued?

Other Benefits

- What are the other key energy and non-energy benefits unique to small-scale and community-based renewable energy projects?
- How can these other benefits be valued?

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Key Questions

Rate Impacts

- What is the potential impact of small-scale and community-based renewable energy projects on electricity rates:
  - For participants / owners of the project?
  - On overall utility rates – including for utility customers who are non-participants to the project?
- How do the avoided cost rates paid to Qualifying Facilities affect utility rates for their ratepayers now?

Costs

- What are the differences in costs between different scales of development?
- What are the major drivers of those differences in cost?
- How do different types of renewable energy projects (e.g., PURPA QF, utility-owned large-scale projects, community-owned small-scale projects, etc.) affect the utility's overall revenue requirement?
- Is there sufficient data publicly available about costs of different types / scales of renewable energy projects?

Other Questions

- What gaps in information are there regarding these costs?
- What data are needed?
- What are the specific benefits associated with different ownership models for small-scale renewable projects?
- How can the benefits of small-scale project be extended to environmental justice communities?

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Stakeholder Project Perspectives

Vista House, Columbia River Gorge

Stakeholder Project Perspectives

- Dave Moldal – Energy Trust
- Ormand Hilderbrand – PáTu Wind Farm
- Rosanne Ratkiewich – California Public Utilities Commission
- Kevin Whitener – Portland General Electric
- Erik Anderson – PacifiCorp
- Kacia Brockman – Oregon Public Utilities Commission

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Energy Trust

Dave Moldal

Vista House, Columbia River Gorge

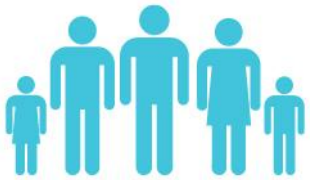
Small-Scale Renewable Energy Projects Study

Benefits, Costs, and Rates Workshop – June 28, 2022

EnergyTrust of Oregon

Clean and affordable energy since 2002

From Energy Trust's investment of $2.2 billion in utility customer funds:



Nearly 770,000 sites transformed into energy efficient, healthy, comfortable and productive homes and businesses

18,000 clean energy systems generating renewable power from the sun, wind, water, geothermal heat and biopower

$8.9 billion in savings over time on participant utility bills from their energy-efficiency and solar investments

36.2 million tons of carbon dioxide emissions kept out of our air, equal to removing 7 million cars from our roads for a year

Distributed Renewable Energy Benefits

1. Net-metering allowing Oregonians manage energy use
2. Irrigation modernization → revenue from energy sales provides debt service for piping
3. Non-energy benefits: water savings, nutrient recovery, methane destruction, material management, pollution prevention, resilience
4. Local jobs and economic development

Costs: distributed renewables

Solar:

- Technology curve benefits
- Market uncertainties increase cost
- Opportunity to capture all the value streams

Costs: distributed renewables

- Contractual and revenue-related barriers
- Grid related costs
- Operational costs

Thank You

Dave Moldal

Sr. Program Manager

dave.moldal@energytrust.org

EnergyTrust of Oregon

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PáTu Wind Farm

Ormand Hilderbrand

Vista House, Columbia River Gorge

PáTu Wind Farm
and Community Renewable Energy

Community Wind / Renewable Energy

- “Community” Renewable Energy - Local Investment in small to utility scale RE – *ownership remains in the community*
- “Absentee” are renewable projects where local ownership is absent.

Why are Community Renewables Important to Oregon

- Renewable Energy – is our local Resource
- Use It to Improve Our Community
- Provides 3.5 – 5 times more return to the local economy (NREL, OSU, U of MN) compared to Absentee RE Projects
  - *The money stays in the community*
- Provides long term base employment

- Synergistic with larger scale renewable energy
- Improved community acceptance when it is a “Community Project”
- Upside Potential – Solar & Storage
  - Need to maximize existing generation asset
  - Can enhance community resiliency
  - Immediate generation expansion / 2X

PáTu Wind

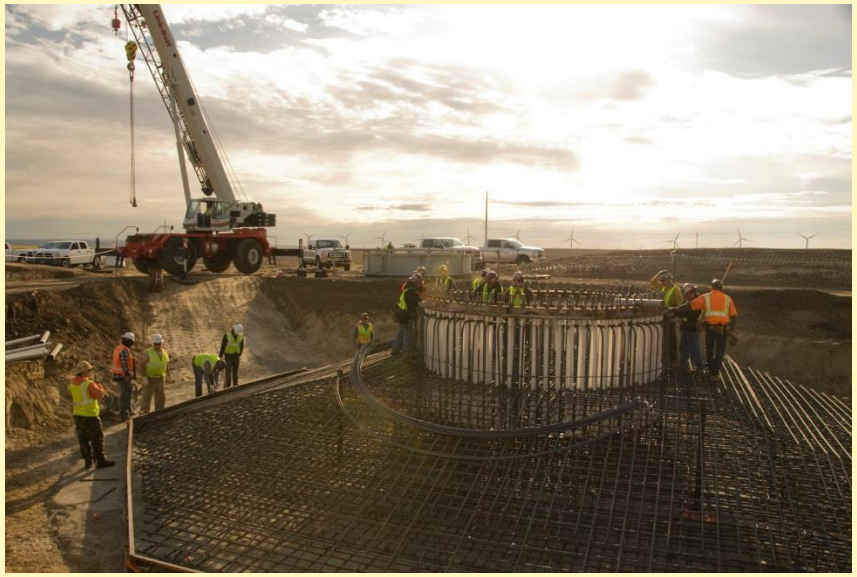
One Example of Community Renewable Energy

PáTu Wind Farm Background

- Family dry land wheat farm – Sherman Co. Oregon
- Original wind development area – leased “Wind Rights” to predecessor of Iberdrola / Avangrid
- 2005 Iberdrola – decision not to develop part of leased area.
- Decided to take back lease and move forward on own

Reasons to Move Forward - 2005

- Wind Resources
- Large, Existing Developments
- Oregon Business Energy Tax Credit
- Oregon PUC – Small QFs / PURPA Avoided Cost Ruling
  - PáTu generation costs are immaterial with PURPA Avoided Cost.
- Federal Investment Tax Credit



Area Benefits

- 6 – GE 1.5 MW Turbines
- Generates power for approx. 3,000 homes in the Portland area
- Total Investment – $22 M +
- More than $7.0 M invested within the Region during Construction
- Sherman Co – 5th largest taxpayer / ~ $1M since 2012
- Annual regional payroll and services exceed $300,000

Critical Factors for PáTu - Past

- 2005 / 2007 - Oregon PUC ruling - Small Renewable Energy project below 10 MW
  - Oregon PUC Recognized the importance of Community Renewable Energy
  - Must receive firm, 20 year, Power Purchase Agreements from Oregon utilities
  - Pricing for energy delivered per PURPA Avoided Cost

PáTu Critical Factors - Past

- Oregon Dept. of Energy
  - Small Energy Loan Program
    - Standard PPA's are difficult to finance
    - Long Term Finance up to 20 years
- Investment Tax Credit
  - Section 1603 Grants

PáTu Critical Factors - NOW

- Mandate by OPUC for small, local investor community projects.
- PPA tariff based on PURPA Avoided Cost
  - projects 10 MWs or less – solar and wind
  - Hybrid Solar, Wind, Battery – dispatchable delivery up to 10 MW continuous.
  - PPA 20 year / banks demand certainty

Why Should ODOE Be Involved

- Community Renewable Energy is important to our region's future
- Oregon needs a mix of different renewable energy sources – community, local investor, utility scale developers, and IOUs

Other NW Examples

- Lime Wind, Baker County Oregon near Huntington
- Located - BLM administered lands
- Family owned, developed, operated and maintained
- 3 MW - six 500kW rebuilt Nordtank turbines
- PURPA PPA with Idaho Power Company for 20 years

Other NW Examples

- https://www.coastalcap.org/coastal-energy-project/

- Coastal Wind, Coastal Community Action Program (CCAP) - nonprofit organization, Aberdeen, WA
- 4 GE 1.5 MW turbines
- New Market Tax Credits
- Craft3 financing

Outside of the NW Minnesota Leads

- Winona County, Minnesota
  - 2 MW project owned by Winowa County
  - Broad community organizational support
- City of Willmar, Minnesota
  - 4 MW
- City of Howard and Miner County
  - 2 – 106 KW used turbines

Kodiak Electric Association
Alaska

- 3 – 1.5 MWs
- Benefits: rate reduction, environmental, local economic impacts (reduction in diesel fuel storage)
- KEA objective 95% renewable by 2025

Berkshire Wind Power Cooperative

- The towns of Hancock and Lanesboro receive payments in lieu of taxes from the project.
- 50 full time jobs during construction / 2 full time for operations plus part time services

South Dakota Wind Energy Partners Jerauld Co, SD

- 7 – 1.5 MWs
- Benefits:
  - Owned by 606 residents of Jarauld Co.
  - Built to maximize local economic befits

Critical Success Factors

- Vision and Plan
- Project Leadership
- Involving the Community
- Financing and Pricing
- Siting, Permitting and Interconnection

Great Partners and Friends

- Oregon Dept. of Energy
- CoBank
- Iberdrola Renewables
- EDF & Vestas
- General Electric - Wind
- OneEnergy Renewables
- Bonneville Power Admin
- Seattle City Light
- Wasco Electric Co-op
- Sherman County

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California Public Utility Commission Microgrids

Rosanne Ratkiewich

Vista House, Columbia River Gorge

California Public Utilities Commission Microgrids and Resiliency Proceeding R.19.09.009, Track 5 – Value of Resiliency

A Scalable Approach to Exploring Resiliency Evaluation and Planning

Resiliency and Microgrids Team, Energy Division

Rosanne Ratkiewich, Sr. Regulatory Analyst

June 28, 2022

California Public Utilities Commission

Mechanisms to Measure Improved Resiliency

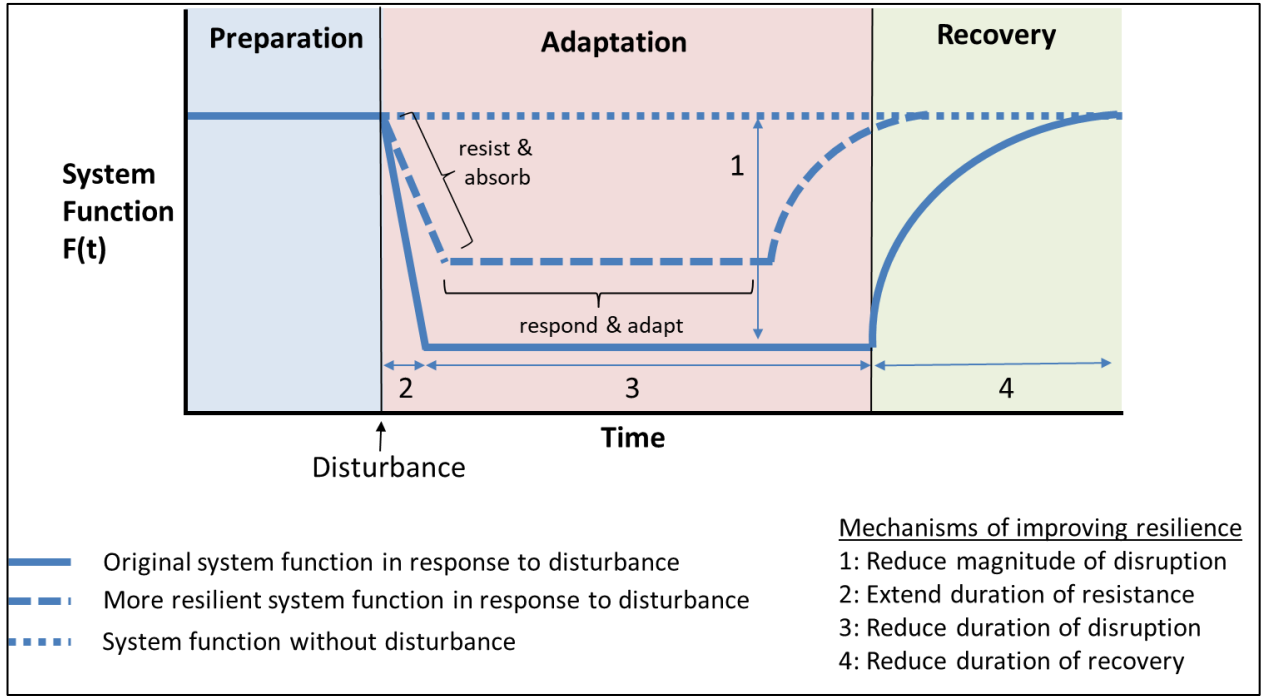
ENERGY System Function:
- **operating** levels –
  - MW, MW/hrs, MW * hours
- **infrastructure** levels
  - # lines/circuits functional, # lines/circuits tripped, # lines/circuits restored

INTERDEPENDENT System Functions:
- Water/Wastewater
- Gas
- Communications
- Transportation

ECONOMIC System Function:
- Revenue and productivity due to power disruption
- Income and perishable losses due to power disruption

SOCIAL/EQUITY System Function:
- # of vulnerable or disadvantaged population in area served
- # of Critical Facilities

ENVIRONMENTAL System function:
- GHG, Criteria Air Pollutant Emissions



Resilience Trapezoid (adapted from Panteli, et al. (2017); T. Ding, Y. Lin, G. Li, et al. (2017); T. Ding, Y. Lin, Z. Bie, et al. (2017))

4 Pillars of Equitable Resiliency Evaluation and Planning Framework

I. Baseline Assessment

I. What/Whom do we want to protect and where is it/where are they?
II. What threatens it/them?
III. How well are we doing now to protect it/them?

II. Mitigation Measure Assessment

I. What protection options do we have?
II. What does the best job at protecting the most?
III. What does it cost?

III. Resiliency Scorecard – scoring resiliency configuration characteristics including those that support State policy goals

IV. Resiliency Response Assessment (post-disruption or modeling) –

I. How well did the investments do in reaching resiliency targets?
II. Did the investments reduce impacts on the community?

Resiliency Planning and Evaluation – Pillars I & II

I. Baseline Assessment:

1) Define Geographical area of study
2) Define Load Tiers or Consequence Categories (Critical, Priority, Discretionary)
3) Identify Resiliency Targets within Load Tiers
4) Define Hazards to consider (All-Hazard assessment, analysis, ranking, weighting)
5) Conduct assessment of current Resiliency when disrupted from Hazard 1, Hazard 2, Hazard 3 (according to Hazard assessment)
6) Results of Resilience Assessment – Identify Resiliency deficits and priorities and Resiliency Metric Reporting of Baseline levels

II. Mitigation Measure Assessment

1) Identify potential mitigation measure options
2) Assess ability of each mitigation option to reach Resiliency Targets for Hazard 1, Hazard 2, Hazard 3
3) Compare costs of each mitigation option to reach Resiliency Targets for Hazard 1, Hazard 2, Hazard 3

Resiliency Planning and Evaluation – Pillars III & IV

III. Resiliency "Scorecard"

1) Resiliency Scorecard is a suggested tool that provides a basic benchmark of achievement but recognizes that more can be done.
2) Scoring reflects resiliency configuration characteristics.
3) Scoring system provides for different areas of improvement (e.g. 100% resilience targets are met, but configuration uses 70% fossil fuel resources to meet those targets, improvement would be to decrease fossil fuel resources while maintaining targets. Would result in a higher "score."

IV. Resiliency Response Assessment (computer modeling or post-disruption approach):

1) Conduct Baseline Assessment (1-6).
2) After implementation of chosen mitigation measure option, conduct annual data collection of Resiliency Metrics,
3) Assess achievement of Resiliency Targets and any changes in Community Impacts

Microgrids Proceeding R. 19-09-009, Track 5

Track 5: Value of Resiliency in the Microgrids proceeding R.19-09-009 identifies the following specific key issues to be considered in the proceeding:

- **Economic and Equity Impacts** – direct and indirect economic and equity impacts on customers experiencing major disruptive events that may impact delivery of energy services
- **Resiliency Standards** – standard definitions, metrics, tools or methodologies to assess impacts of major disruptive events and evaluating the efficacy of ratepayer investments in mitigating those impacts
- **Grid Planning and Investment** – how direct and indirect economic and equity impacts on customers should inform grid planning and investment decision making
- **Coordination Across the Public Entities** – whether to adopt or modify rules to enhance bi-directional, multi-jurisdictional collaboration between utilities, Tribes and government agencies on emergency plans, all-hazard mitigation plans, resiliency plans or grid investments
- **Environmental and Social Justice** – what extent should resiliency valuation decisions explicitly support ESJ communities including the extent to which resiliency valuation could support achievement of any of the nine goals of the Commissions ESJ 2.0 plan

California Public Utilities Commission

Rosanne.Ratkiewich@cpuc.ca.gov
https://www.cpuc.ca.gov/resiliencyandmicrogrids/

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Beaverton Public Safety Center Microgrid

Kevin Whitener - PGE

Vista House, Columbia River Gorge

Microgrid Projects to Support Resiliency and a Green Energy Future

Kevin Whitener
Portland General Electric
June 28, 2022

Salem Smart Power Project

State-of-the-art smart grid demonstration highlights:

- 5 MW battery storage with 1.26 MWh
- Renewable integration, reliability and economic dispatch
- Microgrid potential when coupled with PGE's DSG system
- Up/Down frequency regulation, voltage regulation, power factor control, peak shifting

Portland General Electric

Project Facts

- Corner of SW Hall and SW Allen
- Fed from PGE's Beaverton Substation
- 1,000kW diesel generator (DSG)
- 300kW solar PV (NEM)
- 250kW/1,000kWh battery
- PGE budget approximately $1MM

Beaverton Public Safety Center

Powin Battery Enclosure

Why involve communities in resiliency planning?

When we work together, we make our community stronger

How resiliency and flexibility offer shared benefits to utilities and our customers

Experience is a cruel teacher. It gives a test before presenting the lesson.

Major Natural Disasters

- Hurricanes
- Fire
- Tsunami

How has the COVID-19 pandemic influenced your own resiliency strategy to plan and care for yourself or your family?

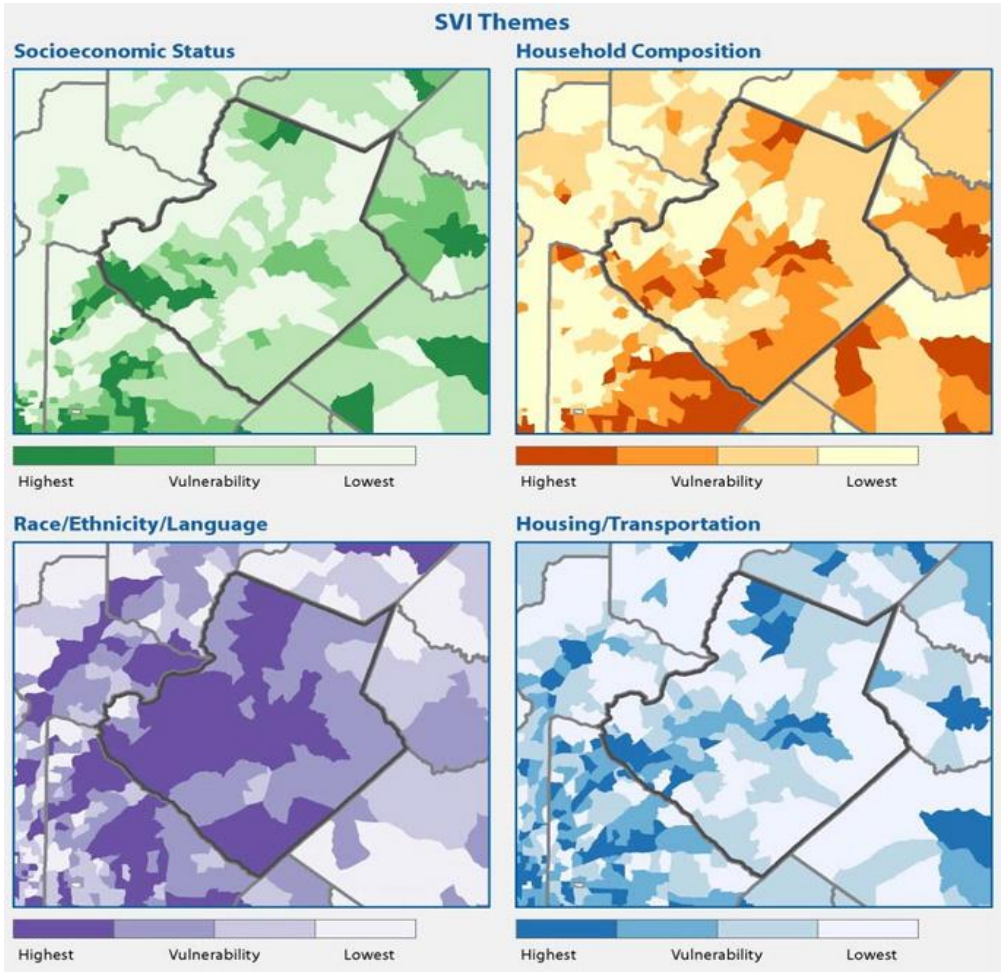
What are your criteria for determining Microgrid location?

How we selected a location

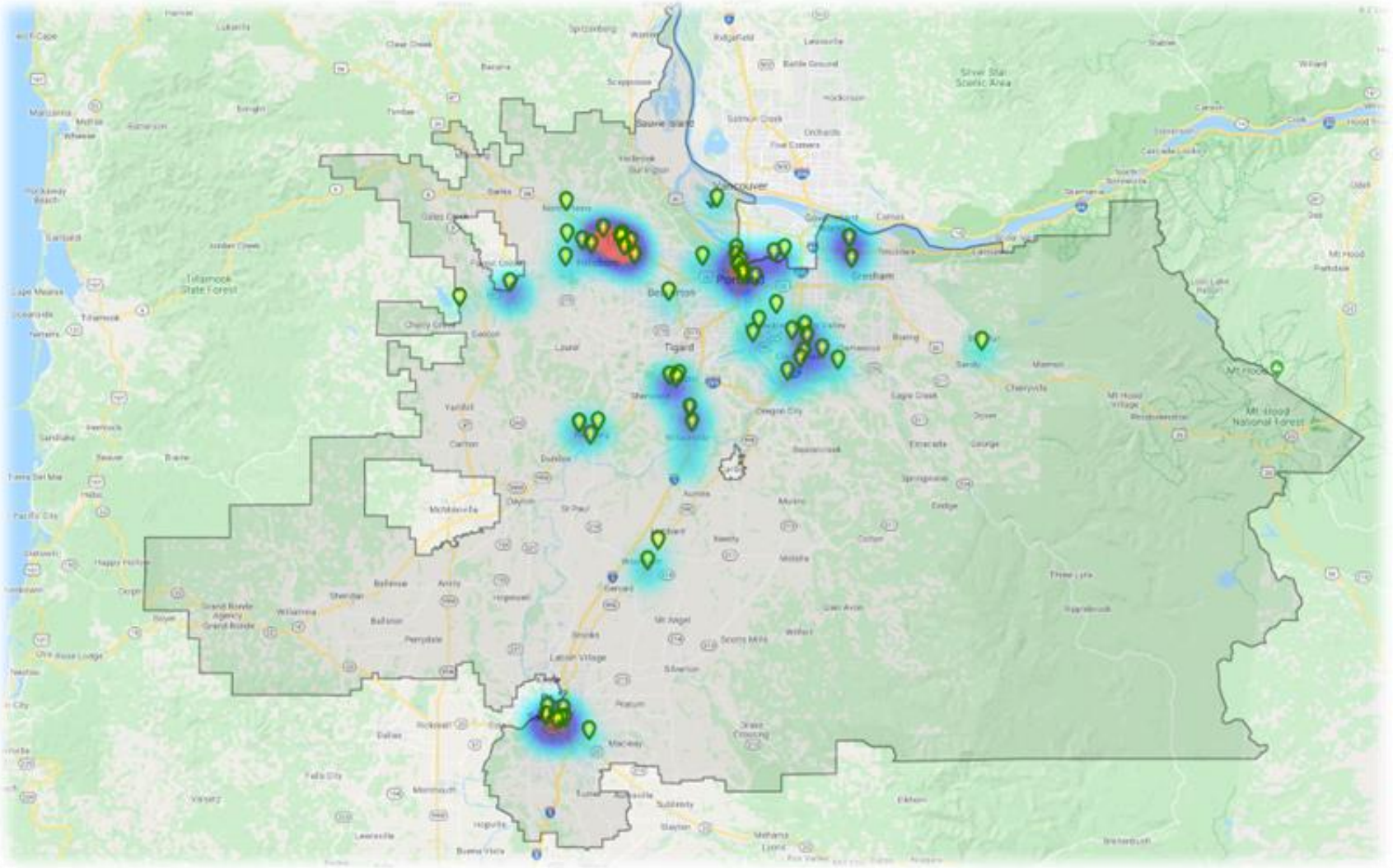
Criteria	Data	Metric
Location near a critical facility	Critical facilities include the following data: • Hospitals • Law Enforcement • Fire Stations • Emergency Operation Centers • Public Schools • Water Treatment	Location only suitable within 1,000 ft: • Hospitals - High • Law Enforcement - Medium • Fire Stations - Medium • Emergency Operation Centers - High • Public Schools - Low • Water Treatment - Medium
Location near a distributed energy resource	Portland General Electric Generator Data	Location only suitable near a generator: • > 50 kW within 1,000 ft - High • > 1 MW within 3,000 ft - High • Everything else – Low
Location not in a flood zone	FEMA SFHA Flood Hazards	Location not in flood hazard area. Flood hazard areas were used as a mask in this analysis.
Location in a low landslide susceptibility area	DOGAMI Landslide Susceptibility	Location in a low DOGAMI ranked landslide susceptibility area.
Location in an area of high population density	Census Bureau American Community Survey Population Data	Location in top 50th percentile of population density by block group.
Location in an underserved community	Census Bureau American Community Survey Median Income Data	Location in bottom 25th percentile of median income by block group.

How we selected a location

CDC Social Vulnerability Index



DSG Sites and PGE Service Territory



Battery Energy Storage For Outage Response

Benefits of Battery Energy Storage for Outage Response

- Seamless transfer at the time of the outage and at the time of return
- Likelihood of not starting the diesel generator
  - Saves fuel
  - Reduces emissions

Battery Energy Storage For Grid Support

Benefits of Battery Energy Storage for Grid Support

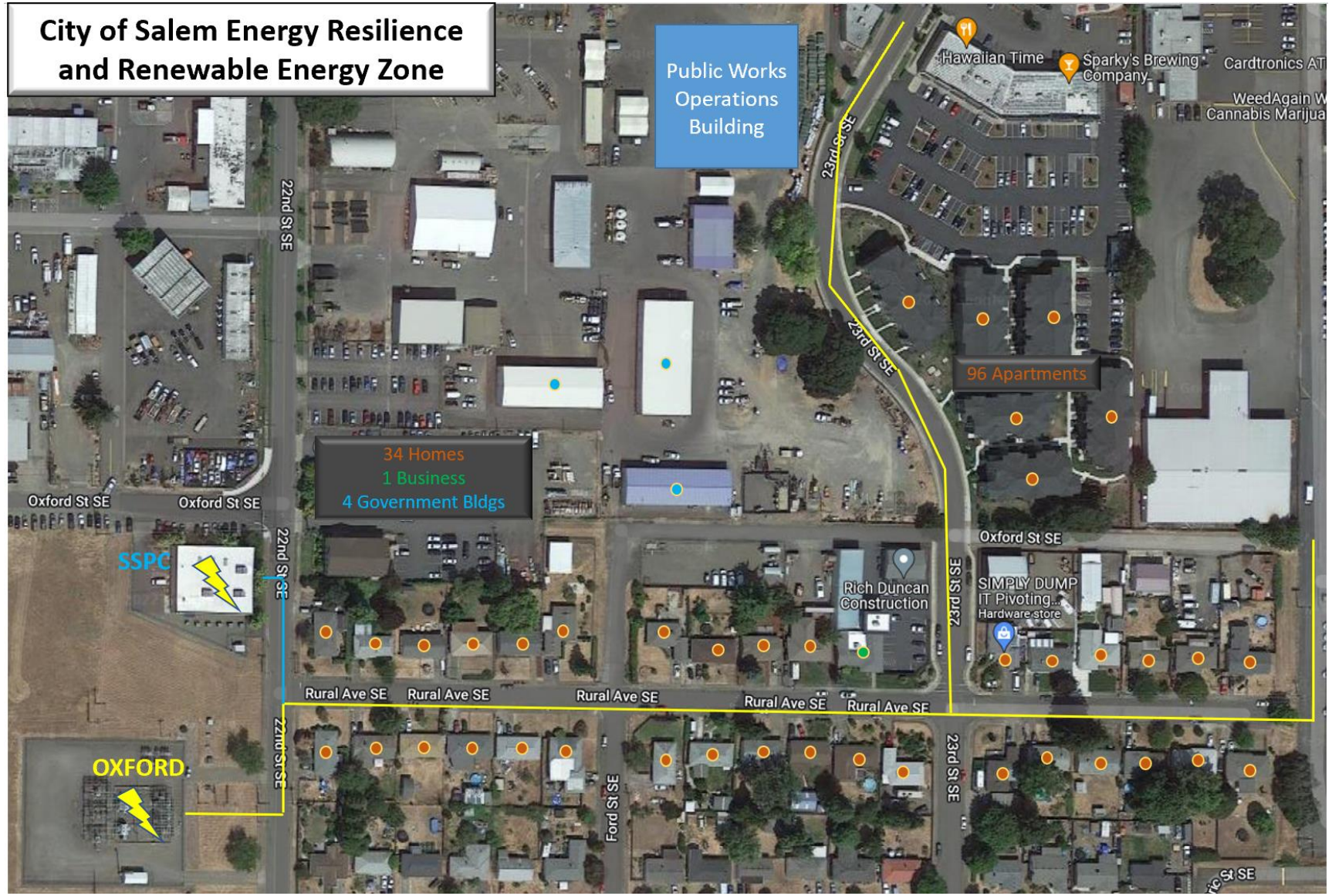
Frequency Response - between $52.50 and $61.50 per 0.1Hz per kW per year.

Contingency reserve - $81.60 per kW per year

So, for example: A repowered Salem Smart Power Center at 15 MW represents an operational value of $2.1MM per year to PGE to provide these reliability services.

What is Planned for the Future?

Existing and Planned Energy Storage Projects	Size	Planned Operation
Anderson Readiness Center	0.5MW/1MWh	Aug-22
Integrated Operations Center	2.5MW/5MWh	Jun-23
Baldock Energy Hydrogen Generator	2MW/4MWh	Jun-23
Salem Smart Power Center Repower	15MW/30MWh	Dec-23
Coffee Creek Substation	20MW/80MWh	Dec-24


City of Salem Energy Resilience and Renewable Energy Zone
Public Works Operations Building
34 Homes
1 Business
4 Government Bldgs
96 Apartments
SSPC
OXFORD
Hawaiian Time
Sparky's Brewing Company
Cardtronics AT
WeedAgain W
Cannabis Marijua
Rich Duncan Construction
SIMPLY DUMP IT Pivoting...
Hardware store
22nd St SE
23rd St SE
Oxford St SE
Rural Ave SE
Ford St SE

PGE's New Integrated Operations Center

PGE's Decarbonization Goals

Getting to Zero

How we're transforming the energy future:

By 2030:

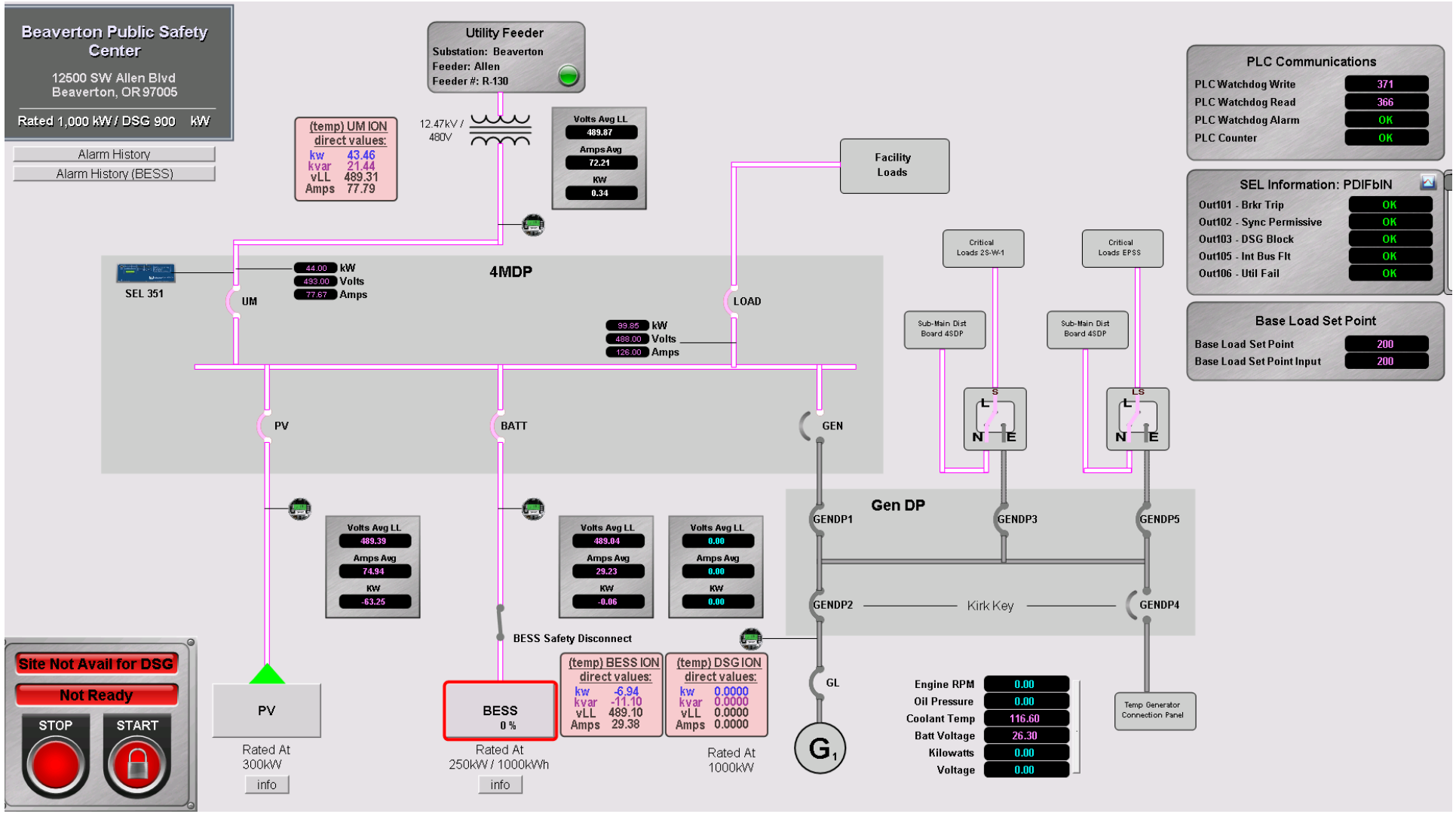
At least an **80% reduction** in greenhouse gas emissions from power served to customers

By 2035:

At least a **90% reduction** in greenhouse gas emissions from power served to customers

By 2040:

Zero greenhouse gas emissions from power served to customers


Beaverton Public Safety Center
12500 SW Allen Blvd
Beaverton, OR 97005
Rated 1,000 kW / DSG 900 kW
Alarm History
Alarm History (BESS)
Utility Feeder
Substation: Beaverton
Feeder: Allen
Feeder #: R-130
12.47kV / 480V
(temp) UM ION direct values:
kw 43.46
kvar 21.44
vLL 489.31
Amps 77.79
Volts Avg LL 489.87
Amps Avg 72.21
KW 0.34
Facility Loads
PLC Communications
PLC Watchdog Write 371
PLC Watchdog Read 366
PLC Watchdog Alarm OK
PLC Counter OK
SEL Information: PDIFbIN
Out101 - Brkr Trip OK
Out102 - Sync Permissive OK
Out103 - DSG Block OK
Out105 - Int Bus Flt OK
Out106 - Util Fail OK
Base Load Set Point
Base Load Set Point 200
Base Load Set Point Input 200
SEL 351
44.00 kW
493.00 Volts
77.67 Amps
UM
4MDP
LOAD
99.85 kW
488.00 Volts
126.00 Amps
Critical Loads 2S-W-1
Critical Loads EPSS
Sub-Main Dist Board 4SDP
Sub-Main Dist Board 4SDP
S
LS
PV
BATT
GEN
Volts Avg LL 489.39
Amps Avg 74.94
KW -63.25
Volts Avg LL 489.04
Amps Avg 29.23
KW -0.06
Volts Avg LL 0.00
Amps Avg 0.00
KW 0.00
Gen DP
GENDP1
GENDP3
GENDP5
GENDP2
Kirk Key
GENDP4
BESS Safety Disconnect
Site Not Avail for DSG
Not Ready
STOP
START
PV
Rated At 300kW
info
BESS
0 %
Rated At 250kW / 1000kWh
info
(temp) BESS ION direct values:
kw -6.94
kvar -11.10
vLL 489.10
Amps 29.38
(temp) DSG ION direct values:
kw 0.0000
kvar 0.0000
vLL 0.0000
Amps 0.0000
Rated At 1000kW
GL
G1
Engine RPM 0.00
Oil Pressure 0.00
Coolant Temp 116.60
Batt Voltage 26.30
Kilowatts 0.00
Voltage 0.00
Temp Generator Connection Panel

Caterpillar Diesel Generator

Project Partners

A complex project with many project partners

- The City of Beaverton
- PGE
- Powin
- PXiSE
- Peterson Caterpillar
- Controlled Power,Inc.
- Nikos, Inc.
- SolarEdge
- PAE
- OEG

Dynapower Inverters

SolarEdge PV Inverters

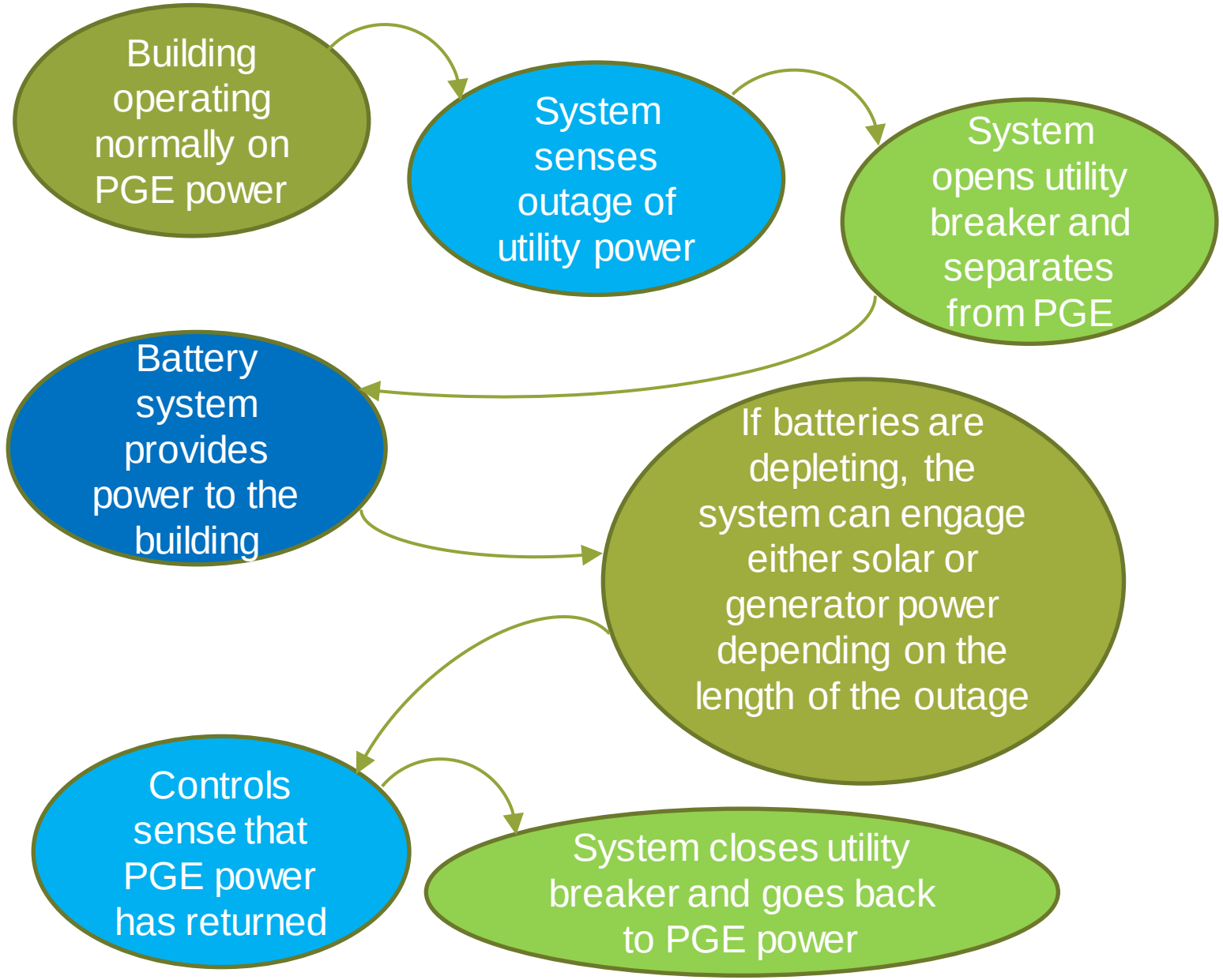
Eaton Switchgear

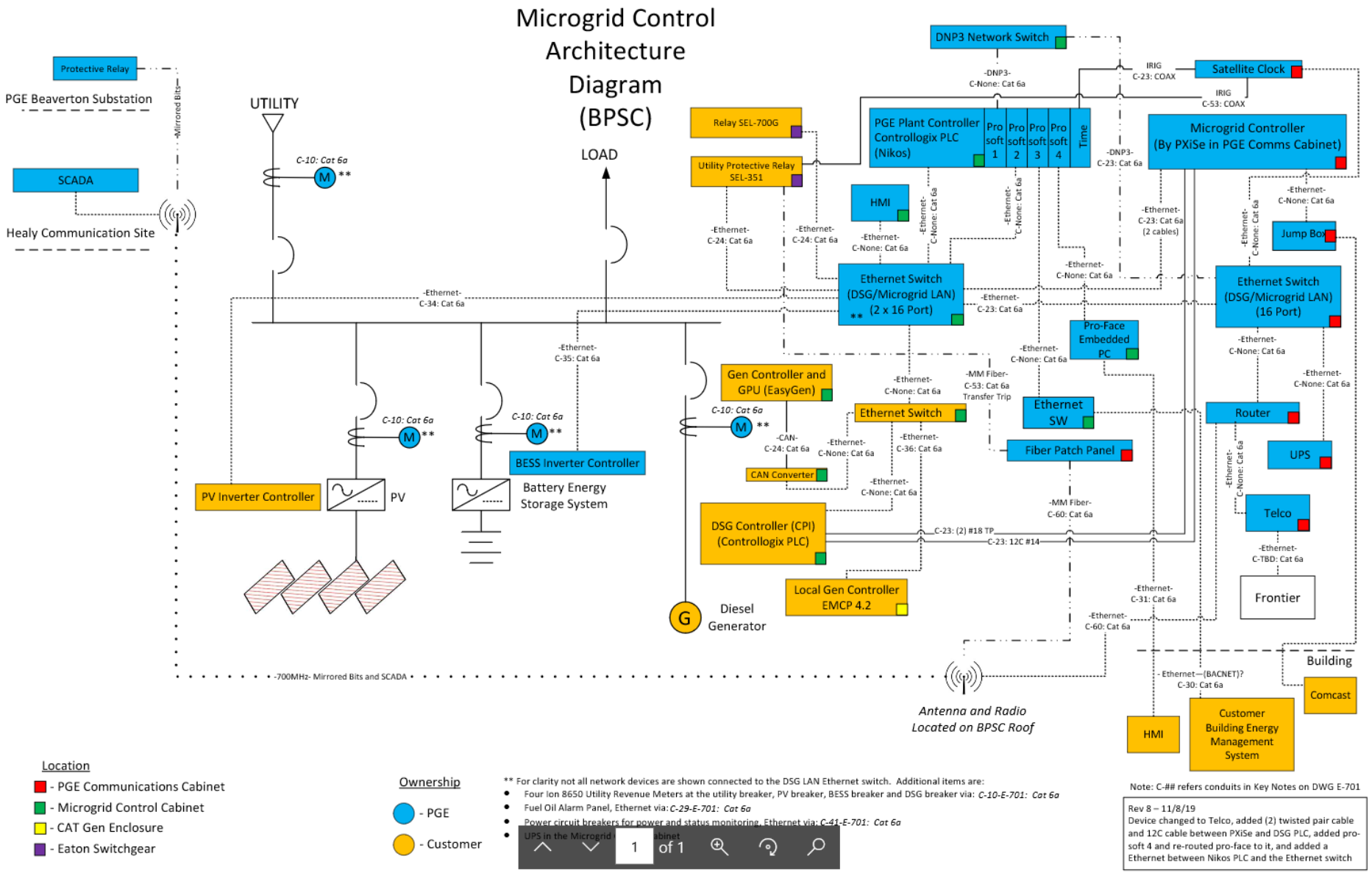
Battery Stacks

PGE

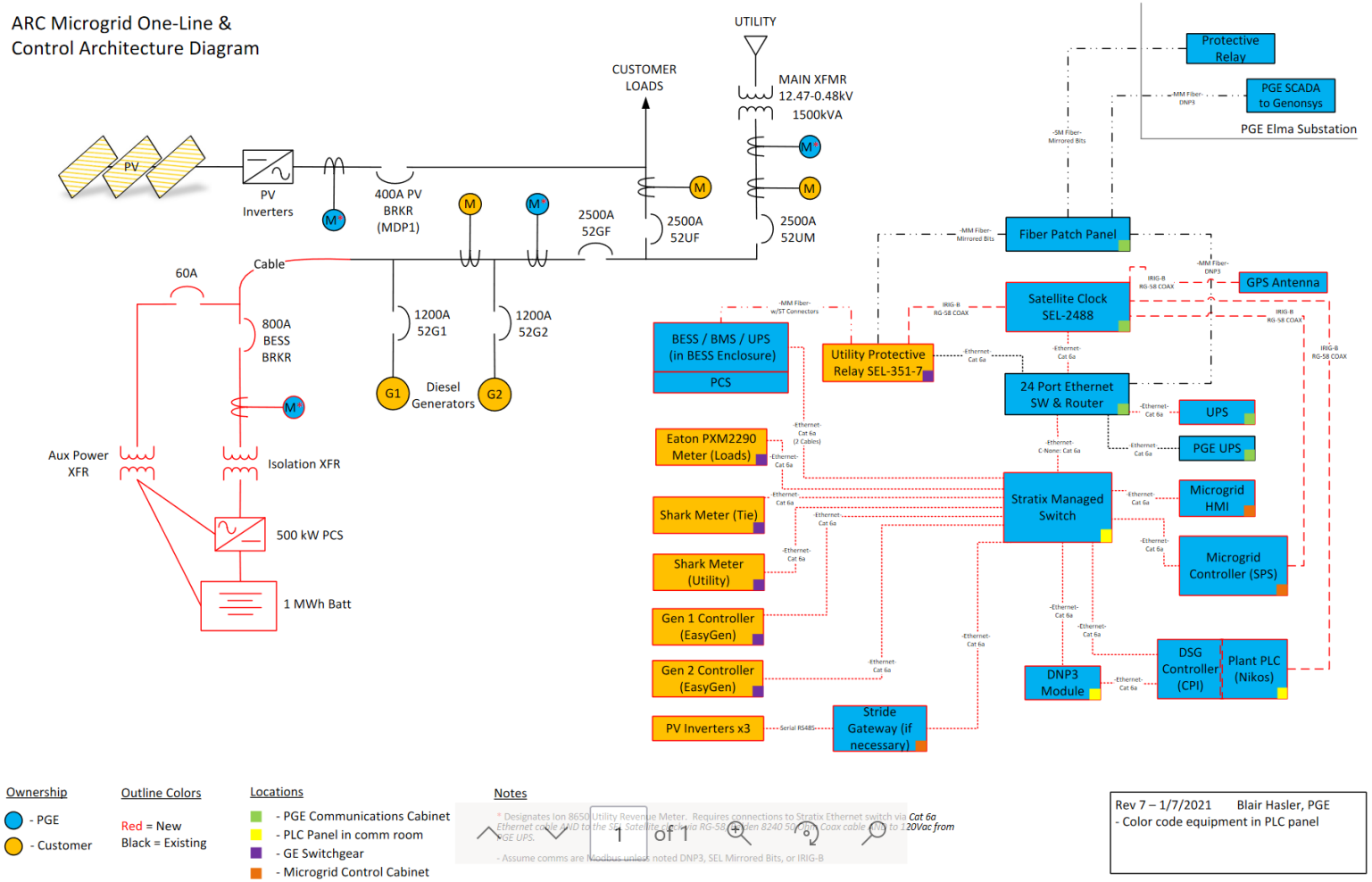
Communications Cabinet

Sequence of Events During Power Outage




Microgrid Control Architecture Diagram (BPSC)
Protective Relay
PGE Beaverton Substation
-Mirrored Bits-
SCADA
Healy Communication Site
UTILITY
C-10: Cat 6a
LOAD
DNP3 Network Switch
-DNP3- C-None: Cat 6a
IRIG C-23: COAX
Satellite Clock
IRIG C-53: COAX
Relay SEL-700G
Utility Protective Relay SEL-351
PGE Plant Controller Controllogix PLC (Nikos)
Pro soft 1
Pro soft 2
Pro soft 3
Pro soft 4
Time
Microgrid Controller (By PXiSe in PGE Comms Cabinet)
-DNP3- C-23: Cat 6a
HMI
-Ethernet- C-24: Cat 6a
-Ethernet- C-None: Cat 6a
-Ethernet- C-23: Cat 6a (2 cables)
Jump Box
-Ethernet- C-34: Cat 6a
Ethernet Switch (DSG/Microgrid LAN) (2 x 16 Port) **
-Ethernet- C-23: Cat 6a
Ethernet Switch (DSG/Microgrid LAN) (16 Port)
Pro-Face Embedded PC
-Ethernet- C-35: Cat 6a
Gen Controller and GPU (EasyGen)
-MM Fiber- C-53: Cat 6a Transfer Trip
Ethernet Switch
Ethernet SW
Router
UPS
-CAN- C-24: Cat 6a
-Ethernet- C-36: Cat 6a
CAN Converter
Fiber Patch Panel
-MM Fiber- C-60: Cat 6a
PV Inverter Controller
PV
BESS Inverter Controller
Battery Energy Storage System
DSG Controller (CPI) (Controllogix PLC)
C-23: (2) #18 TP
C-23: 12C #14
Telco
-Ethernet- C-TBD: Cat 6a
Local Gen Controller EMCP 4.2
Frontier
Diesel Generator
-Ethernet- C-31: Cat 6a
-Ethernet- C-60: Cat 6a
-700MHz- Mirrored Bits and SCADA
Building
- Ethernet — (BACNET)? C-30: Cat 6a
Comcast
Antenna and Radio Located on BPSC Roof
HMI
Customer Building Energy Management System
Location
- PGE Communications Cabinet
- Microgrid Control Cabinet
- CAT Gen Enclosure
- Eaton Switchgear
Ownership
- PGE
- Customer
** For clarity not all network devices are shown connected to the DSG LAN Ethernet switch. Additional items are:
Four Ion 8650 Utility Revenue Meters at the utility breaker, PV breaker, BESS breaker and DSG breaker via: C-10-E-701: Cat 6a
Fuel Oil Alarm Panel, Ethernet via: C-29-E-701: Cat 6a
Power circuit breakers for power and status monitoring, Ethernet via: C-41-E-701: Cat 6a
UPS in the Microgrid
1 of 1
Note: C-## refers conduits in Key Notes on DWG E-701
Rev 8 – 11/8/19
Device changed to Telco, added (2) twisted pair cable and 12C cable between PXiSe and DSG PLC, added pro-soft 4 and re-routed pro-face to it, and added a Ethernet between Nikos PLC and the Ethernet switch

Anderson Readiness Center - Salem



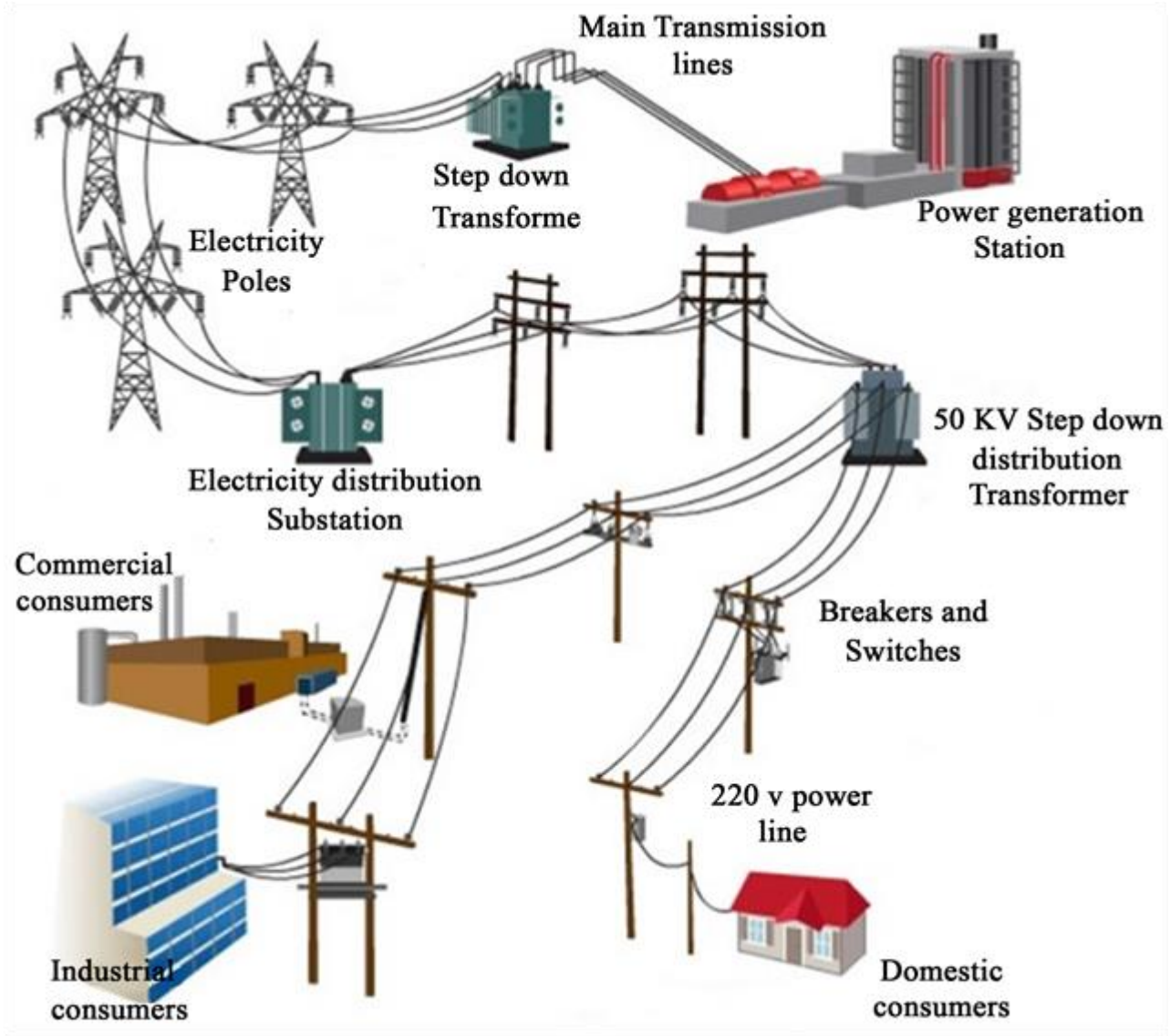
Plus Additions to our Bulk Electric System

"PGE is conducting an RFP to contract for resources to meet its long-term energy and capacity needs. To meet PGE's long-term energy and capacity resource needs PGE procure approximately 150 MW of qualifying renewable energy resources and sufficient dispatchable capacity resources to meet the remainder of PGE's 375 MW capacity need."

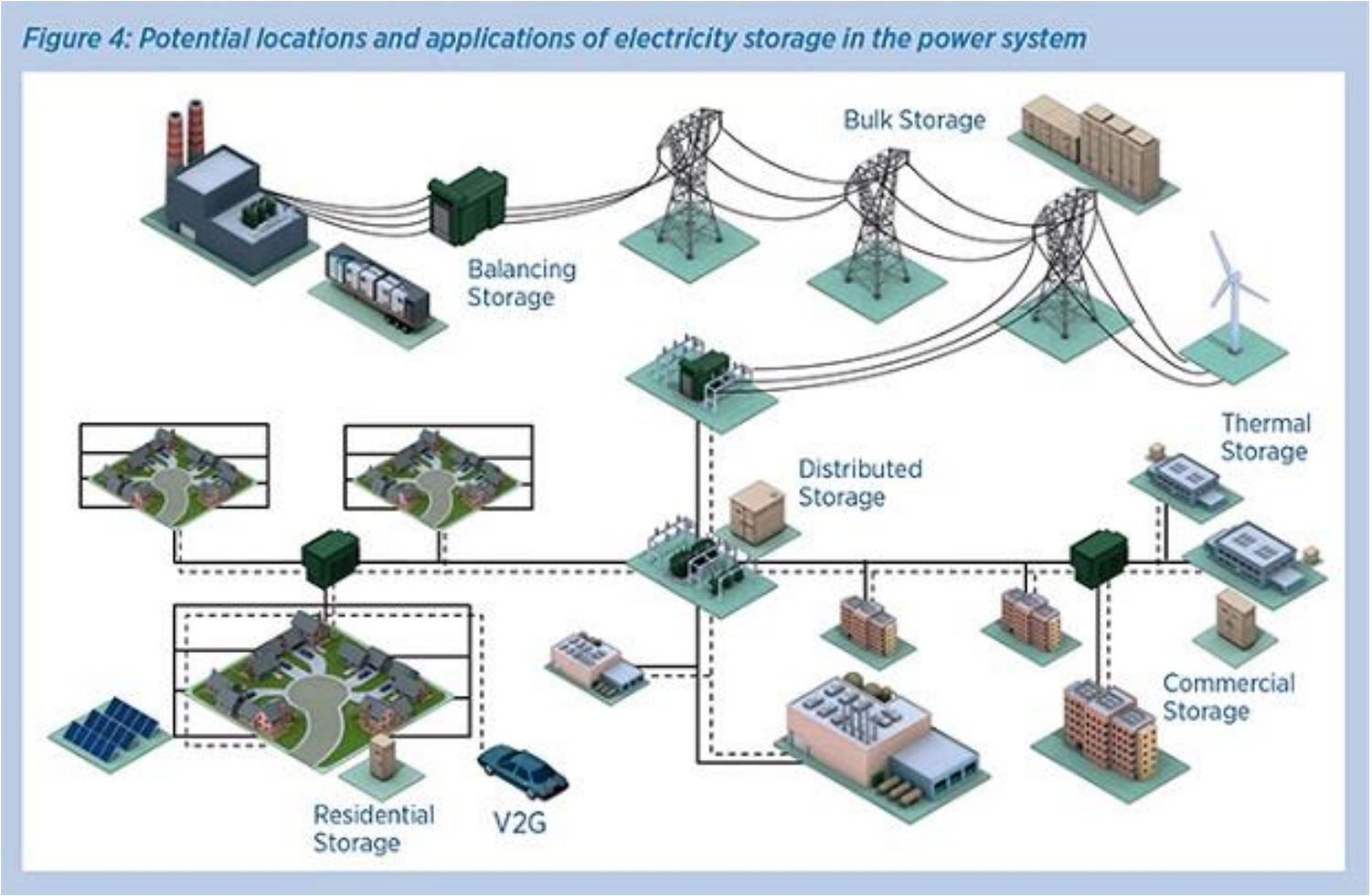
PGE's New Advanced Distribution Management System

PGE's New Advanced Distribution Management System

This is your father's electric grid



This is the Brave New World!



Key Takeaways

Smart Grid Projects Face Many Challenges:

- The easiest are the technical challenges
- The most difficult are regulatory challenges

Add to the list:

- Financial
- Legal and contractual
- Resistance to change (challenge to status quo)

Key Takeaways

Enabling Forces:

- A society that aggressively pursues solutions (EV, PV, residential batteries, TOU, DR)
- Technology exists and continues to improve
- Standards associations vigorously working on the issues (IEEE, UL, NFPA, IFC)

Examples from the Northwest

Know your community resiliency partners and be sure they are well supported.

Who will be our first responders?

- **Medical & Triage**
- **Shelter & Safety**
- **Food Distribution**
- **Communication & Logistics**

FEMA

OREGON DEPARTMENT OF ENERGY

PacifiCorp Redwood Coast Microgrid

Erik Anderson

Vista House, Columbia River Gorge

Oregon Department of Energy
Small Scale Renewable and Resiliency Project
Estimated Costs
June 28, 2022






PACIFIC POWER

POWERING YOUR GREATNESS

Today's Agenda

1. Small Resiliency Project Estimated Costs
2. Multi Customer Microgrid Estimated Costs
3. Utility Planning Estimated Costs

Community Resiliency Programs- OR and CA

- **Battery Energy Storage Technical Assistance**
  - Pacific Power is partnered with TRC to offer technical assistance to evaluate the costs, benefits and technical requirements to install a battery energy storage system
    - **Eligibility** – Critical facilities (defined term)
    - **Cost** – No cost to facilities
    - **Availability** – Ongoing, as funding permits
- **Battery Energy Storage Grant Funding**
  - Pacific Power offers grant funding to install a battery energy storage system for community resiliency purposes
    - **Eligibility** – Critical facilities (defined term)
    - **Cost** – Grant funding available for up to 100% of system cost (solar excluded)
    - **Availability** – Grant window open August 1, 2022 – October 28, 2022.
- Information and applications available on the Pacific Power website: https://www.pacificpower.net/resiliency

Critical Facility Definition

- Police stations;
- fire stations;
- emergency response providers;
- emergency operations centers;
- 911 call centers;
- medical facilities including hospitals, skilled nursing facilities, nursing homes, blood banks, health care facilities, dialysis centers and hospice facilities;
- public and private gas, water, wastewater or flood control facilities;
- jails and prisons;
- locations designated by the IOUs to provide assistance during PSPS events;
- cooling centers designated by state or local governments;
- homeless shelters supported by federal, state, or local governments;
- grocery stores, corner stores, markets and supermarkets that have average annual gross receipts of $15 million or less as calculated at a single location, over the last three tax years;
- independent living centers;
- food banks.

Estimated System Costs- Oregon

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	Community Center- OR	Community Center/ Fire District- OR	Fire District- OR	School/Shelter- OR	Water Treatment Plant- OR
Existing Resources	44 KW Solar	80 KW Propane	16 KW Natural Gas	None	None
Standard Resiliency	75 kW Diesel	No additions	No additions	100 kW Fossil Generator	275 kW Diesel Generator
Capitol Cost	$ 37,500	$ -	$ -	$ 40,000	$ 110,000
O&M	$ 2,600	$ -	$ 7,700	$ 3,500	
2 Week Outage Fuel Costs	$ 2,100	$ 5,700	$ 600	$ 2,300	$ 10,400
Enhanced Resiliency	75 kW Diesel, 75 kW/ 330 kWH Storage	75 KW / 330 kWH Storage	20 kW/ 175 kWh Storage	100 KW Generator, 100 kW/ 500 kWh storage	275 kW Generator, 2 Storage (150 kW,865 kWh storage and 250 kW,1130 kWh)
Capitol Cost	$ 357,700	$ 292,100	$ 174,200	$ 519,500	$ 1,511,400
O & M	$ 3,400	$ 800	$ 200	$ 4,500	$ 1,520
2 Week Outage Fuel Costs	$ 800	$ 1,800	$ 300	$ 1,200	$ 8,300
Comprehensive Resiliency	75 kW Diesel, 75 kW/ 330 kWH Storage, Reconfigure Solar	75 KW / 330 kWH Storage, 5 KW Solar	20 kw/ 175 KWh Storage, 30 KW Solar	100 KW Generator, 100 kW/ 500 kWh storage, 75 kW Solar	275 kW Generator, 2 Storage (150 kW,865 kWh storage and 250 kW,1130 kWh), 500 kW Solar
Capitol Cost	$ 421,400	$ 408,100	$ 234,100	$ 662,700	$ 2,835,500
O&M	$ 3,400	$ 1,600	$ 700	$ 5,800	$ 1,995
2 Week Outage Fuel Costs	$ 400	$ 1,300	$ 200	$ 600	$ 5,000

Estimated System Costs- California

	Community Center- CA	Community Center - CA	Justice Center- CA	Fuel Station- CA	Fuel Station- CA
Existing Resources	40 kW Solar	250 KW Diesel Generator	None	80 kW Propane Generator	20 KW Propane Generator
24 Hours	32kw/38 kWh Storage	28 KW Solar, 15 kw/115 kWh Storage	15 kW Solar, 15 kW/27 KWh Storage	31 kW Solar, 20 kW/ 206 kWh Storage	
Capitol Cost	$ 64,497	$ 254,000	$ 98,500	$ 387,000	
72 Hours	32 kW/100 kWh Storage	35 kw, 15 kW/ 231 kWh Storage	15 kW Solar, 15 kW/ 28 kWh Storage	31 kW Solar, 20 kW/ 513 kWH Storage	10 kW Solar, 20 kW/ 220 kWh Storage
Capitol Cost	$ 169,730	$ 447,000	$ 100,300	$ 799,000	**$ 192,553.13**
One Week	32 kW/ 276 kWh Storage	35 kW Solar, 15 kW 357 kWh Storage	15 kW Solar, 15 kW 36, kWH Storage	33 kW Solar, 20 kW/ 983 kWh Storage	
Capitol Cost	$ 468,455	$ 635,000	$ 115,000	$ 1,436,500	

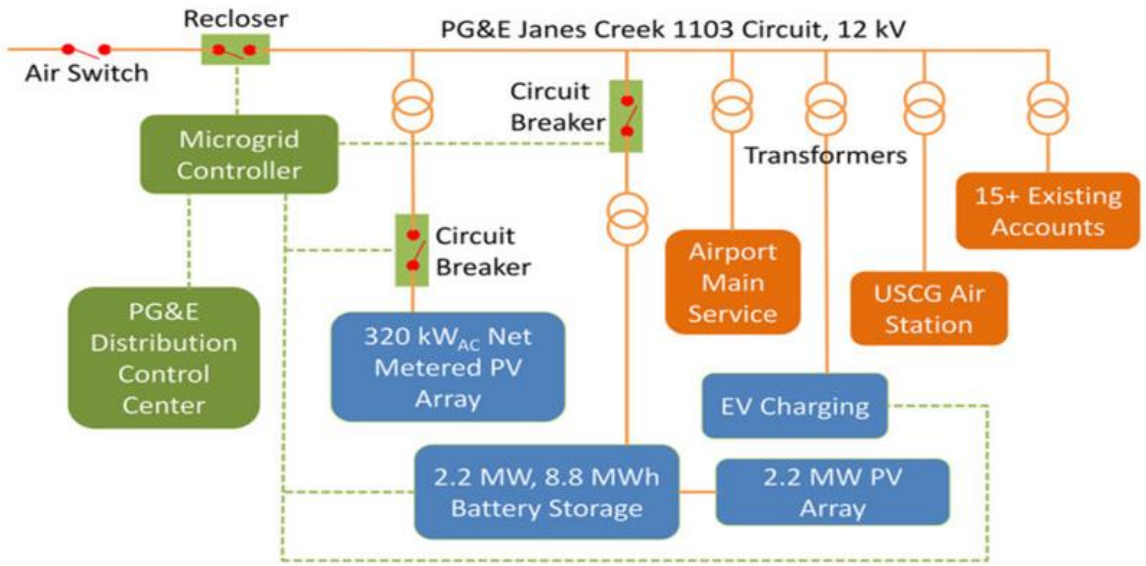
Redwood Coast Airport- Multi Customer Microgrid

Customers: 18 total

- Redwood Coast Airport
- US Coast Guard Air Station
- 16 other existing customers

Major Project Elements

- 2.2 MW_{DC} Solar PV Array
- 2.2 $MW_{AC,}$ 8.8 MWH Battery Energy Storage
- 320 kW PV System serves airport through net metering agreement
- Microgrid control system with distribution control center interface
- Two reclosers with advanced controllers
- Demand response capable electric vehicle charging



Redwood Coast – Costs and Benefits

Project Cost: $11,323,000

Coast Guard Air Station Humboldt Bay

Environmental and Economic Benefits:

- 3100 MWh of renewable energy generated
- 880 MW/yr - CO_2 emissions reduction
- $356,000 per year in economic benefit- energy value/demand reduction
- During Construction: 37 FTE with $1.5M in earnings and $3.4M in economic output

Utility Planning- Estimated Costs

Integrated Resource Plan

- Provides representative pricing for utility to plan how to meet system needs through a "least cost, least risk" portfolio. (PacifiCorp 2021 IRP Chapter 7: Resource Options)
- Renewables included in 2021: Single Axis Tracking Solar, Onshore Wind, Energy Storage, Solar + Energy Storage, Wind + Energy Storage
- Renewables being added in 2023: 20 MW solar systems, offshore wind
    - Refreshed cost information for 2023 currently being developed
    - Estimated availability September 2022

Clean Energy Plan- HB 2021 Section 4, OPUC UM 2225

- Early in the regulatory process, first results available as a part of the 2023 IRP
- "(c)Include a risk-based examination of resiliency opportunities that includes costs, consequences, outcomes and benefits based on reasonable and prudent industry resiliency standards and guidelines established by the Public Utility Commission"
- "(d) Examine the costs and opportunities of offsetting energy generated from fossil fuels with community-based renewable energy"

Lazard- Levelized Cost of Energy

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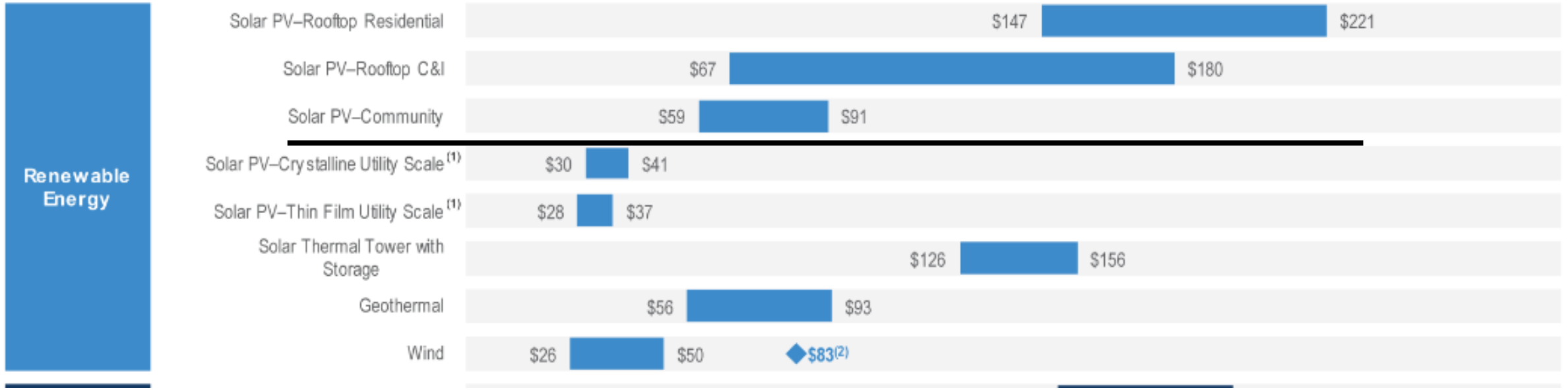
Levelized Cost of Energy Comparison—Unsubsidized Analysis

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



- https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/

Questions?

Erik Anderson
Strategic Manager- Renewable Energy/ Emerging Technology
Erik.Anderson@PacifiCorp.com

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Oregon Public Utility Commission

Kacia Brockman

Vista House, Columbia River Gorge

Title	Docket	Approach
Avoided Cost – PURPA (Public Utility Regulatory Policy Act of 1978)	Utility annual updates: UM 1728 – PGE UM 1729 – Pacific Power UM 1730 – Idaho Power General investigation: UM 2000	On and off peak $/kWh avoided cost rates paid to a baseload, wind, or solar Qualifying Facility based on an avoided gas combined cycle combustion turbine (non-renewable rates) or wind resource (renewable rates). During resource sufficiency period (based on Integrated Resource Plan), rates based on market price forecast. During deficiency period through year 15, rates based on avoided resource cost. Last 5 years, rates based on actual market price. Future docket to consider methodology changes.
RVOS (Resource Value of Solar)	Utility filings: UM 1910 – Pacific Power UM 1911 – Idaho Power UM 1912 – PGE Previous general investigation: UM 1716	12x24 value stack methodology that reflects hourly value to the utility system. Includes 11 elements that are mostly utility system costs. No specific use for RVOS adopted by Commission yet
Net Metering	NA	Simple crediting approach. Generation offsets consumption. Net excess generation credited at retail rate in form of a kWh credit that rolls over for up to a year.
Green tariff	UM 1953 – PGE green tariff filing UE 399 – PacifiCorp general rate case	Customer(s) pay a negotiated purchase price for energy generated by the resource. Ratepayers credit customer(s) for the value the resource brings to system, based on data from utilities' Integrated Resource Plans and General Rate Cases
Community Solar Program	UM 1930	Simple crediting approach. Bill credit rate roughly equal to residential retail rate, although different bill credit rates for low-income, residential, and commercial subscribers.

10-Minute Break (return at 11:35)

Sunset on the Columbia River in Boardman

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Breakout Groups:

- Identify the benefits unique to small-scale renewable energy projects
- Break into categories:
  - Direct economic impacts
  - Indirect economic impacts
  - Health impacts
  - Climate impacts
  - Resilience impacts

Trillium Lake, Mt. Hood

Benefits

- Resilience
  - Cooling/warming centers during outages
  - Critical infrastructure
    - Vehicle charging
    - Phone availability / charging
    - Refrigeration of food / medications
  - Water Pumps
  - Impacts of outages on tribal/low income different/greater
- Climate
  - Decrease local reliance on fossil fuels
  - Phase out diesel generators
  - Reduction of GHG
- Other
  - Ability to capture odd waste streams
  - Potential for decreased local opposition in permitting with local / smaller projects
  - Spinoff benefits – use heat generated for heating
  - Rooftop solar can offset power demands
  - Energy sovereignty
  - Liquid fuels may be unavailable during crisis
- Economic
  - Local job creation
  - Increased local human capital / investment in education
  - Continued reduction in solar costs – offset fossil fuel generation
  - Opportunity for businesses to use solar energy during the day – reduced electricity costs
  - Local economic development
  - Fully maximize existing infrastructure with small projects / take advantage of adjacent projects
  - Utilize refurbished turbines – only small developers able to do this
  - Diversify local economies
  - Increase local tax revenues
  - Support community benefits
  - May have less overhead than large operations
  - Deferred investment in grid infrastructure
- Health
  - Ability of rural hospitals to serve as first responders – if on microgrid
  - Reductions of harmful toxins
  - Reduce diesel emissions
  - Improved water quality – biodigesters

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Breakout Groups:

- Identify the unique costs associated with small-scale renewable energy projects

Trillium Lake, Mt. Hood

Costs

- Expenses involved in smaller organizations/communities with siting
  - Specifically with the time required
  - Lack of coordination between different groups – lots of moving parts
  - General knowledge and skillsets lacking in smaller orgs
- Learning curve via lack of experience
  - Interconnections
- Relationship between workforce development in large scale vs small scale
- Current union practices
- Transaction costs via contractual arrangements
- Investment risk – capital development is not risk free
  - Community investment can be a risk too
  - Production / performance risk
- Reimbursement schedules through PURPA – 20-year schedule in unpredictable future
- Restriction of community solar / PURPA to 3MW
- Tribes and other communities may not have credit ratings / access to credit limited
- COU territory siting – 100 percent contract requirement with BPA – no incentive to develop
  - Wheeling costs
- Rural areas – limitations of housing and workforce – increased costs
- Current regulations / rates don't recognize value of storage
- Difficult to take advantage of economies of scale
- Interconnection costs larger proportion of overall project
- Islanding costs
- Wheeling charges – large portion of attractive projects subject to wheeling charges
- Zoning costs – larger portion of overall project
- Infrastructure / grid costs
- Right-of-way costs
- Expertise / engineering costs – consulting, since not in-house
- Skilled labor – competing with larger projects
- No economies of scale
- Learning curve costs
- Capacity – large developers have in-house staff; small must hire consultants/outside staff

Takeaways and Next Steps

North Fork John Day River, Grant County

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Public Comment

Haystack Rock, Cannon Beach

Public Comment

(1) Please state your name and any affiliation/organization

(2) Please limit your comments to 5 minutes, thank you!

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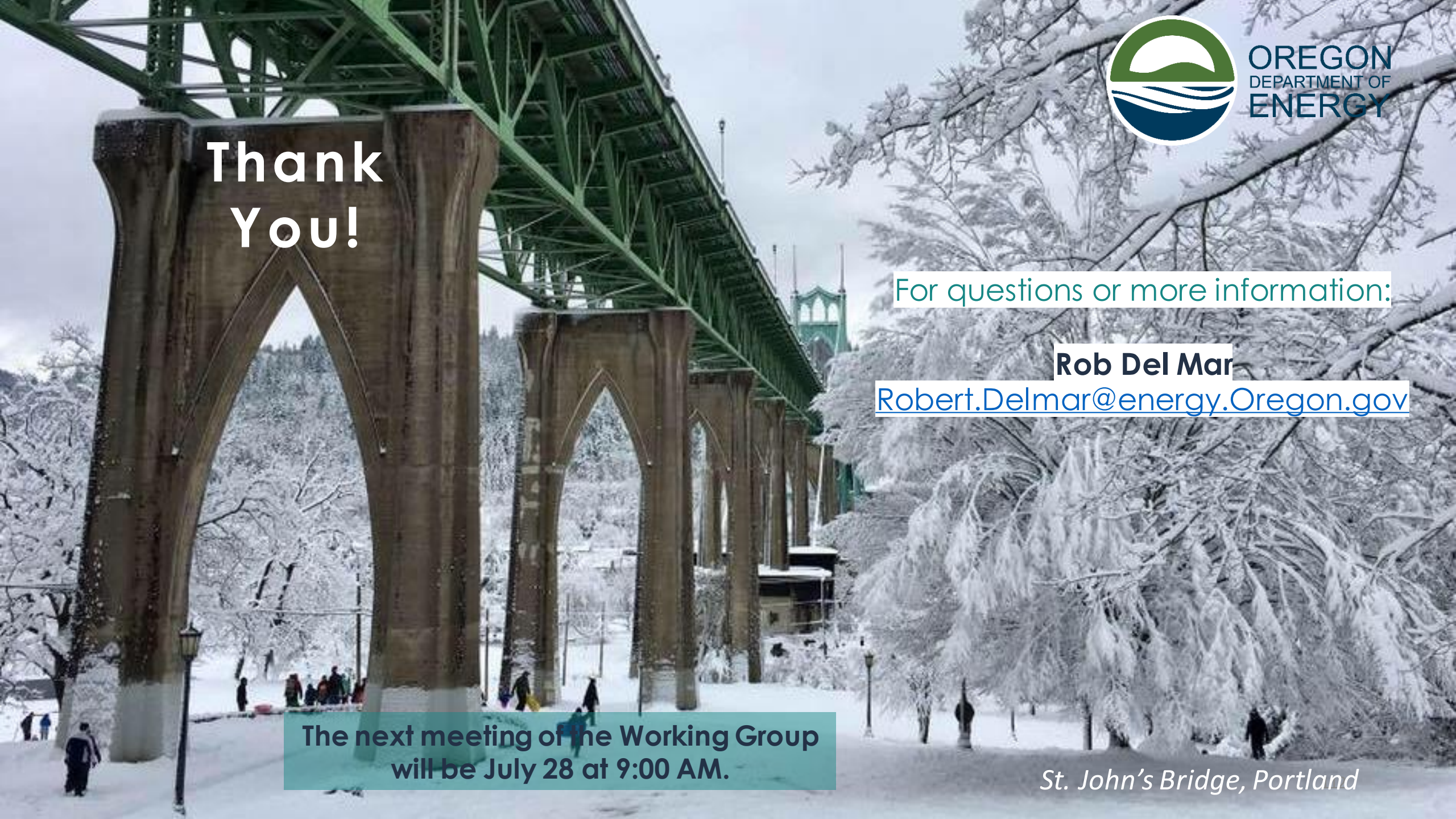

Thank You!

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For questions or more information:

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Robert.Delmar@energy.Oregon.gov

The next meeting of the Working Group will be July 28 at 9:00 AM.

St. John's Bridge, Portland