Docket No. 20000-___-EA-11
Witness: Rick T. Link

BEFORE THE WYOMING PUBLIC SERVICE COMMISSION

ROCKY MOUNTAIN POWER

Direct Testimony of Rick T. Link

September 2011

Q. Please state your name, business address and position with PacifiCorp dba Rocky Mountain Power ("Company").

A. My name is Rick T. Link. My business address is 825 NE Multnomah St., Suite 600, Portland, Oregon 97232. My present position is Director, Structuring & Pricing.

Qualifications

Q. Please describe your education and business experience.

A. I received a Bachelor of Science degree in Environmental Science from the Ohio State University in 1996 and a Masters of Environmental Management from Duke University in 1999. I have been employed in the commercial & trading area of PacifiCorp since 2003 where I have held positions in market fundamentals, structuring, and planning. Currently, I direct the work of the market assessment group, the structuring & pricing group, and the integrated resource planning group. Prior to joining the Company, I was an energy and environmental economics consultant for ICF Consulting (now ICF International) from 1999 to 2003.

Purpose of Testimony

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to explain analyses that support the Company's application for a certificate of public convenience and necessity ("CPCN Application" or "Application") related to clean air investments ("CAI") at the Naughton Unit 3 facility. I describe the Company's long-term resource planning process, summarize the coal utilization analysis that was included in the 2011

Integrated Resource Plan ("2011 IRP"), and present the most current Company analysis that supports this Application.

Q. Please summarize your testimony in this proceeding.

A. My testimony shows:

- The Naughton 3 facility will continue to provide reliable and least cost electric service to customers and that this is reflected in the 2011 IRP.
- The coal utilization study performed in the 2011 IRP supports that the Company's coal resources will continue to provide customers with cost effective energy even after accounting for required CAI costs.
- The incremental analysis performed in support of this CPCN Application clearly demonstrates the economic benefits of CAI at the Naughton 3 facility provide a net system cost savings of $[redacted].
- The incremental analysis performed by the Company in support of this CPCN Application shows CAI at Naughton 3 provide benefits under a range of market price, carbon dioxide ("CO_2") and early retirement scenarios.

Long-term Resource Planning

Q. How does the Company develop its long-term resource plan?

A. Long-term resource planning is done through the Company's Integrated Resource Plan ("IRP"). The Company filed the 2011 IRP in Wyoming on March 31, 2011, in compliance with Commission Rule Section 253 (Docket No. 20000-394-EA-11).

Q. What is the purpose of the IRP?

A. As the Commission is aware, the purpose of the IRP is to provide a framework for discussion of the future actions being considered by the Company to ensure that it continues to provide reliable and least cost electric service to its customers, while striking a balance between cost and risk over the planning horizon including consideration of environmental issues and energy policies.

Q. Please explain the IRP process.

A. On a biennial cycle, the Company initiates the IRP process. The IRP is developed with considerable public involvement from customer interest groups, regulatory staff, regulators, and other stakeholders. Each of these stakeholders has the opportunity to provide input and guidance through a series of public input meetings and technical workshops. The IRP planning horizon is typically 20 years with an action plan that identifies steps that will be taken to secure resources for the first ten years of that horizon. During the IRP process, all material planning assumptions are updated and any resource deficiency is identified. The IRP process then models a number of potential new resource portfolios with the ultimate conclusion being the selection of a preferred portfolio that is expected to result in the least cost on a risk adjusted basis. Appendix F of the 2011 IRP describes the public input process including a participant list, public input meeting dates and topics, and a listing of participants that submitted comments on the draft IRP.

Q. What are the planning conclusions reached in the IRP?

A. The primary conclusion reached in the IRP is the selection of a preferred new

resource portfolio. A plan is then established for actions that will be taken during the next two to four years to secure resources during the first 10-years of the 20-year planning horizon.

Q. Does the 2011 IRP preferred portfolio anticipate that Naughton 3 will be used to provide reliable and least cost electric service to its customers throughout the planning horizon?

A. Yes. The 2011 IRP preferred portfolio indicates that Naughton 3 needs to be available to contribute 330 MW toward the planning capacity requirement.

2011 IRP Coal Utilization Analysis

Q. Did the Company evaluate in its 2011 IRP how market conditions and environmental policy developments might influence whether existing coal units would continue to provide reliable and least cost electric service to its customers?

A. Yes. The 2011 IRP includes a series of sensitivities that evaluate coal resource utilization among a range of future commodity market price and CO_2 cost scenarios. The results of the coal utilization sensitivities are presented in Chapter 8 of the 2011 IRP.

Q. What was the purpose of the coal utilization sensitivities in the 2011 IRP?

A. The coal utilization sensitivities are designed to test the impacts of commodity market prices and prospective CO_2 costs on the existing coal fleet taking into consideration costs for CAI, fueling, decommissioning, liquidated damages for coal contracts, and recovery of remaining plant depreciation in the event of early retirement. The sensitivities were developed to understand what conditions might

cause existing coal units to experience a decline in generation and/or to be replaced by new resources.

Q. Please describe how the coal utilization sensitivities were performed in the 2011 IRP.

A. The sensitivities were performed using the System Optimizer ("SO") model. The SO model is used in the IRP process to produce resource portfolios that minimize costs given a variety of assumptions , which include projections for load growth, market prices, and CO_2 costs. Traditionally, the SO model evaluates how to serve projected peak load plus a planning reserve margin by adding new resources that yield the lowest present value revenue requirement ("PVRR") over the 20-year planning horizon. For the coal utilization sensitivity studies, the SO model was configured to further evaluate whether system costs could be lowered by replacing coal units requiring CAI with natural gas resource replacement options, identified as betterment options in the 2011 IRP.

Q. Please explain how the SO model evaluates the cost tradeoff between existing coal resources requiring CAI and natural gas replacement options.

A. In determining whether a natural gas replacement option would lower the net system PVRR, the SO model compares on-going fixed costs for a coal resource, which include incremental CAI costs, with the on-going fixed costs of the replacement option while considering the net variable cost differences between the two alternatives over the 20-year planning period. To ensure that all costs are being considered in the model's evaluation of the cost tradeoffs in its optimization, the natural gas replacement resource is encumbered with any coal

resource retirement costs. For purposes of the coal utilization study, retirement costs included facility decommissioning costs, recovery of remaining generation resource depreciation expense, and liquidated damages for not meeting minimum-take provisions in existing coal supply contracts.

If total costs for the coal resource are lower than the total cost of the replacement option over time, the coal resource would not be replaced and would continue to supply both capacity and energy in the resource portfolio. Conversely, if total costs for the coal resource are higher than the total cost of the replacement option over time, the coal resource would be removed from the resource portfolio.

Q. What were the results of the coal utilization sensitivities in the 2011 IRP?

A. Chapter 8 of the 2011 IRP presents the results of the coal utilization sensitivities. With medium gas prices and medium CO_2 costs, the market conditions that serve as the foundation for the 2011 IRP preferred portfolio, none of the Company's coal resources were displaced by replacement natural gas resources. When market conditions are modified and favor natural gas replacement resources, the coal utilization sensitivities show that natural gas replacement options are selected to replace between one to two coal units in 2030, the last year of the planning horizon. Such market conditions are characterized by low natural gas prices, which translates into lower fuel costs for natural gas replacement resources, or by high CO_2 costs, which increases operating expenses for coal units relative to the natural gas resource alternative. Even in the most unlikely of scenarios, where low natural gas prices are paired with high CO_2 costs, natural gas replacement resources do not displace coal units any sooner than the middle of the next

decade.[1]

Q. What conclusions were drawn from these results?

A. As noted in the 2011 IRP, the coal utilization sensitivities were performed as a proof-of-concept analysis. In a proof-of-concept analysis the primary purpose is to validate that new model functionality used to evaluate coal plant idling generates reasonable results under a range of test conditions and produces acceptable simulation run-times. The study was done to pave the way for future refinement of the modeling approach and was not intended to draw conclusions on the disposition of individual generating units within the system.

Nonetheless, having performed the sensitivities in the 2011 IRP, some general observations can be made for the coal fleet as a whole. For instance, the sensitivities show that under the most likely market conditions, the Company's coal fleet will continue to provide reliable and least cost electric service to its customers throughout the planning horizon even after accounting for CAI costs. Even in the most unlikely market conditions in which high CO_2 costs are paired with low natural gas prices for a sustained period of time, the majority of the Company's coal fleet remains economically viable and favorable to natural gas replacement options through the latter half of the next decade. As such, the assumption underlying the 2011 IRP preferred portfolio that existing thermal resources such as Naughton 3 will continue to be a source of low cost supply throughout the planning horizon is reasonable.

[1] It is expected that higher CO_2 costs would increase demand for natural gas in the power sector and exert upward price pressure on natural gas prices. Therefore, while possible, it is not likely to exhibit sustained market conditions characterized by high CO_2 costs and low natural gas prices.

Naughton 3 Analysis

Q. Has the Company advanced its coal utilization sensitivities from the 2011 IRP in a way that can be used to evaluate the disposition of specific generating units?

A. Yes. The Company has built upon the 2011 IRP coal utilization sensitivities to evaluate the economics of the CAI required for Naughton 3 ("Naughton 3 Study") as described in this CPCN Application.

Q. Please explain.

A. Improvements were made in three areas. First, the Company made improvements in the study design to better capture the tradeoff in cost between existing coal resources requiring CAI and costs for replacement resource options. Second, the Company updated CAI cost assumptions for all coal resources consistent with the clean air compliance plan supplied in this Application. Third, the Company revisited the market price and CO_2 cost scenarios that are aligned with current economic conditions and policy developments.

Q. How did the Company improve the design of the coal utilization sensitivities to better capture cost tradeoffs between existing coal resources and potential replacement resources?

A. In the original coal utilization sensitivities, the Company allowed existing coal resources to be replaced only by natural gas combined cycle resources located at the site of the coal unit being displaced. These natural gas resource replacement options were scalable in size so that the replacement option equaled the size of the coal unit it could displace. In the Naughton 3 Study, the Company allowed

existing coal resources to be displaced by a wide range of resource options consistent with the resource alternatives used in the 2011 IRP and did not allow these resources to be scalable in size. As such, coal resources could be displaced by green field combined cycle resources, green field simple cycle resources, and demand side management ("DSM") resources in much the same way that resource portfolios were developed in the 2011 IRP process; however, the Company did not allow growth resources to fill long-term resource needs.

Q. What is a growth resource and why was it excluded as a resource replacement option in the Naughton 3 Study?

A. Growth resources are included as a generic resource alternative in the out years of the IRP planning horizon – beginning 2021 in the 2011 IRP. This resource is intended for capacity balancing in each load area to ensure that capacity planning margins are met in the out years of the planning horizon. Growth resources are ascribed costs that are derived from forward power market prices. Growth resources have traditionally been used in the IRP to manage simulation run time by simplifying resource selection beyond the first 10-years of the planning period. Because growth resources are generic resources with costs tied to the power market, they do not accurately reflect the true cost of a replacement resource requiring capital investment or ongoing fixed costs.[2] Allowing growth stations to replace coal resources would provide an artificial incentive for the SO model to retire units assuming they could be replaced by a generic resource option without appropriate cost metrics.

[2] Growth resources, which can be added as system resources in a given load area, should not be confused with front office transactions. Front office transactions are firm forward market purchases made at market hubs that can be used to meet long-term resource needs.

Q. Did the Naughton 3 Study assume that intermittent renewable resources such as wind could replace Naughton 3?

A. No. Intermittent resources such as wind can supply system energy, but are limited in their ability to provide system capacity given the non-dispatchable and intermittent nature of wind resource generation. Because Naughton 3 provides 330 MW of capacity to the system, intermittent resources such as wind are not suitable replacement alternatives and were not included as a resource replacement option in the Naughton 3 Study.

Q. What other improvements were made to the study design for the Naughton 3 Study?

A. To more accurately report findings for specific coal units in the Naughton 3 Study, the Company forced existing coal units to be idled and decommissioned at the end of their currently established depreciable lives. To this end, the Naughton 3 Study forces the removal of three coal plants from the existing resource mix within the 20-year planning period. Carbon is assumed to be idled and decommissioned at the end of 2020, Dave Johnston is assumed to be idled and decommissioned at the end of 2027, and Naughton is assumed to be idled and decommissioned at the end of 2029.

Q. Please describe the CAI cost assumption updates adopted for the Naughton 3 Study.

A. The original coal utilization sensitivities reported in the 2011 IRP were performed using then current CAI costs needed to achieve compliance with expectations for best available retrofit technology requirements under the Environmental

Protection Agency's regional haze rules and increasingly stringent National Ambient Air Quality Standards for criteria pollutants. Costs in the original sensitivities also reflected then current expectations to meet compliance with hazardous air pollutant maximum achievable control technology requirements. Total costs, inclusive of Allowance for Funds Used During Construction ("AFUDC"), for all CAI in the original sensitivities totaled approximately [redacted] through 2022, and nearly [redacted] of capital was assumed for the Naughton 3 unit.

In the Naughton 3 Study, the scope was expanded to include expected investment costs needed to meet compliance for coal combustion residuals and cooling water intake structures. CAI costs for all coal units were updated consistent with those costs reported in this CPCN Application. Total CAI costs, inclusive of AFUDC, among all coal units in the Naughton 3 Study total just over [redacted] through 2030, and approximately [redacted] of capital is assumed for the Naughton 3 unit.[3] Costs used in the Naughton 3 study are included in Confidential Exhibit 2 to the CPCN Application.

Q. What other cost assumption updates were made for the Naughton 3 Study?

A. Assumptions for the recovery of remaining depreciation costs that would be incurred as a result of an early retirement were improved. In the original coal utilization sensitivities, recovery of any remaining depreciation for the underlying resource, before accounting for incremental capital associated with CAI costs, was incorporated as a cost that encumbered the natural gas replacement resource.

[3] The costs for Naughton 3, inclusive of AFUDC, include approximately [redacted] for the installation of the selective catalytic reduction and the pulse jet fabric filter included in this Application.

Given these costs are applicable regardless of whether the coal resource is kept in service or if the coal resource is retired, the Naughton 3 Study removed the cost of recovery for any remaining depreciation associated with the underlying resource. Rather, in the Naughton 3 Study, only recovery of depreciation remaining from incremental CAI costs at any point in time beyond the initial investment period is included in the replacement decision being made by the SO model.

Q. What market price and CO_2 cost scenarios did the Company use for the Naughton 3 Study?

A. The Company used three different scenarios in the Naughton 3 Study – a base case, a high case and a low case. The base case represents the Company's most current official forward price curve ("FPC") and most current expectations for CO_2 price levels and timing. The high case captures a future having higher natural gas prices alongside higher CO_2 costs beginning sooner than assumed in the base case. The low case represents a future where gas prices are lower than those expected under the base case and where no policy is effectuated that places CO_2 costs on emissions in the power sector through the 20-year study horizon. The high and low cases are variations on the base case that represent a reasonable range of high and low market conditions having potential to influence the economic viability of CAI required on the Naughton 3 facility and on the Company's coal fleet at large. The natural gas prices and CO_2 costs assumed for these three scenarios are included in Confidential Exhibit 1 to the Application.

Q. Why did the Company analyze variations in natural gas prices and CO_2 costs when studying unit specific capital investments on coal facilities in the Naughton 3 Study?

A. Natural gas price and CO_2 cost scenarios were considered because assumptions for both are important to the evaluation of the economic tradeoff between coal resources and potential replacement resource options. The assumed price for natural gas directly affects the cost of fuel for natural gas-fired replacement resource alternatives while also influencing the market price for power.[4] As such, natural gas prices are critical to setting the cost for natural gas resource alternatives and in influencing the economic benefits of both coal resources and replacement resource alternatives owing to its influence in the power market.

Similarly, because of the relatively high level of carbon content in coal, higher CO_2 costs disproportionately affect the cost of emissions at coal facilities while also directly influencing the market price for power.[5] Similar to how natural gas prices influence economic tradeoffs between coal and potential resource replacement options, the cost ascribed to CO_2 affects the cost of emissions for coal resources, and to a lesser extent, for natural gas replacement resources. The assumed level for CO_2 costs also influences the economic benefits for both coal and all replacement resource alternatives given its potential to influence prices in the power market.

[4] Natural gas is often the marginal fuel that sets wholesale power market prices in western power markets, and as such, higher natural gas prices routinely yield higher power prices. Similarly, lower natural gas prices routinely yield lower power prices.

[5] Fossil-fired generation resources are often used to supply power at the margin, and as such, the level of CO_2 cost directly influences the marginal cost of supply in western power markets.

Q. Please describe how the Company chose its assumptions for the base case scenario.

A. The Company's June 30, 2011, official FPC was used to set market prices for the base case. The front 72 months of the official FPC is derived from market forwards as of market close on a given quote date, which was June 30, 2011, for purposes of the Naughton 3 Study. Beyond the front 72 months of the FPC, the Company develops a fundamentals-based forecast of market prices using an hourly production cost dispatch model of the western interconnect. These forecasted prices are blended with the forward market price data from months 73 through 84 and directly used in the FPC from months 85 and beyond.

One of the many inputs used to develop the fundamentals-based price forecast is an assumption for the cost for CO_2. The CO_2 assumptions applied in the base case are the same as those used to develop the June 30, 2011 FPC, which has CO_2 beginning in 2021 at $16.00/ton growing to $24.49/ton by 2030. The CO_2 cost and timing used in the June 30, 2011, FPC are consistent with current assumptions used by a variety of third party forecast services, which in aggregate, are expecting policy initiatives that might impute a cost on CO_2 emissions to become effective later than previously forecasted.[6]

Q. How did the Company develop its market price assumptions for the low and high case scenarios used in the Naughton 3 Study?

A. The Company compared current third party natural gas price forecasts to develop a reasonable range around the base case representative of plausible high and low

[6] A review of third party forecasts and the state of environmental policy developments at the time CO_2 assumptions were developed for the 2011 IRP supported a base case view that CO_2 would begin in the 2015 timeframe.

price outcomes. For natural gas prices, we reviewed current projections from Wood Mackenzie, PIRA, and IHS CERA. The natural gas price forecasts used in the Naughton 3 Study are shown alongside these price forecasts in Confidential Exhibit 1 to the Application. In the low case, assumed natural gas prices are reasonably close to the IHS CERA price forecast and the PIRA low natural gas price forecast, both of which are at the low end of the range among all forecasts reviewed. In the high case, assumed natural gas prices are generally consistent with the PIRA high natural gas price forecast through about 2014 and then reasonably close to the PIRA expected value and reference case forecasts thereafter. The Company did attempt to align its high case price assumptions with the PIRA high case projection beyond 2014 because this scenario represents a long-term forecast outlier relative to forecasts produced by either Wood Mackenzie or CERA. Consequently, the Company view currently is inconsistent with the PIRA high price forecast because it does not represents a plausible scenario for where the natural gas market might settle over the long-term on a sustained basis.

Q. How did the Company develop its CO_2 cost assumptions for the low and high case scenarios used in the Naughton 3 Study?

A. As was done with our review of natural gas prices, the Company compared external forecasts of CO_2 cost to develop a reasonable range around the base case representative of plausible high and low cost outcomes. The CO_2 cost assumptions used in the Naughton 3 Study are shown alongside these external forecasts in Confidential Exhibit 1 to the Application. For the low case, we

assumed there would be no policy developments that would impute a cost on CO_2 emissions in the power sector within the 20-year study period. This assumption is consistent with reports from PIRA who have indicated that there is real potential for a zero CO_2 cost scenario. The high CO_2 cost assumptions adopted for the Naughton 3 Study are higher and start sooner than any of the current projections from PIRA, Wood Mackenzie, and IHS CERA, but remain consistent with an upper limit that would have been established under the American Power Act of 2010 as proposed by Senators Kerry and Lieberman in May 2010.

Q. Did the Naughton 3 Study show that the Naughton 3 resource will continue to provide reliable and least cost electric service to customers after accounting for CAI costs?

A. Yes. In all three scenarios, the Naughton 3 resource, encumbered with CAI costs representative of those covered in this CPCN Application and of those contemplated for future environmental compliance needs, is not displaced by any replacement resource through its remaining depreciable life. In fact, resource replacement alternatives did not displace any of the Company's coal resources before either their depreciable lives or the end of the 20-year planning period.

Q. Did the Company perform any incremental analysis for the Naughton 3 Study to calculate the net PVRR benefits of CAI?

A. Yes. To estimate the net PVRR benefits of CAI for Naughton 3, the Company completed six incremental simulations in the SO model. The first three simulations were done within the base, high, and low scenarios to calculate the change in the net system PVRR assuming the Naughton 3 resource would retire at

the end of 2014 thereby foregoing the need for any current or future CAI costs ("the 2014 Analysis"). With the Naughton 3 unit retired at the end of 2014, the SO model was allowed to select the least cost replacement portfolio from the resource alternatives. The resulting change in portfolio costs between the 2014 Analysis and the original studies in which Naughton 3 remains operable through its depreciable life indicates the net system benefit of the CAI required for Naughton 3 relative to the alternative of making no incremental investments.

The remaining three simulations were done within the base, high, and low scenarios to calculate the change in the net system PVRR assuming the Naughton 3 resource would retire at the end of 2024 – five years before the end of its depreciable life ("the 2024 Analysis"). With the Naughton 3 unit retired in 2024, the SO model was allowed to select the least cost replacement portfolio. The resulting change in portfolio costs between the 2024 Analysis and the original studies in which Naughton 3 remains operable through its depreciable life indicates the net system benefit of the CAI required for Naughton 3 relative to the alternative of making incremental investments on a resource that is displaced sooner than contemplated at the time the investment decision was made.

Q. What were the results of the 2014 Analysis and the 2024 Analysis?

A. The results of these incremental analyses, as summarized in Confidential Exhibit 2 to the Application, show that in the base case, CAI on Naughton 3 lowers customer costs by [redacted] in the 2014 Analysis and by [redacted] in the 2024 Analysis. These results show the investments required at Naughton 3 are beneficial relative to the alternative of making no investment and shutting

Naughton 3 down at the end of 2014 and relative to the possibility of making investments and shutting the unit down before the asset reaches the end of its depreciable life. In fact, the base case results show that there is nearly a [redacted] benefit to making the investments and retiring the asset prior to the end of its depreciable life as opposed to the alternative of making no investment and shutting Naughton 3 down at the end of 2014.

Under the low case, the benefits of the Naughton 3 CAI decline relative to those in the base case, but they remain favorable in both the 2014 Analysis and the 2024 Analysis. Early retirement at the end of 2014 with no CAI costs and retirement at the end of 2024 with CAI costs yields portfolio costs relative to making investments and operating the resource through its depreciable life that are [redacted] higher and [redacted] higher respectively. As in the base case, the low case results show that portfolio costs are lower if investments are made and the resource is retired before the end of its depreciable life relative to the alternative of making no investments and shutting down Naughton 3 at the end of 2014. Even in the high case, which has CO_2 costs approaching $70/ton by 2030, system costs are higher in the 2014 Analysis and 2024 Analysis relative to the alternative of operating Naughton 3 through the end of its depreciable life by [redacted] and [redacted] respectively.

Q. Please describe how the resource portfolio changes when Naughton 3 is forced to retire in the 2014 Analysis.

A. Changes to the resource portfolio in the 2014 Analysis as compared to the resource portfolio in the original simulations where no coal resources retire before

the end of their depreciable lives is provided in Confidential Exhibit 2 to this CPCN Application. In both the base case and the high case, an incremental 388 MW natural gas resource is added in 2018. Prior to this resource coming online, the resource gap created by the absence of Naughton 3 is largely filled with incremental DSM resources and firm market purchases. In the low case, incremental gas capacity is added in 2016, in the 2017 to 2018 timeframe, and in 2023. The incremental gas capacity in 2016 results from a 597 MW combined cycle resource addition that displaces the original 388 MW gas resource added to the low case portfolio when Naughton 3 remains operable through its depreciable life. The low case replacement portfolio also shows a 2018 gas resource is pushed forward to 2017 and the incremental addition of a 118 MW peaking gas resource in 2023. As in the base and high cases, the capacity deficit created by the absence of Naughton 3 in the low case portfolio is met largely by DSM and firm market purchases before incremental gas resources are added to the system mix.

Q. Please describe how the resource portfolio changes when Naughton 3 is forced to retire in the 2024 Analysis.

A. Changes to the resource portfolio in the 2024 Analysis as compared to the resource portfolio in the original simulations where no coal resources retire before the end of their depreciable lives is provided in Confidential Exhibit 2 to this CPCN Application. Among all scenarios, changes in the resource portfolio are largely in the latter half of the next decade and show that the timing of natural gas resources are moved forward or that incremental gas resources are needed to meet the capacity shortfall when Naughton 3 is idled at the end of 2024.

In the base case, gas resources are added in 2025 and 2028, which is two years earlier than the gas resource additions in the original optimized portfolio where Naughton 3 remained operable through its depreciable life. In the high case, a 388 MW natural gas resource is pushed forward from 2030 to 2025. With lower gas prices and no CO2 costs, longer term resource needs are also met with incremental gas resources in the low case.

Q. How do changes in the replacement portfolios contribute to increased system costs relative to the original resource portfolios that show Naughton 3 remains operable through its depreciable life?

A. Generally speaking, the cost savings associated with not making CAI at Naughton 3 are more than offset by the increased capital, fixed and net variable costs from the resources in the replacement portfolios. In the 2014 Analysis, replacement resources are dominated by the addition of incremental gas resources particularly beyond the 2016 to 2017 timeframe. This dynamic holds true among all three scenarios; however, the underlying assumptions for natural gas prices and CO_2 costs influence the magnitude of cost differentials among portfolios. For instance, in the high case, the cost savings from lower CO_2 emissions more than offset higher natural gas fuel costs that result from the addition of natural gas replacement resources and higher overall natural gas prices. In contrast, there is no emission cost benefit for natural gas resource replacement options in the low case. As such, the overall cost of replacement resources in the high case is lower than the overall cost of replacement resources in the low case.

In the 2024 Analysis, CAI on Naughton 3 are assumed to be carried out as

planned; however the Naughton 3 resource is forced to be retired five years before the end of its depreciable life and replacement resources are added to the portfolio. Because the replacement resources are needed later in the 2024 Analysis, the time value of money benefits that come with deferring the need for replacement resources offsets the incremental cost of incurring CAI costs for a resource that retires earlier than anticipated.

Q. What conclusions do you draw from the Naughton 3 Study?

A. The Naughton 3 Study shows that with the planned investments described in this CPCN Application, the Naughton 3 resource will continue to provide reliable and least cost electric service to customers. After accounting for planned investments, system costs are expected to be [redacted] lower on a PVRR basis than would otherwise occur if the investment is not made and the Naughton 3 resource were retired at the end of 2014. Moreover, the investments planned for Naughton 3 yield cost savings among all scenarios studied.

Q. Does this conclude your testimony?

A. Yes.