Distribution System Workshop

Distribution System Workshop # 5 | 24 – Sep 12, 2024

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**

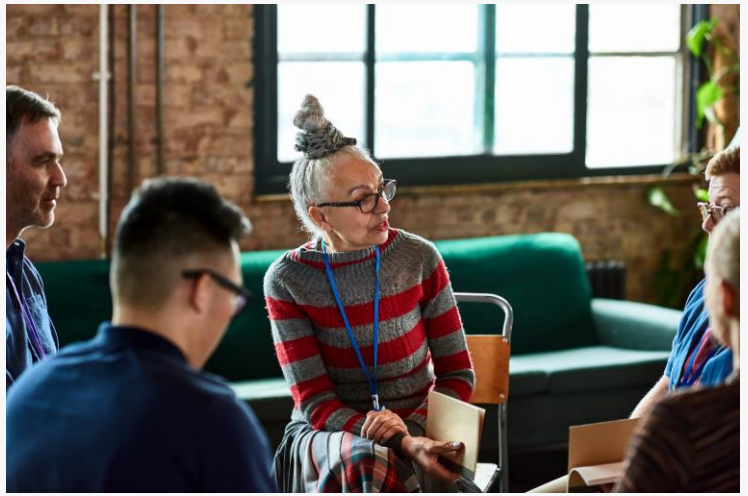
Stay Engaged

Be Willing To Experience Discomfort

Speak Your Truth

Expect and Accept Non-closure

Share the Airtime



The courageous conversations framework
by Glenn Singleton and Curtis Linton

Distribution System Workshop – Office Hours

What are The Office Hours

They are 1-hour sessions held about two weeks after a workshop, scheduled during the lunch hour.

What is the intention of Office Hours

These sessions provide a chance to get follow-up questions answered and dive deeper into topics discussed during a Distribution System Workshop.

Distribution System Workshops

Distribution System Workshop Zoom Link

- Meeting ID: 929 186 2450
- Passcode: 108198
- By phone: 253-215-8782

Office hours:

- Date: Thursday, Sept. 26
- Time: Noon to 1 p.m.

Upcoming meeting:

- Date: Thursday, Sept. 12
- Time: 10 a.m. to 12 p.m.

Agenda

10:00 - Welcome & Meeting Logistics

10:10 - AdopDER Model Inputs to IRP/CEP Update

10:50 - AdopDER Public Interface

11:10 - Grid Needs | How Transmission is addressed in Distribution System Planning

11:55 - Closing Remarks & Next Steps

12:00 - Adjourn



AdopDER Inputs into the IRP/CEP Update

Seemita Pal, Resource Planning Senior Principal Analyst

Distribution System Workshop # 5 | 24 – Sep 12, 2024

Discussion topics

DER forecast methodology

DER forecasts across different scenarios

Level Setting

Who are the users of DER forecasts?

How many times per year do we conduct a run?

What does “Vintage” mean in relation to data inputs and outputs?

How are DER forecasts used for IRP run?

Key Takeaways

'ref', **'lo'** and '**hi'** scenarios investigated for each DER type

In IRP different need futures will be assessed based on DER forecasts

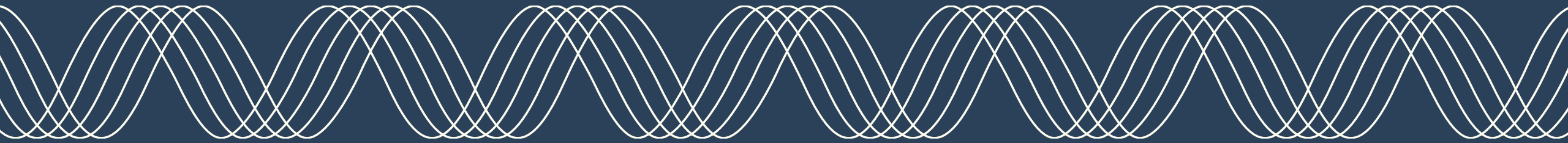
Scenarios account for

- state policies
- incentives
- market shares
- actual adoption data available
- price influences in the future
- future technology costs

Not all the identified potential is cost-effective. The IRP will evaluate supply curves of the non-cost-effective DR potential for any added portfolio benefits.

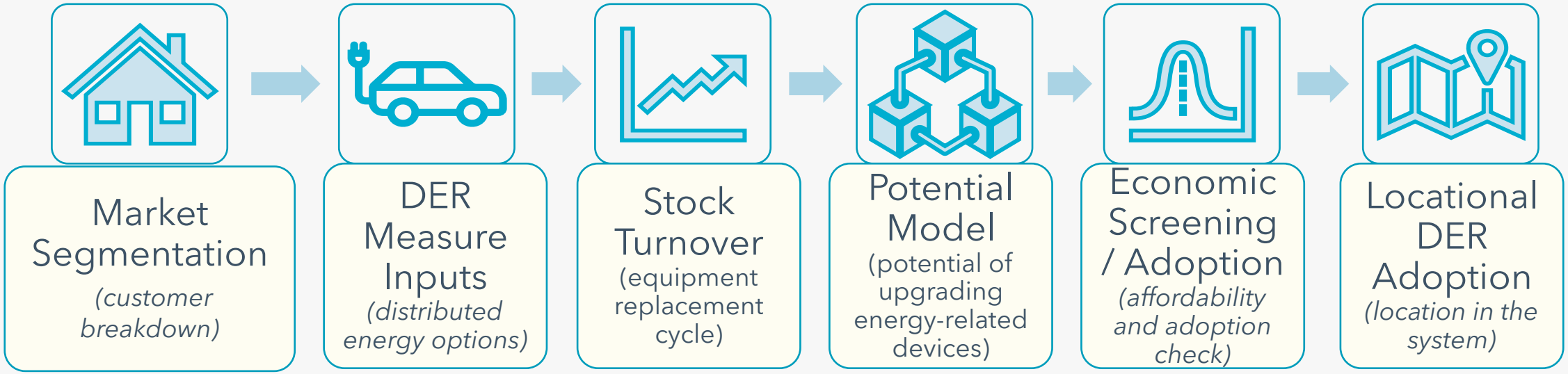
ref = reference case, is a baseline scenario used in forecasting to represent the most likely or expected outcome if current trends and policies continue without any significant change
lo = low adoption scenario
hi = high adoption scenario

DER forecast methodology



Overall Workflow of DER Forecasting Tool

AdopDER: Site-level modeling and simulation tool that estimates locational hourly load impacts from co-adoption of 40+ DERs



Modeled DER Technology Overview

- **Solar and Storage**
  - Solar PV
  - Battery Energy Storage
  - Single-site microgrid
  - Campus microgrid
- **Electric Vehicles**
  - Light-Duty Vehicles
  - Medium-Duty Vehicles
  - Heavy-Duty Vehicles
- **Basic EVSE**
  - Res L2
  - Non-res L2
  - Non-res DCQC
- **Smart Charging**
  - Res Smart EVSE
  - Non-res Smart EVSE
- **Smart Water Heating**
  - ERWH retrofit switch
  - ERWH smart controls
  - Smart ERWH
  - HPWH smart controls
- **Smart HVAC**
  - Res smart tstat controls
  - Res line voltage tstat
  - Res DHP controls
- **C&I DR**
  - Commercial smart tstat
  - Irrigation load control
  - Large C&I tariff
  - Cold thermal storage
- **Non-firm DR**
  - Peak Time Rebates (PTR)
  - Time of Use (TOU) rates
  - EV-TOU

Goal: Measuring Net Load Impacts

Each device and technology studied impacts the net load that the utility is responsible for managing/serving

- understanding how much energy is still required from the power grid after these extra energy sources do their part -

Impacts are measured in terms of

- System capacity
- Energy
- Timing of demand

DER Program Types

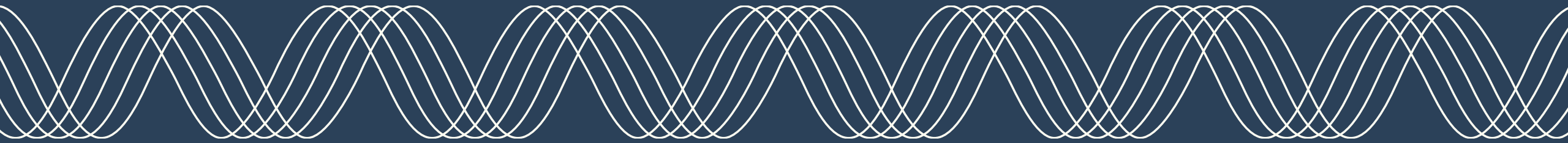
Passive

- ***Non-dispatchable*** (no programmatic control available)
- Examples: standalone solar, customer-operated batteries

Active

- ***Dispatchable*** (programmatic control available)
- Examples: Demand Response (DR), storage (enrolled in program)

DER forecasts across different scenarios

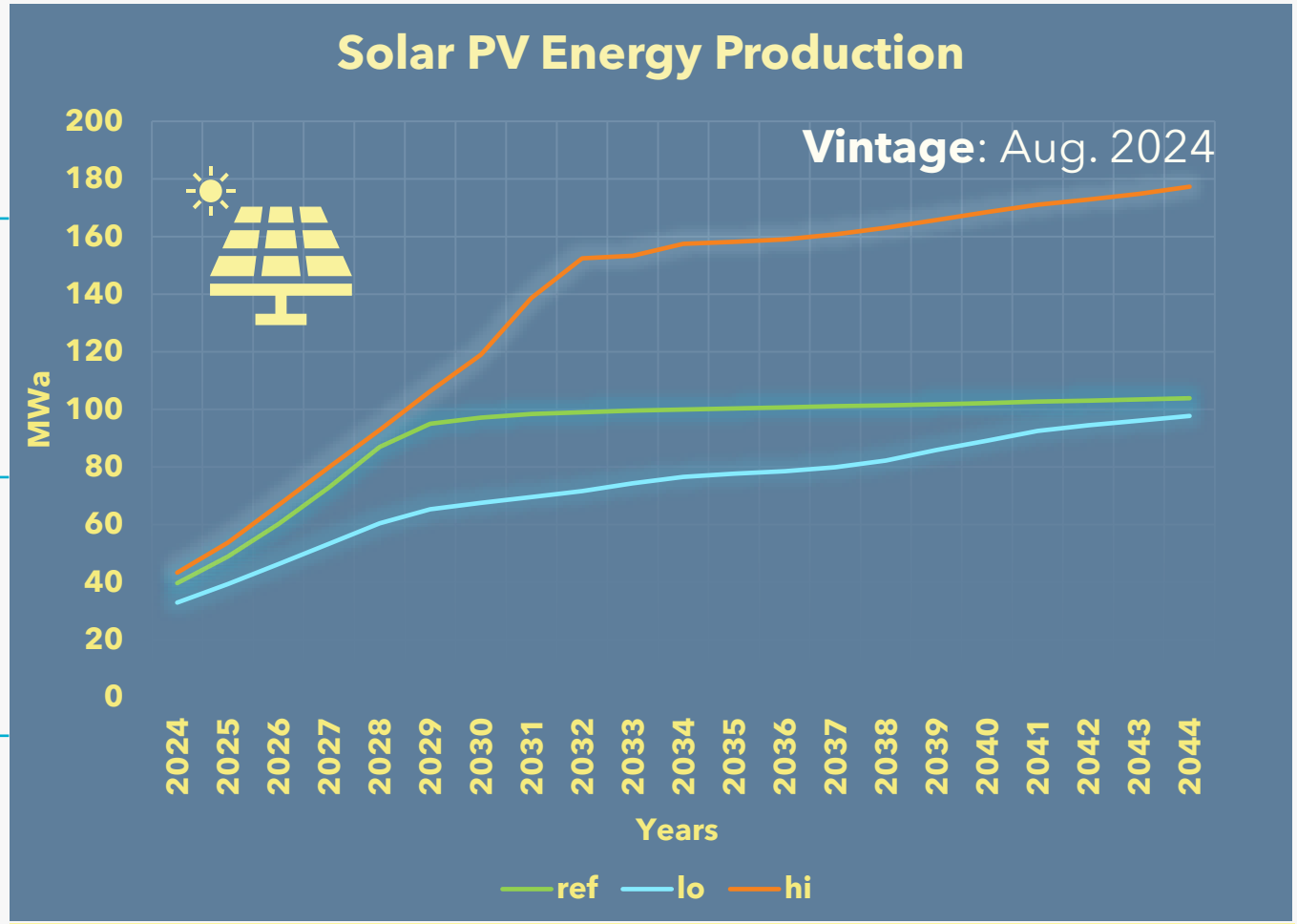


Modeling Solar

Employed bottom-up forecast

Calibrated to existing PGE customer installations from interconnection data

Used NREL's market share information



ref = reference case, is a baseline scenario used in forecasting to represent the most likely or expected outcome if current trends and policies continue without any significant change
lo = low adoption scenario
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Bottom-up forecasting is predicting future energy needs by starting with small, detailed data from individual homes or neighborhoods and adding it up to get a bigger picture.

Modeling Electric Vehicles

Light-duty vehicles (LDV) measure adoption curves are based on market shares provided by EPRI

Scenarios (ref, lo and hi) are formulated based on

- EV purchase price incentives
- Relative price of electricity versus gasoline
- State policies that are favorable to transportation electrification
- Battery costs
- Vehicle capability and model availability

Medium- and Heavy-duty vehicle (MDHDEV): Multi-round expert panel (Delphi approach) to estimate market adoption for short/medium/long term

Using NREL's EVI-Pro Lite tool to analyze charging requirements of expected EV adoption

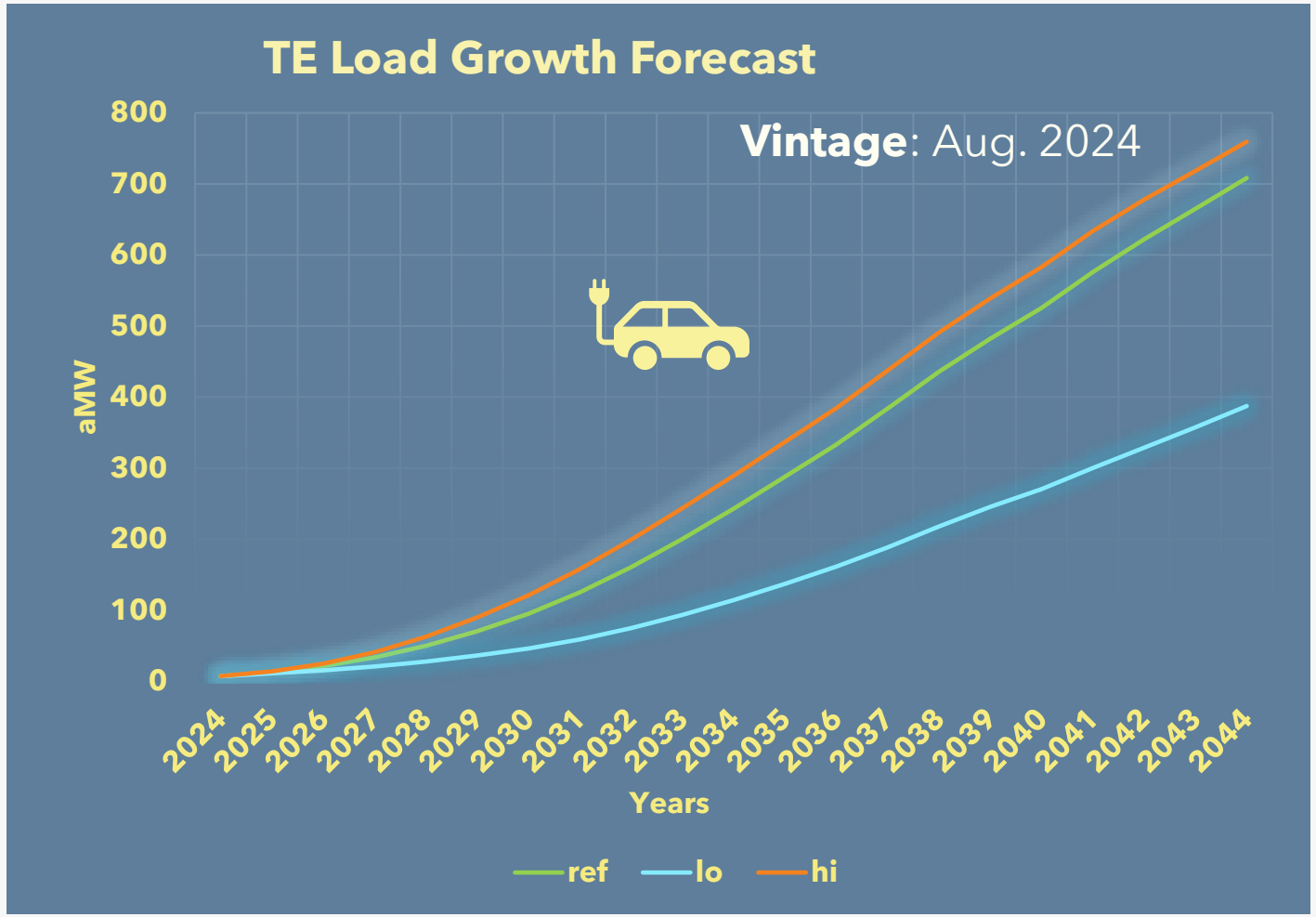
Measure adoption curves show the rate of people starting to use new technologies, like energy-efficient appliances or electric cars, over time, starting slow and then speeding up as more people catch on.

Modeling Electric Vehicles

Covered all segments, including medium and heavy duty

Modeled plug-in hybrids as well as battery electric vehicles

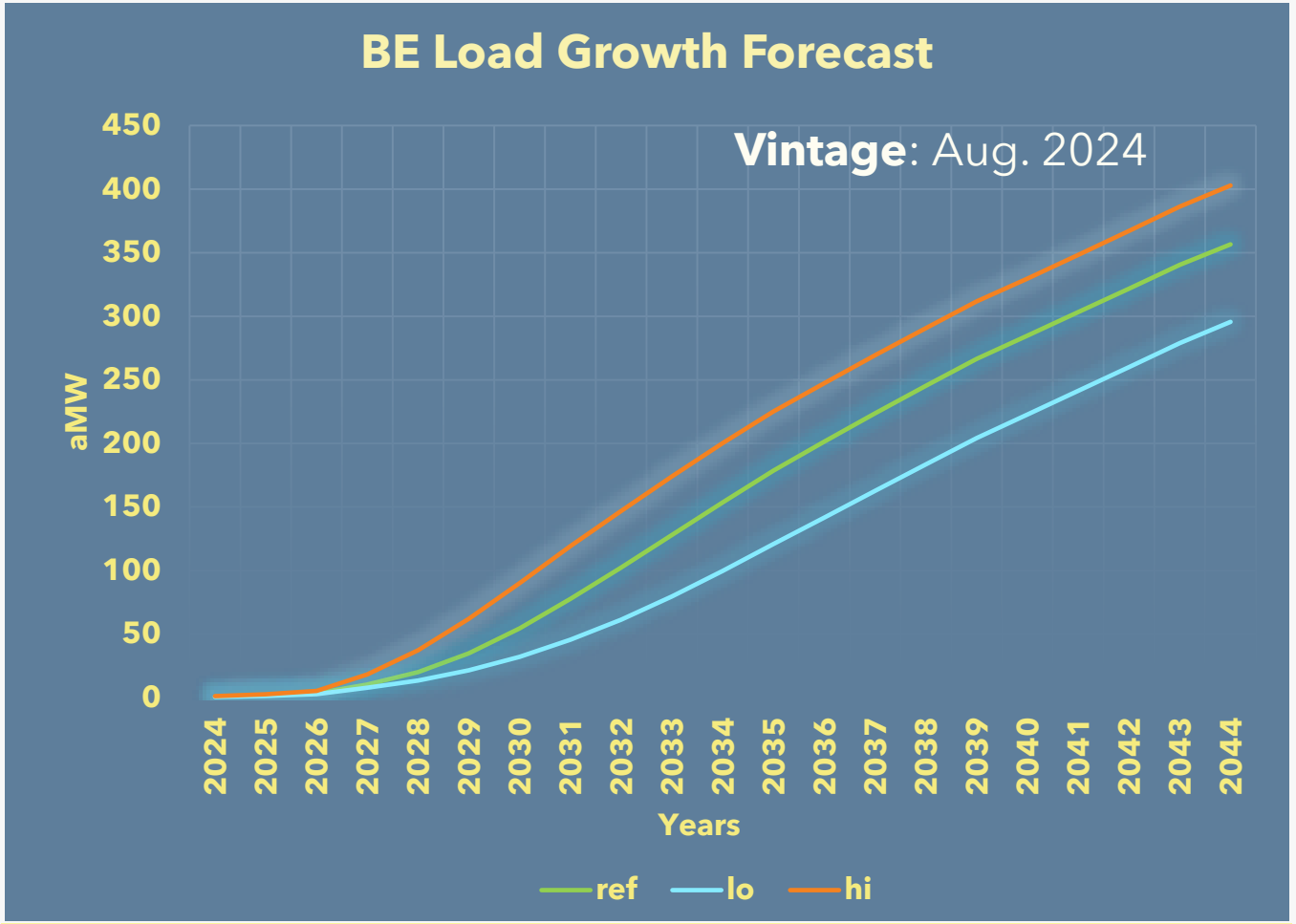
Market landscape has changed since previous study with temporary slowdown in EV adoption especially in MDHD EV categories



Building Electrification (BE) Impacts

Used NREL electrification futures study* for scenarios

Follows-up PGE's 2019 Deep Decarbonization study



***NREL electrification futures study:** Available at [Electrification Futures Study: A Technical Evaluation of the Impacts of an Electrified U.S. Energy System | Energy Analysis | NREL]

Modeling Demand Response (DR)

Inherently a programmatic adoption question (i.e., requires aggregation and control)

Resource cost-effectiveness determined by Total Resource Cost test

- Utilizes utility avoided costs for primary benefits stream
- Leveraging PGE pilot experience for program costs and dispatch patterns

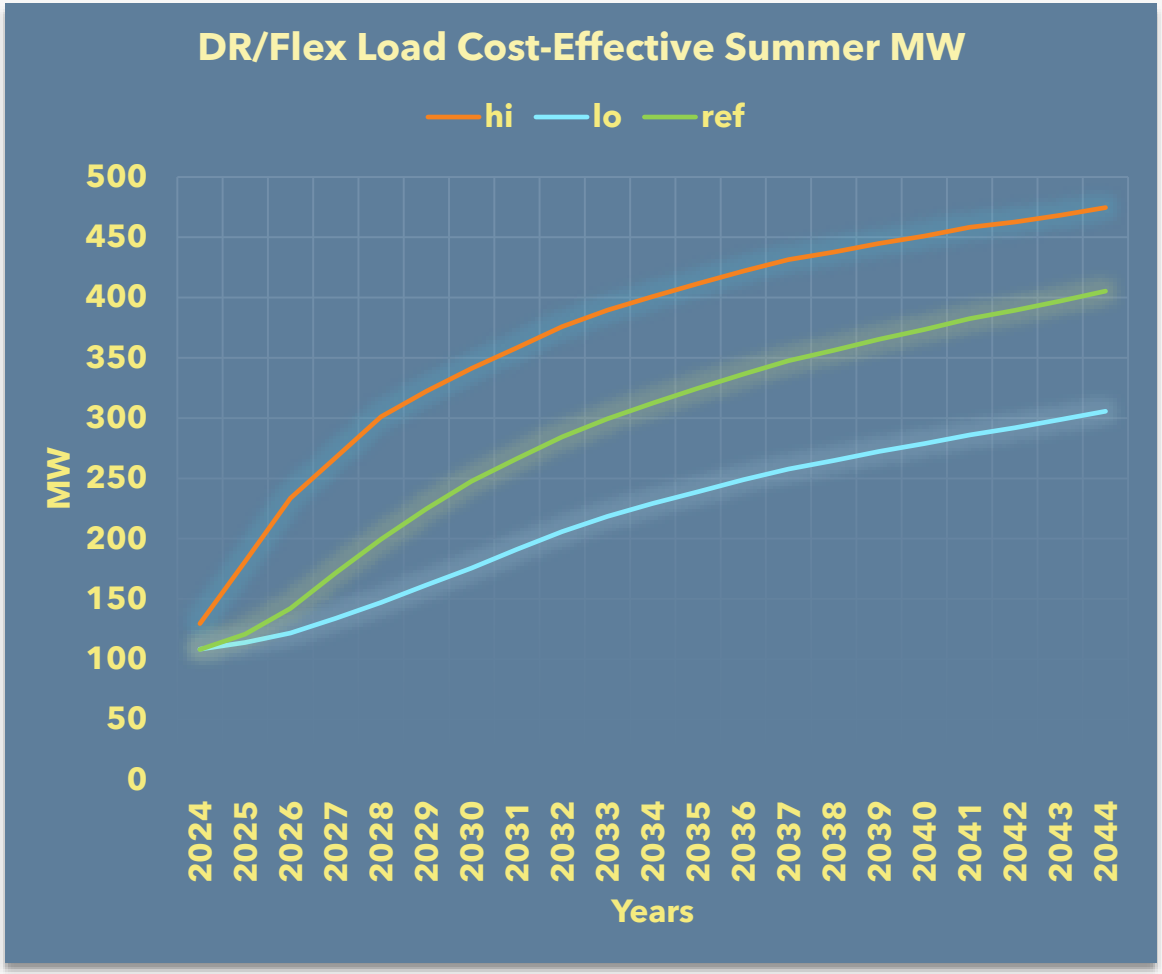
Device functionality phased in over time

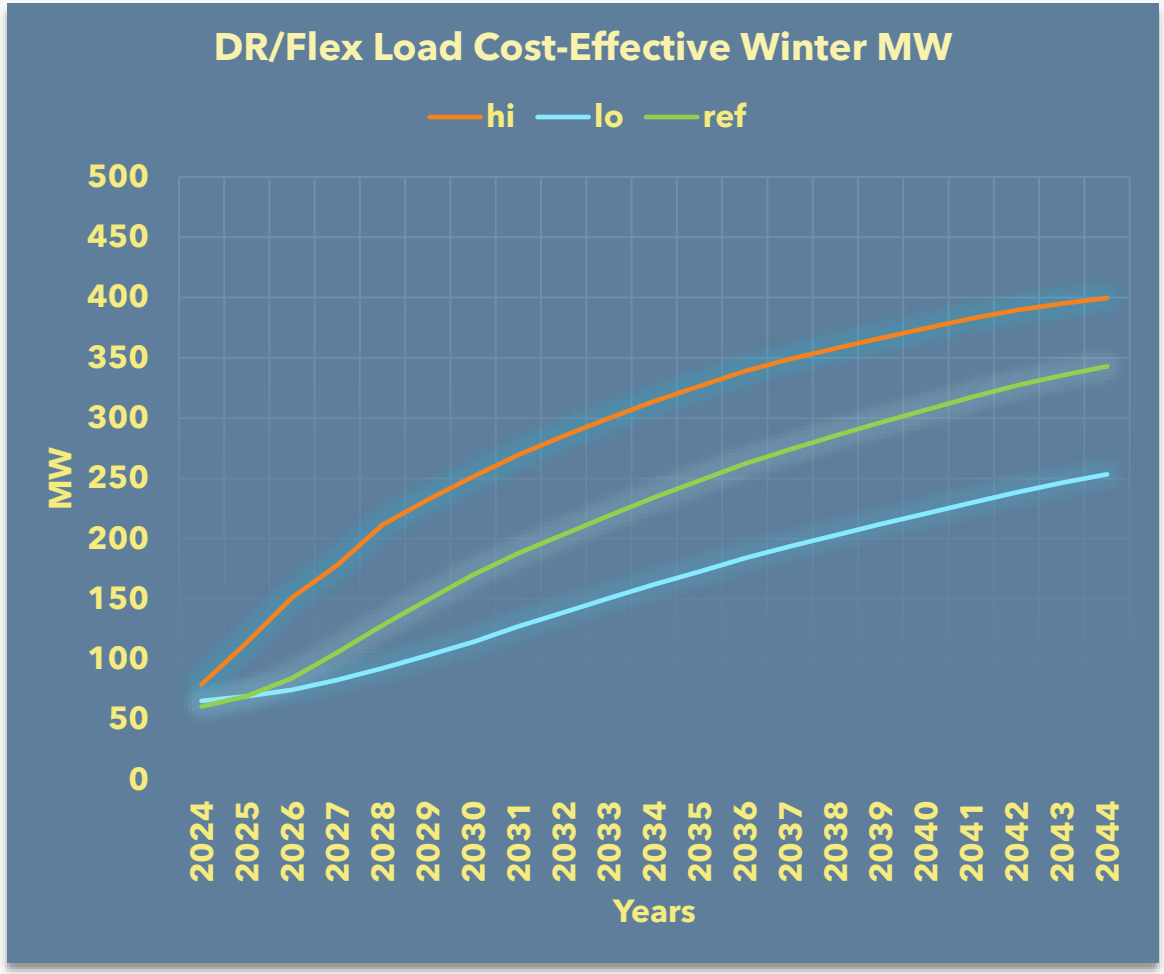
- Accounted for in adoption rates and lower per-unit costs over time
- Accounted for load impacts based on NREL's ReStock model

Study will result in "supply curve" showing amount of DR in terms of levelized $/MW which will roll into IRP update to study possible electric system needs for "non-cost effective" DR

Demand Response is a program where electricity users, like homes or businesses, reduce or shift their energy use during times of high demand.

Demand Response Capacity Impacts





Key Takeaways

'ref', **'lo'** and '**hi'** scenarios investigated for each DER type

Scenarios accounted for state policies, incentives, market shares, actual adoption data available, price influences in the future and future technology costs

Not all the identified potential is cost-effective. The IRP will evaluate supply curves of the non-cost-effective DR potential for any added portfolio benefits.

In IRP different need futures will be assessed based on DER forecasts

TE load growth has decreased from the values reported in 2023 IRP update due to the observed slowdown especially in the MDHD EV categories. BE has slowed down in the short-term but ramps up over the forecasting horizon and in the long term the BE forecasts exceed those used for 2023 IRP.

Questions/ Comments

AdopDER Public Interface

Jason Salmi-Klotz, Strategic Program Planning Senior Manager

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Overview

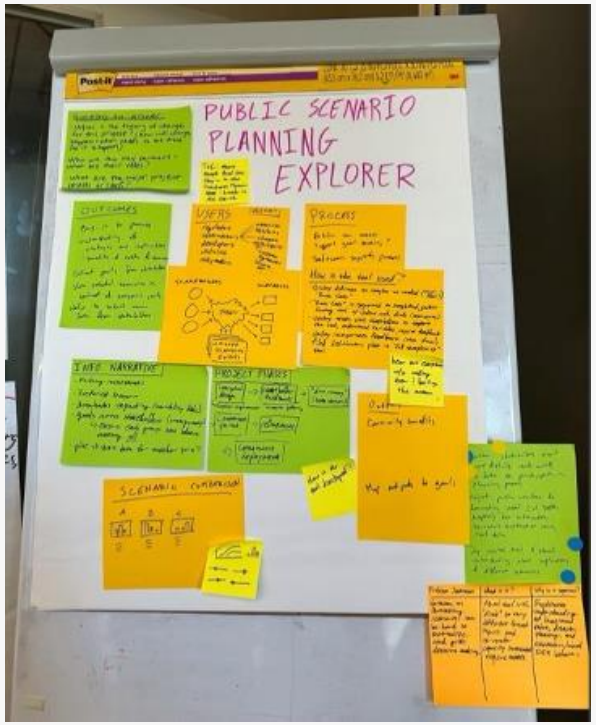
PGE partnering with US Department of Energy

Why creating a public interface of AdopDER

How would the project be approached

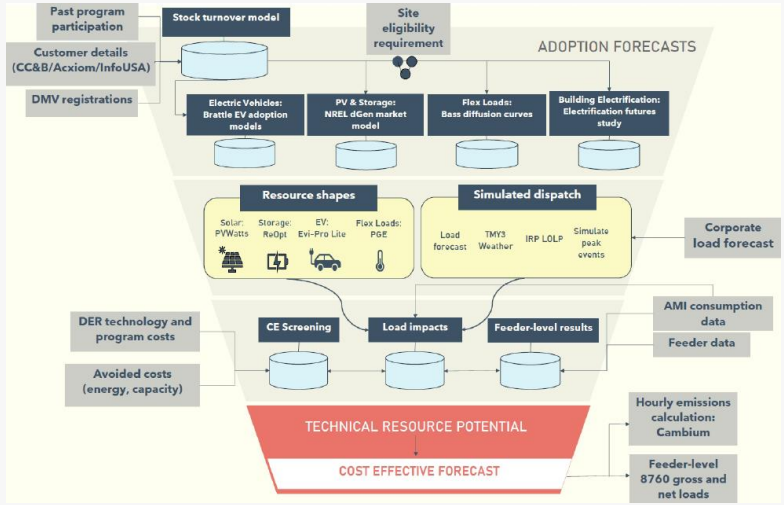
The Big Idea: Data-Driven Public Planning

It all started with a sticky note…



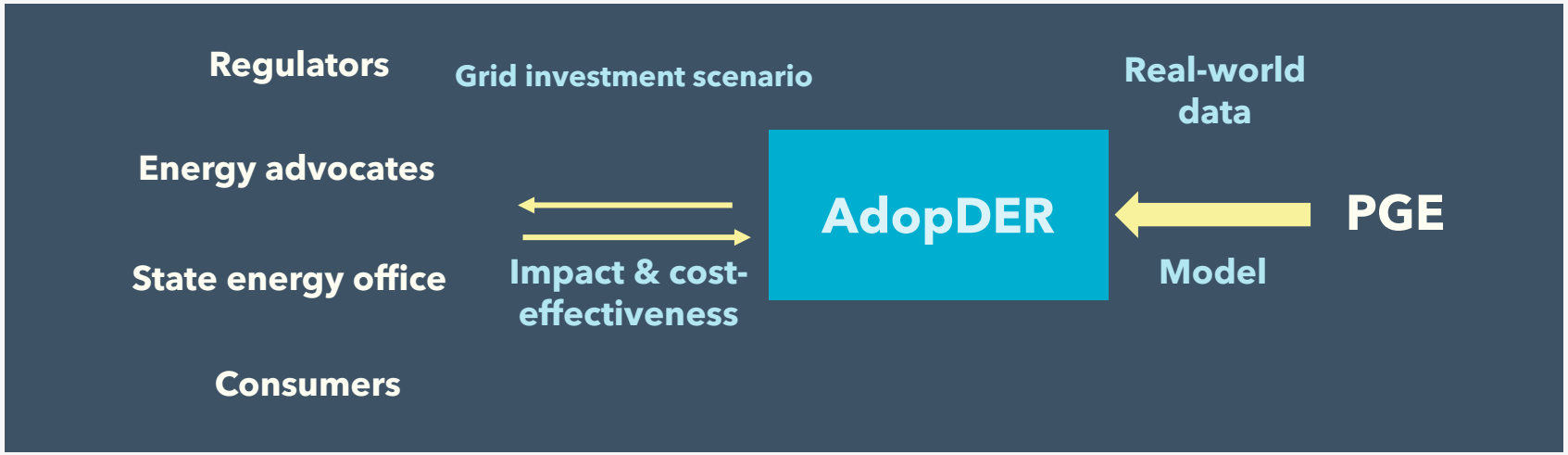
Rocky Mountain Institute Conference
Brainstorming Session on Public Planning

AdopDER – PGE DER Forecasting Modeling Tool



Objective

Develop PGE's distributed energy resource forecasting tool AdopDER with functionalities and public-facing interface to enable stakeholders (such as public utility commission staff and industry or consumer advocates) to develop and assess planning scenarios



Benefits

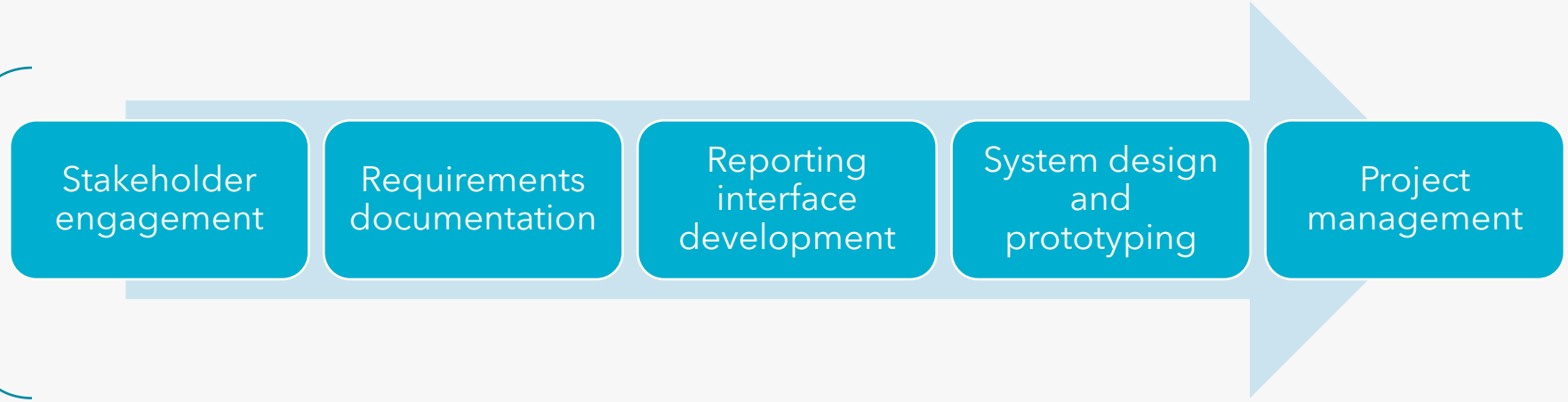
Provide

- Geospatial view of PGE's DER adoption and distribution system load forecast by scenarios, presenting a granular impact of DERs on the overall load for PGE's system
- The ability for stakeholders to create different scenarios as they compare different pathways to decarbonization, and therefore assess their feasibility using same underlying data and models that PGE staff use
- Cost-effectiveness of PGE customer programs by scenarios

The project will strive to demonstrate how sharing access to such large data and sophisticated planning tools would better inform and effectively influence the utility planning and regulatory decisions.

Project Approach

Phase 1: Gather input from key stakeholders and develop functional requirements and working prototype



Phases 2-4 : Execute against identified requirements and design elements.

Phase 2 Develop functional mock-up of the front-end interactions and get stakeholder feedback

Phase 3 Develop back-end computational engine and review results

Phase 4 Develop a full-fledged web application that contains all the features identified helpful for different stakeholders

Next Steps: Stakeholder Participation in Phase 1

Engage with Us Early	We invite stakeholders to actively participate in the initial requirements-gathering process to ensure the tool addresses your needs and priorities.
Collaborative Workshops	Join our upcoming workshops where we will co-create the functional requirements and design prototypes for the public interface.
Shape the Future Tool	Provide input on how the tool should visualize and report data to best support your planning and decision-making processes.
Share Your Expectations	Help us understand the features, functionality, and data integration that will make this tool most effective for your regulatory, advocacy, and planning roles.
Commitment to Transparency	PGE is dedicated to developing a tool that serves both internal and external stakeholders. Your feedback in Phase 1 is crucial to ensuring the tool meets shared goals.


Questions & Comments

Grid Needs

How Transmission is addressed in Distribution System Planning

Fatima Colorado, Distribution Planning Manager

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Discussion topics

Overview of Transmission and Distribution Planning

Transmission Planning Overview

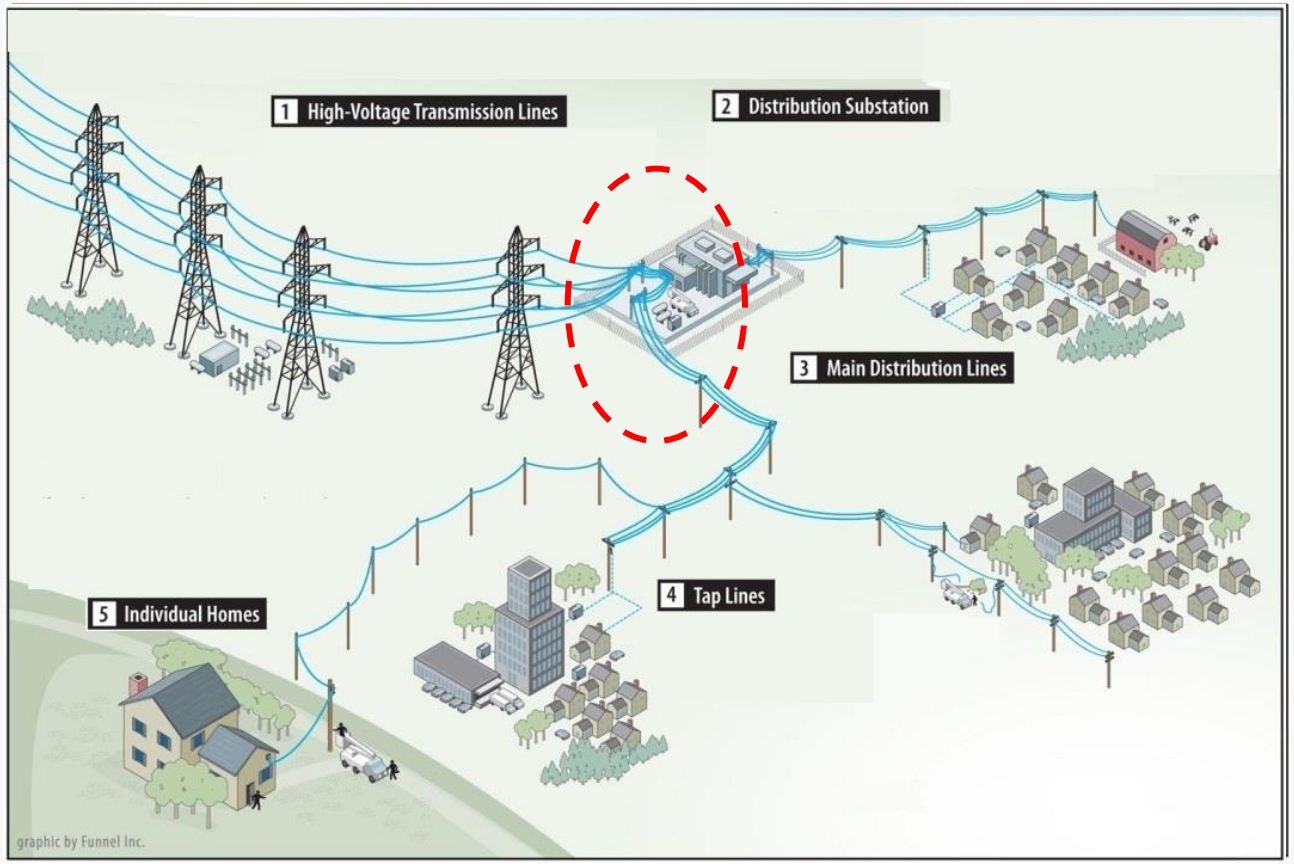
Distribution Planning Overview

The Grid

One-way Power Flow

Generation → Transmission → Distribution Substation → Distribution Lines → Homes

- **Built for peak demand:** The system is designed to handle the highest demand times, so it's built slightly larger than needed to avoid frequent upgrades.
- **Increasing demand for electricity requires upgrades:** As customer demand grows (e.g., population growth, economic development), parts of the system may need to be upgraded to handle more power.
- **Major upgrades may need new infrastructure:** Sometimes the increased demand requires a new substation and every substation is supplied by transmission (Tx) lines, so new Tx will need to be built as well.

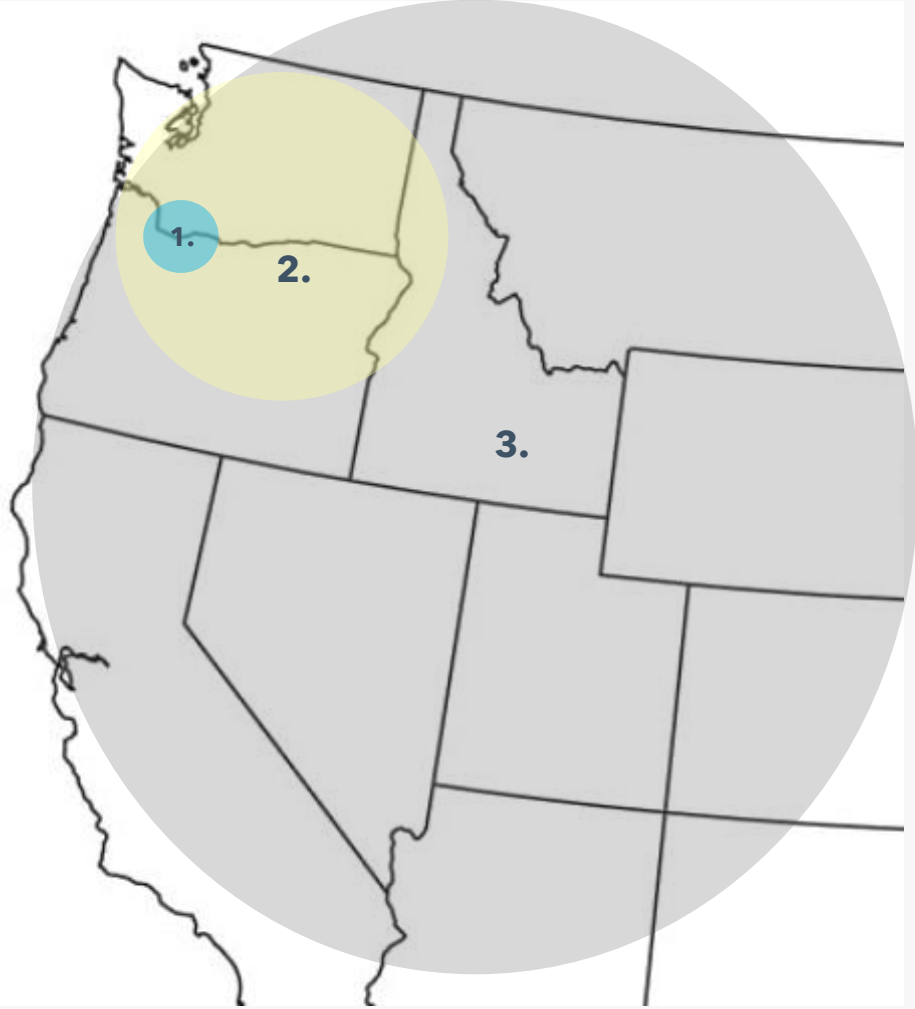


PGE's Three Concentric Circles:

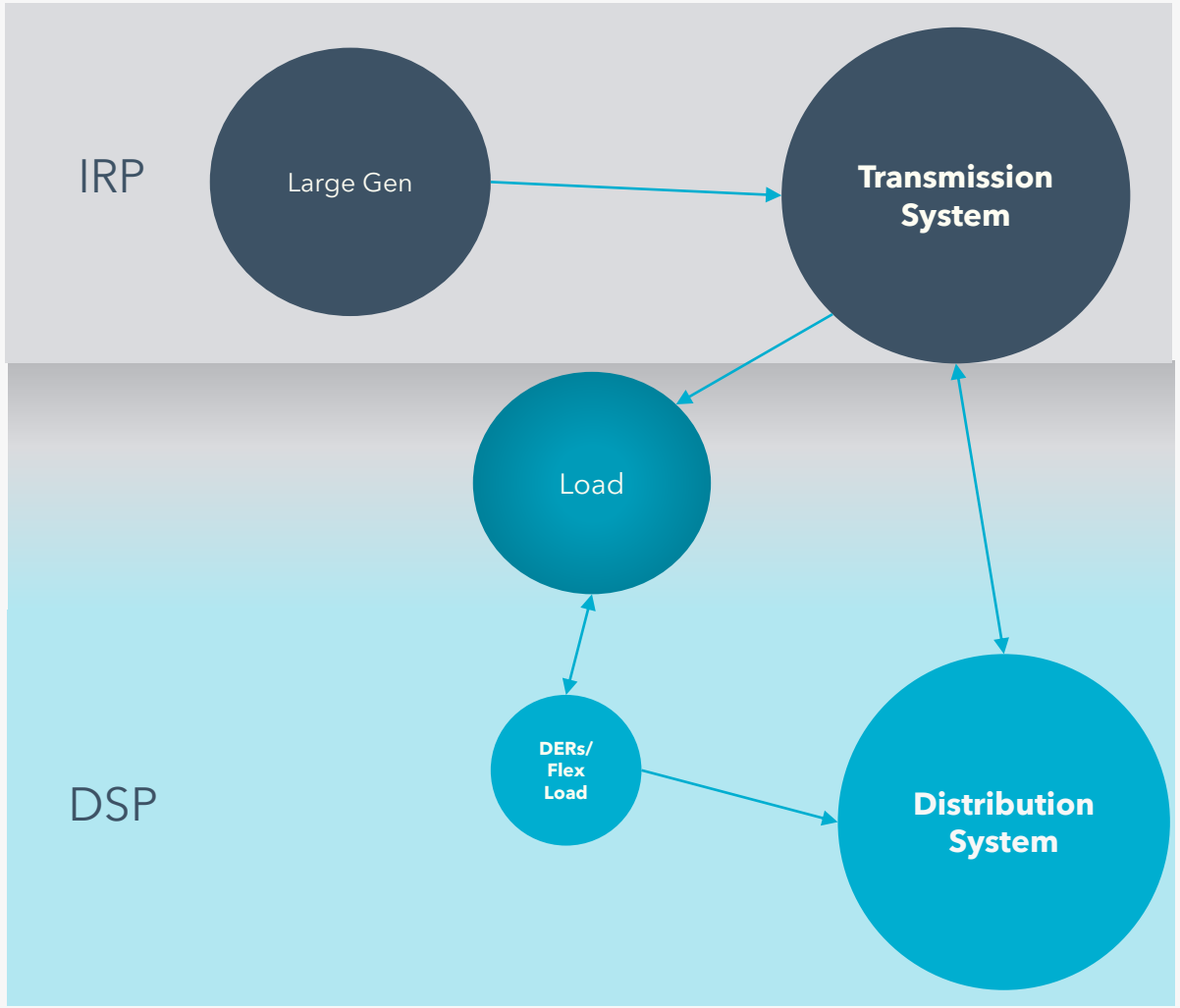
1. PGE's System
Essential for last-mile transmission to serve load from assets on and off our system

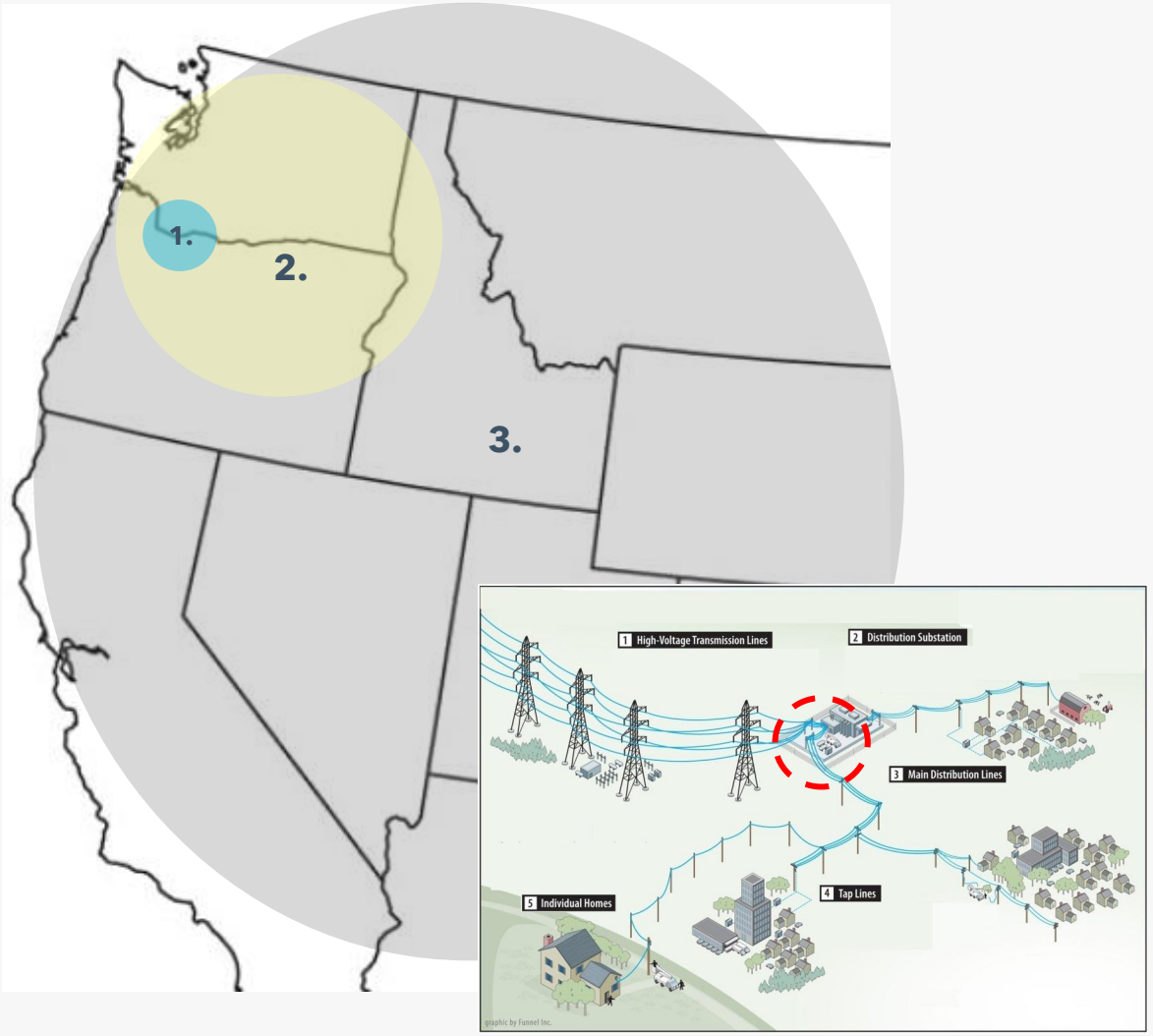
2. BPA & PGE Interface
Incremental capacity to bring power from our region via BPA's system, which encapsulates our service area, to get the power into PGE's area

3. Regional, Interregional Projects
Expand access to least cost intermittent resources, such as wind in Wyoming and sun in the desert Southwest



Overview of Transmission and Distribution Systems





Transmission Planning Overview

Guided by NERC TPL-001-5 Planning standards that requires certain performance standards

- Ensures reliability of the bulk electric system under various system conditions
- Example: Contingencies (failures of elements)

Studies system at various loading conditions

Planning horizons

- Near-Term 2-year & 5-year
- Long-Term 10-year

Issues are identified (**Transmission Needs**) and Corrective Actions (**projects**) are developed to mitigate them

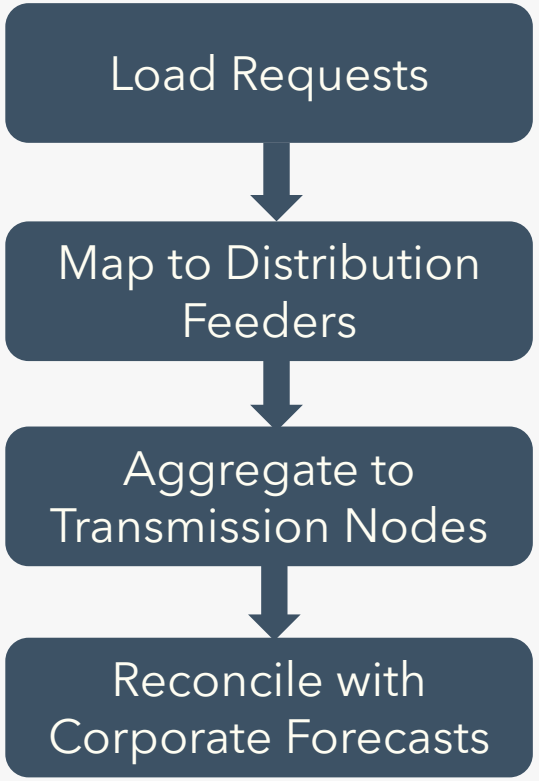
PGE's system is embedded within BPA's transmission

Regional planning coordination

Transmission/Distribution Planning Interface

Describe

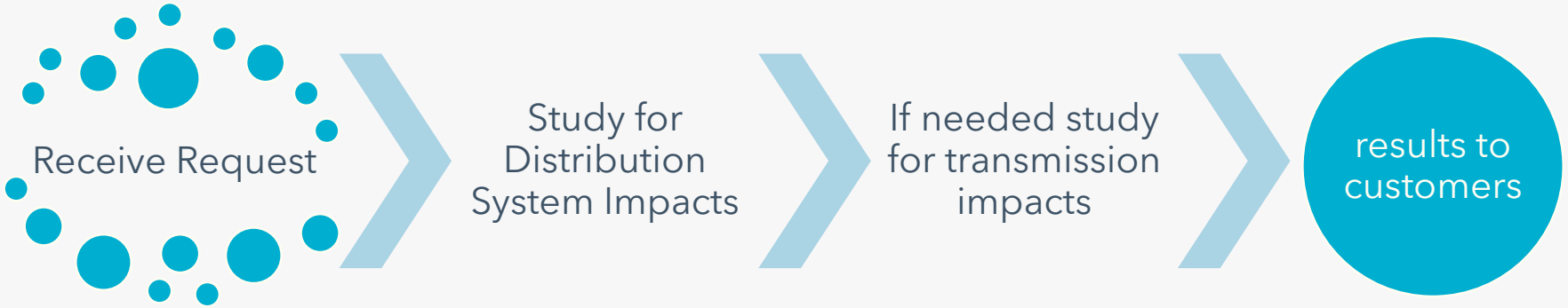
- Corporate Load Forecasting (PGE's total energy forecast)
- Collection of load requests (example: new subdivision)
- Load Allocation to transmission bus/node model
- Yearly updates



Distribution Planning – How Load Requests are Handled

Yearly Planning Process

Spot-load request handling process



Loads proceeding to connect → marked as confirmed in the load planning → system upgrades planned and tracked in planning models

Distribution Planning – Spot-Load Request Process

Load Request

Distribution Planning receives a load request from a new or existing customer

Deliverables: Options and timeline

Initial Assessment

- Distribution Planning conducts a system study and determines point of connection within the distribution grid
- Transmission Planning conducts a system study
- Both teams develop options for Substation, Transmission and/or Distribution upgrades if necessary

Deliverables: Conceptual scope and timeline range

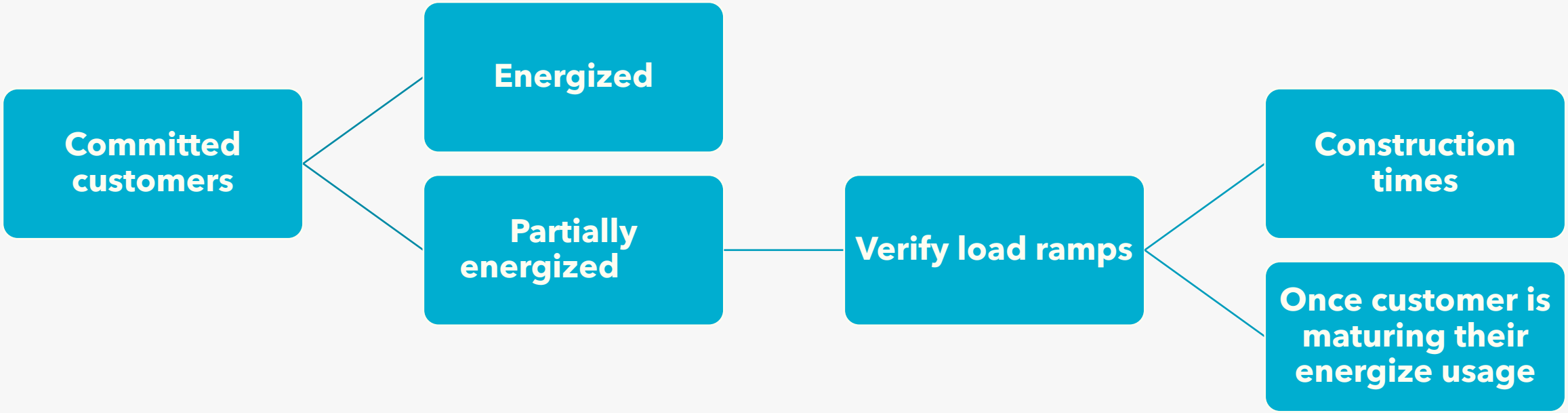
2nd Assessment

- Team continues to refine options
- ID Long Lead materials (supply chain related)
- Identify cost estimates and conceptual schedule

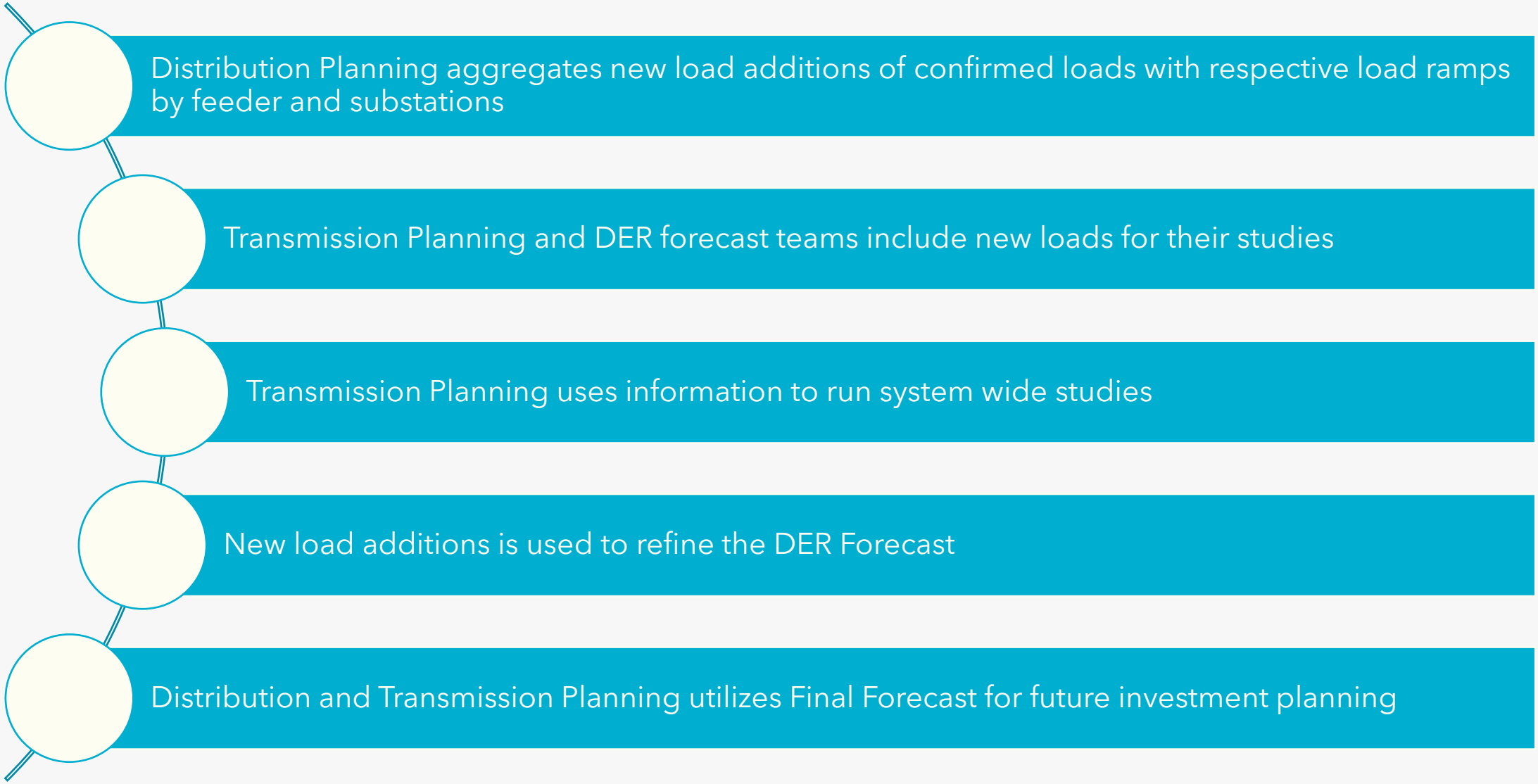
Deliverables: Conceptual scope, estimate and schedule

Distribution Planning – Yearly Planning Process

List of customer requests



Yearly Planning Process



Distribution Study Process

Studies system at various loading conditions

Planning Horizons

- Near-Term: Two & Five-year
- Long-Term: Ten-year

Issues are identified (**Grid Needs**) and Corrective Actions (**projects**) then are developed to mitigate it

Integration of Transmission and Distribution Planning

Transmission Planning

Guiding Standards: NERC TPL-001-5 for system reliability and contingencies

Planning Horizons:

- Near-Term (2 years)
- Mid-Term (5 years)
- Long-Term (10 years)

Regional Coordination: Embedded within BPA's transmission network

Distribution Planning

Load Forecasting:

- Collection and mapping of load requests to distribution feeders
- Aggregation at transmission nodes

Load Request Handling:

- Yearly and spot processes for new and expanded loads
- System studies for necessary upgrades

New Load Management:

- Aggregation by feeder and substation
- Informs transmission and DER forecasts

Integration and Coordination

Coordinated planning ensures a resilient, adaptable utility infrastructure capable of meeting current and future energy demands

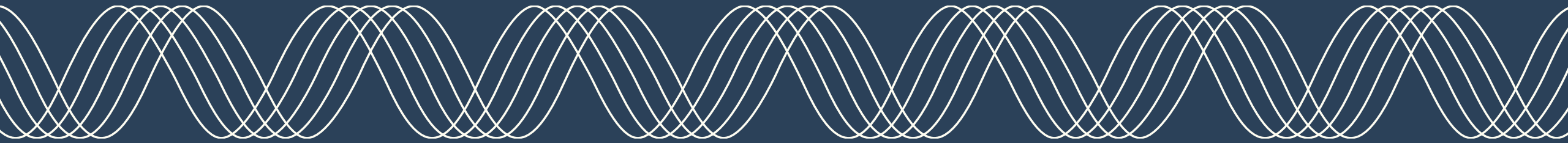
Annual Updates: Ensuring transmission and distribution systems adapt to changing demands

System Alignment: Continuous alignment between local distribution needs and regional transmission capacity

Future Preparedness: Planning for future growth and integration of Distributed Energy Resources (DERs)

Questions/ Comments

Next Steps and Closing Remarks



Next Steps & Closing Remarks

- Tuesday Sep 17 | Updated DSP Guideline Revisions | UM 2005
- Tuesday Sep 24 | Public Workshop | UM 2005
- Wednesday Sep 25 | 10a-12p | Zoom | CBIAG Meeting
- Thursday Sep 26 | 12-1p | Zoom | Distribution System Workshop | OFFICE HOURS
- Wednesday Oct 2 | 9-11:30a | Zoom | CEP/IRP Roundtable
- Thursday Oct 24 | 10a-12p | Zoom | Distribution System Workshop

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

kind of energy