

# PNM 2021-2040 Integrated Resource Plan

**January 5, 2021**

Current Events, ETA Requirements, Modeling Framework,  
and Approach, Draft Model Results, Reliability Analysis,  
Feedback



# Agenda

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- Introduction
  - Welcome and Introductions
  - Safety and Ground Rules
  - Online Participation Instructions
- Background
  - Current Events and Updates
  - Review of ETA Requirements
  - Model Framework and Key Input Assumptions
- Draft Results
  - Portfolio Builds
  - Robustness of Results
  - Reliability Assessment
  - Stakeholder-suggested Scenarios
- Feedback





## **Nick Phillips**

### **Director, Integrated Resource Planning**

Mr. Phillips manages the PNM Resource Planning department and is responsible for developing PNM resource plans and the regulatory filings to support those resource plans.

Prior to joining PNM, Mr. Phillips was involved with numerous regulated and competitive electric service issues including resource planning, transmission planning, production cost analysis, electric price forecasting, load forecasting, class cost of service analysis, and rate design.

Mr. Phillips received the Degree of Master of Engineering in Electrical Engineering with a concentration in Electric Power and Energy Systems from Iowa State University of Science and Technology, and the Degree of Master of Science in Computational Finance and Risk Management from the University of Washington Seattle.



# Meeting ground rules

01



- Questions and comments are welcome – One Person Speaks at a Time

02



- Reminder; today's presentation is not PNM's plan or a financial forecast, it is an illustration of the IRP process

03



- Please wait for the microphone to raise your question or make your comment so we can ensure you are clearly heard and recorded. **Only Q&A are transcribed for our filing package.**
- Questions and comments should be respectful of all participants

04

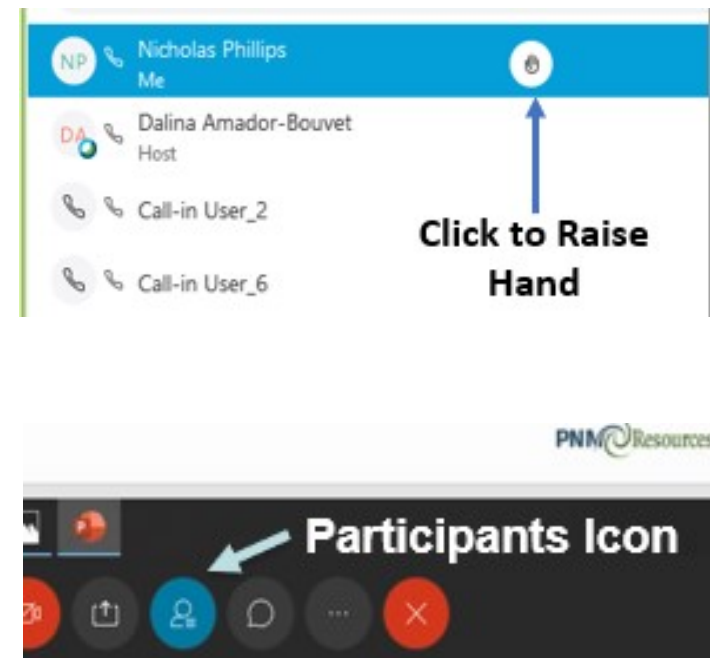


- These meetings are about the 2020 IRP, questions and comments should relate to this IRP. Any questions or comments related to other regulator proceedings should be directed towards the specific filing



# Online Meeting Protocol

- All participants will be on mute upon entering the meeting, raise your hand to be unmuted or use the chat icon if you have a question.
- Participants asking questions are expected to identify themselves and the company they represent.
- All questions during this meeting will be public.



# Disclosure regarding forward looking statements

The information provided in this presentation contains scenario planning assumptions to assist in the Integrated Resource Plan public process and should not be considered statements of the company's actual plans. Any assumptions and projections contained in the presentation are subject to a variety of risks, uncertainties and other factors, most of which are beyond the company's control, and many of which could have a significant impact on the company's ultimate conclusions and plans. For further discussion of these and other important factors, please refer to reports filed with the Securities and Exchange Commission. The reports are available online at [www.pnmresources.com](http://www.pnmresources.com).

The information in this presentation is based on the best available information at the time of preparation. The company undertakes no obligation to update any forward-looking statement or statements to reflect events or circumstances that occur after the date on which such statement is made or to reflect the occurrence of unanticipated events, except to the extent the events or circumstances constitute material changes in the Integrated Resource Plan that are required to be reported to the New Mexico Public Regulation Commission (NMPRC) pursuant to Rule 17.7.4 New Mexico Administrative Code (NMAC).





# Background

**Nick Phillips**

**Director of Integrated Resource Planning**

# Background

- Current Events and Updates
  - Merger with Avangrid
  - Four Corners Abandonment
  - 2020 All-Source RFP
  - IRP Timeline
- Decision drivers/planning objectives?
  - Carbon Targets
  - Ensuring Reliability
  - Other Relevant Requirements
- Model Framework and Key Input Assumptions
  - Scenarios/Futures/Sensitivities Framework
  - Transmission Modeling Approach
  - Modeling Assumptions for Hydrogen as a drop-in Fuel







# Current Events and Updates

# Merger with Avangrid

- On October 21, 2020 PNM Resources and Avangrid announced plans to merge.
- Application filed with NMPRC on November 23, 2020. (NMPRC Case No. 20-00222-UT )
- Merger is expected to close by the end of 2021
- Should not result in any changes with respect to PNM's current IRP or commitment to carbon free by 2040.
  - Avangrid Networks – 8 electric and natural gas utilities with clean energy commitments  
(<https://www.avangrid.com/wps/portal/avangrid/sustainability/environment/CarbonFootprints>)
  - Avangrid Renewables – Owns and operates 7.1 GW of renewable energy resources across 22 states
- Additional information can be found at  
<https://www.sec.gov/Archives/edgar/data/22767/000119312520273264/d77373dex991.htm>



# Early Exit from Four Corners Power Plant

- On November 2, 2020, PNM announced an early exit from its 200 MW share of the Four Corners Power Plant (FCPP).
- PNM will transfer its share to the Navajo Transitional Energy Company at the end of 2024.
- PNM Customers estimated to save approximately \$100 million between 2025 and 2031.
- Early exit from Four Corners a key aspect of proposed merger with Avangrid
- Will allow PNM to decrease its carbon emission intensity faster than envisioned by the Energy Transition Act.
- The current IRP will focus on analysis with FCPP removed from the portfolio as of January 1, 2025.
- Abandonment case to be filed in Q1 of 2021 under the Energy Transition Act providing customer savings through securitization as well as economic assistance funds to the affected community.
- PNM will issue an All-Source RFP to replace the capacity and energy from FCPP shortly after filing the IRP
- Additional Information:  
[https://www.pnm.com/documents/396023/19699976/2020+Press+release\\_PNM+Agreement+for+Early+Exit+from+Four+Corners+Power+Plant.pdf/c84c288b-468e-45c3-8bab-376fad994a4b?t=1604348326580](https://www.pnm.com/documents/396023/19699976/2020+Press+release_PNM+Agreement+for+Early+Exit+from+Four+Corners+Power+Plant.pdf/c84c288b-468e-45c3-8bab-376fad994a4b?t=1604348326580)



# 2020 All-Source RFP Update

- On June 11, 2020 PNM provided notice to its lessors that it would not exercise an option to purchase 114 MW of capacity leased from the Palo Verde Nuclear Generating Station (PVNGS) when leases expire.
- On June 25, 2020 PNM issued an all-source RFP to solicit proposals for resources with a Commercial Online Date by June 1, 2023.
- PNM received approximately 6,000 MW of bids (mainly Solar, Wind, Battery, Combustion Turbines including Hydrogen, CCUS, and hybrid projects) at the end of September and is currently evaluating the bids.
- The current IRP will focus on analysis with PVNGS removed from the portfolio (104 MW removed as of January 15, 2023 and an additional 10 MW removed as of January 15, 2024).
- PNM will file for approval of replacement resources with the NMPRC in Q1 of 2021 after filing the IRP.



# 2021 Omnibus Spending Act – Dec. 27, 2020

## Spending and Tax Provisions

- Carbon Capture – 45Q credits extended for 2024 and 2025 start of construction
- Production Tax Credits
  - Extends the 60% tier for 2021 start of construction projects, these probably imply in-service by Dec. 2025
- Solar ITC:
  - Projects started in 2021-22 get 26% ITC; 2023 get 22%; 10% thereafter – corporate
  - Individual taxpayer-residential use same, except ITC still goes to 0% in 2024
- Off-shore Wind: now eligible for 30% ITC for starts through 2025
- Other appropriations for renewables research and development projects

**\*Note that the tax credit extensions are not reflected in the draft results presented today but will be incorporated into the final IRP filed with the PRC. Consequently, we do expect portfolio costs and build decisions will differ from those presented today.**



# IRP Timeline

The rule changed on IRP about a year ago that changed the way the Commission deals with the IRP. PNM will make an IRP compliance filing then within 120 days the Commission will either accept our filing or identify deficiencies and return it to us to correct and refile. Due to the changes, PNM does not expect that the IRP will involve a formal case with testimony and public hearings.

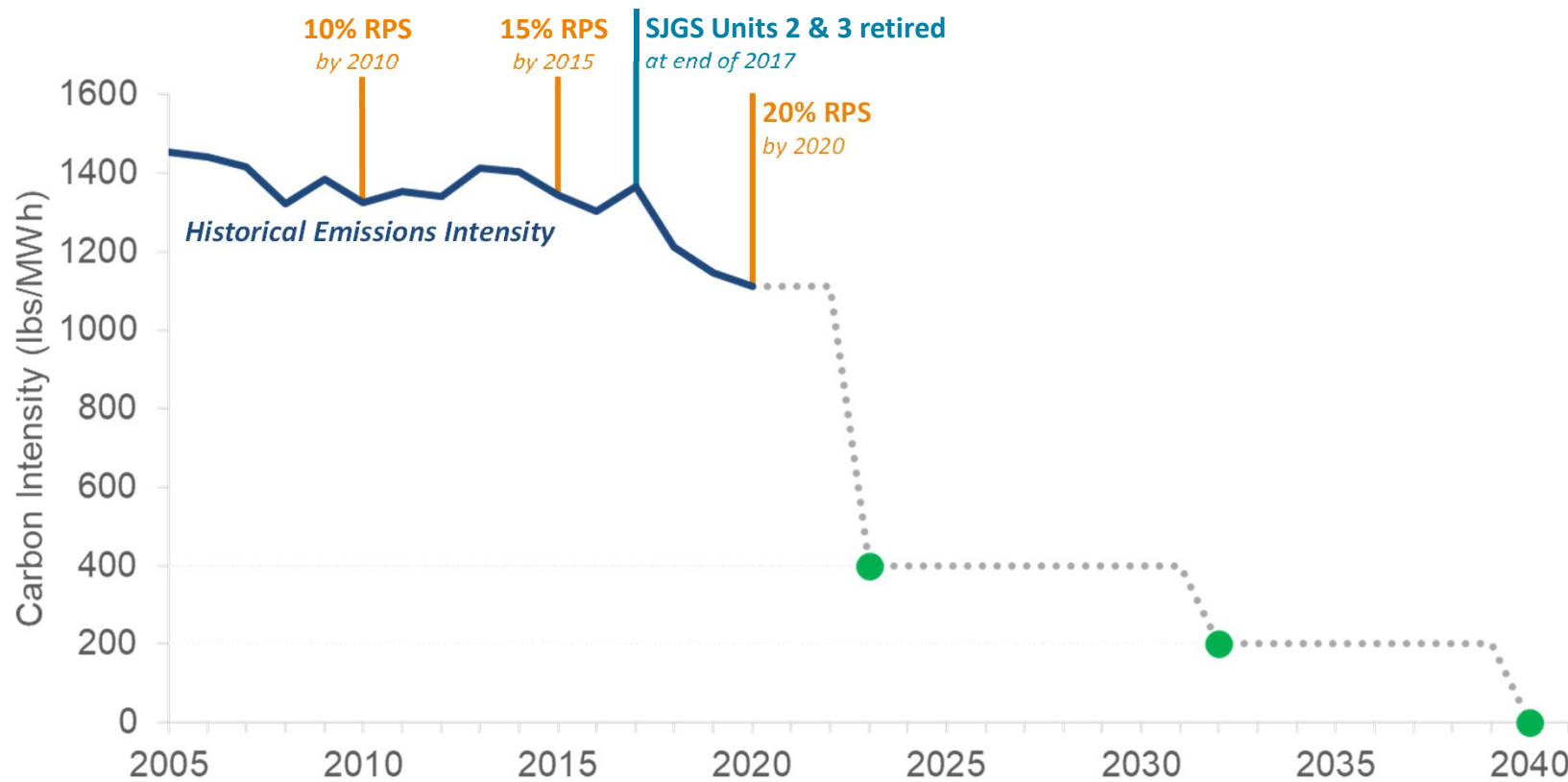
- January 5, 2020 (Today) – Presentation of Draft Results
- January 12, 2020 – Deadline for written feedback
- January 29, 2021 – Filing Date for IRP
- February 18th (20 days after PNM Files) – Parties File Comments
- March 30th (40 days after Comments) – Staff Files Recommendation to Commission
- June 1st (60 days after Staff's Recommendation) – Commission Deadline to Issue Order Accepting IRP or Identifying Deficiencies





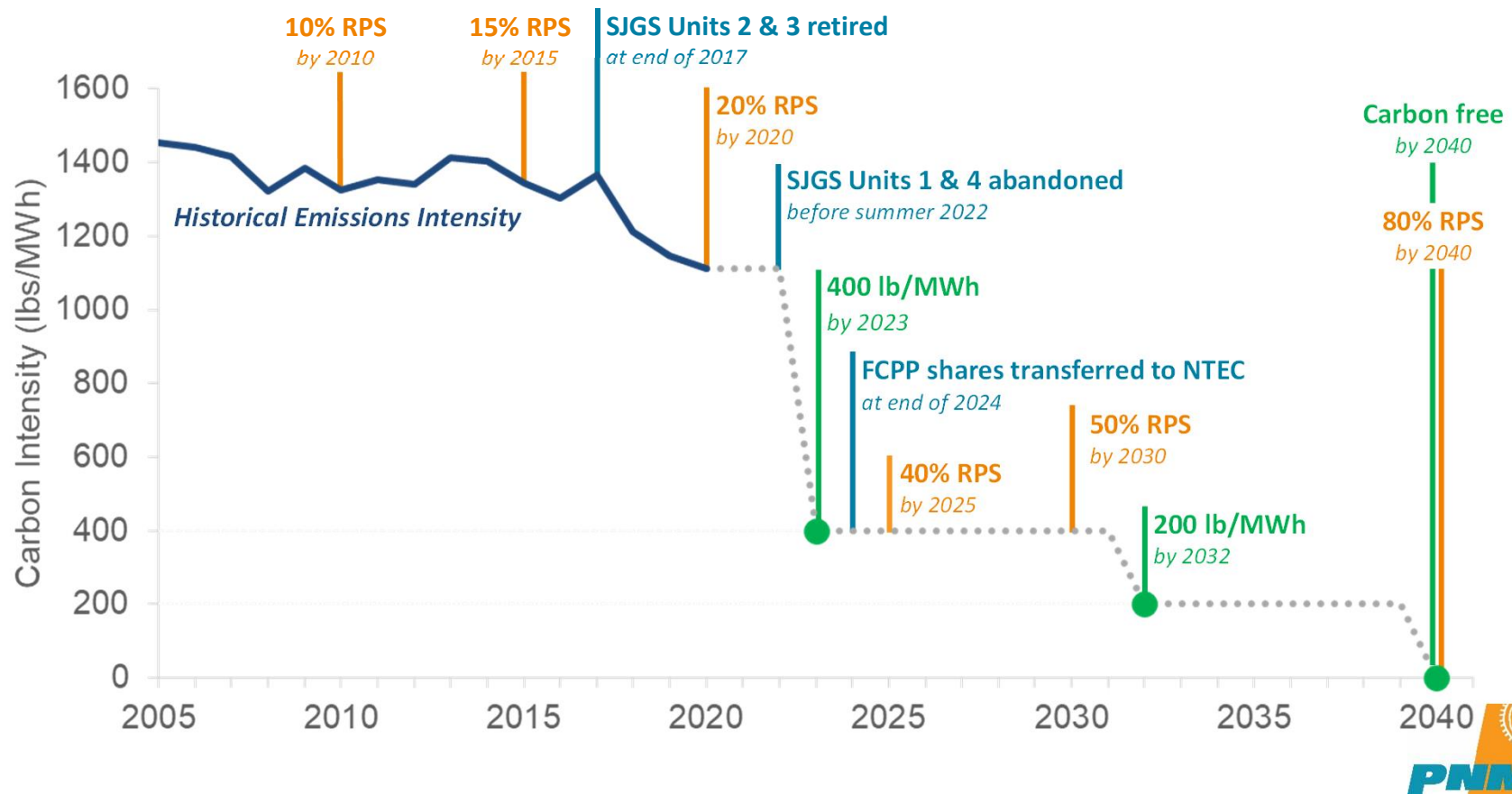
# **Review of ETA Requirements**

# Milestones in PNM's Transition to a Carbon-Free Portfolio





# Milestones in PNM's Transition to a Carbon-Free Portfolio





# **Reliability Modeling with High Renewable Portfolios**

# Updating our PRM Requirement

- 2017 IRP used a 13% PRM requirement based on Commission stipulation, but highlighted that a 13% margin could be deficient going forward:
  - “PNM’s loss of load probability using a 13% reserve margin is higher than two events in every 10 years. Reducing the loss of load probability to two events per year requires a reserve margin of about 17%.”
- For 2020 IRP, PRM is calibrated to result in **LOLE = 0.2 days/yr** and reflects changes in “fundamentals” and “accounting” since 2017 IRP:
  - **Fundamentals:** changes in composition of portfolio (including SJGS abandonment) and market conditions
  - **Accounting:** change in PRM accounting conventions to harmonize treatment across resource types and to prepare for increased levels of renewables and storage
- As PNM continues to transition its system, risks will continue to evolve. Further, as PNM’s portfolio evolves away from large, single contingency resources towards more modular generation, PNM will continue to evaluate moving to a target reliability of 0.1 LOLE days/yr in the 2023 IRP and beyond consistent with the 1 day in 10 year standard used by other entities. Key assumptions and inputs will need to be re-evaluated regularly in all future IRPs and during other resource planning activities as necessary.

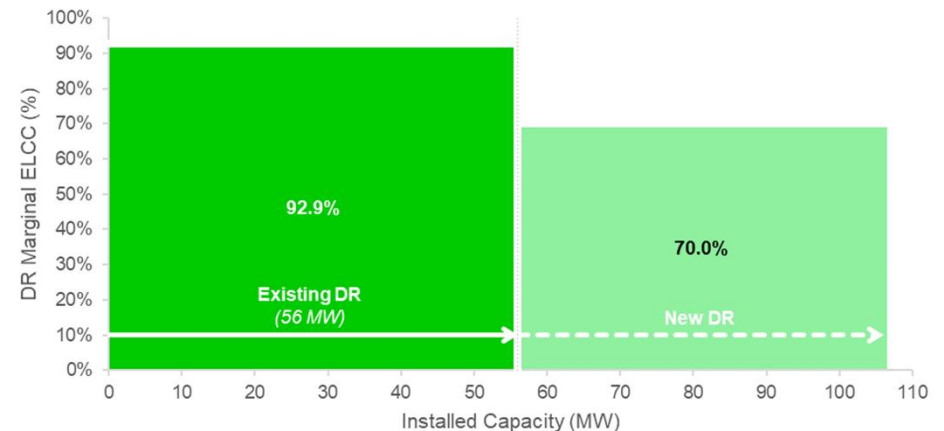
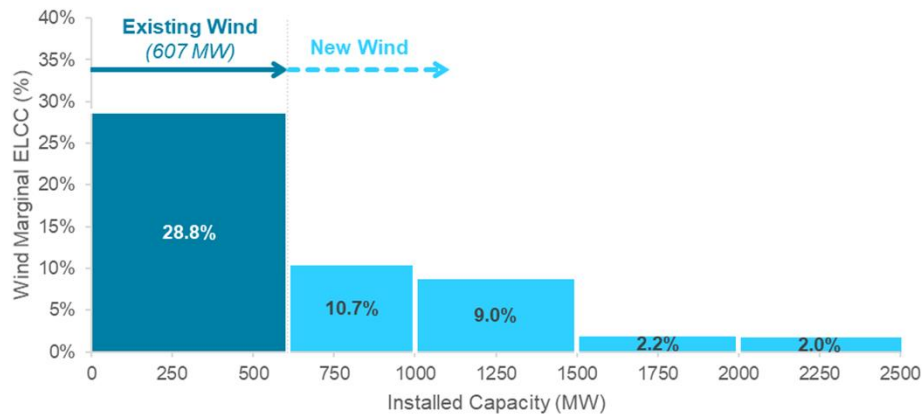
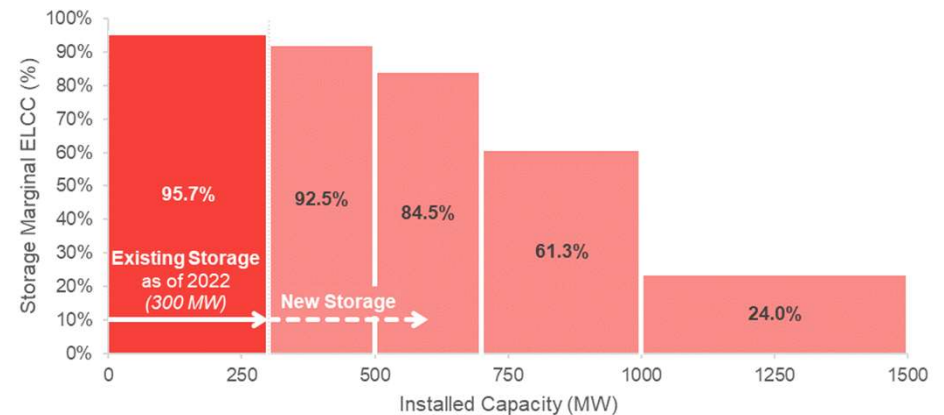
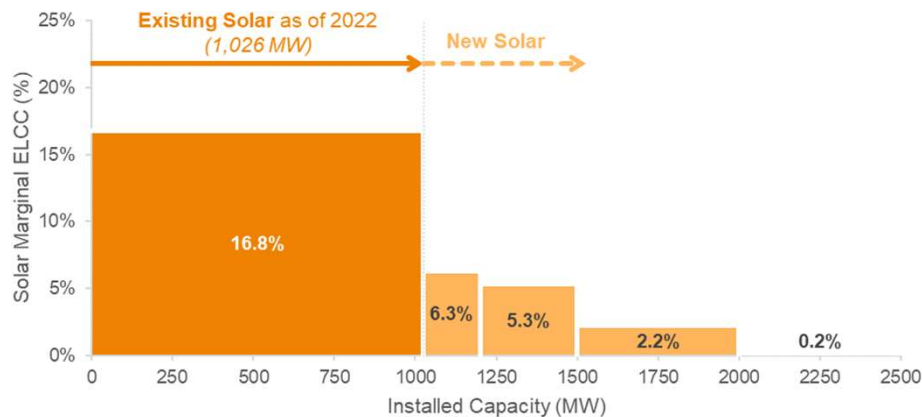


# Key Accounting Changes in Planning Reserve Margin

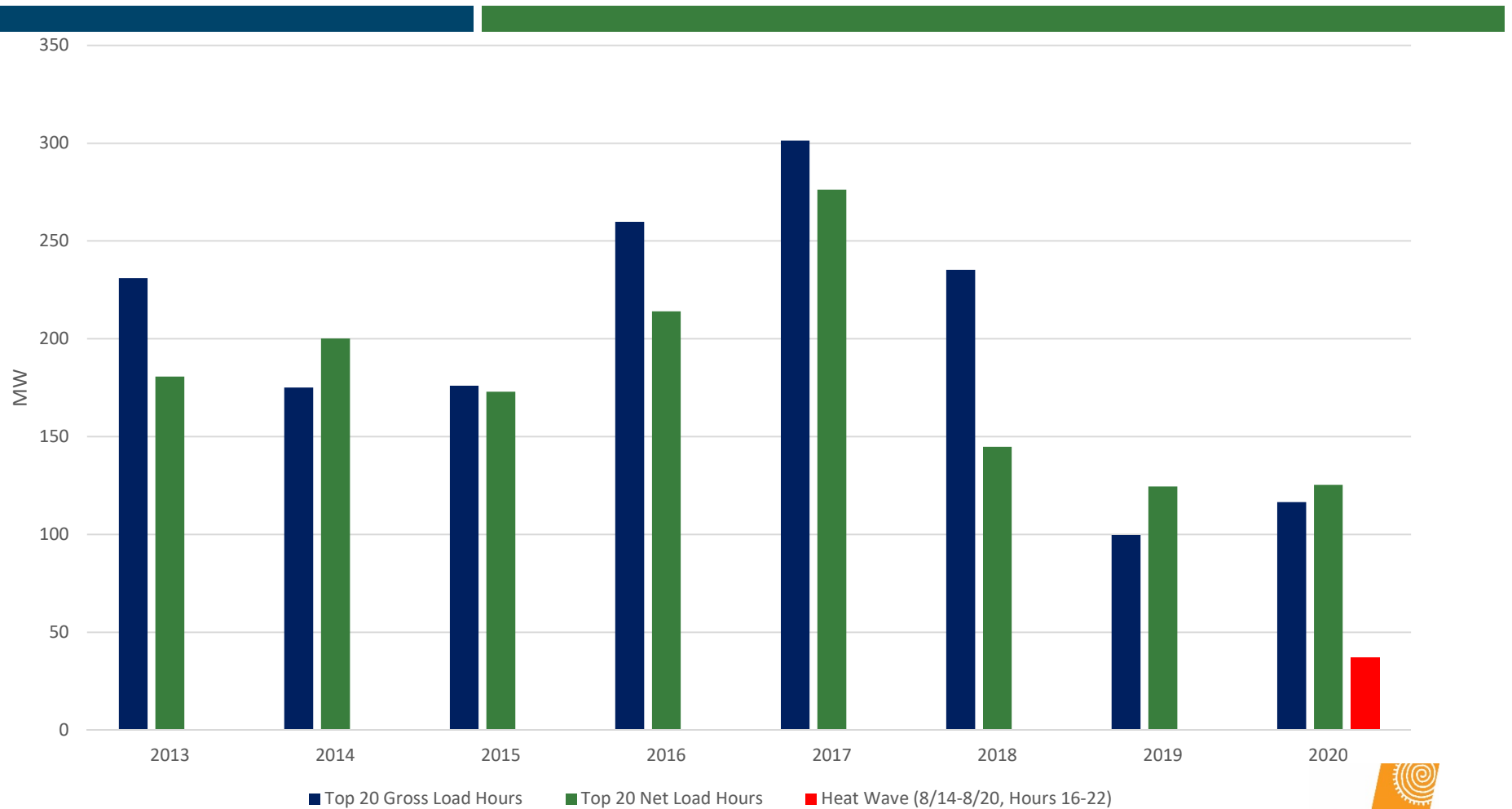
- **Updated ELCC calculations for renewables, storage, and demand response**
  - Contributions of renewables/storage/DR using ELCC, emerging best practice for resource adequacy contributions of non-firm resources
  - Updated ELCCs calculated via LOLE analysis using SERVVM and are thereby aligned with LOLE standard
  - ELCCs will need to be re-evaluated regularly along with LOLE modeling and effects Planning Reserve Margin requirements
- **“UCAP” accounting for thermal resources**
  - Contributions of coal and gas resources towards requirement are derated based on forced outages (along with a commensurate reduction to the PRM requirement)
  - Harmonizes treatment of thermal and renewable/storage resources so that individual resource contributions are apples-to-apples
  - Outage rates will need to be re-evaluated regularly along with LOLE modeling and effects Planning Reserve Margin requirements
- **Market contributions to reserves**
  - To acknowledge reduced liquidity in the WECC markets especially during peak (and net-peak) periods, PNM has adjusted import assumptions to be 200-300 MW during high demand periods and 50 MW during the most reliability critical net peak hours.
  - It is likely that market liquidity during high-risk periods will further decline as neighboring systems become correlated due to increasing solar generation across the WECC. Over time, illiquidity could extend into evening periods as coal and natural gas generation is retired and replaced by renewable and energy storage resources.
  - Market contributions to reserves will need to be re-evaluated regularly along with LOLE modeling and effects Planning Reserve Margin requirements



# ELCCs reflect declining capacity value of non-firm resources

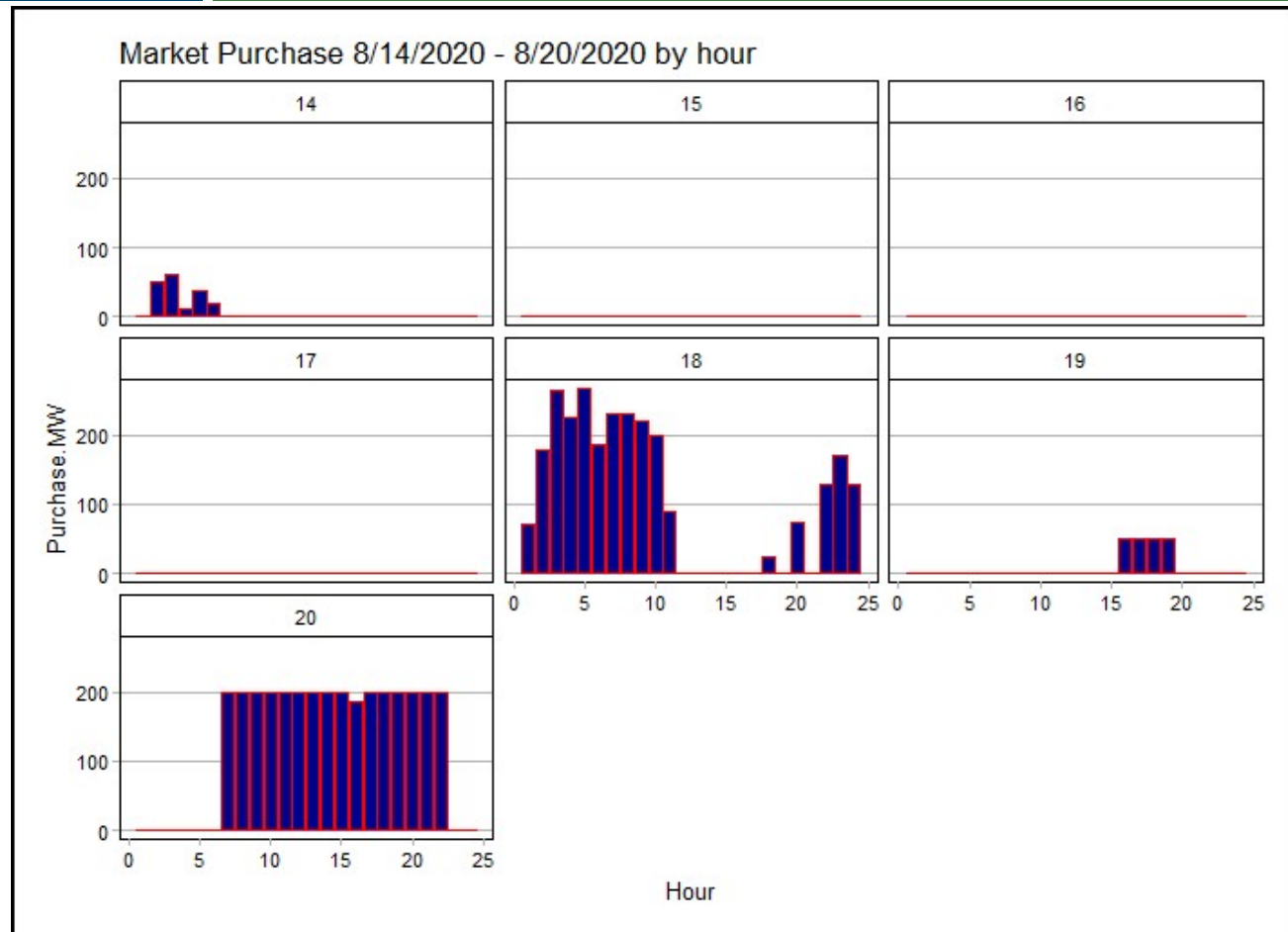


# Market Contributions to Reliability



# Market Contributions to Reliability

- DA & RT markets were virtually illiquid during times of stress during the western heat wave.
- In order to preserve reliability our planning assumptions must reflect this type of market disruption.



# PNM Reserve Margin Calculations and ELCC

- PRM requirement updated to reflect changing portfolio and market conditions

Market Configuration	PNM PRM ICAP	PNM PRM UCAP
Island	27%	23%
50 MW Cap During Net Peak Hours	22%	18%
200 - 300 MW During Peak Hours	14%	10%

Change to UCAP accounting will allow us to maintain a more stable reserve margin even as our portfolio changes – and puts thermal resources on a level playing field with renewables and storage

IRP Assumption

Above reserve margin calculations using ELCC for solar, wind, DR, and battery capacity.

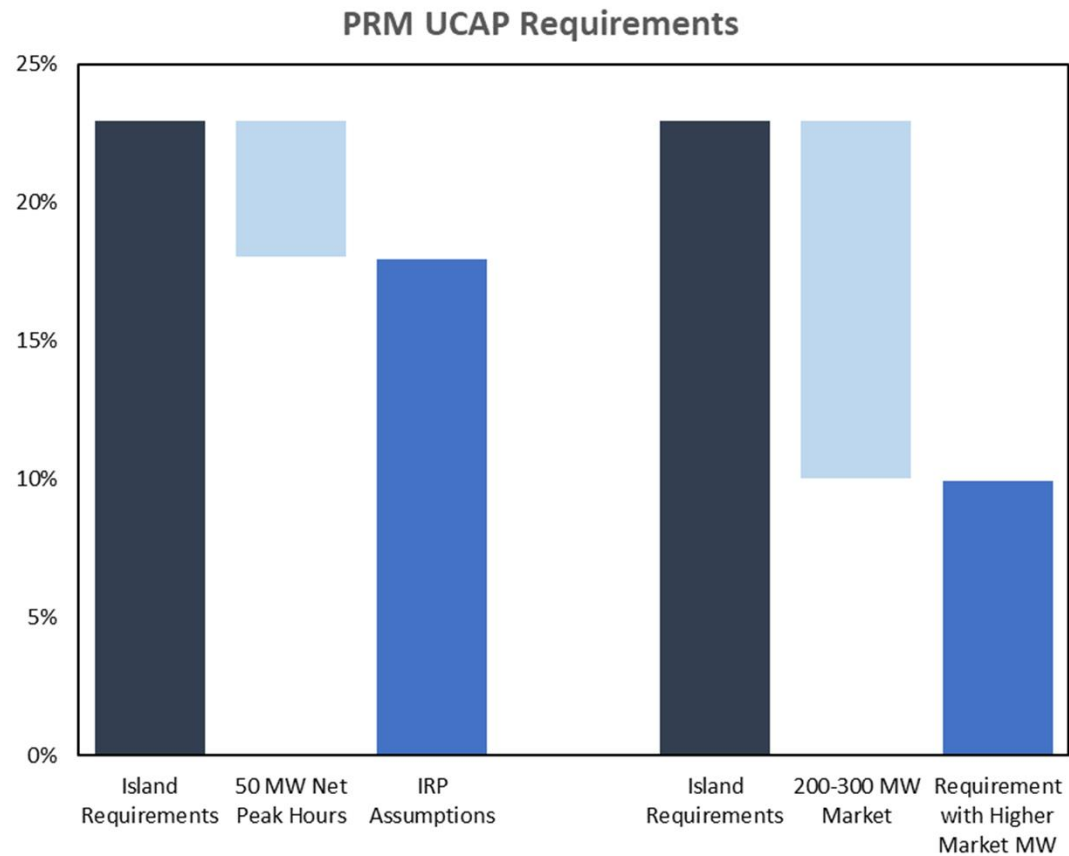
PNM Island Scenario is simulated as BA with Tri State

Market provides between 2 and 13% in reserve margin reduction based on assumption during peak periods

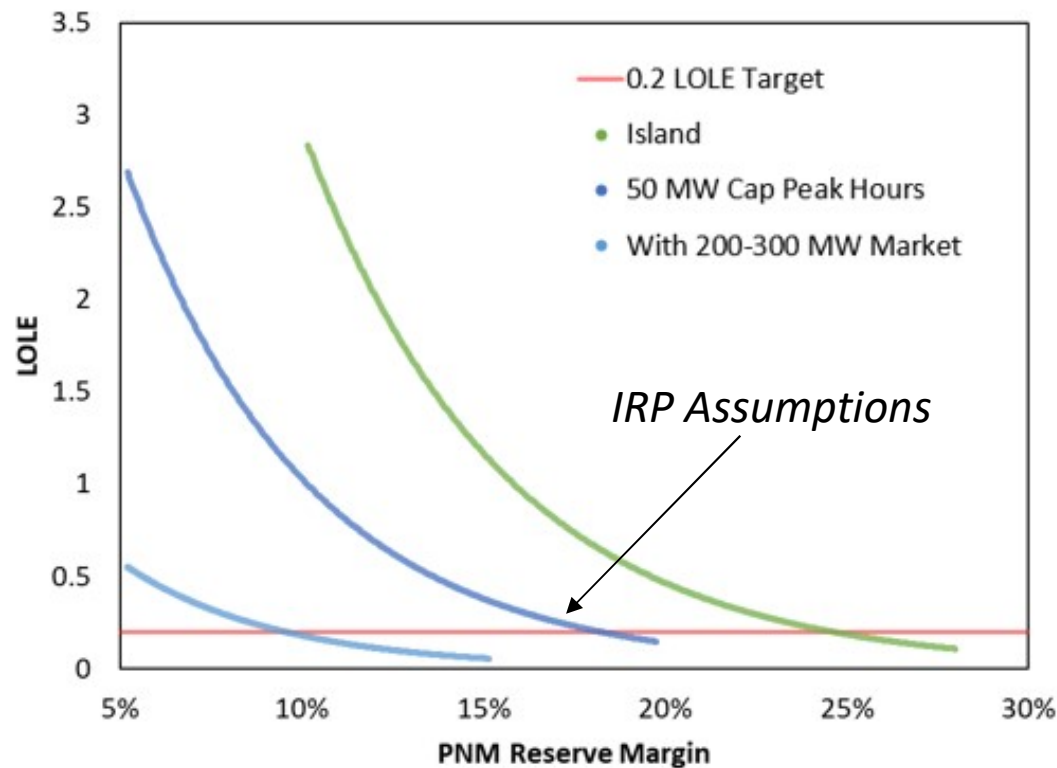




# IRP RM Comparison



# Reserve Margin Curves (UCAP)



**Island** - PNM BA as an islanded system

**50 MW Cap Peak Hours** - 200-300 MW limit during high load hours, 100-150 MW limit during summer hours 16-18, and 50 MW during summer hours 19-22

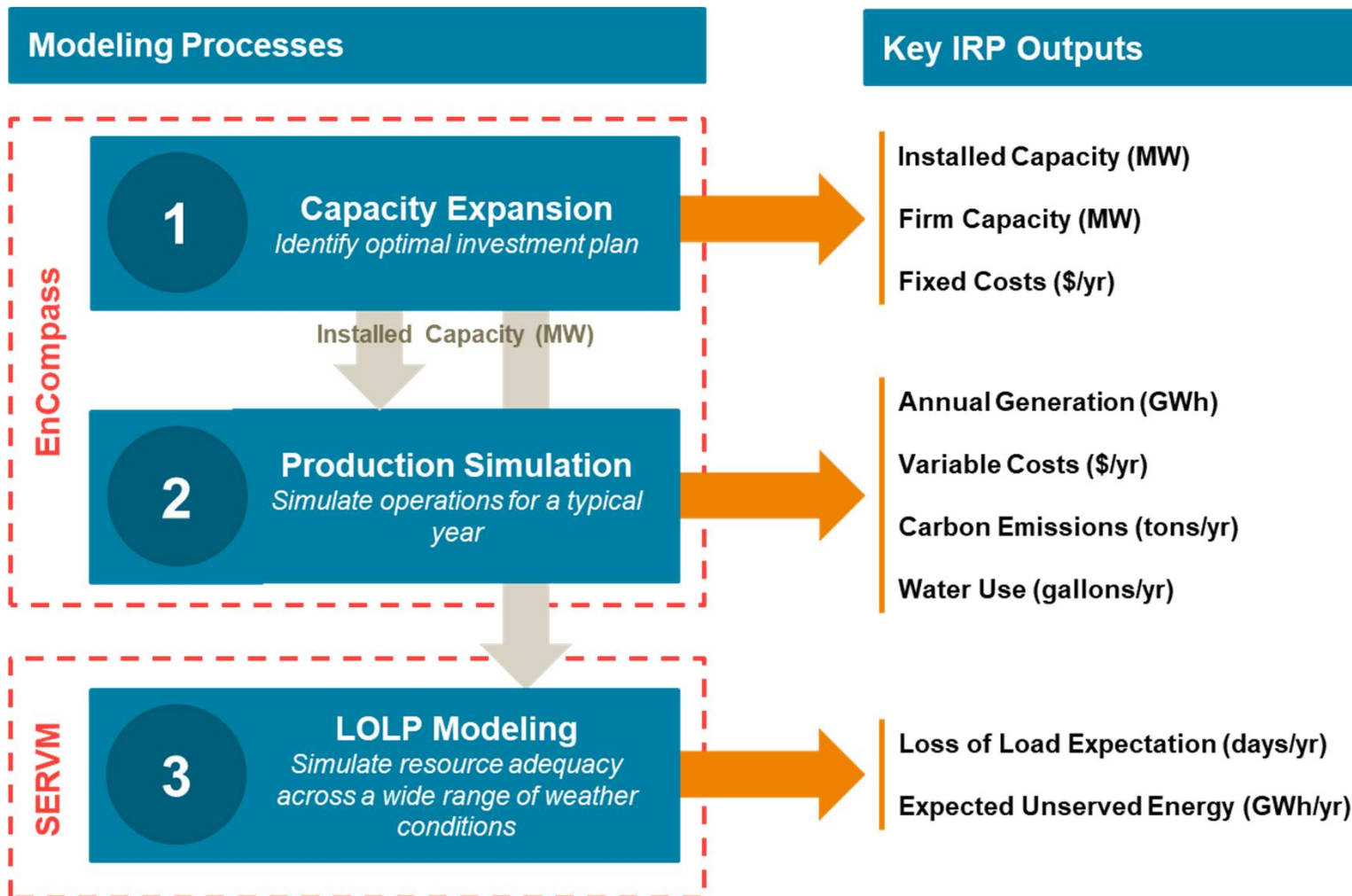
**With Market** – 200-300 MW limit during high load hours



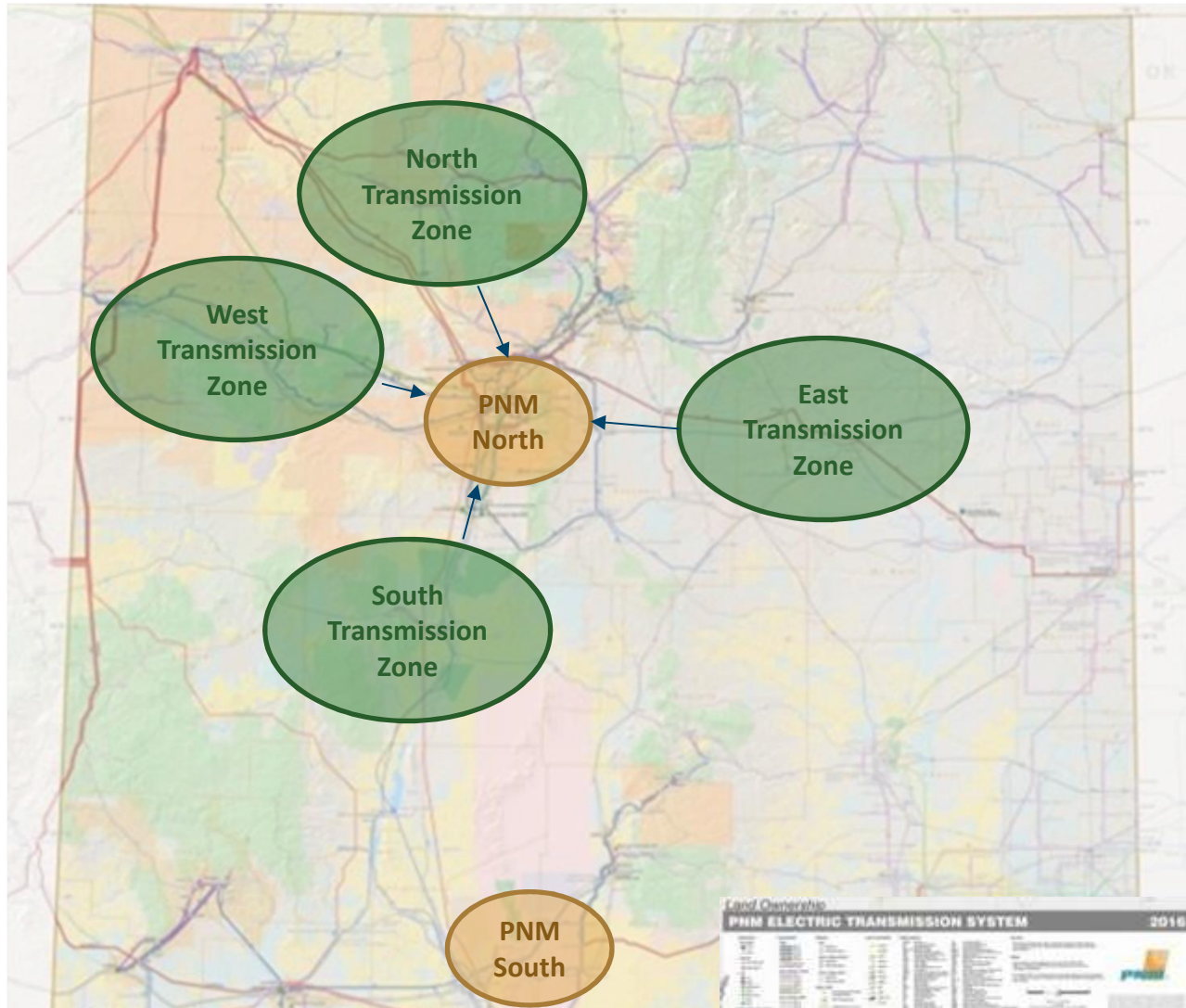


# **Model Framework and Key Input Assumptions**

# Modeling framework pairs EnCompass and SERVUM

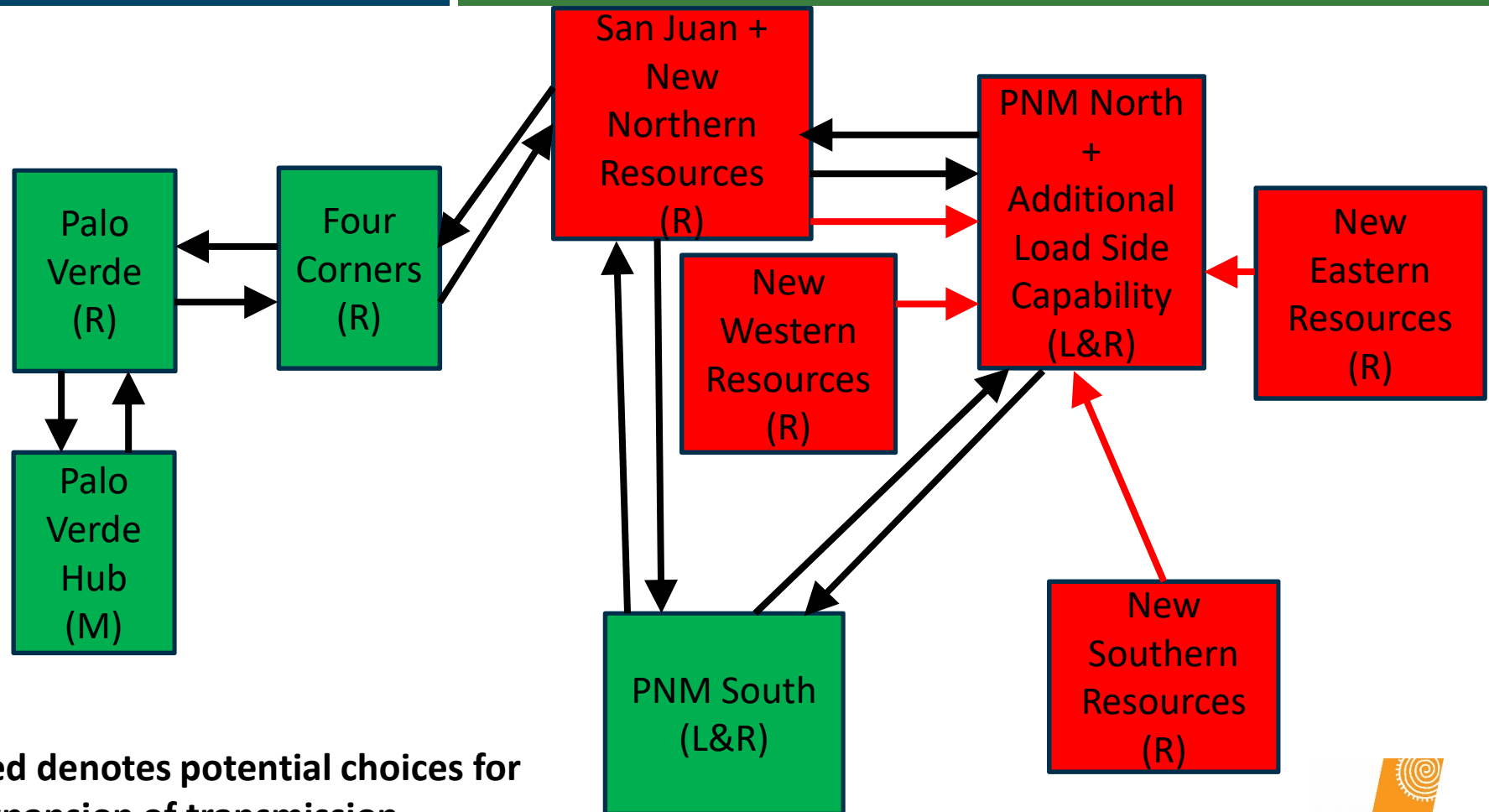


# Transmission Modeling Approach



# Transmission Modeling Approach

## September 2020



Red denotes potential choices for expansion of transmission



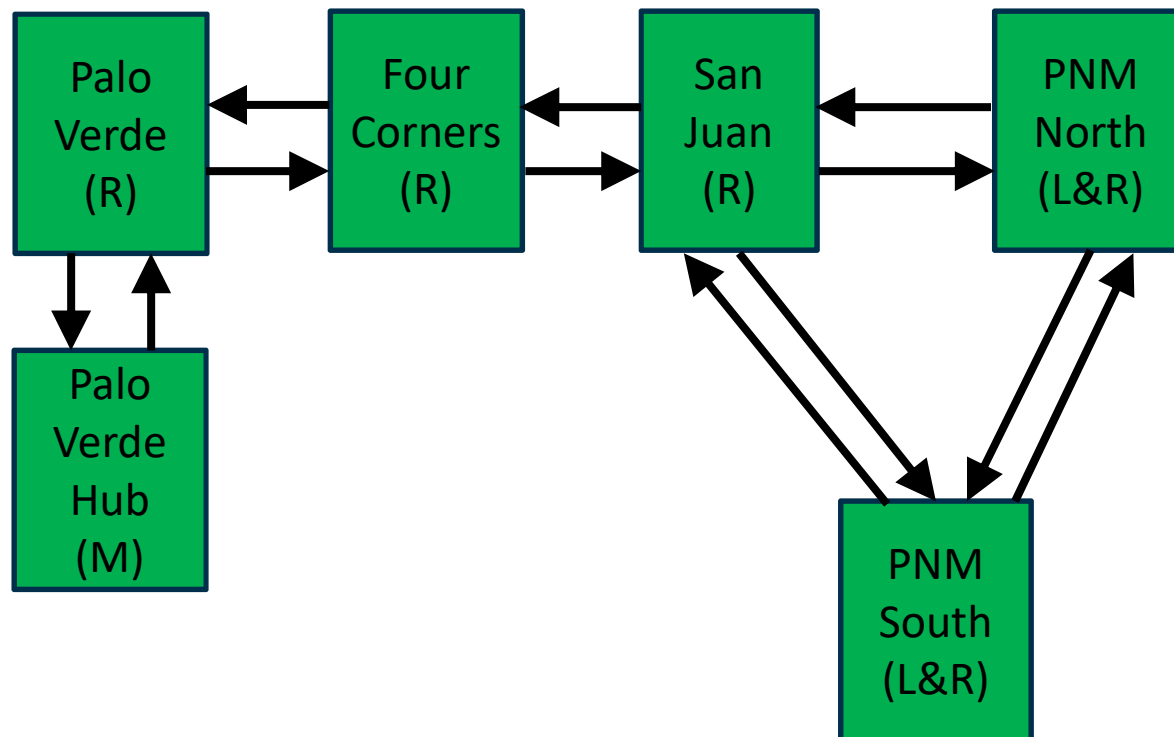
# Update to Transmission Modeling Approach

- Transmission Modeling as of September 15, 2020
  - 4 candidate projects based on September 6, 2019 transmission presentation
  - Transmission costs modeled as network costs
  - Transmission projects added prior to building resources in one of the four designated zones
  - Interplay with ELCC inputs and number of resources  
Interplay with ELCC inputs & zonal resources has led to excessive computation times (>24 hours per simulation)
  - High load cases presented unique challenges



# Transmission Modeling Approach

## January 2021



L : Loads  
R : Resources  
M : Energy Markets



# Transmission Modeling Approach

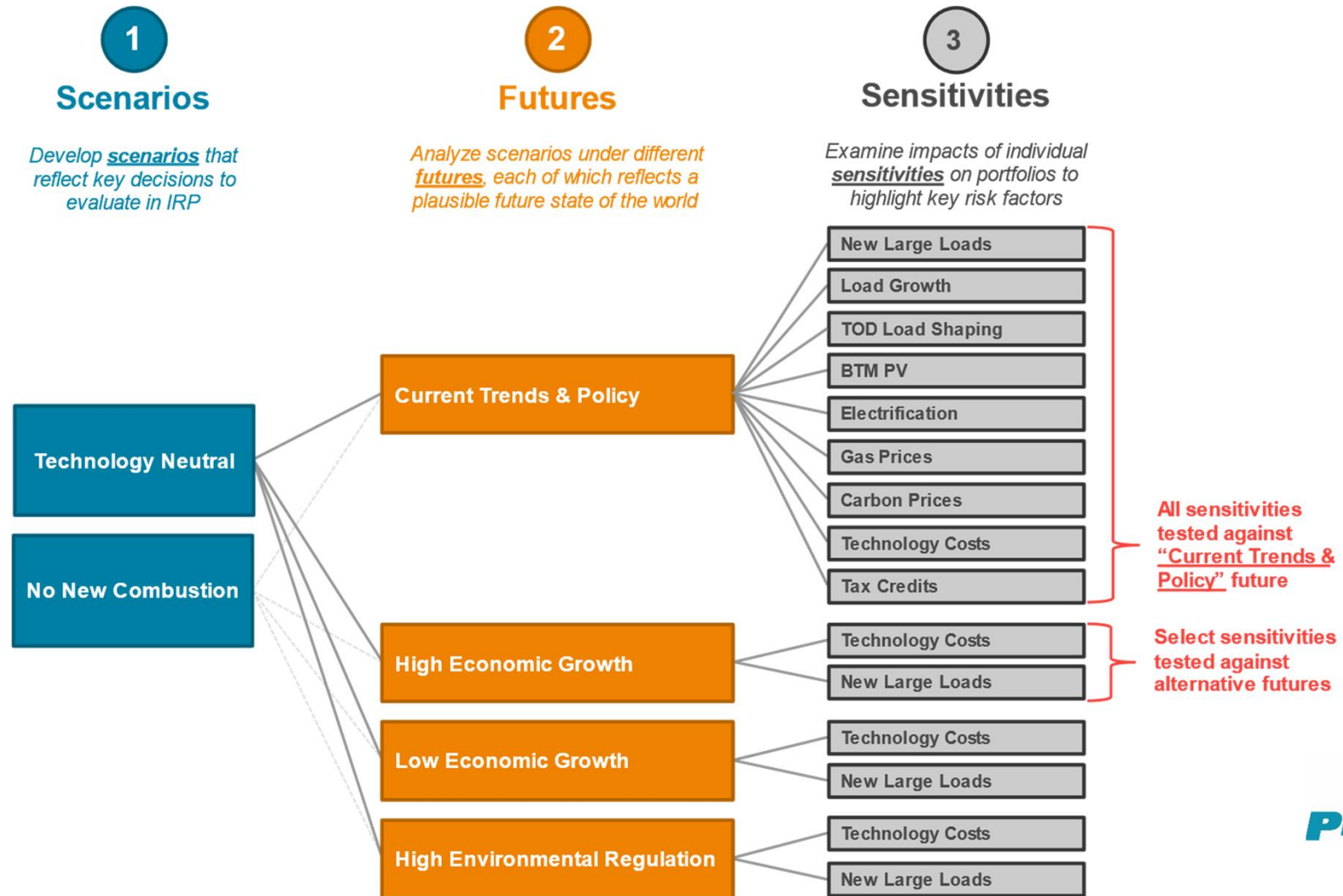
## January 2021

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- Progress in modeling transmission zones has been saved
- PNM plans to pickup existing progress to model potential transmission projects/zones in next IRP cycle
- PNM Transmission group to study additional alternatives for more robust expansion modeling
- Zonal production and cost profiles to further differentiate between alternatives.
- EnCompass version 5.0 released has internal ELCC logic which will reduce need for additional resource and logical constraints in modeling which should improve solution times.



# Overarching framework for scenario analysis



# Scenario Framework Focuses on Role of Technology in PNM's Future Portfolio

## 1. Technology Neutral

- Considers all possible investments that could contribute to PNM's 2040 carbon-free goal
- Meets RPS and carbon intensity requirements of ETA

## 2. No New Combustion

- Limits investments in new resources to renewables, storage, and DSM
- Also compliant with ETA requirements

	Technology Neutral	No New Combustion
Technology Eligibility		
Solar	✓	✓
Wind	✓	✓
Battery Storage	✓	✓
Pumped Storage	✓	✓
Incremental DSM	✓	✓
H2-Ready CTs	✓	✗
Carbon Intensity Targets		
400 lbs/MWh	2023	2023
200 lbs/MWh	2032	2032
Carbon free	2040	2040



# Modeling Assumptions for Hydrogen as a Drop-in Fuel

- “Technology Neutral” scenario considers investments in H<sub>2</sub>-ready combustion turbines as a source of capacity to meet reliability needs
  - Assumes units will be fueled by natural gas through 2039 and converted to H<sub>2</sub> fuel by 2040
  - Units typically operate at low capacity factors for peaking purposes only
- In addition to the “typical” costs of owning and operating a new LM6000 gas unit, H<sub>2</sub>-ready CTs are assumed to incur the following costs:

Cost	Description	Assumption
Conversion Cost	One-time conversion cost to enable combustion of 100% H <sub>2</sub> in LM6000s	\$154/kW
Fuel Cost	All-in cost for H <sub>2</sub> production (assuming electrolysis powered by renewables), storage, and transportation in 2040	\$40/MMBtu



# Scenarios Studied Under Four Alternative “Futures”

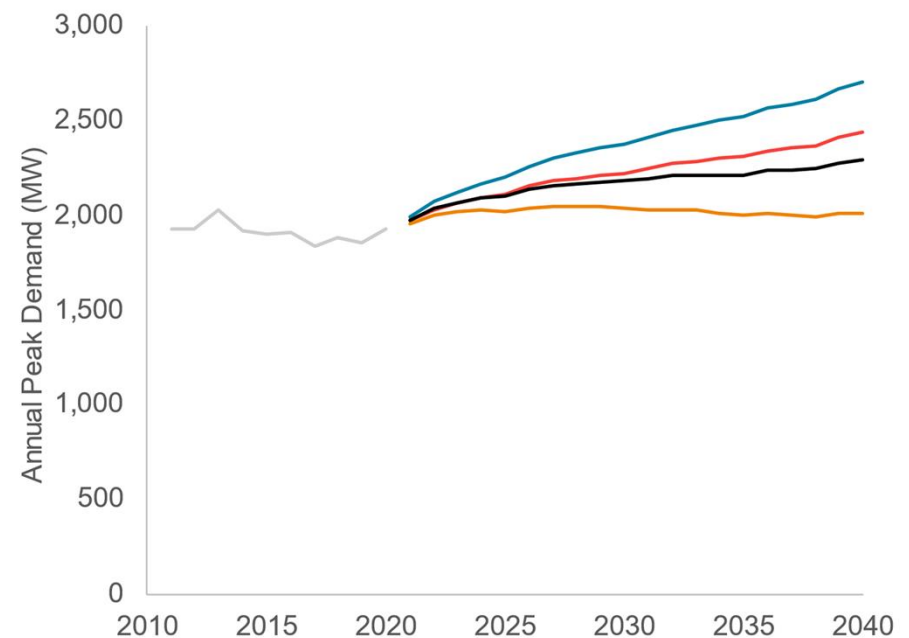
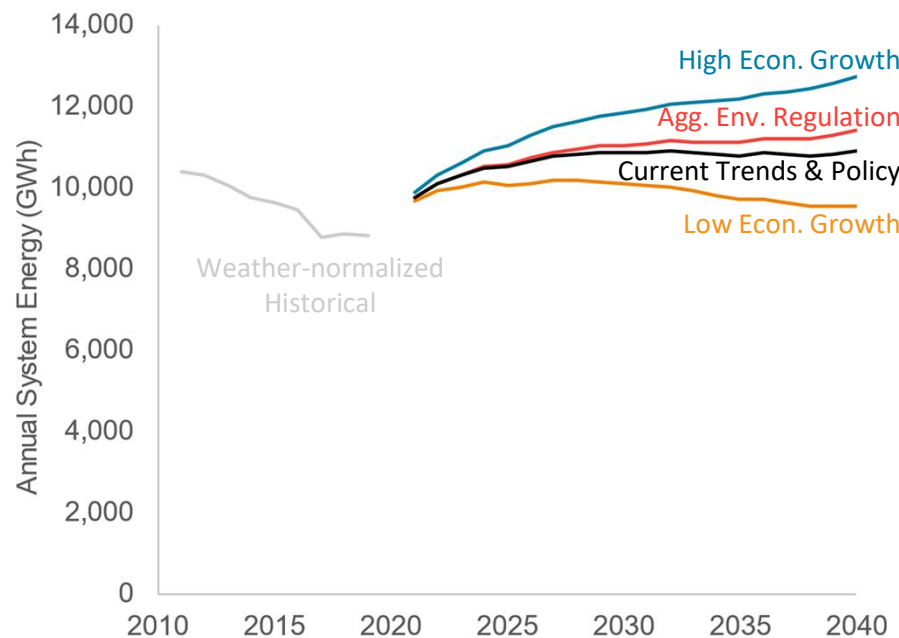
1. **Current Trends & Policy (CTP):** reflects PNM’s view of the most likely set of conditions in the future
2. **High Economic Growth (HEG):** captures potential impacts of a rapidly growing New Mexico economy on load forecast and customer technology adoption
3. **Low Economic Growth (LEG):** reflects impacts of a stagnant New Mexico economy on loads, customer technology adoption, and gas prices
4. **Aggressive Environmental Regulation (AER):** consistent with a suite of more aggressive policies to regulate fossil fuels and drive transition to clean energy

	Current Trends & Policy	High Economic Growth	Low Economic Growth	Aggressive Environmental Regulation
Load Forecast	Mid	High	Low	Mid
BTM PV Forecast	Mid	High	Low	High
EV Adoption Forecast	Mid	High	Low	High
Building Electrification Forecast	Mid	Mid	Mid	High
Gas Price Forecast	Mid	Mid	Low	High
CO2 Price Forecast	Mid	Mid	Mid	High
Technology Cost Forecast	Mid	Mid	Mid	Low



# Load Forecasts Vary Across Different Futures

- Under Current Trends & Policy future, loads grow at roughly 0.6%/yr
  - Levels of load growth studied across different futures vary between -0.1%/yr and 1.5%/yr



# Sensitivities probe robustness of results to deviation from base forecasts

<u>Assumption</u>	<u>Current Trends &amp; Policy</u>	<u>Sensitivity Options</u>	→	
New Large Loads	None	High	Very High	
Load Growth	Mid	Low	High	
TOD Load Shaping	Inactive	Active		
Customer Solar	Mid	Low	High	None
Electrification (Vehicles)	Mid	Low	High	
Electrification (Buildings)	Mid	High		
Gas Prices	Mid	Low	High	
CO2 Prices	Mid	Low	High	
Technology Costs	Mid	Low	High	
Tax Credits*	Expired	Extended		

\*Tax Credit extension sensitivity to be included in IRP, but not included in today's results





# **Draft Results**

**Nick Phillips**

**Director of Integrated Resource Planning**





# Draft Results

- Portfolio Builds
  - Capacity and Energy Mixes
  - Environmental Performance and Cost
- Robustness of Results
  - Portfolios Under Various Futures
  - Sensitivities
- Reliability Assessment
  - LOLE Verification of IRP Portfolios
  - Examination of High-risk Reliability Hours
- Stakeholder-suggested Scenarios



# Portfolio Builds

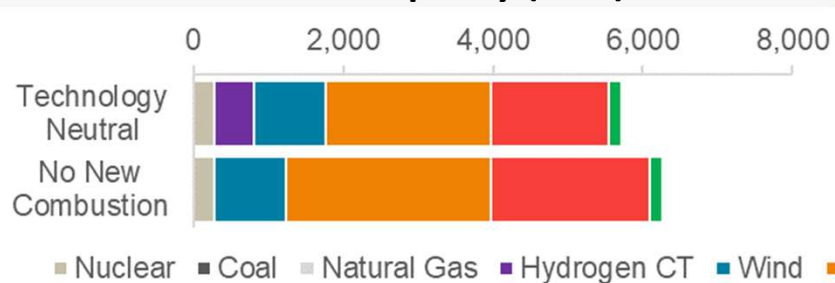


# Portfolio Summaries

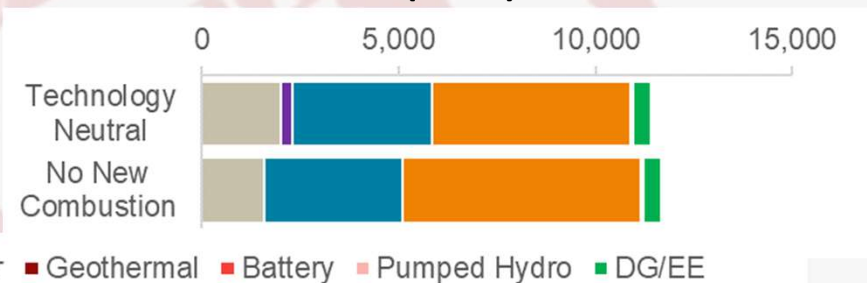
## Current Trends & Policy Future

**Preliminary Draft Results  
Subject to Change**

**2040 Total Installed Capacity (MW)**



**2040 Generation Mix (GWh)**



**Near-Term Annual Portfolio Changes (MW)**

Scenario	Technology	2022	2023	2024	2025
Technology Neutral	DSM	+35	+20	+29	+26
	Solar	+650	—	+10	—
	Wind	—	—	—	—
	Storage	+300	+134	+10	—
	H2 CTs	—	+160	—	+160
No New Combustion	DSM	+35	+20	+29	+26
	Solar	+650	+100	+8	+70
	Wind	—	—	—	—
	Storage	+300	+300	+10	+150
	H2 CTs	—	—	—	—
Coal & Nuclear Abandonments		-497	-104	-10	-200

**20-Year NPVRR (\$ millions)**

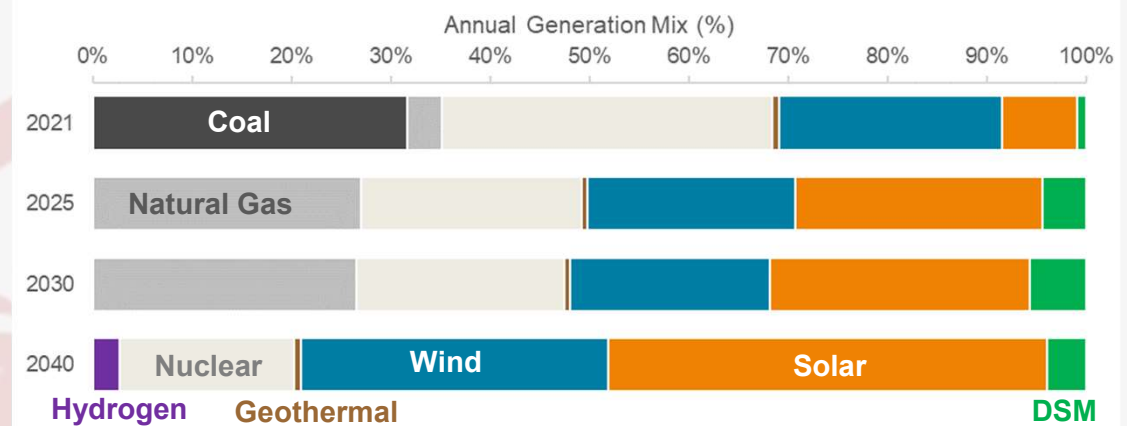


# Portfolio Results – Energy Mix

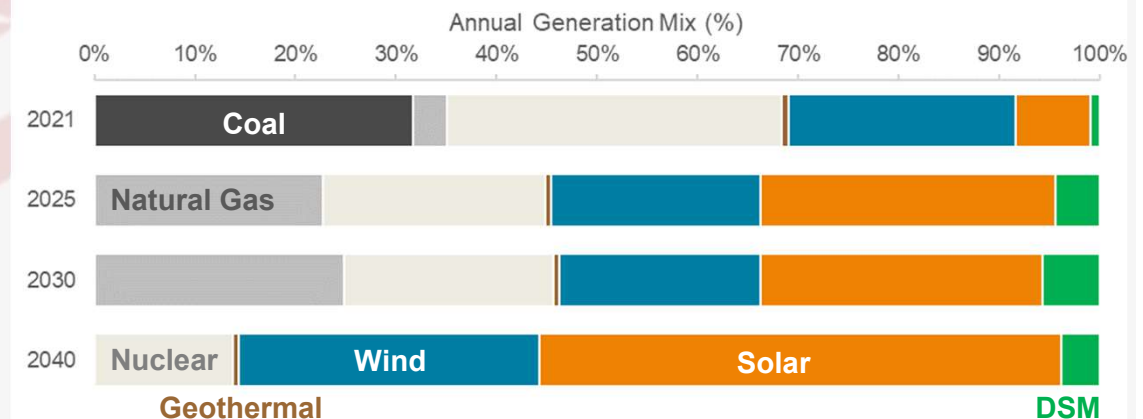
Preliminary Draft Results  
Subject to Change

- Overall energy mix between portfolios is generally similar
  - Both scenarios eliminate coal and achieve renewable penetration >50% by 2025
  - Differences in capacity differences between portfolios do not translate to significant differences in energy mix

Technology Neutral Scenario



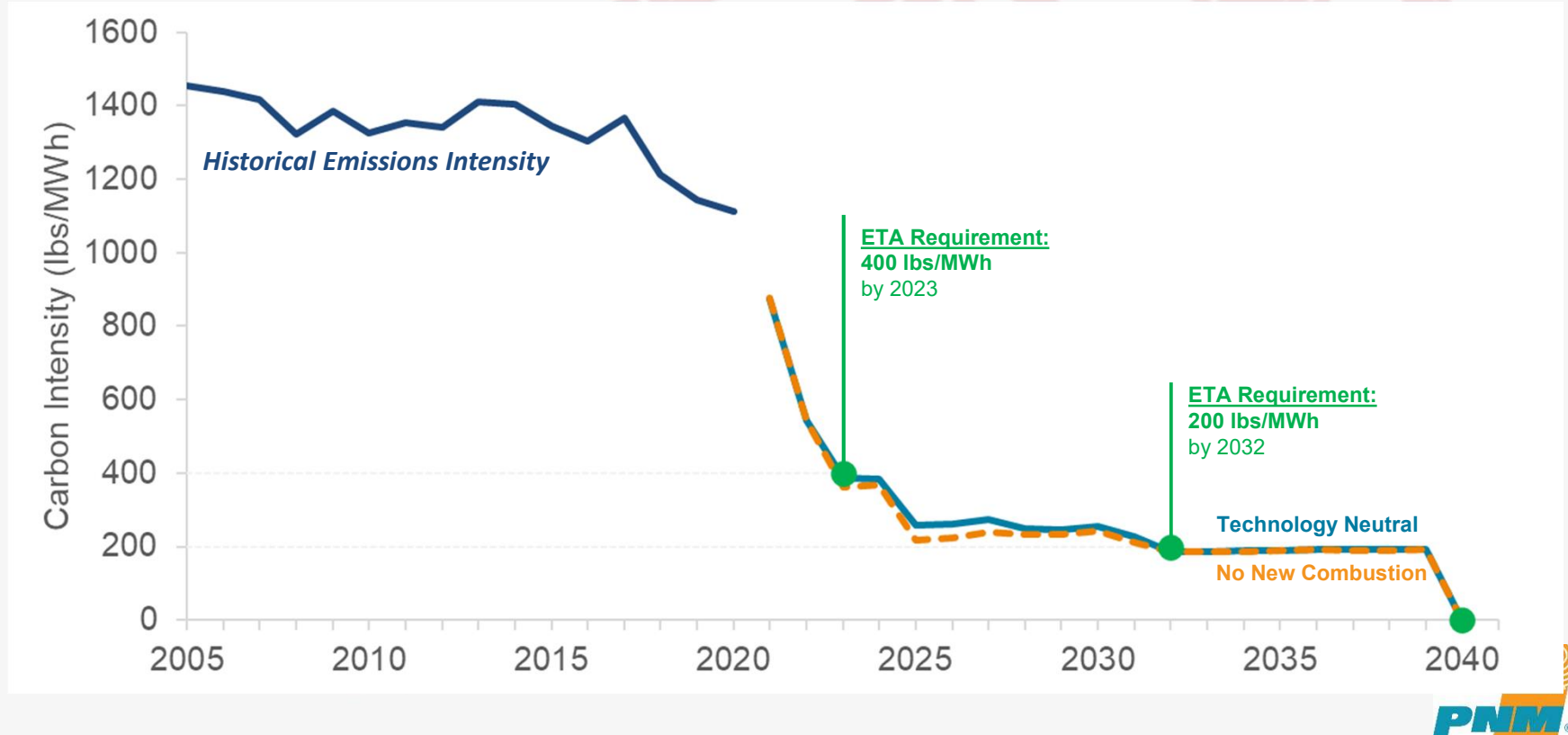
No New Combustion Scenario



# Portfolio Results – Carbon Emissions Intensity

Preliminary Draft Results  
Subject to Change

- Scenarios do not exhibit significant differences in carbon emissions reductions across the modeling period

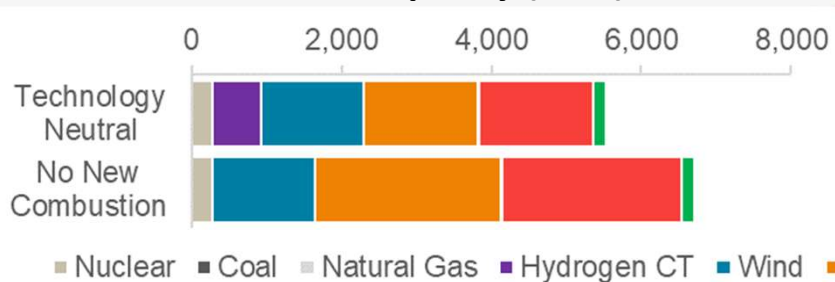


# Portfolio Summaries

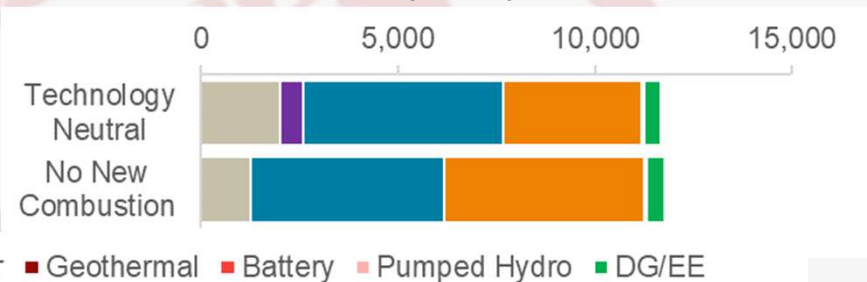
## Aggressive Environmental Regulation

**Preliminary Draft Results  
Subject to Change**

**2040 Total Installed Capacity (MW)**



**2040 Generation Mix (GWh)**



**Near-Term Annual Portfolio Changes (MW)**

Scenario	Technology	2022	2023	2024	2025
Technology Neutral	DSM	+35	+20	+29	+26
	Solar	+650	+18	+17	—
	Wind	—	—	—	—
	Storage	+300	+131	+17	—
	H2 CTs	—	+160	—	+160
No New Combustion	DSM	+35	+20	+29	+26
	Solar	+650	+100	+15	+90
	Wind	—	—	—	—
	Storage	+300	+300	+18	+194
	H2 CTs	—	—	—	—
Coal & Nuclear Abandonments		-497	-104	-10	-200

**20-Year NPVRR (\$ millions)**

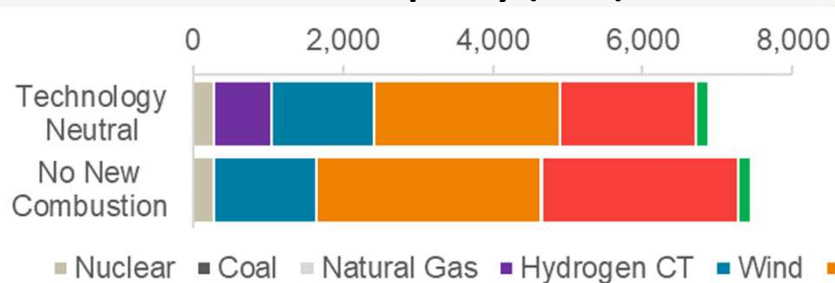


# Portfolio Summaries

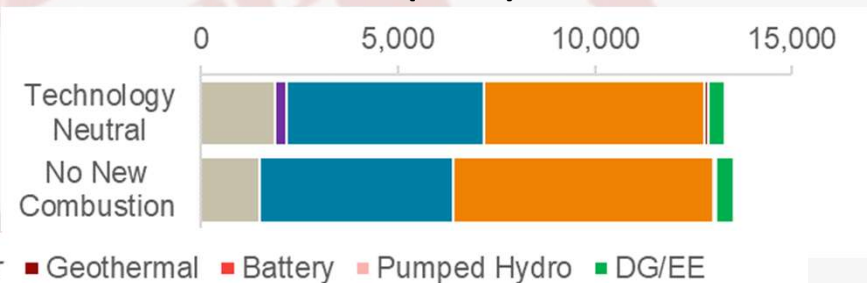
## High Economic Growth

**Preliminary Draft Results  
Subject to Change**

### 2040 Total Installed Capacity (MW)



### 2040 Generation Mix (GWh)



### Near-Term Annual Portfolio Changes (MW)

Scenario	Technology	2022	2023	2024	2025
Technology Neutral	DSM	+35	+20	+29	+26
	Solar	+650	+109	+37	—
	Wind	—	—	—	—
	Storage	+300	+192	+37	+22
	H2 CTs	—	+160	—	+160
No New Combustion	DSM	+35	+20	+29	+26
	Solar	+650	+161	+25	—
	Wind	—	—	—	—
	Storage	+300	+366	+38	+182
	H2 CTs	—	—	—	—
Coal & Nuclear Abandonments		-497	-104	-10	-200

### 20-Year NPVRR (\$ millions)



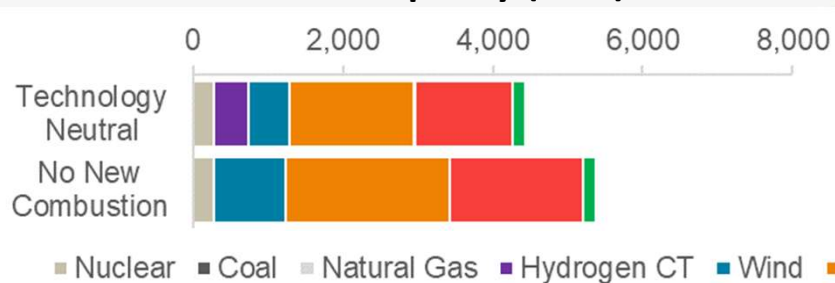


# Portfolio Summaries

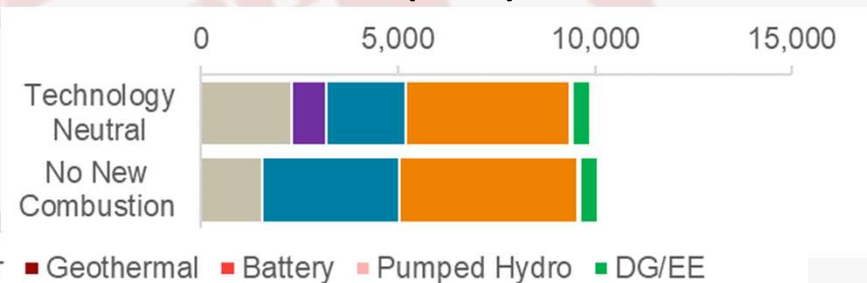
## Low Economic Growth

**Preliminary Draft Results  
Subject to Change**

### 2040 Total Installed Capacity (MW)



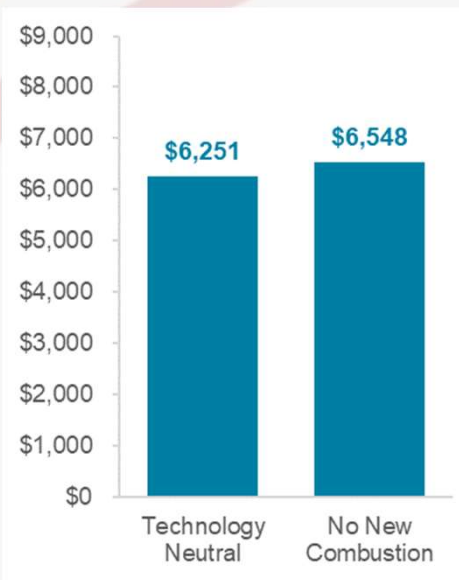
### 2040 Generation Mix (GWh)



### Near-Term Annual Portfolio Changes (MW)

Scenario	Technology	2022	2023	2024	2025
Technology Neutral	DSM	+35	+20	+29	+26
	Solar	+650	—	—	+102
	Wind	—	—	—	—
	Storage	+300	+58	—	+121
	H2 CTs	—	+160	—	—
No New Combustion	DSM	+35	+20	+29	+26
	Solar	+650	+55	—	+120
	Wind	—	—	—	—
	Storage	+300	+238	—	+120
	H2 CTs	—	—	—	—
Coal & Nuclear Abandonments		-497	-104	-10	-200

### 20-Year NPVRR (\$ millions)

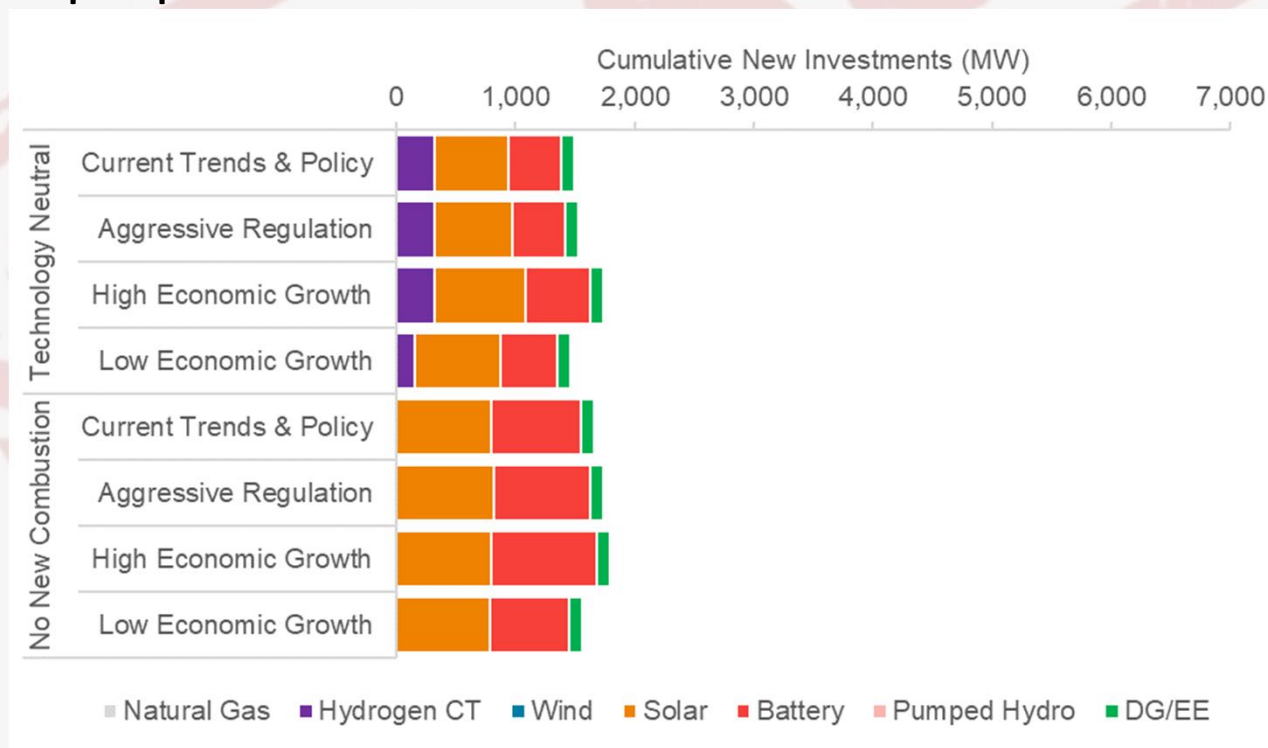




# Near-Term Additions Across Different Futures

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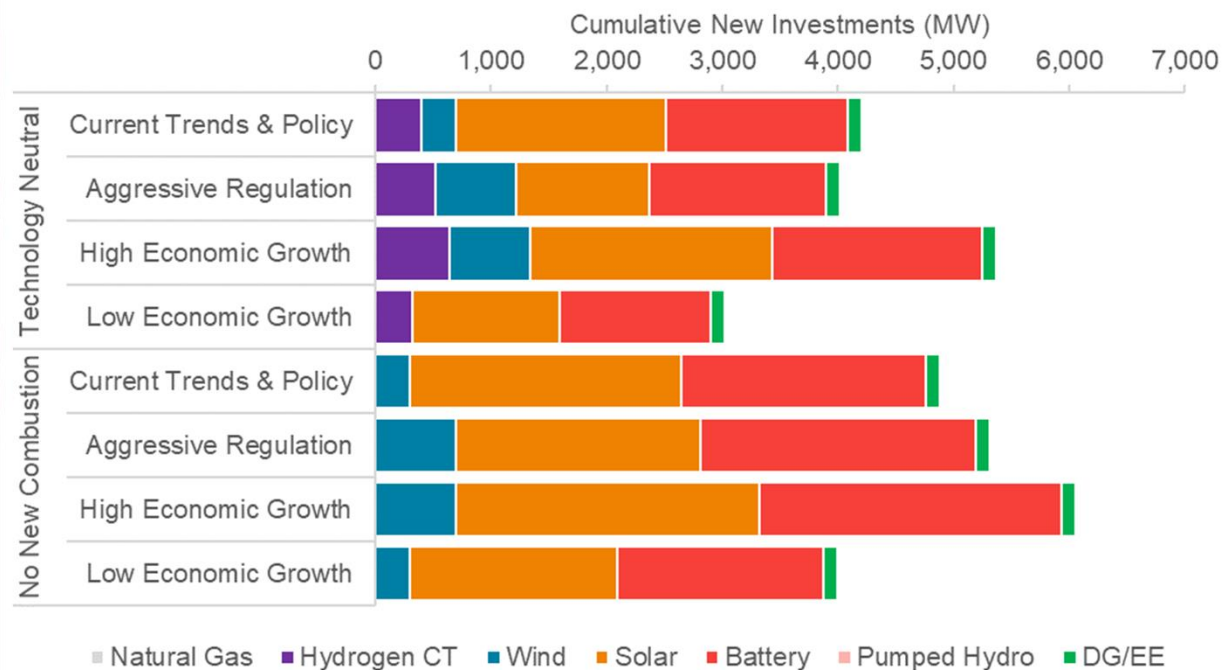
- Near-term (2025) portfolio choices vary little across futures for a given scenario
  - Amount of solar and storage adjusted depending on load, but proportions remain similar



# Long-Term Additions Across Different Futures

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- Long-term (2040) portfolios show more variation by future
  - Key differentiating decisions can wait until more information is known





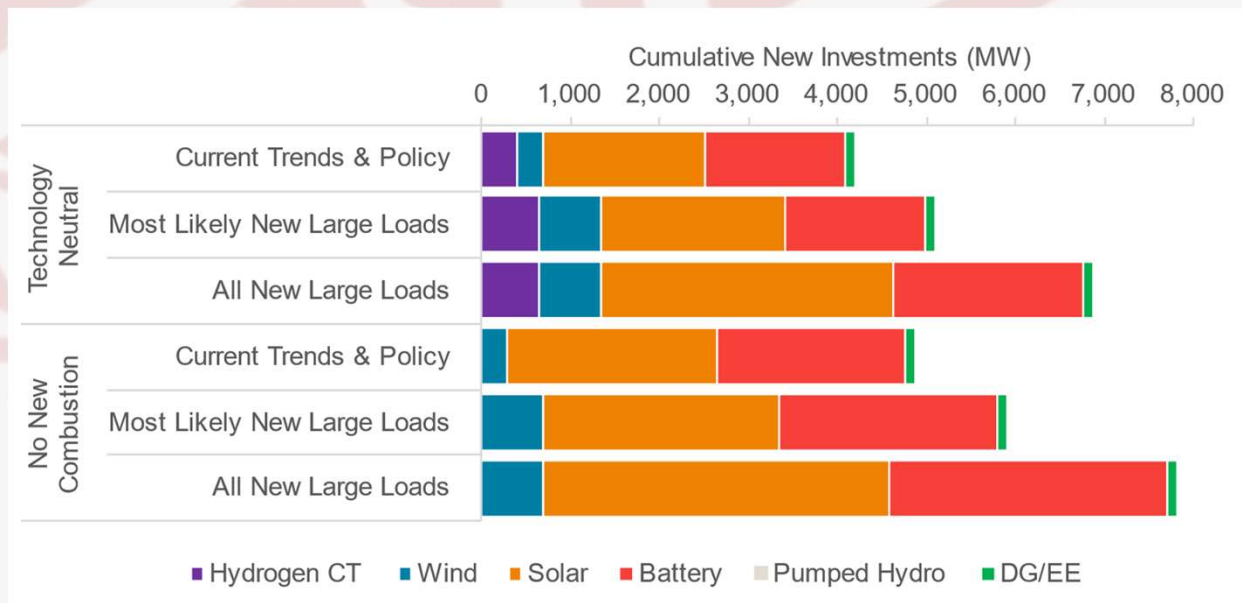
# **Additional Sensitivity Analysis**



# Potential new large loads increase capacity need

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- Larger capacity buildout required to meet peak load increase of 11% to 22% for new large loads
- These new loads result in NPV revenue requirement increases:
  - 16% to 38% for the Technology Neutral scenario
  - 19% to 42% for the No New Combustion Scenario

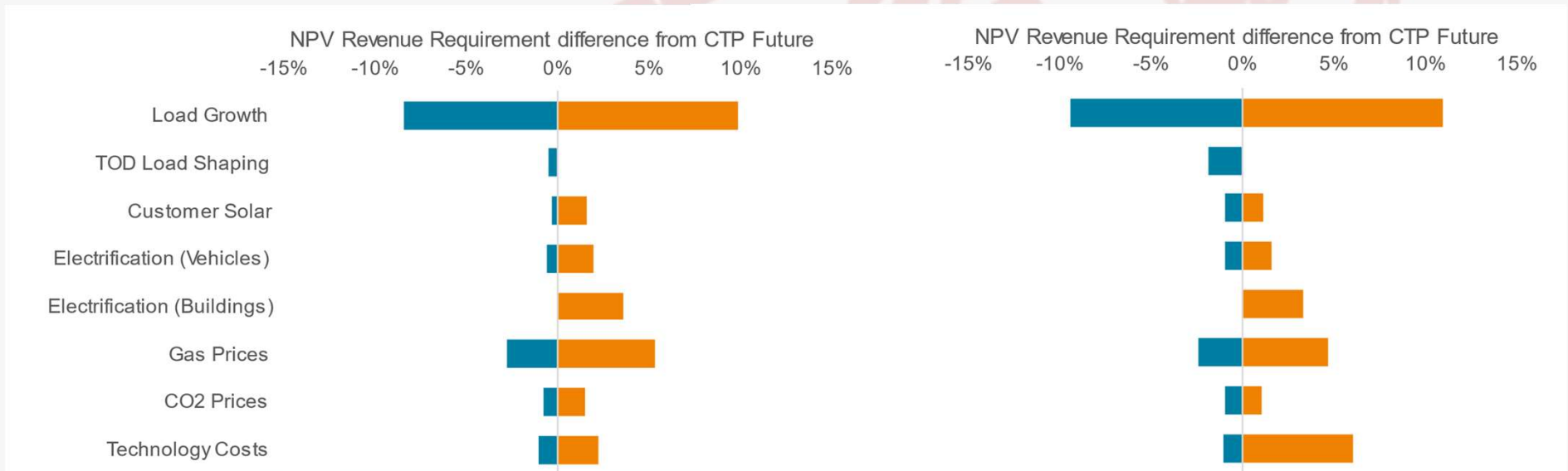


# Costs vary up to 5% due to price uncertainty; 10%+ due to load uncertainty

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## Technology Neutral

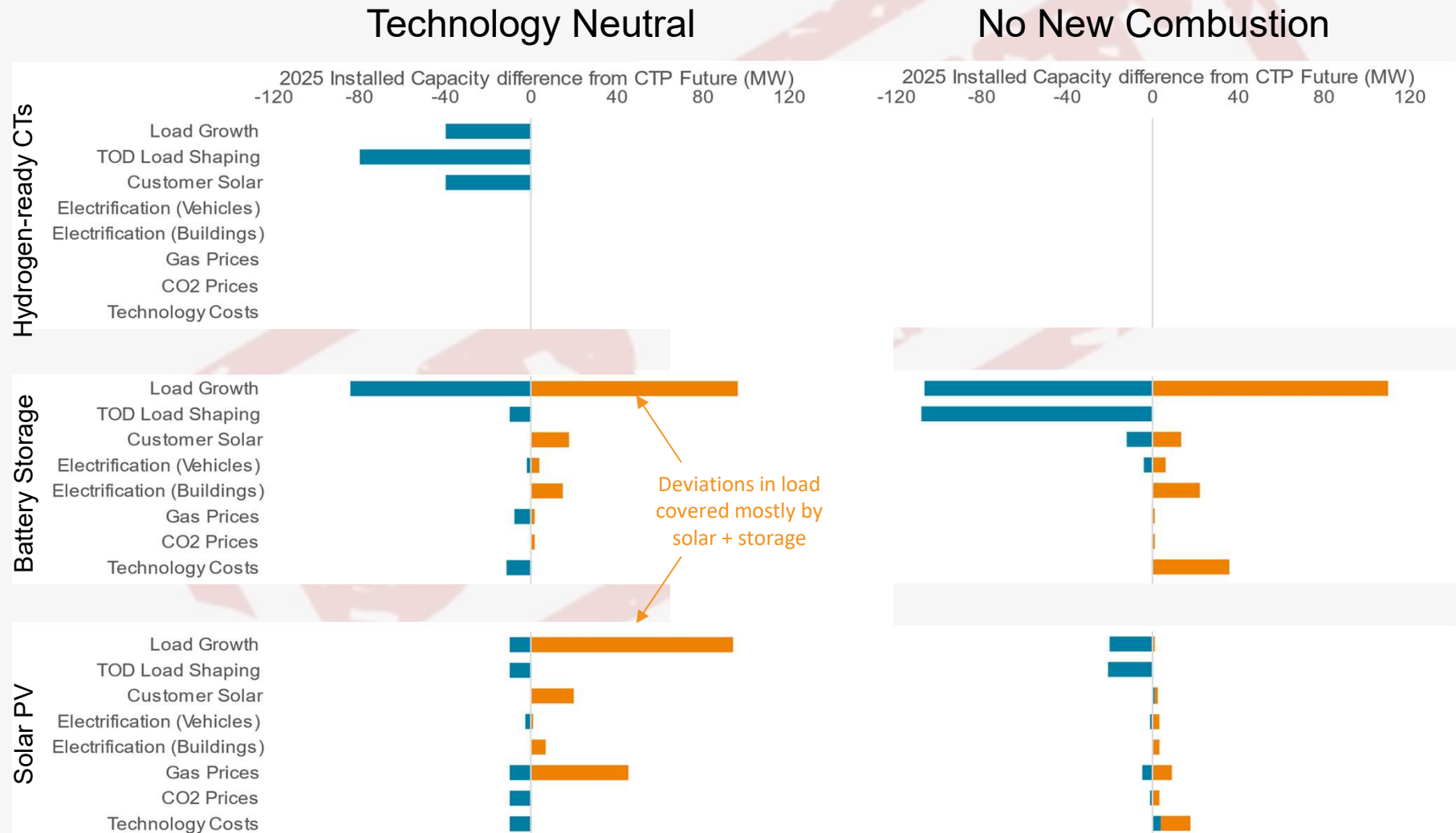
## No New Combustion



NPV Revenue Requirement of Current Trends & Policy Future is \$7,042M in Technology Neutral Scenario and \$7,386M in No New Combustion Scenario

# 2025 installed capacity largely insensitive to price uncertainty

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# Stakeholder suggested scenarios

## Covered by PNM Futures, Scenarios & Sensitivities:

- Economic Cycles / Tax Policies
- EV's & Home Batteries
- Major Carbon Pricing
- Replace PVNGS with All Renewables (based on results from SJGS RFP\*)
- Transmission Expansion\*\* (that would allow all renewables from last RFP that passed initial viability review\*)
- Replace FCPP with All Renewables by 2027 (based on RFP bids from SJGS RFP\*)
- Demand Flexibility
- Energy Purchases Allowed #

\*IRP uses generic resources not specific RFP results

\*\*Slides 29-33 discuss transmission expansion

#Energy purchases will be enabled for production costs but not for capacity contributions





# Stakeholder suggested scenarios

## Modeled by PNM:

- Carbon Free by 2030
  - Force PSH 1500 MW (\$14B -\$15B NPV depending on Tax Credits)
  - Technology Neutral (\$13B NPV)
  - No New Combustion(\$15B NPV)
- Energy Purchases Allowed<sup>#</sup>
  - Technology Neutral (\$6.9B NPV)
  - No New Combustion(\$7.3B NPV)
- Climate Change Scenario\*
  - Currently studying 2020 summer weather/heat wave and implications if similar patterns repeat in the future
  - 2040 market import reliability sensitivity
  - Future work to look at alternative weighting to LOLE weather years and/or development of “climate change” weather that could then be used to develop load and renewable profiles for portfolio modeling

\*Not captured via separate portfolio & economic modeling, but studied in the context of reliability analysis

<sup>#</sup>This is more appropriate for production cost analysis not capacity expansion





# Stakeholder suggested scenarios

## Outside of the scope of the IRP:

- Expand Interconnection to EPE System
- Economic Impact of Environmental Regulations vs Least Cost\*
- Ancillary Service Rates
- Additional DC Interconnects

\*Some information can be gleaned from reviewing the different futures, scenarios and sensitivities as to the cost impact of environmental regulations, but it would be impossible to go back in time 20 years, prior to RPS and other regulations and speculate on loads, resource options etc. For this IRP we are not considering any large combustion assets such as CCGT, Coal etc. which limits the ability to analyze the request. Furthermore, PNM must comply with all applicable laws and regulations.



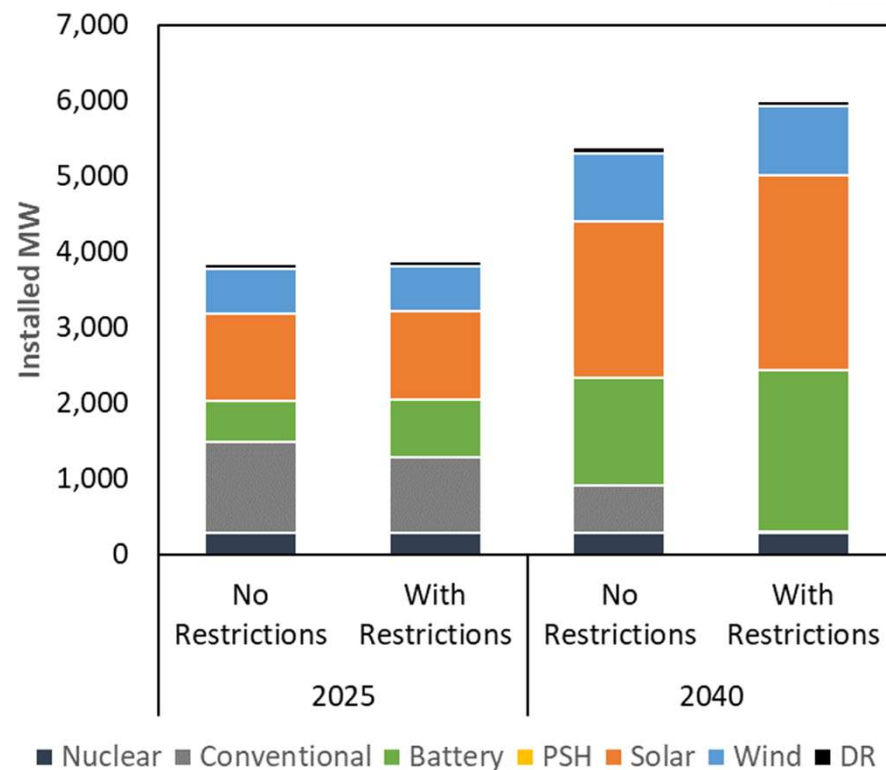


# Reliability Assessment



# Portfolios Assessed

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2025 and 2040 were selected as snapshots in time to measure portfolio reliability

Each Portfolio results in a 18% PRM for the study year when considering the UCAP contribution to the PRM target

A non-carbon emitting, dispatchable resource such as hydrogen fueled combustion turbines (or long-duration storage) reduces the amount of installed capacity necessary to maintain resource adequacy



# LOLE Study Results

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Market Support	Technology Restrictions in Portfolio?	
	No	Yes
2025	PASS	PASS
2040	PASS	PASS
2040 (Low Imports)*	PASS	FAIL**

A non-carbon emitting, dispatchable resource such as hydrogen fueled combustion turbines (or long-duration storage) provides robust reliability for the system.

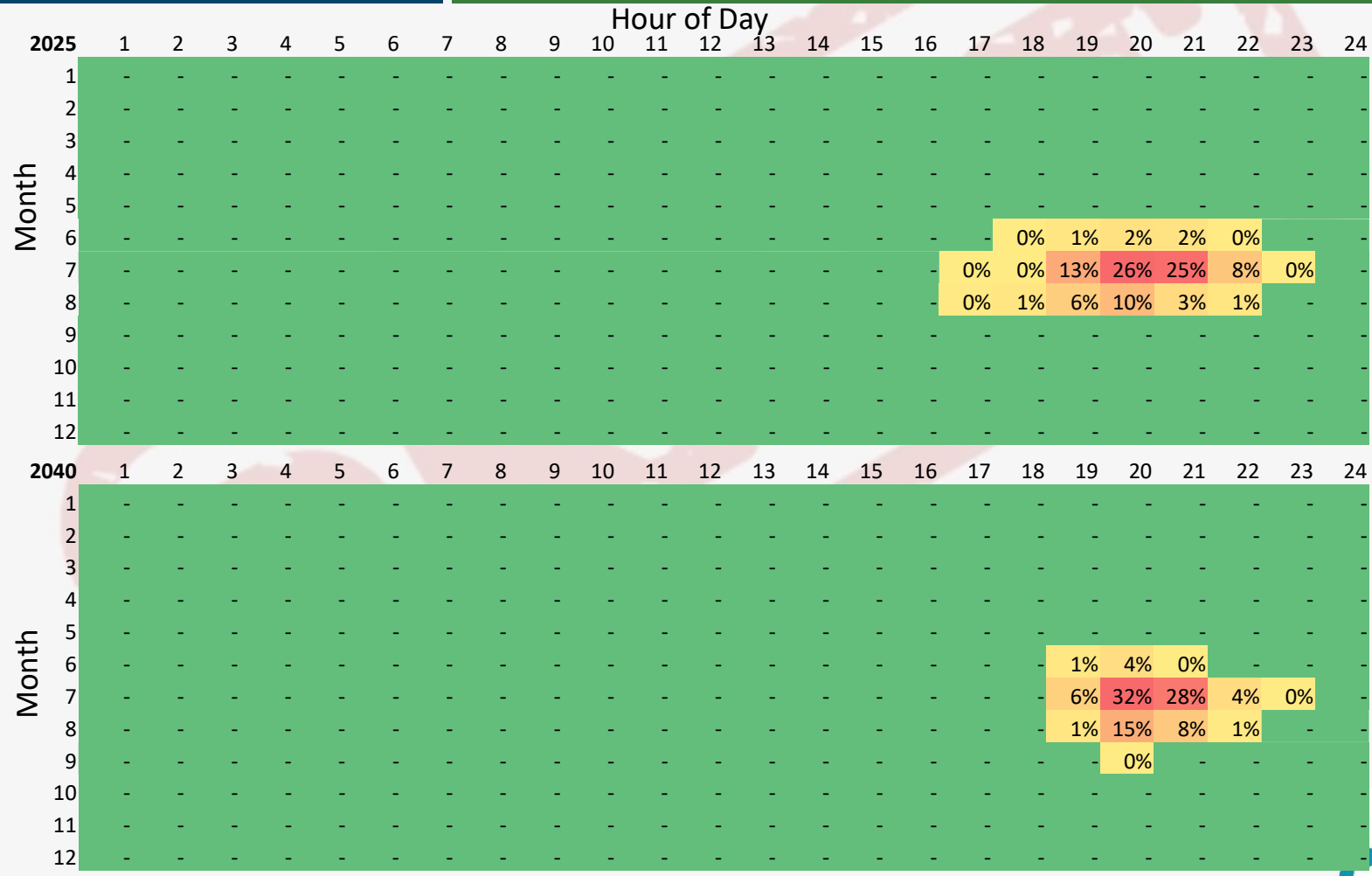
\*Limiting imports to 50 MW during non-daylight hours

\*\*Fails at LOLE of 2.7 days/yr



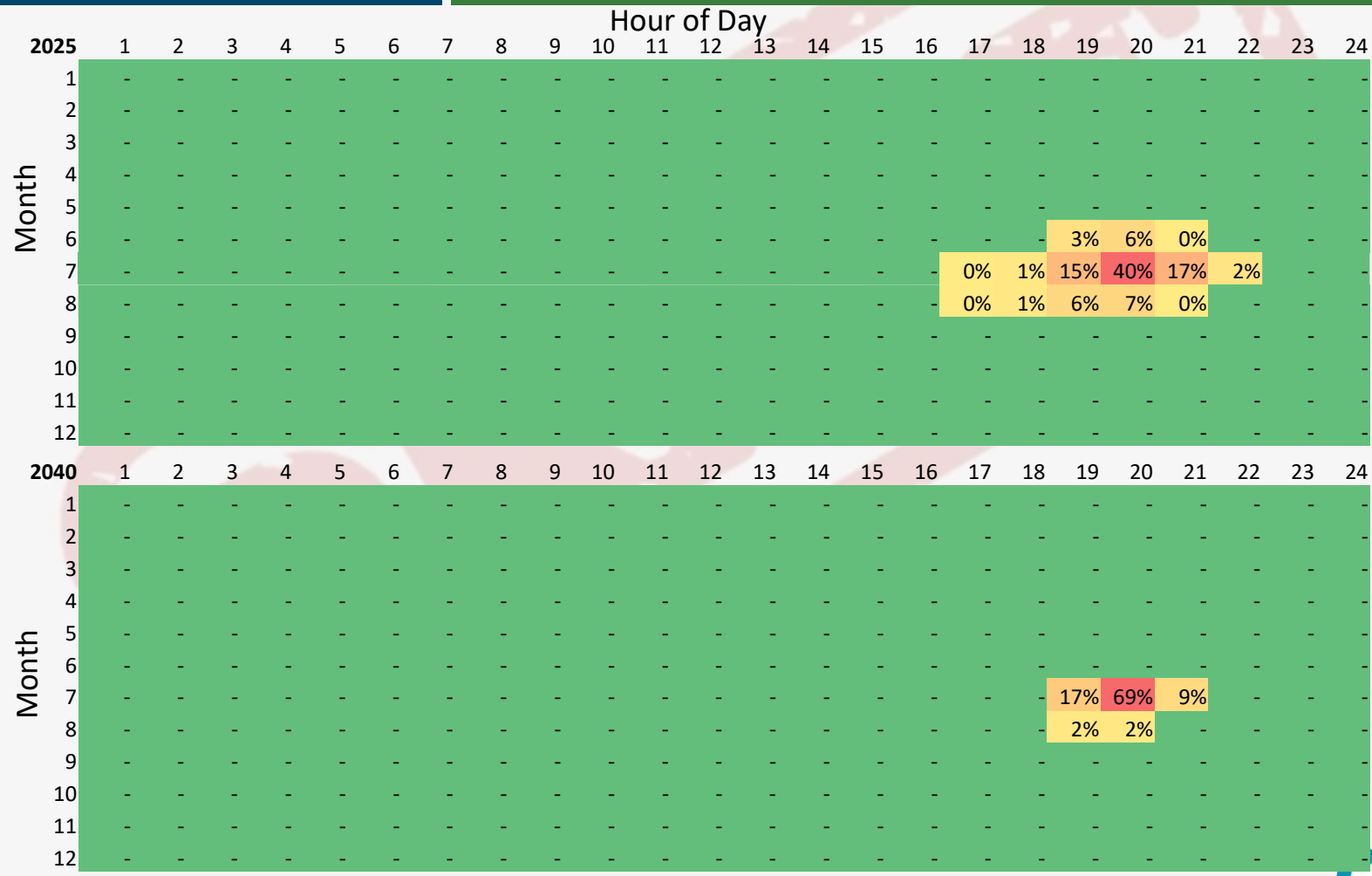
# Portfolios with Technology Restrictions LOLE Heatmap

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Subject to Change



# Portfolios with No Technology Restrictions LOLE Heatmap

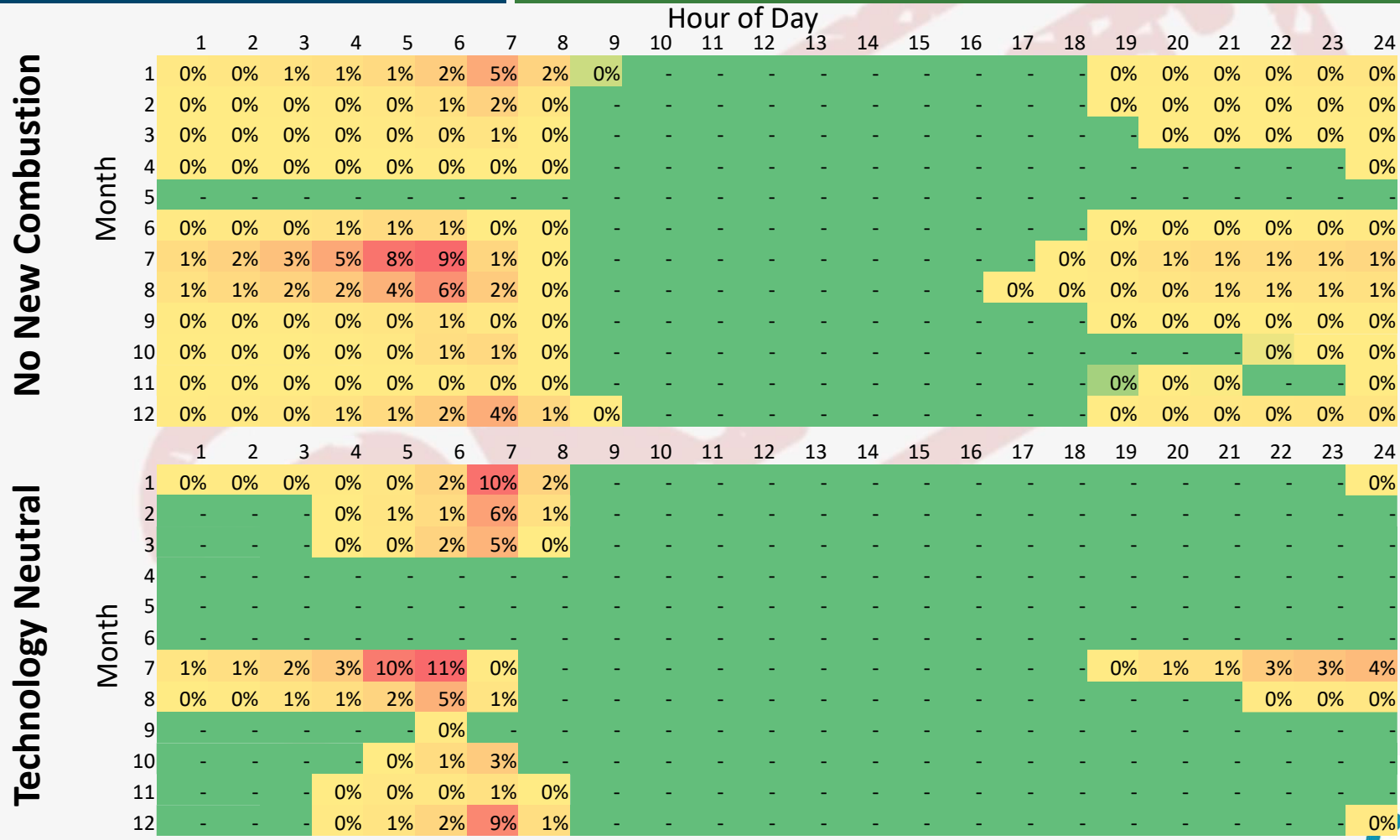
Preliminary Draft Results  
Subject to Change



# 2040 Overnight Imports Sensitivity:

## 50 MW Cap during non-daylight hours

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**Feedback**

**Open Forum**



# Written Feedback

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Please submit written feedback and/or comments regarding PNM's draft result presented here today via email [irp@pnm.com](mailto:irp@pnm.com)

Feedback can include, but is not limited to, recommendations for further analysis, discussion of the draft results, ways PNM can improve the IRP and Public Advisory Group process, etc.

To access [documentation](#) presented so far and to obtain [registration links](#) for upcoming sessions, go to: [www.pnm.com/irp](http://www.pnm.com/irp)

Other contact information: [irp@pnm.com](mailto:irp@pnm.com) for e-mails





**THANK YOU**