

# PNM 2017-2036 Integrated Resource Plan

NOVEMBER 10, 2016 PM ANALYSIS TOOLS AND PLAN



Talk to us.



# AGENDA

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## MODELING TOOLS AND PLAN

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- Overview – Pat O’Connell
- Strategist model – Eric Hughes, ABB
- SERVM – Nick Wintermantle, Astrape
- IRP Initial Modeling Plan – Pat O’Connell
- Wrap-up

# ANALYSIS TOOLS

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## 2017-3036 INTEGRATED RESOURCE PLAN

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- IRP analysis goal is to build and document a four year action plan and illustrate most cost effective portfolios
- The analysis plan is built around scenario and sensitivity analysis
- PNM uses several tools to understand the balance between cost, risk and environmental impact
  - Spreadsheets
  - Capacity expansion model (Strategist)
  - Economic dispatch models (ProMod & Aurora)
  - Chronological model (SERVM)

# ANALYSIS TOOLS

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## STRATEGIST AND SERVM

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- The Strategist and SERVM models are powerful tools that allow PNM to analyze the costs associated with thousands of combinations of resources to balance supply and demand over short and long periods of time
- In an effort to improve understanding of these two tools, we are hosting presentations by the developers of these two models
- Both are widely used and well-suited for resource planning at PNM and other electric utilities world-wide.

**Eric Hughes**

**ABB**

# Nick Wintermantle

Astrape Consulting

# **Pat O'Connell**

**Director, Planning and Resources**

# MODELING PLAN

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## HANDOUT DISCUSSION – INITIAL SCENARIOS

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- Two primary scenarios: continued operation of SJGS through the planning period and discontinue operation of SJGS in 2022
- Use of the three gas price/carbon price scenarios provided by PACE Global plus a mid gas price with the four carbon price scenarios used in previous IRPs means seven portfolios for each load forecast
- Use Strategist to create seven portfolios for each of three load forecasts across two primary scenarios, resulting in 42 portfolios



# MODELING PLAN

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## HANDOUT DISCUSSION – INITIAL ASSUMPTIONS

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- All leased or PPA resources (Palo Verde, Valencia, NMWEC, etc.) expire at the end of the terms of the contracts except the demand response program which is assumed to continue
- Start with “best in breed” resource database, then expand to test the impact if additional options are included
- San Juan available over 2022 summer peak

# MODELING PLAN

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## HANDOUT DISCUSSION – SENSITIVITY ANALYSIS

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Will test impact of varying supply and demand characteristics. Examples are:

- Palo Verde lease repurchase price
- Natural Gas combined cycle purchase prices and sizes
- Demand response program continuation
- Four Corners retirement in 2031
- Impact of energy efficiency on load forecasts

# MODELING PLAN

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## HANDOUT DISCUSSION – RELIABILITY MODELING

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Will work with Astrape Consulting to study resource adequacy topics

- Relationship between variable energy and operating reserves
- Appropriate planning reserve margin
- Will use this work to determine if portfolios produced using Strategist need to be adjusted to maintain reliability

# MODELING PLAN

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## HANDOUT DISCUSSION – STORAGE MODELING

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- Storage will be included as a resource in the Strategist analysis
- Will use the results of the reliability analysis to define potential benefits beyond what is shown in the Strategist analysis
- Build a four year action plan item around storage including requesting bids in the post-IRP RFP

# MODELING PLAN

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## HANDOUT DISCUSSION – TRANSMISSION MODELING

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Base transmission analysis around portfolio and reliability modeling

- Identify transmission requirements associated with apparent least cost portfolios
- Review generation recommendations for opportunities to reduce portfolio cost via transmission
- Include transmission in the four year action plan

# MODELING PLAN

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## HANDOUT DISCUSSION – RISK MODELING

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The NMPRC's Rule 17.7.3, Integrated Resource Plans for Electric Utilities, requires that the IRP consider risk and uncertainty in its plan, specifically noting price volatility.

Will analyze the apparent least cost portfolios for cost risk

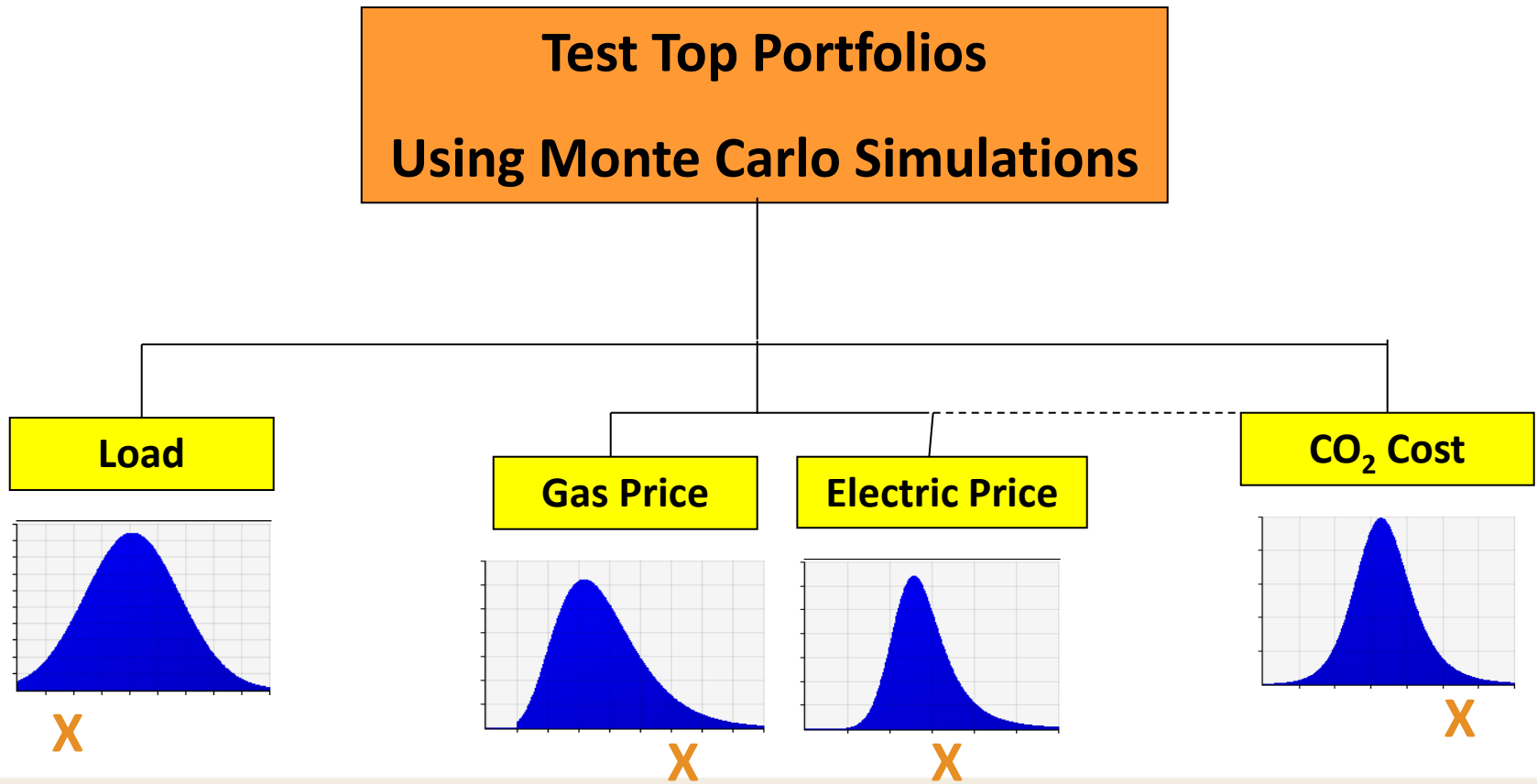
- Create Monte Carlo draws for variables with highest cost impact
- Calculate range of costs associated with Monte Carlo draws
- Estimate impact on off system sales revenues

Monte Carlo simulations provide risk and stress test indicators

- Robust portfolios perform well across broad range of conditions
- Diverse portfolios generally mitigate variability and overall risk

# MODELING PLAN

## HANDOUT DISCUSSION – RISK MODELING



# MODELING PLAN

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## RESOURCE DATABASE HANDOUT DISCUSSION

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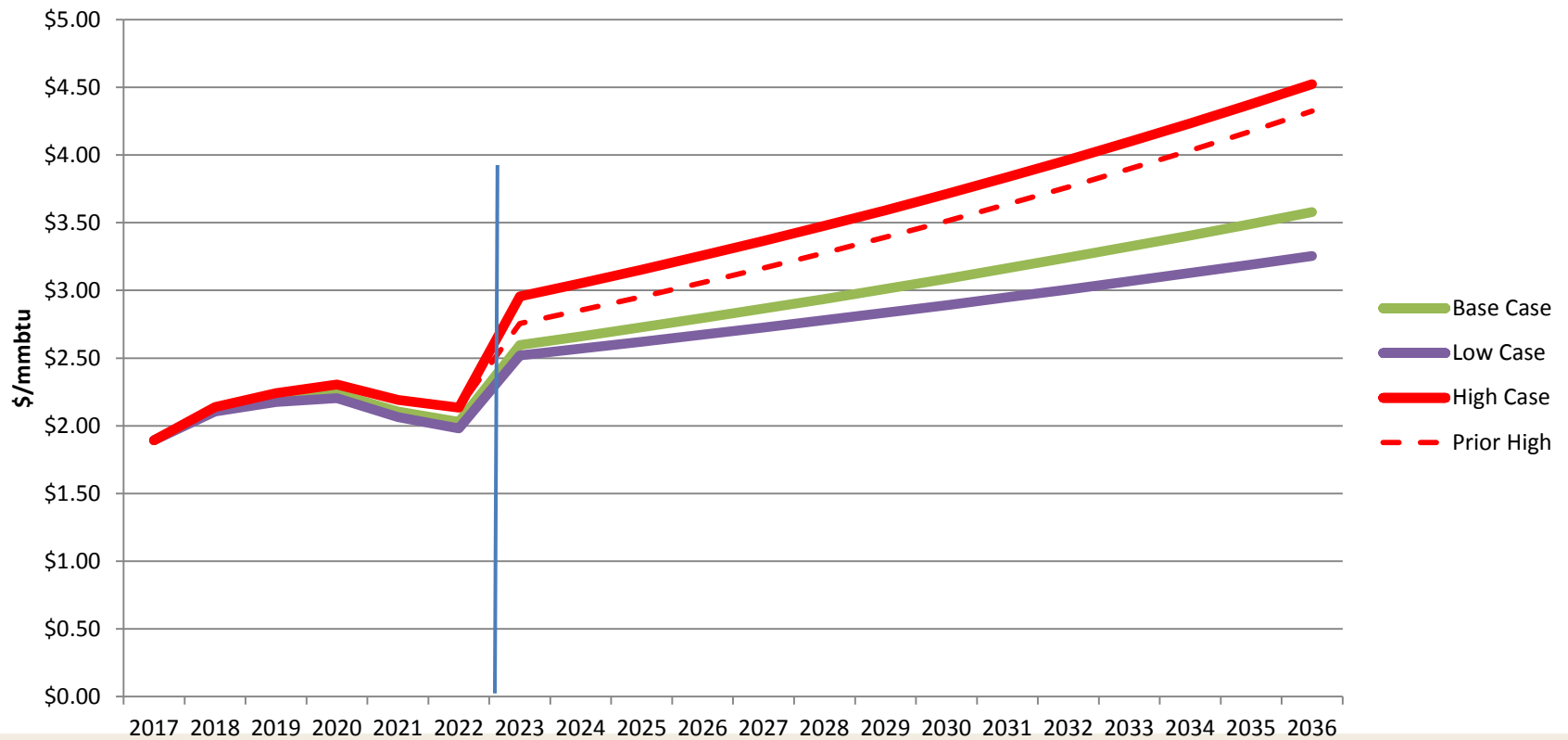
- Fuel price forecasts were provided on August 11 for coal and nuclear and on September 22 for natural gas and carbon
- Energy efficiency resource assumptions were presented on September 1
- Today's handout shows the initial resource database with characteristics, costs and emission rates for each resource
- The initial values for sensitivity variables are highlighted on the handout
- First year available is based on receipt of bids by the end of 2017



# MODELING PLAN

## COAL PRICE UPDATE

### SJGS Fuel Cost Projections: Delivered Tons



# NEXT STEPS

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## 2017 INTEGRATED RESOURCE PLAN

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- Please provide comments on the analysis plan
- PNM will be working the analysis plan through the end of this year
- Look for a meeting to be scheduled early next year to begin discussing analysis findings

# REMINDERS

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**MAKE SURE WE HAVE UP TO DATE CONTACT INFORMATION FOR YOU**

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[www.pnm.com/irp](http://www.pnm.com/irp) for documents

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

Register your email on sign-in sheets for alerts of upcoming meetings and notices that we have posted new information to the website.

# Thank you

