BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR APPROVAL OF PURCHASED POWER AGREEMENT, ENERGY STORAGE AGREEMENTS, AND CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR SYSTEM RESOURCES IN 2028,	)	**Case No. 24-00271-UT**
PUBLIC SERVICE COMPANY OF NEW MEXICO,	)	
Applicant	)	

DIRECT TESTIMONY

OF

THOMAS P. DUANE

November 22, 2024

NMPRC CASE NO. 24-_____-UT
INDEX TO THE DIRECT TESTIMONY OF THOMAS P. DUANE

WITNESS FOR
PUBLIC SERVICE COMPANY OF NEW MEXICO

DIRECT TESTIMONY
OF THOMAS P. DUANE
NMPRC CASE NO. 24-_____-UT

I. INTRODUCTION AND PURPOSE

Q. Please state your name, position, and business address.

A. My name is Thomas P. Duane. I am the Director of Integrated Resource Planning at Public Service Company of New Mexico ("PNM"). My business address is 2401 Aztec Rd. NE, Albuquerque, NM 87107.

Q. Please summarize your educational background and professional qualifications.

A. My education and professional qualifications are provided in PNM Exhibit TPD-1. Prior to my current role, I served as Manager, Transmission Planning for PNM and was responsible for the evaluation of the existing transmission planning functions, analyzing transmission system deficiencies, and creating plans for the capital expansion of the transmission system.

Q. Have you previously testified in regulatory proceedings?

A. Yes. The cases in which I have testified are identified in PNM Exhibit TPD-1.

Q. Please describe the responsibilities of the Integrated Resource Planning department.

A. The Integrated Resource Planning department is responsible for developing PNM's resource plans and the regulatory filings to support those resource plans, including the triennial Integrated Resource Plan ("IRP") and associated updates. The Integrated

Resource Planning department is also responsible for performing resource planning analysis to support resource additions and acquisitions, all of which require New Mexico Public Regulation Commission ("NMPRC" or "Commission") approval such as those being requested in this docket.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to discuss and support the Phase III evaluation performed by PNM and the resulting portfolio of resources that PNM is asking the Commission to approve in PNM's Application as introduced in the testimony of PNM witness Monroy.

Q. How is your testimony organized?

A. First, I discuss the concept of resource adequacy and how this is viewed within PNM's resource planning objectives and standards. Then, I discuss the Phase III analysis PNM performed to determine the resources for which it is requesting approval. I then describe how this procurement fits into PNM's overall strategy for transitioning its electric supply to carbon-free resources consistent with New Mexico's guiding energy policy, the Energy Transition Act ("ETA"), in a safe and reliable way. Finally, I offer my recommendations as they relate to PNM's Application.

Q. Are you sponsoring any exhibits as part of your testimony?

A. Yes. I am sponsoring the following Exhibits:

- PNM Exhibit TPD-1 Education and Professional Qualifications of Thomas Duane
- PNM Exhibit TPD-2 PNM Loads and Resources Tables
- PNM Exhibit TPD-3 Resource Portfolio Modeling Assumptions

II. PNM'S RESOURCE ADEQUACY

Q. When evaluating and selecting new resources for PNM's system, what factors does PNM consider?

A. PNM considers several factors, including resource adequacy (reliability), cost-effectiveness, public policy goals (e.g., the ETA), and impacts to the environment. New procurements must be considered in the context of existing resources and how the procurements can optimally meet the range of conditions and potential loss of load events that can occur to ensure the system continues to have adequate resources to meet planning standards.

Q. Briefly explain resource adequacy and why it is a necessary consideration in procuring new resources.

A. Resource adequacy is the ability of a bulk electric power system to serve load across a broad range of weather and system operating conditions, subject to a long-run reliability standard. No electric system is perfectly reliable; there is always some chance that generator failures and/or extreme weather conditions that impact supply

and demand could compound with one another to result in loss of load. The resource adequacy of a system depends on the characteristics of electricity demand—its magnitude, seasonal and hourly patterns, and weather sensitivity—as well as generation resources—their size, dispatchability, outage rates, and other limitations on availability, such as the variable production of renewable resources. If the availability of resources is adequate to meet load across a wide range of conditions and limit loss of load events to a reasonable level—where "reasonable" is defined by a reliability target—then a system is considered to have an adequate supply of resources.

Q. Are PNM's resource adequacy planning standards consistent with industry best practices?

A. Yes. PNM continues to employ industry best practices for resource adequacy by utilizing the 0.1 LOLE (Loss of Load Expectation) planning standard and procuring the resources necessary to implement its identified system needs. Please see the direct testimony of PNM witness Wintermantel for further details on how LOLE is applied to PNM's proposed portfolio of resources in this application.

III. RESOURCE PORTFOLIO MODELING AND ANALYSIS

Q. Please briefly describe the resources proposed in this Application.

A. The portfolio of resources PNM is presenting for approval in this filing will meet multiple system needs including adding needed capacity to meet increasing PNM

customer demand and energy forecasted on PNM's system beginning in 2028. The proposed resources consist of:

- The Valencia Power Plant Purchased Power Agreement ("PPA"). The PPA provides capacity up to 173 MW based on the final contract. PNM's resource evaluation used a capacity of 167 MW based on the received bid.
- The 150 MW four-hour Sun Lasso Battery Energy Storage System ("BESS") Energy Storage Agreement ("ESA").
- The 150 MW four-hour Corazon BESS ESA.
- A utility owned hybrid 100 MW solar / 30 MW BESS referred to as the Sunbelt Project.

Q. Why is PNM proposing the resource portfolio presented in this filing?

A. The portfolio of resources included in PNM's Application represents the lowest reasonable cost to both meet PNM's customer demand and energy needs in a safe and reliable way while including the procurement of a resource in the Central Consolidated School District ("CCSD") to meet public policy objectives as described by PNM witness Monroy. For PNM, this means procuring resources to meet the 0.1 LOLE industry standard while furthering PNM's transition towards a carbon-free electric system. The 0.1 LOLE standard translates to a planning reserve margin target of approximately 16%, consistent with PNM's 2023 IRP. As shown in PNM Exhibit TPD-2 PNM Loads and Resources Tables, the planning reserve margin is forecasted to be 0.1% in 2028 without the requested resource additions.

Q. What roles did the resource planning team play in evaluating potential resource portfolios in this filing?

A. PNM's resource planning team's primary objective was to perform detailed portfolio modeling of a shortlist of RFP bids, focusing on portfolio economic and reliability analysis. The outcome of this analysis is a recommendation for a preferred set of resources. This is generally referred to as "Phase III" in the RFP evaluation, as described by PNM witness Nagel. While this is the primary function of the resource planning team, the team was also involved in reviewing the RFP and request for bid updates prior to releasing to bidders, coordinating with expert consultants on Phases I and II of the bid evaluation process and meeting with the

Independent Evaluator to provide information throughout the process. PNM witness Nagel discusses the RFP phases and processes in detail in his direct testimony.

Q. Please describe the general framework PNM used to determine the resource portfolio presented in this filing.

A. The first step was to issue an RFP and obtain offers for resources deliverable to PNM's system by the summer of 2028. PNM issued the original RFP in November of 2022 and asked for offers to be submitted for resources that could be delivered in 2026, 2027, or 2028. This process included bid "refreshes" and updates in 2024 to adjust for changes in costs and market conditions. PNM's RFP administration and evaluation team went through a three-phase process to evaluate the bids for 2028, which was overseen by an Independent Evaluator. The final shortlist of bids resulting from the second phase of the RFP evaluation was provided to my team. This shortlist of bids was used to populate a database of candidate resources in PNM's resource planning tools.

Q. Was PNM's procurement process consistent with its most recent IRP that was accepted by the commission and supplemented on October 10, 2024?

A. Yes. The general framework for the portfolio analysis used to determine the resource portfolio presented in this case started with the modeling process and protocols utilized in PNM's 2023 IRP.

Q. What modeling tools did PNM use to perform its resource portfolio analysis?

A. PNM used the EnCompass software to perform its economic analysis. EnCompass is a power supply optimization software developed and licensed by Yes Energy[1] that uses Mixed Integer Programming to simultaneously optimize multiple objectives and constraints (financial, physical, operational, reliability, etc.). PNM also relied on the Strategic Energy Evaluation and Risk Model ("SERVM") under a consulting agreement with Astrapé Consulting, LLC ("Astrape") for the loss of load probability ("LOLP") modeling of portfolios.

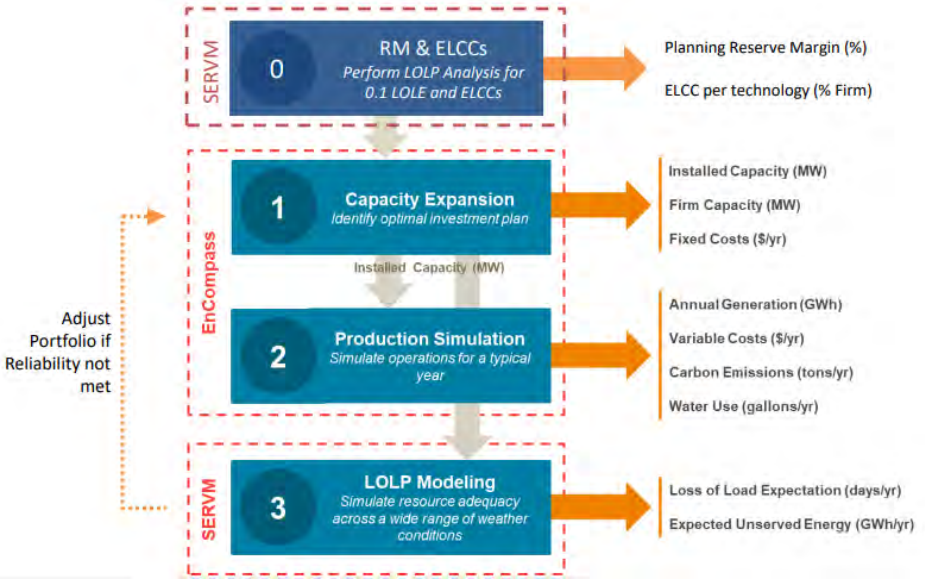
Q. How do the EnCompass and SERVM modeling work together to produce a reliable and cost-effective resource portfolio?

A. PNM Figure TPD-1 graphically shows how SERVM and EnCompass are used in PNM's planning process. EnCompass determines the least cost portfolios under various scenarios and sensitivities which can be simulated in SERVM to validate portfolio reliability standards are met. SERVM is used to perform studies to define PNM's resource adequacy needs across a wide range of weather conditions and to

[1] Horizons Energy provides technical consulting services including EnCompass modeling for PNM's Resource Analysis under PNM's direction. Horizons Energy specializes in consulting services using EnCompass and works closely with Yes Energy which licenses the EnCompass software and develops the Horizons EnCompass National Database.

develop Effective Load Carrying Capability ("ELCC")[2] values that are to be used in the EnCompass capacity expansion module.

PNM Figure TPD-1



Q. Please summarize the key assumptions modeled for the phase III evaluation that were updated since the IRP filing.

A. PNM used the 2023 IRP modeling assumptions as the starting point for its portfolio evaluation. Key inputs that were used in EnCompass and updated from the December 2023 IRP filing include the following:

- The Study Horizon, to examine the 20-year period of 2026-2045;
- The load forecast (PNM Exhibit TPD-2);

[2] ELCC refers to a methodology used to measure the contribution of a specific type of generating resource towards system resource adequacy needs by comparing it against a common benchmark (often a "perfect capacity" resource available at full capacity at all times) in a loss-of-load probability model.

- Commodities pricing (PNM Exhibit TPD-3);
- Fixed production revenue requirements for the existing PNM system;
- ELCC assumptions for renewable, energy storage, and demand response resources (PNM Exhibit TPD-3); and
- Generic candidate resources, technology cost curves (PNM Exhibit TPD-3), and use of the explicit bids received from the 2028 RFP bid refresh (2028 bids only).

Q. How does PNM compare the relative economics between resource portfolios?

A. PNM measures long-term costs by using EnCompass to compare the difference in the net present value ("NPV") of revenue requirements required to meet retail customer loads over a 20-year planning period. This is consistent with the requirement in the Commission's IRP Rule [17.7.3.7(P) and 17.7.3.8 NMAC] to consider resource portfolio costs over a 20-year planning period. PNM's calculation of long-term costs and comparative savings includes the following:

- Cost to operate and maintain existing resources over 20 years;
- Cost to build, operate, and maintain any resources added in the 20-year study period; and
- Costs associated with retirement or abandonment of any resources during the 20-year study period.

The resulting portfolios were constructed subject to the following constraints: all portfolios had to meet the demand and energy loads of PNM's customers and meet regulatory requirements such as New Mexico's Renewable Portfolio Standard and emission rate requirements. All the costs of construction or acquisition of resources, fuel/variable production costs, O&M, and other costs (including the costs for known transmission network upgrades) were translated into estimated revenue requirements. Portfolio costs were calculated for the 20-year study period and converted to NPV to compare costs on an equivalent basis.

Q. What scenarios were examined in the phase III evaluation?

A. PNM analyzed a multitude of scenarios that will allow PNM to reach a carbon-free portfolio by 2040. Generally, scenarios were categorized into two types of scenarios: 1) scenarios that were based on as-bid pricing and 2) scenarios that were based on as-bid pricing including either imputed debt impacts or volumetric pricing structures. Scenarios modeled with as-bid pricing were only used to determine the relative costs between portfolios. Scenarios modeled with as-bid pricing and either imputed debt or volumetric pricing structures were the focus of the modeling analysis and from which the final portfolio selections were made.

Q. Did PNM perform any sensitivity analysis in the phase III evaluation?

A. Yes. Sensitivity analysis focuses on modeling a change in only one assumption and comparing the results before and after the change. PNM's sensitivity analysis in

this evaluation consisted of optimizations of resources related to community preferences (CCSD or Navajo Nation), including or excluding specific RFP bids in portfolio optimizations, not allowing selection of bids for gas resources, sensitivities on incremental load, changes in future commodity costs, changes in future technology costs and sensitivities on the continued operation of Reeves Generating Station beyond 2030.

Q. How did PNM's scenario and sensitivity analysis inform the modeling results and recommended portfolio?

A. PNM utilized the scenario and sensitivity analysis to compare resource builds and portfolio costs across a wide range of assumptions. This also helped to determine how consistently each of the bid projects were included in each of the least cost portfolios across sensitivities. Sensitivity analysis also provided information such as cost differences between bid projects that were not selected in least-cost portfolios. Collectively, the sensitivity analysis helped to support the determination of the best mix of resources for PNM to propose in this application.

Q. Please summarize the results of the phase III evaluation.

A. The portfolio analysis identified the mix of resources comprised of four projects to meet system requirements as identified earlier in this testimony. The portfolio meets the 0.1 LOLE resource adequacy standard and achieves a planning reserve margin of 17.7% percent in 2028 and 16.1% in 2029. This slightly exceeds the

minimum targeted reserve margin in 2028 as a result of the specific bids comprising the selected portfolio but achieves the targeted reserve margin by 2029. PNM witness Barnard provides additional details about these projects, including the proposed contractual agreements for these resources.

Q. Please briefly describe the analysis performed by Astrape.

A. Astrape performs consulting services and analysis on PNM's behalf using the SERVM model. Similar to its role in Case No. 23-00353-UT, Astrape utilized the results of PNM's EnCompass economic modeling and performed LOLP analyses of PNM's recommended portfolio. The LOLP results performed for the portfolio presented in this case showed that the portfolio is adequate and deemed a reliable portfolio. SERVM and its applications in this proceeding are more fully described by PNM witness Wintermantel.

Q. Are there other factors considered in PNM's modeling?

A. Yes. PNM also considered the financial impacts of ESA's being treated like lease agreements. As previously described, PNM received a short-list of RFP projects to be evaluated in its portfolio system modeling to determine the best performing mix of existing and new resources. For energy storage agreements, additional costs were calculated for these projects to reflect the potential to be treated like a lease liability that would appear on PNM's balance sheet. The lease liability creates a cost referred to as imputed debt in this testimony. PNM assumed the same methodology

utilized in Case No. 23-00353-UT to determine the incremental cost of equity that would be needed to offset the imputed debt resulting from fixed price ESAs. PNM assumed that approximately 25% of each ESA's lease liability should be categorized as non-lease components and a 75% risk factor adjustment from the applicable rating agencies. For RFP projects that were bid a corresponding volumetric pricing structure, life-cycle costs of both pricing structures were calculated, and the lowest cost pricing structure was used in the Phase III evaluation.

Q. Are there differences in the terms of the final contracts for the two 150 MW BESS ESAs that mitigate the imputed debt impact assumed in the phase III evaluation?

A. Yes. The final contracts incorporated an "availability" pricing structure that was acceptable to the bidders and eliminates the imputed debt risk. The monthly payment in these contracts is now a function of availability in that month. Witness Barnard discusses terms of the agreements. With the availability pricing, the total 20-year NPV will be reduced, lowering the overall cost of the selected resource portfolio compared to what was modeled in the evaluation process.

Q. Please discuss PNM's analysis associated with a project located in the CCSD or Navajo Nation.

A. As a part of its 2026-2028 RFP, PNM committed to progressing some projects located within the CCSD or sited on Navajo Nation tribal lands into the Phase III evaluation to determine whether an overall portfolio with a CCSD or Navajo project was reasonably competitive relative to the least-cost portfolio that considers all shortlist options. Both CCSD and Navajo projects were evaluated, and the Sunbelt project was identified as producing a portfolio at a minimal cost increase above the least-cost portfolio by approximately $39M NPV. A similar sized portfolio that included a Navajo Nation project was determined to be a hybrid 100 MW solar and 50 MW BESS project that resulted in a portfolio cost increase above the least-cost portfolio by approximately $46M NPV.

Q. Will PNM's resource portfolio meet resource adequacy requirements with a combination of the Valencia PPA, energy storage and solar energy?

A. Yes. The resource portfolio presented in this Application achieves the industry planning standard of 0.1 LOLE criteria. PNM witness Wintermantel's testimony provides additional detail regarding the resource adequacy modeling showing how the selected resource portfolio meets the 0.1 LOLE resource adequacy standard.

IV. CONSISTENCY WITH SAFE AND RELIABLE TRANSITION TO CARBON-FREE RESOURCES AND PNM'S IRP

Q. Has PNM shown that its proposed portfolio of resources, including the PPA and ESAs, is consistent with the provision of safe and reliable electric utility service at the lowest reasonable cost, considering both short- and long-term costs and all other relevant factors like the ETA, as required by Rule 551.8(D)(6)?

A. Yes, as supported through my testimony, PNM's recommended portfolio of resources in this application will allow PNM to continue to deliver reliable electric service to its customer, as demonstrated through the industry standard LOLE criteria. Also as described in my testimony, PNM's analysis of bids received in its all-resource RFP has resulted in the lowest reasonable cost resources to meet this need while also including a resource in the CCSD. Refer to the testimony of PNM witness Nagel for further detail on the bid analysis process.

Q. How does the portfolio support PNM's efforts to transition to a carbon-free generation portfolio?

A. The portfolio of resources included in this Application aligns with a move to a fully carbon-free generation fleet by 2045 as required by the ETA, and PNM's complementary sustainability goal to be carbon-free by 2040. Renewable energy generation in PNM's resource portfolio are sourced mainly from low-cost wind and solar resources. The timeframes in which this energy is produced is limited and

varies throughout the year. While it is possible to produce substantial carbon free energy from these technologies, it is increasingly important that the energy be stored and used during times when wind and solar output are not sufficient to serve load. As with the resource additions approved in Case No. 23-00353-UT, PNM's analysis continues to show that additional storage is required to minimize the cost of balancing capacity deficiencies in low wind and solar timeframes with the low cost of energy from these resources. PNM's recommended portfolio, therefore, mainly consists of additional BESS to store renewable energy and return the energy at times when capacity is needed to serve load, typically during low wind and solar generation periods.

Q. Were long-duration storage resources analyzed in PNM's Phase III evaluation?

A. Storage options submitted to PNM in the RFP process were limited to 2 and 4-hour BESS. As a result, there were no bids to evaluate or available to consider in the Phase III evaluation. The All-source RFP issued in conjunction with this resource evaluation allowed bidders to quote energy storage durations at their discretion. In its next resource RFP, PNM plans to specify a need for firm generating resources that include emerging technologies such as long-duration storage to help meet its future needs.

Q. How does the Valencia PPA for a natural gas-fired resource fit within the ETA transition to clean energy?

A. The Valencia PPA is also consistent with our transition to a carbon-free portfolio by helping to maintain reliability as we continue to increase the amount of intermittent renewable energy used to serve our customers. The continued operation of the existing gas-fired facility through the Valencia PPA is a cost-effective means of sustaining overall reliability. Continued operation provides time for longer-duration capacity resources to be developed over what is currently available in the market today. The operation of the Valencia CT will mostly be to insure reliability. The total generation is expected to be low and, as a result, have minimal contributions to CO2 emissions. PNM also believes there may be longer-term prospects for CT technologies to run on carbon free fuels.

Q. Please explain how the requested Sunbelt Project fulfills the intent of the ETA.

A. The inclusion of the Sunbelt project adds additional carbon-free solar energy to PNM's portfolio along with additional battery storage needed to shift energy and capacity needs to times in the day when resources are most needed. The project also represents the least cost option for adding new resources in the Central Consolidated School District ("CCSD") as soon as is practicable to help offset the impact of shutting down traditional coal-fired generation that historically provided significant economic benefits to these communities.

Q. Is PNM's application in this filing consistent with the 2023-2042 IRP, as required by Rule 551.8(D)(8)?

A. Yes, the analysis and conclusions are consistent with PNM's 2023 IRP in the following ways:

- PNM's proposed portfolio of resources consists of a mix of renewable generation, thermal generation, and battery storage resources which are consistent with the revised statement of need in the IRP Supplemental Filing made October 10, 2024.
- The proposed resources align with PNM's multiple-path 2023 IRP by investing in renewables and non-carbon emitting resources that support PNM's compliance with the ETA.

Q. Please summarize your recommendation for this resource application.

A. I recommend that the Commission approve PNM's Application requesting approval for a portfolio consisting of: The Valencia PPA, the 150 MW four-hour Sun Lasso BESS ESA, the 150 MW four-hour Corazon BESS ESA, and the utility owned hybrid 100 MW solar / 30 MW BESS Sunbelt Project. PNM also has provided an option for an additional 20 MW BESS for the Sunbelt Project as discussed by PNM witness Monroy.

Q. Does this conclude your testimony?

A. Yes, it does.

GCG#533198

Education and Professional Qualifications of Thomas Duane

PNM Exhibit TPD-1

Is contained in the following 2 pages.

PNM EXHIBIT TPD-1

Name: Thomas P. Duane

Address: Public Service Company of New Mexico
414 Silver Ave SW
Albuquerque, New Mexico 87102

Position: Manager, Transmission Planning

Education: Bachelor of Science in Electrical Engineering,
University of Colorado, Boulder, Colorado 1980

Master of Science in Electrical Engineering,
Electric Utility Management Program,
New Mexico State University, Las Cruces, New Mexico 1998

Employment: Public Service Company of New Mexico, Albuquerque, New Mexico

- Director, Integrated Resource Planning 2024
- Transmission Planning Engineer, Manager Transmission Planning (12 Years) 1984-1996, 2006-2024
- Manager, Production Modeling 1996-2005
- Operations Engineer, Wholesale Power Marketing Analyst 1981-1984, 2005

Licensure: Licensed Professional Engineer in the State of New Mexico

Professional Affiliations: Member of Institute of Electrical and Electronic Engineers ("IEEE") Power Engineering Society and Computer Society

Experience:

- Power System Analysis, Planning and Operations – Steady State, Dynamic Stability, Transient, Short Circuit, Power Operations, Production Costs, Generation Dispatch, Resource Planning
- Committee Representation – over 25 years in inter-utility coordination groups, WECC and ERCOT reliability committees, RTO Tariff negotiations, stakeholder groups and industry organizations.

Previous Testimony:

New Mexico Public Regulation Commission (2023): Provided testimony on behalf of Public Service Company of New Mexico regarding transmission system impacts associated with the 2026 resource application. Case No. 23-00353-UT.

New Mexico Public Regulation Commission (2023): Provided testimony on behalf of Public Service Company of New Mexico regarding transmission system impacts associated with TAG solar facility interconnection. Case No Case No. 23-00251-UT.

New Mexico Public Regulation Commission (2021): Provided testimony on behalf of Public Service Company of New Mexico regarding transmission system impacts associated with replacement resources for 114 MW of Palo Verde Nuclear generation. Case No Case No. 21-00215-UT.

New Mexico Public Regulation Commission (2020): Provided rebuttal testimony on behalf of Public Service Company of New Mexico regarding transmission system impacts

associated with replacement resources for San Juan Generation Station Units 1 and 4. Case No 19-00195-UT.

County of Torrance, Seventh Judicial District Court (2020) – Application for Order of Immediate Possession, State of New Mexico, Case D-722-CV-2020-00083, Provided affidavit regarding the need for immediate possession of right-of-way to maintain an existing transmission line.

Federal Energy Regulatory Commission (2010): Provide affidavit on the PNM Balancing Authority Area System Import Limit (SIL) calculations used in the Triennial Market Power Update. Docket Nos. ER96-1551, ER01-615 and ER09-746.

GCG#533199

PNM Loads and Resources Tables

PNM Exhibit TPD-2

Is contained in the following 4 pages.

PNM System Loads and Resources - 2028 Resource Application - Existing & Approved Resources

Description	UCAP 2026	UCAP 2027	UCAP 2028	UCAP 2029	UCAP 2030	UCAP 2031	UCAP 2032	UCAP 2033
Forecasted System Peak Demand	2,387	2,441	2,466	2,514	2,550	2,586	2,625	2,669
Forecasted Incremental Energy Efficiency	(63)	(75)	(80)	(88)	(98)	(109)	(118)	(124)
Forecasted Incremental Customer Sited PV	(37)	(52)	(35)	(43)	(52)	(60)	(68)	(76)
Net System Peak Demand (MW)	2,286	2,314	2,351	2,383	2,401	2,418	2,439	2,468
San Juan								
Four Corners	160	160	160	160	160	160	0	0
Total Coal Resources (MW)	160	160	160	160	160	160	0	0
Palo Verde Units 1,2 & 3	282	282	282	282	282	282	282	282
Total Nuclear Resources (MW)	282	282	282	282	282	282	282	282
Reeves	141	141	141	141	141	0	0	0
Afton	230	230	230	230	230	230	230	230
Lordsburg	84	84	84	84	84	84	84	84
Luna	184	184	184	184	184	184	184	184
Rio Bravo	141	141	141	141	141	141	141	141
Valencia	150	150	0	0	0	0	0	0
La Luz	37	37	37	37	37	37	37	37
Total Natural Gas Resources (MW)	968	968	818	818	818	677	677	677
Total Demand Response Programs (MW)	23	23	23	23	0	0	0	0
Wind Purchase (La Joya II)	28	28	28	28	28	28	28	28
Wind Purchase (NMWEC + Repower)	40	40	40	40	40	40	40	40
Wind Purchase (Red Mesa)	21	21	21	21	21	21	21	21
Utility-Scale Solar PV (22MW - 2012 REPP)	1	1	1	1	1	1	1	1
Utility-Scale Solar PV (21.5MW - 2013 REPP)	1	1	1	1	1	1	1	1
Utility-Scale Solar PV (23MW - 2014 REPP)	1	1	1	1	1	1	1	1
Utility-Scale Solar PV (40MW - 2015 REPP)	2	2	2	2	2	2	2	2
Utility-Scale Solar PV (50MW - 2018 REPP)	3	3	3	3	3	3	3	3
Arroyo Solar	17	17	17	17	17	17	17	17
Jicarilla 2 - Solar Direct Program	3	3	3	3	3	3	3	3
Jicarilla 1 Solar	3	3	3	3	3	3	3	3
San Juan Solar[3]	11	11	11	11	11	11	11	11
Atrisco Solar[4]	18	18	18	18	18	18	18	18
Dale Burgett Geothermal Plant	5	5	5	5	5	5	5	5
Community Solar I	7	7	7	7	7	7	7	7
Facebook Solar Energy Center 1, 2, & 3	2	2	2	2	2	2	2	2
Britton Solar PV	3	3	3	3	3	3	3	3
Encino Solar PV	3	3	3	3	3	3	3	3
Encino North PV	3	3	3	3	3	3	3	3
Route 66 Solar PV	3	3	3	3	3	3	3	3
Sky Ranch Solar PV	11	11	11	11	11	11	11	11
Casa Mesa Wind	10	10	10	10	10	10	10	10
La Joya I Wind	33	33	33	33	33	33	33	33
TAG Solar PV	8	8	8	8	8	8	8	8
Quail Ranch Solar PV	6	6	6	6	6	6	6	6
Total Renewable Resources (MW)	245	245	245	245	245	245	245	245
Arroyo Storage	126	126	126	126	126	126	126	126
Jicarilla 1 Storage	17	17	17	17	17	17	17	17
San Juan Storage	84	84	84	84	84	84	84	84
Atrisco Storage	253	253	253	253	253	253	253	253
Sky Ranch Storage	42	42	42	42	42	42	42	42
TAG Storage	42	42	42	42	42	42	42	42

PNM System Loads and Resources - 2028 Resource Application - Existing & Approved Resources

Description	UCAP 2026	UCAP 2027	UCAP 2028	UCAP 2029	UCAP 2030	UCAP 2031	UCAP 2032	UCAP 2033
Quail Ranch Energy Storage	84	84	84	84	84	84	84	84
Sky Ranch Energy Storage	84	84	84	84	84	84	84	84
Route 66 Energy Stroage	42	42	42	42	42	42	42	42
Sandia Energy Storage	51	51	51	51	51	51	51	51
Total Storage Resources (MW)	826	826	826	826	826	826	826	826
Total Resources (MW)[2]	2,504	2,504	2,354	2,354	2,331	2,190	2,030	2,030
Reserve Margin (MW)	217	190	3	(29)	(69)	(228)	(410)	(439)
Reserve Margin (%)	9.5%	8.2%	0.1%	-1.2%	-2.9%	-9.4%	-16.8%	-17.8%

Notes

1. Resource projections for thermal resources are based on unforced capacity (UCAP) and effective load carrying capability (ELCC) for renewable resources and energy limited resources. This table does not reflect the namplate capacity for resources.

PNM System Loads and Resources - 2028 Resource Application - Preferred Portfolio

Description	UCAP 2026	UCAP 2027	UCAP 2028	UCAP 2029	UCAP 2030	UCAP 2031	UCAP 2032	UCAP 2033
Forecasted System Peak Demand	2,387	2,441	2,466	2,514	2,550	2,586	2,625	2,669
Forecasted Incremental Energy Efficiency	(63)	(75)	(80)	(88)	(98)	(109)	(118)	(124)
Forecasted Incremental Customer Sited PV	(37)	(52)	(35)	(43)	(52)	(60)	(68)	(76)
Net System Peak Demand (MW)	2,286	2,314	2,351	2,383	2,401	2,418	2,439	2,468
San Juan								
Four Corners	160	160	160	160	160	160	0	0
Total Coal Resources (MW)	160	160	160	160	160	160	0	0
Palo Verde Units 1,2 & 3	282	282	282	282	282	282	282	282
Total Nuclear Resources (MW)	282	282	282	282	282	282	282	282
Reeves	141	141	141	141	141	0	0	0
Afton	230	230	230	230	230	230	230	230
Lordsburg	84	84	84	84	84	84	84	84
Luna	184	184	184	184	184	184	184	184
Rio Bravo	141	141	141	141	141	141	141	141
Valencia	150	150	161	161	161	161	161	161
La Luz	37	37	37	37	37	37	37	37
Total Natural Gas Resources (MW)	968	968	979	979	979	838	838	838
Total Demand Response Programs (MW)	23	23	23	23	0	0	0	0
Wind Purchase (La Joya II)	28	28	28	28	28	28	28	28
Wind Purchase (NMWEC + Repower)	40	40	40	40	40	40	40	40
Wind Purchase (Red Mesa)	21	21	21	21	21	21	21	21
Utility-Scale Solar PV (22MW - 2012 REPP)	1	1	1	1	1	1	1	1
Utility-Scale Solar PV (21.5MW - 2013 REPP)	1	1	1	1	1	1	1	1
Utility-Scale Solar PV (23MW - 2014 REPP)	1	1	1	1	1	1	1	1
Utility-Scale Solar PV (40MW - 2015 REPP)	2	2	2	2	2	2	2	2
Utility-Scale Solar PV (50MW - 2018 REPP)	3	3	3	3	3	3	3	3
Arroyo Solar	17	17	17	17	17	17	17	17
Jicarilla 2 - Solar Direct Program	3	3	3	3	3	3	3	3
Jicarilla 1 Solar	3	3	3	3	3	3	3	3
San Juan Solar[3]	11	11	11	11	11	11	11	11
Atrisco Solar[4]	18	18	18	18	18	18	18	18
Dale Burgett Geothermal Plant	5	5	5	5	5	5	5	5
Community Solar I	7	7	7	7	7	7	7	7
Facebook Solar Energy Center 1, 2, & 3	2	2	2	2	2	2	2	2
Britton Solar PV	3	3	3	3	3	3	3	3
Encino Solar PV	3	3	3	3	3	3	3	3
Encino North PV	3	3	3	3	3	3	3	3
Route 66 Solar PV	3	3	3	3	3	3	3	3
Sky Ranch Solar PV	11	11	11	11	11	11	11	11
Casa Mesa Wind	10	10	10	10	10	10	10	10
La Joya I Wind	33	33	33	33	33	33	33	33
TAG Solar PV	8	8	8	8	8	8	8	8
Quail Ranch Solar PV	6	6	6	6	6	6	6	6
Sunbelt Solar PV	0	0	6	6	6	6	6	6
Total Renewable Resources (MW)	245	245	249	249	249	249	249	249
Arroyo Storage	126	126	123	123	123	123	123	123
Jicarilla 1 Storage	17	17	16	16	16	16	16	16
San Juan Storage	84	84	82	82	82	82	82	82
Atrisco Storage	253	253	246	246	246	246	246	246
Sky Ranch Storage	42	42	41	41	41	41	41	41

PNM System Loads and Resources - 2028 Resource Application - Preferred Portfolio

Description	UCAP 2026	UCAP 2027	UCAP 2028	UCAP 2029	UCAP 2030	UCAP 2031	UCAP 2032	UCAP 2033
TAG Storage	42	42	41	41	41	41	41	41
Quail Ranch Energy Storage	84	84	82	82	82	82	82	82
Sky Ranch Energy Storage	84	84	82	82	82	82	82	82
Route 66 Energy Stroage	42	42	41	41	41	41	41	41
Sandia Energy Storage	51	51	49	49	49	49	49	49
Central Energy Storage	0	0	123	123	123	123	123	123
Corazon Energy Storage	0	0	123	123	123	123	123	123
Sunbelt Energy Storage	0	0	25	25	25	25	25	25
Total Storage Resources (MW)	826	826	1,073	1,073	1,073	1,073	1,073	1,073
Total Resources (MW)[2]	2,504	2,504	2,766	2,766	2,743	2,602	2,442	2,442
Reserve Margin (MW)	217	190	415	383	343	184	2	(27)
Reserve Margin (%)	9.5%	8.2%	17.7%	16.1%	14.3%	7.6%	0.1%	-1.1%

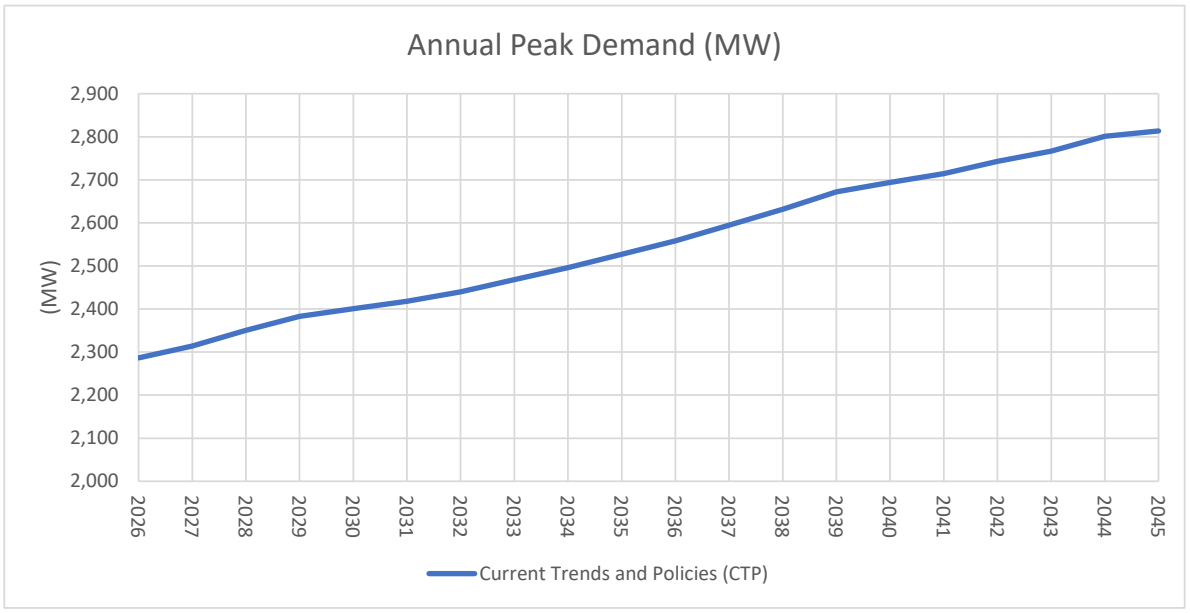
Notes

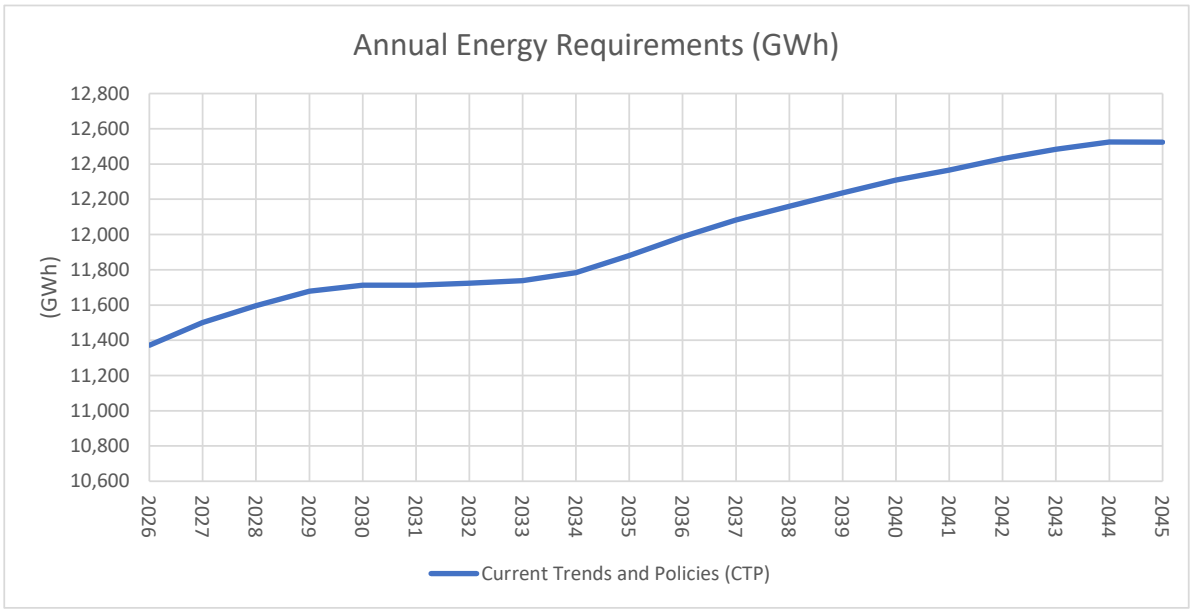
1. Resource projections for thermal resources are based on unforced capacity (UCAP) and effective load carrying capability (ELCC) for renewable resources and energy limited resources. This table does not reflect the namplate capacity for resources.

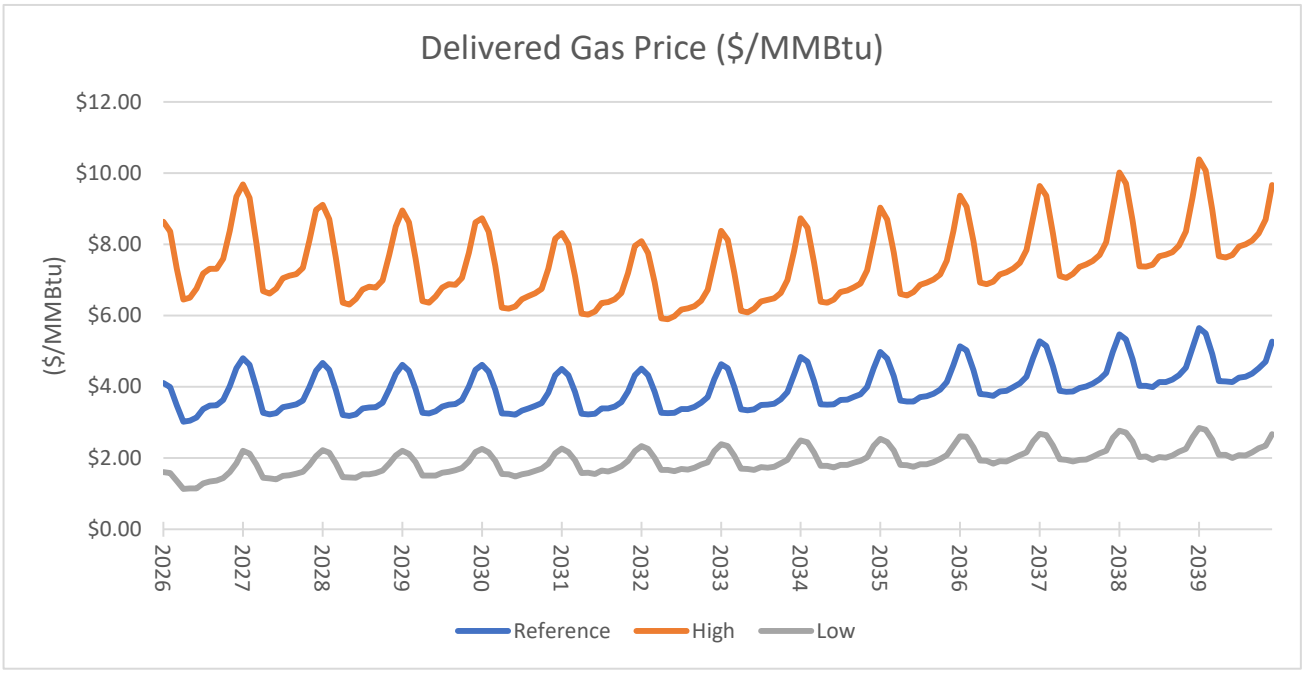
Resource Portfolio Modeling Assumptions

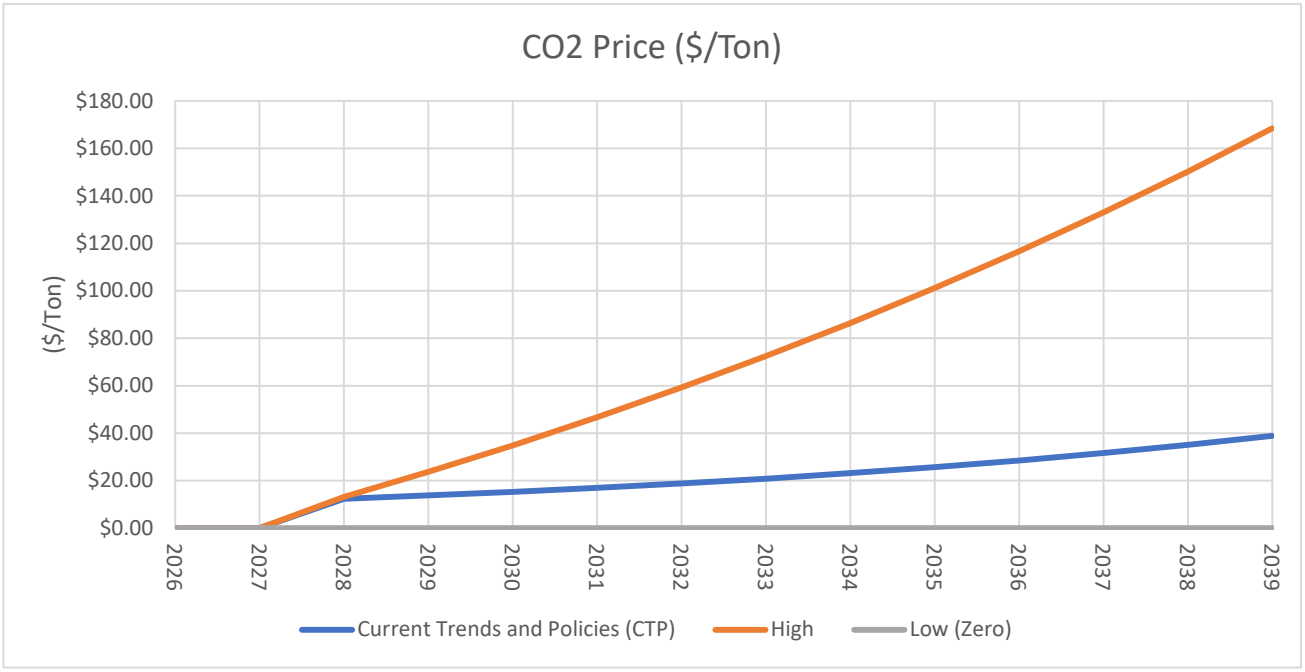
PNM Exhibit TPD-3

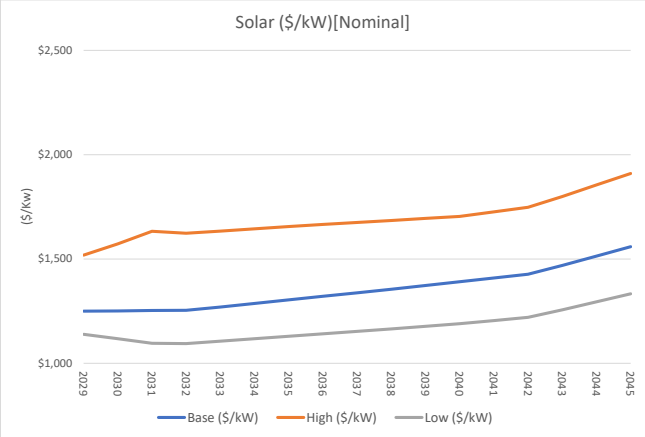
Is contained in the following 4 pages.

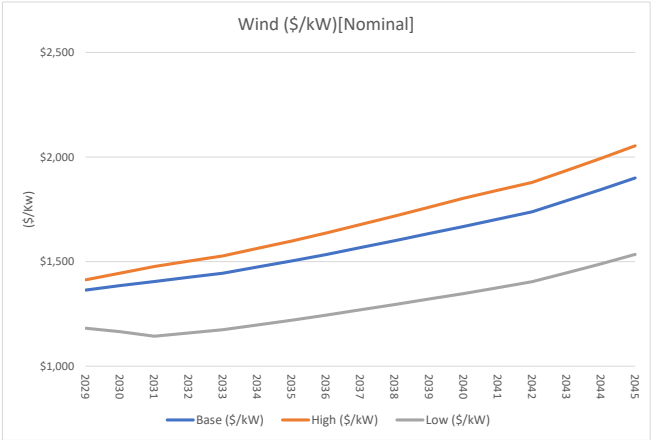

Annual Peak Demand (MW)
(MW)
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
Current Trends and Policies (CTP)

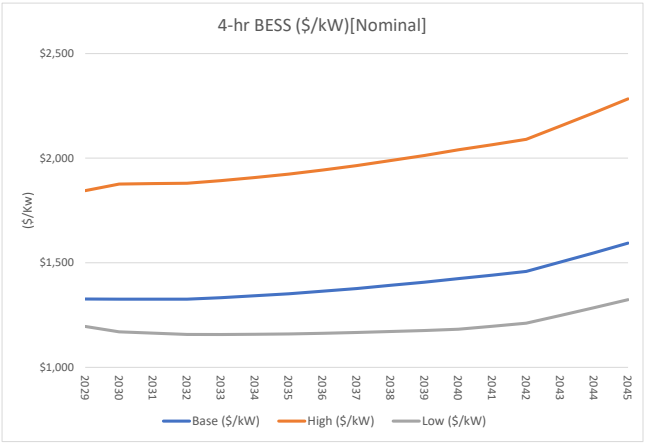

Annual Energy Requirements (GWh)
(GWh)
12,800
12,600
12,400
12,200
12,000
11,800
11,600
11,400
11,200
11,000
10,800
10,600
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
Current Trends and Policies (CTP)

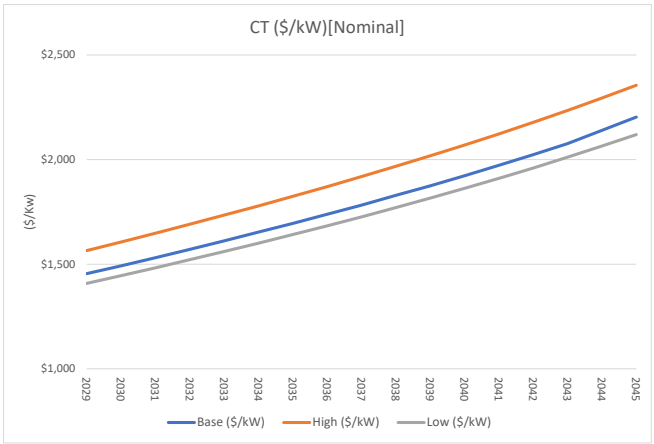

Delivered Gas Price ($/MMBtu)
$12.00
$10.00
$8.00
$6.00
$4.00
$2.00
$0.00
($/MMBtu)
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
Reference
High
Low


CO2 Price ($/Ton)
$180.00
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
($/Ton)
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
Current Trends and Policies (CTP)
High
Low (Zero)


Solar ($/kW)[Nominal]
$2,500
$2,000
$1,500
$1,000
($/kW)
2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045
Base ($/kW)
High ($/kW)
Low ($/kW)


Wind ($/kW)[Nominal]
$2,500
$2,000
$1,500
$1,000
($/kW)
2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045
Base ($/kW)
High ($/kW)
Low ($/kW)


4-hr BESS ($/kW)[Nominal]
$2,500
$2,000
$1,500
$1,000
($/kW)
2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045
Base ($/kW)
High ($/kW)
Low ($/kW)


CT ($/kW)[Nominal]
$2,500
$2,000
$1,500
$1,000
($/kW)
2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045
Base ($/kW)
High ($/kW)
Low ($/kW)

BESS 4-hr (% ELCC)																					
Load Level (MW)	Existing	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
0	84.8	84.8	84.8	84.8	84.8	84.8	84.8	63.7	63.7	63.7	63.7	63.7	63.7	63.7	63.7	52.7	52.7	52.7	52.7	52.7	52.7
850		80.7	80.7	80.7	80.7	80.7	80.7	63.7	63.7	63.7	63.7	63.7	63.7	63.7	63.7	52.7	52.7	52.7	52.7	52.7	52.7
1050		75.8	75.8	75.8	75.8	75.8	75.8	63.7	63.7	63.7	63.7	63.7	63.7	63.7	63.7	52.7	52.7	52.7	52.7	52.7	52.7
1250		65.0	65.0	65.0	65.0	65.0	65.0	63.7	63.7	63.7	63.7	63.7	63.7	63.7	63.7	52.7	52.7	52.7	52.7	52.7	52.7
1450		44.7	44.7	44.7	44.7	44.7	44.7	61.8	61.8	61.8	61.8	61.8	61.8	61.8	61.8	52.7	52.7	52.7	52.7	52.7	52.7
1650		27.7	27.7	27.7	27.7	27.7	27.7	49.7	49.7	49.7	49.7	49.7	49.7	49.7	49.7	52.7	52.7	52.7	52.7	52.7	52.7
1850		25.4	25.4	25.4	25.4	25.4	25.4	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	52.7	52.7	52.7	52.7	52.7	52.7
2000		23.7	23.7	23.7	23.7	23.7	23.7	33.2	33.2	33.2	33.2	33.2	33.2	33.2	33.2	36.1	36.1	36.1	36.1	36.1	36.1
2500		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
9999		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Solar (% ELCC)																					
Load Level (MW)	Existing	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	24.0	24.0	24.0	24.0	24.0	24.0
300		6.0	6.0	6.0	6.0	6.0	6.0	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	24.0	24.0	24.0	24.0	24.0	24.0
1000		6.0	6.0	6.0	6.0	6.0	6.0	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	24.0	24.0	24.0	24.0	24.0	24.0
1500		6.0	6.0	6.0	6.0	6.0	6.0	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	24.0	24.0	24.0	24.0	24.0	24.0
2000		1.9	1.9	1.9	1.9	1.9	1.9	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	24.0	24.0	24.0	24.0	24.0	24.0
2500		1.0	1.0	1.0	1.0	1.0	1.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.6	14.6	14.6	14.6	14.6	14.6
3000		0.3	0.3	0.3	0.3	0.3	0.3	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.0	7.0	7.0	7.0	7.0	7.0
3500		0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.7	1.7	1.7	1.7	1.7	1.7
4000		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Wind (% ELCC)		
Load Level (MW)	Existing	All-years
0	20.1	20.1
800		19
1000		12
1200		7
1400		1

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR APPROVAL OF PURCHASED POWER AGREEMENT, ENERGY STORAGE AGREEMENTS, AND CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR SYSTEM RESOURCES IN 2028	)	**Case No. 24-00271-UT**
PUBLIC SERVICE COMPANY OF NEW MEXICO,	)	
Applicant	)	

AFFIDAVIT

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

THOMAS P. DUANE, Director, Integrated Resource Planning at Public Service Company of New Mexico, upon being duly sworn according to law, under oath, deposes and states: I have read the foregoing **Direct Testimony of Thomas P. Duane** and it is true and accurate based on my own personal knowledge and belief.

Dated this 22nd day of November, 2024

/s/_Thomas P. Duane
THOMAS P. DUANE