DECEMBER 18, 2024

Distribution System Plan

Distribution System Workshop

Distribution System Workshop # 6 | 24 – Dec 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

Agenda

10:00 - Welcome & Meeting Logistics (5 min) Shadia

10:05 – DSP 2024 document outline & context setting

10:15 – DSP Vision and Strategy

10:35 – Virtual Power Plant & Benefit Cost Analysis of the Platform

11:00 – Near term action plan

11:20 – DER Forecast

11:30 – Traditional and Non-traditional grid needs/ solutions

11:55 - Closing Remarks & Next Steps

12:00 - Adjourn

DSP - Document Outline

DSP Guidelines- Process and Timing:
1.c. Each utility will present the results of the filing to the Commission at a public meeting

- Executive summary
- Reader's guide – Important terms
- Chapter 1. Distribution system vision
- Chapter 2. Distribution system strategy
- Chapter 3. DER forecasting
- Chapter 4. Technology foundations for a bi-directional grid
- Chapter 5. Virtual Power Plant (VPP)
- Chapter 6. Traditional infrastructure needs and solutions
- Chapter 7. Empowered communities
- Chapter 8. Action Plan (2-4 yrs)

Main body of the document
~120 pages

- Appendix. A Compliance crosswalk
- Appendix. B Distribution planning process
- Appendix. C Stakeholder feedback
- Appendix. D Multi-Year Plan 2024 – Program descriptions
- Appendix. E Description of solutions to address grid needs
- Appendix. F Grid modernization long-term plan and workstreams
- Appendix. G Forecast results and AdopDER
- Appendix. H Annual reliability report
- Appendix. I Baseline data
- Appendix. J Capital planning process

Appendices (minus one-pagers)
~200 pages

Distribution System Plan (DSP) context setting

What is it?

- **For the Commission and Staff** – transparency and cost containment
- **For Customers and Stakeholders** – an opportunity to weigh in on investment decisions
- **For PGE** – an opportunity to explain our current Strategy/direction for distribution investments

Why submit now?

- Fall submission aligns with PGE's project planning process
- Avoid concurrent submission of DSP and 2023 CEP/IRP Update by staggering filings
- CEP/IRP and DSP to be informed by each other's analysis

Problem Statement

Traditional energy grid must evolve to support clean energy transition while maintaining affordability

Growing distributed energy resources (DERs) need integration into modernized grid infrastructure

Resource and load flexibility becoming critical with shift to variable renewable resources

Approach

Grid Solutions
(Primary)

- Modernize infrastructure for two-way power flow
- Build Virtual Power Plant network
- Target: 25% of peak met w/DERs by 2030
- Enable DER integration and optimization
- Balance reliability with renewables

Customer Benefits
(Resulting)

Enhanced customer control over energy use and bills

Affordability

- Beneficial rate structures
- Shared system benefits
- Connected home resources (solar, batteries, Evs)

DSP Vision & Strategy Ch 1 & Ch 2

Jason Salmi-Klotz, Senior Manager Strategy & Planning

Strategic Program Planning

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Overview of the DSP

Two Tracks of Focus

Operational

Activities and investments to *maintain reliability in today's environment*

Traditional solutions, such as equipment upgrades, ensure grid reliability

Transformational

Activities and investments to *address future challenges*

Distributed Energy Resources (DERs) and orchestration offer:

- Alternatives to traditional solutions
- Improved grid efficiency
- Asset longevity and avoided costs

The Vision: Virtual Power Plant (VPP)

Enhanced System Management

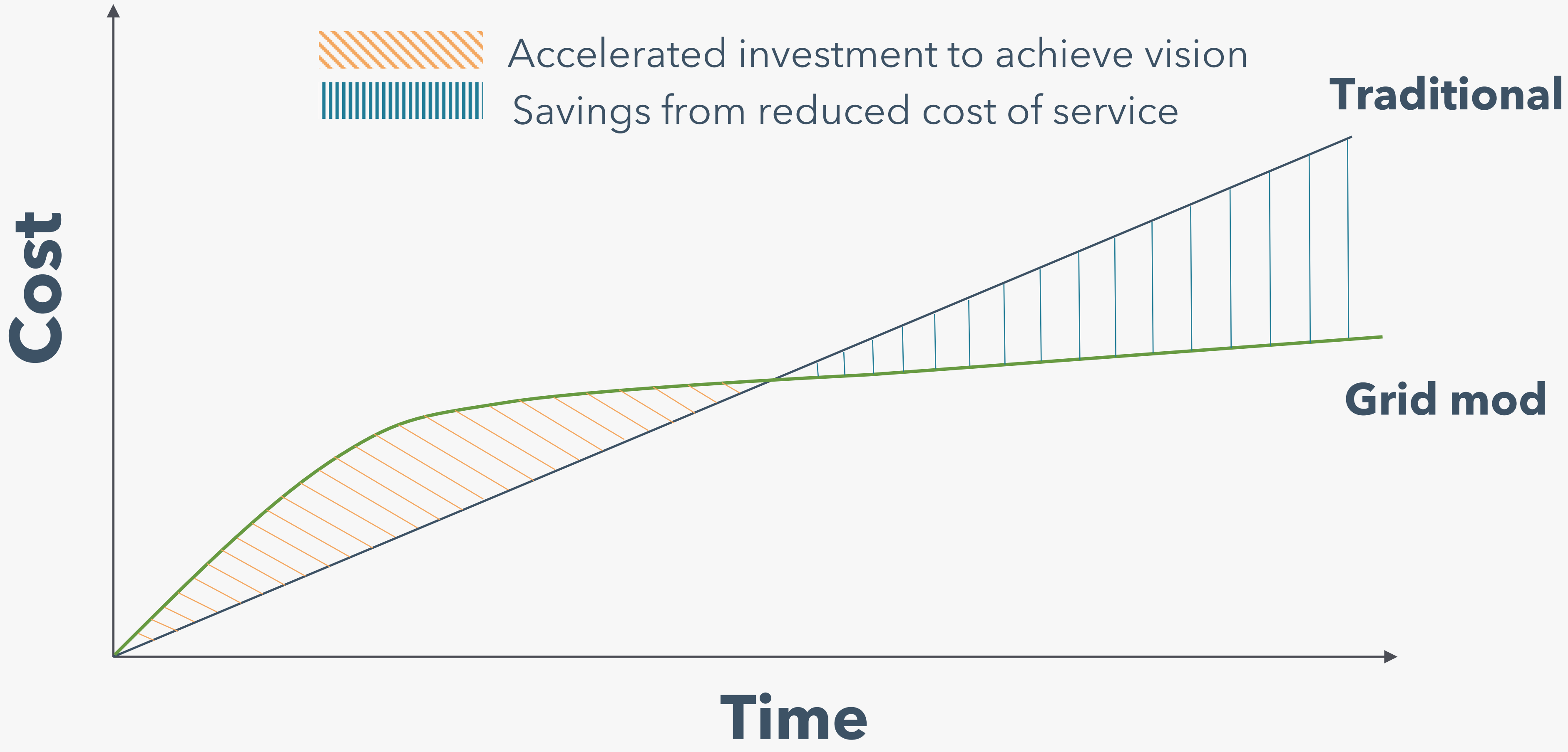
Combines traditional solutions with DERs for dual benefits:

- Reliability
- Additional customer advantages

DSP Alignment

- Supports revised DSP guidelines
- Incorporates a full discussion of VPP development to orchestrate DERs for:
  - Greater grid and customer benefits
  - Quantified impacts outlined in the accompanying benefit-cost analysis

Illustrative Graph: Cost of service impacts of our vision



Vision – modernize the distribution system to enable bi-directional powerflow which unlocks customer value and mitigates increases in cost of service in the long-term

Strategic Pillars & Actions

Grid Modernization

Situational Awareness & Response

Advance initiatives for modernizing the grid, integrating digital technologies to improve system performance, resilience and enable a bi-directional power flow.

Examples include: ADMS/DERMS, DA

DER Integration

Facilitate the integration of distributed energy resources (DERs) to support grid resilience and enhance energy management capabilities in real time.

Examples include: Communication and operational standards, new planning practices

Accelerating DER Deployment

Leverage existing & new delivery channels - Co-deploy with Partners

Increase adoption of current measures, seek deployment and measure development partnership with the ETO and NEEA. Support Federal and local grant awardees to maximize each dollar spent and accelerate DER deployment

Deliver Value through Programs & Services

Implement measures to reduce bills for both participating and non-participating customers through customer programs and rate designs.

Examples include: Energy efficiency, flex load, self generation, Time of Use

Virtual Power Plant

Build and optimize a distributed resource

Model, standardize and deploy existing and new resources to capture a suite of grid services capable of operating as a power plant from within the distribution system

Reduce Cost of Operations

Develop operating procedures that enable deferral of infrastructure investment or energy purchases.

Examples include: Advanced powerflow, locational resource valuation, non-wire solutions


Questions & Comments

Virtual Power Plant

Jason Salmi Klotz, Senior Manager Strategy & Planning
Strategic Program Planning

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Document structure/location

- Chapter 5. Virtual Power Plant (VPP)
  - 5.1 Virtual Power Plant
    - 5.1.1 What is the VPP
    - 5.1.2 Why develop a Virtual Power Plant
    - 5.1.3 Examples of the services that will be provided by the VPP
    - 5.1.4 VPP resources: Flexible load programs
    - 5.1.5 VPP resources: Distributed supply (solar + storage)
    - 5.1.6 VPP resources: Distributed thermal
    - 5.1.7 Technology platform
  - 5.2 Benefit cost analysis

Objectives of this chapter:

- Demonstrate capabilities necessary to deliver an NWS and a VPP that involves customer-sited DERs
- Demonstrate delivery and measurement of community benefits
- Investigate how CBREs can deliver an NWS or otherwise address grid needs

Capabilities Required for NWS/VPP

Capability	Description
Grid Modeling & Analysis	Digital twin/network model development, including analysis of SCADA and field sensor data, typology models and control settings, and DER performance data.
DER Control & Dispatch	Design and implement DER controls, including DERMS alignment, lab simulation, hardware-interoperability and testing, OEM communication and coordination.
Product Design & Marketing	Analyze customer composition of chosen locations, assess customer preferences/needs, customize product offerings to maximize participation/adoption, incorporate considerations for disadvantaged populations, design and implement measurement and evaluation framework.
Contractor Training & Management	Identify installers who are willing to add NWS requirements to the install process, work with installers to design efficient installation processes, prepare installers to configure DERs to integrate with PGE systems/controls.
ADMS/DERMS Controls Integration	Configure ADMS/DERMS to recognize and operate NWS DERs, develop operations procedures to cover NWS use cases.
Equity Lens	Apply environmental justice principles in the deployment of DER-based solutions

Collectively, VPPs Can Deliver a Range of Benefits

Customer Community Benefit	Cost Control	Reliability & Resilience	Decarbonization	T&D Infrastructure Relief
• Enable consumers to optimize energy cost, use, and source • Retain and create good jobs • Compensate consumers and businesses	• Energy market risk mitigation • Defer grid capex (generation, T & D) • Avoid fuel costs	• Integrate back-up power • Eliminate single-point-of-failure	• Add distributed renewable generation • Reduce curtailment of renewables • Reduce reliance on fossil fuels	• Increase efficiency by smoothing peaks • Alleviate congestion with local dispatch

Source: https://liftoff.energy.gov/vpp/

PGE's VPP Vision

PGE will enable customers to shift their power usage from peak times while providing reliable and affordable energy

DEFINITION: The orchestration of Distributed Energy Resources and Flexible Load, through technology platforms, to provide grid and power operations services.

OUTCOME: 25% peak usage offset while supporting 100% of customer energy needs by targeting over 2,000 VPP-enabled megawatts by 2030.

VIRTUAL POWER PLANT

Resource	Flexible Load	Distributed Solar + Storage		Distributed Thermal[2]	Utility Storage
2024	105 MW	0 MW [1]	+ 27 MW	114 MW	275 MW
2030	250 MW	350 MW	+ 150 MW	300 MW	600 MW+
Examples	Example: Customer Programs in Multi-Year and TE Plans	Example: Community Based Renewable Energy		Example: Customer Dispatchable Standby Generation	Example Sundial Battery Storage
Technology	**Technology Platforms** — Examples: Advanced Distributed Management System, Distributed Energy Resource Management System				Example Energy Management Sys.

Utility Storage is complementary to VPP

(1) Distributed Solar interconnected capacity from the Net Energy Metering Program is approximately 286 MW in Sep 2024; excluded from VPP because it is not integrated with PGE's VPP technology platforms.

(2) Distributed Thermal represents the customer back-up engines in the Dispatchable Standby Generation (DSG) program.

Questions/ Comments

Benefit-Cost Analysis of the Modernized Grid Platform

Seemita Pal, Senior Principal Strategy & Planning Analyst
Distributed Resource Planning

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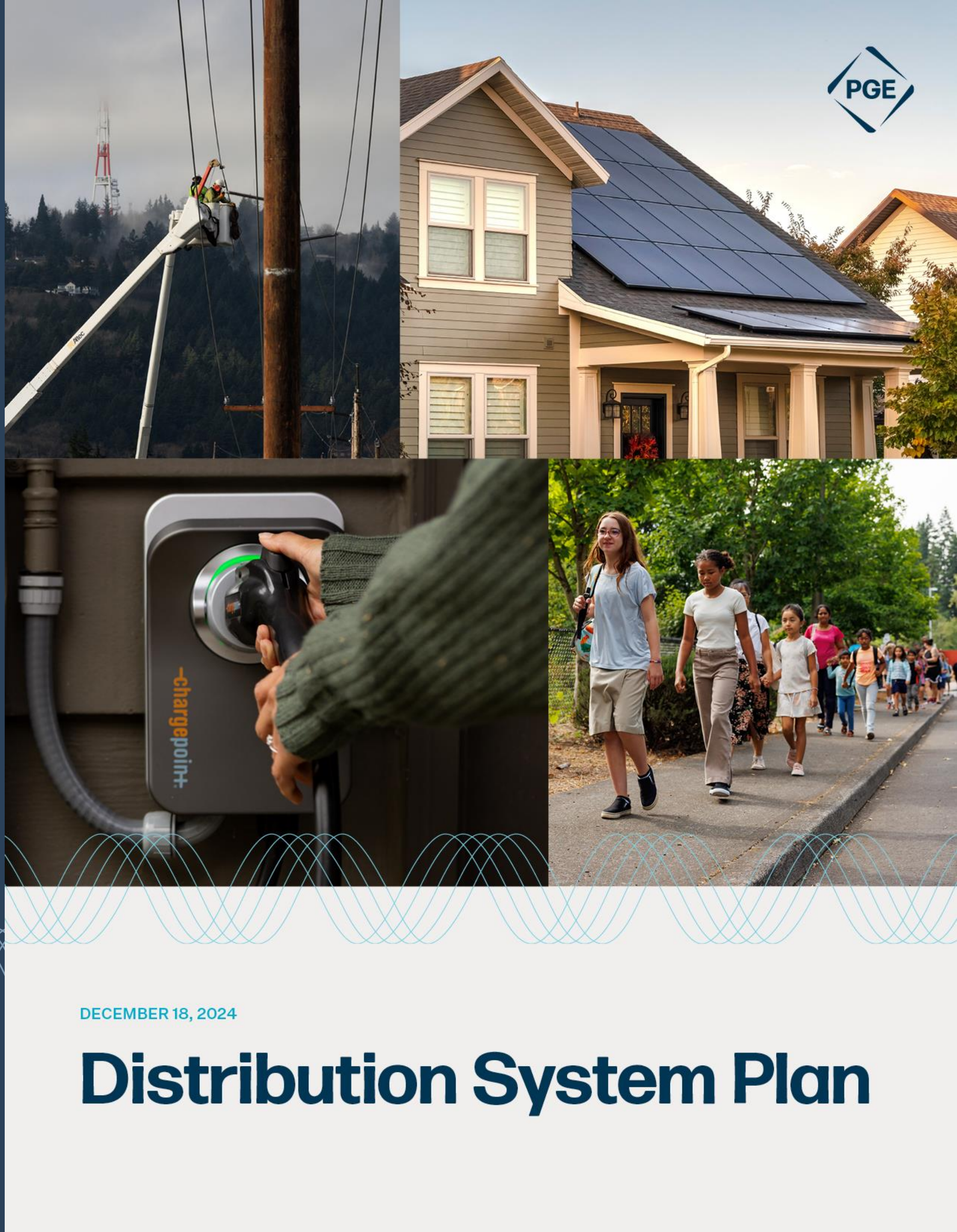

PGE An Oregon kind of energy.℠

Document structure/location

- Chapter 5. Virtual Power Plant (VPP)
  - 5.1 Virtual Power Plant
  - 5.2 Benefit cost analysis
    - 5.2.1 Scope of analysis
    - 5.2.2 Benefit-costs tests
    - 5.2.3 Costs
    - 5.2.4 Quantitative impacts
    - 5.2.5 Qualitative impacts
    - 5.2.6 Assumptions
    - 5.2.7 Approach
    - 5.2.8 Discussion of results

Objectives of this chapter:

- Conceptually demonstrate that PGE's vision for the distribution system has a customer benefit
- Provide an assessment of benefits and costs that can be realized through a modernized grid
- Define and quantify benefit streams brought about by grid modernization and VPP

Benefit Cost Analysis (BCA) of VPP Portfolio

Initial benefit-cost analysis shows the Virtual Power Plant **would deliver benefits that outweigh the costs over 20 years**, demonstrating quantifiable returns on investments for PGE customers and the system.

Motivation

- PGE's Leadership requested to perform BCA for DSP
- Utilities like AES Ohio, Eversource Energy etc., have included BCA of their proposed grid modernization plans to justify the investments
- Preliminary BCA will help Staff and stakeholders' have insight in the customer value that VPP delivers

Approach

- Identified distribution projects that serve as VPP resources or enabling technologies
- Adopted the industry-leading National Standard Practice Manual for DER Benefit-Cost Analysis, incorporating utility best practices and TRC calculations
- Integrated valuable input from key internal stakeholders to ensure organizational alignment
- Took a conservative valuation approach, accounting for select DER benefits while acknowledging additional value streams exist

Other Considerations

Ensures compliance with long-term planning requirements as per OPUC's DSP Guidelines

Utilizing Widely Accepted Approach

Below is a list of the relevant value streams that are being included. These are standard value streams in Total Resource Cost (TRC) test per National Standard Practice Manual and have been included in plans developed by other utilities (for example, AES Ohio and Eversource). PGE traditionally included a subset of these value streams.

PGE can expand its analysis by incorporating additional benefit streams, conducting a more comprehensive BCA, and demonstrating the value of VPP investments by showing the returns.

In this preliminary BCA, we have included values of foundational benefits expected to be achieved.

Potential impact streams (can be either benefit or cost)				
Impacts	**AES Ohio**	**Eversource**	**NSPM**	**PGE's traditional approach**
Energy generation (includes arbitrage)	Y		Y	Y
Generation capacity	Y		Y	Y
Ancillary Services			Y	Y
Transmission capacity deferral	Y		Y	
Distribution capacity deferral			Y	
Distribution O&M savings	Y		Y	
Program administration			Y	Y
Reliability	Y	Y	Y	
Capital costs to utility	Y	Y	Y	Y

Opportunities for PGE to better justify benefits from investments

Questions/ Comments

Near term action plan (NTAP)

Joe Boyles , Resource Planning Project Manager
Strategic Program Planning

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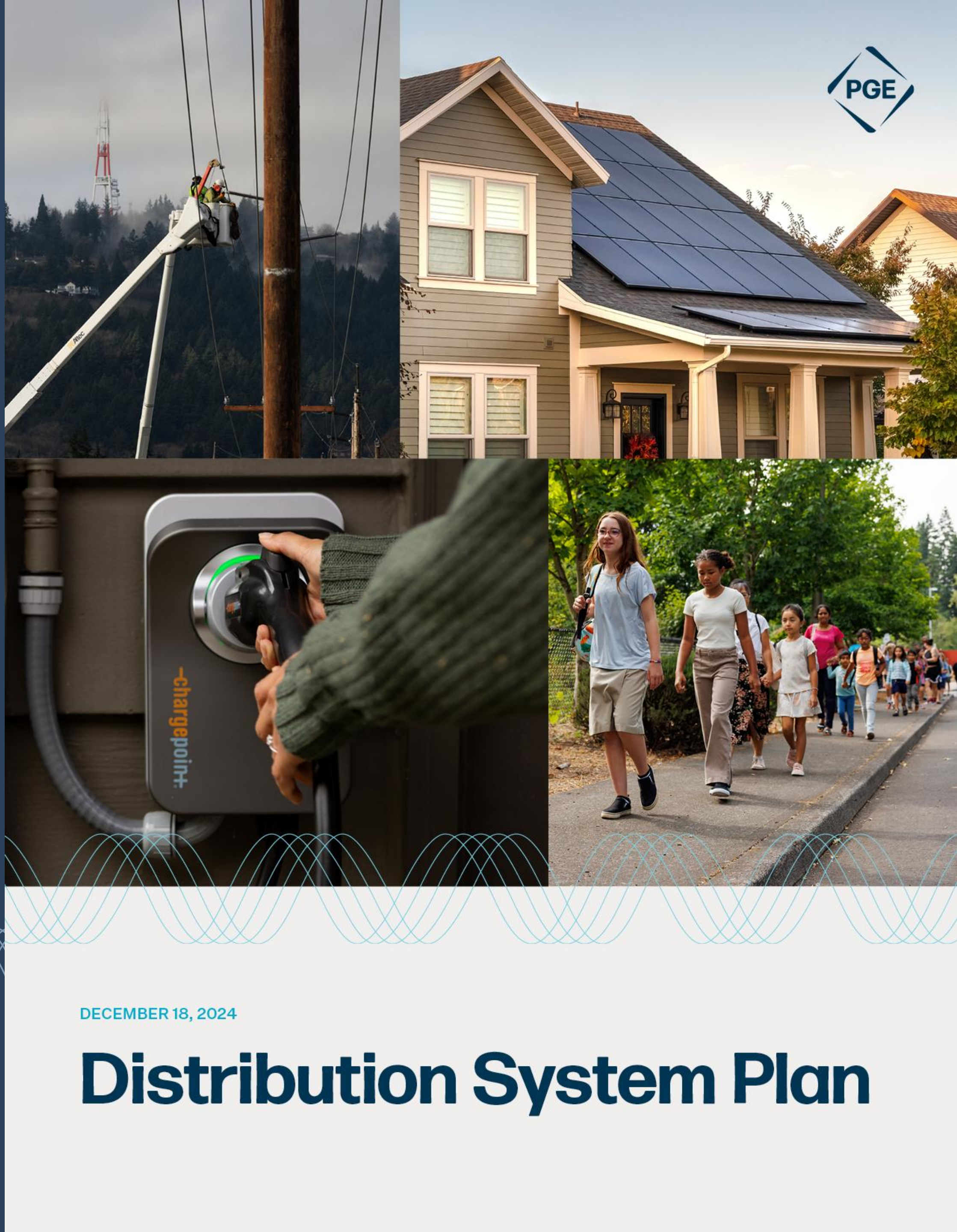


PGE An Oregon kind of energy.℠

Document structure/location

- Chapter 8. Action Plan (2-4 yrs)
  - 8.1 Introduction
  - 8.2 Traditional infrastructure investments
  - 8.3 Grid modernization investments
  - 8.4 VPP resource targets
  - 8.5 Other significant or emerging drivers for distribution system investment
    - 8.5.1 MYP programs
    - 8.5.2 Transportation electrification
    - 8.5.3 Wildfire mitigation
  - 8.6 Monitoring and adapting PGE's DSP
- Appendix. E Description of solutions to address grid needs
  - E.1 One-page project descriptions for investments greater than $2 M

Objectives of this chapter:

- Summarize the investments described in this DSP
  - Traditional
  - Grid modernization
  - VPP
- Provide context for those investments
- Cross-reference related planning documents
- Describe the measures that are used to evaluate distribution system performance

Capital Planning Process Roles

Role	Description
Board of Directors (BOD)	The Board of Directors reviews and approves the annual capital budget. In addition, the BOD approves large strategic projects and future-year obligations for long-lead-time equipment purchases.
Capital Review Group (CRG)	The Capital Review Group is a standing committee with governance over capital projects and allocates capital resources based on business value and alignment with PGE's strategy.
Business Sponsor Group (BSG)	The Business Sponsor Group is a standing committee, empowered by the CRG to approve capital projects and manage the assigned portfolio to deliver the most value at the least cost. The BSG reviews and approves a proposed annual budget based on a five-year project road map that prioritizes projects based on PGE's initiatives and project readiness.
Generation, Transmission & Distribution Project Management Office (G-T&D PMO)	The G-T&D PMO is an organization that manages a standardized process for the governance and execution of assigned capital projects for Generation and T&D. The G-T&D PMO includes roles such as Project Managers, Project Controllers, Estimators and Construction Managers.
Capital Portfolio Management Team	The Portfolio Management team optimizes the project portfolio, acts as the primary interface with the BSG and CRG, and oversees the steps related to the planning and execution gates. The Portfolio Management team also monitors Portfolio health and execution risks throughout the year, escalating issues to the executive team and the CRG as needed.

Business Sponsor Group (BSG) Reporting Structure

PGE

Board of Directors

Establish the corporate vision and strategic objectives

Critique plans and performance

Approve budgets; ensure adequate funds

Chief Executive Officer

Lead executives and hold them accountable

Communicate direction and priorities

Executive Team

Determine Executive Steering Committee capital allocation

Executive Steering Committees

Customer / **Operations** / **Strategy** / **People** / **Risk**

Detail the strategies to reach the vision

Establish metrics and track progress towards goals

Capital Review Group

Optimize financial plan

Arbitrate funding allocation priorities

Business Sponsor Groups

Gen/Power Ops / **IT** / **T&D** / **Customer** / **Grid Mod** / **Services**

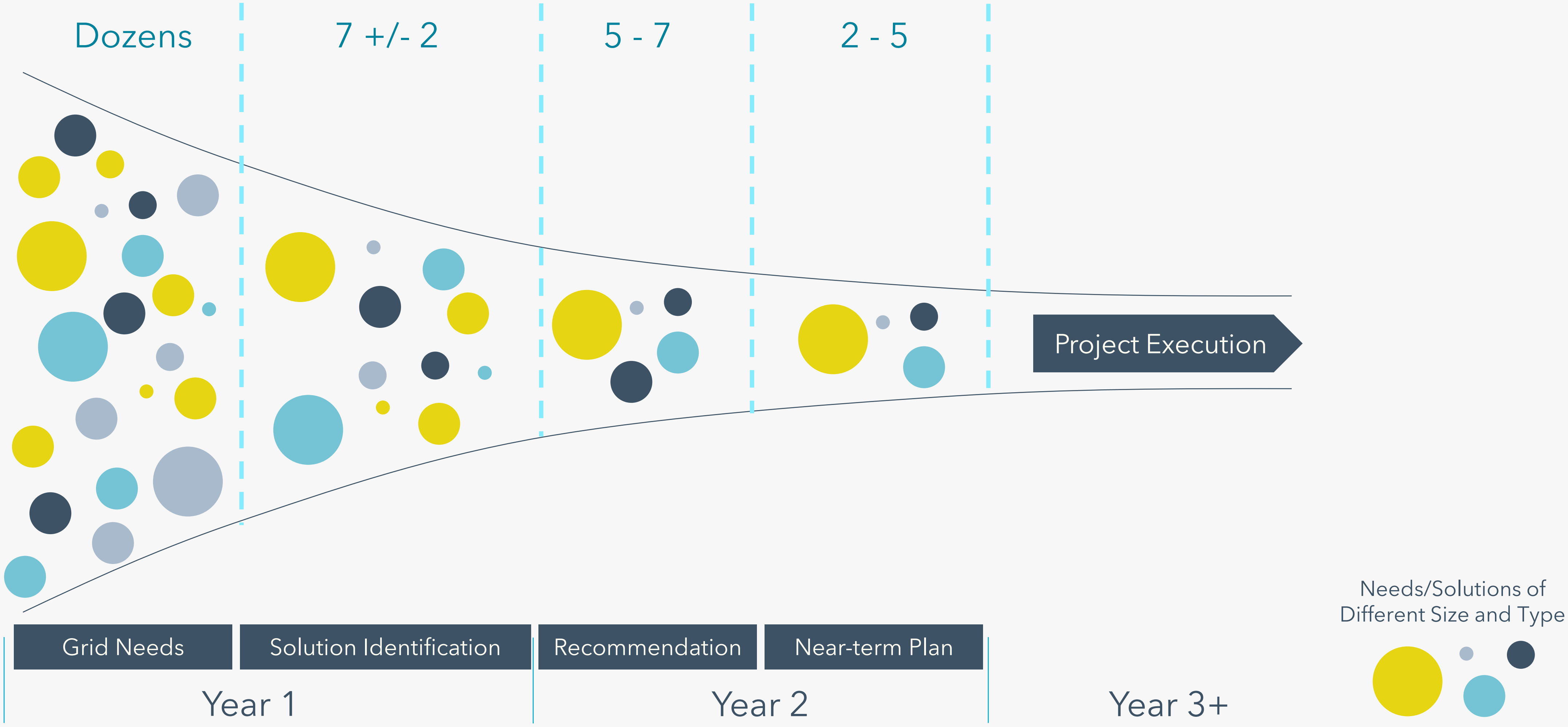
Translate strategies into actionable 3-year roadmaps
Allocate project funds within guidance

Resolve tactical project and portfolio tradeoffs and risks
Optimize business value through portfolio management

Current T&D Project Categorization

Portfolio	Sub-Portfolio	Category
Transmission & Distribution	**Grow** (load growth/ econ. dev.)	**Capacity/Flexibility** – increase capacity and/or flexibility to address load growth or increased demand; may include capacity-driven compliance and reliability projects
	Grow / **Sustain**	**Customer/Partner** – investments involving a commitment to a customer, internal partner, municipality, or co-owner; includes critical service restoration and our obligation to serve; applicable to both sustaining and growth sub-portfolios
	Sustain (keep the lights on)	**Compliance** – address a non-capacity related compliance requirements from FERC, NERC, OPUC, EPA, DEQ or other regulatory body
		Reliability – enhance reliability, resiliency and security; includes proactive repair/replace in kind projects as well as broader improvement initiatives
		Operations – address tools, safety, restoration of non-critical services, and efficiency improvements

T&D Project Development Funnel



Portfolio Considerations

Alignment to Strategies and Goals

Firm commitments – customer and/or compliance

Execution readiness – cost estimate, resource and materials

Stage-gate approvals: minimize risk with planning-only approval

Quantified project benefits

NTAP: Traditional or business-as-usual investments

Project category ($M, incurred*)	2024	2025	2026	2027	2028
Compliance	$148.32	$187.38	$141.53	$91.10	$72.07
Customer/Partner	$153.44	$140.55	$131.80	$135.58	$140.49
Capacity/Flexibility	$38.76	$9.64	$158.01	$132.78	$162.75
Reliability	$41.37	$70.27	$47.90	$38.62	$31.85
Operations	$1.25	$1.10	$2.26	$2.47	$2.56
Traditional Investments Totals	**$383.15**	**$493.95**	**$481.50**	**$400.54**	**$409.72**

*Investments that are presented in the DSP are shown in “incurred” amounts – equipment, materials and labor.

Figures for ‘24/’25 have been through the capital governance process. Figures for ‘26-’28 are estimates and more subject to change.

NTAP: Grid modernization investments

Project category ($M, incurred*)	2024	2025	2026	2027	2028
Grid management systems	$48.29	$37.16	$16.10	$5.50	$4.00
Integrated planning	$1.50	$0.70	$1.40	$-	$-
Sensing, measurement, and automation	$2.50	$4.05	$13.60	$35.60	$4.20
Telecommunications	$12.80	$14.16	$13.65	$9.85	$3.55
Physical grid infrastructure	$5.00	$4.84	$8.50	$8.80	$9.00
Grid Mod Total	**$70.09**	**$60.91**	**$53.25**	**$59.75**	**$20.75**

*Investments that are presented in the DSP are shown in "incurred" amounts – equipment, materials and labor.

Figures for '24/'25 have been through the capital governance process. Figures for '26-'28 are estimates and more subject to change.

NTAP: VPP resource targets in MWs

VPP Resources (MW)	2024	2025	2026	2027	2028
Flexible Load (Summer/Winter)	116.3/61.2	126.9/65.7	140.3/69.8	151.3/74.0	162.3/78.2
Solar	9	9	285	325	365
Storage	0	0	135	155	175
Distributed Thermal	140	180	220	260	300
Grand Total (Summer/Winter)	**265.3/210.2**	**315.9/254.7**	**780.3/709.8**	**891.3/814**	**1,002.3/918.2**

Grid Modernization Needs and Solutions – Compliance Overview

Prioritized list of the utility's proposed solutions (investments/expenditures) over the next five years to address identified grid needs.	Appendix E provides a list of currently approved projects
Summary of each planned investment / expenditure estimated to cost more than $2 million.	Appendix E includes one-pagers for the projects >$2M
Projected spending: Provide a table of the projected cost to implement the Action Plan… on an annual basis… in the same spending categories used for historical distribution system spending	Summary tables of spending from '24-'28 are provided

Key points about PGE's compliance

- Investment amounts shown are estimates and likely to change
- Investments are shown in incurred $ meaning overhead amounts will be added later when all costs are known
- Distribution investments must compete with each other and other demands on limited capital

Questions/ Comments

DER Forecast
Ch 3

Seemita Pal, Senior Principal Strategy & Planning Analyst

Distributed Resource Planning

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PGE

DER Forecast

Chapter 3. DER forecasting
- 3.1 DER Forecasting Model
- 3.2 AdopDER Enhancements
- 3.3 Latest DER Forecasts

Objectives of this chapter:

- Explains how DER (Distributed Energy Resources) forecasting is fundamental to PGE's three-component strategy
- Introduces and explain PGE's DER forecasting model called AdopDER
- Documents recent improvements to the AdopDER too

Forecasting Outputs and Business Impact

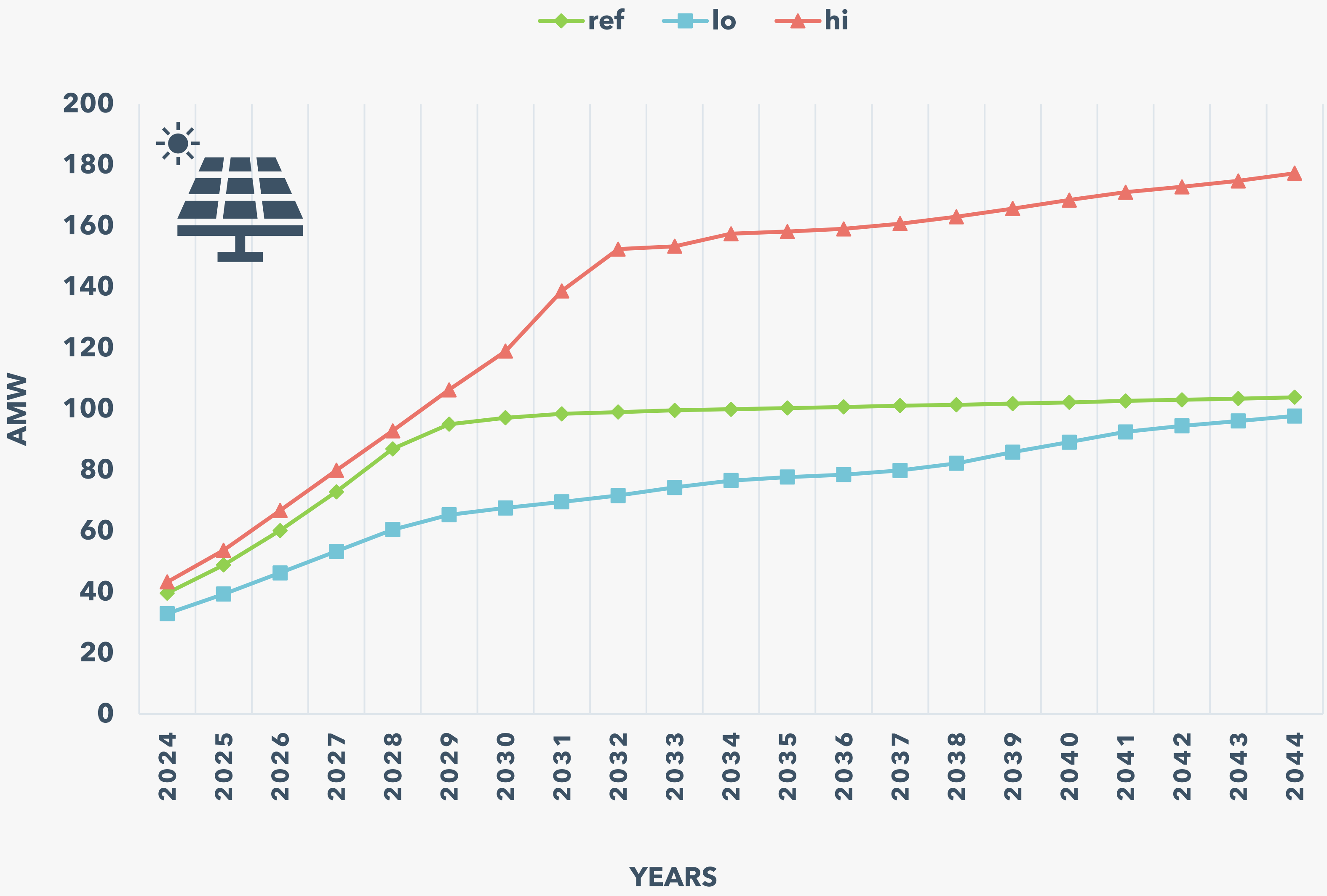
Key Forecasting Outputs	20-year forecasts (2025-2044) with high/medium/low scenarios
	8760 hourly load impacts of DER at feeder level
	Baseline loads at feeder level across distribution system
	Granular adoption forecasts for all DER technologies
Business Applications	Informs grid modernization investments
	Enables effective customer program design
	Supports Virtual Power Plant (VPP) service planning
	Guides infrastructure investment decisions

Modeling Solar

Employed bottom-up forecast

Calibrated to existing PGE customer installations from interconnection data

Used NREL's market share information

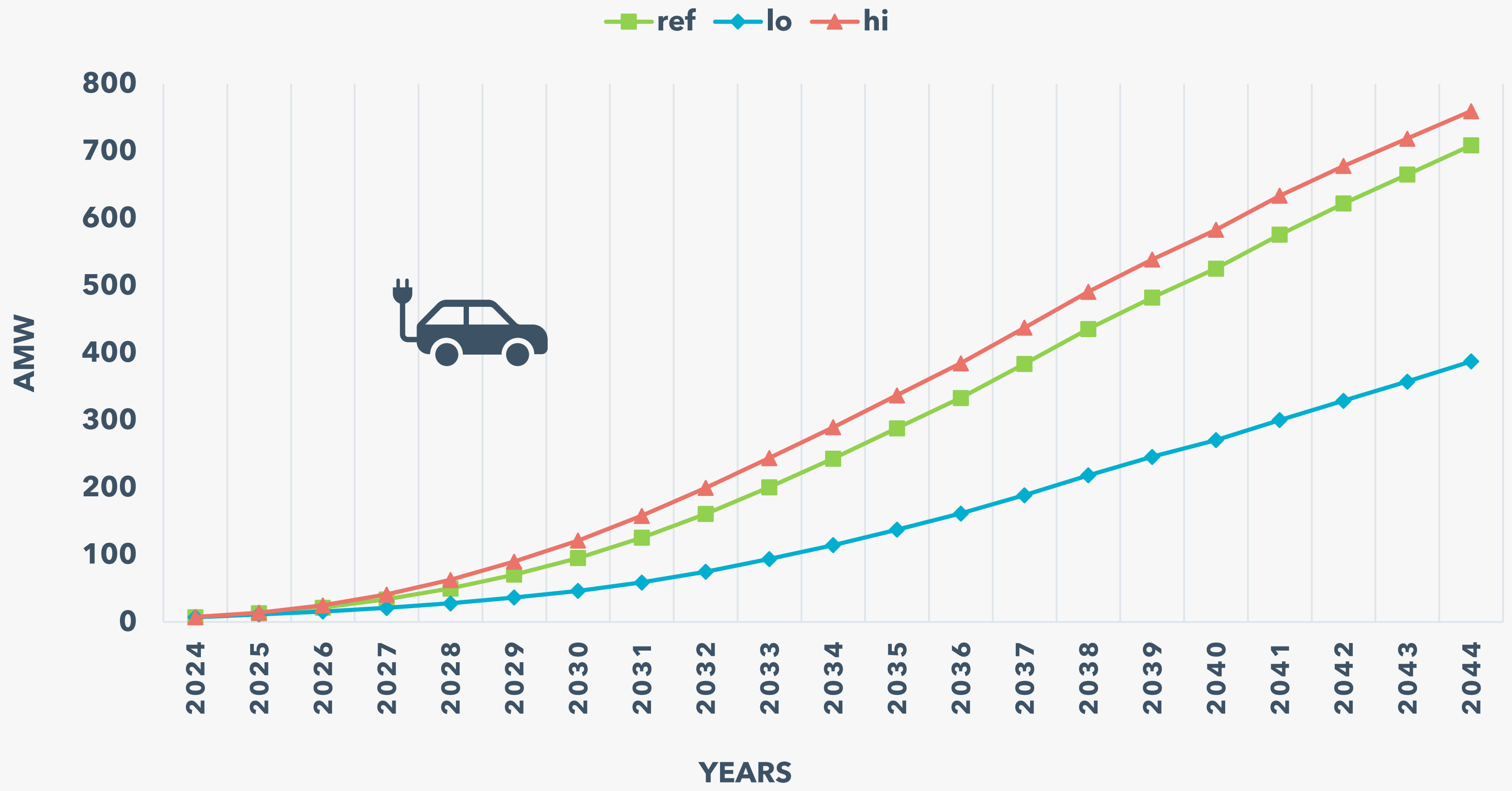


Modeling Electric Vehicles

Covered all segments, including medium and heavy duty

Modeled plug-in hybrids as well as battery electric vehicles

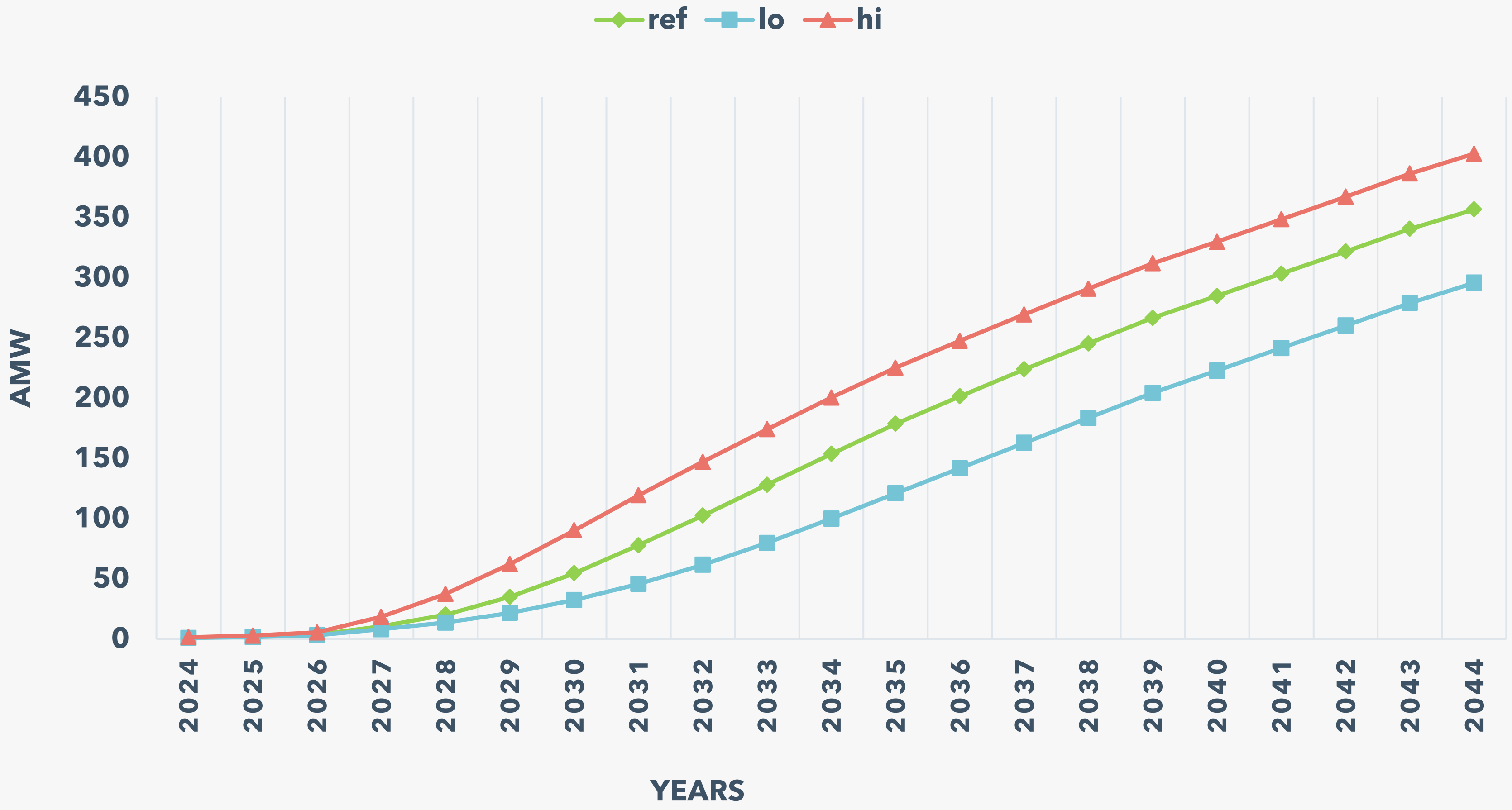
Market landscape has changed since previous study with temporary slowdown in EV adoption especially in MDHD EV categories



Building Electrification (BE) Impacts

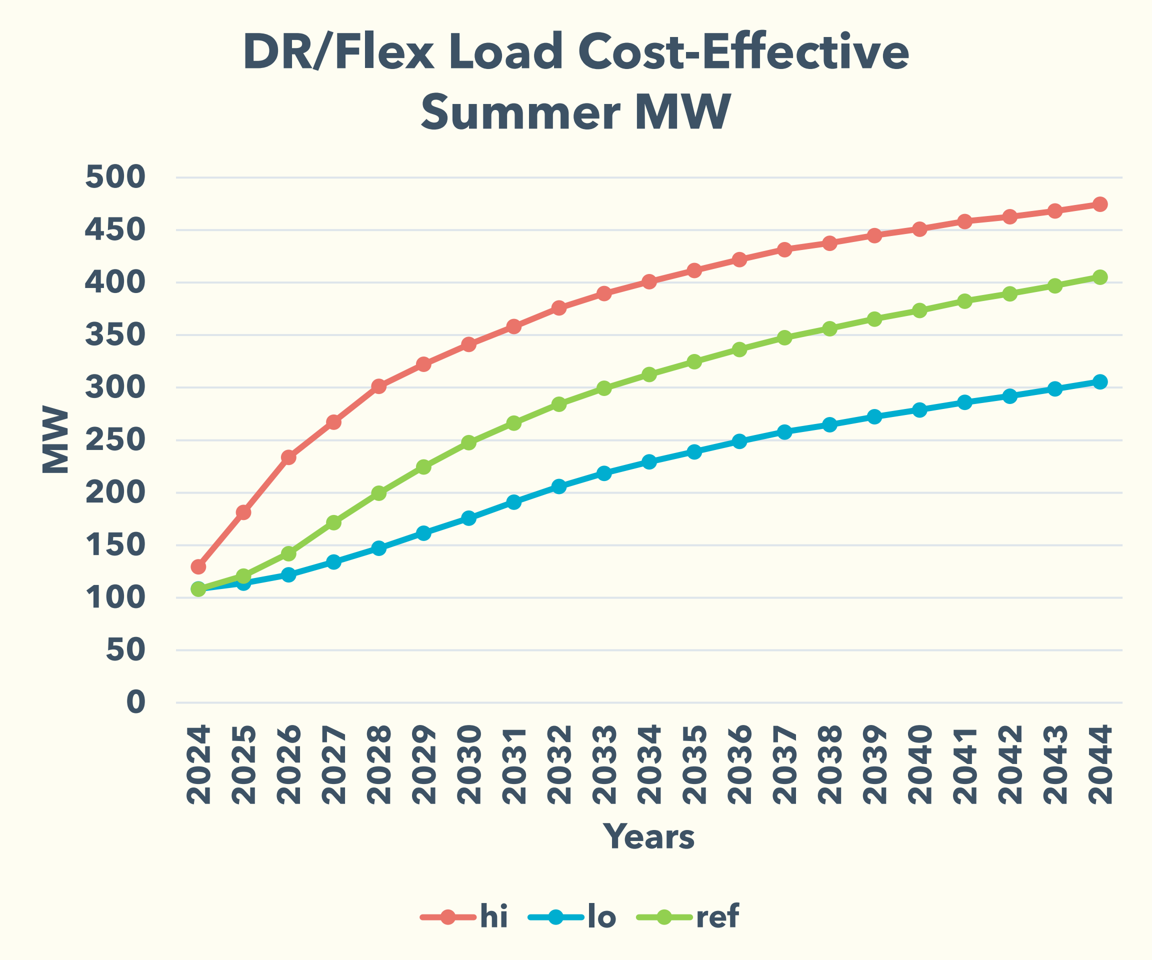
Used NREL electrification futures study* for scenarios

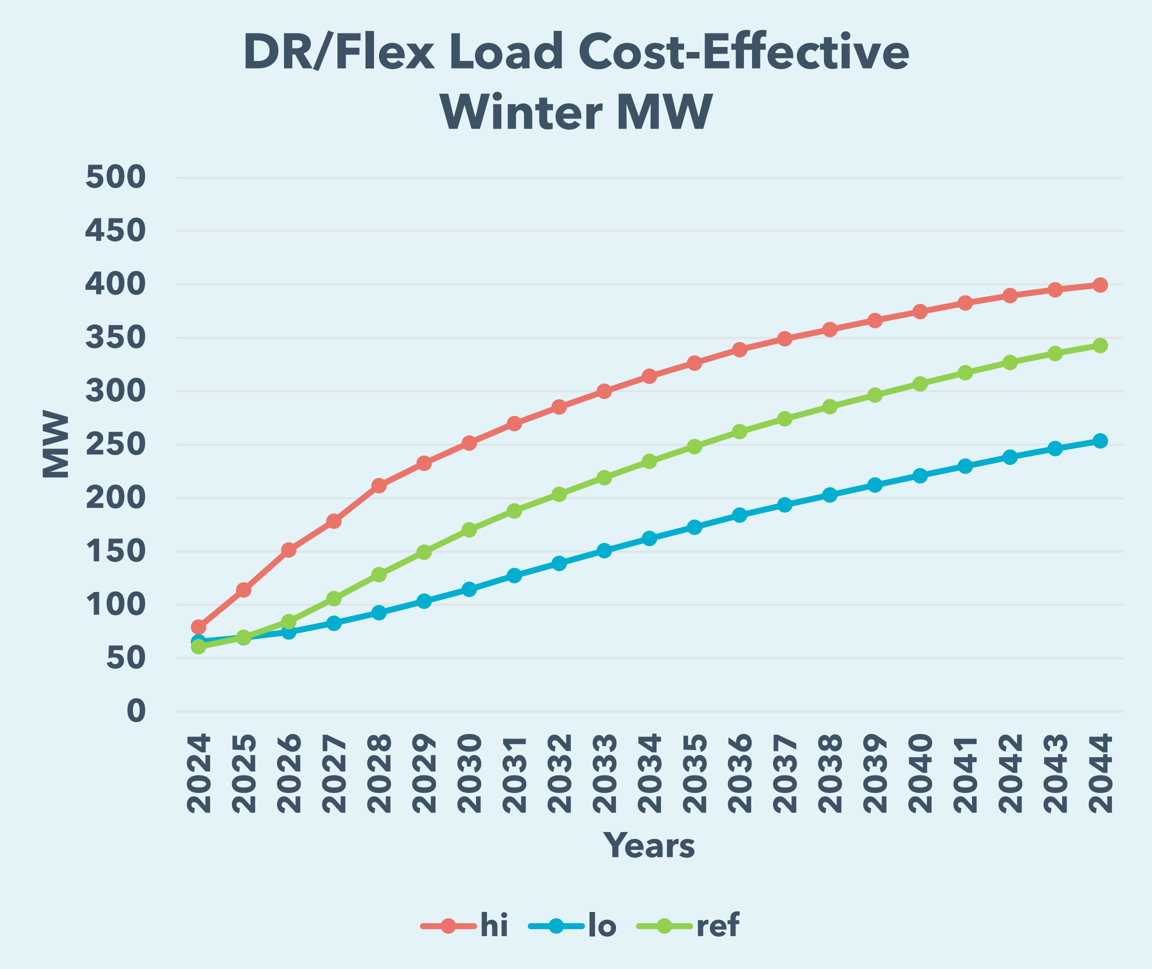
Follows-up PGE's 2019 Deep Decarbonization study



***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]

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.

DER Forecast - Compliance Overview

PGE

PGE's AdopDER Model Framework	Explains the comprehensive forecasting tool and its capabilities
Data Sources and Integration	Details the various inputs and system integration aspects
Forecasting Outputs and Business Impact	Shows how the forecasts are used in practice

Key points about PGE's compliance

- Exceed the minimum requirement of substation-level granularity by providing forecasts down to the service point ID level
- Use a sophisticated hybrid approach combining top-down and bottom-up modeling
- Provide the required high/medium/low scenarios for DER and EV adoption
- 20-year forecast horizon (2025-2044) provides long-term visibility
- Integrate multiple data sources and maintain clear documentation of sources and vintage

Questions/ Comments





Grid needs & solutions to support DER integration and orchestration

Joe Boyles , Resource Planning Project Manager
Strategic Program Planning

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Document structure/location

- Chapter 4. Technology foundations for a bi-directional grid
  - 4.1 Needs analysis for DER integration and operation
    - 4.1.1 Modernized grid
    - 4.1.2 Why is grid modernization necessary?
      - 4.1.2.1 Customer growth in energy use
      - 4.1.2.2 Customer energy management
      - 4.1.2.3 Decarbonization through electrification
      - 4.1.2.4 Increase resilience
      - 4.1.2.5 Increase price competitiveness
    - 4.1.3 Key components of grid modernization
    - 4.1.4 Benefits of grid modernization
  - 4.2 Grid modernization solution identification
    - 4.2.1 How do we identify solutions?
    - 4.2.2 What solutions are needed?
      - 4.2.2.1 Customer ecosystem
      - 4.2.2.2 Integrated planning capability
      - 4.2.2.3 Grid management systems
      - 4.2.2.4 Physical grid infrastructure
      - 4.2.2.5 Sensing, measurement & automation
      - 4.2.2.6 Telecommunications
      - 4.2.2.7 Cybersecurity

Objectives of this chapter:

- Focuses on needs as they relate to the grid's ability to support integration and orchestration of DERs to deliver value to customers and address needs with alternatives to traditional solutions
- Discuss the capabilities that we need to develop in order to use DERs as solutions
- Discuss the approach to grid modernization
- Describe how we identify solutions to build the needed capabilities

DER integration and orchestration

What do we need to integrate and operate DERs such that they deliver value to customers AND mitigate cost increases?

Enhance customer engagement and energy service options

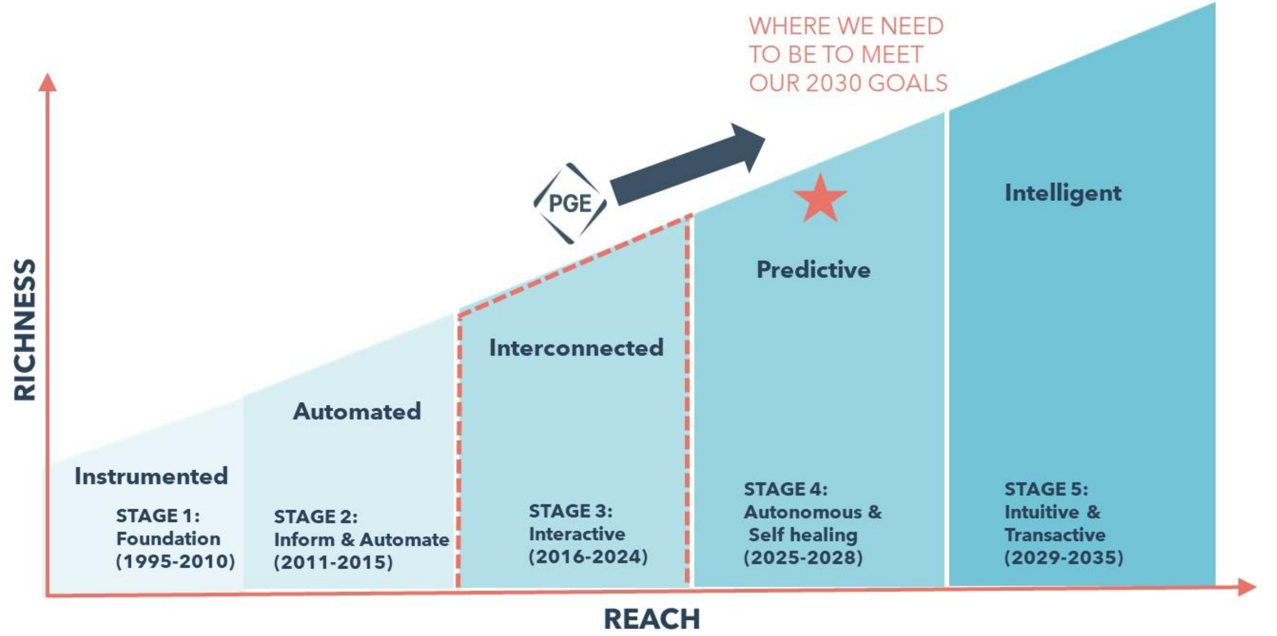
Create accessible grid platforms for new technologies and services

Optimize grid assets to reduce system costs

Improve system planning and analysis with growing DERs

Enable data-driven decision making

Evolution to a more predictive state



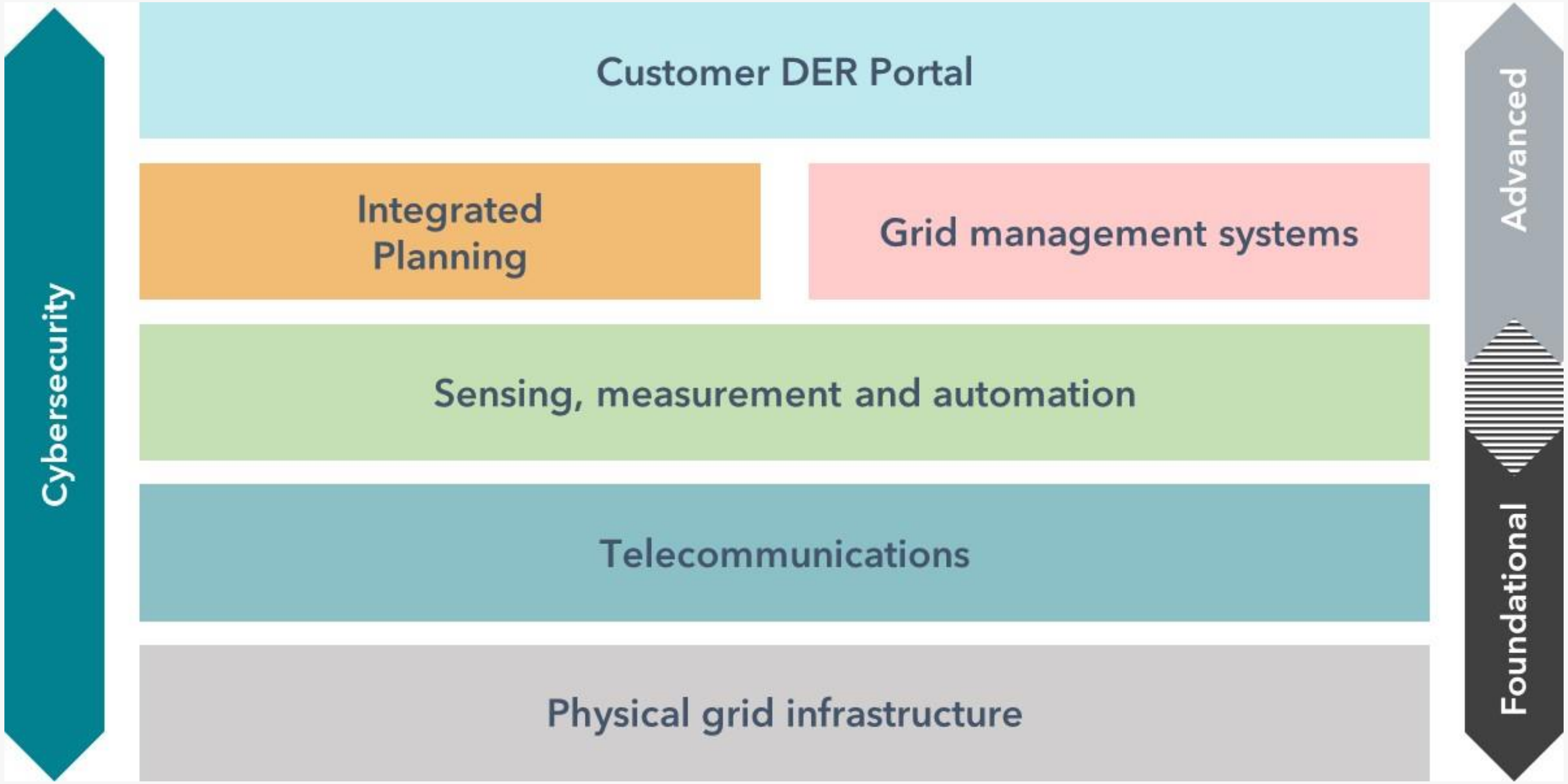
Stages of Grid evolution based on technology implementation /adoption

Identifying grid modernization solutions

WHY	**Business Strategy**	• Decarbonize • Electrify • Perform
TARGET	**Desired Benefit**	Specific goals and metrics to be met in alignment with business strategy
WHAT	**Required Capability**	Expected, timebound capabilities to enable business to achieve desired benefit
HOW	**Recommended Solution**	Specific technology solution to provide the desired capability prioritized against Strategic Fit, Risk, Budget, and Org Capacity
WHEN	**Program/Project Plans**	Programs/ projects implemented to deliver the required capabilities

- **Ideate** based on required business capabilities
- **Conceptualize** & Create Innovation Challenge Statements
- **Demonstrate in Smart Grid Test Bed, lab, or field** and capture outcomes and learnings for no-go or move to pilot
- **Pilot and capture outcomes and learnings** to no-go or develop business case as recommended solution
- **Deploy & scale** in program/ project via appropriate funding mechanism

Grid modernization framework



Grid modernization needs and solutions - Compliance overview

Discuss anticipated grid needs to address - load growth, DER adoption, customer needs	Explains the capabilities needed to address DER integration and orchestration as alternative to traditional solutions
Process to identify range of possible solutions to address needs	Describes grid modernization solution identification process

Key points about PGE's compliance

- Pressure on the grid is increasing
- DERs contribute to that pressure
- Orchestration of DERs can relieve some pressure and mitigate cost increases

Questions/ Comments





Traditional grid needs & solutions

Fatima Colorado, Manager Planning Distribution Engineering
Distribution Planning

Distribution System Workshop # 6 | 24 – Dec 12, 2024

TRADITIONAL grid needs & solutions

- Chapter 6. Traditional infrastructure needs and solutions
  - 6.1 Traditional grid needs analysis
    - 6.1.1 Distribution planning process
    - 6.1.2 Prioritized list of grid needs
      - 6.1.2.1 Detailed breakdown of the updated methodology
        - 6.1.2.1.1 Safety and customer commitment
        - 6.1.2.1.2 Compliance and grid constraints
        - 6.1.2.1.3 Precursor to mitigating other grid needs
        - 6.1.2.1.4 Temporary equipment mitigation
        - 6.1.2.1.5 Equity index
        - 6.1.2.1.6 Loading and risk factors
    - 6.1.3 Distribution planning process evolution
  - 6.2 Traditional solution identification
    - 6.2.1 Traditional solution identification process
  - 6.3 Non-wires solution identification and development
    - 6.3.1 Flexible Feeder Project (SALMON: SmartGrid Advanced Load Management & Optimized Neighborhood)

Objectives of this chapter:

- Focus on grid needs as they relate to load growth, constrained areas of the grid and equipment, such as substation transformers, that are reaching performance thresholds
- Discuss planning thresholds that drive "needs" identification
- Share list of grid needs that have been prioritized for solution development
- Discuss solution identification process

Peak Load

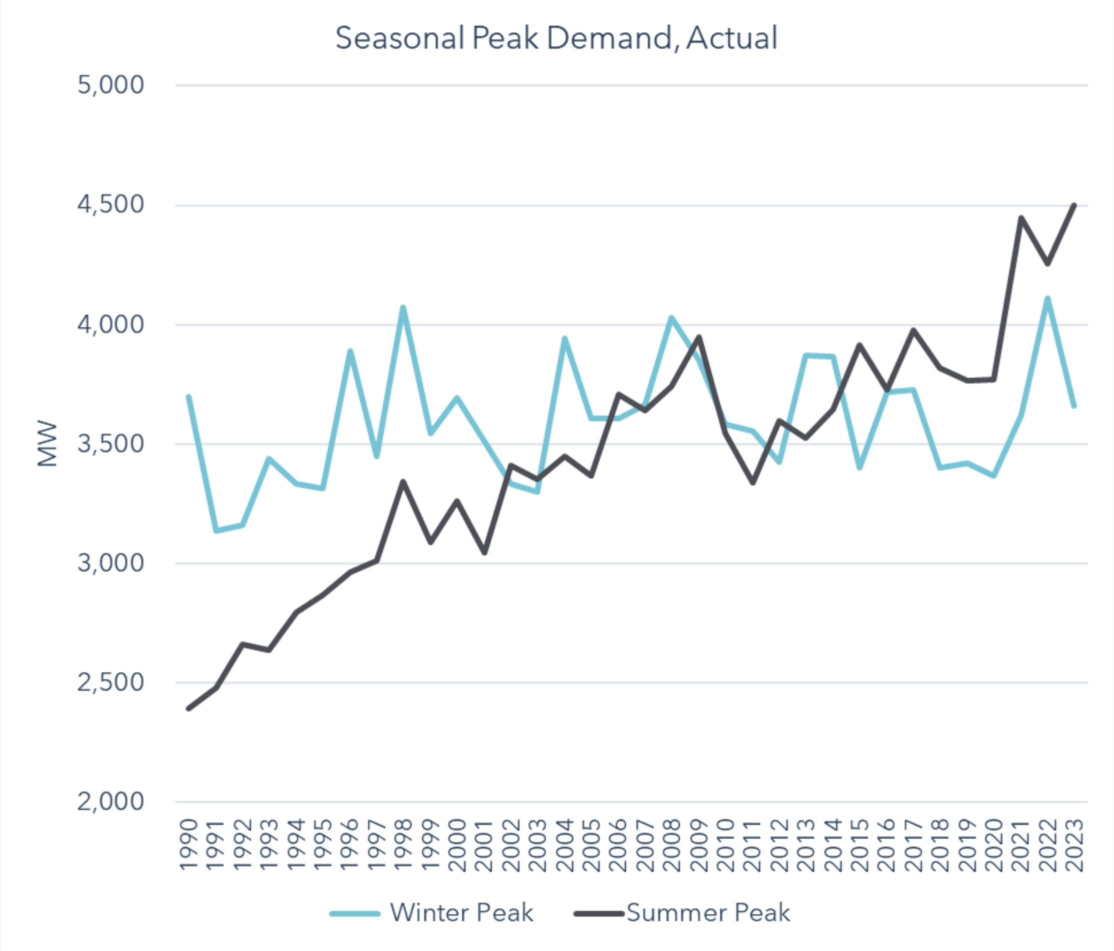
Is the highest electricity demand on a utility system

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

Summer: 4,498 MW

Winter: 4,113 MW

Knowing peak load helps utilities design systems to handle maximum demand



Distribution Planning Expected Results

Goals

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

Grid Assessment Criteria

Plan to peak

PGE plans the distribution system to serve customers even at extreme temperatures, at the largest power demand at a given point during a year

Planning criteria for equipment loading

target loading is less than 67% for feeders, less than 80% for transformers to have capacity to move load around on the system

Target system flexibility at both the transformer and feeder level

all load picked up by switching to other equipment for the loss of a single element

Customer-driven projects

take priority, e.g., large housing development, manufacturing facility, industrial park

Ensure new infrastructure is planned for the long-term forecasted load in the area

when PGE implements a project, we aim to not have to do another project on the affected equipment for at least 10 years

Assessment Process & Methodology

System Assessment Framework

- Comprehensive distribution planning process incorporating system reliability and asset health assessments
- Advanced modeling using CYME software for detailed power flow analysis
- Integration of corporate load forecasts and DER adoption projections
- Consideration of multiple data sources including AMI data, economic development plans, and known block loads

Key Performance Metrics

- Safety and customer commitment
- Compliance and grid constraints
- Equipment utilization and risk factors
- Equity considerations

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)

Grid Needs to Solution Identification Process

Identified grid needs in 2024

Prioritized grid needs

Emergent grid needs

Distribution Planning Engineers conducting studies on the prioritized grid needs for 2025 capital cycle

Solution Identification

Step 1
WHAT & WHERE IS THE PROBLEM

Step 2
CURRENT STATE ANALYSIS AND SOLUTION IDENTIFICATION

Step 3
OPTION ANALYSIS

Step 4
RECOMMENDATIONS

Prioritized List of Grid Needs with Approved Funding

Priority	Project	Grid need	Total Score
1	Evergreen	Add distribution infrastructure to substation	4.9
2	Swan Island	Substation Rebuild	4.8
3	Glisan	Industrial load growth in Gresham - substation	4.5
4	Sub E	New Load/Capacity need, rebuild substation	4.4
5	Glencoe-Glisan	Capacity addition	2.7
6	Holgate	Capacity and reliability improvements to substation	2.5

Traditional Grid Need and Solutions - Compliance Overview

Employ a comprehensive assessment process that incorporates multiple data sources and sophisticated modeling tools

Prioritization methodology has been refined based on stakeholder feedback to be more balanced and equitable

Approach allows for both traditional and non-traditional solution

Questions/ Comments

Next Steps and Closing Remarks

Next Steps & Closing Remarks

- Wednesday Dec 18 | PGE DSP Filing | UM 2197
- Wednesday Jan 8 | 9-11:30a | Zoom | CEP/IRP Roundtable
- Wednesday Jan 22 | 10a-12p | Zoom | CBIAG Meeting
- Thursday Feb 20 | 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

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