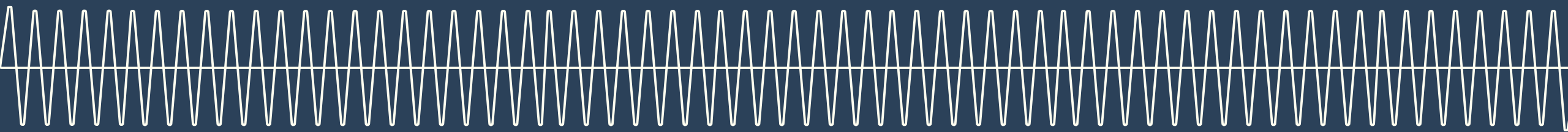
PGE Distribution System Plan Partners Monthly Workshop # 15

June 8, 2022



Waiting Room

One moment please, while we wait for people to join

Song by artist:

The Silver Spear - A classic Irish Reel

Please use the QR code to check-in:
Name and Organization

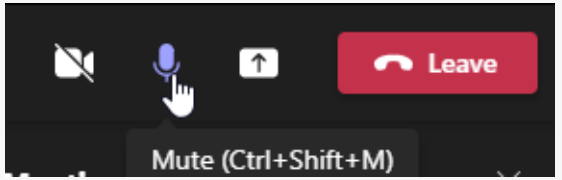
Meeting Logistics

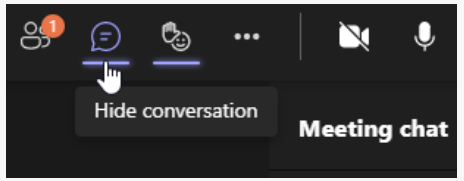
Teams Meeting

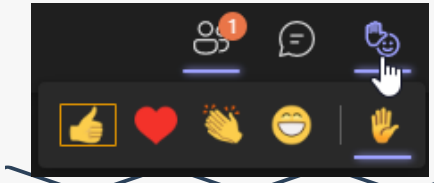
- Please click the meeting link sent to your email or [Click here to join the meeting]
  - +1 971-277-2317 (dial this number into your phone for best results)
  - PW: 885 018 032#
- Please use **Microsoft Edge** or **Google Chrome** with Teams as it will give you the best experience

During the presentation:

- All attendees will be muted; to unmute yourself via computer, click on the microphone that appears on the screen when you move your mouse
- To unmute yourself over the phone, **press *6**
- If you call in using your phone in addition to joining via the online link, please make sure to **mute your computer audio**
- Use the chat feature to share your comments and questions.
- Raise your hand icon to let us know you have a question







Quick Updates!

Please visit us at www.portlandgeneral.com/dsp

You can email us at: DSP@pgn.com

Online Feedback Form

DSP Mailing list: Sign-up form / Opt-out form

Important dates in 2022:

- PGE Community Workshop
  - **Wednesday, June 15 (9-11 am)**
- OPUC DSP-Part 2 Working Group
  - **To be moved to July, date and time TBD**
- PGE DSP Partner Meetings
  - **Wednesdays July 13, August 3 (9 am – 12 pm)**
- DSP Part 2 filing date
  - **Monday, Aug 15**

Agenda

9:00 – 9:15 am – Opening Remarks (15 min)

9:15 – 9:50 am – Distributed Energy Resources (DERs) **Water Heaters Update** (35 min)

9:50– 10:10 am – **Resilience Products** (20 min)

10:10 – 10:40 am – **Workforce Development** (30 min)

10:40 – 10:50 am – Break (10 min)

10:50 -11:40 am – **Prioritized Grid Needs** (50 min)

11:40 – 11:55 am – **Transportation Electrification** (15 min)

11:55 am – 12:00 pm – Next Steps (5 min)

Operating Agreements

Establishing norms with our communities is foundational to building trust.

To create a **safe space**, we establish **common agreements** such as **respect** and **inclusivity**.

Practice curiosity and **seek to understand different perspectives**.

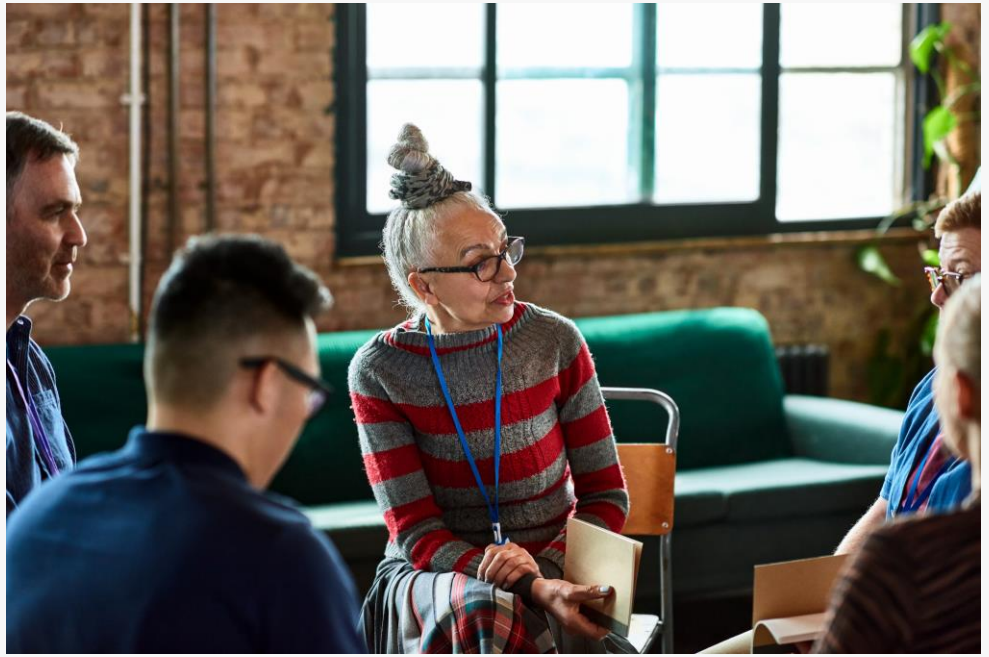
Stay Engaged

Experience Discomfort

Speak your Truth
(knowing it's only part of the truth)

Expect and Accept Non-closure

Share the Airtime. Step up, Step back.



The courageous conversations framework
By Glenn Singleton and Curtis Linton

Distributed Energy Resources (DERs) & Water Heater Example

Binh Lu & Jessica Atwater
Product Development & Senior Product Developer
June 8, 2022





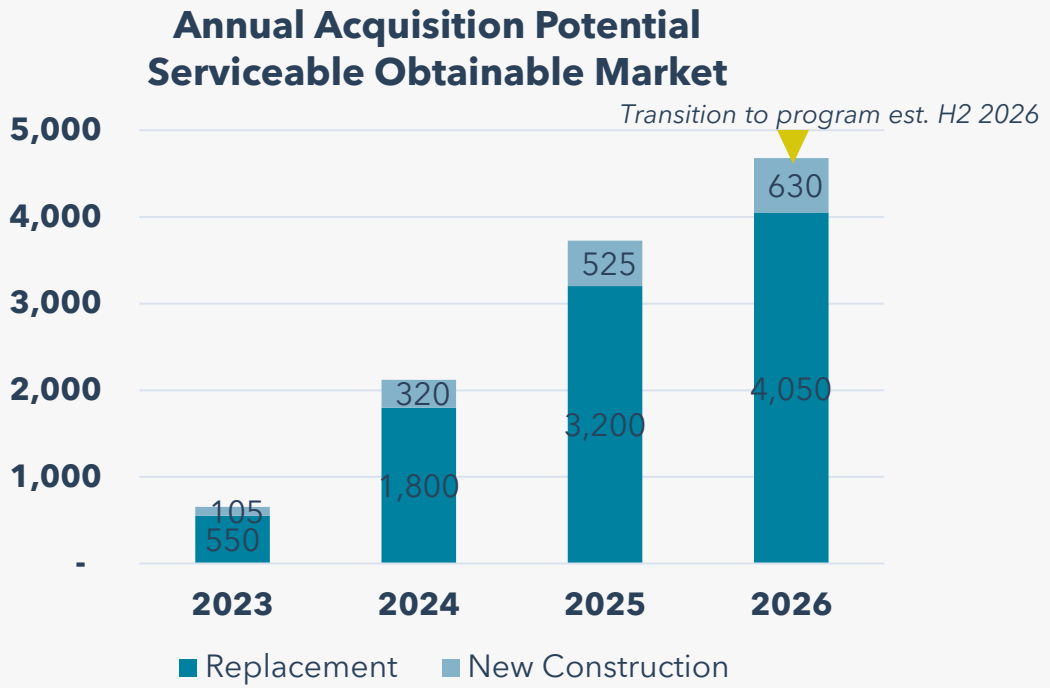
OBJECTIVE

Provide updates about the Smart Water Heating pilot design and next steps

Receive feedback on the proposed Smart Water Heating design

WATER HEATER POTENTIAL

Estimated Annual Market Size	Annual Customers	Electric Resistance	Heat Pump
Total Addressable Market	30,000	80%	20%
Serviceable Available Market	15,000	80%	20%
Serviceable Obtainable Market	5,000	80%	20%

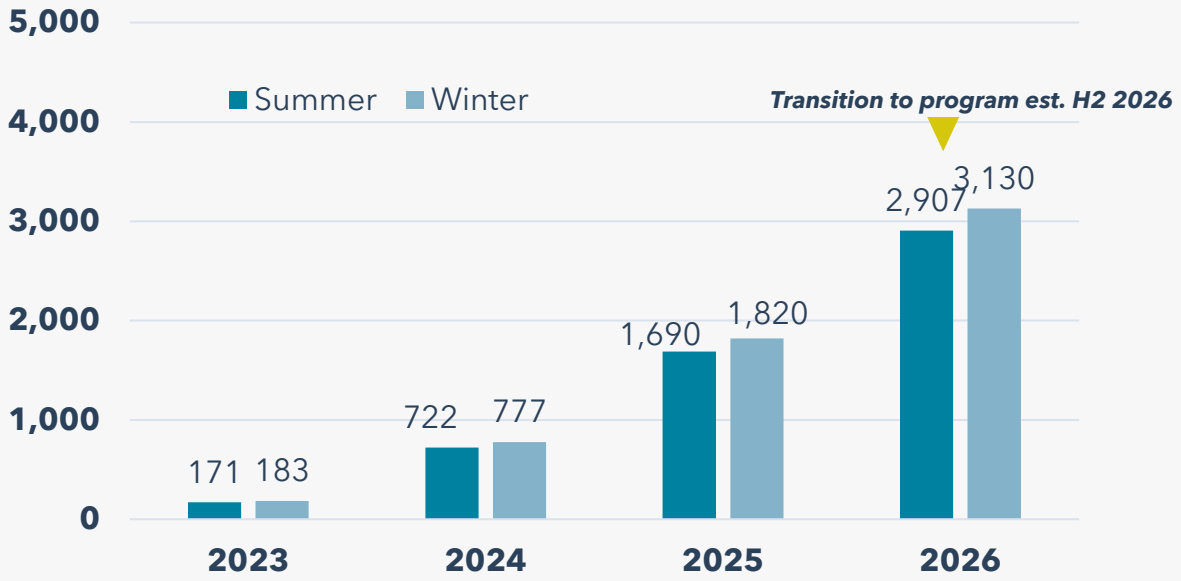


Key Notes

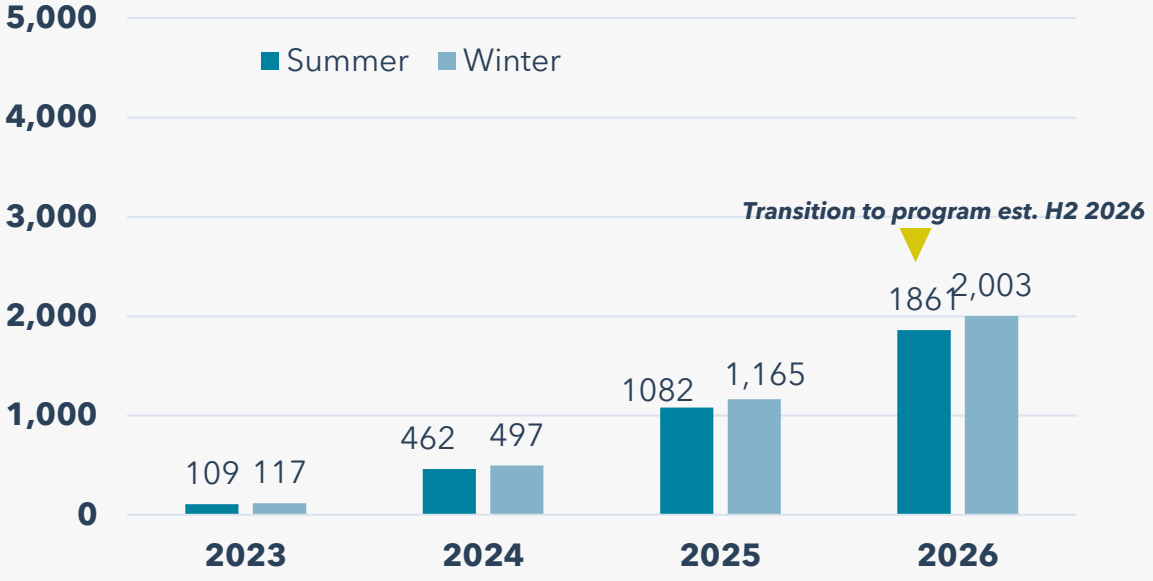
- 500,000 water heaters in PGE service territory in single family existing construction, 50% are electric
- 4,900 new single-family homes constructed in PGE service territory each year, 53% are electric
- Focusing on annual rate of replacement and construction because water heaters last an average of 10 years, limited window of opportunity to influence equipment choice

WATER HEATER POTENTIAL

Estimated Maximum kW Potential by Season by End of Year



Estimated kW Realization Rate per Event by Season by End of Year



Key Notes

- The Pilot will begin with load shifting events and will identify other use cases for testing within the Smart Grid Test Bed.
- Electric resistance water heater capacity planning value estimated to be 0.3 kW per dispatched unit in summer and winter seasons.
- Heat pump water heater capacity planning value estimated to be 0.1 kW in summer and 0.2 kW in winter per dispatched unit.
- Factors that influence the estimated event realization rate include opt-outs (~3%), connectivity (~80%), override / not heating during event (~20%).
- There may be as many as 172 winter and 119 summer events, each progressively increasing toward these capacity estimates as the number of UCMs in the fleet increases.
- While the individual water heater kW potential is relatively low, the total potential volume and scale are significant.

PILOT DESIGN OVERVIEW

How will Participants

Get a UCM to join the pilot?

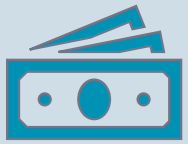
- Opt-out approach to enrollment
- Smart Water Heating installer network
  - ✓Plumbers / home performance contractors
  - ✓Builders / verifiers

Learn about water heating flexible load?

- Smart Water Heating installer interactions
- PGE created resources (ex. one-pager, website, etc.)
- Potential for a general awareness campaign

Be incentivized?

- Monetary incentive for water heater purchase and UCM installation
- Non-monetary incentive for seasonal participation in flexible load events



What kind of flexible load events will be implemented?

- Load shifting, no-notice events
- Weekdays and weekends
- Roadmap to explore additional use cases
- Investigate load shifting event compatibility with behavioral flex load

PROPOSED KPI CATEGORIES

Flexible Load Adoption

- Installation network growth
- UCM** installation rate
- Qualifying water heater options
- Customer declines UCM rate^

Event Performance

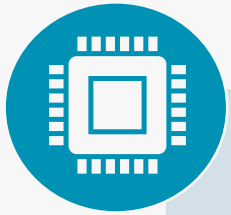
- Connectivity rate
- Rate of availability (heating during event)
- Override rate
- Capacity achievement
- Realization rate

Participant Experience

- Installation network retention
- Installation network rate of participation
- Customer complaints
- Non-monetary rewards uptake
- Enrollment churn

**Each Key Performance Indicator (KPI) for each metric will all be tracked by water heater type by market over time.*
***UCM – universal communications module*
^This may be challenging to track pending installers' level of engagement and ease of data collection.

CURRENT RISKS



UCM hardware

- Demonstrating low connectivity in field due to device configuration

- OEM confirmed second gen. design underway to address it

- Could delay pilot launch pending equipment testing and availability

A

Timeline alignment

- Water heater manufacturers still recovering from supply chain disruptions

- ODOE code standard delayed from Jan 1, 2022 to Jul 1, 2022 and likely out to Jul 1, 2023

- Revising pilot launch into market until standard goes live to ensure product is widely available

Med

AC vs. DC form factor

- Water heater manufacturers may choose an AC or DC form factor for their Ecoport*

- There are AC LTE UCMs, and there are DC LTE UCMs in development

- Two major manufacturers using AC LTE UCMs, one considering using AC and DC LTE UCMs

On the radar

Notes

- The first two issues pose a risk to the pilot timeline, and the third to product compatibility with PGE selected UCMs, but none pose a risk to the conceptual basis for the pilot.
- To mitigate these risks to the best of our ability, the team will communicate with supply chain contacts closely to understand market direction and revise timelines as appropriate.
- As of this date, the team plans to undertake a beta launch prior to the ODOE code standard effect, and pursing launch at market scale after code goes into effect and UCM product is readily available.

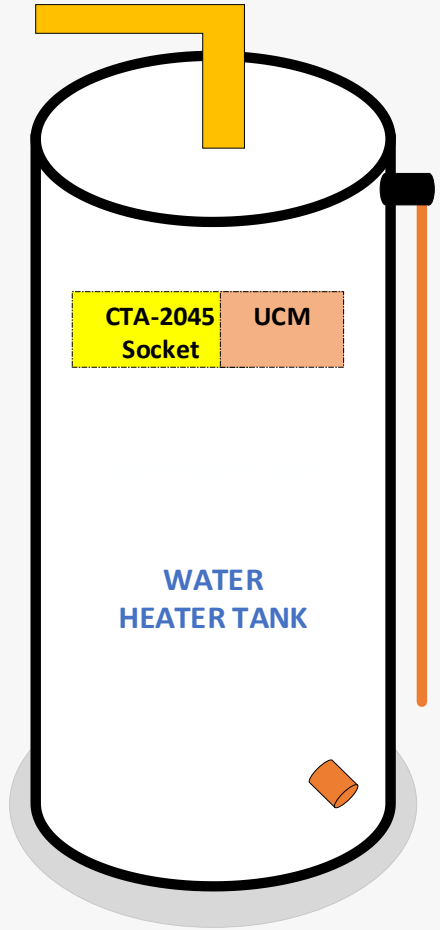
**Ecoport is the new name for the CTA-2045 physical form factor and flexible load protocol developed by EPRI.*

NEXT STEPS

- Present to DRAG and FLASH on **June 10**
- File with the Multi-year Plan in **August**
- Begin preparing for Pilot launch
- Provide updates to stakeholders
- Start shifting load!

Please contact Binh Lu, binh.lu@pgn.com

With feedback, and/or if interested in participating in design process



Resilience Products

Audrey Burkhardt, Manager of Customer Resilience Products

Hannah Porter, Product Development Specialist

June 8, 2022

Objectives

1

Resiliency Framework

2

Deep dive into proposed offering:

Resiliency for Medically Vulnerable Customers

3

Overview of additional Customer Resiliency Products

4

Opportunities for engagement

Why is Customer Resiliency Important?

Just look to the last few years…

September 2020

First Public Safety Power Shutoff initiated in PGE History

February 2021

Ice, wind, and snowstorm blankets the Portland area

420,000+ customers without power

June 2021

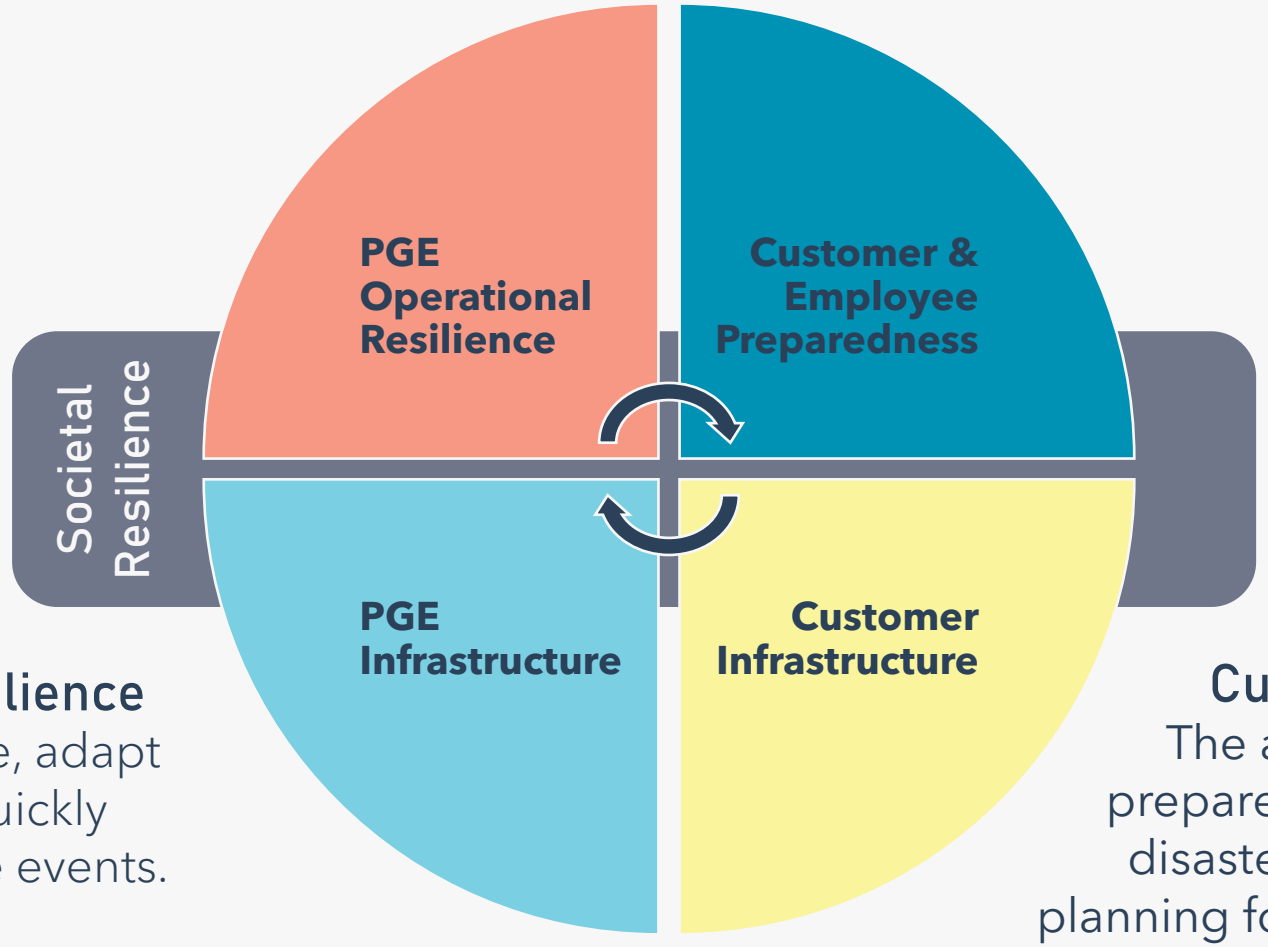
Heat dome sets records for high temperatures in the Portland area

6,000+ customers without power

???

Cascadia Subduction Zone Earthquake

Resiliency Framework



Energy System Resilience

The ability to anticipate, adapt to, withstand, and quickly recover from disruptive events.

Customer Resilience

The ability to adapt, safety, preparedness, and recover from disaster (i.e., wildfires, smoke), planning for energy justice and equity.

Customer & System Resiliency

PGE works to meet customer goals at the same time we meet system needs

- Low carbon resilience solutions are often more expensive
- Customers **need to** choose between affordable & clean

Integration

Some customers lack:

- the urgency of preparation until the emergency has arrived
- technical expertise for highly complex systems

Knowledge

PGE seeks to value the societal benefits of resilience to help the most vulnerable Oregonians

Equity

Resiliency for Medically Vulnerable Customers

Some customers are critically reliant on electricity to power medical devices; being without power for a few minutes can become a life-or-death situation.

PGE has researched the experiences, behaviors, and attitudes of these customers and their caregivers and would like to **offer portable non-emitting batteries at no cost to qualified customers.**

Primary Research

- In-depth-interviews with customers who are medically-dependent on electricity and their caregivers
- Quantitative survey targeted at customers who are medically-dependent on electricity and their

Secondary Research

- Ongoing discussions with PG&E to learn from their existing programs
- Deep-dive into existing resiliency programs state-wide and in the region

Community Engagement

- Ongoing one-on-one program design discussions with customers in target population
- Presented for comment at FLASH: Flexible Load Advisory Stakeholder Sessions in April 2022 and upcoming in June 2022

Resiliency for Medically Vulnerable Customers

55%
Of Medically Dependent Individuals

46%
Of Caregivers

Are **unprepared or not prepared at all** for a critical outage.

78%

listed **cost as a top reason** for not purchasing a necessary backup device.

95%

reported they either did not know of, or **do not work with any community organizations** to prepare for an outage.

65%
Of Medically Dependent Individuals

81%
Of Caregivers

stated it would take a **lot of effort and might not be possible or would be difficult to leave home during an outage.**

49%

of those living in multi-family housing cited their **housing-type as the primary barrier** to installing their desired resiliency product.

"The first time we had a power outage…It's an instant switch off. Wide open eyes, instant terror. We started pumping [the manual oxygen bag] and it wasn't enough. She knew right away that it wasn't enough [air], and so we, speed dialed our neighbor and said the power is out, run. And they came running [with a backup battery]. **It was the worst 8 minutes of [her] life."**

Identifying the most vulnerable customers

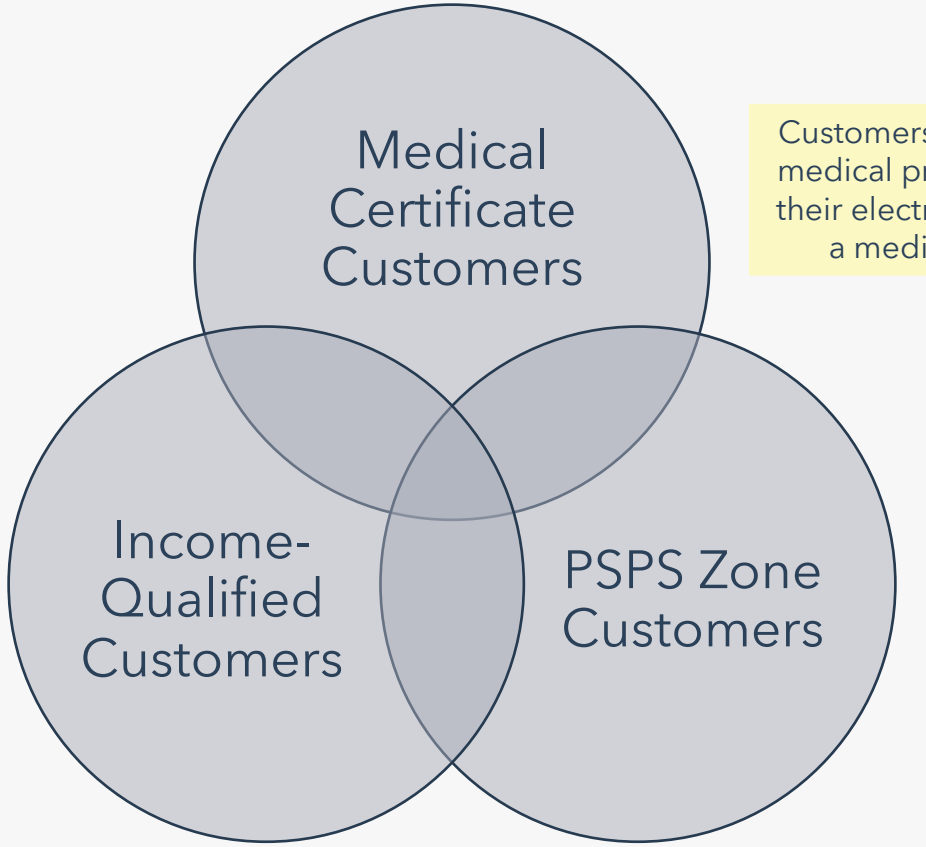
Proposal:

Qualified customers a portable battery at no cost, 'purchased' via the PGE Marketplace and shipped directly to their homes.

Equity:

Fair treatment concerning benefit vs. burden, infrastructure, and wealth. Access in the sense of removing barriers, inclusion, and finances. Opportunity to live in a healthy environment while being included. Advancement for all in a healthy environment, equal power and inclusion, and harm remediation.

Focusing on Environmental Justice Communities



Customers whose qualified medical provider can affirm their electricity need due to a medical condition.

Customers who qualify for the Income-Qualified Bill-Discount Program.

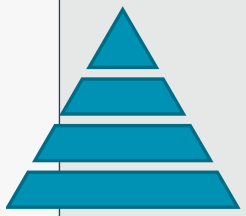
Public Safety Power Shutoffs; intentional deenergizing during extreme weather events.

Possible Future State:

Where should we go from here to serve our most vulnerable customers?

Opportunities for Stakeholder & Customer Input

Develop a program dedicated to serving the needs of PSPS customers?



Offer tiered subsidies to curate to specific audiences?

Expand resiliency products available to customers?

Additional Resiliency Efforts

Smart Battery Pilot - Ongoing pilot for residential customers

- Investigating whether to restructure the Pilot to reflect changed Test Bed boundaries and low uptake of the existing rebate.
- We have learned a lot over the past year that could be incorporated!

Energy Partner Schedule 26 - Targeted at non-residential customers

- Expanded the program to give more options for energy storage participation
- Recent Tariff approval

DSG - Targeted at large industrial customers

- Expanded the program to include battery energy storage as an eligible technology
- Recent Tariff approval

Community Resiliency

- Exploring customer and community partnerships
- Potential proof-of-concept to establish a distribution-sited microgrid
- Exploring ODOE funding, grants & the Self-Direct Public Purpose Charge to expand resiliency efforts

Next Steps

Flexible-Load Advisory Stakeholder Mtg – Friday June 10

- Quarterly meetings which provide an overview of ongoing and upcoming flexible load products and programs at PGE.
- Want to join this session? Drop your name in the chat and we'll add you to the distribution list!

DSP Resiliency Listening Session – TBD Fall 2022

- Explore the resiliency roadmap in further detail, offer opinions, and engage with PGE staff to identify the best way forward to serve our customers.

Please contact Hannah Porter, Hannah.porter@pgn.com

With feedback, and/or if interested in participating in design process

Workforce Development

Brooke Brownlee, State Legislative Affairs Manager

June 8, 2022

Objectives

Provide information on the Oregon Clean Energy Workforce Coalition effort

Provide space for questions and make available opportunities for further engagement and participation

Challenge

The electric energy sector is in a period of rapid growth and transition

The state's newly adopted decarbonization goals for the electric sector and the acceleration of new technologies like transportation electrification combined with a lack of workforce to meet existing needs has the potential to lead to challenges in availability of workforce to meet future needs.

Historically high job growth in Oregon anticipated by 2030

Projections from the Oregon Employment Department anticipate a 16% increase in jobs between 2020 and 2030. Many renewable energy jobs are not included in those projections.

Lack of awareness of this workforce need outside the sector

Stakeholders within the energy sector recognize the challenge being presented, but without a unified voice, broad awareness outside the sector is lacking.

Strategy

Develop awareness and urgency:

Utilize existing and pursue additional qualitative and quantitative data to tell the story about the need to address workforce development – a pivotal piece of the state's transition to the clean energy future.

Leverage existing resources and efforts:

Build on the foundation of work that many are doing throughout the state and seek to fill in the gaps, rather than duplicate efforts.

Build a strong and diverse coalition:

Engage a diverse group of stakeholders that represent a variety of interests that will collectively contribute to a successful roadmap.

Seek opportunities for funding:

Review state and federal grant opportunities to determine grants that can be leveraged for planning and needed investments to build the pipeline.

Be intentional about removing barriers:

Identify and plan to address the obstacles to employment for underrepresented communities while solving the barriers to employment within the energy sector for many (wrap-around services, workplace culture, etc.).

Oregon Clean Energy Workforce Coalition

The Oregon Clean Energy Workforce Coalition will bring together a diverse group of stakeholders from around the state to identify short, medium, and long-term solutions to ensuring a robust electricity sector workforce pipeline

Members

- Utilities
- Pre-apprenticeship programs
- Building trades
- Education (K-12, post-secondary)
- Community based organizations
- Renewable energy developers
- Workforce investment boards
- State agencies
- Policymakers
- Environmental organizations
- Cities
- Counties
- Organizations representing environmental justice communities

Coalition framework

Oregon Clean Energy Workforce Coalition

Meeting cadence

- Larger coalition meets bi-monthly for updates on individual committee progress, consideration of funding and policy opportunities, and direction on overall direction.
- Subcommittees to meet monthly

Subcommittees

- Transportation electrification
- Building electrification, energy efficiency, and community resiliency
- Building and maintaining the system (generation/transmission/distribution)
- Modern grid and storage
- Eliminating barriers and expanding access

Next Steps

Coalition meetings scheduled through the end of the year

- June 24
- September 9
- November 14

Interested in participating?

We'd love to have your voice at the table!

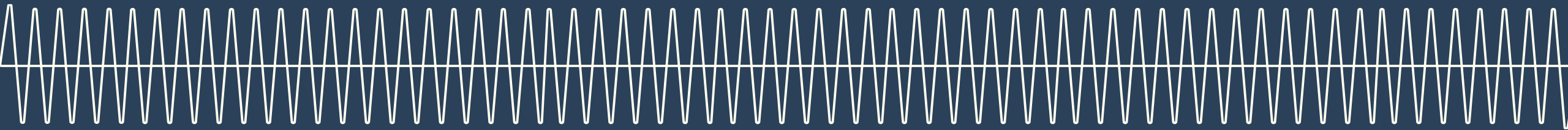
- Brooke Brownlee, brooke.brownlee@pgn.com

10 Minute Break

Prioritized Grid Needs

Jennifer Galaway, Manager, Distribution Planning Engineering

June 8, 2022



Objectives

Walk through PGE Distribution Planning's prioritization **"Ranking Matrix"**

Provide an example of scoring a Grid Need

Present prioritized list of Grid Needs

Next Steps

Ranking Matrix

Five levels of prioritization

Considers loading &

- Asset health
- Safety
- Customers

Multipliers for prioritizing at each Level

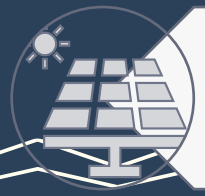
Ranking Matrix

Level 5: Safety and customer commitment

Level 4: Impacts to other facilities

Level 3: Heavy loading, telemetry, & substation risk

Level 2: Feeder risk, load growth, & redundancy



Level 1: System utilization & DG readiness

Level 5 – Safety and Customer Commitment

Addresses "**must do**" grid needs

Safety is PGE's number one priority:

Most Grid Needs developed from Distribution Planning **will not** necessarily have a strong **safety driver**

Customer commitment – **PGE has an obligation to serve**

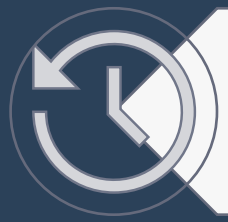
- In most areas of PGE's distribution system, we can accommodate residential and small commercial developments without major system upgrades
- **Large customer load often cannot be served with existing facilities**

Level	Metric	Max Possible Score	Multiplier	Max Total	Peak Importance
Level 5	Addresses Safety Concern? Yes = 15, No = 0	15	5	75	21.8%
	Must Do for Customer Commitment? Yes = 15, No = 0	15	5	75	21.8%

Level 4 – Impacts to other facilities

Addresses grid needs that **have impacts to other facilities**

Transmission or Sub-Transmission Constraint
If the sources to the distribution station are not adequate to serve the distribution system, customer load is at risk of being turned off when that system is stressed



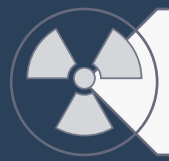
Precursor to other projects
Sometimes a grid need requires another project to be completed before the grid need can be addressed

Frees up or mitigates mobile/temporary equipment or system configuration
When equipment fails or the system is overly constrained, sometimes we must install a temporary transformer at a substation to be able to serve load; unfortunately, these can stay at the site for years if a permanent solution is not implemented

Level 4: Impacts to other facilities

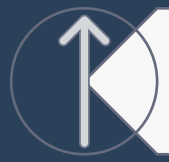
Level	Title	Max Possible Score	Multiplier	Max Total	Peak Importance
Level 4	Compliance Driver or Mitigates Transmission/Sub-Transmission Constraint? 115 kV+ = 10, 57 kV = 5, No = 0	10	4	40	11.6%
	Precursor to mitigating other grid needs? Two or More = 10, One = 5, No = 0	10	4	40	11.6%
	Frees up or mitigates mobile/temporary equipment or configuration? Yes = 5, No = 0	5	4	20	5.8%

Level 3: Heavy loading, telemetry,& substation risk



Loading and risk enters the prioritization

Ranking is established on loading of the "system normal" state, without field switching to mitigate loading issues – this tells us the actual load that the equipment would be serving if we couldn't move load around for heavy loading



When a **feeder** or **transformer exceeds Planning Criteria**, it is flagged as a grid need and prioritized against other grid needs

Using the Asset Management Planning team's **Risk Register**, we determine the existing substation total risk (asset and geographic), which is **probability of failure multiplied by consequence of failure**

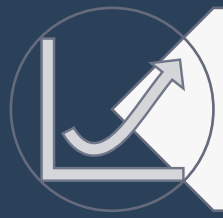
Also using Risk Register, determine existing substation **Customer Minutes Interrupted** (CMI) **Impact**, which is probability of failure multiplied by total customer minutes interrupted

Category also includes whether a substation has **SCADA telemetry**, and if it does, if the SCADA obsolete

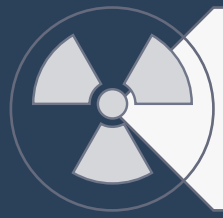
Level 3: Heavy loading, telemetry, & substation risk

Level	Metric	Max Possible Score	Multiplier	Max Total	Peak Importance
Level 3	Feeder % Loading of Seasonal Limit (N-0) >100% = 4, 90%-99% = 3, 80%-89% = 2, 67%-79% = 1, <67% = 0	4	3	12	3.5%
	Transformer % Loading of LBNR (N-0) >100% = 4, 90%-99% = 3, 80%-89% = 2, <80% = 0	4	3	12	3.5%
	Existing Total Risk (Substation) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	3	12	3.5%
	Existing CMI Impact (Substation) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	3	12	3.5%
	Substation SCADA Adds New = 3, Replace Obsolete = 1, No or New Sub = 0	3	3	9	2.6%

Level 2: Feeder risk, load growth, & redundancy

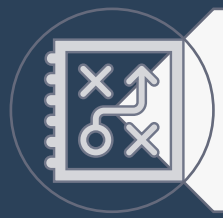


Continued look at risk, but also **load growth and resiliency**

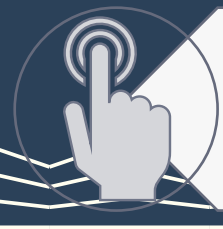


Total Risk & **Customer Minutes Interrupted** on the feeders, outside of the substation

Load growth impact to equipment
How heavily does our equipment load, and does it impact voltage, and by when;
load growth includes DER forecast



Multiple feeders or transformers exceeding Planning Criteria
If there are multiple feeders or transformers at a substation or in an area that can be addressed at the same time, this receives a higher score

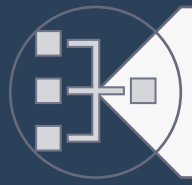


N-1 redundancy
If the grid need involves a feeder or transformer that cannot be completely offloaded, a point is given in these categories; this speaks to our resiliency – we want to be able to pick up all customer load in the event of an outage, anywhere on our system, even during the hottest summer or coldest winter

Level 2: Feeder risk, load growth & redundancy

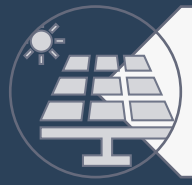
Level	Metric	Max Possible Score	Multiplier	Max Total	Peak Importance
Level 2	Existing Total Risk (Feeder) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	2	8	2.3%
	Existing CMI Impact (Feeder) Top 10 = 4, Top 30 = 2, Top 50 = 1, Other = 0	4	2	8	2.3%
	Known Load Growth Impact to Equipment Exceeds Limits in 1-5 Years = 4, Exceeds Planning Criteria = 2, Other or No Growth = 0	4	2	8	2.3%
	Multiple Feeders or Xfmrs Exceed Planning Criteria? Three or More = 3, Two = 2, No = 0	3	2	6	1.7%
	Overload or Voltage Issue for a N-1 condition (Feeder) Yes = 1, No = 0	1	2	2	0.6%
	Overload or Voltage Issue for a N-1 condition (Transformer) Yes = 1, No = 0	1	2	2	0.6%

Level 1: System Utilization & DG readiness



Evaluates the **utilization of the system**

If a grid need with a feeder or transformer exceeds **Planning Criteria in both summer and winter**, it receives a point



DG readiness
This is considered a bonus given the current regulatory landscape with utilities investing in generation vs. the interconnection process

Level	Title	Max Possible Score	Multiplier	Max Total	Peak Importance
Level 1	Distribution Xfmr Utilization Index If Summer and Winter Xfmr Peaks are ≥ 80% = 1, Otherwise = 0	1	1	1	0.3%
	Distribution Feeder Utilization Index If Summer and Winter Feeder Peaks are ≥ 67% = 1, Otherwise = 0	1	1	1	0.3%
	Makes Substation DG Ready? Yes = 1, No = 0	1	1	1	0.3%

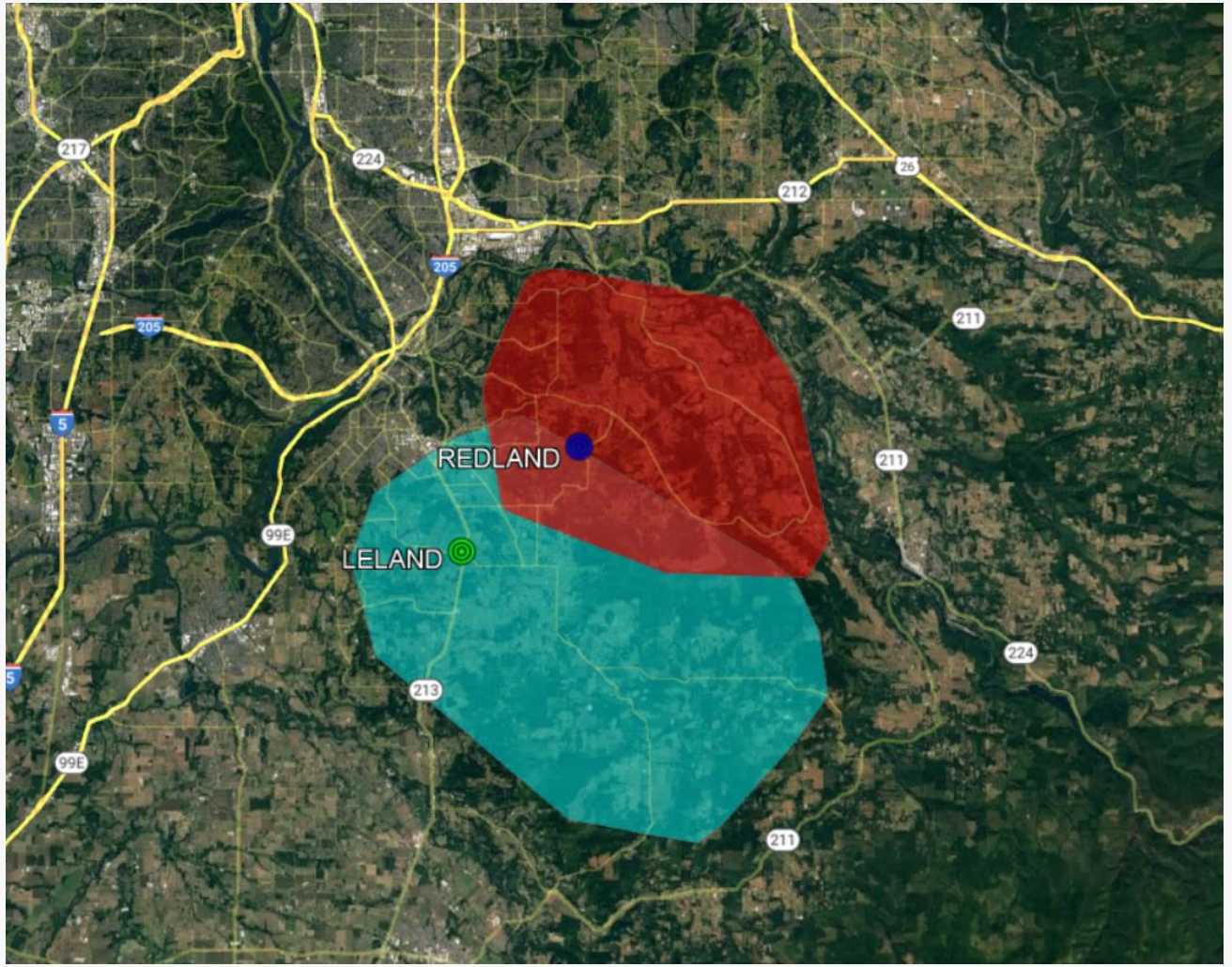
Grid Needs Example

Area east and south of Oregon City, OR

Leland Substation

Redland Substation

- Heavily loaded equipment
- Aging infrastructure
- Lack of SCADA telemetry



Grid Needs Example

Leland BR1 substation transformer, Leland-Carus feeder, and Leland-Beavercreek feeder all exceed Planning Criteria

Redland-Redland 13 feeder exceeds Planning Criteria

Being that these are adjacent substations and feeders from the substations tie to each other, these can be combined into one grid need, which can have multiple components to solutions

Grid Needs Example: Scoring

Level 5

- Addresses Safety Concern? **= 0**
  ✓No known safety issues at Redland or Leland
- Must Do for Customer Commitment? **= 0**

Level 4

- Compliance Driver or Mitigates Transmission/Sub-Transmission Constraint? **= 0**
  ✓No transmission or sub-transmission issues around Redland or Leland
- Precursor to Mitigating other Grid Needs? **= 5** (one)
  ✓The Mt Pleasant substation needs to be rebuilt, but capacity needs to be added to adjacent substations (Redland) to offload the substation for construction.
- Frees up or mitigates mobile/temporary equipment or configuration? **= 0**
  ✓There are no mobile/temporary equipment or configurations impacting this area.

Total for Level 5 and Level 4 = [(0 x 5) + (5 x 4)] = 20

Grid Needs Example: Scoring

Level 3

- Feeder % Loading of Seasonal Limit (N-0) **= 1 (67%-79%)**
  ✓Leland-Beavercreek 13 kV feeder peaks at 78.7% of its summer thermal rating

- Transformer % Loading of LBNR (N-0) **= 3 (90%-99%)**
  ✓Leland BR1 transformer peaks at 93.8% of its summer LBNR

- Existing Total Risk (Substation) **= 1 (Top 50)**
  ✓Redland substation is in the Top 50 of all substations for Existing Total Risk

- Existing CMI Impact (Substation) **= 4 (Top 10)**
  ✓Redland substation is in the Top 10 of all substations for Existing CMI Impact

- Substation SCADA **= 3 (Adds New)**
  ✓Redland substation does not have SCADA; a rebuild would add SCADA

Total Level 3 Score = (12 x 3) = 36

Grid Needs Example: Scoring

Level 2

- Existing Total Risk (Feeder) **= 4 (Top 10)**
  - ✓ Leland-Carus 13 kV feeder is in the Top 10 of all feeders for Existing Total Risk
- Existing CMI Impact (Feeder) **= 4 (Top 10)**
  - ✓ Leland-Carus 13 kV feeder is in the Top 10 of all feeders for Existing CMI Impact
- Known Load Growth Impact to Equipment **= 0 (None or No Growth)**
  - ✓ The load growth forecast for Redland and Leland does not cause any equipment to load beyond their thermal limits or exceed planning criteria

Grid Needs Example: Scoring

Level 2 (Continued)

- Multiple Feeders or Transformers Exceed Planning Criteria? **= 3 (Three or More)**
  - ✓Leland BR1 transformer, Leland-Beavercreek 13 kV feeder, Leland-Carus 13 kV feeder, Redland-Redland 13 13 kV feeder all exceed Planning Criteria
- Overload or Voltage Issue for a N-1 Condition (Feeder) **= 1 (Yes)**
  - ✓The Leland feeders do not have N-1 redundancy
- Overload or Voltage Issue for a N-1 Condition (Transformer) **= 1 (Yes)**
  - ✓The Leland BR1 transformer does not have N-1 redundancy

Total Level 2 Score **= (13 x 2) = 26**

Grid Needs Example: Scoring

Level 1

- Distribution Transformer Utilization **= 0 (< 80%)**
  - ✓The Leland BR1 transformer does not exceed Planning Criteria for transformers in the winter
- Distribution Feeder Utilization **= 1 (> 67% summer and winter)**
  - ✓The Leland-Carus 13 kV feeder exceeds Planning Criteria for feeders during the winter
  - ✓The Leland-Beavercreek 13 kV and Redland-Redland 13 13 kV feeders exceed Planning Criteria for feeders during the summer
- Makes Substation DG Ready **= 1 (Yes)**
  - ✓A Redland substation rebuild would make the substation DG-ready

Total Level 1 Score **= (2 x 1) = 2**

Grid Needs Example: Scoring

Grid Need	Level 5	Level 4	Level 3	Level 2	Level 1	Total
Aging infrastructure, heavily loaded transformer and feeders, lack of telemetry east of Oregon City	0	20	36	26	2	**84**

Total score of 84 for the grid need was the 4th highest ranking grid need

Prioritized List of Grid Needs

Prioritized list of grid needs presented here are the grid needs identified in 2021 that were analyzed for the 2023 capital planning cycle

Twelve total grid needs prioritized for detailed analysis

Each Distribution Planning Engineer studies 1-3 grid needs per year

Prioritized List of Grid Needs

Ranking	Grid Need	Type of Need/Constraint	Size of Need/Constraint	Timing/Duration of Need/Constraint	Level 5 Score	Level 4 Score	Level 3 Score	Level 2 Score	Level 1 Score	Total
1	Industrial load growth in North Hillsboro	Overload, Load Growth	From 91 MVA in 2024 to 270 MVA in 2030 serving multiple large data centers	24/7 due to the nature of data center operations	75	40	18	14	2	**149**
2	Commercial load growth in Woodburn area and 57 kV system constraints	Overload (Distribution and Sub-Transmission), Voltage Issues (Sub-Transmission), DG Readiness, Load Growth	7 MVA on the distribution system	Approximately 5-11 PM, summer for distribution. Summer and Winter seasons for Sub-Transmission.	0	80	9	12	1	**102**
3	Existing loading issues and industrial load growth in Silverton	Overload, Load Growth	8 MVA starting in 2023/2024	Afternoon through late evening, summer	75	0	9	12	0	**96**
4	Aging infrastructure, heavily loaded transformer and feeders, lack of telemetry east of Oregon City	Overload, Aging Infrastructure, Lack of SCADA Telemetry	10 MVA	Summer and Winter seasons, evenings for overload; 24/7 for aging infrastructure, lack of telemetry	0	20	36	26	2	**84**
5	Substation with high arc flash concerns, commercial load growth in St Helens	Aging Infrastructure, Safety, Lack of Facilities to serve new load	7 MVA	24/7	75	0	0	8	0	**83**
6	Industrial load growth in Gresham	Overload, Load Growth	6 MVA starting in 2023/2024	24/7 due to nature of load being served	75	0	0	6	0	**81**

Prioritized List of Grid Needs

Ranking	Grid Need	Type of Need/Constraint	Size of Need/Constraint	Timing/Duration of Need/Constraint	Level 5 Score	Level 4 Score	Level 3 Score	Level 2 Score	Level 1 Score	Total
7	Commercial load growth south of Woodburn and 57 kV system constraints	Overload (Sub-Transmission), Voltage Issues (Sub-Transmission), DG Readiness	Sub-Transmission System Issue	Summer and Winter seasons for Sub-Transmission.	0	60	3	14	1	**78**
8	Capacity addition to implement other grid need mitigations, temporary equipment being utilized for support in inner SE Portland	Temporary Equipment, Aging Infrastructure, Non-Standard Equipment, Dependency for other Projects	Transformer and feeder capacity needed to support adjacent substation rebuilds	24/7	0	60	3	10	0	**73**
9	Residential load growth in the Happy Valley area, temporary equipment being utilized for support	Overload, Load Growth	2 MVA, increasing to 14 MVA by 2025	Summer, approximately 2-9 PM	0	20	18	20	0	**58**
10	Transformer failure resulting in capacity constraints, aging infrastructure in the Boring area	Overload, Aging Infrastructure	2 MVA, increasing to 5 MVA by 2025	Aging infrastructure 24/7; overload in summer, approximately 2-7 pm	0	20	18	16	1	**55**
11	Capacity addition to implement other grid need mitigations in SW Portland, lack of SCADA telemetry, feeder reliability improvements	Aging Infrastructure, non-standard equipment, capacity to support other rebuilds, lack of SCADA telemetry	33 MVA to support adjacent substation substation rebuilds	Aging infrastructure 24/7; overload in summer, approximately 2-7 pm	0	40	9	4	1	**54**
12	Existing loading issues and residential development in the Murrayhill/Scholls areas resulting in capacity constraints	Overload, Load Growth	2 MVA, increasing to 13 MVA by 2027	Currently summer late afternoons to early evenings; more prevelant as load increases	0	0	18	20	0	**38**

Next Steps

Starting to prioritize 2024 grid needs
Will go through the new processes of community engagement and NWS analysis

Incorporating **Equity** into the Ranking Matrix – this will go into Level 3

Transportation Electrification: Engaging Communities in Our 2023-2025 Plan Development

Eva DeCesaro, Transportation Electrification

June 8, 2022

What is Transportation Electrification?

Supporting Oregon's move from fossil fuel powered vehicles (gasoline, diesel, natural gas) to electric powered vehicles of all kinds

Why: this transformation is especially critical in the transportation sector, where greenhouse gas emissions are growing every year.

How: helping customers by providing incentives, technical support, and maintenance of vehicle chargers and related equipment to connect to the electrical grid – as well as programs that help keep down costs for customers

Vision

1. People have the information they need to transition to EVs
2. Charging is equitable, affordable, reliable and accessible
3. Businesses & cities achieve emissions goals by electrifying fleets

4. Electric vehicles are efficiently integrated into the grid
5. Electric mobility is available to all

Customer Segments

PASSENGER EV

RESIDENTIAL

EV Driver

EV Considerer

Non-Driver

NON-RESIDENTIAL

Multifamily Property

Business

Public

FLEET

Private

Transit/School Bus

Municipal

Why get involved?

Your input will bring important perspective and help create a plan that meets community needs!

Next Steps

Let us know in the chat if you'd like to get involved (name, org, contact details) TEP@PGN.com

Please visit our TE Planning website at ww.portlandgeneral.com/tep

- Join our mailing list
- Find details on our June 14th 1-5PM presentation on current thinking

Schedule a convenient time for us to talk together

See us at this meeting July 13 for updates and more discussion

Thank you!

Appendix

DSP Part Two Framing

Angela Long, Distributed Resources Planning, Manager

DSP Part Two Requirements Summary

Due August 15, 2022

Forecasting of Load Growth, EV/DER Adoption

- Describe **current state for Load Forecast** – process, tools, data
- DER/EV:
  - Forecast methodology and geographic allocation
  - **Adoption by substation** - high/med/low scenarios
  - Forecast of load growth and adoption

Grid Needs Analysis

- Document process to assess grid adequacy and identify grid needs
- Discuss criteria used to assess reliability and risk – methods and modeling tools used
- **Present prioritized constraints publicly**, including prioritization criteria and timeline to resolve constraints

Solution Identification

- Document process for identifying the range of solutions to address grid needs
- **For each need, describe the data used to support investment decisions**
- For large projects, describe process for engaging communities and getting input
- **Propose 2 NWS pilot projects**

Near-term Action Plan (2-4yrs)

- Provide 2-4 yr. plan to address grid needs
- **Disclose planned spending, timeline and recovery mechanism**
- Discuss relationship between planned investments
- Discuss pilots being conducted to enhance the grid

Goals of DSP Part Two

Community Engagement

- Two-way flow of information

- Co-created education material

- Continued partnerships with community experts

Metrics & Data

- Resilience metrics for customer and utility

- Socio-economics & Demographics

- Cost-benefit analysis

DER Resource Planning

- Climate risk modeling

- Decarbonization

- NWS, Locational

- DEI/Equity

- Estimated impacts of electrification adoption

Portfolio Analysis

- Cost-effective DER

- Environmental and social justice community

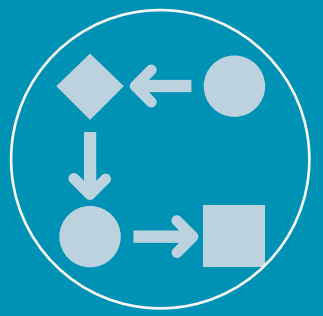
- Resilience/Outage

- High DER adoption

High Level – Project Timeline

Planning: Developing the approach to address Part 2 requirements

Oct – Dec 2021



Executing: Co-creating an inclusive Distribution Planning process

Jan – May 2022

Reporting: Documenting the process changes and the plan to enact them

Jun – Aug 2022

Filing DSP Part 2

Aug 15, 2022

Engaging Our Communities

Our objective is to foster **procedural equity and ensure diversity of voice** in the DSP planning process.

To accomplish this, we will continue to partner with Community-based Organizations (**CBOs) and other organizations that have longstanding relationships and establish trust in environmental justice communities** to:

- Co-develop solutions for NWS pilot projects
- Co-create community workshops to identify community energy needs, desires, barriers and interest in clean energy planning and projects
- Co-develop community education around key DSP practices and relevant energy related concepts

Identifying Grid Needs for NWS Pilots

Step 1: What is the problem?

Prioritized grid needs for capital cycle

Potential future grid needs/ lower priority grid needs

NWS pilot candidates for the DSP