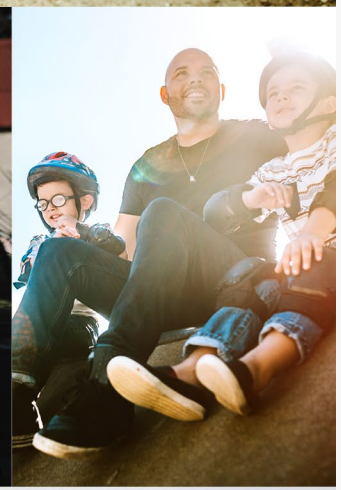
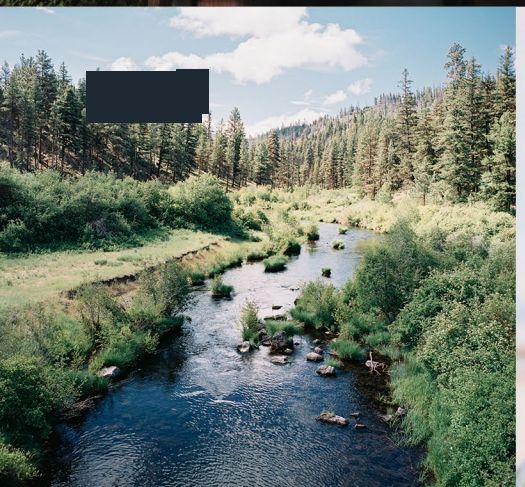




Distribution System Workshop

Distribution System Workshop # 2 | 25 – July 31, 2025

Meeting Logistics


Audio


Microphone


Chat box


Video


Raise Hand


Closed Caption

Operating Agreements

Establishing norms with our communities is foundational to building trust

To create a **safe space**, we established **common agreements** such as **respect, honoring diversity of thought**, and **inclusivity**

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

Stay Engaged

Be Willing To Experience Discomfort

Speak Your Truth Respectfully

Expect and Accept Non-closure

Share the Airtime

The courageous conversations framework
by Glenn Singleton and Curtis Linton

Agenda

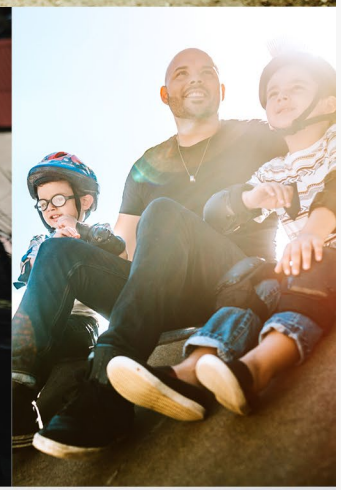
10:00 - Welcome & Meeting Logistics

10:05 – 2024 DSP Comments

10:45 – Flex Load Programs Portfolio Update

11:00 - DSP Grid Needs and Solutions

11:55 –Next Steps & Adjourn



2024 DSP Comments

Seemita Pal

Distribution System Workshop # 2 | 25 – July 31, 2025

Thank You for Your Feedback

- Public Utility Commission of Oregon (OPUC Staff)
- Energy Advocates
  - NW Energy Coalition (NWEC)
  - Green Energy Institute at Lewis & Clark Law School (GEI)
  - Community Energy Project (CEP)
  - Oregon Solar + Storage Industries Association (OSSIA)
- Oregon Citizens' Utility Board (CUB)
- OSSIA
- Utilidata

We value your feedback!

One of our guiding principles is considering and incorporating stakeholder suggestions in our work going forward.

A Few Key Points

PGE's 2024 DSP was developed in full alignment with the vision encompassed by the current guidelines

Decision to file the plan in Q4 2024 intentionally supported coordination across various planning channels

The information requests and formal set of comments indicate that our stakeholders are engaged, and we are grateful for that. There are multiple channels for continuing the discussions during the development of the next DSP

ACTIONS | SERVICE LIST | SCHEDULE | Public Comments

Date/Time	Event	Description
10/28/2025 9:30:00 AM	PUBLIC MEETING **Location:** VIA ZOOM	Commission consideration of 2024 DSP at public meeting
10/21/2025	COMMENTS/RESPONSES DUE	Staff's Memo published
9/19/2025	COMMENTS/RESPONSES DUE	PGE Reply Comments due (2nd Round)
8/22/2025	COMMENTS/RESPONSES DUE	Staff and Stakeholder Comments due (2nd Round)
7/11/2025	COMMENTS/RESPONSES DUE	PGE Reply Comments published
6/13/2025	COMMENTS/RESPONSES DUE	Staff Comments published to the docket
5/1/2025	COMMENTS/RESPONSES DUE	Public Comment Period on 2024 DSP from 5/1/25 to 6/13/25.
4/17/2025	MISCELLANEOUS	PGE "office hours" for stakeholder questions and discussion
4/15/2025 9:30:00 AM	PUBLIC MEETING **Location:** ZOOM	Item No. RA1. PGE presentation of 2024 DSP to Commission at public meeting

Themes of Comments

- DSP Forecasting Practices
- DER Deployment
- Fairness & Equity
- Virtual Power Plant
- Distribution Investment Process
- Emergent DER Technologies

2024 DSP Comments

Theme 1:

DSP Forecasting Practices

Substation-level load forecasts provided in Confidential Appendix of the response filed to all comments

Recent improvements incorporated in the TE forecasting since May 2024 through June 2025, and comparison of latest forecasts with other sources has been provided

Latest EV Forecasts available at the time of filing are provided in **TEP and DSP**. They utilize consistent tool but with refreshed inputs and necessary improvements

PGE strives to **achieve consistency and alignment of forecasts** in different planning workstreams. It is important to be mindful of the resources considered in the different forecasts

We acknowledge **policy and market landscape are constantly changing**. Updated forecasts will be provided in the Interim Update

2024 DSP Comments

Theme 2:
DER Deployment

Resources **contributing to VPP's storage 2030 targets** are outlined. Impacts of changed policy and market environment are to be determined

PGE is looking forward to **partnering with ETO** to advance flexible load and distributed solar + storage goals

Demonstrations are being conducted in Smart Grid Test Bed (SGTB) to assess the requirements and barriers to communicating with grid-enabled heat pump water heaters in single-family homes

Strategic DER Deployment has been a focus

Resiliency metrics have been developed but they are not applicable to all PGE projects. Work is needed to determine their proper integration into project prioritization scoring

2024 DSP Comments

Theme 3:

Fairness & Equity

- Accessibility of new technology benefits by all customers
  - **Multiple system-wide benefits** are received from newer technologies by all as demonstrated in the benefit-cost analysis for VPP
  - PGE acknowledges that **some customers may lack accessibility to certain programs by virtue of their housing stock**. We are working to offer appropriate programs to those customers
  - There are **income-eligible bill assistance and discount** (up to 80%) programs to offset rate impacts from distribution system upgrades
  - PGE is working to find new **approaches to remove the barrier of the "split incentive"**; we are open to ideas

- **Methodological details of the equity index** have been provided

2024 DSP Comments

Theme 4:

Virtual Power Plant

Information requested regarding **VPP desk scope, labor and costs** have been provided

Depending on program design, advantages of DERs can be shared broadly or targeted more specifically. As part of **UM 2377, the investigation into marginal cost study treatment of costs for large customers**, we aim to understand their contributions to system and customers

DERs optimized through a VPP are non-wires solutions offering increased values. They potentially diminish/defer the need for future investment in "traditional" solutions (reason for PGE's focus on VPP initiative) in some cases.

2024 DSP Comments

Theme 5:

Distribution Investment Process

Load sensitivity analysis is often conducted to support analysis of alternatives for proposed projects - example has been provided

Two-step prioritization approach involving **value framework and Risk Informed Decision-Making (RIDM)** used for prioritization of non-discretionary projects has been described

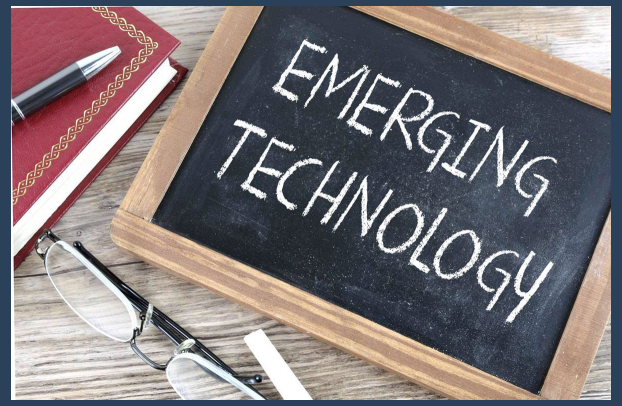
List of **grid needs** has been provided in the 2024 DSP. Nuances between heavily loaded equipment and prioritized grid needs explained

Data supporting near-term action plan have been provided in Appendix E and as part of one of the information requests

2024 DSP Comments

Theme 6:

Emergent DER Technologies



Mitigation of potential issues related to advanced computation

PGE is committed to safeguarding the privacy of individuals and businesses

We are currently evaluating the benefits and tradeoffs of AI-enabled technologies

Grid Edge Computing may support NWS and potentially enhance the financial and operational benefits of local resources

PGE's participation in the California ISO's (CAISO) Demand and Distributed Energy Market Integration (DDEMI) stakeholder initiative is important. PGE **seeks enhancements to the existing DR participation models and performance evaluation methodologies**.

Other Comments: Utility-Supported Finance

Comment: *Use utility cost-of-borrowing to accelerate uptake of heat pump technology*

- Utility-supported finance is under consideration, though there is risk of cost transfer to customers if technologies underperform or markets shift.
- The Quilt demo is appropriately sized to support learning while balancing adoption goals with the need to protect customers from unproven technologies.
- PGE continues to pursue cost-sharing and braiding through grants and other funding to reduce customer risk and support emerging technologies.

Other Comments: V2G Technology Assessment

Comment: *Identify V2G technology now commercially available subject to certain tech constructs. Establish demo PGE V2G linkages and associated tariffs for degrees of utility access to the EV battery*

- **Commercial sector:** Most V2G-capable vehicles and chargers target the school bus market. Only ~3 charger manufacturers currently offer V2G, though most school bus OEMs claim capability.
- **Residential sector:** OEMs like Ford, GM, and Tesla focus on backup power rather than grid use. Bidirectional charging is mostly DC, though AC interest is growing.
- PGE is leading school bus V2G demos in 2024–2025 to evaluate viability, value, and program design. If successful, broader implementation will be considered.
- Demos are funded by the Clean Fuels Program; 2024 findings are in the TE Plan Annual Report.
- Early demos revealed interoperability and technical barriers. Compensation mechanisms remain unclear.

Other Comments: Partially Degraded Batteries

Comment: *Offer to purchase partially degraded EV batteries from EV owners, enabling them to extend the lifetimes of their vehicles at lower cost and building utility load management battery banks.*

*(**Note:** anticipated cost to replace a degraded EV battery is a significant disincentive to purchasing an EV.)*

Purchasing degraded batteries from EV owners is not within utility role. A lot of vehicle OEM's already have recycling pathways. They could provide second life battery options with qualified vendors, like Tesla does with Powerwall

Other Comments: Catalogue

Comment: *Heat pump equipment/installation financing*

- PGE is looking to support residential customers with HVAC (ducted heat pumps, ductless heat pumps, central air conditioners, electric forced air furnaces) installation services within PGE+ platform, expected release in 2026.
- PGE is working to make available on-bill financing to PGE+ installations by the end of 2025 through vetted third-party lender for products/installations purchased through the PGE+ platform.

Comment: *Utility payments for access to cycling home/business loads to manage for peak demand*

Thank you for this great suggestion! We will explore this idea in the future.

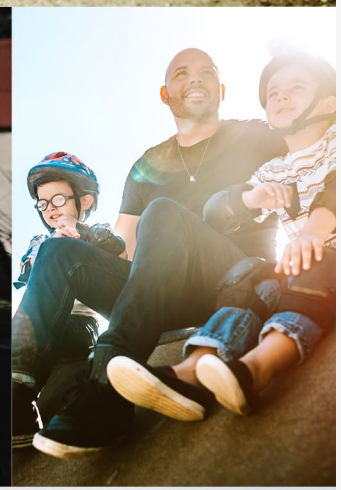
Comment: *Utility access to EV battery capacity to manage for peak demand*

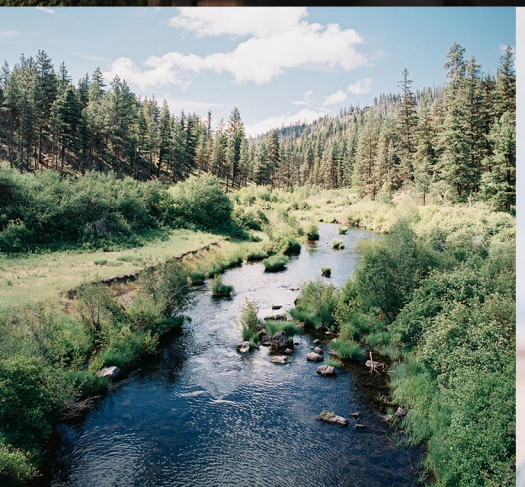
PGE is exploring reliability of V2G within Smart Grid Test Bed (SGTB). It requires additional demonstration activity

Comment: *Utility service contracts for heat pumps and heat pump water heaters; Utility insuring heat pump compressors for failure/replacement*

Options explored that currently do not align with our current strategic priorities

Questions/ Comments





Flex Load Program Portfolio Update

Franco Albi

Distribution System Workshop # 2 | 25 – July 31, 2025

Retail Customer Strategy

Encouraging customers to shift energy use

Streamlined architecture
creates vital development, marketing, and participation efficiencies

Energy shifting portfolio
centered around customer participation in programs that match and adapt to their lifestyle

FROM
disconnected products

TO
streamlined architecture

PEAK TIME REBATES | SMART T-STAT & EV | TIME OF DAY

DISPATCHABLE STANDBY GENERATION

SOLAR + STORAGE | *SMART STORAGE*

ADDITIONAL PRODUCT AND PROGRAM INNOVATION

CRITICAL* ENERGY SHIFTING

DAILY* ENERGY SHIFTING

CONTINUOUS* ENERGY SHIFTING

* Working Titles. Actual language under development

Energy shifting supports affordability for all customers

PGE is evolving, integrating, and scaling its Program portfolio to meet changing customer needs

Today, over 270,000 customers (25%) are enrolled in Flexible Load Programs, providing 113 MW of summer peak capacity

Continued growth through:

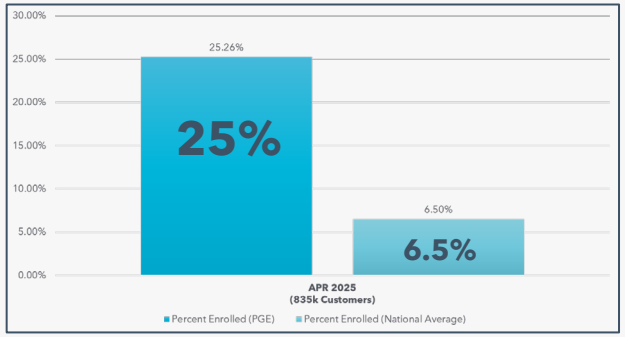
- Programs for Residential, Small Business, and C&I customers with focus on improved dispatchability and automation potential
- Integration with Enterprise DERMS to enhance visibility and to inform optimized dispatch
- Continued Regulatory progress: OPUC approved updated tariffs (effective June 1) which enable increased utilization. Plan for consolidation of multiple tariffs into one to reduce regulatory burden is underway

Flexible Load Portfolio Forecast

Customer Segment	Program	2025	2026	2027
Residential	Smart Thermostat	48.1	52.5	57.2
Residential	Peak Time Rebates	16.1	16.6	17.1
Residential	Time of Day	4.1	5.6	7.1
Residential	EV Smart Charging	2.6	3.3	4.1
C&I	Energy Partner on Demand	41.3	43.8	45.8
C&I	Energy Partner Smart T-stats	2.1	2.8	3.2
Multi-Family	Multi-family Water Heaters	2.0	2.3	2.7
	Capacity (Summer MW)	116.3	126.9	137.2
	Incremental Add (Summer MW)	9.8	10.6	10.3

Percent of Residential accounts enrolled in Flexible Load Programs

PGE Customer enrollment is 4x the national average



Questions/ Comments

Distribution System Planning – Grid Needs & Solution Identification

Fatima Colorado, Distribution System Planning Manager

Distribution System Workshop # 2 | 25 – July 31, 2025

PGE An Oregon kind of energy.℠

Outline

Grid needs	Grid needs assessment – what, why and when?
	Inputs and Process
	List of grid needs
Solutions	General framework of developing solution
	Example solution from latest assessment

Distribution Information

Service Territory

- 1.9 million population
- 4,000 square miles
- ~900,000 customers

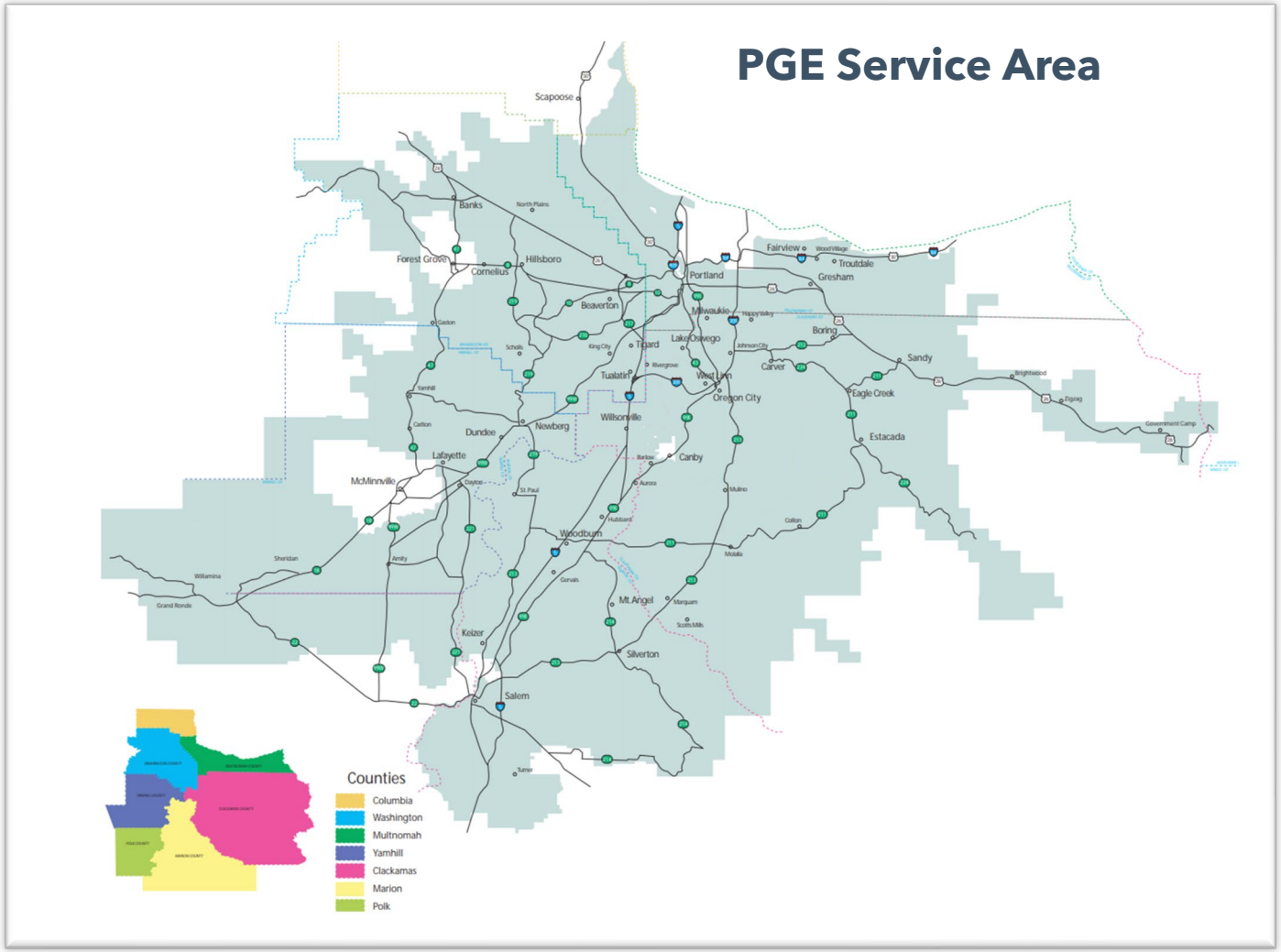
Big Equipment

- 152 Substations
- 280 Power Transformers
- 707 Feeders

Net System Peak Load

- Summer: **4,367MW**
- Winter: **3,879** MW

Data Vintage:2024



Peak Load

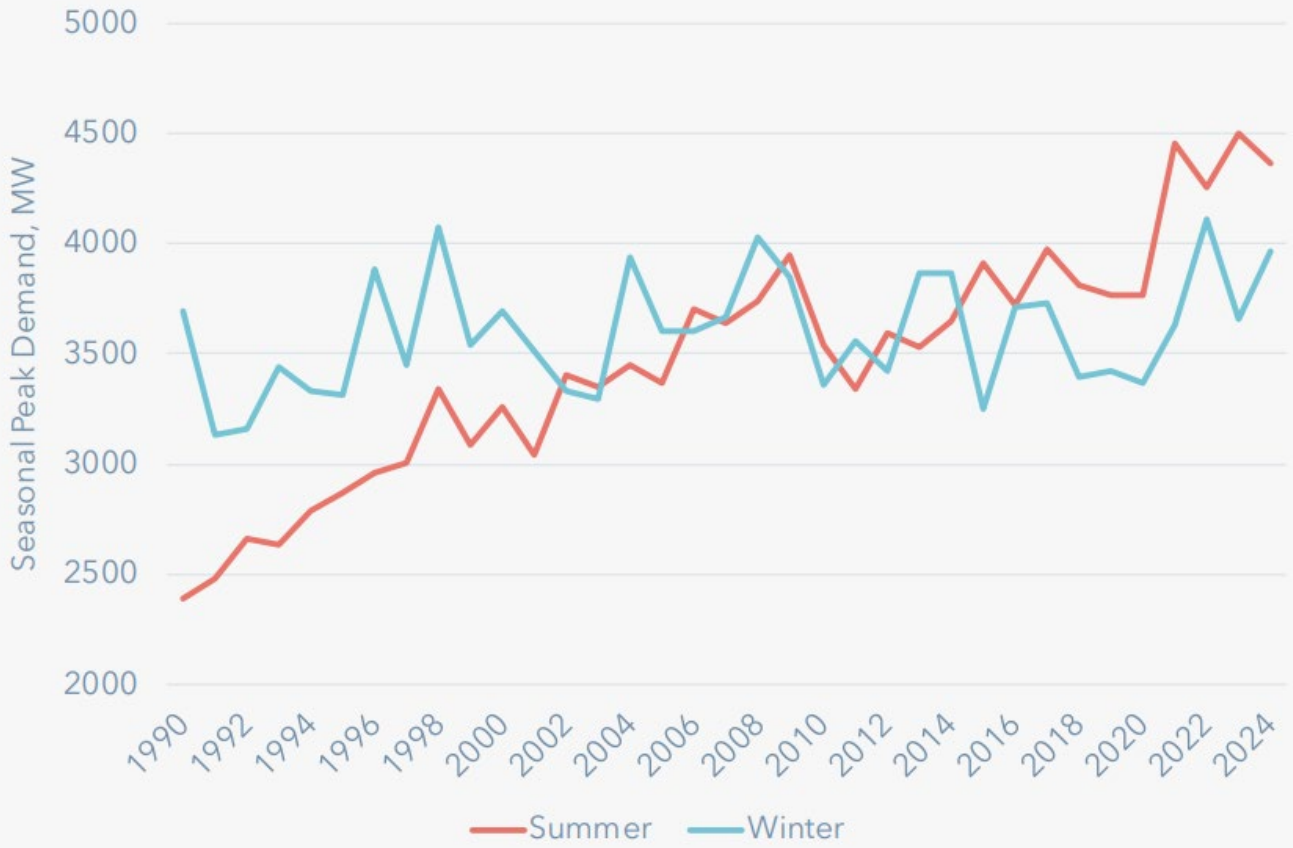
Is the highest electricity demand on a utility system

PGE typically experiences system-wide peak loads during both the hottest and the coldest days of the year

Summer: 4,367 MW

Winter: 3,879 **MW**

Knowing peak load helps utilities design systems to handle maximum demand



Grid Needs Assessment

Drivers

- Economic development
- Load growth/Forecasts
- Lumped load additions
- Modernization
- Policy regulatory requirements
- Safety
- Reliability performance

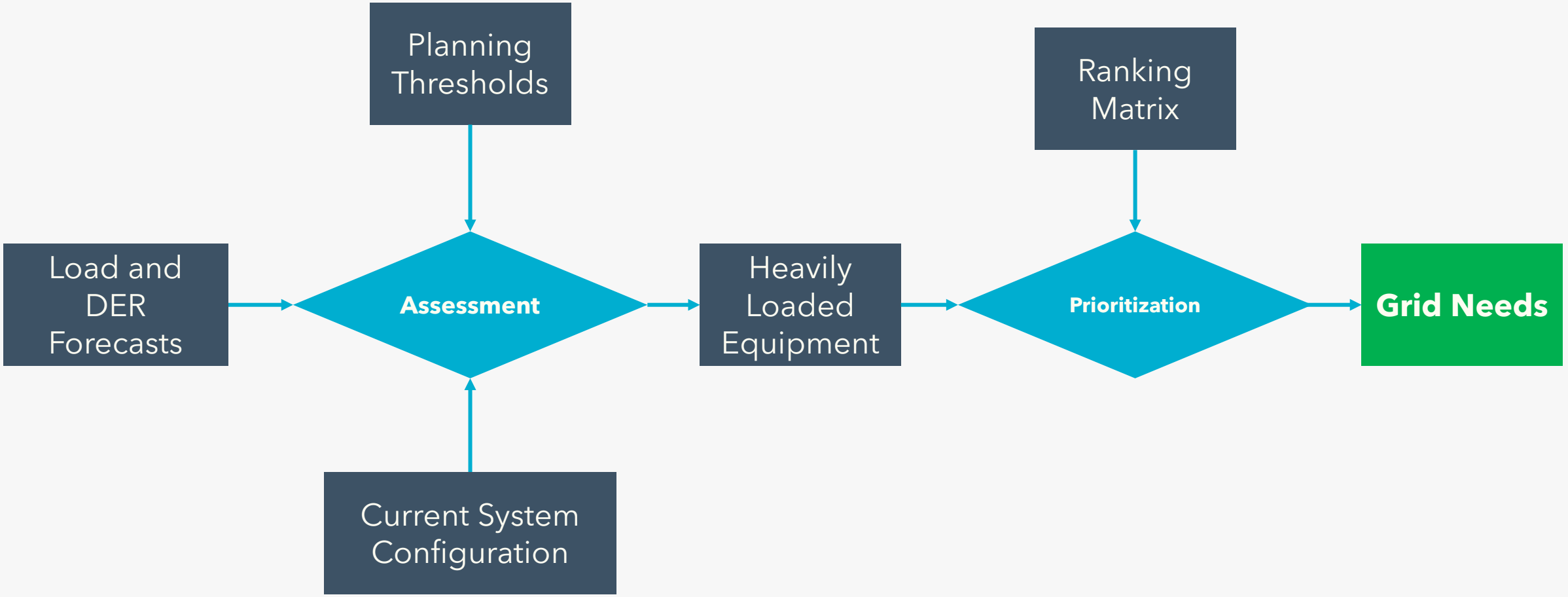
What is it? It is the process of analyzing the distribution grid to assess whether it is capable of serving existing and future load (power demand) under normal operating conditions and in the face of contingencies such as failure of a component.

Objectives

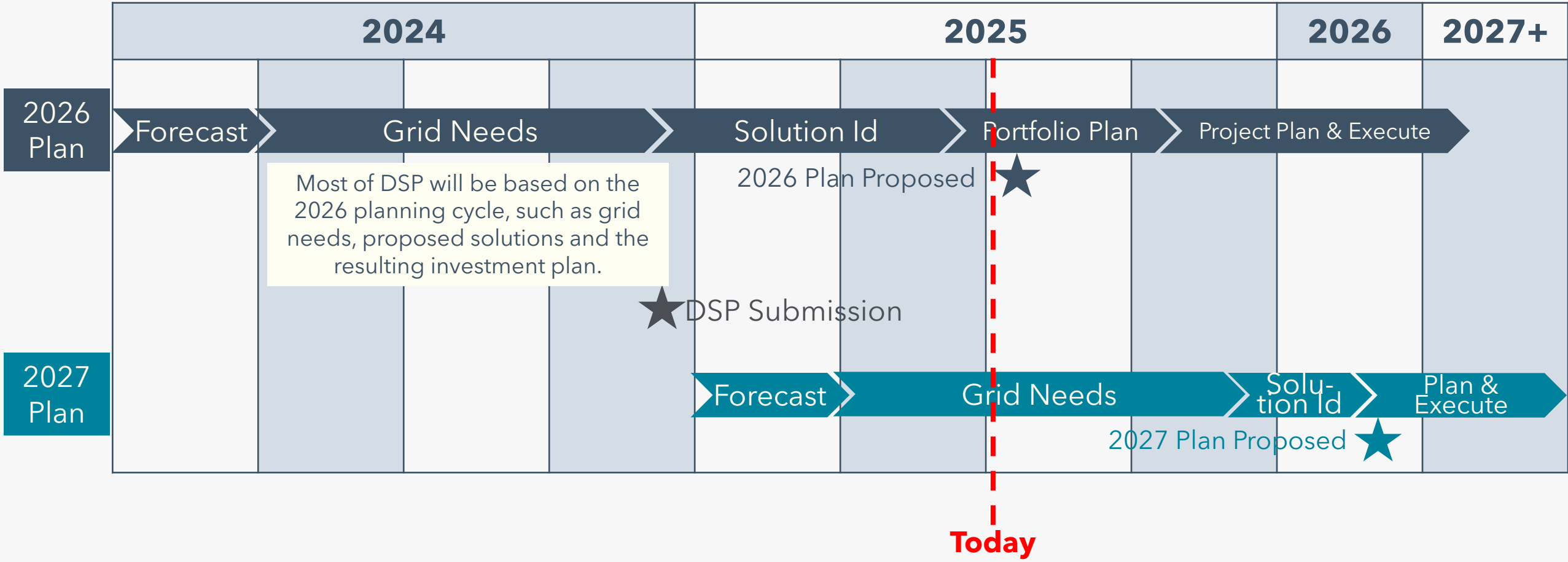
Goals

- Enhance **safety**
- Increase **reliability**
- Meet **customer needs**
- Meet **standards/requirements**
- Recommend best **solutions**
- **Reduce risk** (likelihood x consequence)
- Improve **customer experience**

Grid Needs Analysis



Investment Timeline: A 3-year Cycle



Prioritized List of Grid Needs for 2026 Plan

Priority *	PGE location	Grid need	Project	Resubmitted Project	Total
1	Happy Valley	Load Growth in Pleasant Valley	Happy Valley Project	Project Resubmitted	**43**
2	Tualatin	Industrial load growth in Tualatin	Quarts Project	No	**31**
3	Station E	Load growth in NW Portland and aging assets	Station E Rebuild	Project Resubmitted	**31**
4	Glencullen	Aging Asset	Glencullen Rebuild	Project Resubmitted	**25**
5	Holgate	Aging Asset	Holgare Rebuild	Project Resubmitted	**22**
6	Swan Island	Load growth	Swan Island Feeder extension	Project Resubmitted	**21**
7	Various Locations	Generation Limited feeders	Generation Limited feeders Program	No	**NA**
8	Barnes- Sunnyside	Load growth	Barnes- Sunnyside Reconductor	No	**19.8**
9	Fairmount – Mission	Load growth	Fairmount – Mission	No	**18.9**
10	Meridian-13	Load growth	Meridian-13 Reconductor	No	**10.3**

Note: "Total" column shows the scoring based on the ranking matrix that is utilized for prioritizing grid needs

Solution Identification

Step 1

WHAT & WHERE IS THE PROBLEM

Step 2

CURRENT STATE ANALYSIS AND SOLUTION IDENTIFICATION

Step 3

OPTION ANALYSIS

Step 4

RECOMMENDATIONS

Step 1: What is the problem?

Determine **why the system needs to be upgraded to meet future needs (Identification Stage)**

Identification Tools

Analysis

Feeder Load (System Weak Link Report/Minimum Load): Indicates equipment and conductors approaching certain limits or thresholds

Reliability: Focuses on trouble spots in the distribution system based on historic outage events

Assessment

System Assessments: Indicates potential problematic areas when the system is most stressed

Modeling

Asset Risk Models: Identifies and quantifies risk related to certain equipment

Step 1: Where is the problem located?

Area affected by the problem

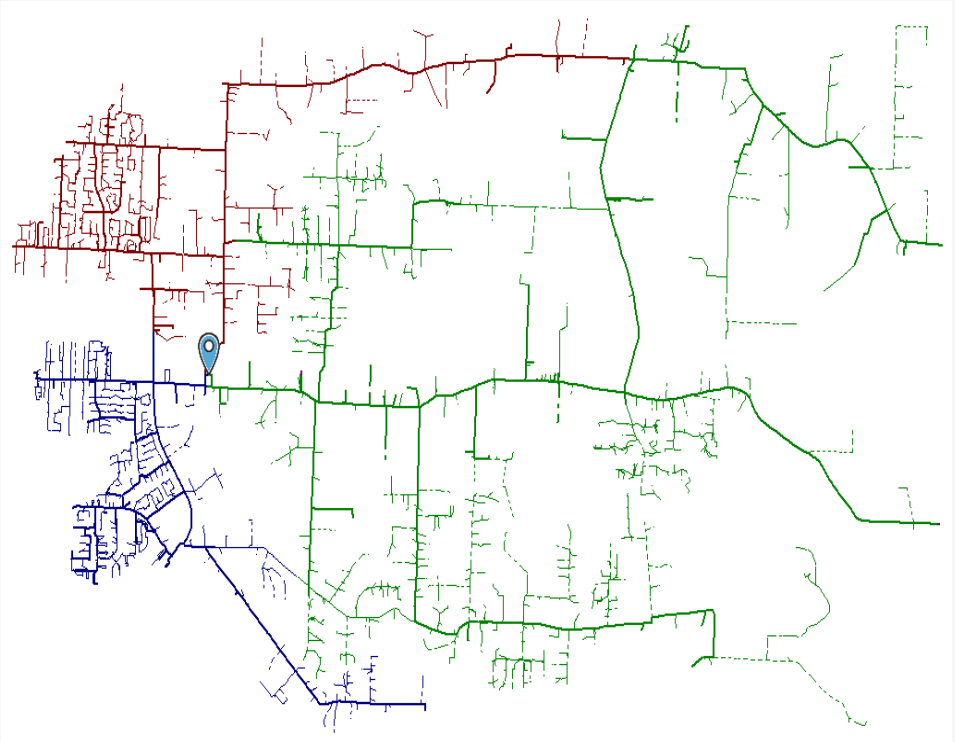
Review

- Geographic boundaries
- Affected customers
- Contractual obligations
- Approach to contingency analyses

Forecasting parameters

Load profiles/Allocation

Setup models



Step 2: Current State Analysis

Examine the **severity of the grid needs** and **identify additional issues** using software simulation (CYME)

Step One: Run CYME of the grid needs under peak-load of normal-conditions (N-0)

Step Two: If issues are identified under normal conditions investigate how to make corrections where needed

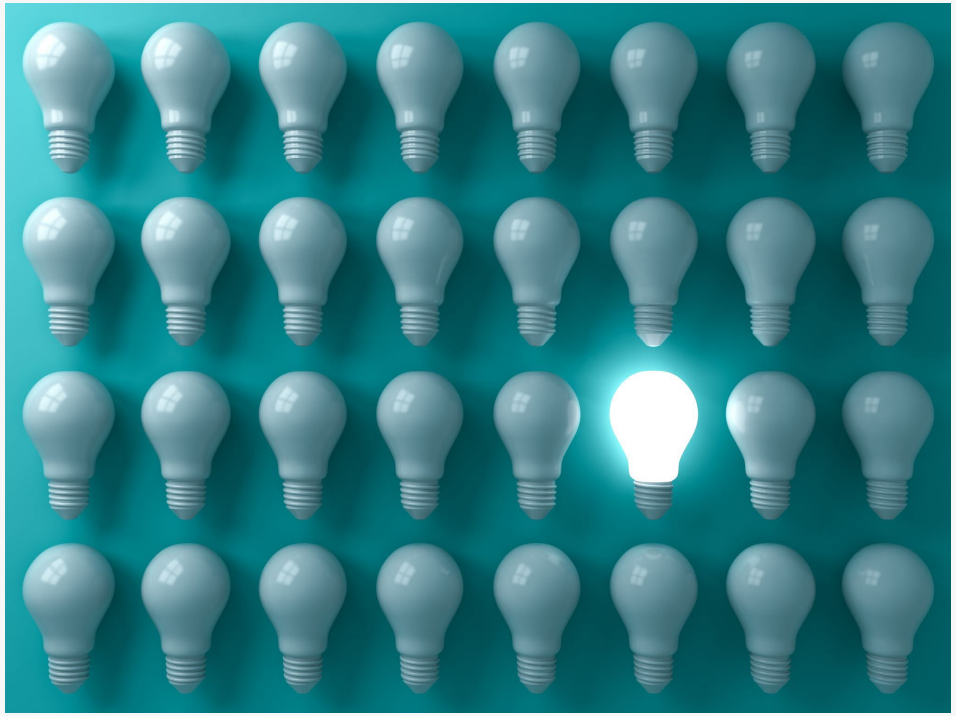
Step Three: Run a contingency-analysis (N-1)* at the grid needs

*N-1 take each feeder & transformer out of service in the model, one at a time, and determining if the load can be pick up on other feeders and transformers without causing overloads or voltage issues

Step 3a: Finding Solutions: Current State Analysis

Software simulation will further **define severity** of the **problem area** and **identify additional issues**

- Conductor loading violations
- Voltage violations
- Contingency analysis deficiencies
- Faulted equipment violations
- Load balancing / High neutral current
- Protection-related issues



Step 3b: Option Analysis

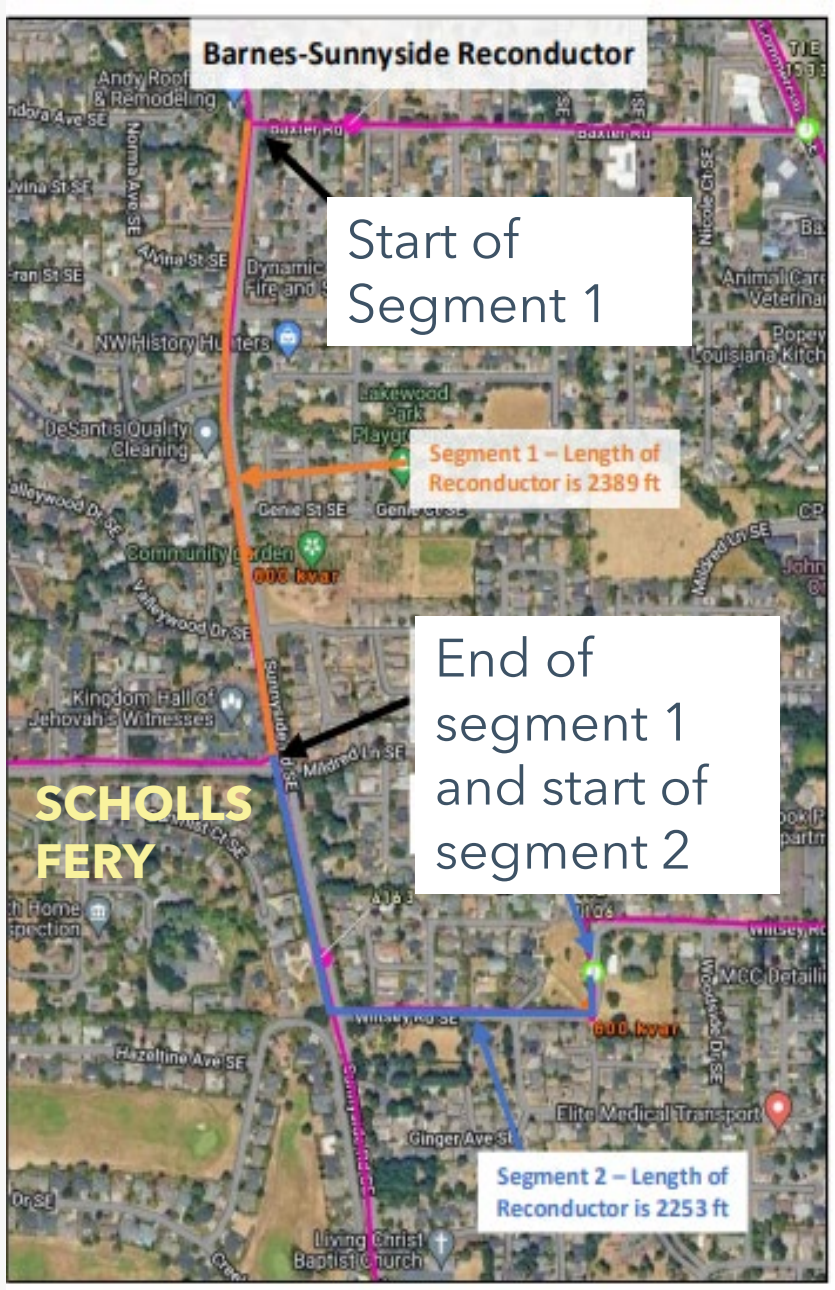
- Benefit vs Cost
- Risk reduction on assets and non-assets
- Stacked benefits
- Savings
- Improve resilience
- Reduce outage duration/ frequency

Leads to Step 4

Final Recommendation(s)

Example Solution Identification

Barnes-Sunnyside is a feeder that located at the Southern edge of PGE's territory. During summer, a downstream section on the feeder experiences loading issues on 336 AAC beginning at Baxter Rd and Sunnyside Rd SE extending slightly south of the intersection of Wiltsey Rd SE and Sunnyside Rd SE.



Solution/Option Analysis

Step One: Start with the most basic option

Reconductor segment 1 - over 100% and 90% loading section

Step Two:

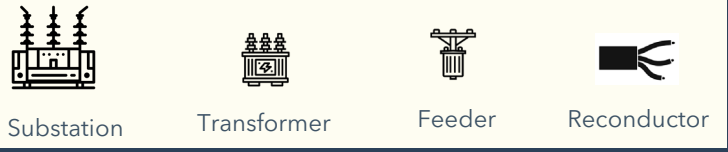
Define Option 1: Reconductor Section 1 - 2389ft

Analyze Option 1: Determine if it meets needs before proceeding to Option 2 (more extensive)

Step Three:

Define Option 2: Replace Section 1 and 2 - 2389 ft +2253ft and add a tie switch

Analyze Option 2: Determine if it meets needs



Solution/Option 1 Results

Step Two: **Define and analyze Option 1 to determine if it meets our needs before proceeding to Option 2 (more extensive)**

Define Option 1: Reconductor overloads greater than 90%

Analyze Option 1: Reconductor Section 1; 2389 ft

- Reconductor Section 1 => **Planning criteria and N-1 are not achieved**

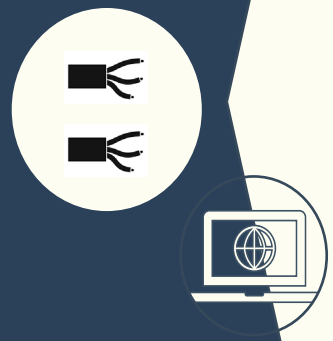
*N-1 contingency analysis takes each feeder out of service in the model, one at a time, and determining if the load can be pick up on other feeders without causing overloads or voltage issues

Solution/Option 2 Results

Step Three: Define and analyze Option 2 to determine if it meets our needs

Define Option 2: Reconductor all planning criteria violations

Analyze Option 2: Reconductor Section 1 & 2; 2389 ft + 2253ft



- Reconductor all sections that exceeds planning criteria to alleviate existing load and add a tie switch to adjacent feeder **=>Alleviates load**
- Establishes N-1 feeder redundancy at feeder **=>N-1* achieved**

*N-1 contingency analysis takes each feeder out of service in the model, one at a time, and determining if the load can be pick up on other feeders without causing overloads or voltage issues

Solution Benefits

Option 1 Vs. Option 2

Barnes Sunnyside Reconductoring project – Section 1

- add **limited capacity** into the area
- but will not increase reliability for the customers served by **feeder** or surrounded area.

The Barnes Sunnyside Reconductoring project – Section 1 and 2 will provide increased reliability for the customers in the area during unplanned outages

This **additional capacity** will allow for faster and more extensive restoration, especially during high loading periods

Provides capacity to the area and removes all equipment over **planning thresholds**

Project Option	Reduction of Cost of Ownership + Geo Risk, NPV	Reduction of Annual Truck Rolls Near-Term Failure Probability %	Reduction of Near-Term Customer Minutes Interrupted	Reduction of Near-Term Risk	B/C Ratio
Option 1	$2,903,000	1	75,000	$370,000	4.73
Option 2	$2,903,000	1	75,000	$370,000	3.83

NWS Criteria - Barnes-Sunnyside

Type of grid need – Does not meet NWS criteria

Reliability Need for N-0 & N-1* condition

Forecast certainty

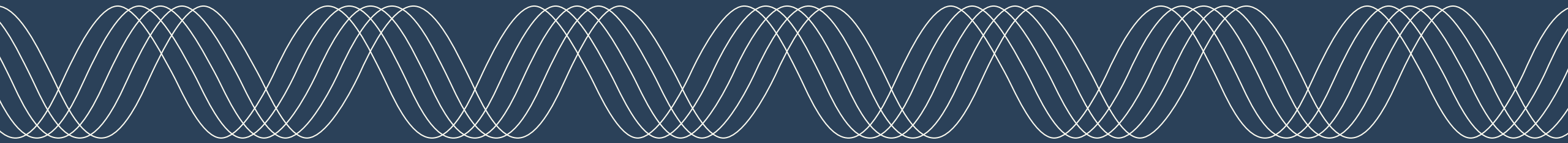
Lead time

Minimum of 30 months

*N-1 contingency analysis takes each feeder & transformer out of service in the model, one at a time, and determining if the load can be pick up on other feeders and transformers without causing overloads or voltage issues

Questions/ Comments

Next Steps and Closing Remarks



Next Steps & Closing Remarks

PGE DSP Docket UM 2362

- Second Round of Staff & Stakeholder Comments | 8/22/25
- PGE Reply to Second Round of Comments | 9/19/25
- Staff's Memo Published | 10/21/25
- Commission Consideration of 2024 DSP at Public Meeting | 10/28/25 (@ 9:30 am)

Meeting materials and recording will be posted to our Plan's Engagement webpage at Plans Engagement | Portland General Electric

For more information or if you have questions, please email us at dsp@pgn.com

Thank You for your participation in our plans

An

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kind of energy