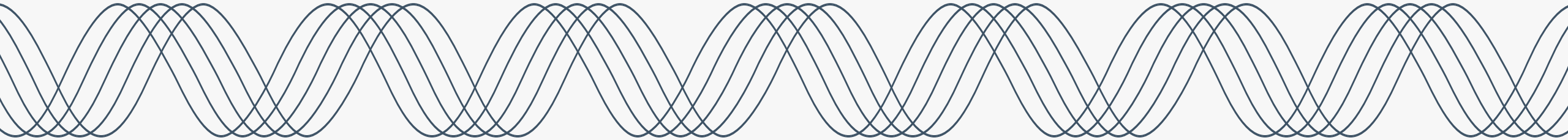
PGE CEP & IRP Roundtable 25-3

April 25th 2025



April 25th, 2025 – Agenda

9:00 – 9:05	Welcome | Meeting Logistics
9:05 – 10:55	Draft Portfolio Analysis Results
10:55 – 11:00	Closing Remarks | Next Steps

Meeting Details

1

Electronic version of presentation

https://portlandgeneral.com/about/who-we-are/resource-planning/combined-cep-and-irp/combined-cep-irp-public-meetings

2

Zoom meeting details

- Join Zoom Meeting https://us06web.zoom.us/j/9291862450?pwd=xVXQI4jljt7FdetDzWD0G35FFvayF8.1&omn=84372774388
- Meeting ID: 929 186 2459
- Passcode: 108198

3

Participation

- Use the raise the hand feature to let us know you have a question
- Unmute with microphone icon or *6

Meeting Logistics

Focus on Learning & Understanding

- There will be no chat feature during the meeting to streamline taking feedback
- Team members will take clarifying questions during the presentation, substantive questions will be saved for the end (time permitting)
- Attendees are encouraged to ‘raise’ their hand to ask questions

Follow Up

If we don’t have time to cover all questions, we will rely on the CEP/IRP feedback form

Draft Portfolio Analysis Results

Rob Campbell, PGE

Presentation Outline

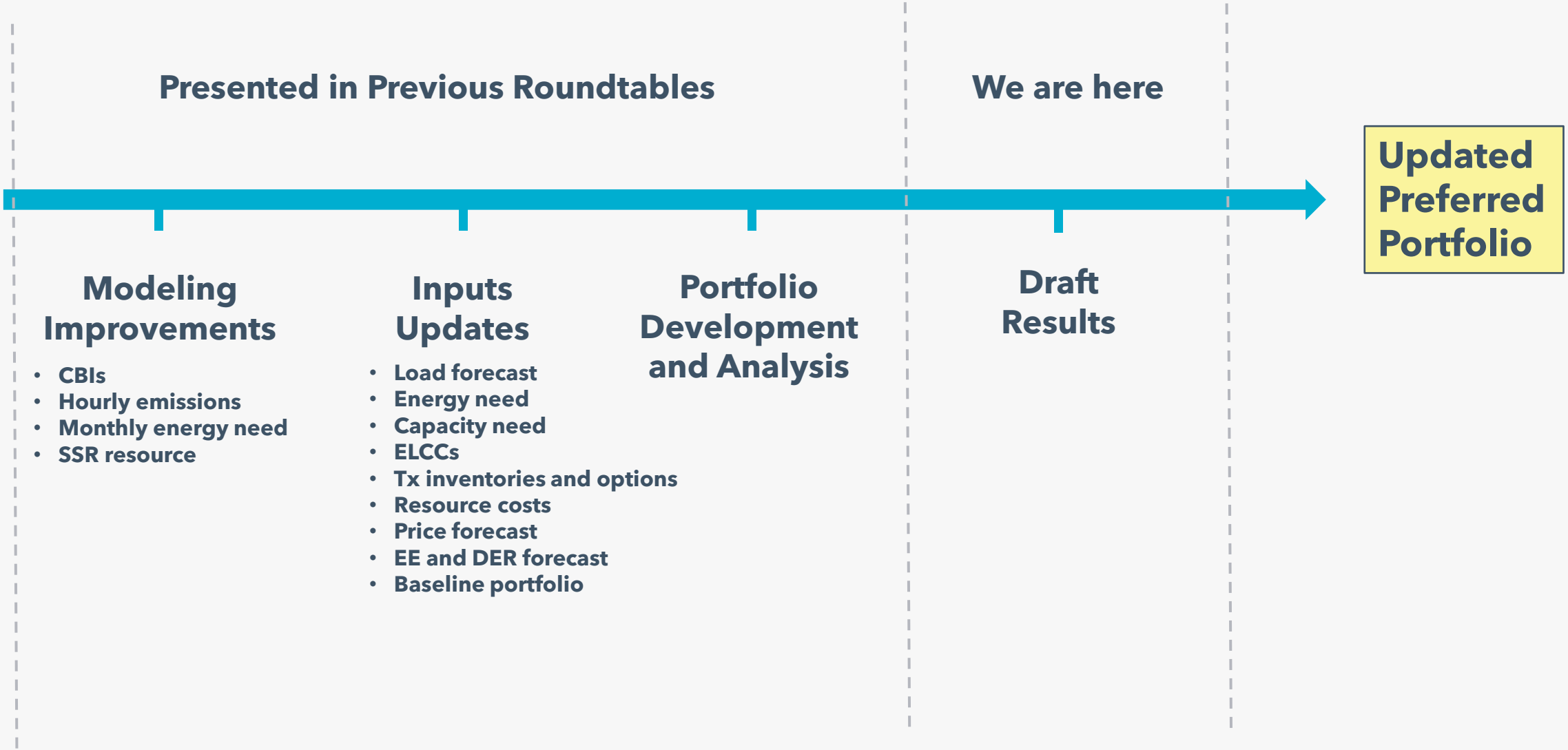
Portfolio Analysis Plan Overview

Review of Portfolios Analyzed

Draft Preferred Portfolio Results

Draft Results of Preferred Portfolio Scenario Analysis

2023 IRP Update Portfolio Analysis Plan



Portfolio Description

Portfolio	Description
Preferred Portfolio	• Update to the 2023 CEP/IRP Preferred Portfolio • Demonstrate compliance with HB 2021 under Reference Case conditions
Reliability Needs Only	Demonstrate underlying resource needs driven by load growth and portfolio composition, rather than emission reduction policy, to serve retail load
Large Industrial Customer Growth	Attribute resource need to: 1. 'Organic' load growth 2. Large industrial-customer growth
Market Scenarios	Consider impacts of alternative market outcomes through changes in select assumptions: • Scenario 1: Identify 50% of currently unspecified purchases as zero-emitting specified • Scenario 2: Extend existing low-emitting contracts set to expire • Scenario 3: Reduce unspecified emissions rate by 30%

Portfolio Description – Cont.

Portfolio	Description
State RA Requirements	Use assumptions consistent with state RA program to determine capacity need and proxy resource capacity contributions.
Absence of Non-Emitting Market	Demonstrate the additional quantity of resource additions required for HB 2021 compliance using hourly analysis with no access to non-emitting market purchases.
Small Scale Renewables	Demonstrate 10% SSR compliance in 2030 under alternative assumptions about resource eligibility.
Resource CBI (rCBI)	Consider the impact of rCBI-related cost-reductions on the addition of additional quantities of EE and DERs.

Preferred Portfolio Key Assumptions

Parameter	Base Case Assumption
Emissions	HB 2021 compliance in accordance with updated GHG glidepath.
Resource procurement	Opportunities for incremental supply side resource additions start in 2029. Annual battery storage additions limited to 500 MW.
Transmission	Off-system renewables must have associated transmission through: 1) BPA ATC, or 2) Transmission expansion (and associated costs), or 3) Transmission upgrade (and associated costs).
Non-emitting market	Access to vector of non-emitting market purchases for hourly emissions compliance.
RPS	Portfolios must comply with RPS obligations.

* Assumptions also apply to scenarios, except where otherwise noted.

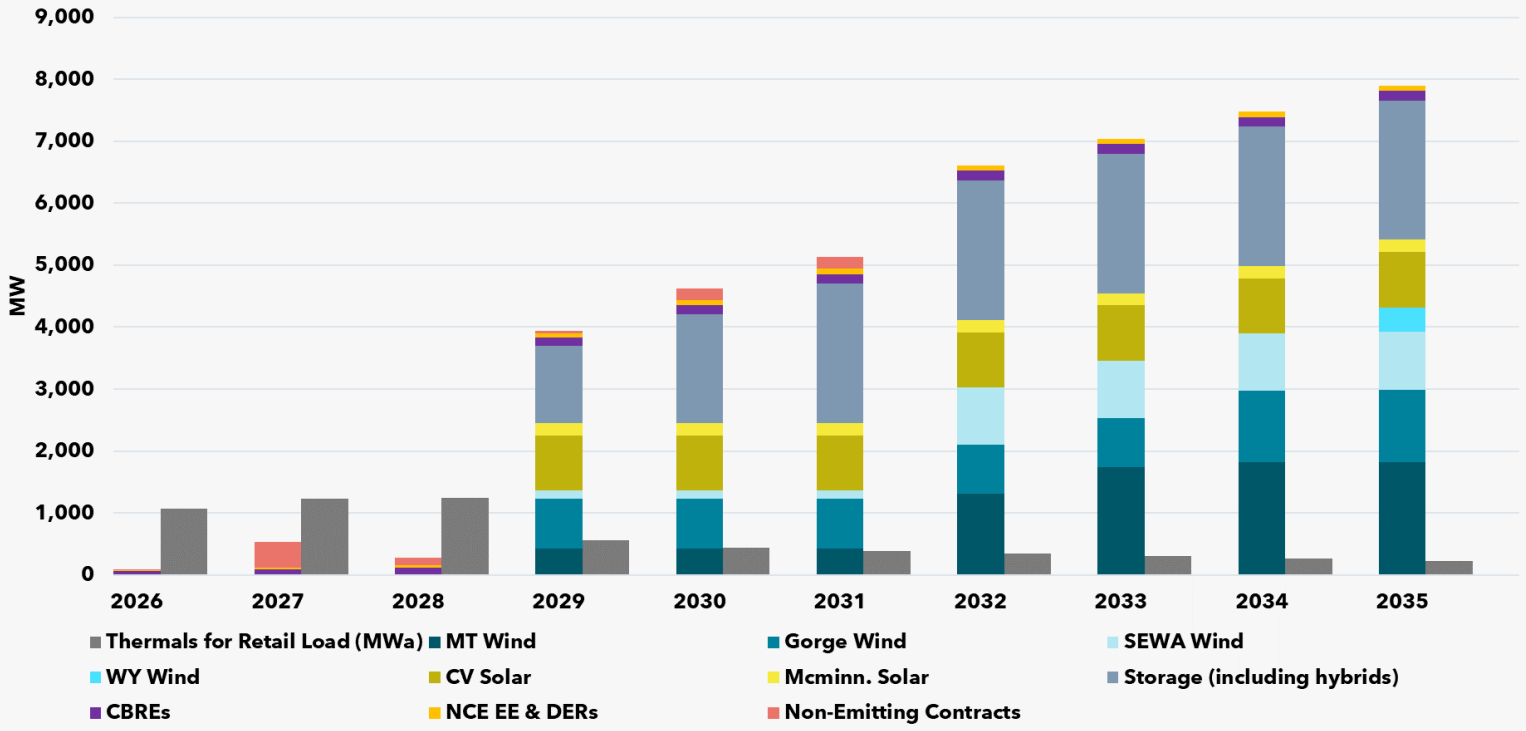
Preferred Portfolio

The Preferred Portfolio is an update to the 2023 CEP/IRP Preferred Portfolio that incorporates refreshed input data vintages and modeling advancements.

It represents the least-cost, least-risk, set of resource actions that meets energy and capacity needs while complying with HB 2021 GHG emissions targets and RPS requirements.

Transmission constraints are a key driver of outcomes, necessitating reliance on near-term contracts prior to the first available transmission option in 2032.

Preferred Portfolio Resource Buildout



2030 Resource Additions

1,362 MW wind

1,089 MW solar (including hybrid)

1,750 MW storage (including hybrid)

155 MW CBREs

83 MW EE and DERs

190 MW non-emitting contract

Key Takeaways

4,629 MW of 2030 resources is a 15% increase compared to the final 2023 CEP/IRP Preferred Portfolio.*

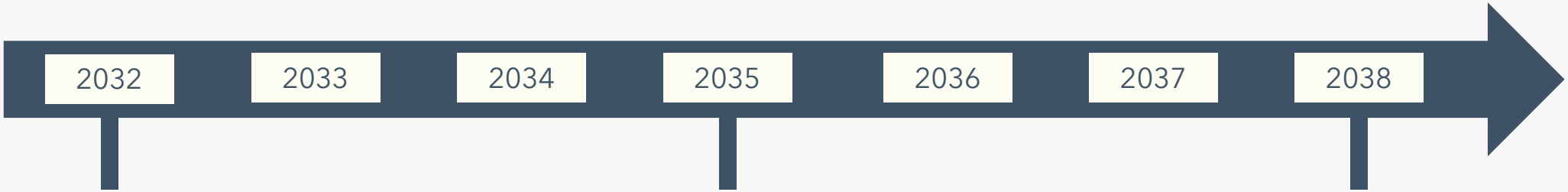
* Updated resource need reporting conventions introduce some complexities when comparing current projections of resource need to past disclosures. The comparison made here uses the updated convention of identifying hybrid storage separately for the calculation of total resource need.

Preferred Portfolio – Transmission Additions

Transmission expansion and upgrades are a critical component for the creation of an adequate and HB 2021-compliant portfolio.

All seven transmission options are added to the portfolio between 2032 and 2038*, unlocking access to the energy and capacity of 6,927 MW of off-system renewables.

Some transmission options provide additional capacity through access to diverse markets.



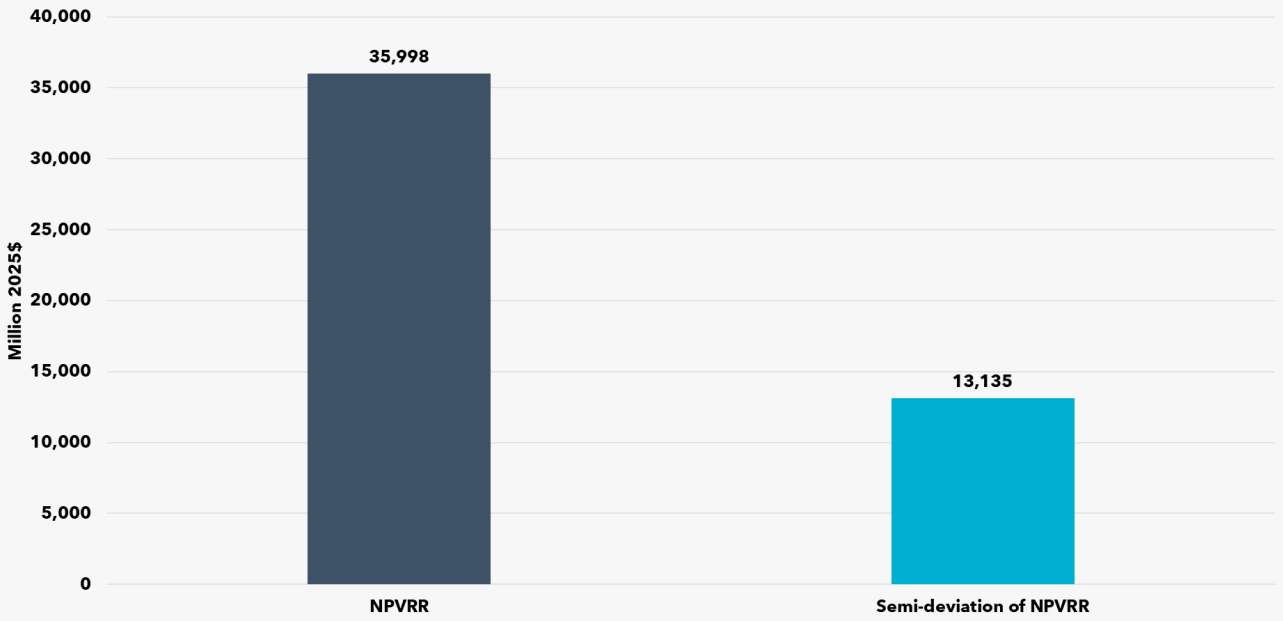
Bethel-Round Butte
(3,000 MW + winter capacity)

Trojan-Harborton
(800 MW)
SWIP North & B2H
(400 MW + winter capacity)
Gateway West & B2H
(400 MW + winter capacity)
Greenlink
(627 MW + winter capacity)

Cascade Renewables
(1,100 MW)
North Plains Connector
(600 MW + summer and winter capacity)

*Project COD is determined by the timeline of the most-restrictive component of the activities required to deliver energy to PGE's system, including BPA upgrades, which results in later CODs than may be found referenced by other sources. Details can be found in PGE's January 2025 Roundtable.

Preferred Portfolio Cost and Risk



Net present value of revenue requirement (NPVRR) represents the discounted cost and benefits across the full 20-year analysis timeline (2025-2044), for the **Reference Case**.

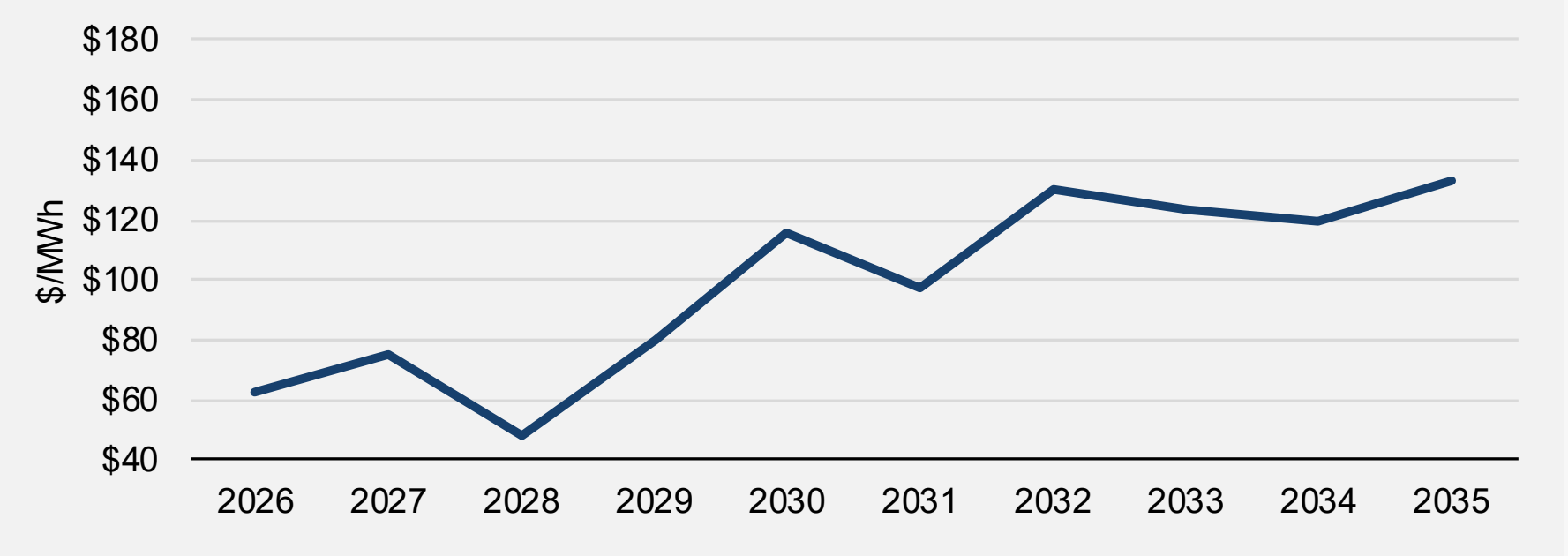
NPVRR is calculated for each of 351 future scenarios analyzed in ROSE-E. Semi-deviation captures the potential variation in cost outcomes across those futures.

Preferred Portfolio Annual Costs

Annual Portfolio Costs below represent the Preferred Portfolio assumptions including 50% generation asset ownership, and fully available ITC/PTC tax credits for relevant resources.

While this analysis does not represent actual changes to customer prices, it is suggestive that, on a planning basis, system costs are likely to increase in order to comply with HB 2021.

Annual cost results assume availability of Inflation Reduction Act tax incentives and do not yet reflect any price impacts that potentially arise from recently announced import duties.



Preferred Portfolio Resource Adequacy

The adequacy contribution of the Preferred Portfolio is tested to ensure it provides sufficient capacity to meet the Company's 24 hours in ten years adequacy metric.

- The Preferred Portfolio results in an adequate system for years with significant resource additions.
  - Proxy resources are assumed unavailable prior to 2029.
- Winter 2030 presents resource adequacy challenges that appear to drive resource buildout.
  - Loss of load hours (LOLH) estimate in winter 2030 appears to represent a binding constraint

System Capacity Need with Preferred Portfolio

Year	Summer Need (MW)	Winter Need (MW)
2026	0	0
2027	0	0
2028	0	68
2029	0	0
2030	0	0

System LOLH Estimate with Preferred Portfolio

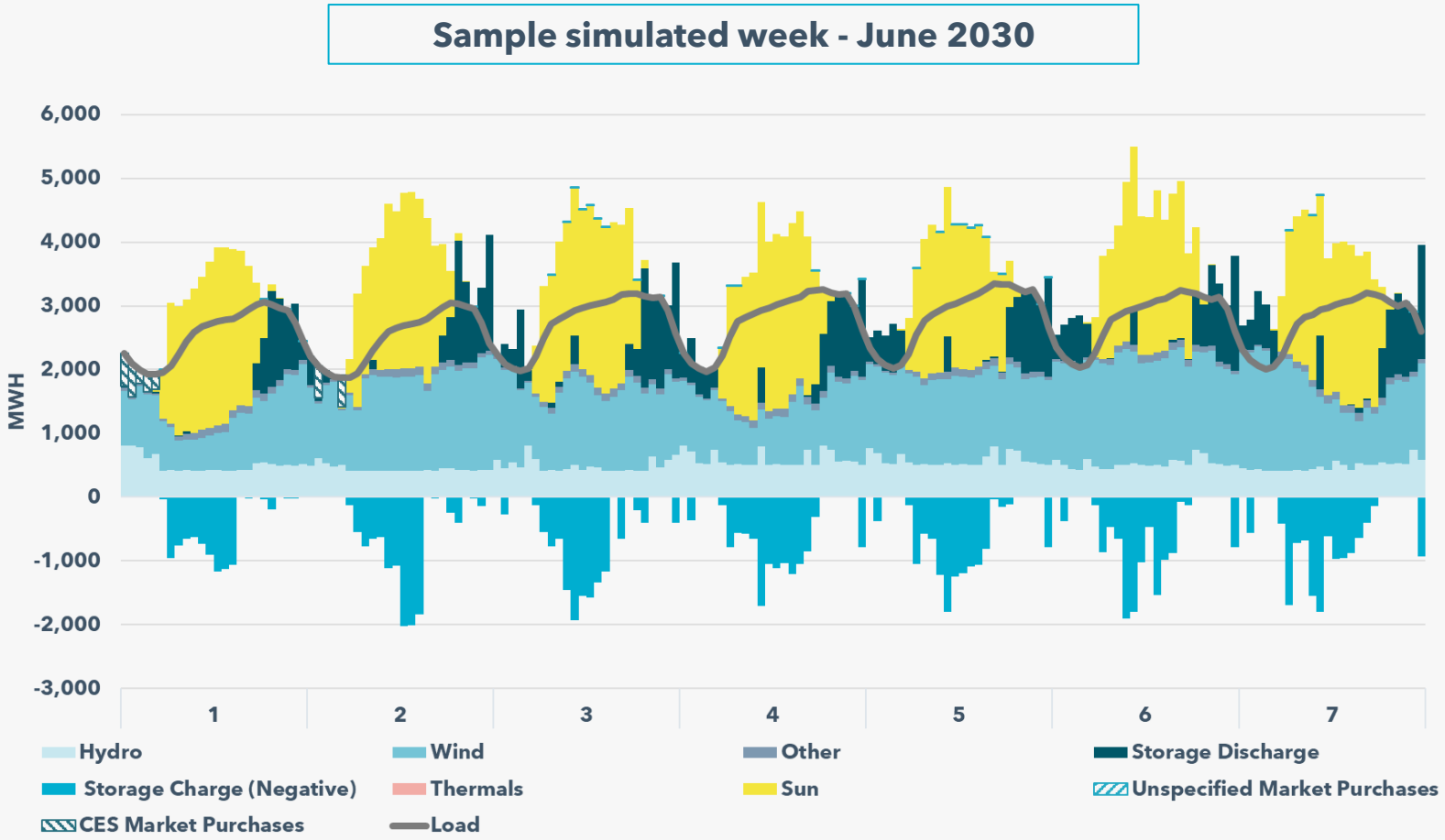
Year	Summer LOLH	Winter LOLH
2026	2.27	0.03
2027	1.45	0.20
2028	0.41	4.41
2029	0.00	0.00
2030	0.06	2.25

Short-term adequacy challenges may require structured/bi-lateral capacity agreements or regional sharing mechanisms (e.g., WRAP)

Preferred Portfolio Hourly Analysis

In response to Staff Recommendation #3 from the IRP Acknowledgement Order 24-096, the Preferred Portfolio is tested to ensure it provides sufficient energy to meet PGE demand while achieving the 2030 CO_2 emissions target (1.62 million metric tons).

Hourly Modeling demonstrates least cost dispatch of PGE generation and market purchases used to serve retail load.

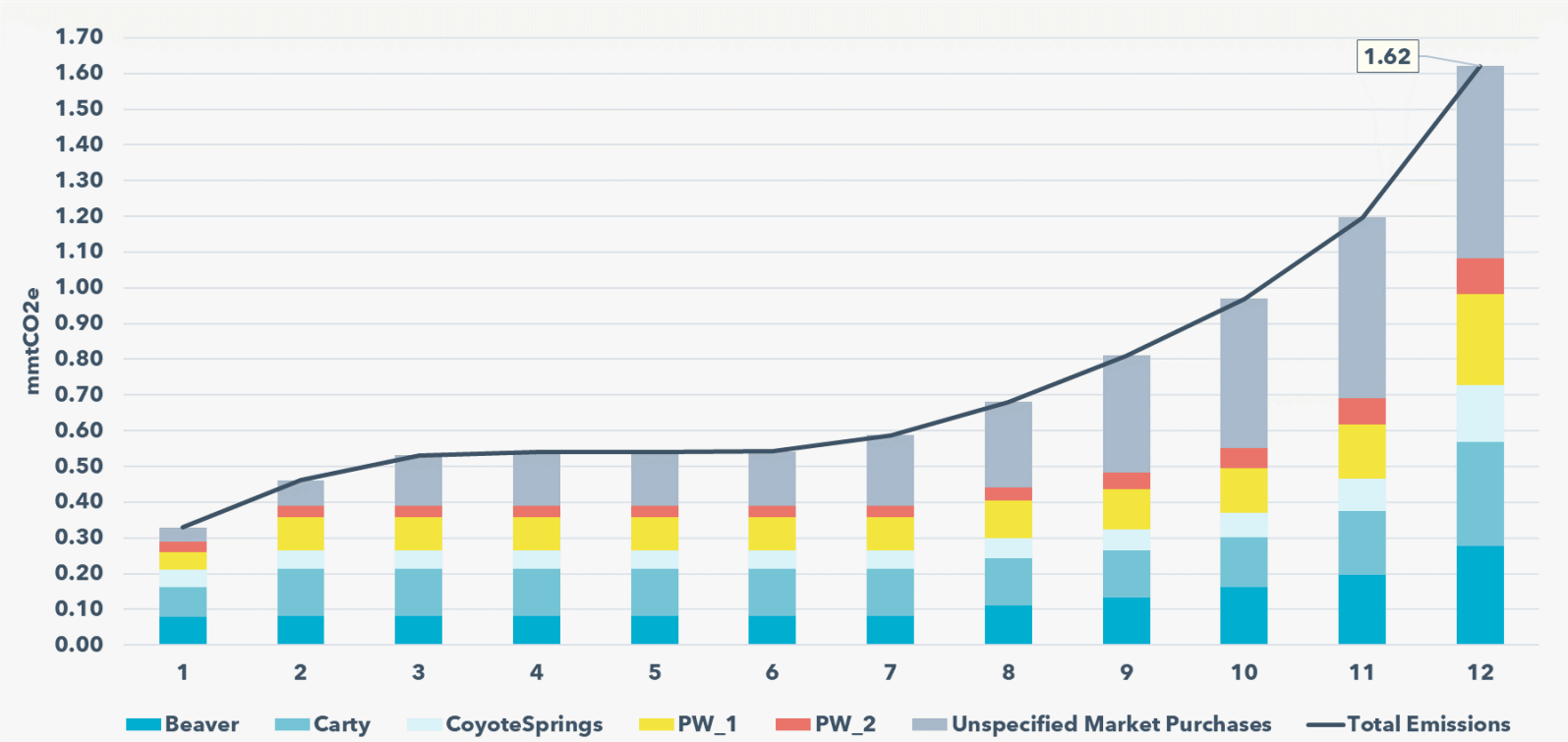


Preferred Portfolio Hourly Analysis

In response to Staff Recommendation #3 from the IRP Acknowledgement Order 24-096, the Preferred Portfolio is tested to ensure it provides sufficient energy to meet PGE demand while achieving the 2030 CO_2 emissions target (1.62 million metric tons).

- The model is constrained to the 2030 HB2021 emissions limit of 1.62 mmt CO_2e.
- Includes thermal energy used to serve retail load.
- Emissions attributed to load is forecasted to be concentrated in winter months.
  - In the winter, solar energy is less plentiful; mid-day energy used to charge batteries is more expensive.

Thermal and Unspecified Market Purchases meet 2030 emissions targets

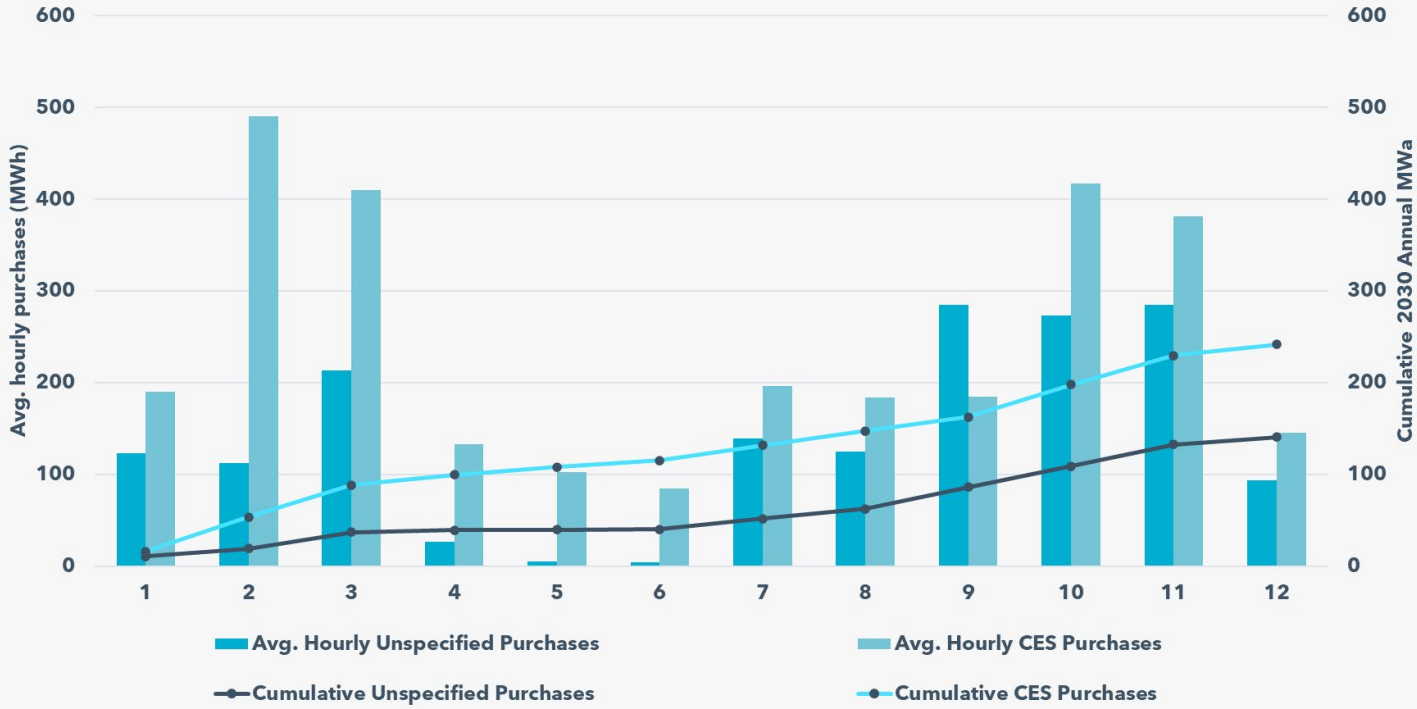


Preferred Portfolio Hourly Analysis

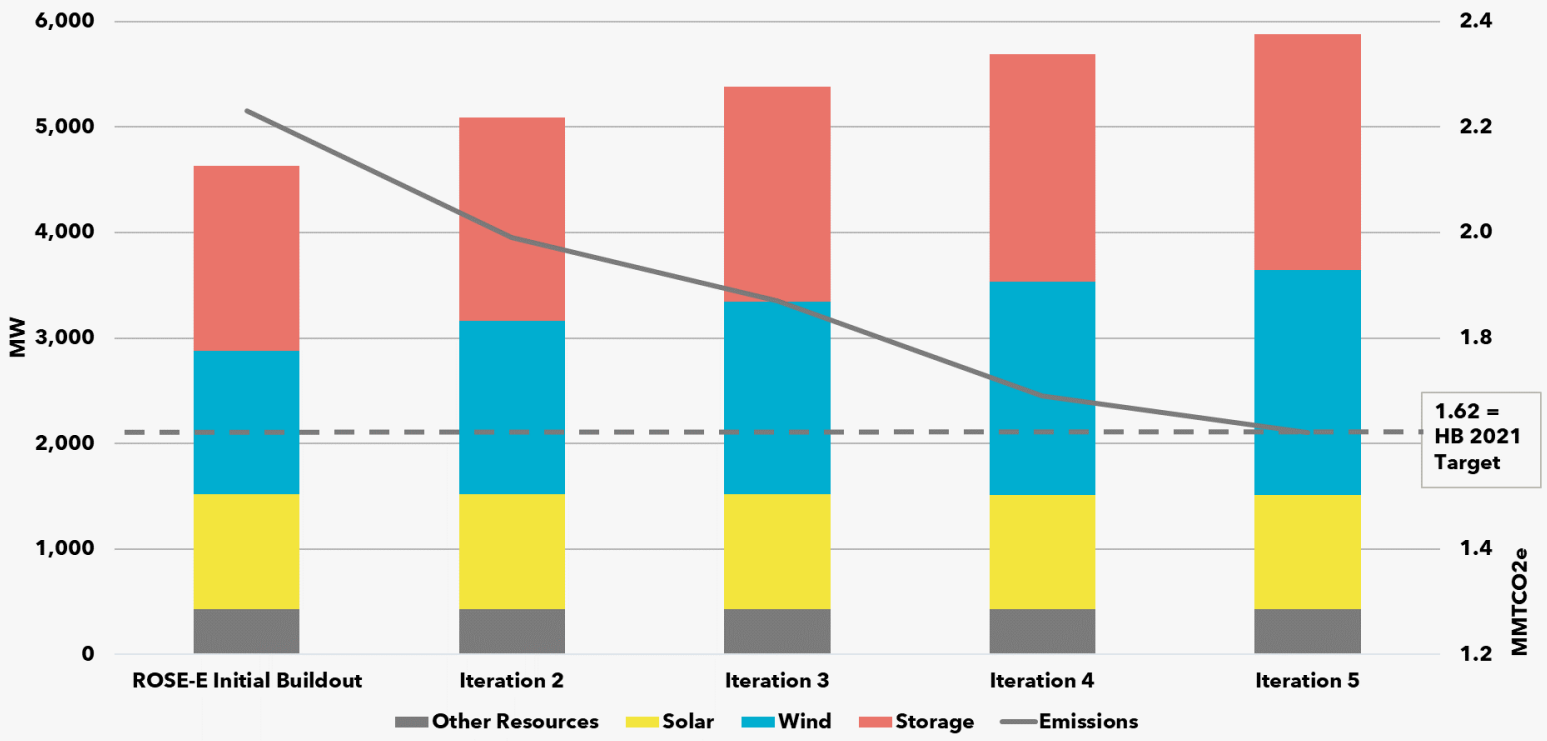
In response to Staff Recommendation #3 from the IRP Acknowledgement Order 24-096, the Preferred Portfolio is tested to ensure it provides sufficient energy to meet PGE demand while achieving the 2030 CO_2 emissions target (1.62 million metric tons).

- Unspecified market purchases are priced using the IRP forecasted hourly market price and capped by HB2021 emissions limit.
- Non-emitting (CES) market purchases include an additional price premium for non-emitting energy and are quantity-constrained by the hourly results of the Brattle Analysis (*August 2024 Roundtable*).

Cumulative Non-emitting (CES) and unspecified market purchases total 242 and 141 MWa, respectively



Absence of Non-Emitting Market Scenario



Key Takeaway

Without access to non-emitting market, a 1,249 MW, or 21%, increase in resource additions is required to achieve 2030 emissions target using hourly analysis.

Achieving decarbonization as an individual utility is less efficient than leveraging benefits of regional carbon-free portfolio diversity market in some hours.

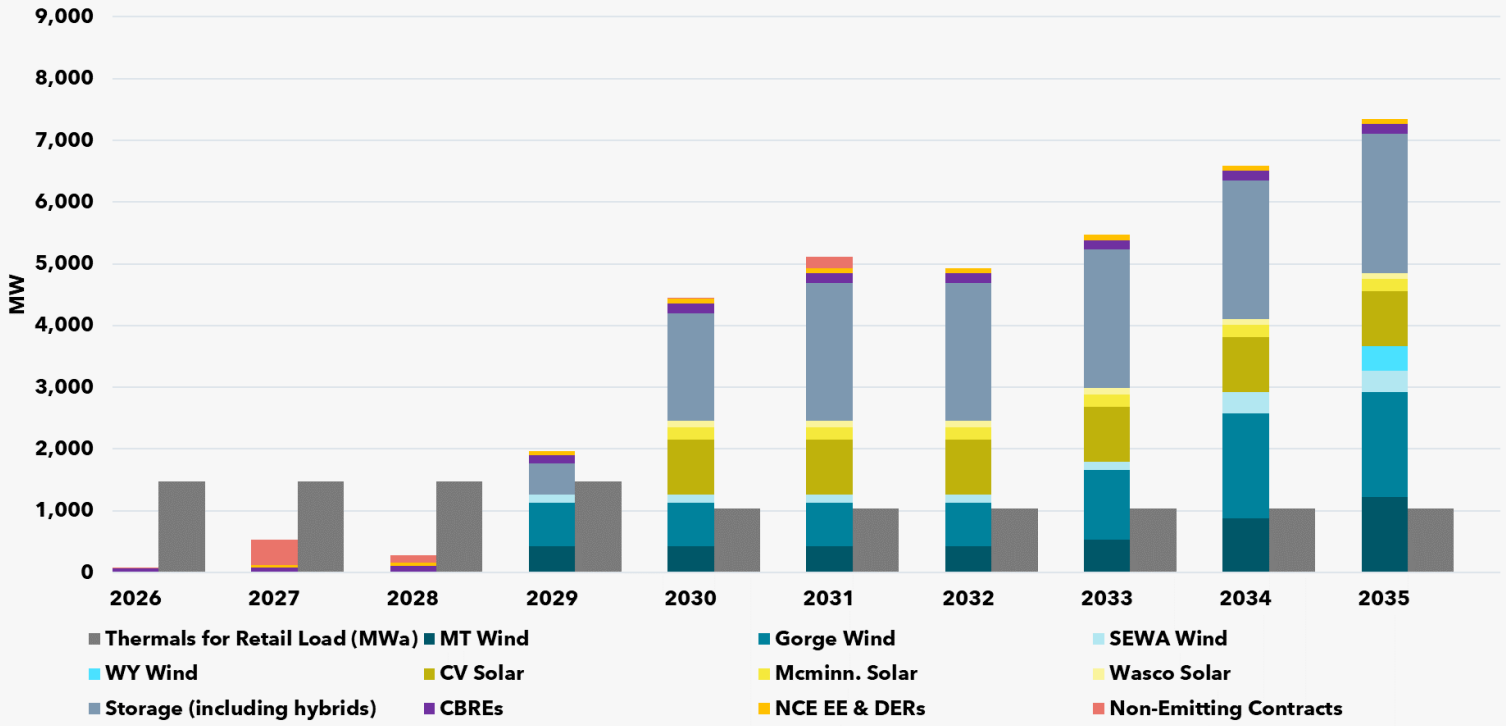
Reliability Needs Only Scenario

The ‘Reliability Needs Only’ scenario demonstrates how capacity and energy needs driven by load growth and portfolio composition changes.

GHG policy is relaxed to examine how PGE’s resource needs are driven by capacity and energy requirements distinct from GHG compliance.

The ‘Reliability Needs Only’ scenario is RPS compliant and no new natural gas additions can be made.

Reliability Needs Only Resource Buildout



2030 resource additions

1,262 MW wind

1,189 MW solar (including hybrid)

1,745 MW storage (including hybrid)

155 MW CBREs

83 MW EE and DERs

9 MW non-emitting contracts

Key Takeaways

4,443 MW 2030 resource additions without reducing thermals suggests resource adequacy is a main driver of resource need.

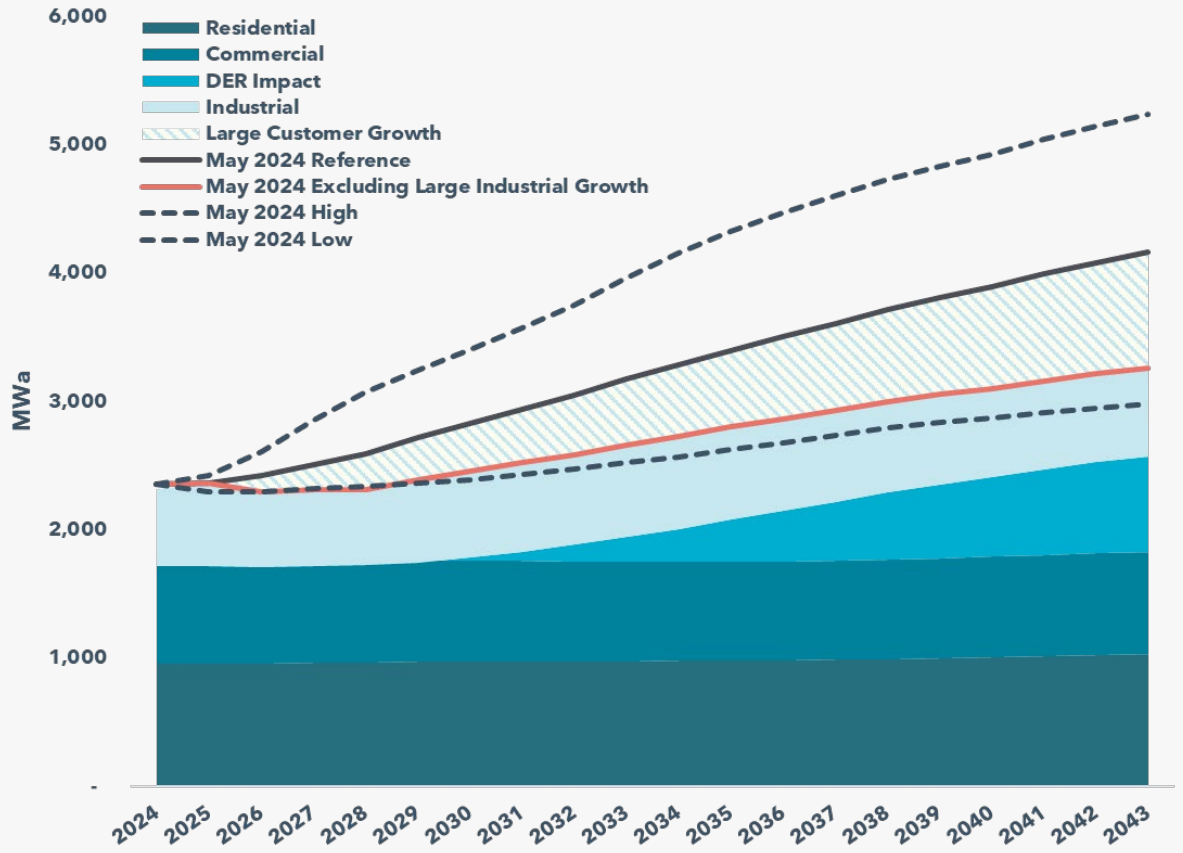
Large Industrial Customer Growth Scenario

Illustrates attribution of a portion of PGE's resource need to large industrial customer load growth.

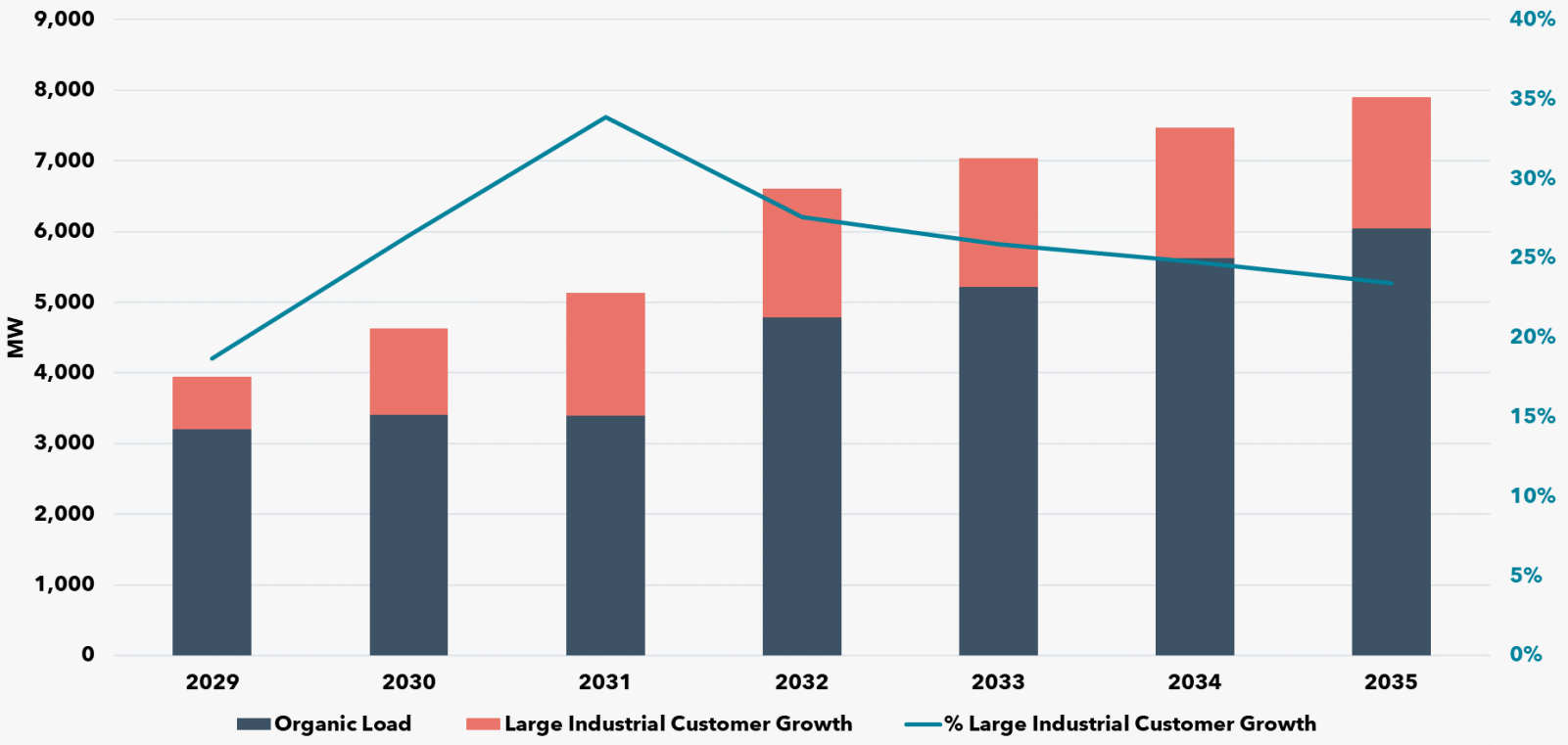
Uses a "No large industrial growth" load forecast variation which removes the forecasted growth associated with these sources.

Resource additions attributable to serving large industrial customer growth can be found using the difference between resources added under the Reference Case load forecast and resources added under the "No large industrial growth" forecast.

All other assumptions held constant relative to the preferred portfolio, including compliance with HB 2021 GHG targets.



Large Industrial Customer Growth Results



26% of resources added in the draft Preferred Portfolio through 2030 are associated with large industrial customer growth.

State RA Requirements Scenario

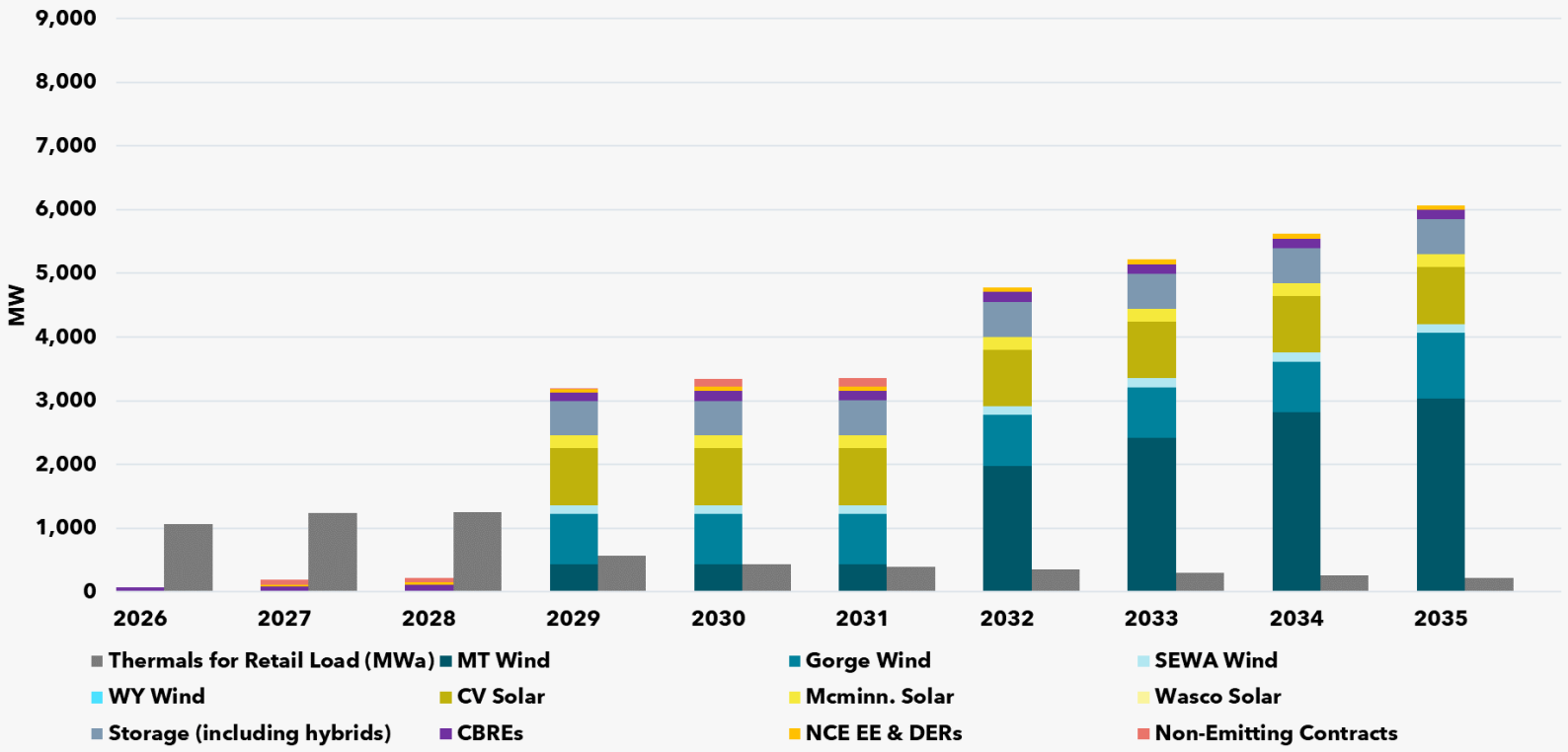
The ‘State RA Requirements’ scenario models PGE’s resource adequacy needs using methods consistent with the state RA program instead of using the PGE resource adequacy methods that are standard in the Preferred Portfolio and all other scenarios.

The alternative methodology used for this scenario impacts capacity need and proxy resource ELCCs.

Details on the methodology and resulting capacity need and ELCCs was presented in PGE’s February 2025 Roundtable.

The ‘State RA Requirements’ scenario is HB 2021-compliant.

State RA Requirements Resource Buildout



2030 resource additions

1,362 MW wind

1,089 MW solar (including hybrid)

545 MW storage (including hybrid)

155 MW CBREs

68 MW EE and DERs

126 MW non-emitting contract

Key Takeaway

3,345 MW 2030 resource additions are substantially lower than under IRP assumptions.

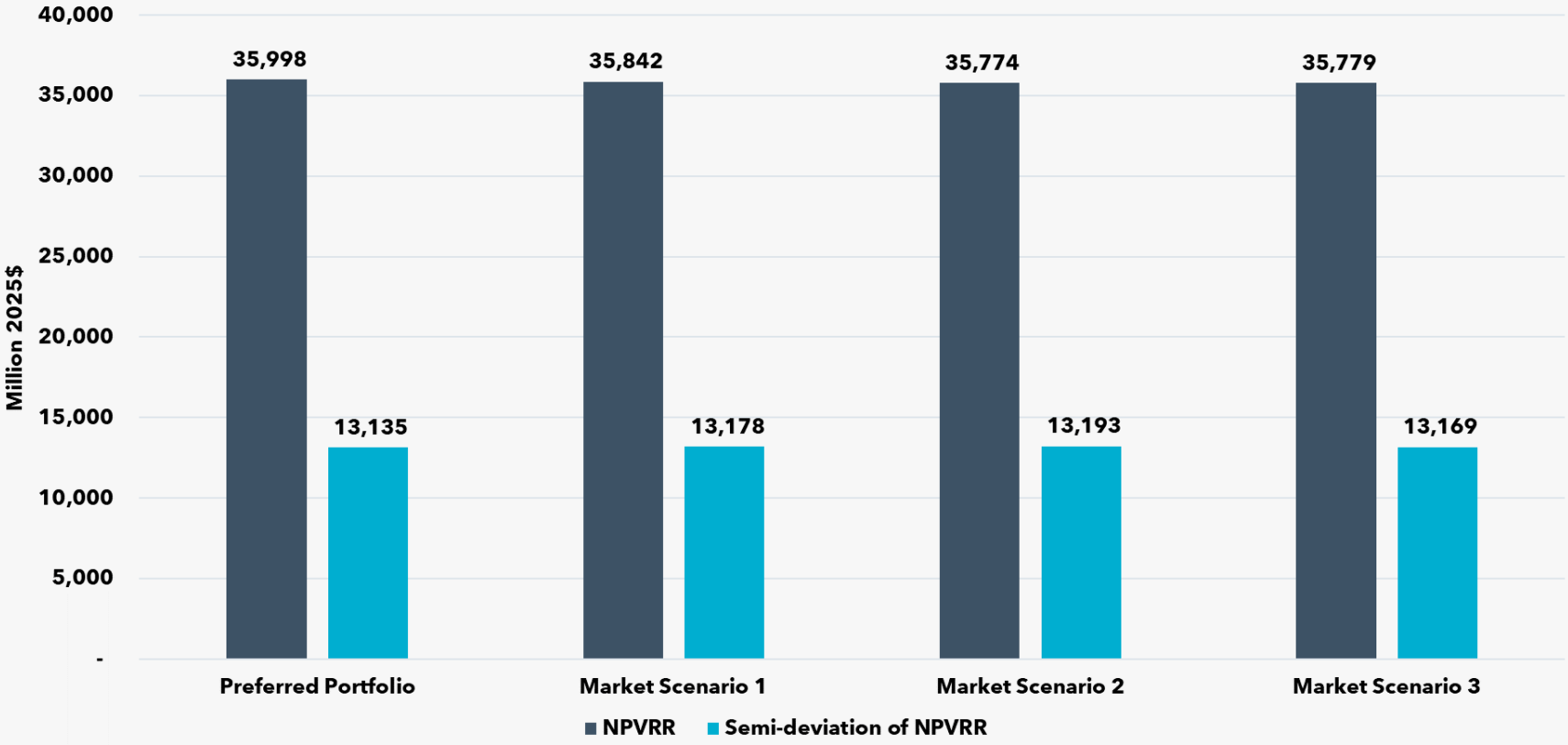
Market Scenarios

Market scenarios vary assumptions in PGE's IGHG model, increasing the quantity of emitting energy that PGE is ultimately able to retain to serve retail load.

Market Scenarios are HB 2021-compliant.

Specify More Power Purchases	Extend Low-Emitting Existing Purchases	Lower Emission Rate
Modeling change: *Specify 50% of budgeted unspecified market purchases as non-emitting*	**Modeling change:** *Assume ongoing low-emitting short-term specified purchases*	**Modeling change**: *Reduce the unspecified emissions rate by 30%*
CONTRACTS	CONTRACTS	MARKET

Market Scenarios Cost Comparison

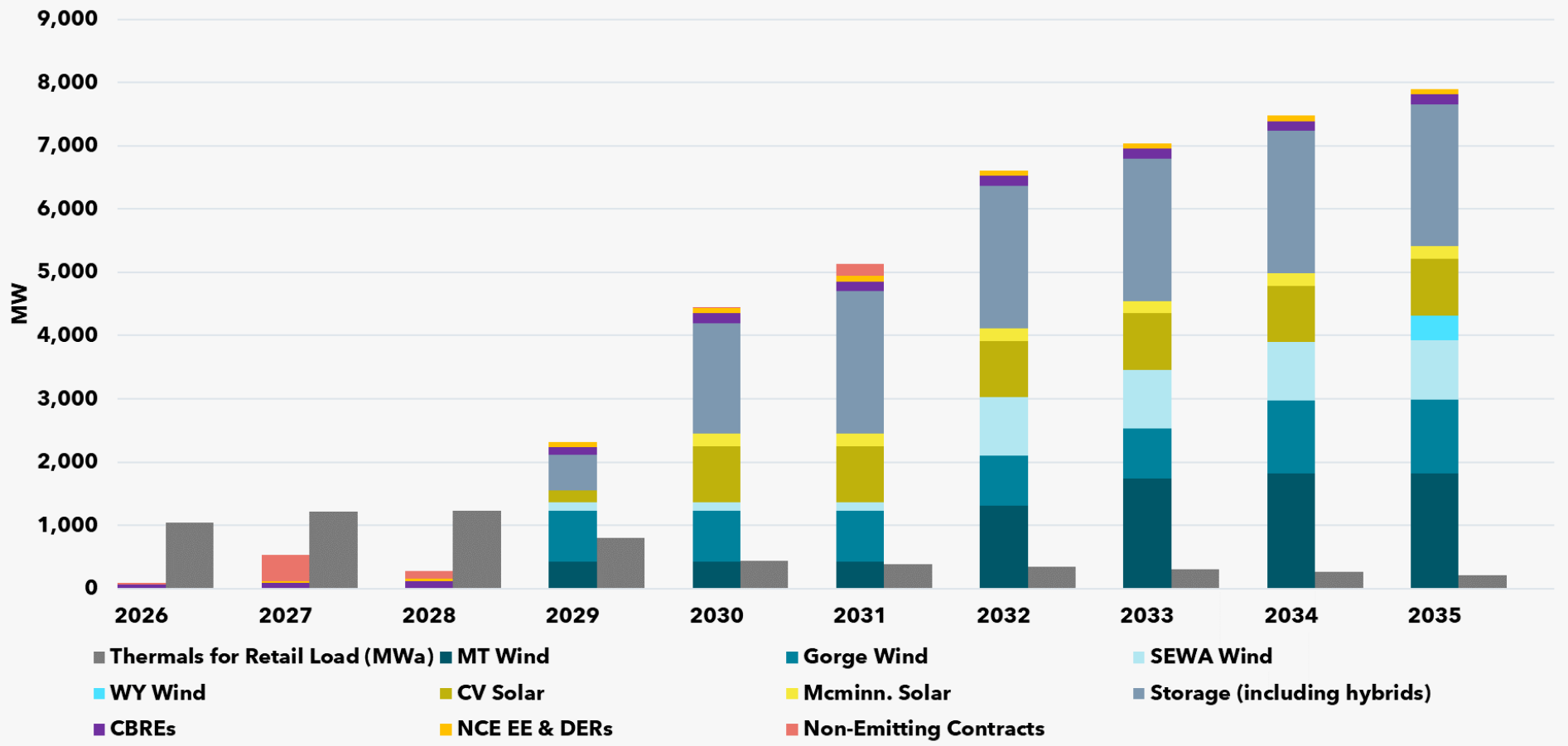


Key Takeaway

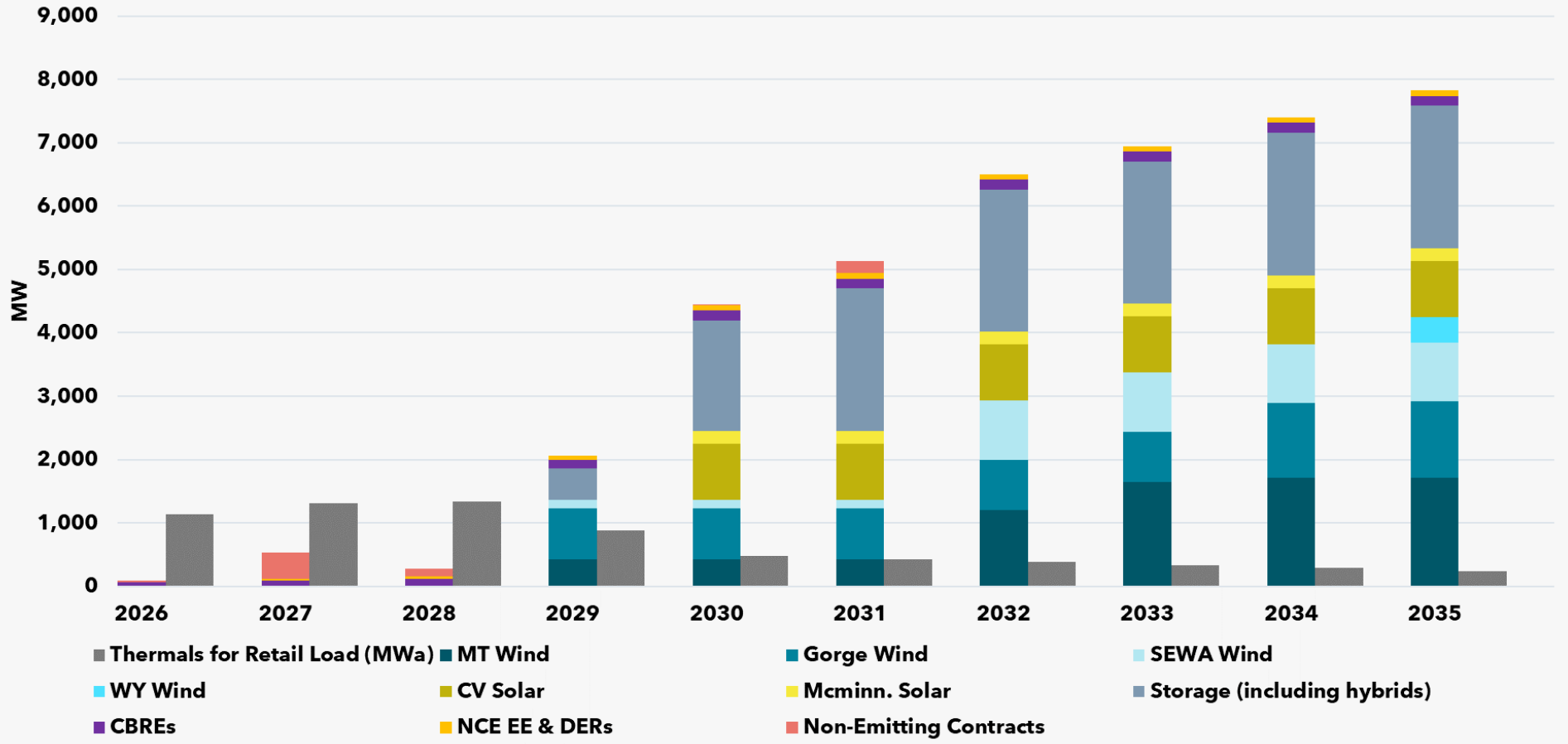
Because the assumptions in the market scenarios allow PGE to retain more emitting energy and thus reduce the energy need, resource additions are lower than in the Preferred Portfolio.

Impacts on resource buildouts and portfolio cost and risk are modest because change in energy need is relatively small and capacity need is unchanged.

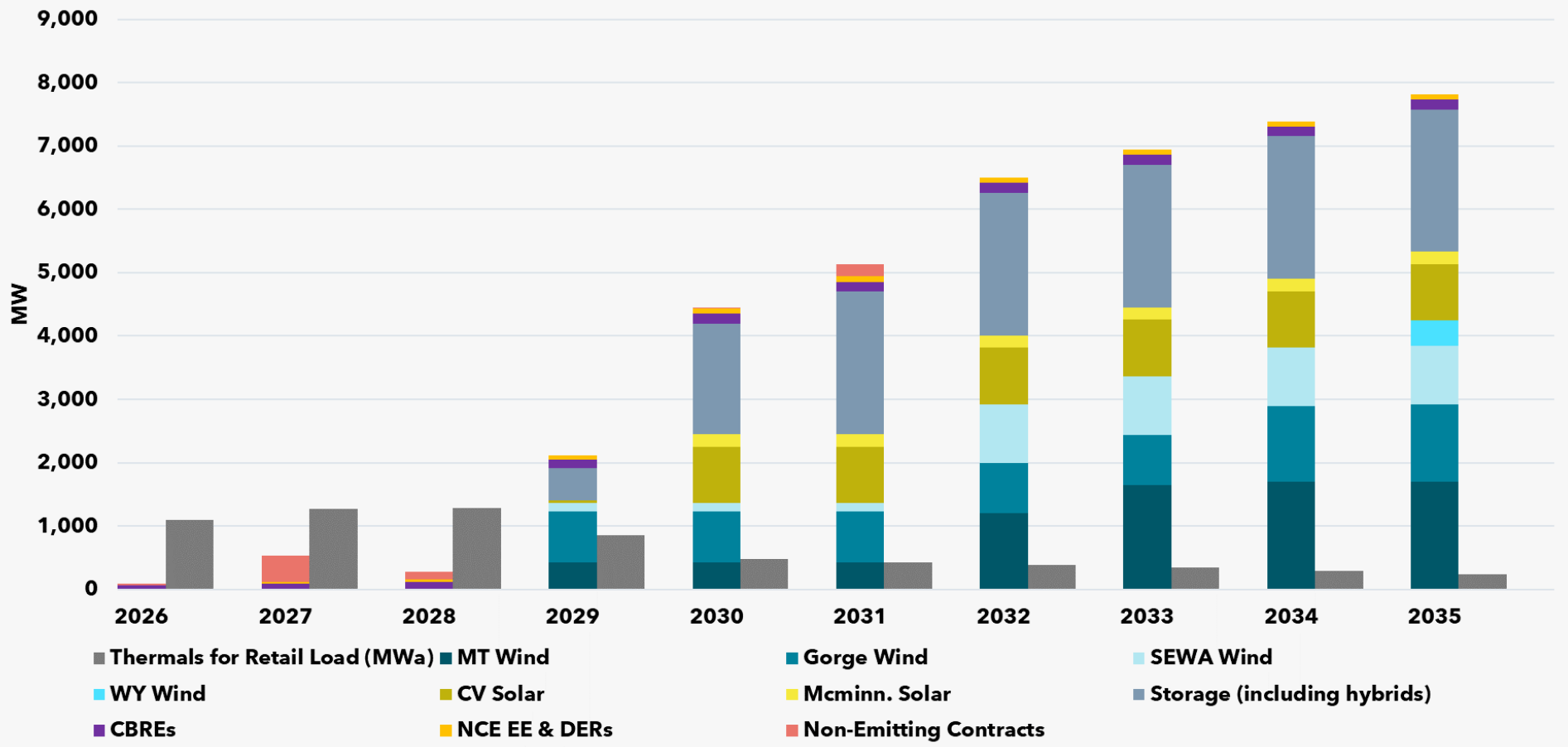
Market Scenario 1 Resource Buildout



Market Scenario 2 Resource Buildout



Market Scenario 3 Resource Buildout



Community Benefits Indicators

Resource Community Benefits Indicators (rCBIs)

- rCBIs are reductions in fixed costs to certain CBRE, NCE DR, and NCE EE resources to reflect the societal value of their associated community benefits.
- Cost adjustments can influence the selection of resources and cost outcomes of portfolios in ROSE-E.
- The influence of rCBIs is explored with the '**rCBI Scenario**'.

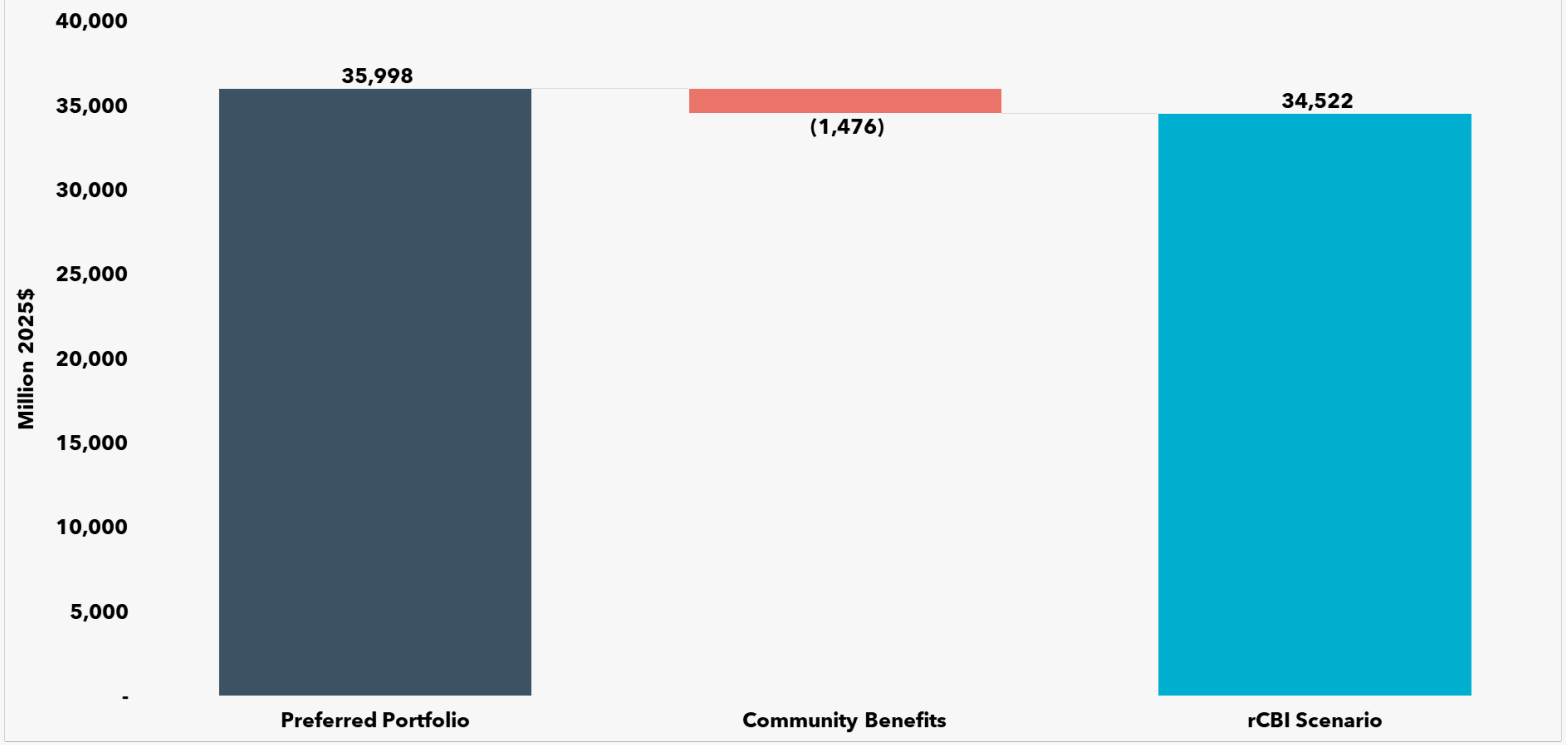
Portfolio Community Benefits Indicators (pCBIs)

- Unitless indicators of community benefits that accrue for each MW of eligible resource that is added in a portfolio.
- Reporting metrics that can be used to compare portfolios.
- Do not influence resource selection in ROSE-E.

pCBI Metrics
pCBI 1: Economic Impacts
pCBI 2: Energy Equity
pCBI 3: Health and Community Wellbeing
pCBI 4: Resilience / Reliability
pCBI 5: Environmental Impacts

CBI development was discussed in the September 2024 Roundtable.

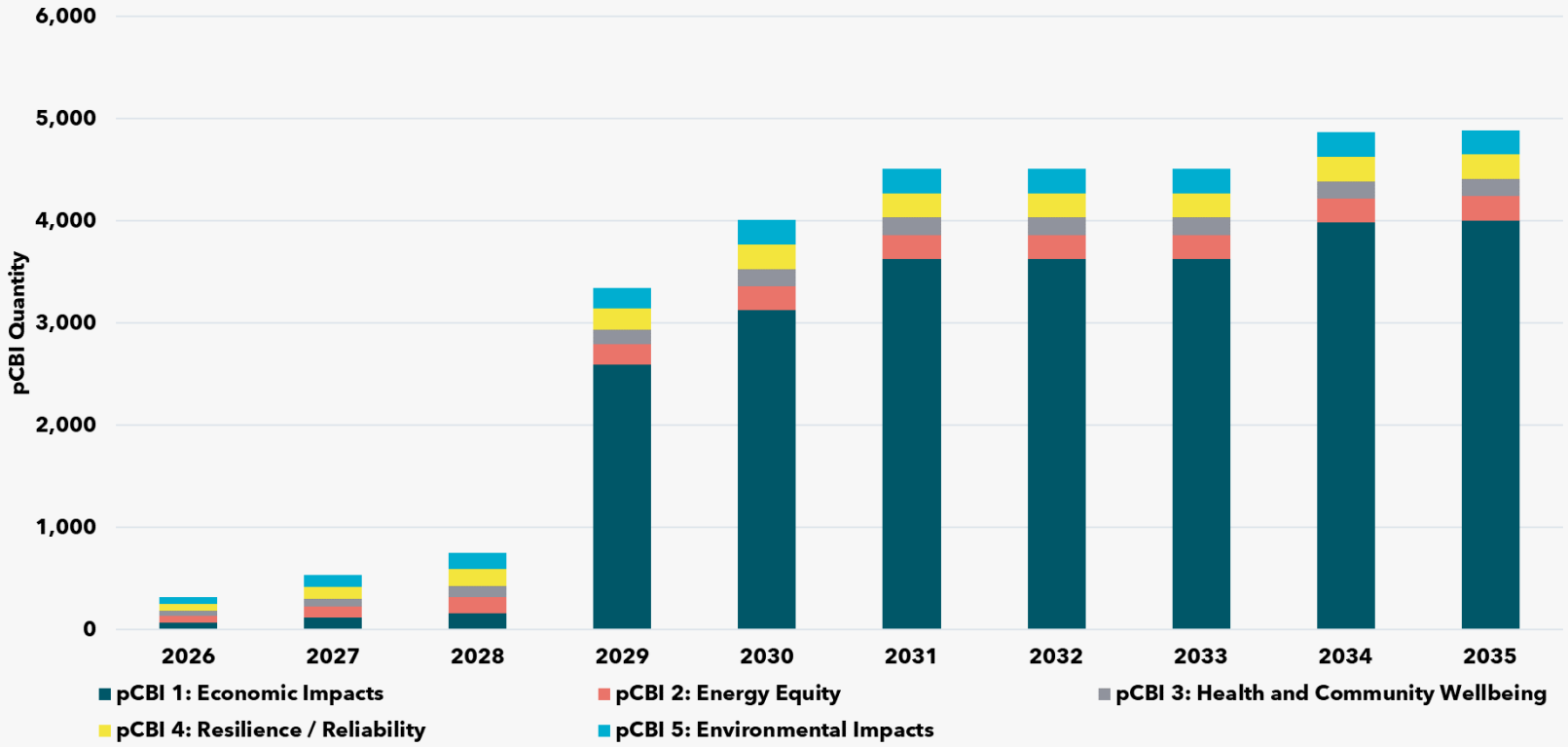
Resource CBI (rCBI) Scenario



Key Takeaways

- Minimal impact on resource additions (2 MW increase in NCE DR resources).
- $1,476 million reduction in NPVRR represents the value of localized community benefits provided by the resources in the portfolio.
- Reduced NPVRR, reflects the societal benefits provided by the resources. It does not represent a decrease in the monetary cost of the portfolio or suggest that the 'rCBI' scenario would result in lower customer bills than the Preferred Portfolio.

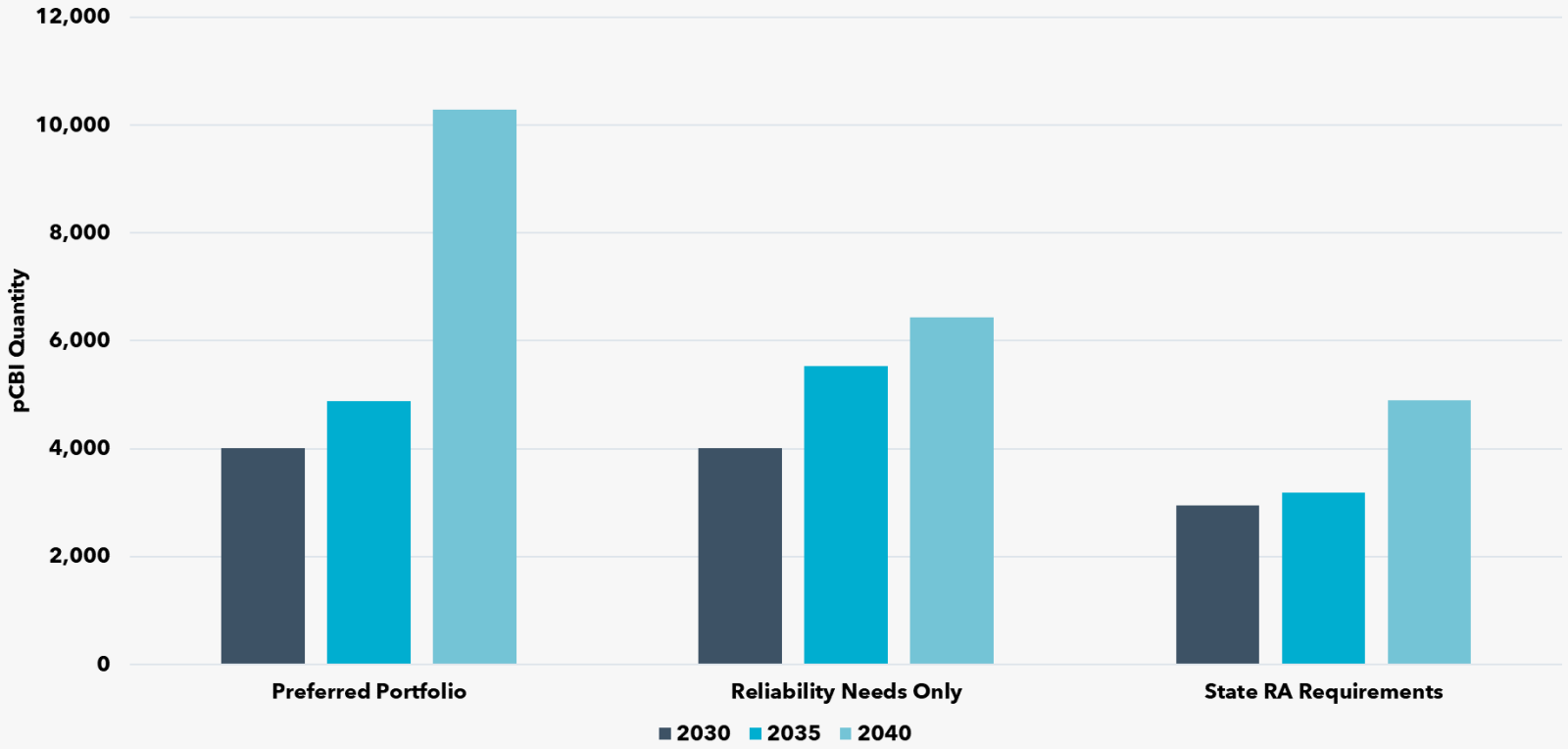
Portfolio CBIs (pCBIs) – Preferred Portfolio



Key Takeaways

- Large increase in pCBIs in 2029 is driven by substantial additions of renewable resources, which generate pCBI 1 when sited in OR.
- pCBIs 2-5 (generated by NCE EE and DERs and CBREs) increase through 2030 as additions of these resources are made to the portfolio.
- pCBIs generated by the 'rCBI' and three 'Market' scenarios are nearly identical to Preferred Portfolio.

Portfolio CBIs (pCBIs) Comparison



Key Takeaways

Because the Preferred Portfolio has more renewable resource additions, it generates more pCBIs than the 'Reliability Needs Only' and 'State RA Requirements' scenarios throughout the study period.*

*In 2035, the 'Reliability Needs Only' portfolio generates more pCBIs than the Preferred Portfolio because it contains more OR renewables.

Small Scale Renewables Analysis

The small-scale renewables (SSR) analysis consists of two components:

SSR needs assessment	Summarize PGE's 2030 SSR compliance position, with and without contributions of NEM.
SSR compliance cost assessment	Constrain ROSE-E to add sufficient quantities of SSR Proxy Resource to meet any compliance shortfalls in the Preferred Portfolio in all years starting in 2030.

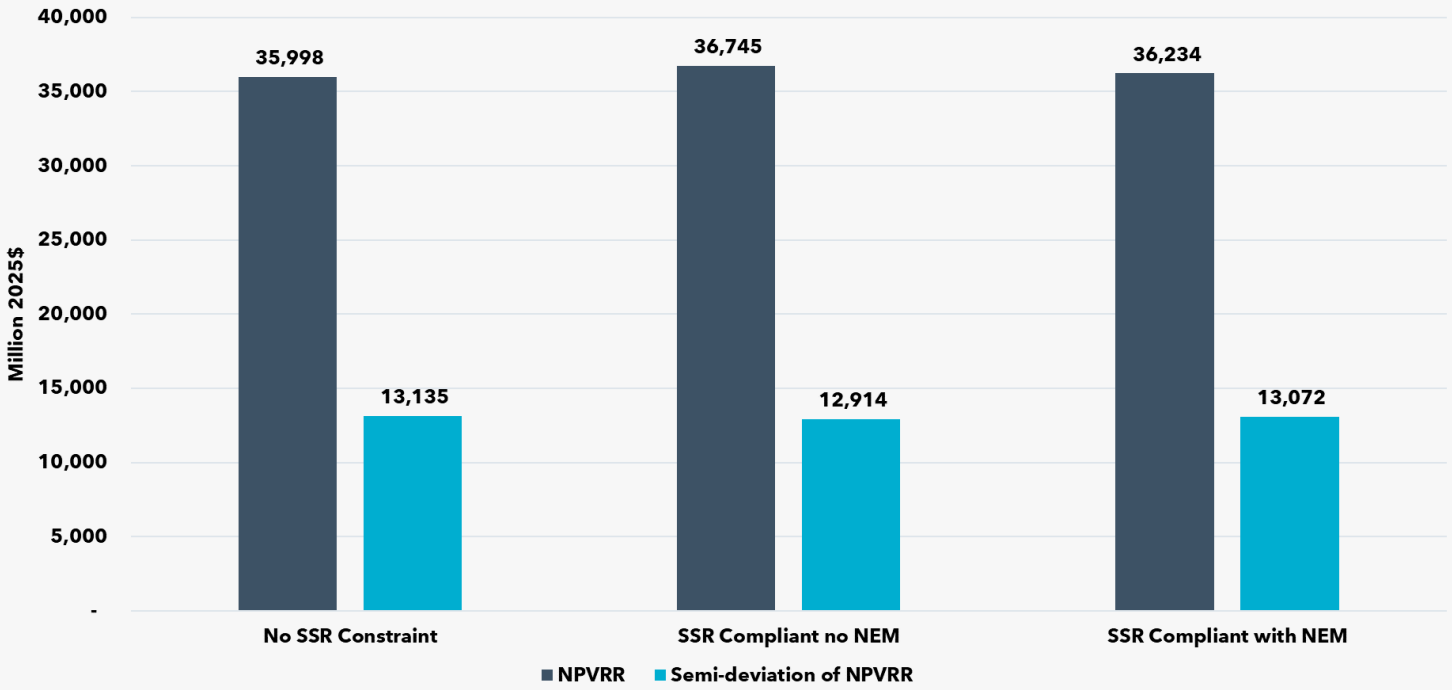
SSR Needs Assessment

	All NEM Remains Ineligible	All Customer Sited Eligible
2030 Compliance Need	**769 MW**	**837 MW**
Baseline Resource Contribution	**560 MW**	**560 MW**
Customer-Sited Contribution	**0 MW**	**675 MW**
Incremental Compliance Requirement	**210 MW**	**0 MW**

SSR compliance requires that 10% of owned and contracted generating resources are 20 MW or smaller.

Compliance need is determined by PGE's existing portfolio of resources and the resources added in ROSE-E in the Preferred Portfolio.

SSR Compliance Cost Assessment



Key Takeaways

Relying on the SSR Proxy Resource to meet remaining unmet compliance shortfalls throughout the study period:

- Increases portfolio NPVRR by $747 million when NEM is not considered an eligible resource for compliance.
- Increases portfolio NPVRR by $236 million when NEM is considered eligible.*

* Cost premium of 'With NEM' scenario is a function of SSR resources added after 2030.

Questions

NEXT STEPS

A recording from today's webinar will be available on our website in one week

Upcoming Roundtable: June 4th, 2025

Thank you

Contact us at
IRP.CEP@PGN.COM

An

kind of energy

ACRONYMS

ARIMA: autoregressive integrated moving average
ART: annual revenue-requirement tool
ATC available transfer capability
BPA: Bonneville Power Administration
C&I: commercial and industrial
CBI: community benefit indicators
CBIAG: community benefits and impacts advisory group
CBRE: community based renewable energy
CDD: colling degree day
CEC: California energy commission
CEP: clean energy plan
CF conditional firm
DC: direct current
DER: distributed energy resource
DR: demand response
DSP: distribution system plan
EE: energy efficiency
ELCC: effective load carrying capacity
EJ: environmental justice
ETO: energy trust of Oregon
EUI: energy use intensity
GHG: greenhouse gas
HB2021: House Bill 2021
HDD: heating degree day
HVDC: high-voltage direct current
IE: independent evaluator
IOU: investor-owned utilities
ITE: information technology equipment
ITC: investment tax credit
kW: kilowatt
LOLH: loss of load hours
LT/ST: long term/ short term
LTF long-term firm
MW: megawatt
MWa: mega watt average
NAICS: North American industry classification system
NCE: non-cost effective
NG: natural gas
NPVRR: net present value revenue requirement
OASIS Open Access Same Time Information System
ODOE: Oregon department of energy
PPA: power purchase agreement
PSH: pumped storage hydro
PUC: public utility commission
PURPA: Public Utility Regulatory Policies Act
PV: photovoltaic
REC: renewable energy credit
RLRR: low carbon price future
ROSE-E: resource option strategy engine
RPS: renewable portfolio standard
RRRR: reference case price future
RTO: regional transmission organization
SoA: South of Allston
T&D: transmission and distribution
TSR: transmission service request
TSEP: TSR study and expansion process
Tx: transmission
UPC: usage per customer
UPS: uninterruptible power supply
VER: variable energy resources
VPP: virtual power plant
WECC: western electricity coordinating council