



APS RPAC Meeting

08/04/2023



MEETING AGENDA



Welcome & Meeting Agenda

Matt Lind
1898 & Co.



Regulatory Update

Todd Komaromy
APS



APS's Clean Energy Accounting

Mike Eugenis
APS



IRP Reference Case

Akhil Mandadi
APS



Next Steps & Open Discussion

Matt Lind
1898 & Co.

Meeting Guidelines



Member Engagement

RPAC Member engagement is critical. Clarifying questions are welcome at any time. There will be discussion time allotted to each presentation/agenda item, as well as at the end of each meeting.



Action Items

We will keep a parking lot for items to be addressed at later meetings.



Meeting Minutes

Meeting minutes will be posted to the public website along with pending questions and items needing follow up. We will monitor and address questions in a timely fashion.



Preliminary Content

Meetings and content are preliminary in nature and prepared for RPAC discussion purposes. Litigating attorneys are not expected to participate.



July Meeting Recap

- APS detailed the latest regulatory changes and updates. The 2023 IRP filing date has been moved to November 1st, 2023.
- APS provided an update on its transmission interconnection reform and outlined key milestones in the process.
- EPRI informed RPAC Members about the ongoing climate change scenario analysis and asked for feedback on plausible extreme scenarios.
- APS summarized resource adequacy study results for RPAC members including planning reserve margin and effective load carrying capability.



Following Up

- Action Items from Previous Meetings:
 - No immediate action items
- Ongoing Commitments:
 - Distribute meeting materials in a timely fashion (3 business days prior)
 - Transparency and dialogue





Regulatory Update



Regulatory Update

Staff's Proposed Timeline for Review of Submitted Integrated Resource Plans

Stakeholder comments due: **1/31/2024**
LSEs responses filed: **5/29/2024**

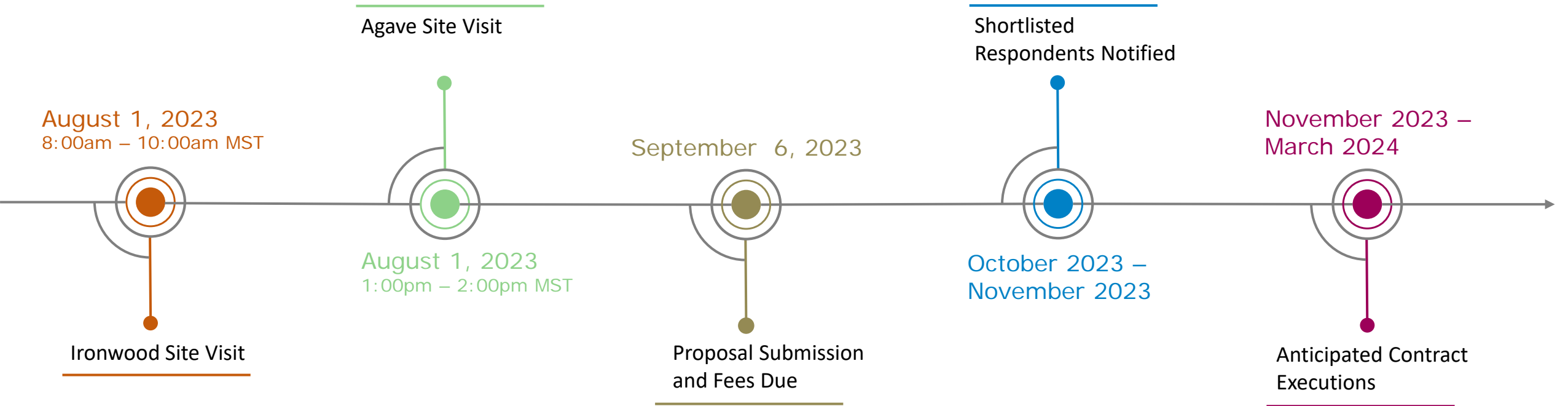
ACC Staff assessment and Proposed Order:
8/31/2024

Docket No. E-99999A-22-0046





RFP Schedule





Discussion & Questions






APS's Clean Energy Accounting



APS's Clean Energy Commitment

- APS uses two types of metrics to report the relative shares of different types of generation in its portfolio: **Renewable Energy Percentage** and **Clean Energy Percentage**. To report the renewable energy share, similar accounting conventions specified in the existing Arizona Renewable Energy Standards are used, under which each utility's share of renewables is expressed as a percentage of annual customer retail sales.

Clean Energy Commitments

-  100% clean, carbon-free electricity by 2050
-  65% clean energy by 2030 with 45% renewable energy
-  Eliminate coal by the end of 2031





Renewable Energy Percentage

- Renewable metric is based off actual retail sales and is measured over entire year
- Historical Distributed Generation (DG) as well as forecasted installations for the current year are considered part of the target.
- Self-consumed DG is included in the denominator to prevent overcounting of DG
- Is **not** a REC-based standard – differing from ACC's Renewable Energy Standards definition

$$\text{Renewable Energy \%} = \frac{R + DE_{load} + DG_{YTD}}{RS + DG_{SelfConsumed}}$$



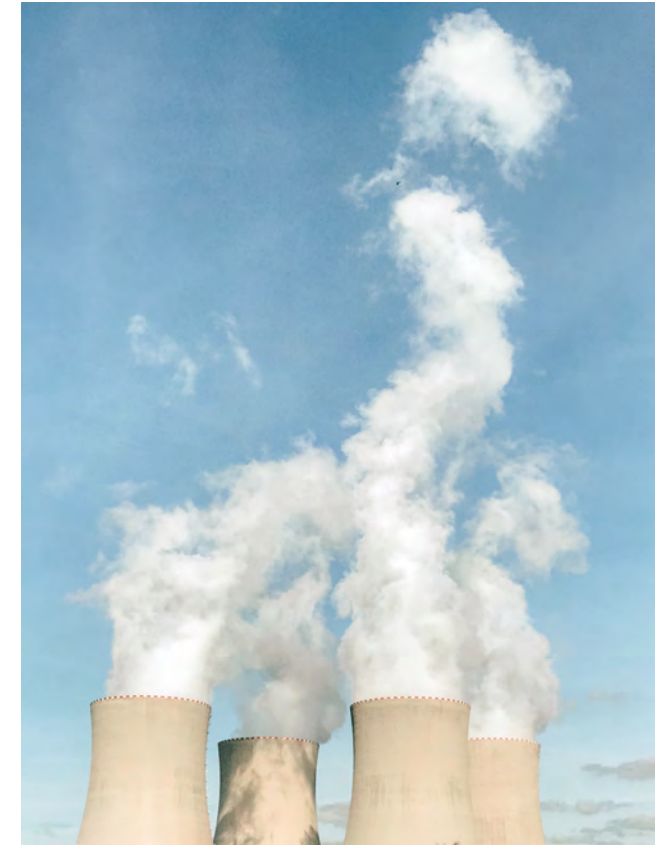
Clean Energy Percentage

Includes Non-Renewable Zero-Carbon Resources

The Clean Energy Percentage differs from the Renewable Energy in a few respects:

1. The calculation takes generation losses into account (measuring output at generator bus)
2. Includes nuclear generation (Palo Verde)
3. Includes distributed generation (rooftop solar)
4. The energy mix is explicitly adjusted to include the load impact of DSM programs
5. Includes market purchases made at negatives prices

$$\text{Clean Energy \%} = \frac{\text{Nuclear} + \text{Renewable (including DG)} + \text{DSM} + \text{Clean Purchases}}{\text{Energy Requirement including DSM \& DG}}$$





Discussion & Questions



IRP Reference Case



IRP Reference case identifies an optimal portfolio under various constraints and a base set of assumptions on uncertain variables



Portfolio selected in reference case is **NOT** the preferred portfolio. APS will evaluate portfolios selected across each of the cases before determining a preferred portfolio.

External environment

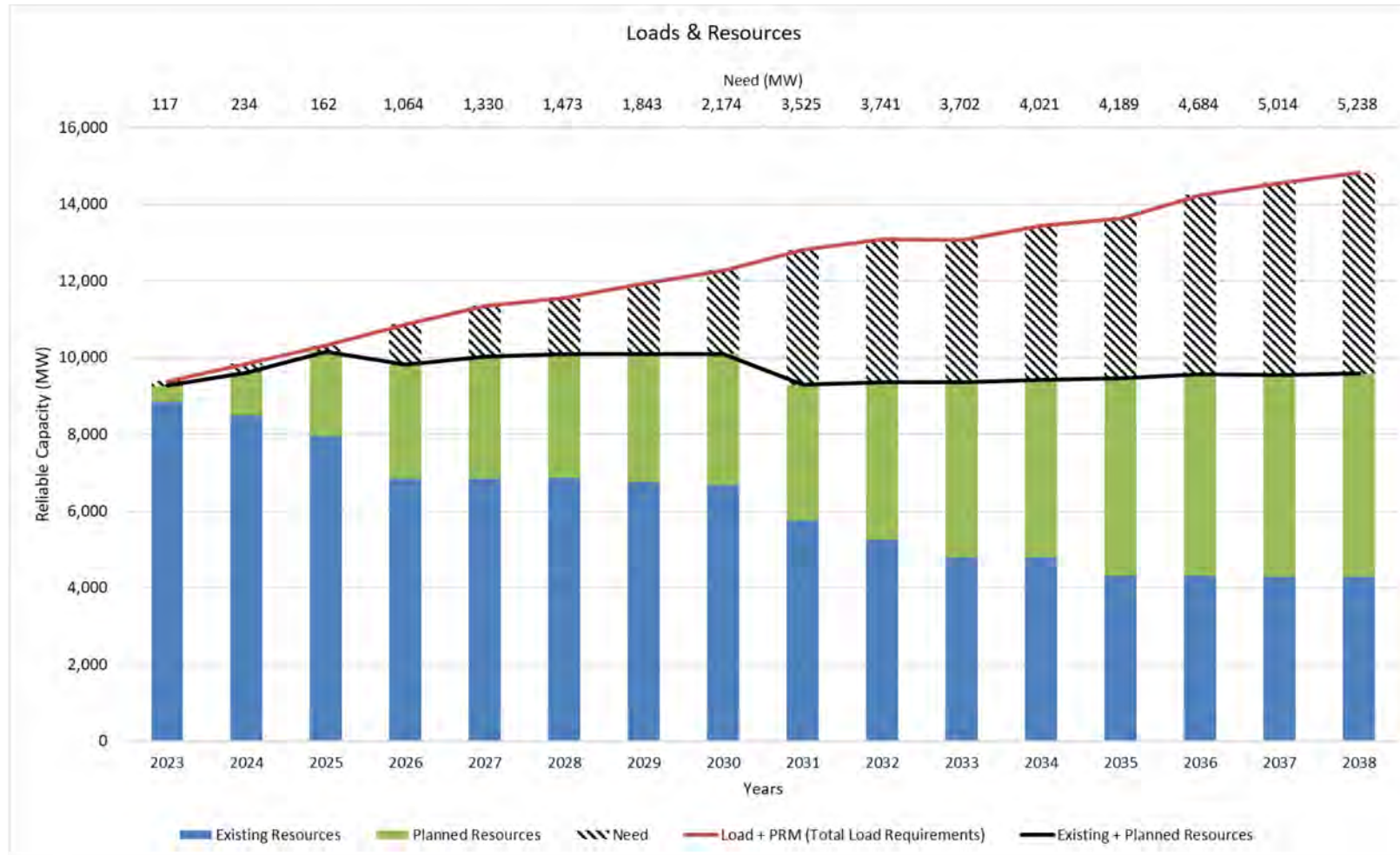
Load growth	Capital costs
Peak load growth of ~3.5% p.a. from 2023-2032 <i>(23Q1 w/ probability-weighting)</i>	Reflect 2022 ASRFP baseline pricing & utilize NREL ATB for price curves
Natural gas prices	Market prices
Base Forecast	E3 revised 2023 prices

APS-specific assumptions

Financial	EE and DSM	Four Corners Exit
2.5% Inflation 6.74% WACC	In accordance with most recent DSM Implementation Plan	Exit in 2031
Carbon Price	Clean Energy Commitment	
\$20.72/ton CO ₂ e <i>(internal assumption)</i>	45% Renewable / 65% Clean by 2030	



IRP Reference Case – “Need” Identification





New Resource Alternatives – LTCE Runs

National Renewable Energy Laboratory (NREL)

Advanced Nuclear

Small Modular Reactor

Large-Frame Combustion Turbine

Combined Cycle (CCGT)

CCGT w/ Carbon Sequestration 90%

Concentrated Solar Power

Geothermal

Biomass

APS RFP

Battery Energy Storage System (BESS) – 4hr

BESS – 5hr

Utility Solar – Single-Axis Tracking

Solar + BESS – 4hr (PVS-4hr)

Solar + BESS – 5hr (PVS-5hr)

Southwest Wind

Microgrid

Pumped Storage Hydro

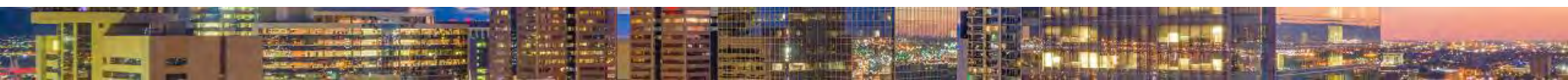
Compressed Air Energy Storage (CAES)

Energy Information Administration (EIA)

Aeroderivative Combustion Turbine

Guidehouse

Energy Efficiency Portfolios



LTCE Run Details

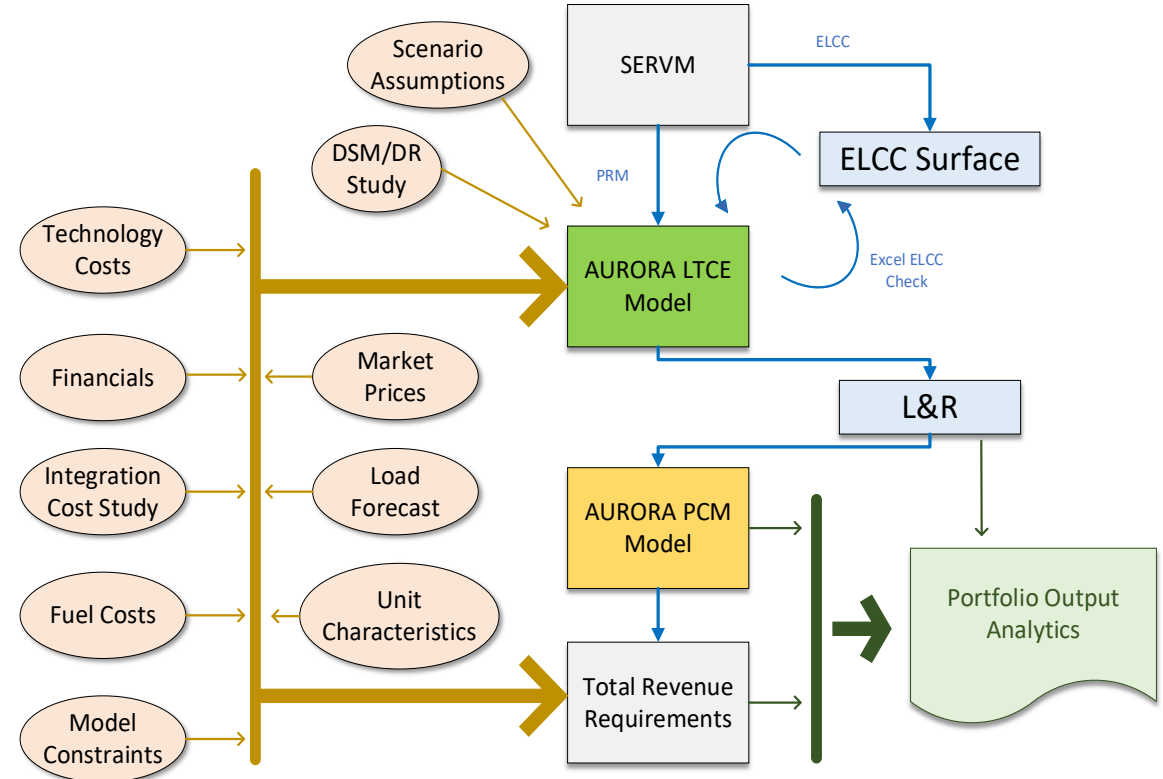
Updates to the model version 1 shared on June 26, 2023, with the RPAC Modeling Committee (RMC):

- ❑ Model data revisions
- ❑ Introduced transmission wheeling in addition to maximizing utilization of existing transmission and new build transmission
- ❑ Included updated results of ELCC and PRM from the 2023 APS Resource Adequacy Study discussed in the July RPAC meeting
- ❑ Introduced monthly natural gas transport limits as constraints

New Modeling data to be shared with RMC:

- LTCE model picking the reference case
- PCM model with the picked reference case

IRP 2023: MODELING PROCESS FLOW DIAGRAM



Key Model Considerations



Liquidated Damages modeling for coal plant operations



Co-optimization of transmission expansion along with resource expansion



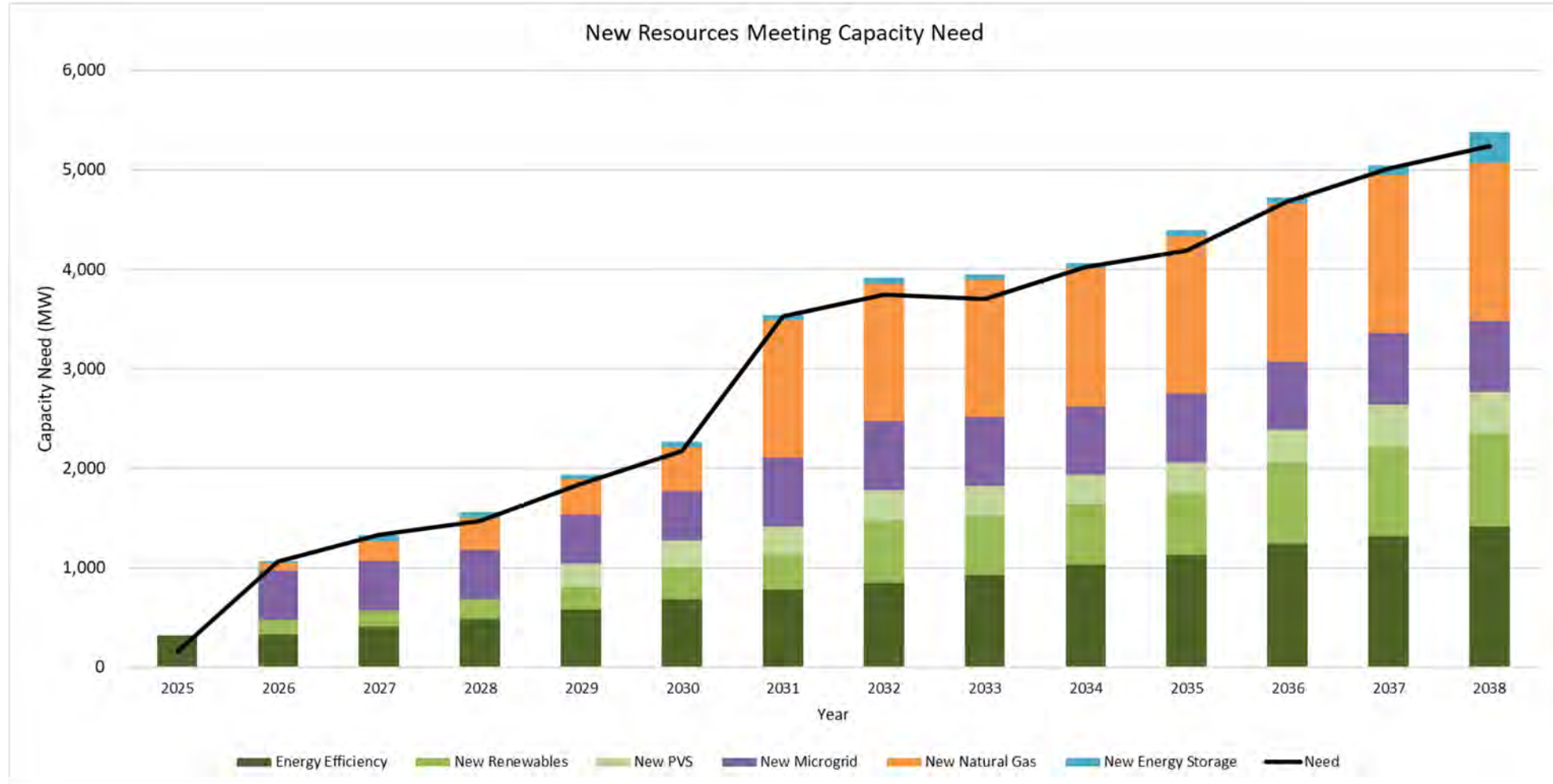
Updated resource contribution to reliability navigating the loop between capacity expansion and resource adequacy considerations



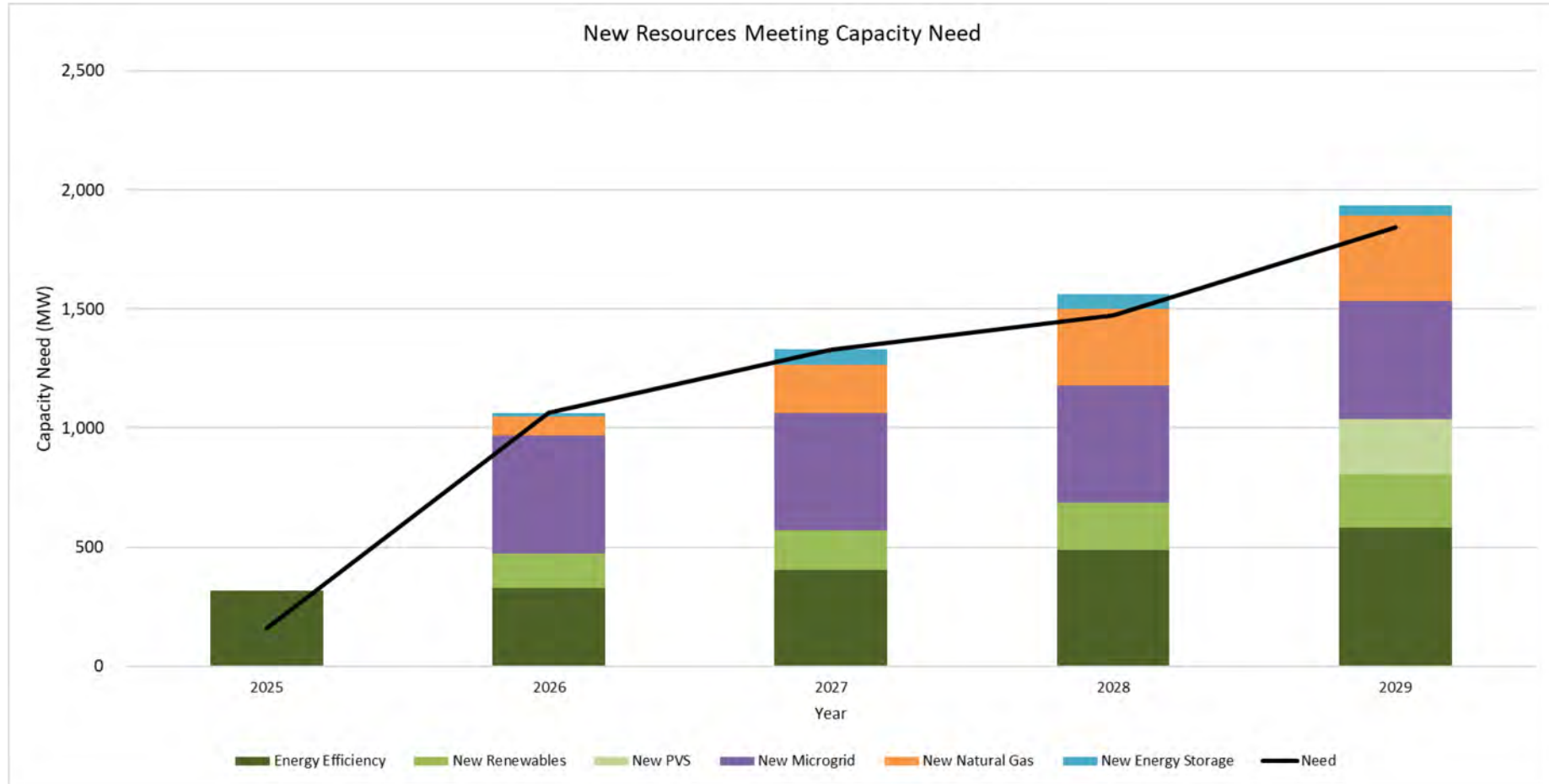
Monthly Gas Transport Limitations modeling



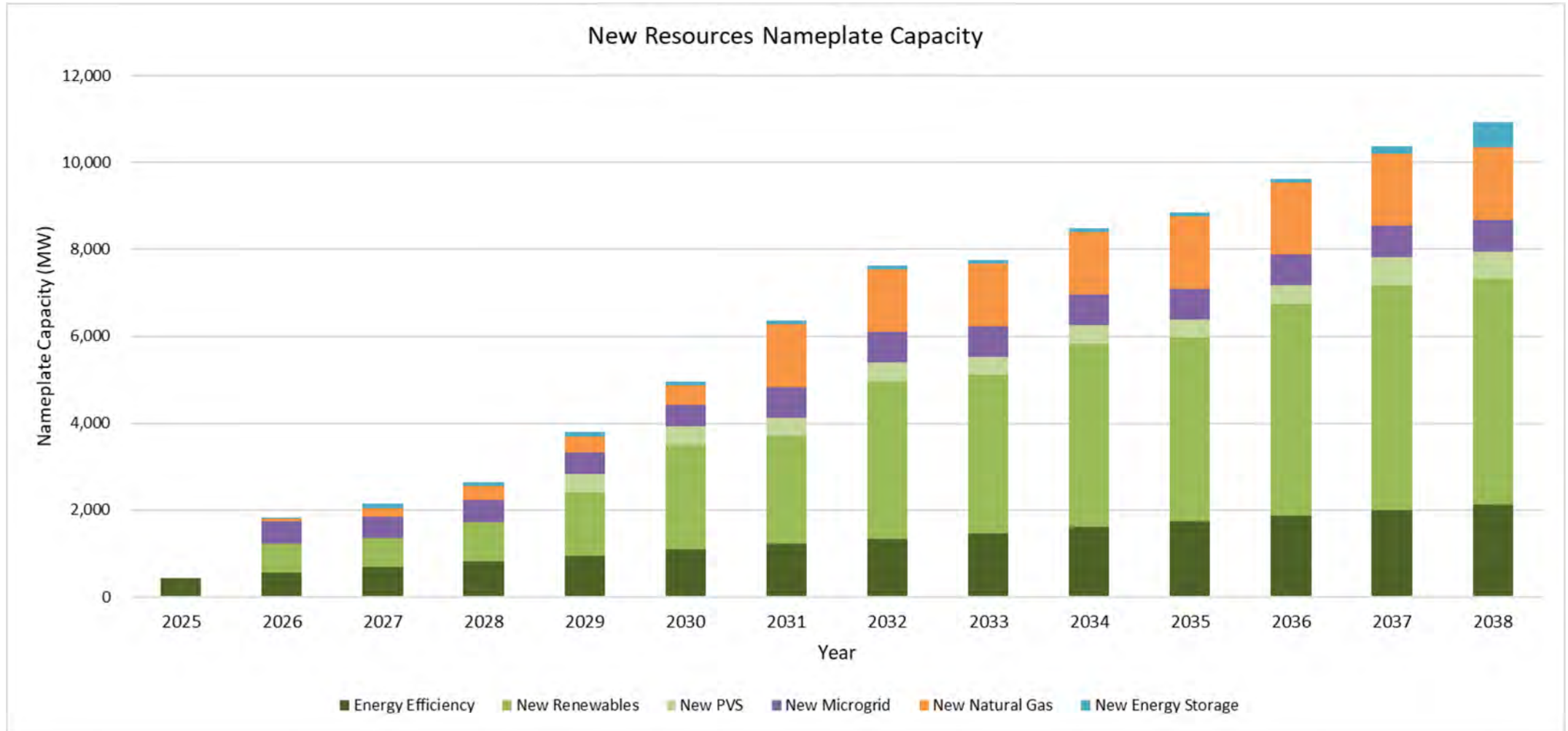
Loads and Resources – New Reliable Capacity Built



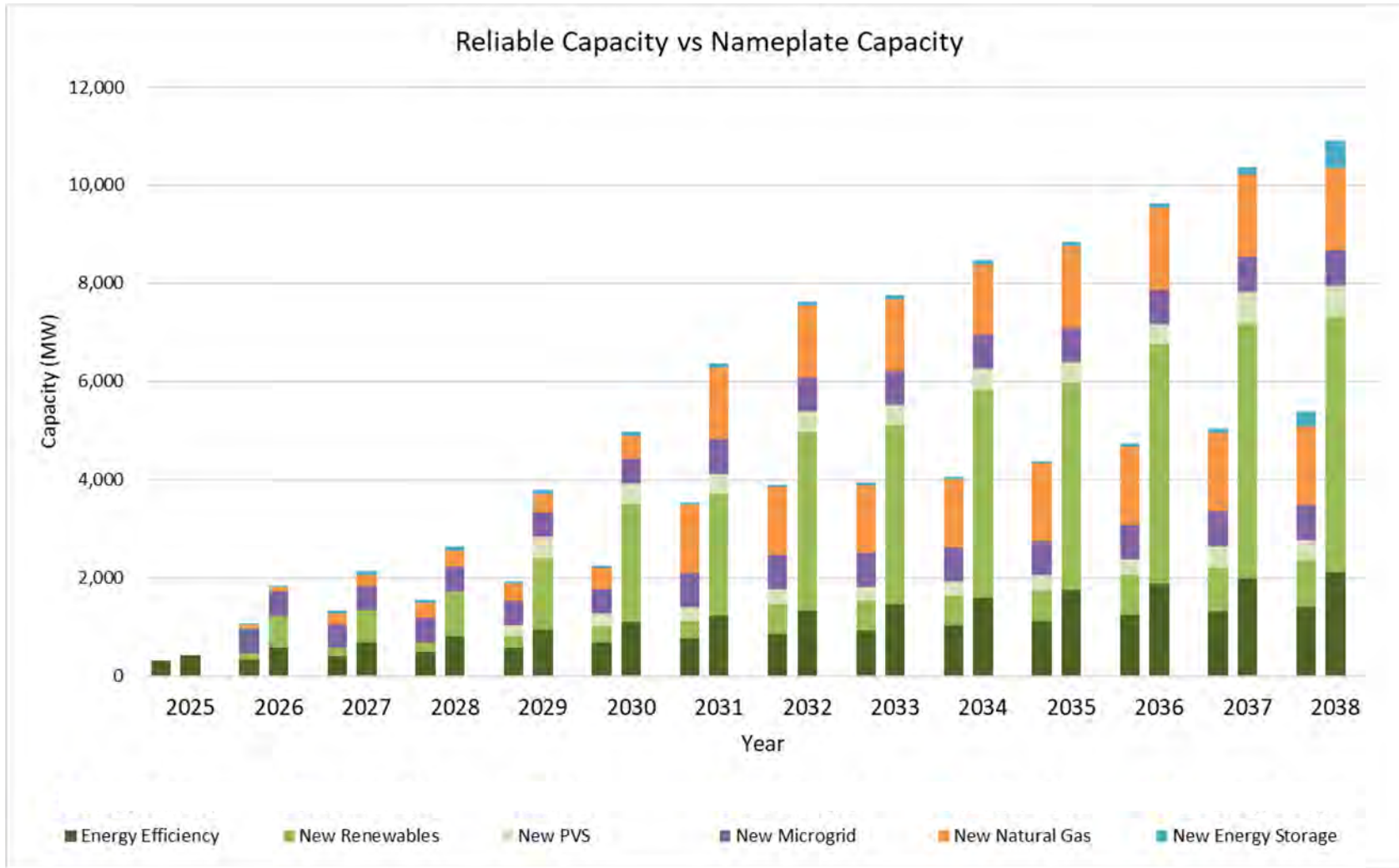
New Reliable Capacity Built: Short-term focus



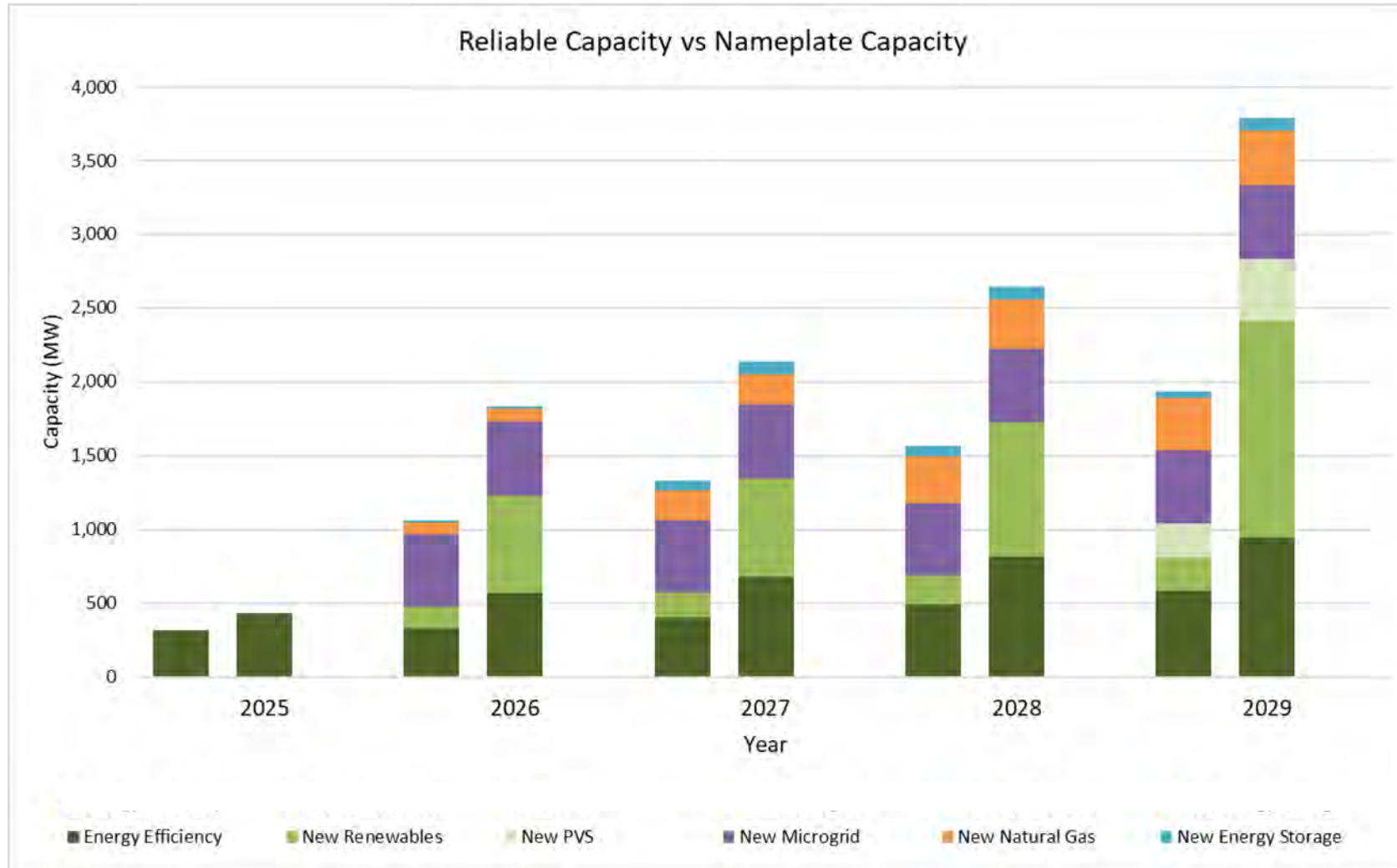
Loads and Resources – New Nameplate Capacity Built



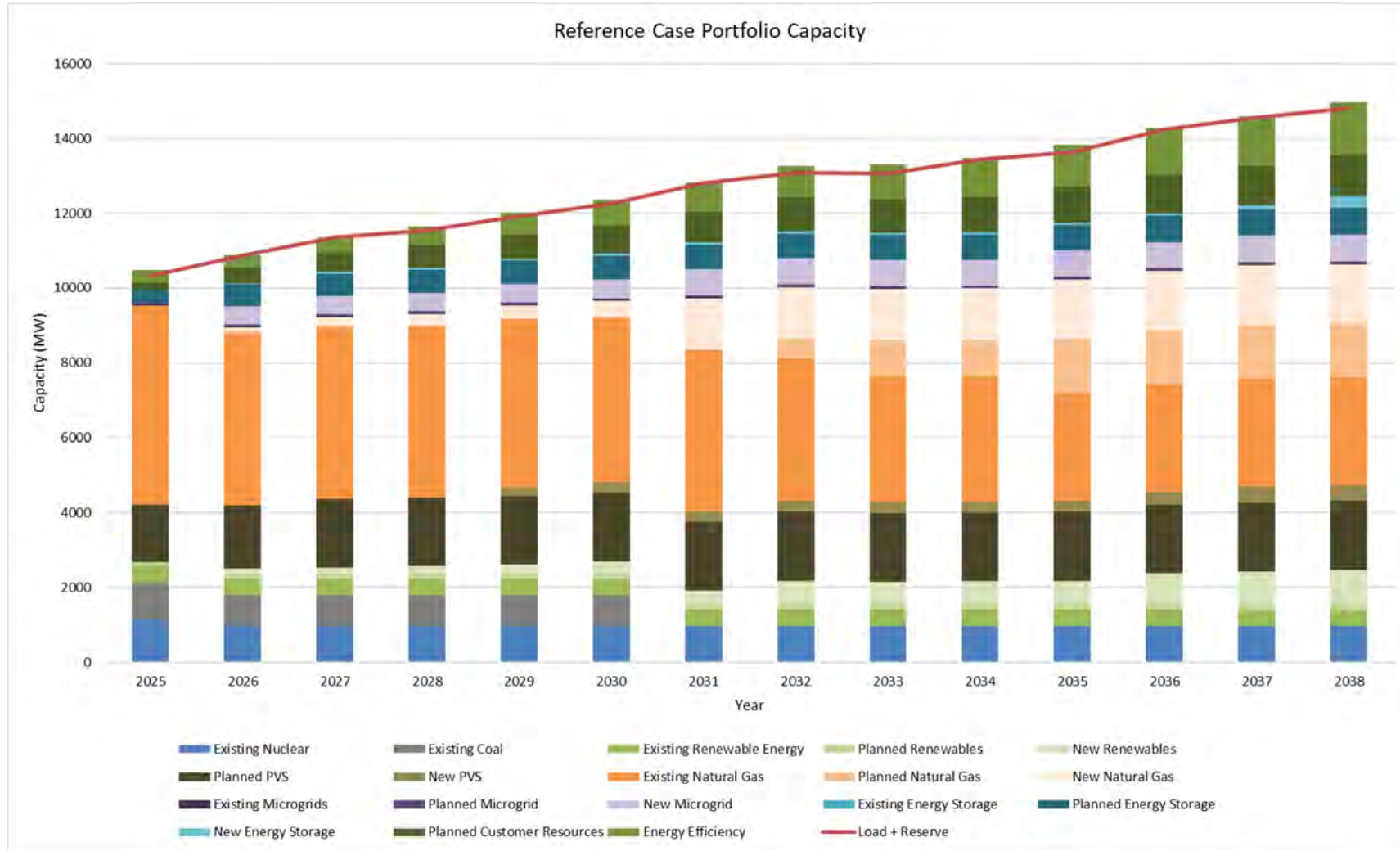
Loads and Resources - Reliable vs Nameplate Capacity



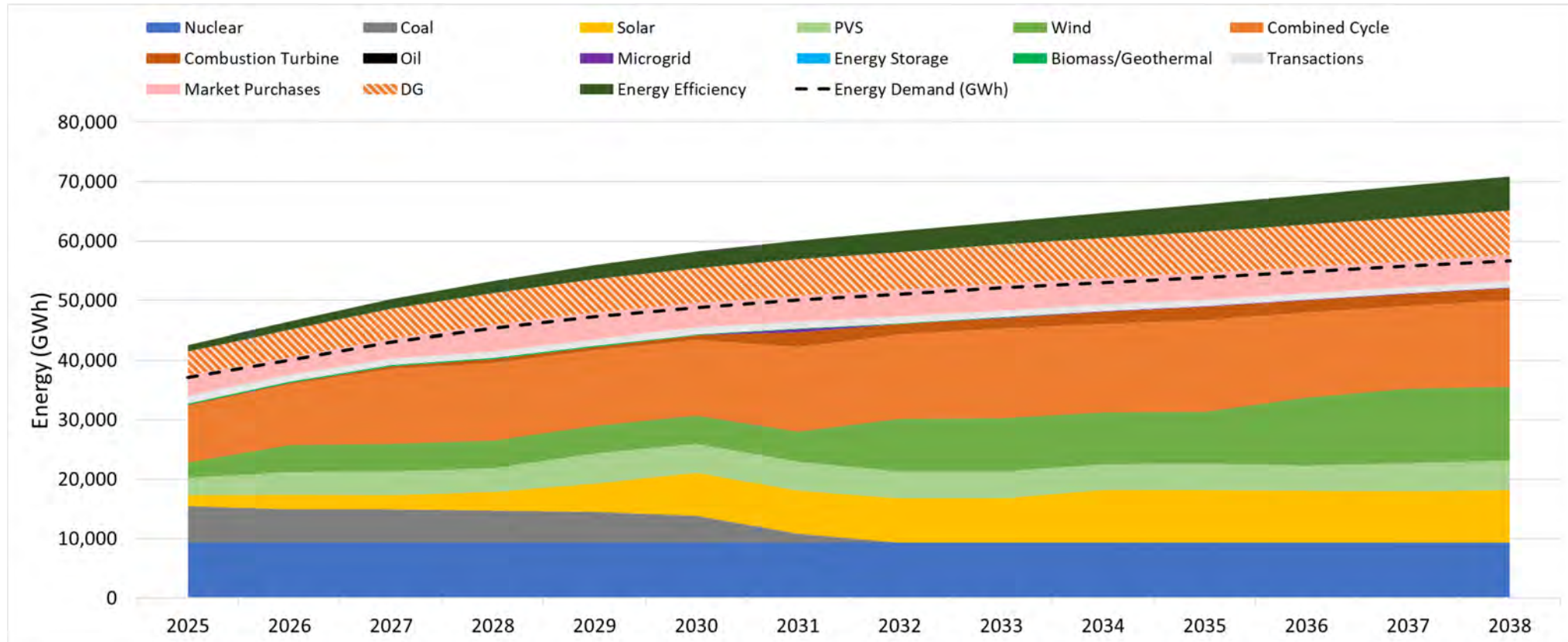
Loads and Resources: Short-term focus



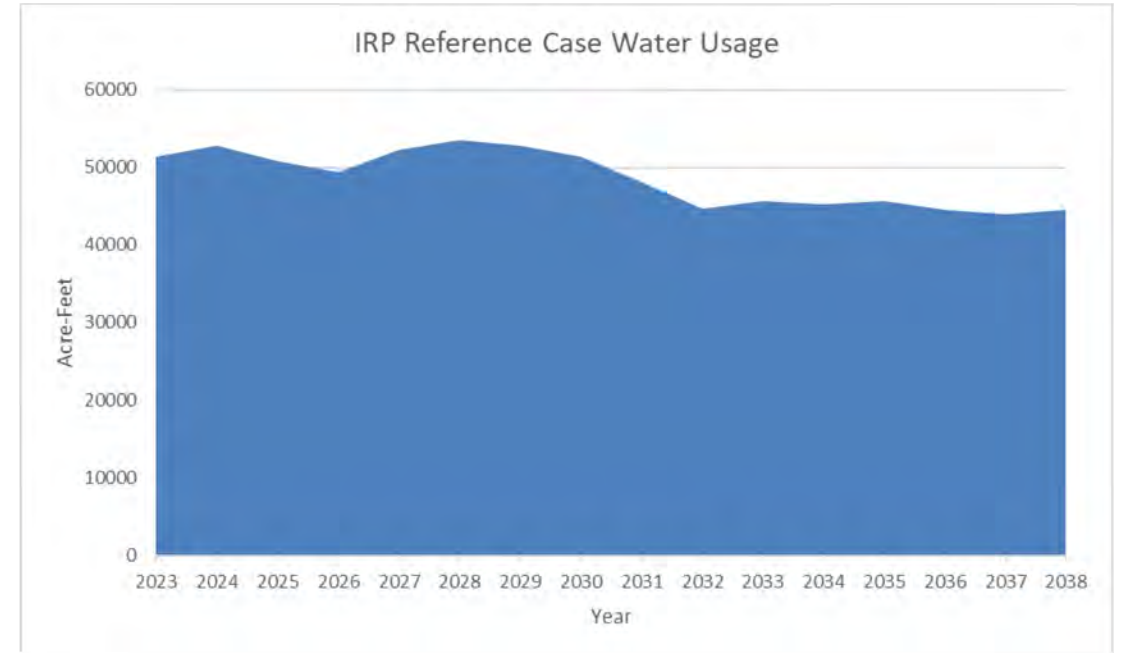
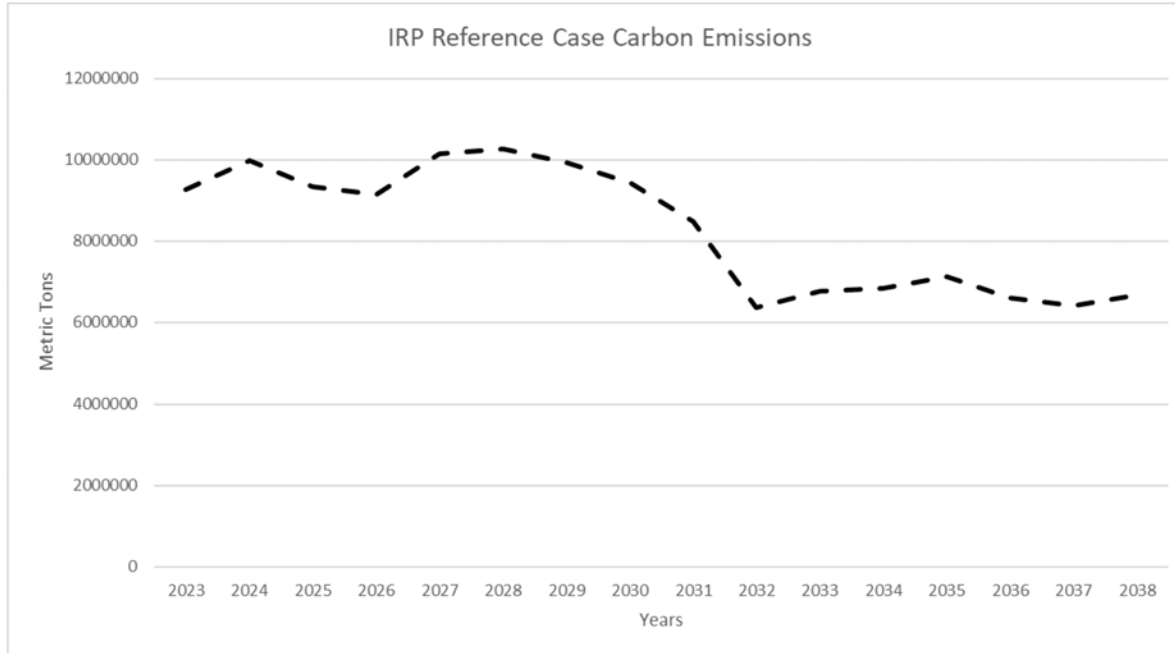
Reference Case Portfolio – Peak Capacity



Reference Case Portfolio – Energy



Other Portfolio Characteristics





Discussion & Questions

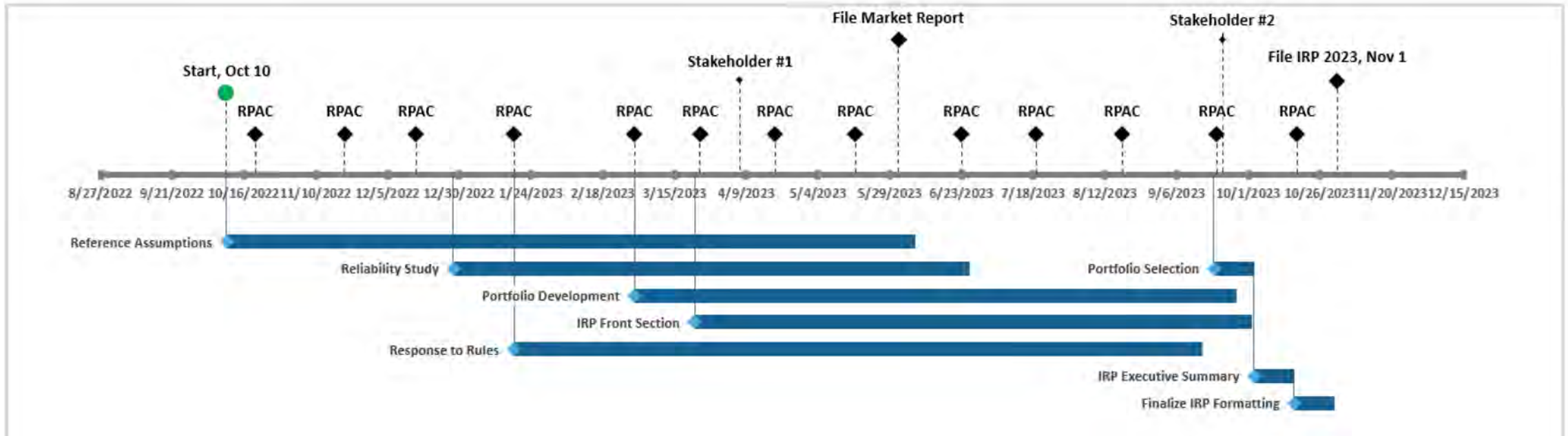


Next Steps





IRP Timeline



Key Milestones

September RPAC Meeting: 9/22/2023

Public Stakeholder Meeting #2: 9/27/2023
IRP Filing: 11/01/2023

