Working Group Purpose
Engage interested stakeholders in modeling efforts to inform Action Plan input.

Key Principles

- Allow input from a wide range of interests. Stakeholders who have expressed an interest in modeling will be considered as members of the Modeling Working Group.
- Establish a "core team" to prioritize and address the key issues and to engage with the utility modeling team.
    - Core team to prioritize model run requests using transparent criteria.
    - Core team members have knowledge of IRP related modeling activities (but do not have to be expert) and agree to represent input from a specific subset of stakeholders who have an interest in modeling efforts.
- Keep all interested stakeholders informed.
- Gridworks will organize stakeholder comments and questions and will work with the core team and utility modeling team to document responses to questions.
- Provide opportunity for stakeholders who have done their own analysis to share their observations with all stakeholders.
    - Note that the utility is not obligated to accept the findings.
    - Note also that such findings could inform future modeling frameworks and planning processes.

Modeling Activities and Data Sharing

1) PNM will perform modeling of stakeholder modeling runs as prioritized by the modeling core team.
2) Virtual machine access to PNM's modeling platform and software will not be available during this IRP cycle.
3) Stakeholders wishing to run EnCompass or SERVM models are responsible for having expertise to run the programs and acquiring the appropriate training.
4) A public-facing data set of modeling input information will be made available through VENUE. Target release date of May 24, 2023. A public-facing data set of model output information will also be available over the course of the modeling activities.
5) Stakeholders who request PNM confidential modeling information (both input and output data) who are not engaged with PNM RFIs or RFPs, are not participants in the Eergy Imbalance Market, and have signed a confidentiality agreement, will be provided access to this information through VENUE.
6) If requested, licenses for EnCompass and SERVM software will be provided by PNM to stakeholders who have obtained approved licensing agreements from the software vendor(s).

Categorizing Questions and Comments
Stakeholder questions and comments will be publicly available and organized as follows:

1. Scenarios

2. Modeling run prioritization criteria and run requests
3. Analysis Framework
4. Inputs and Assumptions
5. Modeling Rules/Constraints
6. Outputs

Proposed Engagement Plan and Timeline (BOLD DATES ARE SCHEDULED STAKEHOLDER MEETINGS)

May 4: Stakeholders interested in modeling identify themselves to Gridworks

May 11: PNM modeling presentations delivered and recorded

May 15: Proposed modeling engagement plan circulated to working group for feedback.

May 18: Revised modeling engagement plan presented to all stakeholders during stakeholder meeting. Modeling core team (of 5-8 people) formed. NDA distributed (and due back to IRP@pnm.com with copy to mtatro@gridworks.org and nicholas.phillips@pnm.com by June 15).

May 19: Comments on modeling engagement plan (preferably in redline format) due to mtatro@gridworks.org by 5 PM MDT.

May 19 - June 15: Stakeholders may request access to either public facing or confidential modeling information via password protected VENUE platform. (Access to proprietary info - both input and output data - requires a signed NDA.) Stakeholders with an approved license agreement for EnCompass and or SERVM may request software licenses, which will be paid for by PNM.

May 26: Model Run Requests and suggested prioritization criteria due to mtatro@gridworks.org who organizes the information for the Modeling Core Team.

June 1: Model Run prioritization criteria finalized during stakeholder meeting (by dot-voting)

June 8: Modeling core team applies criteria, combines requests (if appropriate), and develops prioritized list of model runs. Recommendation presented at June 15 meeting.

Note: as of 5/7/23, two model run requests (included in See ANNEX 3), have been submitted to the facilitators and will be considered by the modeling core team.

Note: as of 5/7/23, four model run prioritization criteria have been received:

1) Rank as determined by vote of modeling working group members
2) Alignment with Statement of Need

3) Delineation from existing scenarios
4) Runs that impact short term (within 10-year horizon) implementation rather than the long term interpretation (currently doing?)...This contradicts input from others that suggests at least one 20-year horizon scenario and resiliency analysis be conducted.

June 15: Latest date for model information request and signed NDA due back to IRP@pnm.com with copy to mtatro@gridworks.org and nicholas.phillips@pnm.com

June 15:

- PNM shares preliminary results of their EnCompass (scenario) modeling (Phase 1 & 2) and PNM short list of most cost effective portfolios (MCEPs) which will require additional analysis alongside stakeholder scenarios to finalize.
- Core Team reports prioritized (additional) model run requests to all stakeholders. PNM provides feedback regarding feasibility of requested runs. Decision on how to proceed.

June 15 – July 13:

- PNM – additional EnCompass (scenario) modeling of prioritized requests; and SERVM modeling of PNM MCEP shortlisted scenarios
- Stakeholders – independent analyses

June 29: full day, in person workshop discussing modeling results so far and path forward. Modeling working group members with their own analyses will be given the opportunity to present their observations. Discussion of whether additional SERVM runs are necessary.

NOTE: specific activities after June 29 may be adjusted to support development of Action Plan input.

July 13: PNM presents results of prioritized stakeholder requested modeling runs (EnCompass). Decision on need for additional SERVM runs. Note that depending on the number of runs requested and the complexity of analysis, this might have to shift to late July or early August.

August 17: Review PNM results of additional stakeholder requested modeling runs. Decide on need for additional SERVM runs. Last opportunity for stakeholders to share results of independent analyses.

Sept. 14: Review results of additional SERVM runs conducted, if requested by the modeling core team. Review results of resiliency study on single MCEP. Develop action plan input and check consistency with SoN.

Oct. 19: Determine level of consensus regarding action plan, using results of modeling.

ANNEX 1 - Stakeholders with Modeling Interests
The modeling working group consists of any stakeholder who has expressed an interest in modeling activities. A Modeling Core Team is a subset of the working group.

Proposed candidates for Modeling Core Team:

- Research community representative - Marissa Ballantine/Cody Newlun, Sandia National Labs.
- Environmental advocates representative - Aaron Gould, WRA
- New Mexico State agencies representative - Ed Rilkoff/Cynthia Mitchell, NM PRC Utilities Division
- Consumer interests - Keven Gedko, NMAG
- NM Large business interests - Kelly Gould, NM AREA
- Renewable Energy developers/providers - Kailash Raman/Rachel Wilson, Form Energy and Chris Leger/Mike Goggin, Interwest Energy Alliance
- Energy Storage (including long duration storage) developers/providers - Alondra Regalado/Sergio Duenas, Western Energy Storage Taskforce of the CA Energy Storage Alliance
- Advisor - Cliff Ho

Decision on composition of modeling core team will be made by Gridworks in consultation with PNM.

Note: one stakeholder raised the issue of possible conflict of interest by potential RFP participants with regards to representation on the Modeling Core Team. The stakeholder recommended the core team be composed of trade associations, rather than individual companies. This concern will be documented in Gridworks' report to the PRC at the end of the stakeholder process.

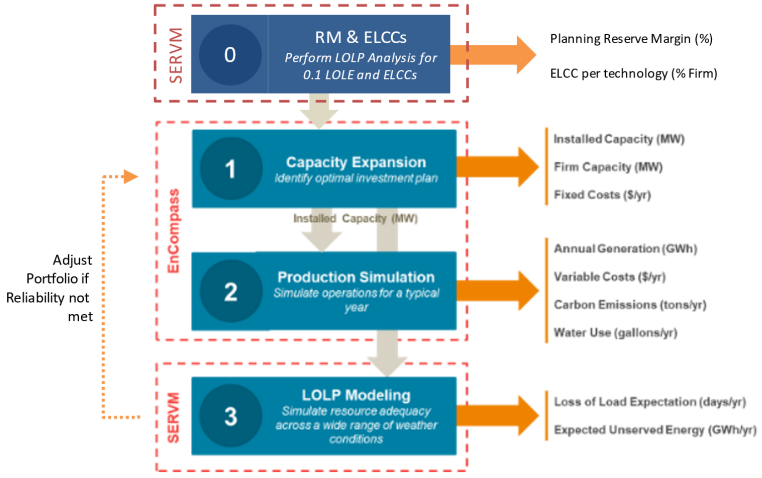
Modeling Core Team Resources shown in teal highlight.

Name	Organization	May 4 Modeling Break Out Attendee	Unable to attend May 4
Nitin Luhar	Mitsubishi Power	X	
Thomas Conroy	Kinetic Power	X	
Olga Lavrova	NMSU	X	
Glenn Wilke	NMSU	X	
Fengyu Wang	NMSU		X
Orland Whitney	NMSU	X	
Aaron Gould	WRA	X	
Cynthia Mitchell	Community Member	X	
Hector Dorbecker	PNM	X	
Shane Guiterrez	PNM	X	

Name	Organization	May 4 Modeling Break Out Attendee	Unable to attend May 4
Nitin Luhar	Mitsubishi Power	X	
Thomas Conroy	Kinetic Power	X	
Olga Lavrova	NMSU	X	
Glenn Wilke	NMSU	X	
Fengyu Wang	NMSU		X
Orland Whitney	NMSU	X	
Sarah Baxley	PNM	X	
Nick Phillips	PNM		X
Nick Wintermantel	Astrape Consulting	X	
Kevin Cox	CDG Engineers	X	
Jerry Montaño	Pueblo of Sandia	X	
Cliff Ho	Sen. Heinrich's Office	X	
Ed Rilkoff	NM PRC	X	
Bamadou Ouattara	NM PRC	X	
Eli LaSalle	NM PRC		X
Bruno Carrara	Community member	X	
Marissa Ballantine	Sandia Natl Labs	X	
Kelly Gould	NM AREA	X	
Owen Smith	Meta Platforms (NM AREA?)		X
Kalish Raman	Form Energy	X	
Rachel Wilson	Form Energy		X
Brian Johnson or Erik Aaboe	NM RETA	X	
Michael Kenney	SWEEP		X
Daren Zigich	NM EMNRD		X
Leesa Nayudu	Solariant		X
William Maxwell	Community member		X
Barbara Chatterjee	Community member		X
Brian King	Kingzzzz Ranch		X
Jim DesJardins	NM REIA		X
Dugan Marieb	Pine Gate Renewables		X
Lindsay Parker	Next Era Energy		X
Ashley Sgaliardich	Next Era Energy		X
Jack Smith	Synapse on behalf of NMAG		X
Jacqueline Waite	NM EMNRD ECMD	X	
Chris Leger	Interwest Energy Alliance		X

ANNEX 2 – MODELING PROCESS

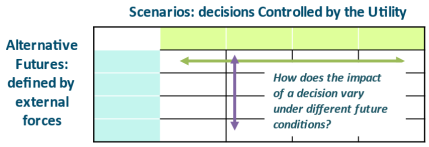
MODELING PROCESS

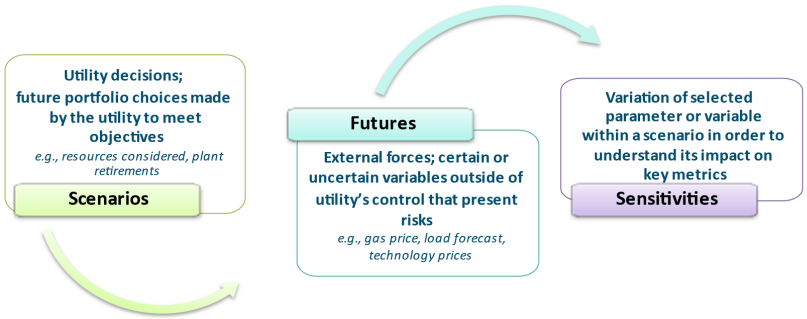


SLIDE 4 | MAY 4, 2023

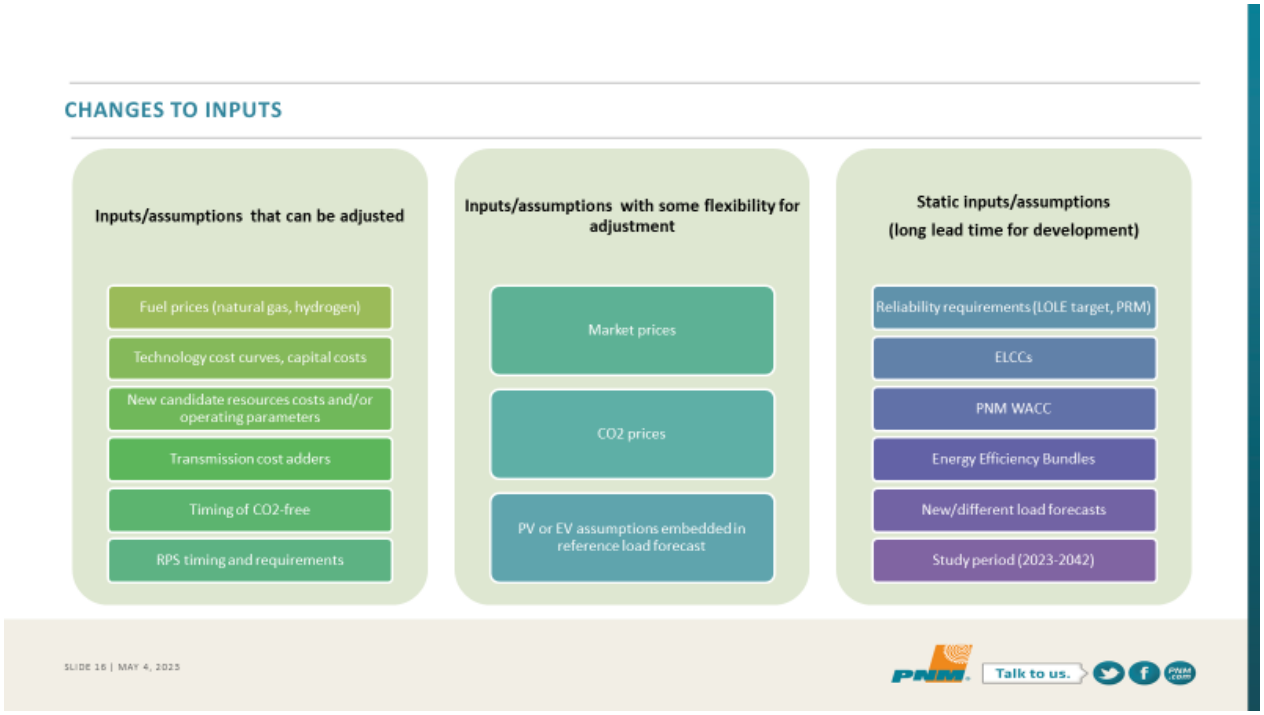
TERMINOLOGY AND MODELING APPROACH

- A **scenario** describes potential key decisions made by PNM
- A **future** consists of a set of forecasts or conditions that describe a future state of the world; PNM generally has no ability to influence factors that determine which future becomes reality
- A **sensitivity** describes a change in a single element of a given future; sensitivity analysis is used to understand how sensitive the results are to the changed variable



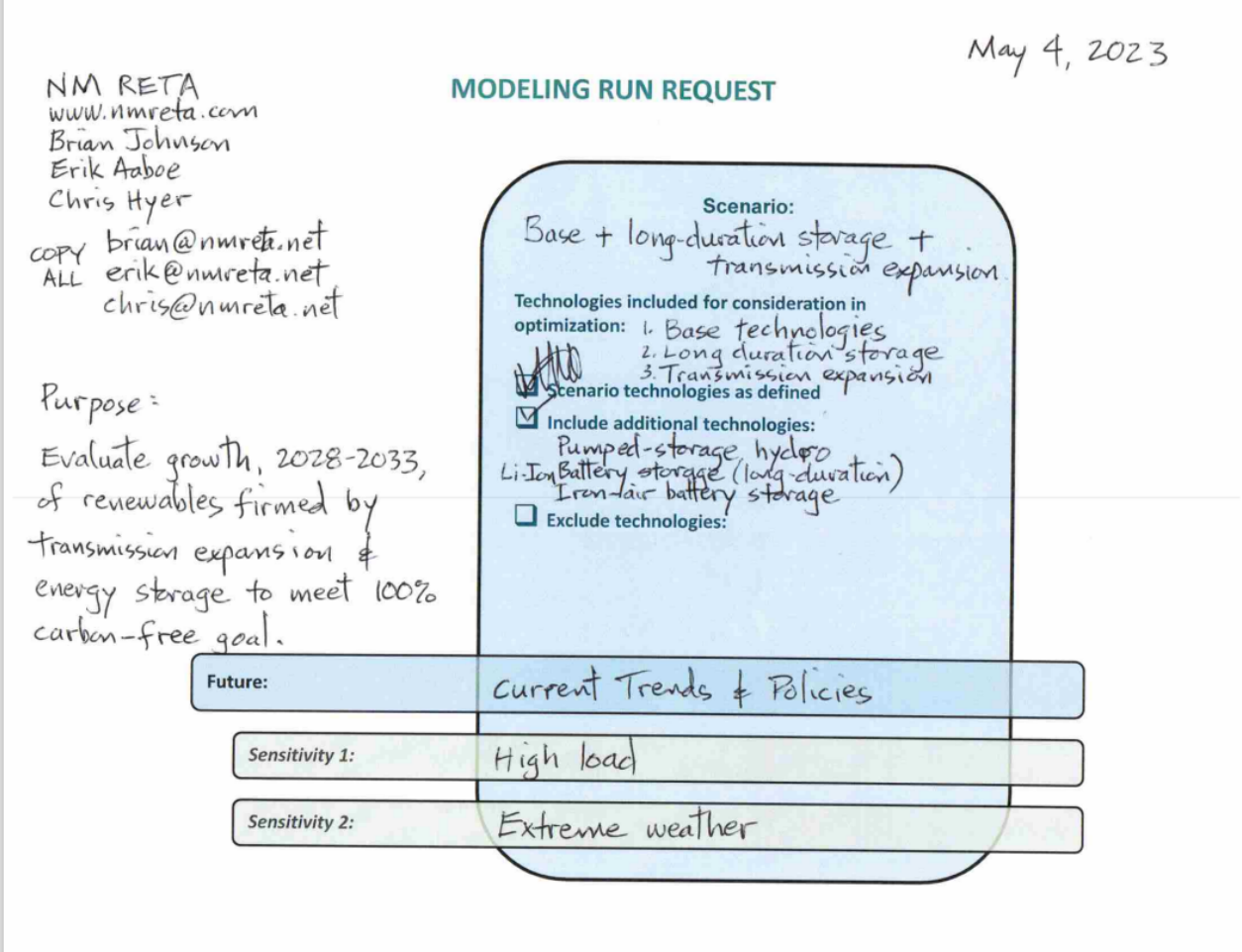


SLIDE 12 | MAY 4, 2023


CHANGES TO INPUTS
Inputs/assumptions that can be adjusted
Fuel prices (natural gas, hydrogen)
Technology cost curves, capital costs
New candidate resources costs and/or operating parameters
Transmission cost adders
Timing of CO2-free
RPS timing and requirements
Inputs/assumptions with some flexibility for adjustment
Market prices
CO2 prices
PV or EV assumptions embedded in reference load forecast
Static inputs/assumptions (long lead time for development)
Reliability requirements (LOLE target, PRM)
ELCCs
PNM WACC
Energy Efficiency Bundles
New/different load forecasts
Study period (2023-2042)
SLIDE 16 | MAY 4, 2023
PNM
Talk to us.

ANNEX 3 - INPUTS TO DATE

Modeling Run Requests



May 4, 2023

NM RETA
www.nmreta.com
Brian Johnson
Erik Aaboe
Chris Hyer

COPY ALL brian@nmreta.net
erik@nmreta.net
chris@nmreta.net

MODELING RUN REQUEST

Purpose:

Evaluate growth, 2028-2033, of renewables firmed by transmission expansion & energy storage to meet 100% carbon-free goal.

Scenario:
Base + long-duration storage + transmission expansion

Technologies included for consideration in optimization:
1. Base technologies
2. Long duration storage
3. Transmission expansion

☑ Scenario technologies as defined
☑ Include additional technologies:
Pumped-storage hydro
Li-Ion Battery storage (long-duration)
Iron-air battery storage
☐ Exclude technologies:

Future: Current Trends & Policies
Sensitivity 1: High load
Sensitivity 2: Extreme weather

We were asked to input to the "use cases to be analyzed". I am not sure precisely what that means or how to do so.

1. My "use case" request is to model (from a tabula rasa state) a PNM fully decarbonized grid with wind, solar, a 1500 MW/70-hour duration PSH, minimal transmission incremental build, and separate/distinct fast-response grid stability resources such as BESS.
2. From any sort of "end case" optimized model (such as the one suggested immediately above), then determine the interim steps that get you to the desired end state in an efficient manner from a cost, reliability, and emissions standpoint.

Thomas Conroy
Kinetic Power, LLC
M: (505) 399-0883

ADD HERE AS THEY COME IN