Integrated Resource Planning

STAKEHOLDER FEEDBACK: October 2025

Received: 12/15/2025

Stakeholder: OPUC Staff

Organization: Oregon Public Utility Commission

Applicable Public Meeting Date: 10/25/2025

1. Corporate Load Forecast: Methodology & Trends – What do you see as the biggest risks to PGE's load forecast?

Stakeholder: OPUC Staff

One risk factor to PGE's load forecast is potentially the data center load forecast methodology. The question is whether the company's methodology for forecasting large load is right sized in terms of not over or under forecasting and impacts to customers. Over forecasting risks overbuilding resources, greater capital investment, and higher customer costs and under forecasting risks reliability. Persistent over or under forecasting imposes costs and risks on electric consumers. In general, Staff would like to learn more about the following.

- PGE's strategy for managing data center requests.
    - **PGE RESPONSE:** For any customer planning to connect a significant new electrical load to PGE's power grid (1 MW or greater for both new facilities or existing facilities looking to expand), PGE requires a Large Load Study. The Large Load Study assesses the impact of adding the requested energy to the grid and has up to four phases: pre-feasibility, feasibility study, system impact study, facilities study.
    - More information is available on the large load study process at this site: https://portlandgeneral.com/builders-new-construction/large-load-study
- The assumptions the company makes about the nature of the load, and how the company explores and considers least-cost, least-risk approaches to serve these customers.
- ***Staff suggests*** PGE consider additional sensitivities or scenarios exploring the timing of when large load will come online in five-year increments. These increments would show

how much and fast large load growth is expected to come online and how the resource mix and costs will be. A broad scenario could evaluate low growth, moderate growth, high growth, and extreme near-term growth. Extreme near-term growth could be a forecast that projects near term demand that could fundamentally alter the energy landscape within five years. ***Staff sees potential opportunities*** for this IRP to inform what options are available to serve these loads, the extent to which demand response or flexibility can be leveraged, and what information about the load shape is necessary to be able to assess the availability and impact of demand vs supply side options for serving these loads.

  - **PGE RESPONSE:** PGE has developed a reference, low and high load forecast scenario to assess the impact of different large load volumes coming online. PGE's high case scenario assumes that the existing segment of data center demand (400 MW) has rapid expansion in the next 5 years, growing to 1.2 GW by 2030, and then to 3 GW by 2040.
  - To the extent that information is available for large load to include demand response, flexibility, or additional options available to serve these incremental large loads, PGE will include in IRP analysis.
  - Additionally, a number of PGE's contracted large load customers intend to build backup generation as part of PGE's Distributed System Generation (DSG) program. PGE is forecasting increased DSG capacity additions from large load contracts. The IRP will allow for the selection of expected DSG capacity additions. This approach will allow PGE to analyze the role of DSG resources in grid reliability, resource buildout, and portfolio costs. PGE believes such an analysis can provide a representative assessment of the value of flexible load associated to large loads and will continue to evaluate the impacts of large load contracts on existing programs.

- Is the full suite of costs and benefits that come from large loads being considered or captured? Are there opportunities that some large loads present that could be overlooked if not considered in how they're modeled? For example, demand response benefits, unique HB 2021 compliance approaches, shared transmission investments, etc. Staff suggests the IRP include analytical considerations and discussion on large load characteristics, and where appropriate or possible, explore whether different assumptions about large loads meaningfully alter near term resource needs.
  - **PGE RESPONSE**: At the January roundtable, PGE presented planned portfolio categories for the 2026 IRP. One of the planned categories is to include a no large load growth portfolio that is designed to specifically include resources that are needed to meet core load-growth only and exclude growth associated with data centers. This will allow for the 2026 IRP to include significant analysis regarding the costs and benefits from large loads.
- Data Centers are generally assumed to have a flat load shape, high forecast uncertainty that future load will match actual load, and a high flight risk meaning that there is a high

likelihood that the load will shift to a different location if grid or economic conditions are not favorable. PGE's IRP should describe how these situations are considered in planning and include sensitivities that capture the impacts of getting assumptions about large loads wrong.

  - **PGE RESPONSE:** PGE agrees with Staff's assertion that right sizing the data center load forecasting is a key element to the 2026 IRP analysis. The load forecast used in the IRP will center around the reference case, which assumes that the existing segment of data center customers (400 MW) increases to approximately 1 GW in 2030 and 2 GW in 2040. This forecast is based on a combination of historical information and recent data derived from PGE's existing customers.
  - The data centers in PGE's service territory typically carry less flight risk than other areas of the country given they are smaller in size (~130MW average capacity) and provide AI, Enterprise Computing, and Cloud services, in an already mature high-tech and data center ecosystem. This customer class has been experiencing growth over the past 5+ years at a steady pace, and we expect it to continue into the future.
  - However, PGE has designed a high-load and low-load scenario within the IRP to address the uncertainty that forecasted load will not match actual load. As presented in the October 2025 roundtable material, the high case assumes rapid expansion, with the current customer segment increasing to 2 GW in 2030 and 3 GW in 2040. Alternatively, the low case has constrained growth, assuming that the existing segment only grows to 500 MW in 2030 and 600 MW in 2040.
  - After continued discussion and feedback from stakeholders, PGE has updated the high case of the corporate load forecast, subsequent to the October 2025 roundtable, to more accurately reflect near-term limits associated with transmission availability. This update results in the current customer segment increasing to 1.2 GW in 2030 and 3 GW in 2040 in the high case of the corporate load forecast.
  - With these various scenarios, PGE will be able to assess the impacts of data center load increasing at volumes that are significantly more or less than forecasted.

- ***Staff suggests*** aligning load forecasts and scenarios with gas utilities with which the Company shares its service territory. Gas companies increasingly need to rely on electric company forecasts as they evaluate opportunities for beneficial electrification. Part of this alignment is on load forecasts and developing forecasts that are usable from a gas utility perspective. Staff sees value in identifying specific load forecast scenarios and approaches that could be used by gas utilities with overlapping territories as electric utilities. For example, aligning assumptions and capturing adequate granularity to consider the use of electricity for heating. In the development of the load forecast

and scenarios, Staff would like PGE to work with NW Natural's IRP team to identify load forecasts that can be useful to both utilities.

PGE RESPONSE: PGE appreciates this feedback from Staff. PGE's corporate load forecasting team has met with load forecasting teams from a local gas company to begin to identify if any alignment can be gained in future iterations of load forecasting.

In addition, PGE's Resource Planning group is participating in PNUCC's Gas–Electric Coordination Initiative which aims to accomplish similar objectives about the related impacts between the electric and gas sector.

2. Draft AdopDER Forecast - What other data, scenarios, and considerations would help ensure AdopDER continues to serve long-term DER planning? Are there specific updated datasets that you think should be included in the AdopDER analysis? Examples such as: NEEA's 2025 CBSA, EIA's most recent Residential Consumption Survey (RECS), etc.

Stakeholder: OPUC Staff

Staff thanks PGE for providing an additional and separate overview of the AdopDER model to new Staff members. Staff had a chance to ask basic questions during that session. Staff looks forward to continued conversations.

- PGE requested Staff's feedback on specific updated datasets that it thinks could be included in the AdopDER analysis. Upon reviewing the slides from the most recent Roundtable and Appendix C of the DSP (DSP Part 2 - AppendixC.pdf), Staff would like information about the current data sources used in AdopDER. Appendix C provides useful information on the variables included in models and the Roundtable slides provide useful information on at least some of the data sources (e.g., left pane in slides 43-45). To provide useful feedback to PGE, Staff requires one resource that combines complete information on AdopDER data sources and variables. PGE is in the process of bringing AdopDER "in house" from its contractor and will provide Staff with data documentation that includes all relevant meta data for variables/measures used in modeling, including data sources. Upon receiving AdopDER data documentation, Staff will provide feedback on existing datasets included in the AdopDER analysis and may provide recommendations for updated datasets.

PGE RESPONSE: PGE appreciates Staff's participation in the AdopDER overview session and the opportunity to address introductory questions from new Staff members. PGE agrees that continued technical discussions will be valuable as Staff becomes more familiar with the model and its applications.

PGE agrees that a consolidated reference documenting AdopDER data sources and variables would facilitate more effective feedback from Staff. As AdopDER transitioned to be in-house in Q1 2026, PGE is developing formal data documentation in coordination with Resource Innovations (previously Cadeo). This documentation will include variable definitions, data sources, and relevant metadata for all measures used within the AdopDER modeling framework for Integrated Resource Planning.

Upon providing this documentation, PGE welcomes Staff feedback on the datasets currently used in AdopDER and on potential recommendations for updated data sources. PGE previously provided examples of datasets with known updates for consideration in future AdopDER applications and looks forward to continued collaboration with Staff to ensure scenarios reflect the most current and relevant inputs.

- Staff is interested in the inclusion of dollar value incentive variables when modeling adoption of DERs. During the development of AdopDER, was there discussion or analysis of the benefits of including incentive variables into the models? If so, what were the reasons for not including them in AdopDER forecasts? Currently, what would be the benefits and drawbacks of (as well as barriers to) adding incentive-based variables into AdopDER models?

PGE RESPONSE: AdopDER includes incentive effects where such incentives are structured as part of current or anticipated DER programs. These incentives may take the form of upfront incentives (e.g., rebates) or ongoing incentives (e.g., bill credits or performance-based payments), and their impacts are reflected consistent with how customers experience program economics.

With respect to state and federal incentives, the current AdopDER forecasts reflect policies enacted as of September 2025. This includes the modeled phase-out and removal of federal Investment Tax Credit (ITC) benefits and the corresponding impacts of those changes on solar adoption and electric vehicle sales.

PGE recognizes that explicitly modeling incentive variables presents both benefits and limitations. While incentive inclusion can improve sensitivity to near-term program design, incentives are subject to policy uncertainty, frequent redesign, and administrative constraints. As a result, PGE evaluates incentives within AdopDER in a manner that allows new information to be incorporated as it becomes available, while maintaining inputs that remain relevant, current, and appropriate for the analysis period.

- Following Order 24-096 concerning PGE's 2023 IRP, does PGE plan on validating Community-Based Renewable Energy (CBRE) AdopDER forecasts with bottom-up community-driven analysis in the 2026 IRP? What CBRE relevant lessons were learned from the implementation of PGE's 2023 IRP and forecasts from AdopDER that would inform a similar process in the 2026 IRP?

PGE RESPONSE: For the 2023 IRP, PGE estimated Community-Based Renewable Energy (CBRE) potential using a targeted, top-down potential assessment for solar, solar plus storage, and low-impact hydro resources. This assessment was informed by qualitative and quantitative research, including a review of published municipal climate action targets with local resource goals; the Oregon Department of Energy CBRE Working Group Report (September 2022); Oregon Community Solar project cost data and relevant OPUC Orders; national laboratory studies; and peer-reviewed academic literature.

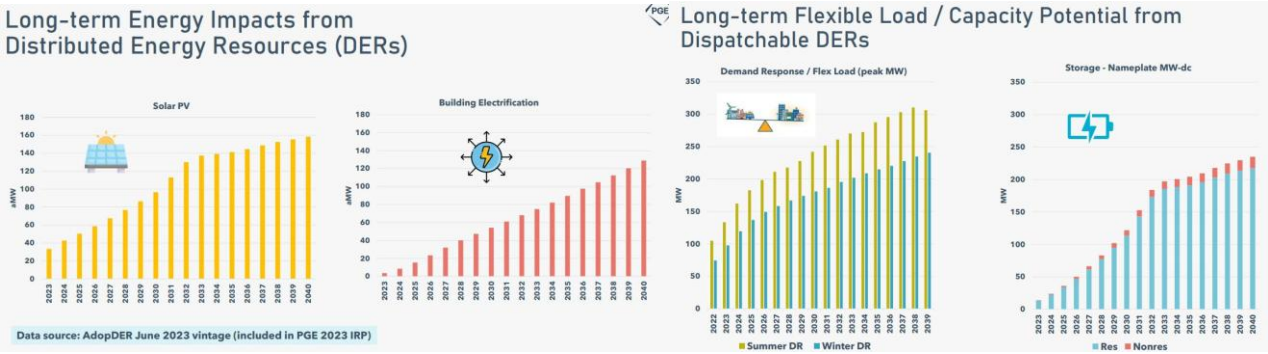
In addition, PGE reviewed Energy Trust of Oregon small renewable and resiliency project lists to assess market interest and typical project configurations, leveraged the Cadeo Community Resiliency resource potential study, and analyzed PGE feeder-level reliability and outage data. This analysis identified 144 feeders meeting defined criteria (including PSPS exposure, presence of critical customers, and outage frequency), for which solar and storage microgrid configurations were sized to support 72-hour outage durations while accounting for existing DER already installed on the system.

Collectively, this work informed estimates of available CBRE capacity by 2030 for use in the 2023 IRP.

For the 2026 IRP, PGE plans to estimate CBRE availability and commercial operation dates for the 2026–2030 period using customer bids submitted through the CBRE Request for Offers (RFO) process. This approach reflects a shift toward incorporating bottom-up, market-based information to inform CBRE assumptions in the IRP, rather than relying primarily on qualitative approaches derived from AdopDER or other research-based methods.

CBRE bids are reviewed with input from the Community-Based Infrastructure Advisory Group (CBIAG) against established CBRE scoring metrics. Project capacity and cost assumptions are evaluated based on the characteristics of projects proposed within the planning horizon, allowing PGE to ground CBRE assumptions in observed market interest and project-specific information.

- PGE's Distribution System Workshop on 5/8/24 discussed AdopDER long-term energy impacts from Distributed Energy Resources. Staff is interested to learn more about how retail rates are applied in the economic screening for adoption rates and how does PGE see increasing retail rates impacting the graphs on slides 13-14?



PGE RESPONSE: Retail electricity rates do affect DER adoption within AdopDER; however, the magnitude and direction of that effect varies by technology. For some technologies, higher electric rates may increase adoption by improving relative economics (solar, battery), while for others, higher rates may moderate customer willingness to adopt (building electrification, EVs).

PGE continues to evaluate historical customer adoption trends to better understand the role electric rates play in DER adoption decisions and to refine model inputs over time. At this time, PGE cannot definitively quantify the extent to which electric rates alone drive customer technology adoption, as adoption decisions are influenced by a combination of economic, policy, programmatic, and behavioral factors.

3. Resource Topology - Aurora (Model) Topology - Are the modeling refinements described clear to you? And do they make sense?

Stakeholder: OPUC Staff

The modeling refinements described by PGE in the 'Aurora' section of the slides explain that PGE is considering model enhancements to determine the following outcomes:

- Can the workflow be simplified by using fewer models by moving the resource energy valuation and portfolio energy and emissions evaluations into the Aurora model thereby resulting in one model.
- Can the interaction of resources with PGE's load and markets be simulated having the model differentiate energy delivered to retail load versus wholesale sales and the emissions arising from that energy.
- Consider the potential effects of Co2 emissions pricing schemes.

Staff's view is that it is reasonable to combine the models where it improves understanding, insights, and process efficiencies. Staff is interested in more discussion to understand what PGE is proposing with the modeling changes. What does PGE see as the next steps for condensing the models? Staff is interested in learning more about if there are any tradeoffs with the enhancements, if there is information that is harder to manage with this change, and will hourly emissions data still be available.

PGE RESPONSE

- PGE is continuing to refine and vet the model internally through on-going analysis and review. The next steps include: incorporating upstream data (load forecast, simulated energy prices, resource characteristics, etc.) and producing outputs to inform other IRP models.
- Providing increased functionality while streamlining data handling tasks are the primary goals of this enhancement. Information should be easier to manage but the process will be different than the past. PGE does not currently anticipate any tradeoffs or that the enhancements would make information harder to manage. Forecasting hourly emissions across a range of years for various resource portfolios and scenarios (price futures or policy considerations) is a key feature of this refinement.

4. Futures and Markets - What questions do you have about the difference between the use of the PGE Zonal Model and the WECC model?

Stakeholder: OPUC Staff

- Staff is interested in a bullet list of the uses of the PGE Zonal Model and the WECC model.

- Staff is interested in a description of how the two models work together. Does the WECC Model feed into the PGE Zonal Model or vice versa?

PGE RESPONSE

- Response to first question:
    - PGE utilizes the WECC model, which is the broader regional model, to:
        - Simulate IRP price futures
        - Perform ad-hoc analysis as needed
    - PGE utilizes the PZM model to:
        - Generate inputs to ROSE-E Portfolio Analysis:
            - Market dispatch of PGE resources and cost of market energy purchases.
            - Calculate variable costs for baseline portfolio and new resources.
            - Determine resource energy values associated with market dispatch used in ROSE-E portfolio analysis.
        - The PZM includes a functionality to calculate the emissions associated with serving retail load (new in 2026 CEP-IRP).
        - Analysis of Risk in Investments and Assets (ARIA):
            - Market purchases and wholesale sales to refine the financial analysis from ROSE-E.
        - Energy Position and RPS Workbook
            - Output from emitting and non-emitting resources inform energy need and RPS obligations.

- Response to the second question:
    - Hourly price futures are simulated in the WECC model. Those prices are incorporated into the PZM to represent the energy price of the wholesale transactions. PGE resources are dispatched to meet load or for wholesale sales (new to 2026 CEP-IRP).

5. Futures and Markets - What are your reactions about PGE's proposed WECC price future concepts?

Stakeholder: OPUC Staff

- In slide 74, does PGE plan to still use the same 39 price futures that it used in the 2023 CEP/IRP and 2023 Update?

PGE RESPONSE: No. PGE does not plan on using the same 39 price futures that it used in the 2023 CEP/IRP and 2023 Update. PGE has adjusted the number down from 39 to 37 with changes to the dimensions of the analysis. Additional details will be presented in the March 2026 Roundtable.

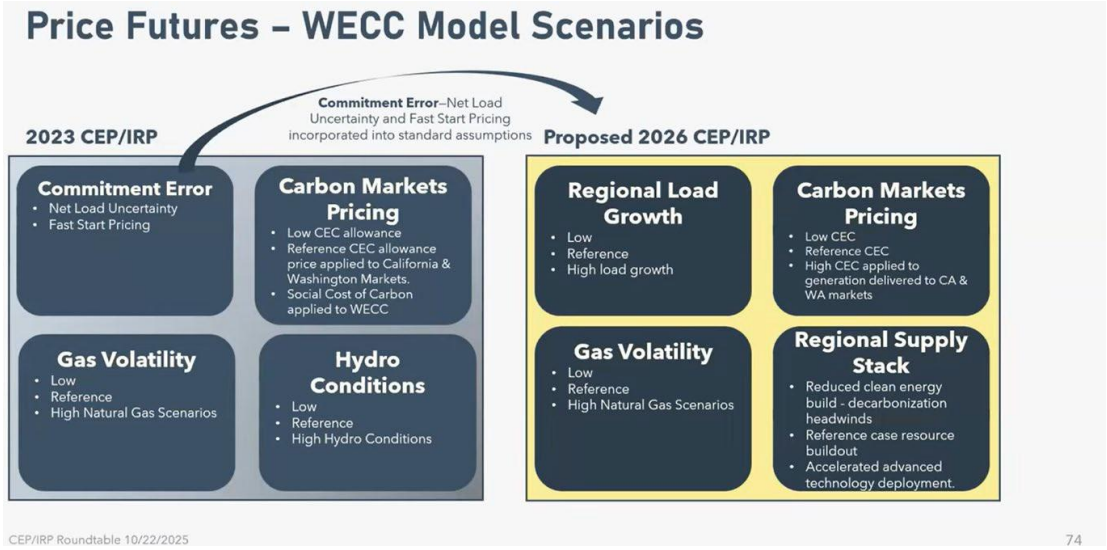
- How have the hydro conditions in the 2023 CEP/IRP been applied to the Proposed 2026 CEP/IRP Regional Supply Stack?

PGE RESPONSE: Variations in hydro conditions will not be assessed in favor of comparing what-if scenarios wherein the WECC-wide resource buildout leans toward either (1) natural gas development or (2) alternative technologies including nuclear and geothermal.

- Staff would like to learn more about how PGE plans to apply the categories listed in the Proposed 2026 CEP/IRP Regional Supply Stack.

PGE RESPONSE: The objective for applying changes to the regional supply stack is not to change the amount of MWs available on an annual megawatt-average basis, but to instead see how changes in technology would reshape regional prices. To do this, PGE used resource capacity factors to substitute the equivalent megawatt-average buildout for natural gas and alternative technology buildouts as a replacement for solar and wind PTCs.

- What are PGE's assumptions about the emissions associated with WECC wide unspecified purchases over the time horizon.



PGE RESPONSE: The WECC model incorporates emission prices into the hurdle rates for imports into CA and WA. This creates price separation and will impact the PGE IRP price forecast by forcing emitting resources to clear the emissions hurdle on exports to those zones. PGE does not calculate emissions from the WECC model specifically but incorporates information about market availability from the WECC model into the CESM to inform the PZM dispatch. Any market purchases calculated within the PZM will accrue emissions (mtCO2e) towards the HB2021 cap, based on input assumptions for market emission rate per MWh purchased to serve PGE load.

6. Futures and Markets - What type of information would you like the IRP to share and what alternatives would you suggest? (In reference to PGE's proposed WECC Price future concepts.)

Stakeholder: OPUC Staff

Currently Staff does not recommend any alternatives. Staff is interested to learn more about the proposed 2026 CEP/IRP Regional Supply stack scenarios. Staff will review the material provided by PGE and will provide additional information if needed.