



Distribution System Workshop



Distribution System Workshop # 2 | 26 - Sep 9, 2026



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 - Overview of Activities on the Smart Grid Testbed

11:00 - Non-Wires Solutions

11:50 - 2027 Interim Update (2024 DSP)

11:55 - Next Steps & Adjourn

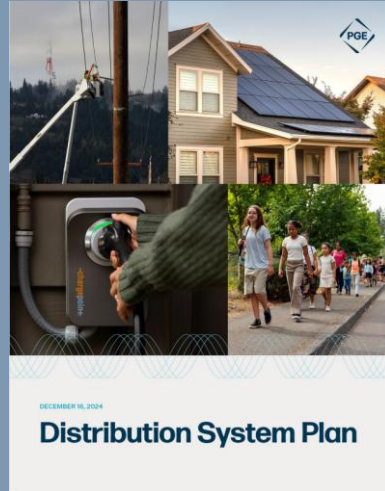
Plan Integration

IRP establishes long-term DER adoption targets



IRP: estimates our future energy and capacity needs and identifies the optimal portfolio of resources to meet those needs in a least-cost least-risk manner

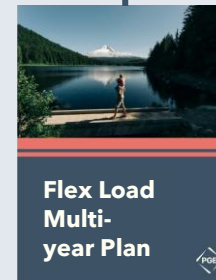
CEP: informs our pathways to decarbonizing our energy mix



DSP: assesses our future distribution system capacity needs using our forecasts, and prioritizes traditional and alternative solutions for making the system reliable, affordable and resilient, and meeting the needs of our customers

TE grid needs

VPP resources

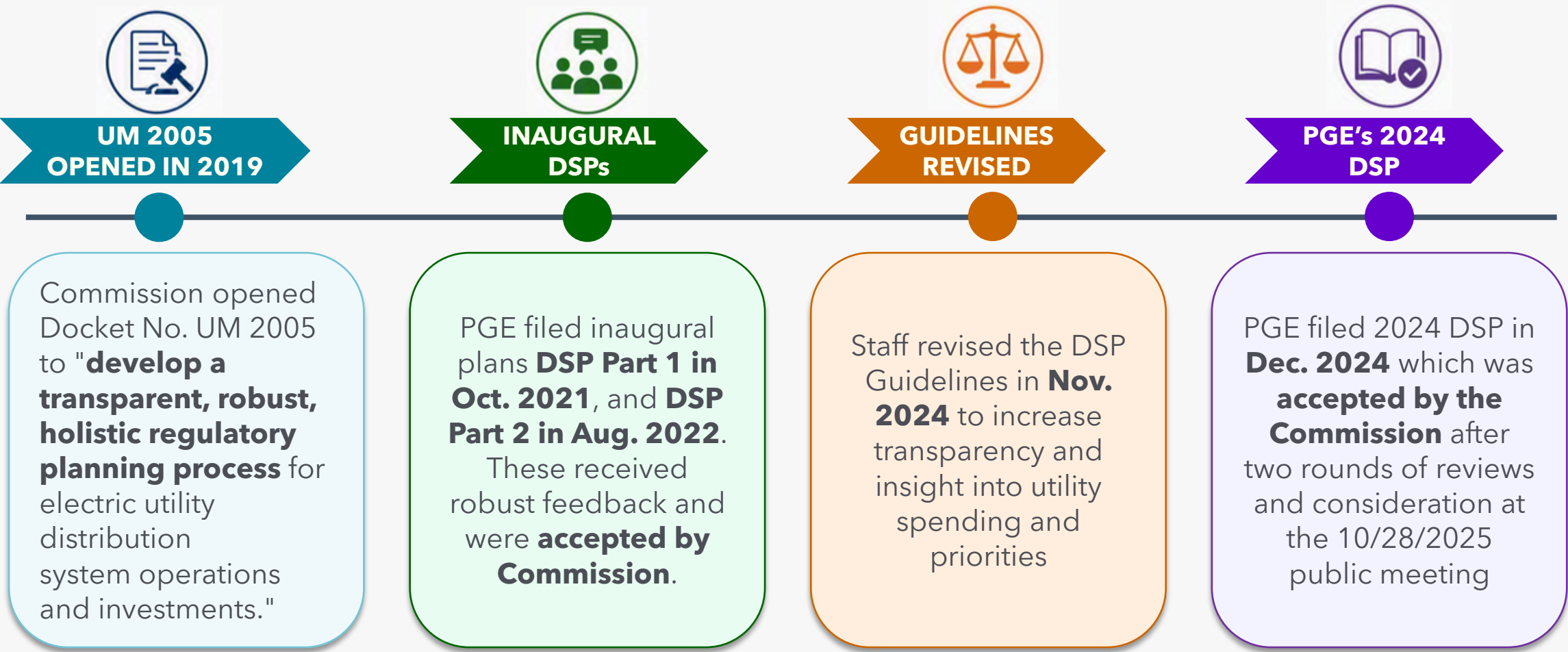


VPP/MYP: Upcoming plan includes all Virtual Power Plant resources being orchestrated to support grid and customer needs. Distributed resources such as demand response, solar, batteries, Dispatchable Standby Generation which complement traditional generation resources and are key to our decarbonization efforts.

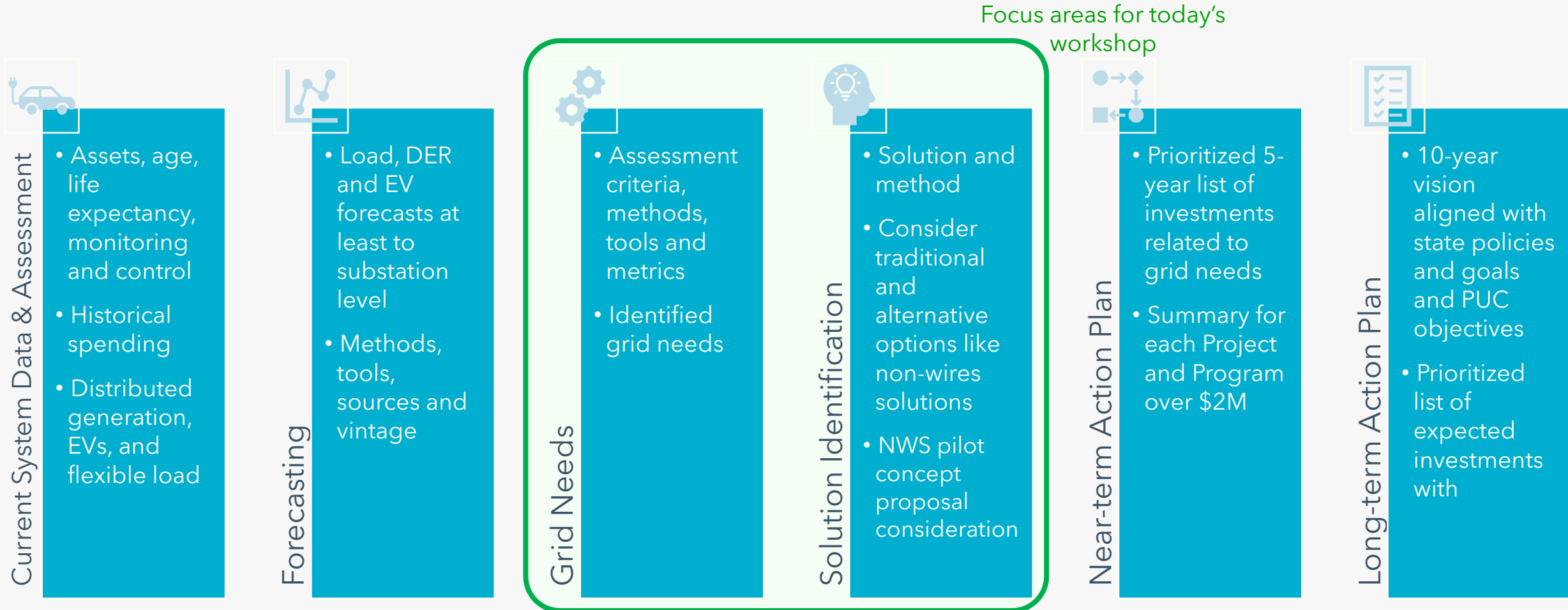


TEP: describes our actions in support of transportation electrification by proposing a portfolio of activities that facilitate our ability to plan for, manage, and serve TE loads rapidly coming to our system.

Distribution System Plan: Key Milestones



DSP Guidelines At a Glance





Technology Development – Smart Grid Test Bed (SGTB)

Overview: History, Highlights, & Managed Charging

Rick Hodges, Principal Technical Program Manager

Matt Hubbard, Manager Grid Edge Planning & Engineering

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Smart Grid Test Bed

Real world demonstration of grid edge technologies



The electric grid is no longer a one-way street

In the old days, power would only flow one direction: from where it's made (generated) to where it's used by customers in homes, businesses and schools. But today it also flows the other way - from customers who generate their own power and send what they don't need back into the grid. This new relationship is an important part of powering a green future for all of us.



Outline

Smart Grid Test Bed (SGTB) Origin, Timeline and Some Facts

SGTB Evaluations Overtime: From Customer Engagement to DER Operationalization

SGTB Phase II

SGTB Example Deep Dive: EV Managed Charging

What It Means at Scale?

Connecting to PGE's Programs

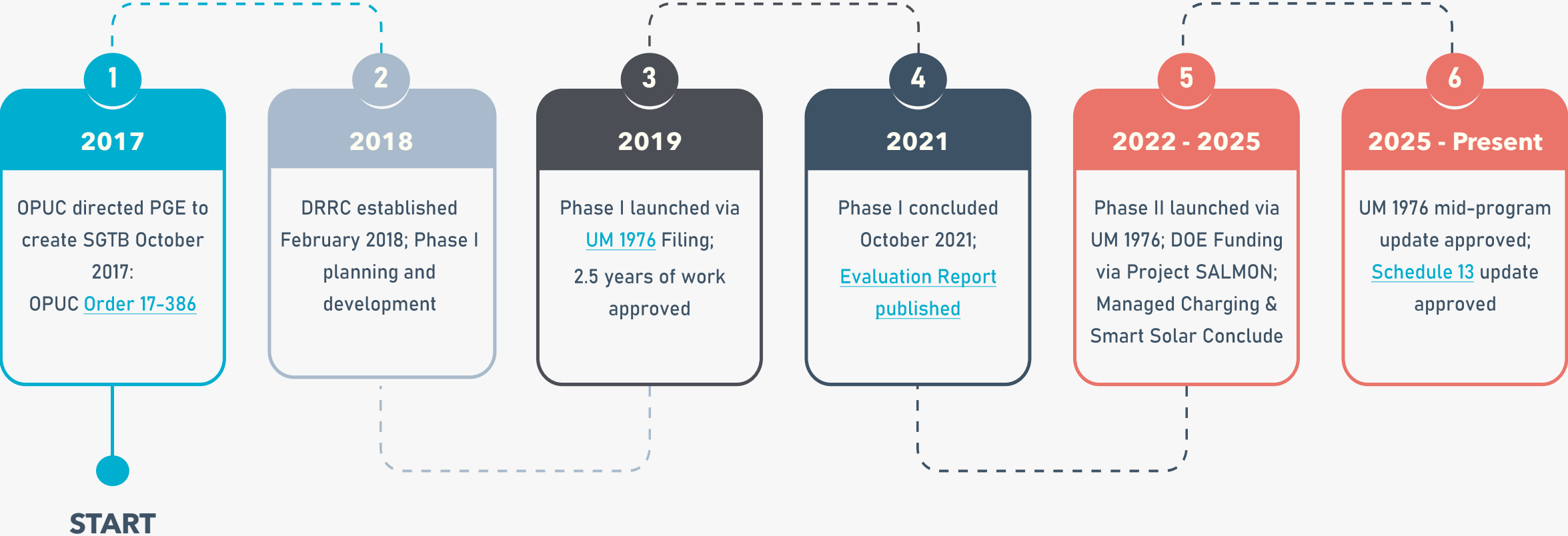
SGTB Origin and Timeline

Governance & Oversight

OPUC-mandated Demand Response Review Committee (DRRC) advises and approves

Demonstrations approved via UM 1976 filings and Schedule 13 updates

Funded through automatic adjustment clause, up to approved regulatory budget



Note: The PGE Technology Development Team manages the SGTB

SGTB Phase II Quick View: 2022-2028



What

**Grid Edge Technology
Validation
w/Customers**

Why

**Regulatory Alignment,
Inform Grid Use Cases,
& Tech Scaling**

Who

**Technology
Development Team**

Where

In-Field

Demonstration Areas:

- Managed EV Charging
- V2X
- Smart Solar Inverter
- Water Heating Bundle
- Single Family New Construction
- C&I, Flex Load, & Resiliency
- Flex Feeder



Highlighted Learnings and Scaled Capabilities

Managed EV Charging

- Demonstrated ability to reduce 40% of total EV peak load
- 90% customer satisfaction with 82% saying the program improved PGE's perception

Flex Feeder

Built Digital Twin & Full ADMS-DERMS Integrations: performs within 5% error rate, leveraging to modeling DERMS capabilities and strategies.

Commercial Thermostats

SGTB initiated a Honeywell thermostat integration, validated functionality that enabled program growth. Honeywell has accounted for 500+ of 650 total and 80%+ of Commercial Thermostat installs from 2023-2025.

Connected Water Heaters

Validated flex load across multiple sites and programs with partners NEEA

Demonstration Summary: EV Managed Charging

Deep dive on one evaluation



OVERVIEW AND PURPOSE	Study EV Managed Charging to assess multiple scenarios of load shifting against across multiple grid optimization objectives.
SCOPE	Timeframe: 2023-2024 Participants: 240 vehicles across 212 customers Incentives: \$20/month bill credit Focus Areas: Bethany Neighborhood Technology Tested: Telematics-based EV charging optimization using dynamic signals
PARTNERS	→ WeaveGrid (EV DERMS) → PGE Programs (existing customer enrollment) → Opinion Dynamics (3 rd Party Evaluator)
USE CASES & FINDINGS	A. Bulk System Coordination Goal: Evaluate ability to shift charging to optimize against wholesale Outcome: Successful shifting with price optimization B. Load Optimization Goal: Evaluate ability to flatted loads on distribution system Outcome: Successful flattening of loads regardless of group size. Demonstrated ability to reduce total peak load up to 40% on feeders and 90% customer satisfaction . 82% of customers say the demonstration improved their perception of the utility. C. DER Integration Goal: Evaluate ability to optimize charging based on solar/grid conditions Outcome: Low Impact from limited charging and solar alignment D. Time of Day Rate Analysis Goal: Evaluate impacts of TOU rates Outcome: TOU customers already shift. Managed charging has less impact on TOU customers.



DECISION: Go for internal scaling review
NEXT STEP: Hand off to internal program team



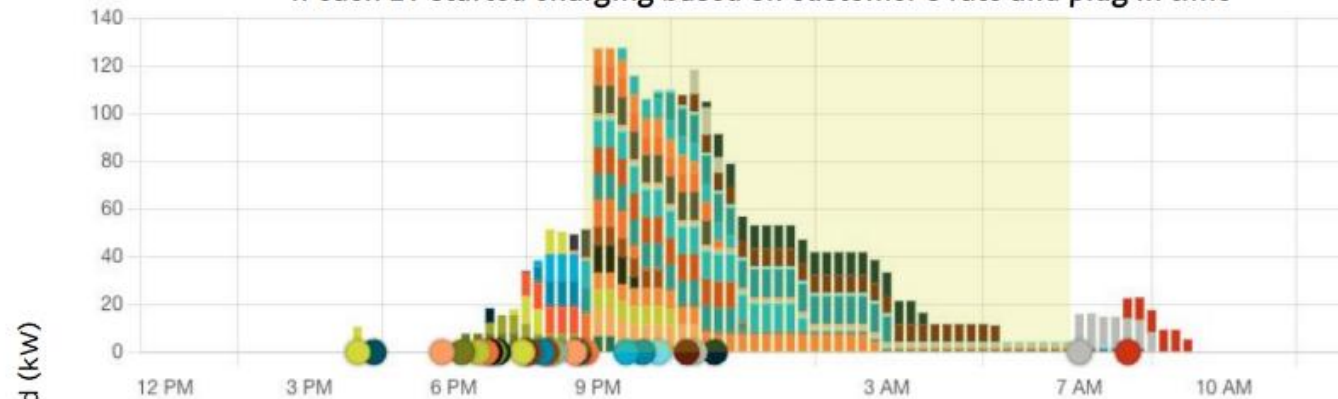
Data Sources:
EV Telematics,
PQ Meters



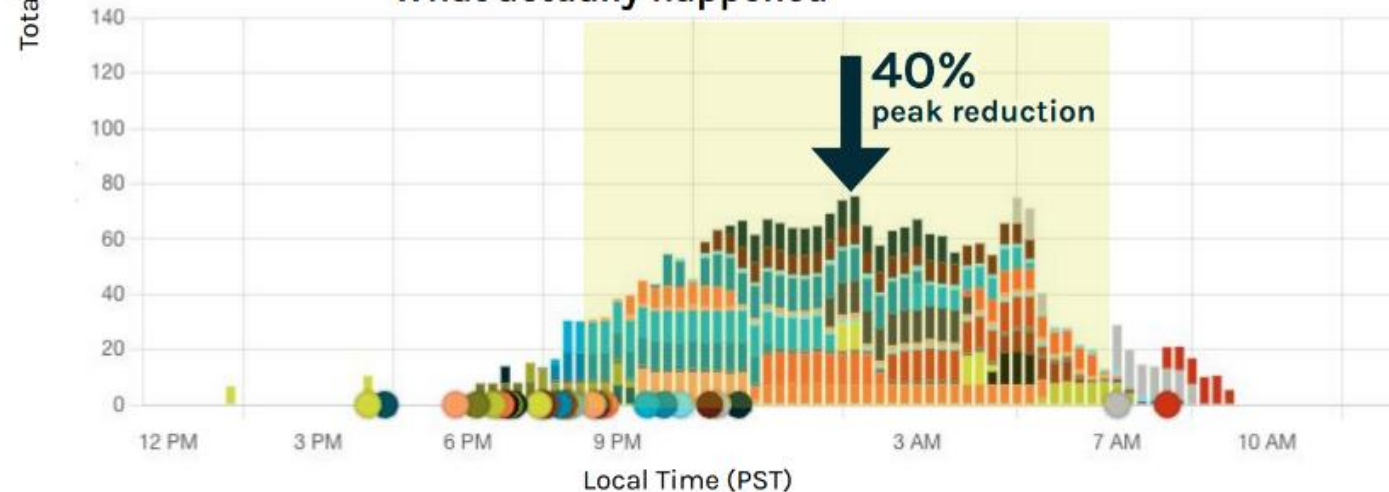
Analysis Tools:
3rd Party Evaluation

Feeder level EV charging optimization reduced peak

What would have happened
if each EV started charging based on customer's rate and plug in time



What actually happened

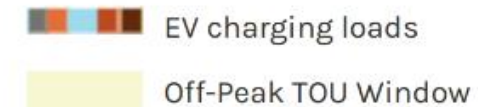


Group Details

55 vehicles served by
the same PGE feeder

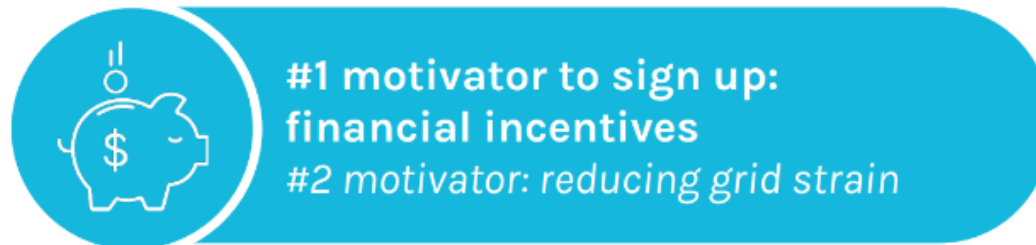
31 plug ins this night

Majority on a TOU rate



Participants rated their experience favorably

Survey data was collected in February 2024 and reflects feedback from 118 participants (42% were on a default rate, 56% were on a TOD rate, and 1% were on a Legacy TOU rate)



DRIVER FEEDBACK

“Program is a **Win/Win** - easy to use, good integration with Tesla app, **fosters good EV charging habits**”

“Car is **always fully charged** when needed, and done at a time that is **least taxing to the grid and best for me economically**”

“I like the **savings** and knowing that I'm charging when there is **less strain on the grid**”

What Managed Charging Means at Scale



Program Design

Telematics-only enrollment from existing Residential Smart Charging customers, with no charger hardware required. Built a nightly schedule per vehicle from a grid signal, respecting each driver's ready-by time.



Grid Impact

81-98% of weekday charging moved into the lowest price and load hours, against 0-6% for the comparison group. Peak-to-average ratio fell from 16.4 to 10.0 at Bethany-Burton, taking up to 40% off total peak.



Customer Experience

90% satisfaction, and 82% said the program improved their view of PGE. Ready-by times are the binding constraint on how far load can shift, and time-of-day customers already shift, so added impact is smaller for them.



Path to Scale

Decision is go for internal scaling review. Build local capacity limits into the optimization, stack signals rather than optimizing to price alone, add a daytime-flexibility offer for solar, and re-test at higher EV adoption.

How SGTB Connects to PGE's Plan



Innovation

Test Bed demonstrations prove out grid edge technology in the field before it is committed to at scale, reducing the risk of investment in unproven solutions.



Programs

Validated technologies hand off to customer programs with demonstrated performance, customer experience data, and a confirmed business case.



Non-Wires Solutions

Demonstrations confirm which distributed energy resources can be relied on to meet distribution system needs in place of traditional infrastructure.

WHAT'S NEXT

Continued demonstrations through 2028, with results feeding regulatory filings, program design, and distribution system planning.

Summary

PGE tests technologies for grid connectivity and viability. Cost-effectiveness is not the focus in this initial testing stage

PGE tests various emerging technologies in a small sample sizes (low risk)

One of the demonstrations included EV Managed Charging which has been performed to assess multiple scenarios of load shifting against across multiple grid optimization objectives

- Peak-to-average ratio fell from 16.4 to 10.0 at Bethany-Burton, taking up to 40% off total peak
 - 90% satisfaction, and 82% said the program improved their view of PGE
-

Continued demonstration work through 2028, with results feeding regulatory filings, program design, and distribution system planning

Through PGE's VPP Flex Load Programs thousands of enrolled customer devices are orchestrated every day as a single dispatchable resource

PGE's Virtual Power Plant



Thousands of enrolled customer devices, orchestrated every day as a single dispatchable resource

250,000+

CUSTOMERS ENROLLED

25% of PGE customers

~600 MW

CAPACITY

Size of a large generation plant

500+

DISPATCHES A YEAR

Called across the portfolio

13+

PROGRAM OFFERINGS

Residential & Commercial

100x

GROWTH SINCE 2015

2,300 customers to 250,000+

WHAT'S IN THE PORTFOLIO



AUTOMATED CONTROL

Smart thermostats, EV smart charging, water heating, and Smart Battery. PGE signals, devices respond, no customer action required.



PRICE RESPONSE

Time-of-Day and Peak-Time-Rebates. Voluntary, behavioral, and weather-dependent – participation varies event to event.



CONTRACTED CAPACITY

Energy Partner on Demand and Dispatchable Standby Generation. Committed capacity under contract at a known location.

2030 GOAL

Double the VPP to roughly 25% of system peak – about 1,200 MW – through market integration and new customer offerings.

Questions/ Comments



Non-Wires Solutions

Seemita Pal, Senior Principal Analyst, Resource Planning

Jenn Latu, Manager, Community Engagement

Fatima Colorado, Manager, Distribution Planning

Gabriel Kjos, Manager, Flex Load Portfolio

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Outline



What is a Non-Wires Solution (NWS) and why is it important?



PGE's NWS journey



Prior Community Engagement and Learnings



Strategy for Moving from NWS Design to Implementation



Benefits of Current NWS Strategy



Summary of Progress: Updated Framework and Candidate Selection

Non-Wires Solutions (NWS) or Non-Wires Alternatives

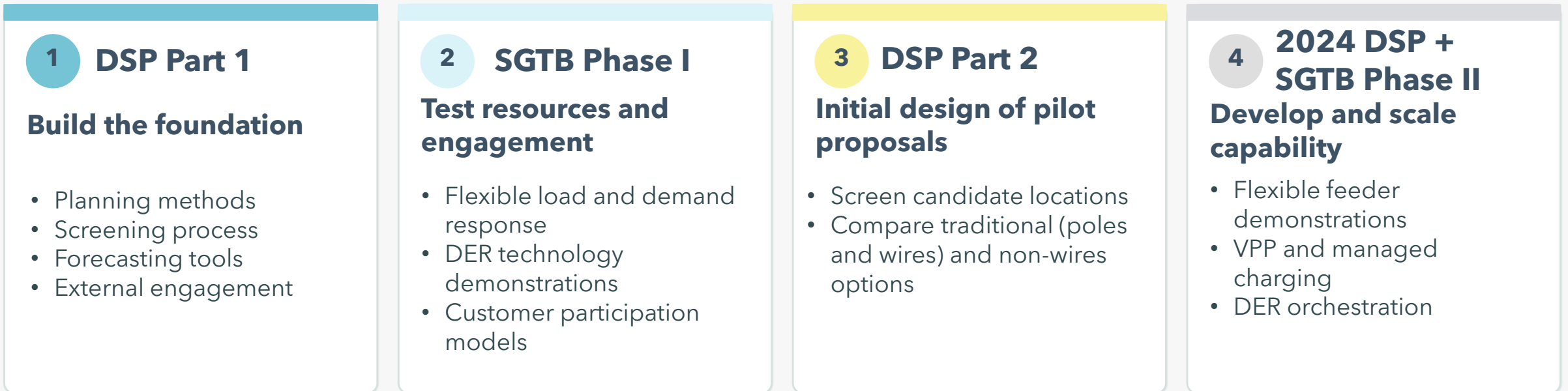
What is an NWS?

- A way to meet some electric system needs using local resources like batteries, solar, and flexible energy use.
- Can provide additional grid capacity and give utilities more options when planning for future growth.

Why NWS matters?

- Expands the range of tools and resources
- Potentially adaptable over time as system needs evolve
- Can create opportunities for customers to contribute to solutions that support the electric grid
- May incorporate local resources such as solar, battery, and/or flexible load

PGE's Non-Wires Solutions Journey



Previous NWS engagement

- **Stakeholder engagement.** Hosted stakeholder and community workshops.
- **Community-based partnerships.** Partnered with Community-Based Organizations (CBOs): Community Energy Project (CEP), Coalition Communities of Color (CCC), and Unite Oregon.
- **CBO participation support.** Provided resources to support CBO participation and to help PGE reach customers and communities.
- **Criteria to evaluate NWS candidates.** Grid need assessment, equity map and community impact considerations, and cost effectiveness analysis.

Key takeaways

- **Saving money.** Lower energy bills was the most common reason customers expressed interest in flex programs.
- **Resilience matters.** Customers value solutions that maintain electric service and support community resilience during extreme weather.
- **Barriers to participation.** Additional outreach and support may be needed for lower-income households, renters, and historically underserved communities.
- **Trust is important.** Some customers want more information about how their energy-use data will be protected and used.
- **Communicate benefits accessibly.** Customers want clear information about how NWS programs work and how they may benefit households and communities.

NWS Engagement Next Steps

Goals

- Gather and analyze information to inform customer and community outreach strategy.
- Understand customer technology use, preferences and perspectives.
- Identify potential participation barriers and opportunities to support customer engagement.

Desired outcome

Actionable insights into customer preferences, technology adoption and participation drivers to inform future NWS planning and engagement.



The NWS Challenge: Finding the Right Opportunities

Five simple questions help us decide when flexible load may be a smart alternative to a traditional upgrade



Strong NWS candidates are grid needs that fit flexible-load capabilities, grow gradually, allow time for customer enrollment, and create clear economic value.

VPP Flex Load: Alternative Solution with Multiple Benefits



Defer specific traditional grid upgrades

(Demonstrate commitment to affordability)



Stack customer and community benefits from **VPP Flex Load**

(Grid, customer and environmental benefits)



Unlock **greater utilization** of DERs and grid infrastructure

(Maximize utilization of assets)

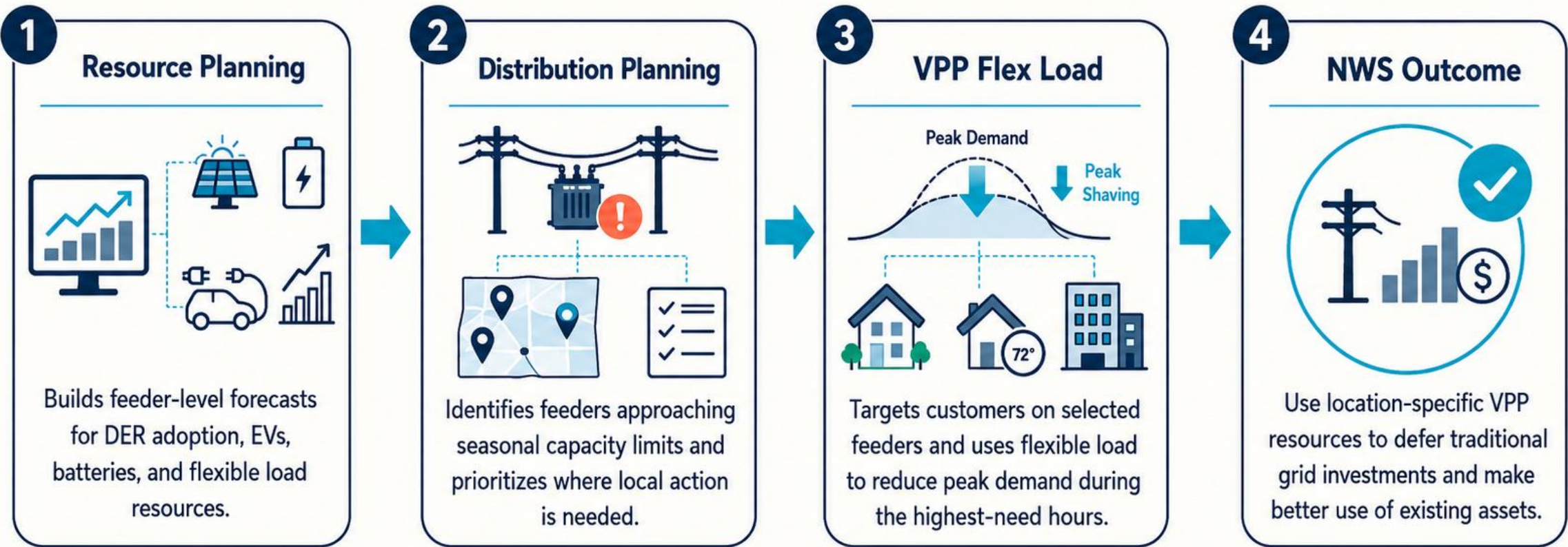


Increase **customer engagement** and target potential **bill savings**

(Improve customer experience)

Strategically plan VPP Flex Load resources where they can defer traditional investment

The NWS Approach: Using VPP Flex Load to Defer Appropriate Distribution Investments



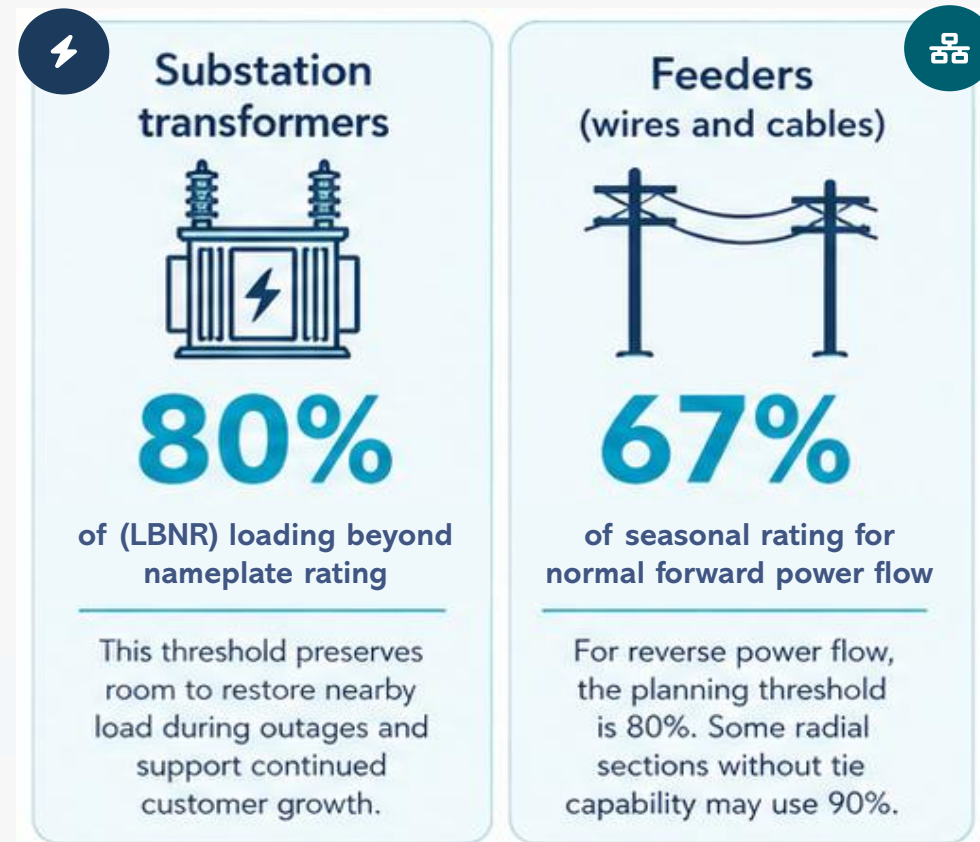
Cross-functional support

Regulatory Affairs, Community Engagement, Technology Development, Marketing, and Power Operations



NWS is the coordinated use of planning insights and targeted flexible load to solve a specific feeder need.

What Are Planning Criteria and Why Do They Matter?



Planning criteria set how much heavily equipment can be loaded before it becomes a constraint – the starting point for every grid needs assessment.

- They keep **spare capacity**, so nearby customers can be served during an outage without overloading equipment.
- That spare capacity is what lets us restore power quickly after **unexpected events**.
- It also **leaves room for steady customer growth**, so costly upgrades can be deferred.

LBNR is the maximum transformer loading that can be sustained based on thermal limits and transformer aging criteria. It is based on a widely accepted Standard.

Grid Needs Assessment and Identification of Assets with Exceedances

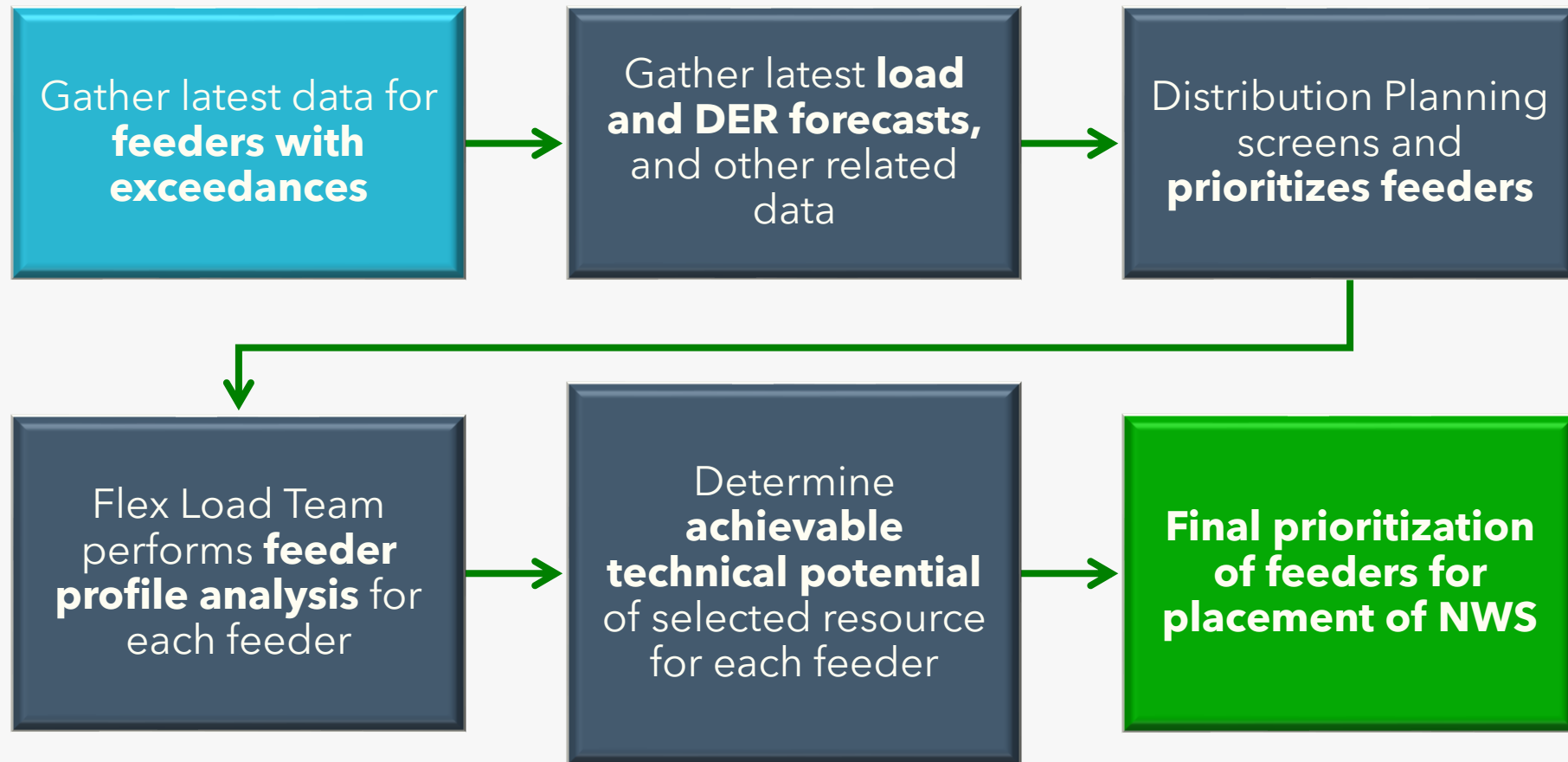
Drivers and Benefits for Annual Grid Needs Assessment



Feeder Ranking Based on Criticality of Intervention

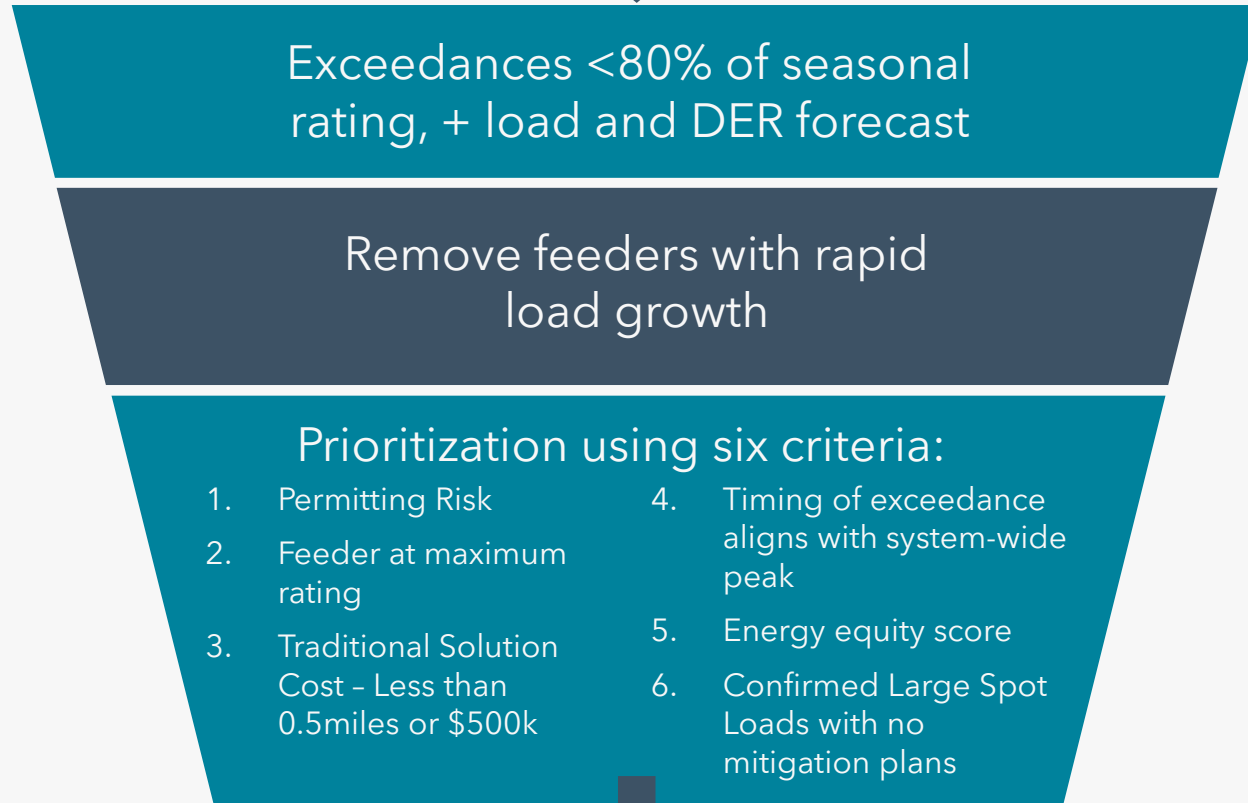


Integrated and Repeatable Approach for NWS Feeder Selection



Updated NWS Framework: Development and Application

All distribution feeders



Prioritized list of candidate locations for consideration by Flex Load Team

- Used by PGE's Distribution Planning team for NWS Feeder assessment and Prioritization
- PGE's VPP Flex Load Team perform analyzes feeders prioritized by Distribution Planning for viability of VPP-based NWS
- Detailed analysis of feeder and load characteristics to determine suitability

Non-Wires Solutions: VPP Optimization



COORDINATED PROGRAMS

Residential Smart
Thermostat

RES DR

Peak Time Rebates

RES DR

Time of Day

RES RATE

Residential EV Smart
Charging

RES DR

Smart Battery

STORAGE

Energy Partner
Programs

COMM DR

VIRTUAL POWER PLANT

VIRTUAL POWER PLANT

Coordinated flexible
load and DER
capability.

System-wide programs,
directed to local grid
value.

NON-WIRES SOLUTIONS

Feeder-specific dispatch of flexible resources

- Optimizes feeder loading during hours of load exceedance
- Defers or mitigates traditional distribution upgrades
- Extends the value of existing residential and commercial programs

WHAT THIS MEANS

The Non-Wires Solutions is not separate from the VPP. It is the VPP applied locationally to solve a specific feeder need using existing residential and commercial programs.

TARGETED MARKETING

Locational marketing for priority NWS feeders is expected to be absorbed within current program budgets.

PGE already has the portfolio building blocks. NWS applies them locationally to maximize existing assets and defer traditional grid investment.

Non-Wires Solutions: VPP Optimization



PGE can use existing programs as a practical first step before traditional capital investment



LOCATIONAL DISPATCH

Use flexible load where the grid need exists, not only where enrollment already happens.

PORTFOLIO APPROACH

No single program is likely to provide enough dependable feeder capacity on its own. Combining programs increases flexible capacity and improves the likelihood of success.

TARGETED MARKETING

Locational marketing for priority NWS feeders is expected to be absorbed within current program budgets over the next two years.

NEAR-TERM OPERATING MODEL

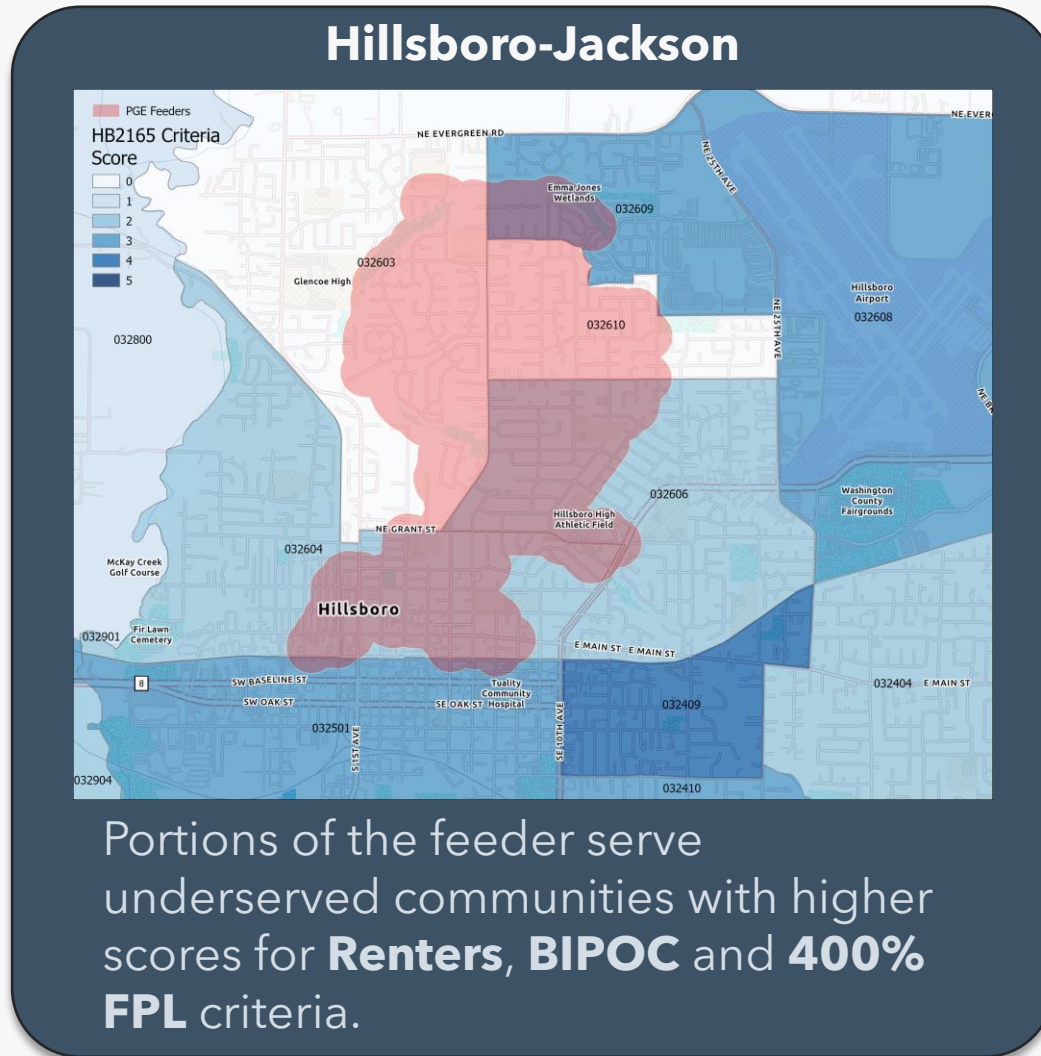
- ▶ Residential EV smart charging as the preferred lead resource
- ▶ Additional residential, commercial, storage, and pricing programs layered in as needed
- ▶ Feeder-specific enrollment and dispatch strategy
- ▶ Existing program budgets support initial targeted marketing

Preview of Identified Feeder Candidate

Feeder Name	Feeder Rating (MVA)	Exceedance in kW based on peak load data of 2025	DR potential 2027-2028 (in kW)	Estimated cost of traditional solution	Estimated cost of NWS
Hillsboro-Jackson	14.3	100	140	\$1,343,000	No incremental costs expected beyond original Program costs

- **Hillsboro-Jackson** currently experiences exceedance (at conductor), has low load growth rate, and high DR potential
- This is the **first iteration** and we will enhance the framework as we make progress
- Our long-term vision is to develop a **programmatic approach** to NWS where Distribution Planning and VPP Flex Load work closely to strategically grow VPP resources

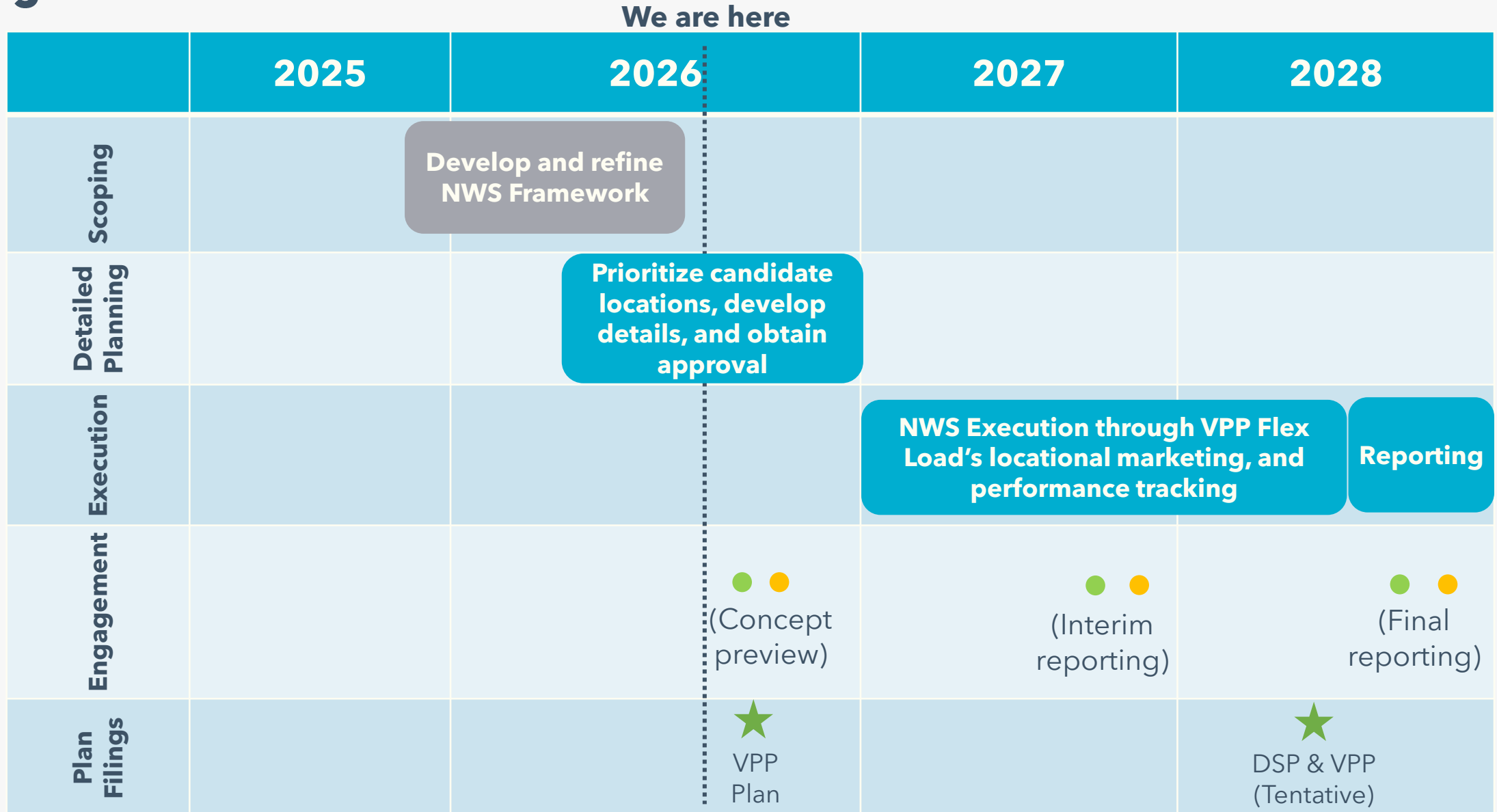
A Closer Look at the NWS Candidate Feeder



Underserved Community Scoring Criteria (HB2165)

- Environment
- Renters
- Black, Indigenous, and People of Color (BIPOC)
- 400% Federal Poverty Level (FPL)
- RUCA (Rural-Urban Commuting Area)
- Tribal area
- Dwelling type

High-Level Timeline



Takeaways

Right Resource. Right Place. Right Time.

VPP delivers measurable customer, community and grid value while deferring traditional infrastructure upgrades



Advance non-wires solutions through design, testing, and evaluation

Recognize that some grid constraints require traditional solutions

Learn from customer engagement and NWS experience since 2020

Build scalable VPP capabilities through targeted demonstrations

Expand VPP Flex Load to defer traditional grid upgrades

Identify promising NWS opportunities using the NWS Framework.

Questions/ Comments



2027 Interim Update (2024 DSP)

Seemita Pal, Senior Principal Analyst, Resource Planning

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DSP Interim Update



From the DSP Guideline

*“Each utility will file an Interim Update to provide **formal, summary-level progress reporting on projects included in the last-filed DSP.***



i) The Interim Update should be filed one year after filing a full DSP.

ii) The intent of the Interim Update is to clearly communicate substantive developments such as new project initiation, project advancement, completion, or delay, that may occur between DSP filings and may appear in the cost recovery process.



*iii) The Interim Update will be **informational** and **not require Commission action**”*

Scope of the Interim Update



Based on 2024 DSP

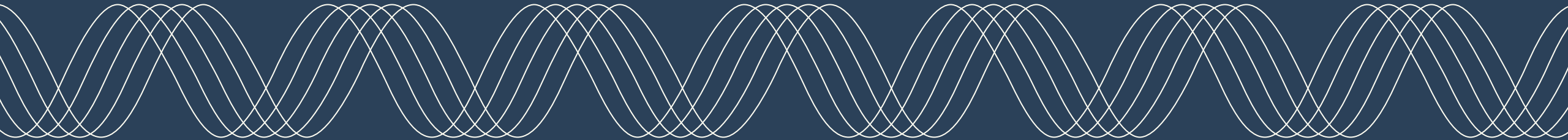
- Incremental updates for all projects included in 2024 DSP's Appendix E

New Information

- Any new capital funded investments* over \$2M that are related to distribution grid needs
- Any new transmission planning investments* above \$2M that are relevant to 57kV reclass reporting

*In case of programs related to distribution grid needs or 57 kV reclass reporting, information would be included for those with planned investments over \$2M in 2026 and beyond

Next Steps and Closing Remarks



Closing Remarks



PGE DSP Docket [UM 2197](#) Procedural Schedule



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

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