BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF NEW MEXICO FOR APPROVAL TO ABANDON SAN JUAN GENERATING STATION UNITS 2 AND 3, ISSUANCE OF CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY FOR REPLACEMENT POWER RESOURCES, ISSUANCE OF ACCOUNTING ORDERS AND DETERMINATION OF RELATED RATEMAKING PRINCIPLES AND TREATMENT, PUBLIC SERVICE COMPANY OF NEW MEXICO, Applicant	)	**CASE 13-00390-UT**

Direct Testimony and Exhibit in Opposition to the Stipulation of Jeremy I. Fisher, PhD

On Behalf of
New Energy Economy

November 25, 2014

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1. INTRODUCTION AND PURPOSE OF TESTIMONY

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

A My name is Jeremy Fisher. I am a Principal Associate with Synapse Energy Economics, Inc. ("Synapse").

Q Are you the same Jeremy Fisher who submitted direct testimony in this docket on August 29, 2014?

A Yes, I am.

Q Please describe the purpose of your testimony.

A My testimony reviews the modeling supporting the Stipulation entered into between Public Service Company of New Mexico ("PNM" or "the Company") and other parties, and focuses particular attention on the planned acquisition of additional capacity at San Juan 4 as laid out in that stipulation.

In the modeling supporting the Company's initial filing, the supplemental filings on July 1st and 15th, and in the testimony backing the stipulation before the Commission today, the Company has relied upon internally inconstant and inappropriate assumptions that bias the Company's resource selection of San Juan Unit 4.

In my direct testimony, I reviewed a number of inconsistencies in the Company's modeling framework; I theorized that correcting these assumptions would substantively change the outcome of the Company's analysis.

After the release of the Company's stipulation on October 31st, New Energy Economy acquired a licensure for the Ventyx model Strategist, used by the Company to support their plan. We also acquired the model runs supporting the Company's July testimony, subsequent discovery responses, and this stipulation, as well as model runs conducted by New Mexico Industrial Energy Consumers (NMIEC) supporting August testimony and this stipulation.

Q Please describe the structure of your testimony.

A As I described earlier, my testimony is focused on the long-term economics of the choice to acquire an additional share of San Juan Unit 4 (SJGS-4). For this assessment, I employ an analysis structure to specifically review this decision under a variety of assumptions. The results of these analyses suggested that the entirety of San Juan is likely non-economic and only artificial constraints made the retention of the entire plant appear economic. To test this hypothesis, I also reviewed scenarios provided by the Company with regards to shuttering the entire plant, and tested similar scenarios as described above, as well as the release of other modeling constraints.

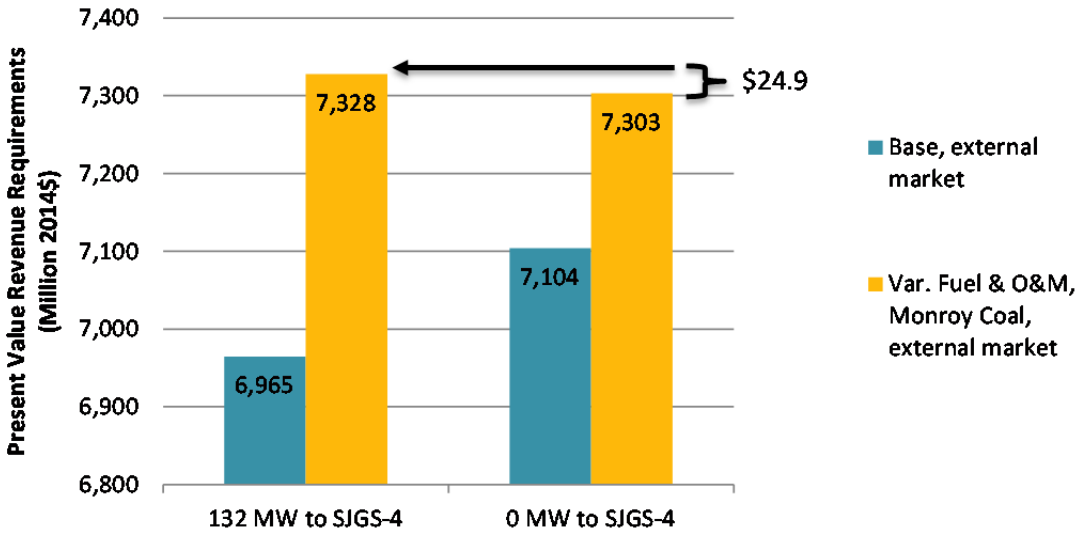
Q Would you please summarize your findings with regards to the acquisition of San Juan Unit 4?

A The Company's portrayal of the benefit of SJGS-4 significantly mischaracterizes the operational costs of San Juan, and the opportunity to replace the unit with non-fossil resources, such as wind.

The Company has assumed that the vast majority of its fuel costs and all of its operational and maintenance costs at San Juan are fixed costs, an inappropriate assumption that biased in favor of the operations of the coal unit. In addition, the Company's portrayal of fixed costs at San Juan obscure an artificially low coal price assumption in the Strategist modeling, inconsistent with the Company's assessment in the IRP, discovery responses, and even other witnesses.

Correcting the Company's modeling and running the system through a market simulation similar to the mechanism employed by NMIEC indicates that SJGS-4 is a liability of $24.9 million to ratepayers – not a benefit of $143 million as suggested by Company witness Mr. Patrick O'Connell[1] (see Figure 1, below).

Figure 1. Valuation of stipulation against no incremental addition at SJGS-4 after accounting for variable O&M and consistent coal costs.

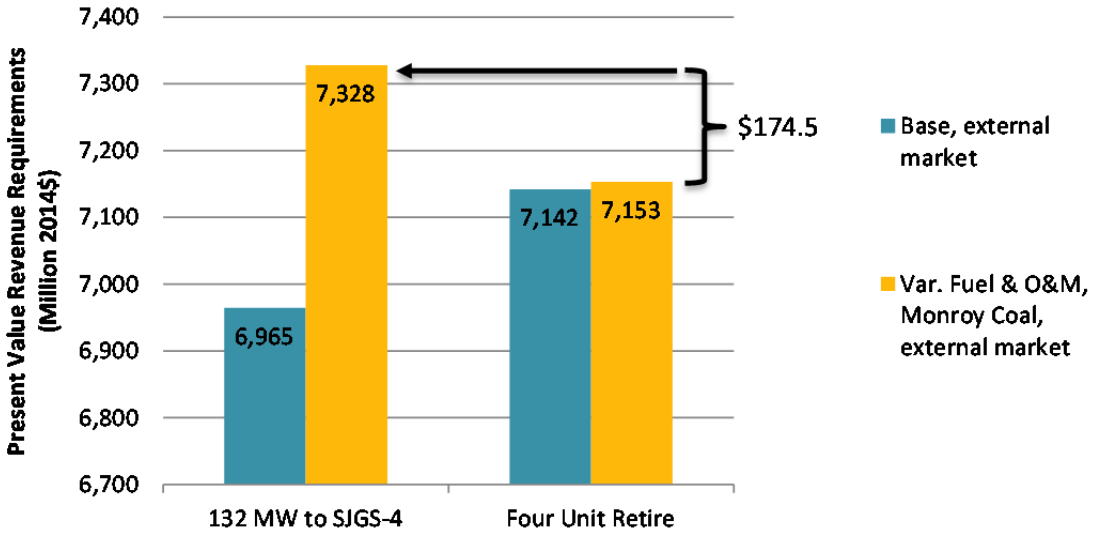


[1] See Direct Testimony of Patrick O'Connell, page 18 line 17.

Q Would you please summarize your findings with regards to the retention of San Juan Generation Station, as a whole?

A Mr. O'Connell's testimony would suggest that the retention of San Juan 1 & 4 as well as the incremental 132MW at SJGS-4 has a value of $334 million for consumers relative to the retirement of all four units.[2] This portrayal incorrectly compares a scenario where Palo Verde 3 is valued at $1,650/kW (in the stipulation case) versus one where it is valued at $2,500/kW (in the four unit retirement case),[3] convoluting a wholly unrelated factor. Further, this valuation relies on the assumption of low variable costs and higher fixed costs at San Juan, and the artificially low coal price implemented in Strategist. Correcting these factors and reviewing two internally consistent model runs indicates that the entirety of San Juan plant is at least a $174.5 million liability to PNM's ratepayers (see Figure 2, below).

Figure 2. Valuation of stipulation against four unit retirement after accounting for variable O&M and consistent coal costs, with an external market.

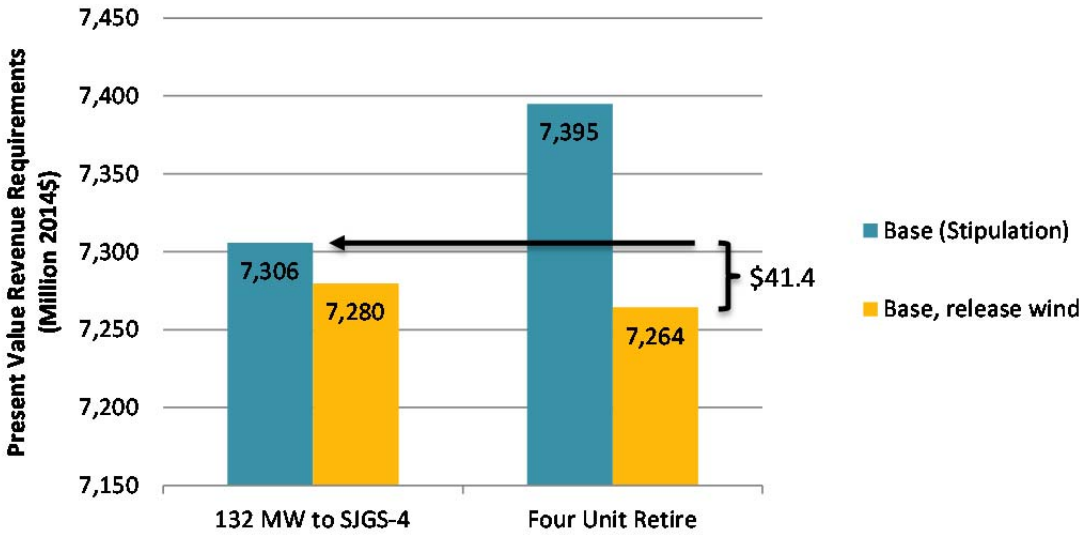


[2] See Direct Testimony of Patrick O'Connell, Table PJO-2
[3] See PNM Exhibit PJO-5 (Stip), page 1 of 2, line 8, columns A & D, respectively.

Q Did you find additional concerns with the Company's analysis of a four-unit retirement?

A Yes. The model is constrained in such a way that it is only allowed to build one 100 MW wind farm during the entire analysis period. Simply releasing this constraint to four 100 MW wind farms changes the equation set dramatically. Without changing any other factors in the model, PNM's own model indicates that San Juan plant is a liability in the absence of market sales of $41.4 million (see Figure 3, below).

Figure 3. Valuation of stipulation against four unit retirement with wind constraint released.



In the presence of market sales and still not changing any of PNM's erroneous assumptions, San Juan barely breaks even at $17.2 million. Clearly, the Company's estimate of San Juan plant as a benefit worth over $300 million is a significant mischaracterization.

Q Please summarize your conclusions and recommendations in this case.

A The incremental addition of SJGS-4 is much more likely to pose a liability to PNM's consumers than a benefit, using the Company's own modeling. Further, entirety of the San Juan Generating Station appears to be a significant liability to PNM consumers, a result not thoroughly explored by the Company.

I conclude that PNM failed to show this Commission a reasonable portrayal of their system, have used internally inconsistent forecasts that bias the selection of San Juan, and constrained their model in such a way that a least cost plan could not be generated.

I respectfully recommend that this Commission deny this stipulation with regards to the acquisition of San Juan Unit 4, and require that PNM submit a revised application with a variety of alternative plans to the San Juan plant that are in consumers best interests.

Further, I recommend that this Commission act quickly to intervene in the Company's assessment of future coal contracts or provisions at San Juan; a commitment by the Company to a third party may have the effect of committing ratepayers to a distinctly non-economic future, and will surely outweigh the impact of even the decision to acquire San Juan 4 in this case.

Finally, I recommend that if the Commission does approve the Stipulation, that it is approved with condition that the Company be limited to the receipt of fuel costs not in excess of those modeled to support this case, not exceeding $2.15/MMBtu in any year between 2020 and 2033.

2. COMPANY MISCHARACTERIZES MODEL OUTCOMES

Q What value does Mr. O'Connell ascribe to SJGS-4?

A Mr. O'Connell states the following:

> The NPV of cost for the portfolio without the 132 MW of additional capacity in SJGS Unit 4 is $6,834 million compared to $6,691 million if the additional capacity in SJGS 4 is included. Including the additional capacity in SJGS Unit 4 provides a customer savings of $143 million over the twenty year period.[4]

The figures he draws on rely on PNM Exhibit PJO-6, which apparently do not include the long-term maintenance capital that would clearly be avoided by not acquiring the additional 132 MW of SJGS-4.

The planning outcome from Strategist for the preferred scenario in this case is $6,774 million,[5] and thus the benefit without the presence of the market is only $62 million as shown in Table 1, below.

[4] Direct Testimony of Patrick O'Connell, p18, lines 14-17.
[5] Scenario provided in run NEE 4-5b ("Revised SIP with PV3 ($1,650/kW), 132 MW to SJ4, October Filing."

Table 1. Total PVRR for the RSIP with and without the incremental 132 San Juan 4 acquisition ('000 2014$) as in O'Connell Testimony versus Strategist outcome, with no ongoing capital.

	O'Connell Testimony[6]	Strategist Output No market sales
RSIP w/ 132 MW to SJGS4 (4-5b)	6,690, 762[7]	6,774,052
RSIP w/o 132 MW to SJGS4 (4-5i)	6,834,155[8]	6,836,422
Benefit of SJGS 4	**143,393**	**62,370**

Q How does Mr. O'Connell characterize the exclusion of ongoing capital expenses at San Juan and Palo Verde?

A Mr. O'Connell admits that excluding ongoing capital investments is "a potential source of discontinuity when comparing scenarios that feature retirement of existing units or addition of base-load resources."[9] This representation downplays a mistake on the part of the Company. It is understandable that the Company may have previously excluded ongoing capital expenses in IRP if they did not consider the retirement of existing units, but when acquiring existing units or reviewing the retirement of existing units, excluding known and likely ongoing expenses is simply an error and cannot be considered a "sensitivity" as characterized by Mr. O'Connell.[10] San Juan, Palo Verde, and Four Corners will all continue to require maintenance outages to replace worn plant components. As PNM would not expect to pay for these components if it does not own or operate a unit (or share of a unit), these costs are avoidable and should be included in a forward-looking analysis.

[6] Direct Testimony of Patrick O'Connell, p18, lines 14-17.
[7] Also in PNM Exhibit PJO-4 (Stip), Column A.
[8] Also in PNM Exhibit PJO-6 (Stip), Column B
[9] Direct Testimony of Mr. Patrick O'Connell, page 14 line 12 through page 15 line 3.
[10] Direct Testimony of Mr. Patrick O'Connell, page 15, line 1.

Accounting for the ongoing capital expenses, the benefit of San Juan 4 in the Company's base case is $52.7 million, without the benefit of market sales, and $139.3 million with the benefit of market sales, as shown in Table 2, below.

Table 2. Total PVRR for the RSIP with and without the incremental 132 San Juan 4 acquisition ('000 2014$) as in Strategist outcome, without and with ongoing capital.

	O'Connell Testimony[11]	Strategist Output no Market	Strategist Output Market sales
RSIP w/ 132 MW to SJGS4, no ongoing CapEx (4-5c)	6,690, 762[12]		
RSIP w/o 132 MW to SJGS4 no ongoing CapEx (4-5zg)	6,834,155[13]		
RSIP w/ 132 MW to SJGS4 w/ ongoing capex (4-5c)		7,305,798	6,964,620
RSIP w/o 132 MW to SJGS4 w/ ngoing capex (4-5zg)		7,358,542	7,103,936
Benefit of San Juan Plant	**143,393**	**52,744**	**139,316**

Q How are you modeling the external energy market sales in Strategist?

A I employed the mechanism described by Mr. James Dauphinais, witness for New Mexico Industrial Energy Consumers (NMIEC),[14] using the same market price curves as NMIEC, which were derived from PNM's 2014 IRP market price inputs. In this method, scenarios are optimized without an energy market, and then re-run with an external energy market intact while holding constant the resource portfolio from the non-market optimization run.

Q What value does Mr. O'Connell ascribe to San Juan Generating Plant?

A In this testimony, the Company does not explicitly value San Juan plant, but we can derive the Company's estimate from scenarios shown by Mr. O'Connell. In Table PJO-2, Mr. O'Connell shows the cost of the revised SIP with the 132 MW

[11] Direct Testimony of Patrick O'Connell, p18, lines 14-17.
[12] Also in PNM Exhibit PJO-4 (Stip), Column A.
[13] Also in PNM Exhibit PJO-6 (Stip), Column B
[14] See Direct Testimony of Mr. James Dauphinais, page 18, lines 3-9.

of SJGS-4 capacity at $7,557 million, as well as scenarios without PV3, with a four unit shut-down at $7,223 million. Therefore, we can hypothesize that the Company values their prospective share of San Juan at $334 million (see Table 3, below).

However, this scenario is not a reasonable scenario for the evaluation of San Juan's benefit for PNM's ratepayers. Importantly, the four unit retirement scenario he shows here prices Palo Verde 3 at $2,500/kW, while the base case models Palo Verde 3 at $1,650/kW.[15] Using a run provided by the Company in response to discovery,[16] but not shown in Mr. O'Connell's testimony, we can derive that the value of the San Juan plant without market sales is just $89.1 million. Adding in market sales and purchases brings the value up to $177, in the Company's base case (see Table 3), below.

Using an internally consistent set of scenarios (i.e. those in which Palo Verde is valued at $1,650/kW), the derived value of San Juan Plant is about half of the Company's supposition, assuming a benefit from excess market sales. However, it is my opinion that the assumptions and constraints used by the Company in deriving even this value are incorrect.

[15] See also Exhibit PJO-5 (Stip) line 8, Columns A and D, respectively.
[16] NEE 4-5zj

Table 3. Total PVRR for the RSIP versus four unit shutdown ('000 2014$) as in O'Connell Testimony, Strategist outcome, with and without market exchange.

	O'Connell Testimony[17]	Strategist Output no Market	Strategist Output Market sales
RSIP w/ 132 MW to SJGS4 Maintenance/Outage Capital (4-5c)	7,222,507[18]	7,305,798	6,964,620
Four Unit Shutdown at SJGS + Maintenance/Outage Capital PV3 @ $2,500/kW (4-5f)	7,556,691[19]		
Four Unit Shutdown at SJGS + Maintenance/Outage Capital PV3 @ $1,650/kW (4-5zj)		7,394,932	7,141,822
Benefit of San Juan Plant	**334,184**	**89,134**	**177,202**

3. VARIABLE COSTS FOR SAN JUAN ARE NOT APPROPRIATELY CHARACTERIZED

Q In your direct testimony, filed August 29 2014, you expressed concern that PNM had confounded fixed and variable costs of operation at San Juan. Is that still the case today?

A Yes. The Company's modeling supporting the original case and this stipulation both continue to model variable costs as fixed.

Q Which variable costs are considered fixed by the Company in modeling supporting this case?

A Both variable operations and maintenance (O&M) costs and take-or-pay fuel contract prices after 2018 are wrapped into the fixed cost category, which is problematic. At the moment, the Company models no variable O&M and half of their coal price after 2018 as fixed, rather than variable.

[17] Direct Testimony of Patrick O'Connell, p18, lines 14-17.
[18] Also in PNM Exhibit PJO-5 (Stip), Column A
[19] Also in PNM Exhibit PJO-5 (Stip), 1st page, Column D

Q Why should take-or-pay fuel contract prices after 2018 be modeled as a variable cost in the Company's model?

A Variable costs represent expenses that are incurred through the incremental operation of a unit, or avoided when the unit is not operated. They are distinguished from fixed costs, which are costs incurred regardless of the operation or non-operation of a unit. In almost all circumstances, fuel costs should be considered variable if the costs can either be avoided through the non-operation of a unit, or if procured coal can be sold to a third party. Effectively, the variable cost of fuel should capture the opportunity cost of not burning the fuel – either by not obtaining it, or selling excess.

The Company's current long-term contract with BHP expires at the close of 2017, and PNM is currently seeking either a replacement contract or an alternative fuel source. To date the supplier, contract price, and contract terms after 2018 are effectively completely unknown. Until 2018, the Company has little opportunity to avoid taking their remaining coal obligation, and little opportunity to sell it to a third party; the mine is not accessible through a main rail line and shipping is likely fairly expensive. After 2018, however, PNM has significant opportunity to avoid burning coal at San Juan. Regardless of if a new contract with a coal provider requires a fixed term or not, PNM can dictate the terms of that contract with regards to volume, if not price. From a forward-looking perspective (i.e. this planning case), PNM may freely obtain or avoid every ton of coal at San Juan. It bears no obligation to take any coal past 2018 today. Therefore, these costs cannot reasonably be considered fixed and must be considered variable.

Q What if the Company needs to sign a new take-or-pay contract to obtain coal after 2018?

A The Company should use a forward-looking model (such as Strategist) to determine the amount of coal it should contract, rather than presupposing a particular capacity factor and operation at San Juan. If, economically, San Juan should only generate at a 45% capacity factor, rather than an 85% capacity factor when the all-in cost of coal is considered, then San Juan should only sign a fixed contract for that amount of coal. When San Juan is dispatched, any incremental generation past 45% would then be dispatched at the incremental variable cost of coal – i.e., what San Juan could obtain on a spot basis.

This is an important consideration. I understand that PNM is currently seeking replacement coal for San Juan once the contract with BHP expires. This case and the coal contract are mutually dependent. The Company should review the economics of running San Juan and the acquisition of a new coal contract under the same construct – namely, modeling the opportunity cost of coal.

The correct course of action with regards to this case is to model the all-in cost of coal as variable after 2018.

Q Did you seek clarification from the Company as to which O&M costs are appropriately fixed and variable?

A Yes. But as I pointed out in my direct testimony, the Company provided contradictory answers about what costs were embedded in their fixed cost

category.[20] Following direct testimony, answers received from the Company continued to be contradictory. In CCAE 14-8a, the Company indicated that variable O&M costs were not input into Strategist,[21] but then indicated later that variable O&M costs were modeled as fixed costs.[22]

Q Is it appropriate to model variable costs as fixed in a dispatch model?

A No. Pushing variable costs into a fixed cost category overestimates the ability of a unit to run economically. Pushing both variable O&M and fuel costs into the fixed category leaves San Juan looking much more economic on a variable basis than it actually is, and has the additional feature of obscuring the real cost of operation.

Q Were you able to disentangle fixed and variable O&M costs in the Company's model?

A Yes, roughly.

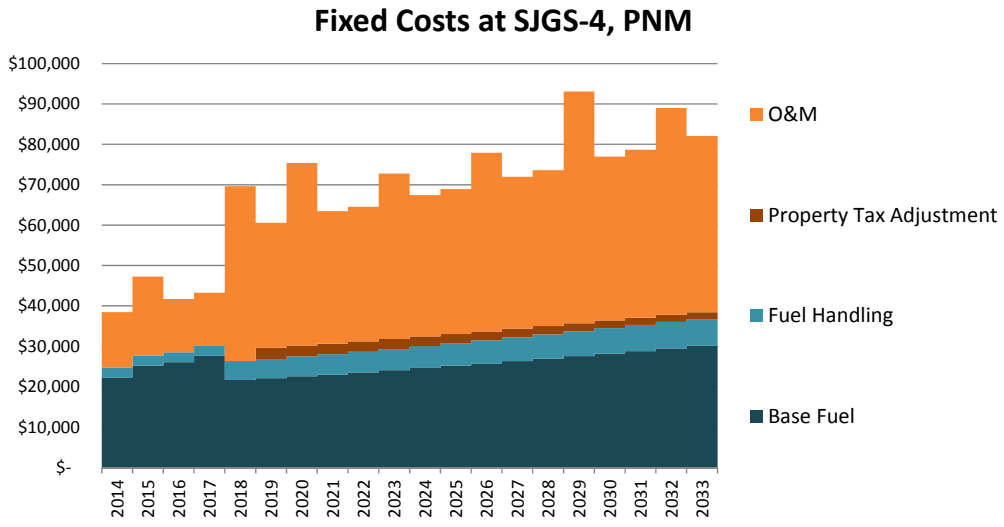
In response CCAE 14-8, PNM finally provided a breakdown of fixed costs at San Juan as supposedly used in the Strategist model (see footnote 21). This breakdown was the first time interveners could actually examine the substantive costs obscured behind the "fixed cost" category in PNM's modeling. The fixed

[20] Direct Testimony of Dr. Jeremy Fisher, page 25 line 3 through page 26 line 6.
[21] In CCAE 14-8, interveners requested that PNM "please provide an annual breakdown of the costs that appear in "fixed O&M" in the Strategist GAF [Generation and Fuel] Unit Report from each of the model runs presented in Patrick J. O'Connell's July 1 Supplemental Testimony, with supporting analyses and workbooks (in electronic, machine-readable format with formulas in-tact), including the following categories. Please ensure that the total sums to the complete fixed O&M as produced in the strategist GAF, or explain why it does not if not. (a) Annual Variable O&M Costs (excluding fuel)." The Company responded that "variable O&M costs (excluding fuel) are not considered as fixed O&M expenses; therefore, **will not appear** in the Strategist® GAF Unit Report under "Fixed O&M". [emphasis added]
[22] Response to NEE 6-4(b): "PNM has included variable O&M expenses with the fixed O&M costs for PNM's base-load units (San Juan Units 1-4, Four Comers Units 4-5 and Palo Verde Units 1-3). The reporting for these variable costs as well as the fixed costs **will appear** in the Strategist GAF Unit Report under "FIXED COST $000" for those facilities." [emphasis added]

costs in the Strategist model supporting the stipulation (provided to in NEE 4-5c) do not match the fixed costs CCAE 14-8, and are consistently lower, suggesting that PNM lowered their fixed costs from the July 15th filing by just under $1 million (NPV), no reason given.

The Company breaks fixed costs at SJGS-4 into four categories – O&M, property taxes, fuel handling and the base fuel price (see Figure 4, below).

Figure 4. Fixed costs at SJGS-4, with 132 MW addition, from CCAE 14-8. (Nominal $/yr)



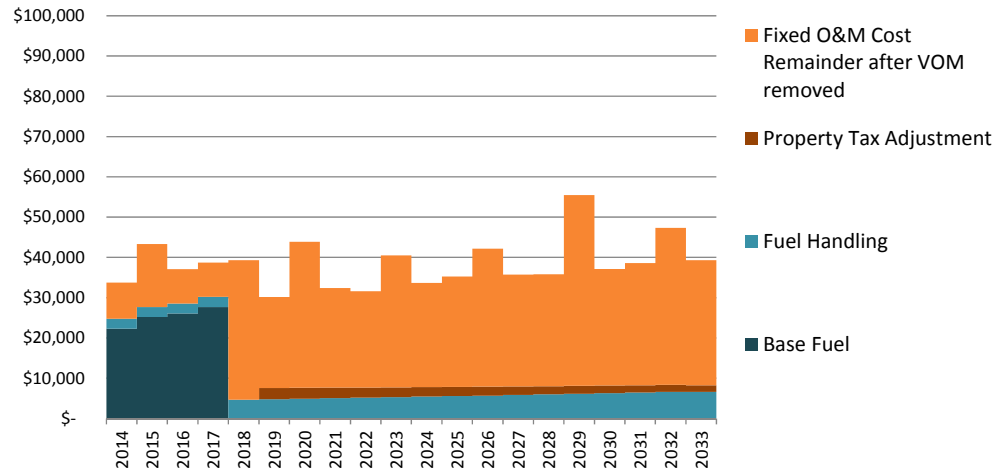
I used PNM's FERC Form 1 filings from 2005 through 2013 and divided reported expenses at San Juan into approximate variable and fixed categories.[23] Ultimately, I estimated that approximately 30% of the O&M costs year on year should be considered variable (i.e. avoidable with reduced generation), at an approximate

[23] Variable categories included expenses for operations, coolants, steam, electric, and miscellaneous power, while fixed categories included expenses for rents, engineering, structures, boilers, plants and miscellaneous steam. FERC reporting is notoriously different across reporting entities and Companies. This is an inexact estimate.

cost of $3.41/MWh.[24] I multiplied this term by PNM's estimated SGJS generation,[25] and removed the variable O&M term from the fixed costs.

Next, I removed all of the base fuel costs after 2018, and converted these to a variable figure. The resulting fixed costs for SJGS-4 are as shown in Figure 5, below.

Figure 5. Fixed costs at SJGS-4, with 132 MW addition, variable costs removed. (Nominal $/yr)



Finally, I divided the fixed fuel costs at SJGS by the fuel burn at each unit from the July 15th PNM Strategist runs.[26] This resulted in an estimated base fuel price in $/MMBtu. I added this value to the Company's incremental fuel price at SJGS to arrive at a total PNM variable fuel price from 2018 to 2033. In this way, I simply moved costs from fixed to variable categories without changing the total aggregate cost at all.

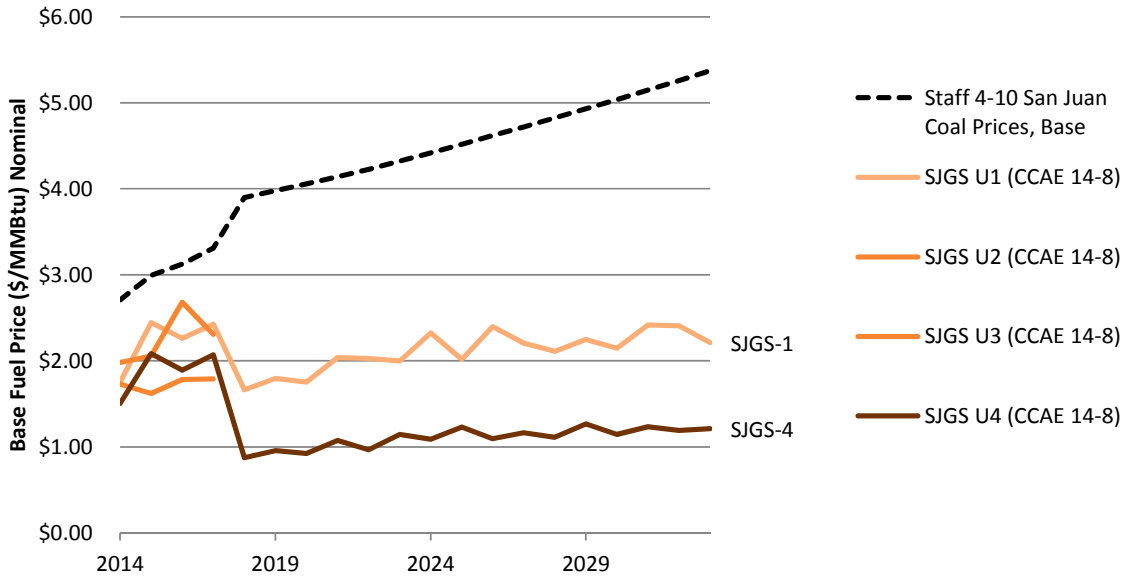
[24] This value is lower than the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2014 assumption of $4.47/MWh for new scrubbed coal. See Table 8.2 in Electricity Market Module assumptions, June 2014. http://www.eia.gov/forecasts/aeo/assumptions/pdf/electricity.pdf
[25] I turned variable O&M in $/MWh into total dollars by multiplying by SJGS unit generation in the July 15th 2014 base case run, provided in PNM Exhibit CCAE 14-2z.
[26] PNM Exhibit CCAE 14-2z

Q Did the base fuel price derived from the Company's workbooks match the base fuel price provided by the Company elsewhere?

A No. In fact, the base fuel price at each of the San Juan units did not match each other – much less the base fuel price shown by the Company in other workpapers. At SJGS-4, the base price of fuel used by PNM in Strategist fell by nearly 60% in 2018 – from $2.07 to $0.87/MMBtu, while at SJGS1 the price fell by 30% - from $2.43 to $1.66/MMBtu. Neither its starting price, nor ending price, match the "base fuel price" shown repeatedly by the Company in other sources including response to Staff 4-10 and the 2014 IRP.

Figure 6, below, shows the base fuel price in response to Staff, and as used in Strategist.

Figure 6. Base fuel price at SJGS from Staff 4-10 and CCAE 14-8 (as used in Strategist).



Q Do you have an explanation for the discrepancy between the base price in Strategist and as shown in Staff 4-10?

A Not really. I hypothesize that the base fuel price is meant to proxy the Company's take-or-pay contract, and therefore represents the cost of obtaining the first segment of coal at the plant. However, the appropriate modeling of this arrangement is not to allocate fixed and variable costs for fuel, but rather to have two San Juan modeling units for each unit in reality – the first dispatches fully with only a fixed cost, and the second dispatches incrementally with the incremental fuel cost. But that is not how PNM has modeled their system, and the fuel prices are highly disparate.

I have no explanation as to why (a) the base fuel price between SJGS-1 and SJGS-4 would be so radically different, and (b) why both of these prices fall in 2018.

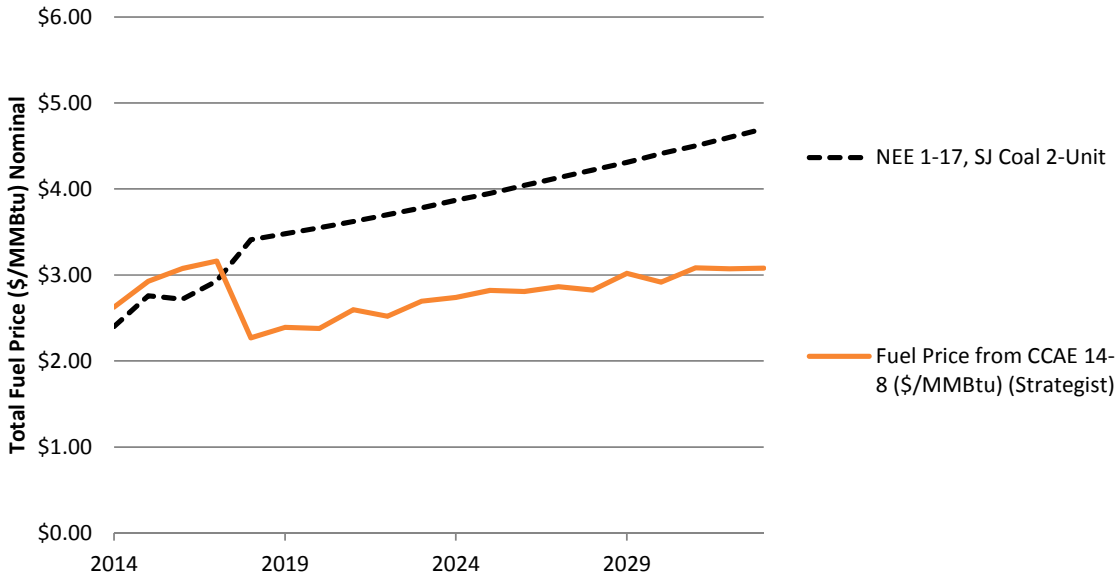
Q What is the total all-in cost of coal after you add the variable and fixed components together?

A The Strategist model used an all-in fuel price of about $2.27/MMBtu ($2.06/MMbtu in 2014$) starting in 2018. In response to discovery, PNM provided its total fuel costs for San Juan and estimated a cost of $3.41/MMbtu in 2018,[27] or 50% higher than as used in Strategist. The trend of these two prices are shown in Figure 7, below.[28]

[27] See PNM Exhibit NEE 1-17

[28] For ease of use, these prices are approximately flat in real 2014$ at $3.00/MMBtu in NEE 1-17, and $2.00/MMBtu in Strategist.

Figure 7. All-in fuel cost at SJGS from Strategist and as provided in NEE 1-17.



The Company has provided no reasonable evidence that it can expect dramatically lower fuel prices in the future. Indeed, Company witness Mr. Chris Olson notes that it is unclear if the mine might be acquired by a San Juan owner, an affiliate Company, or a third party,[29] and that PNM only entered into an agreement to assess the current mine's assets and liabilities as of two months ago.[30] I do not think that there is any reasonable evidence that PNM can acquire coal at a 30% discount to its historic or projected rates.

Q Did you run the Company's Strategist model with the coal and variable O&M costs as variable costs, rather than fixed costs?

A Yes. Without changing the fundamental underlying assumptions, I ran scenarios that maintained capacity at SJGS-4, increased SJGS-4 by 132 MW, and retired the entire plant. These scenarios reduced the value of SJGS-4 by 33%, and the value

[29] Direct Testimony of Mr. Chris Olson, page 50 lines 6-7
[30] Direct Testimony of Mr. Chris Olson, page 50 lines 7-10

of San Juan plant by 20%. The results of these analyses are shown in the next chapter in Table 4 and Table 5 for SJGS-4 and San Juan plant, respectively.

4. COAL COSTS ARE INCONSISTENT WITH HISTORIC COSTS AND INTERNAL FORECASTS

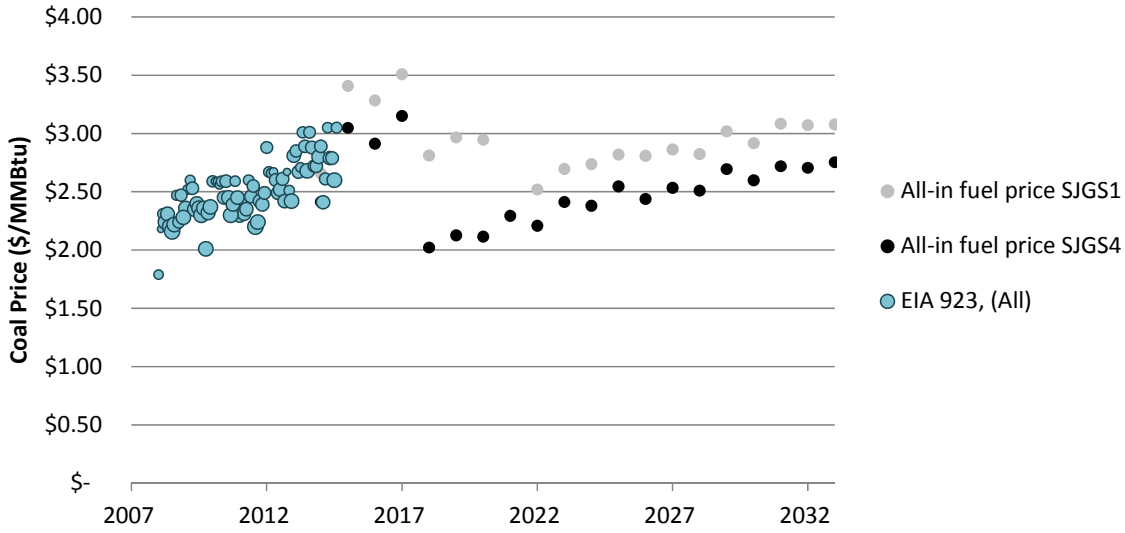
Q Do you have any other evidence that the Company's coal costs are too low in the Strategist model?

A Yes. I reviewed both historic prices paid at San Juan, and internal forecasts for coal costs from PNM Witness Mr. Monroy.

The Energy Information Administration (EIA) collects data on fuel receipts and prices paid, by month, from plant operators to fuel providers.[31] I collected reported prices from 2008 through August 2014, and compared these against Strategist's assumptions for the all-in cost of coal through 2033 at SJGS-1 and 4. These are shown in Figure 8, below.

[31] EIA Form 923 requires plants to report the all-in cost of coal provided, and does not distinguish between fixed and variable costs for coal.

Figure 8. San Juan Coal delivered price in EIA 923

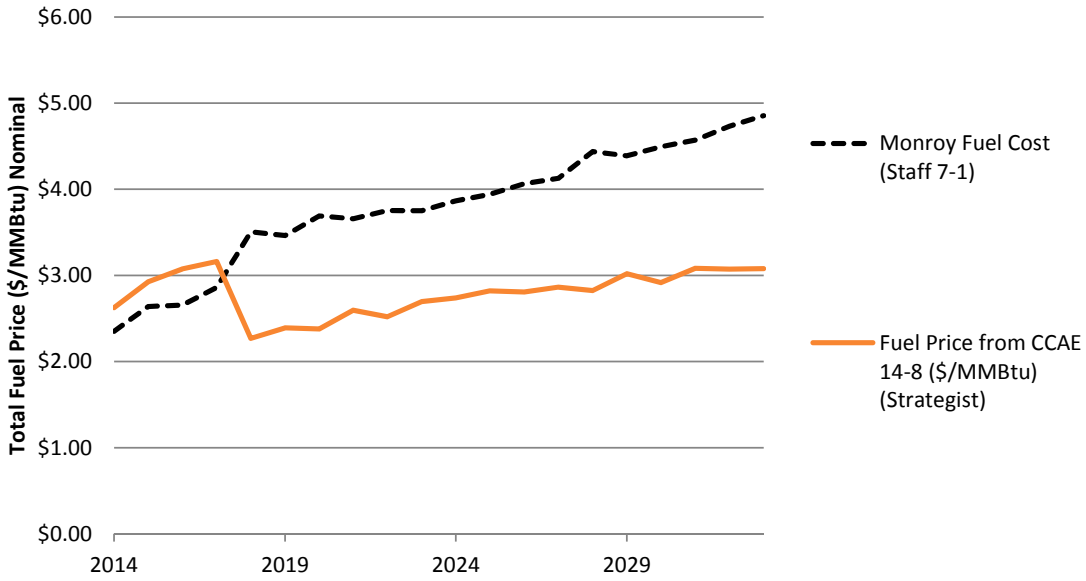


The Company's estimates for coal costs appear reasonable and in line with historic trends through 2017. Again, the drop in 2018 is inexplicable and does not comport with prices paid.

Mr. Monroy also provided a coal price forecast in accounting workpapers in response to Staff 7-1, along with expected generation from San Juan.[32] I used these figures to derive an estimated cost of fuel in $/MMBtu. Mr. Monroy's prices closely mirror the costs shown in NEE 1-17, and are well above the prices used in Mr. O'Connell's Strategist modeling.

[32] PNM Exhibit Staff 7-1, Workpaper 4 pg5-8. Line 9 = fuel cost ($); line 120 = generation from San Juan (MWh).

Figure 9. All-in fuel cost at SJGS from Strategist and as estimated from Staff 7-1.



I believe that there is sufficient evidence to suggest that the coal prices used in Strategist by Mr. O'Connell, aside from being inappropriately construed as fixed, are dramatically lower than either historic prices or those estimated by the Company elsewhere.

It is important to note that this information was not available to interveners until PNM provided CCAE 14-8 in early September, after all parties had provided direct testimony.

Q Did you run the Company's Strategist model with the coal costs consistent with Mr. Monroy's workpapers?

A Yes. Using the same fixed O&M assumptions as described previously (i.e. removing variable O&M and fixed fuel costs), I substituted in Mr. Monroy's fuel prices and re-ran Strategist with scenarios that maintained capacity at SJGS-4, increased SJGS-4 by 132 MW, and retired the entire plant.

The results of these analyses are shown in Table 4 and Table 5 for SJGS-4 and San Juan plant, respectively.

Table 4. Total PVRR for the RSIP with and without the incremental 132 San Juan 4 acquisition ('000 2014$).

	Base (PNM Stipulation)	Variable Fuel & O&M	Var Fuel, O&M, & Monroy Coal
RSIP w/ 132 MW to SJGS4 (4-5c)	7,305,798	7,329,382	7,575,121
RSIP w/o 132 MW to SJGS4 (4-5zg)	7,358,542	7,364,506	7,553,981
Benefit of SJGS 4	**52,744**	**35,124**	**(21,140)**

Table 5. Total PVRR and for the RSIP versus four-unit retirement in 2016 ('000 2014$).

	Base (PNM Stipulation)	Variable Fuel & O&M	Var. Fuel, O&M, & Monroy Coal
RSIP w/ 132 MW to SJGS4 (4-5c)	7,305,798	7,329,382	7,575,121
Four unit shutdown (4-5zj)	7,394,932	7,399,335	7,399,335
Benefit of San Juan Plant	**89,134**	**69,953**	**(175,786)**

Using Mr. Monroy's coal costs, but maintaining all of PNM's other assumptions, acquiring SJGS-4 is a net liability, at a loss of $21.1 million.

Possibly more importantly, this Strategist run indicates that that the entirety of the San Juan plant is a significant net liability to PNM's ratepayers, at a loss of $175.8 million. This figure does not just represent a loss by the last year of the analysis (in 2033), but a loss in each and every year from 2018 through the end of the analysis period. At coal prices approaching Mr. Monroy's estimates – and historic prices, San Juan plant is unsustainable.

Q If these higher coal prices render San Juan non-economic, why hasn't the unit been considered for retirement at recent historic fuel prices?

A The recent all-in fuel prices for San Juan would suggest that this unit should have been considered for retirement prior to today – electricity prices have been relatively low and the coal prices at the unit have been quite high. However, I believe that the take-or-pay contract for coal has actually obscured the otherwise poor performance of San Juan. Were these prices considered as variable costs, rather than fixed costs, San Juan would dispatch at a 60-70% capacity factor, rather than above 80% - and parties would be aware this unit was economically marginal. PNM, however, considers its fuel costs broadly fixed (i.e. a sunk cost) and thus obscures that the plant is non-economic.

In seeking to sign another take-or-pay contract, or purchase a mine outright, PNM would once again be committing ratepayers to a long series of high cost operations, put in place (and effectively hidden) by a commitment signed today.

5. RETIREMENT DATE IS INCONSISTENT WITH REVISED SIP

Q What is the Company's assumption regarding the date of retirement should all four units at San Juan be shut down?

A When the stipulation reviews the retirement of all four San Juan units in compliance with the regional haze rule, it retires the units at the end of 2016.[33] On October 10, 2014, three weeks prior to the submission of PNM's testimony supporting the stipulation, EPA approved the New Mexico RSIP with regards to

[33] See PNM Exhibit PJO-5 (Stip), column D, line 15.

San Juan.[34] The revision specifically calls for the shutdown of SJGS 2 and 3 by December 31, 2017 and installation of SNCR 15 months after the approval of the SIP (or February, 2016). Regardless of the SNCR installation deadline, a closure of the San Juan units at the end of 2017 would be legal, less expensive and more practical than the December 2016 retirement assumed in Strategist. A rough implementation of this scenario carries a benefit of approximately $3 million towards the retirement scenario.

6. LIMITATIONS ON WIND PROCUREMENT RESULT IN HIGHER COST PLAN

Q What limitations does PNM place on wind expansion in the model?

A PNM's model allows exactly 100 MW of wind capacity to be built, starting in 2017. In nearly every case, Strategist chooses to take this option. In the cases where the 132 MW of SJGS-4 is acquired (the RSIP), the acquisition is deferred until 2026.[35] Where no additional San Juan capacity is acquired, the wind option is selected in 2020. When the entire San Juan plant is retired in 2016, the model takes the wind immediately. The wind is a desirable resource, and the acquisition of SJGS-4 precludes the model from selecting the wind option earlier.

[34] 79 FR 60978, effective November 10, 2014
[35] See PNM Exhibit PJO-5, page 1

Q Did you test how Strategist would optimize if allowed to take additional wind?

A Yes. I released the constraint on wind to allow up to four 100 MW wind farms to be constructed starting in 2017 (one each year),[36] but otherwise retained the Company's wind costs and characteristics, and other base assumptions. The loosening of this single constraint was significant. The model acquired all of the wind offered in each case, to striking effect. Notably, in this test, I changed nothing else in the model, including coal prices, fixed costs or variable costs.

Q What was the impact of the wind constraint on the decision to acquire incremental capacity at SJGS-4?

A In the Company's preferred plan (132 MW incremental acquisition of SJGS-4), all four wind plants were built between 2026-2030, and the cost of the plan dropped by $26 million (NPV, 2014$). Similarly, in the case where no incremental capacity in SJGS-4 was acquired, all four wind plants were built between 2020 and 2027, and the cost of the plan dropped by $40 million (NPV, 2014$).

Table 6, below, indicates the relative costs of the RSIP with and without the 132 MW incremental acquisition of SJGS-4, and the significant drop in value of SJGS-4 when additional wind is allowed to compete in the Strategist model.

[36] Changed "cumulative maximum" to four in 2017 in PROVIEW module.

Table 6. Total PVRR for the RSIP with and without 132 MW acquisition of SJGS-4 ('000 2014$), no energy market, release wind constraint.

	Base (PNM Stipulation)	Release Wind Constraint	*Change in cost due to wind*
RSIP w/ 132 MW to SJGS4 (4-5c)	7,305,798	7,279,799	*(25,999)*
RSIP w/o 132 MW to SJGS4 (4-5gz)	7,358,542	7,318,542	*(40,000)*
Benefit of SJGS-4	**52,744**	**38,743**	***(14,001)***

The most remarkable impact occurred in the case where all of the San Juan units were retired, in which case all four wind farms were built between 2017 and 2020, and the cost of the plan fell by $131 million – or $41.4 million below the cost of the Company's preferred plan as put forth in this stipulation. Even under the Company's base assumption, the stipulation plan is not least cost, and a very reasonable acquisition of wind would provide significant benefit to ratepayers.

Table 7 below, shows the relative costs of the preferred RSIP plan against the four unit retirement when additional wind is considered.

Table 7. Total PVRR for the RSIP versus four unit retirement ('000 2014$), no energy market, release wind constraint.

	Base (PNM Stipulation)	Release Wind Constraint	*Change in cost due to wind*
RSIP w/ 132 MW to SJGS4 (4-5c)	7,305,798	7,279,799	(25,999)
Four Unit Retirement (4-5gj)	7,394,932	7,264,398	(130,534)
Benefit of SJGS Plant	**89,134**	**(15,401)**	**(104,535)**

Notably, comparing the scenario where San Juan plant is retired and replaced incrementally with 400 MW of wind against the Company's stipulation case in which additional wind is not available indicates that the additional wind is a very

favorable outcome, particularly when coal reaches prices commensurate with Mr. Monroy's estimates, as shown in Table 8, below.

Table 8. Total PVRR for the RSIP versus four unit retirement ('000 2014$), no energy market, release wind constraint.

	Base (PNM Stipulation)	Variable Fuel and O&M	Var Fuel and O&M, Monroy Coal
RSIP w/ 132 MW to SJGS4 (4-5c)	7,305,798	7,329,382	7,575,121
Four Unit Retirement (4-5gj) *Release Wind Constraint*	7,264,398	7,268,800	7,268,800
Benefit of SJGS Plant	**(41,400)**	**(60,582)**	**(306,321)**

7. SCENARIO PERFORMANCE WITH EXTERNAL ENERGY SALES

Q What is the impact of reviewing the scenarios with external energy sales?

A PNM's linkage with the larger western energy grid, and the opportunity to purchase or sell energy to other utilities is an important consideration for both the operation and economics of the Company's resources, and all the more reason that the variable and fixed costs should be appropriately characterized. By characterizing variable costs as fixed and relying on wholesale market sales, PNM asks their own customers to subsidize energy sales to other utilities. As stated by NMIEC witness Mr. Dauphinais:

> Resource choices that are only better due to their potential to produce off-system sales margins that exceed their additional costs may be choices that are appropriate for independent power producers that are looking for potentially profitable investments in the wholesale power market, but they are not choices consistent

with the mission of a regulated electric utility to provide bundled retail service at lowest reasonable cost.[37]

I generally agree with Mr. Dauphinais. While the consideration of market sales is an important potential, it should not drive resource choices in a vertically integrated utility – particularly where access to a wholesale market is on an informal basis (i.e. there is no organized market in PNM's service territory).

The Company's resource choice is actually driven in large part by market sales. Of the total $177 million net benefit of the Company's stipulation plan over the course of the plan in which all of San Juan is retired, $383 million (NPV, 2014$) is attributable to a difference in off system sales.

It is my opinion that, in a vertically integrated utility, banking on off-system sales to make a plan economic over the long term is a poor choice. In particular, ratepayers should be concerned when the mechanism of making them whole is through the sales of coal power in a world where environmental regulations are generally making coal-fired generation a more costly endeavor.

Q Does your analysis of the Monroy coal prices or the loosened wind constraint consider the impact of the wholesale energy market?

A Not as I showed them earlier. However, I did run the scenarios through a market sales dispatch operation, similar to the mechanism used by NMIEC in this docket (holding the expansion plan constant, and allowing units to dispatch against the market).

[37] Direct Testimony of Mr. James Dauphinais, page 19 lines 5-12.

I ran the base four-unit retirement scenario with the loosened wind constraint, with no changes to variable or fixed costs, through an external market simulation.

Table 9. Total PVRR and for the RSIP versus four-unit retirement in 2016 ('000 2014$), with market sales

	Base (PNM Stipulation)	Release Wind Constraint
RSIP w/ 132 MW to SJGS4 (4-5c)	6,964,620	6,964,620
Four unit shutdown (4-5zj)	7,141,822	6,981,802
Benefit of San Juan Plant	**177,202**	**17,182**

While this scenario does not show a liability, San Juan's value sinks to $17.2 million overall – a fraction of the annual O&M spent by PNM on maintaining San Juan in the first place. From an analytical perspective, this $17.2 million benefit for maintaining San Juan is likely in the noise – less than ¼ of one percent of the total PVRR of the system. And this particular scenario does not even consider PNM's mischaracterization of fixed and variable costs, or Mr. O'Connell's misrepresentation of the costs of coal at San Juan.

Table 10 and Table 11, below, show the outcome of the valuation of SJGS-4 and San Juan plant, respectively. I show both the Company's base case and the case where I've distinguished variable O&M and fuel costs, and used Mr. Monroy's fuel costs for SJGS.

Table 10. Total PVRR for the RSIP with and without the incremental 132 San Juan 4 acquisition ('000 2014$), with market sales

	Base (PNM Stipulation)	Var Fuel, O&M, & Monroy Coal
RSIP w/ 132 MW to SJGS4 (4-5c)	6,964,620	7,327,669
RSIP w/o 132 MW to SJGS4 (4-5zg)	7,103,936	7,302,761
Benefit of SJGS 4	**139,316**	**(24,908)**

Table 11. Total PVRR and for the RSIP versus four-unit retirement in 2016 ('000 2014$), with market sales

	Base (PNM Stipulation)	Var. Fuel, O&M, & Monroy Coal
RSIP w/ 132 MW to SJGS4 (4-5c)	6,964,620	7,327,669
Four unit shutdown (4-5zj)	7,141,822	7,153,153
Benefit of San Juan Plant	**177,202**	**(174,516)**

Clearly, with Mr. Monroy's coal prices as the basis of dispatch in 2018 and beyond, San Juan performs very poorly against the market –costing ratepayers over $174 million. The incremental purchase of 132 MW at SJGS-4 proves to be a liability of $24.9 million to ratepayers.

8. CONCLUSIONS

Q Please summarize your conclusions and recommendations with regards to this case.

A It is my conclusion that the additional capacity at SJGS-4 is not cost effective for PNM's customers, and should not be allowed into rates. While this capacity is provided to PNM effectively "free of charge" by the departing owners, PNM customers will not realize a benefit from this addition – and are likely to face a loss through this addition. Therefore, PNM should not be allowed to acquire this liability on behalf of ratepayers.

Further, the results of my modeling for SJGS-4 indicate a potential significant liability at the remainder of San Juan. This Commission should take the opportunity afforded by this docket to investigate if PNM holds excess risk through the continued operation of San Juan 1 & 4 beyond 2018. The current

approved revised SIP allows the continued operation of all of the units through December 2017, leaving reasonable opportunity in the next three years to seek lower cost alternatives than the continued operation of San Juan.

The modeling conducted by the Company in support of this case, and then in support of the stipulation had significant limitations and biases that resulted in the inappropriate selection of SJGS-4 in particular, and San Juan plant generally. The Company's modeling shows significant instability – San Juan plant is made non-economic simply by releasing a constraint on wind obtained beyond 2018. The Company has used an assumption regarding their coal procurement strategy that effectively bakes another large, long-term coal contract into the selection of resources. The mechanism used by the Company to model a future coal contract precluded reasonable alternatives, and obscured either an error in total fuel costs, or a deliberate bias in the coal price forecast. While structurally, the mechanism used by the Company to evaluate San Juan and Palo Verde options was sound, the execution failed to produce reasonable least cost plans.

Finally, I understand that the Company is in ongoing negotiations to sign a new contract for coal once the current contract expires at the end of 2017. I expect that because San Juan mine is captive to SJGS station (and visa versa) any new contract would likely require a large fixed investment – either through a capital expense or a take-or-pay contract. If the acquisition of incremental capacity at SJGS-4 is approved, or even if SJGS continues operation past 2017 without the incremental addition, PNM's customers will be committed to a significant investment. Indeed, based on the current schedule for negotiations, PNMs

customers may be committed well before this docket is decided. I conclude that any such action on the part of PNM would be premature and poorly timed.

Q Please summarize your recommendations in this case.

A I respectfully recommend that this Commission deny this stipulation with regards to the acquisition of San Juan Unit 4, and require that PNM submit a revised application with a variety of alternative plans to San Juan plant that are in consumers best interests. PNM should be required to examine opportunities to obtain wind, solar, and other renewable resources, and model the costs of the continued operation of San Juan appropriately and consistency.

Further, I recommend that this Commission act quickly to intervene in the Company's assessment of future coal contracts or provisions at San Juan; a commitment by the Company to a third party may have the effect of committing ratepayers to a distinctly non-economic future, and will surely outweigh the impact of even the decision to acquire San Juan 4 in this case.

Finally, I recommend that if the Commission does approve the Stipulation, that it is approved with condition that the Company be limited to the receipt of fuel costs not in excess of those modeled to support this case, not exceeding $2.15/MMBtu in any year between 2020 and 2033.