BEFORE THE
PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of: The Voluntary Request of Rocky Mountain Power for Approval of Resource Decision to Construct Selective Catalytic Reduction Systems on Jim Bridger 3 & 4	)))))))	**Docket No. 12-035-92** Rocky Mountain Power's Voluntary Request for Approval of Resource Decision to Construct Selective Catalytic Reduction Systems on Jim Bridger Units 3 & 4

Direct Testimony of
Jeremy Fisher, Ph.D.

On Behalf of
Sierra Club

REDACTED VERSION

November 30, 2012

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INTRODUCTION AND PURPOSE OF TESTIMONY

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

A My name is Jeremy Fisher. I am a scientist with Synapse Energy Economics, Inc. (Synapse), which is located at 485 Massachusetts Ave, Suite 2, in Cambridge Massachusetts.

Q Please describe Synapse Energy Economics.

A Synapse Energy Economics is a research and consulting firm specializing in energy and environmental issues, including electric generation, transmission and distribution system reliability, ratemaking and rate design, electric industry restructuring and market power, electricity market prices, stranded costs, efficiency, renewable energy, environmental quality, and nuclear power.

Q Please summarize your work experience and educational background.

A I have ten years of applied experience as a geological scientist, and four years of working within the energy planning sector, including work on integrated resource plans, long-term planning for utilities, states and municipalities, electrical system dispatch, emissions modeling, the economics of regulatory compliance, and evaluating social and environmental externalities. I have provided consulting services for various clients, including the U.S. Environmental Protection Agency (EPA), the National Association of Regulatory Utility Commissioners (NARUC), the California Energy Commission (CEC), the California Division of Ratepayer Advocates (CA DRA), the National Association of State Utility Consumer Advocates (NASUCA), National Rural Electric Cooperative Association (NRECA), the State of Utah Energy Office, the State of Alaska, the State of Arkansas, the Western Grid Group, the Union of Concerned Scientists (UCS), Sierra Club, Natural Resources Defense Council (NRDC), Environmental Defense Fund (EDF), Stockholm Environment Institute (SEI), and Civil Society Institute.

Prior to joining Synapse, I held a post doctorate research position at the University of New Hampshire and Tulane University examining the impacts of Hurricane Katrina.

I hold a B.S. in Geology and a B.S. in Geography from the University of Maryland, and an Sc.M. and Ph.D. in Geological Sciences from Brown University.

My full curriculum vitae is attached as Exhibit 1.

Q On whose behalf are you testifying in this case?

A I am testifying on behalf of Sierra Club.

Q Have you testified in front of the Utah Public Service Commission previously?

A Yes. I submitted testimony in PacifiCorp's 2011 General Rate Case (Docket 10-035-124) on behalf of Sierra Club.

Q What is the purpose of your testimony?

A In my testimony I evaluate the reasonableness of the assumptions used by the Rocky Mountain Power (dba PacifiCorp, the "Company") in the modeling that supports this Request for Approval (RA) to construct Selective Catalytic Reduction (SCR) systems at Jim Bridger units 3 & 4. Specifically, this testimony:

1. evaluates assumptions and validity of the data underlying the range of natural gas and carbon dioxide (CO_2) prices used by the Company;
2. reviews opportunities to avoid significant and high cost transmission investments in the Gateway West project between Bridger and Populus terminals; and
3. critiques the assumption that the fate of Jim Bridger generating station should be dictated by the need to fund remediation activities of Bridger Coal

Company, and proposes that coal prices at Jim Bridger, and in other planning exercises, should be evaluated at fair market prices to capture opportunity costs.

Q Have you evaluated the Company's use of either of the models that support the Company's RA?

A I have not. Sierra Club intervened in this case at a fairly late stage, and I was only made privy to confidential documents a week and a half prior to the filing date of this testimony. As such, I have not had the opportunity to review in appropriate depth the Company's use or execution of the models. I have also not had the opportunity to test the outcomes of my assumption concerns in the Company's model.

Q Does your lack of comment on the Company's use of the System Optimizer or GRID model indicate that you agree with their use and execution of same?

A No. Given the opportunity to review the Company's modeling, I will provide more in-depth discussion of the use and execution of the System Optimizer model, in particular. At this juncture, I withhold opinion on the modeling.

I will state, however, that I do generally approve of the Company's use of a similar modeling framework for use in the Integrated Resource Planning (IRP) process as in making strategic planning decisions, such as in this case. That said, to formulate a nuanced opinion (i.e. the absolute outcome is not at all definite from the Company's own analysis) requires significant care and attention. Based on my findings below, it appears that the Company has put significant effort into some aspects of future planning, such as evaluating how to fund their coal mine remediation efforts, but have completely neglected significant opportunities to provide ratepayer benefits through the avoidance of potentially unnecessary capital expenses, such as new transmission expense.

Q What are your preliminary findings?

A Based on my review, it is my opinion that that there is sufficient evidence to show that the retrofit of Bridger is not in the best interests of ratepayers. The analysis shows a marginal, at best, outcome for ratepayers in a reasonable and updated base case. Further, the Company's continued inability to find opportunities to protect ratepayers against inefficient expenditures shows that the investment in SCR is not merely marginal, but a net liability for consumers.

1. ANALYSIS RELIES ON OUTDATED FORECASTS

Q Please describe how PacifiCorp evaluated the benefit of retrofitting Jim Bridger with SCR against alternatives.

A As discussed in Mr. Link's testimony, the Company presents the results of its analysis as the difference between two scenarios:

1. the System Optimizer (SO) model is allowed to choose freely to invest in the SCR system and continue operation of Bridger 3 and 4, or to convert Bridger 3 and 4 to natural gas, called the "optimized" case; and
2. SO is restricted from making whichever operational choice (invest in SCR or convert to gas) it deemed optimal, known as the "change case".

The present value of revenue requirements (PVRR) is calculated for each of these scenarios, and the difference between them – called the PVRR(d) – is a final measure of the relative merits of the two scenarios. When the PVRR(d) for a given set of assumptions is negative, the revenue requirements of the SCR retrofit scenario are less than the gas conversion, indicating a preference for the SCR retrofit. When the PVRR(d) is positive, the revenue requirements of the SCR retrofit are greater than the gas conversion, indicating a preference for conversion to natural gas.

Q Please describe how PacifiCorp reviewed uncertainty in gas and CO_2 prices.

A The Company presents PVRR(d) results for seven different sets of assumptions that vary in terms of their natural gas and CO_2 allowance prices. The base gas price is the December 2011 Opal official forward price curve (OFPC), which has a nominal levelized value of $6.18/MMBtu; the projection of this base gas price included the assumption that $16/ton CO2 price would be in effect by 2021 and would escalate gradually thereafter.

The Company also runs the SO model using high and low gas prices, the nominal levelized value of which (with the assumed $16/ton CO2 price) are $8.94/MMBtu and $4.51/MMBtu, respectively.

In addition to high, base, and low gas price assumptions coupled with the Company's base CO_2 price of $16/ton starting in 2021 (and escalating gradually thereafter), PVRR(d) results were estimated using a high ($34/ton starting in 2018, then escalating) and zero ($0/ton in all years) CO_2 price.

For the high and low CO_2 price assumptions the Company has chosen to adjust the natural gas price, a point that I will discuss more fully below. With the high CO_2 price, the nominal levelized value is $7.25/MMBtu for the base gas price and $5.50/MMBtu for the low gas price. With the zero CO_2 price, the nominal levelized value is $5.62/MMBtu for the base gas price and $8.70/MMBtu for the high gas price.

Table 1 below reports the PVRR(d) values for each of these seven sets of assumptions. The values displayed are taken from Confidential Attachment OCS 12.3 (Attached as Exhibit 2), which provides results that are corrected for errors found in the Link Testimony. According to the Company's modified findings, SCR is preferred to natural gas conversion for Bridger 3 and 4 in all cases that use the base or high gas prices; gas conversion is preferred in the low gas price cases.

Table 1. Net benefit of retrofitting both Jim Bridger 3 & 4 as presented in initial Company testimony.

(millions 2012$)	Low Gas	Base Gas (Dec.2011)	High Gas
Zero CO_2		[redacted]	[redacted]
PacifiCorp Base CO_2	[redacted]	[redacted]	[redacted]
PacifiCorp High CO_2	[redacted]	[redacted]	

Q What can you conclude from these results?

A According to Mr. Link, the Company's decision to implement SCR appears, on the surface, to be heavily dependent on projections of future gas and CO_2 prices. However, upon closer inspection, it becomes clear that the decision hinges on other questions as well, which I discuss later in this testimony.

The Company does not put an explicit weight on any given option.[1] However, by stating that the results support its position to retrofit the plant, it is clearly putting greater emphasis on the base case, and discounting the risk of low future gas prices and high future CO_2 allowance prices.

Q Did the Company review the impact of changing gas and CO_2 prices on the outcome of their analysis?

A The Company used a simple linear trend to estimate the breakeven CO_2 price at the base (December 2011) gas price.[2] Their estimated breakeven nominal levelized CO_2 price is [redacted]/ton. They have not reported breakeven CO_2 prices at their high and low gas prices, nor breakeven gas prices for non-base case CO_2 prices.

[1] Response to OCS 1.115 (Attached as Exhibit 3). "The Company has not assigned weighting to each of the alternatives presented in the application. Rather the Company has provided analyses of a range of input assumption to provide the Commission with a range of information from which to make their determination."

[2] See Confidential Exhibit RMP__(RTL-7)

Q Did the Company review changes to either gas or CO_2 prices after the time it ran the original SO model?

A Yes. According to Mr. Link, the Company ran the base CO_2 price (assuming a $16/ton starting in 2022) using the June 2012 Opal OFPC natural gas price (reported to have a nominal levelized value of $5.65/MMBtu in Mr. Link's testimony). The [redacted] million PVRR(d) of this updated case is only reported in Mr. Link's testimony and not in the corrected SO results presented in Confidential Attachments OCS 14.3, and is therefore not directly comparable to the corrected PVRR(d) results shown above in Table 1.

Q What was the impact of having changed the gas price?

Updating the gas price to the June 2012 forecast lowers the uncorrected PVRR(d) results from [redacted] million to [redacted] million. Both results are favorable to installation of the SCR system, but the more recent forecast reduces the benefits of SCR installation by [redacted] million.

Q At the newer gas price, what is the breakeven CO_2 price?

A Updating assumptions regarding future gas and CO_2 prices would change the Company's PVRR(d) results. To demonstrate this I have done the following:

1. Calculated updated nominal levelized gas prices for the scenarios run by the company. The base gas price is calculated directly from the Company's September 2012 Opal OFPC.[3] High and low gas prices are then calculated as the same percentage change from base as in Company's original filing. No adjustment has been made to these gas prices to take account of low or high CO_2 prices. The nominal levelized values are $5.57/MMBtu for the base gas price, $8.50/MMBtu for the high gas price, and $4.15/MMBtu for the low gas price.

[3] See Confidential Attachment OCS 9.1 -1

2. Calculated nominal levelized CO_2 prices for the Synapse low, mid, and high cases (as reported in Exhibit 4). Prices come into effect in 2020 in all three Synapse cases. The 2020 nominal values for the Synapse CO_2 prices are \$17/ton, \$23/ton, and \$35/ton, respectively.[4] The Synapse low, mid, and high CO_2 prices have nominal levelized values of \$15.41/ton, \$23.81/ton, and \$37.94/ton.

3. Performed a multiple linear regression using the Company's nominal levelized gas and CO_2 prices as the explanatory variables and its PVRR(d) values as the dependent variable. The results of this regression were then applied to the updated gas prices to identify the breakeven CO_2 price, and to the zero and Synapse low, mid, and high CO_2 prices to identify the breakeven gas price.

Using the updated gas prices, the breakeven nominal levelized CO_2 price is [redacted]/ton for the base gas price.[5] Using the Synapse mid CO_2 price, the breakeven nominal levelized gas price is [redacted]/MMBtu.[6] It is noteworthy to recall that Mr. Link's revised gas price from June 2011 has a nominal levelized value of \$5.65/MMBtu, very close to this value.

The breakeven nominal levelized CO_2 price of [redacted]/ton at the updated base gas price can be compared to the Company's estimated breakeven CO_2 price of [redacted]/ton at the base gas price used in the original filing. Using the updated assumptions, any benefit from the SCR installation is negated at a much lower CO_2 price than found by the Company.

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[4] Using the Company's assumed 1.9% inflation rate. Approximated from Confidential Attachment OCS 1.20 -1.

[5] Also [redacted]/ton for the high gas price, and [redacted] /ton for the low gas price.

[6] Also [redacted] /MMBtu for the low Synapse CO_2 price and [redacted]/MMBtu for the high CO_2 price.

2. Company Base CO_2 Price is Unreasonably Low

Q Does the Company's CO_2 price forecast represent a reasonable forecast range?

A No. The Company's base (December 2011) forecast is low relative to other industry estimates from the last two years.[7] The high forecast is closer to what other utilities and parties consider a mid-range price forecast. While the zero CO_2 price may provide a useful end number, in my opinion, it is not reasonable to rely on a long-term assumption of no action regarding climate change.

It is my testimony that the Company has been very selective in choosing which forecasts to review and follow, and while the current forecast represents an slight improvement over that used by the Company in 2009 (an increase of about 46% in levelized nominal terms),[8] it is still quite low relative to forecasts from other utilities and industry groups.

Q How do the Company's CO_2 price forecasts compare to forecasts used by other utilities?

A The Company's forecast is lower than that used by other utilities and industry groups. Synapse has reviewed CO_2 price forecasts from approximately 25 publicly available IRP and utility planning dockets filed over the last three years (2009-2012), representing over sixty non-zero price forecasts.[9] In addition, Synapse has reviewed government and other forecasts, as well as the changing policy landscape, and published a set of price forecast series in October, 2012.[10] I

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[7] Company CO_2 prices presented in Link Direct Testimony, Figure 2 and Confidential Exhibit RMP___(RTL-2).

[8] Comparison of base case CO_2 prices as used in Hunter 1 & 2 PVRR(d) analyses for FGD (evaluation in November, 2009) against base case values used in this docket. Nominal levelized cost performed similarly to Company mechanism from 2015-2030.

[9] Attached as Exhibit 5.

[10] Synapse Energy Economics, Inc. October 4, 2012. *2012 Carbon Dioxide Price Forecast*. Attached as Exhibit 4, and available online at http://www.synapse-energy.com/Downloads/SynapseReport.2012-10.0.2012-CO2-Forecast.A0035.pdf.

show these forecasts as a backdrop against the Company's forecast (in red) and the Synapse 2012 price forecast (in black) in **Figure 1**, below.[11]

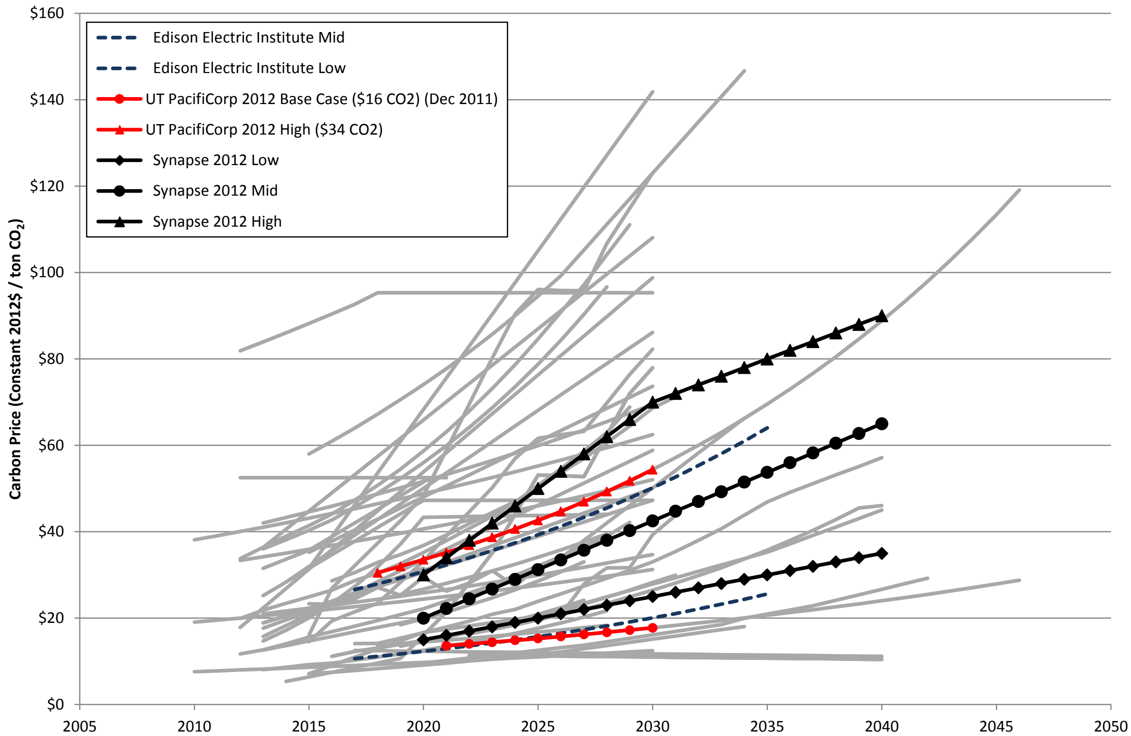

Figure 1. Company (red), Synapse (black), and Edison Electric Institute (blue) assumed CO_2 price forecasts against a backdrop of sixty other utility forecasts from 2009 - 2012.

The PacifiCorp Base Case (red circles) is at the very lowest threshold of prices in this diagram, above only three other forecasts.[12] In all three cases, the other utility forecasts also start earlier than PacifiCorp base case, imposing a greater impact on decisions today.

The PacifiCorp high case starts a few years earlier, and is closer to the middle of the utility forecast spectrum.

[11] Figure 1 is attached as Exhibit 6.
[12] American Electric Power (2011), New Mexico Public Service, Low (2012), and NE Omaha, Low (2010).

Interestingly, the PacifiCorp forecasts fall almost in line with two forecasts produced by the Edison Electric Institute (EEI) in a January 2011 study.[13] I have also plotted these two forecasts in Figure 1 (blue dashes). However, EEI characterizes the higher forecast as their baseline expectation, and the lower forecast as an "Alternate" low case. The EEI study also explores a zero CO_2 price forecast.

The Synapse CO_2 price forecasts bound the PacifiCorp high case. Our Low, Mid, and High 2012 forecasts start in 2020, at $15, $20, and $30/short ton CO_2 (real 2012$) respectively, and rise over time. The PacifiCorp Base CO_2 price is below the Synapse Low.

Q How did the Company develop their CO_2 price forecasts?

A The Company reviewed 2011 third-party forecasts from three consultancies ([redacted]) as well as older estimates from the U.S. EPA on the expected allowance price under the 2009 American Clean Energy and Security Act (ACES, or Waxman-Markey).[14] Ultimately, the Company appears to have settled on a forecast close to the [redacted] forecast as their base price, and EPA's estimate of allowances prices from the Waxman-Markey bill (as run in June of 2009) to set their high price.

Q Do the Company's CO_2 price forecasts cover a reasonable range of risk?

A No. Importantly, EPA did not consider the PacifiCorp high allowance price (taken from the Waxman-Markey bill) to be at the "high" end; rather, this price was the EPA's base allocation price assumed to be required under the mechanisms proposed in the regulation. A valid mechanism of evaluating the "high" and "low" estimates of the impact of that particular bill would be to look at a range of models and a range of scenarios to determine how that particular bill might

[13] Potential Impacts of Environmental Regulation on the U.S. Generation Fleet. January, 2011. Edison Electric Institute (prepared by ICF International). Attached as Exhibit 7.
[14] See Confidential Attachment OCS 1.35 -2 "ThirdParty_CoalStudy_CO2 CONF.xlsx".

impact CO_2 allowance prices. If the Company had looked at EIA's estimate of the impacts of the Waxman-Markey, it would have found a much wider and higher range than that found by EPA or used by PacifiCorp. I have plotted EIA's estimates against the Company's "third-party" estimates from Confidential Exhibit RMP___(RTL-2) in Figure 2, below. EIA includes several cases exploring the impact of international offsets, which has a significant impact on the assumed allowance price. Note that the EIA's estimate in the Waxman-Markey "Basic Case" quickly exceeds PacifiCorp's High, and EIA's estimate for a restricted offset case is about twice PacifiCorp's High case.

[redacted]

Figure 2. Confidential. Company CO_2 price forecasts against third-party estimates from Confidential Exhibit RMP___(RTL-2). Modified to include EIA estimates of Waxman Markey CO_2 allowance prices.

Q Are there other indicators that the High case chosen by PacifiCorp was at the low end of estimates for the Waxman-Markey assumptions?

A Yes. In September 2009, the Electric Power Research Institute (EPRI) ran the National Energy Modeling System (NEMS) model and produced a "Preliminary Analysis of Waxman-Markey (H.R. 2454) Using NEMS for PacifiCorp." This document is found on PacifiCorp's IRP website. [15] The CO_2 prices calculated by the NEMS, shown in Figure 3 (below), ranges from a reference case starting in 2012 and passing about $30 (real 2012$) in 2021, finishing at about $40 in 2030, a similar trajectory to PacifiCorp's High case. The NEMS model also shows several other sensitivities that clearly outpace the Company's base case in this docket.

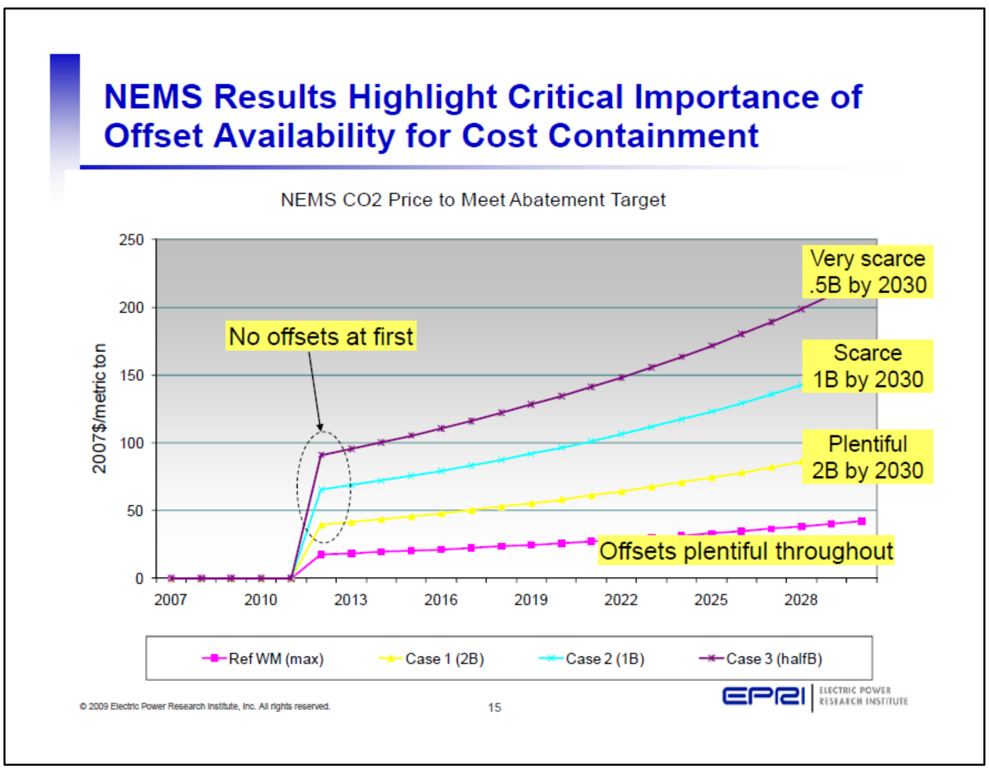

Figure 3. Slide from "Preliminary Analysis of Waxman-Markey (H.R. 2454) Using NEMS for PacifiCorp." September, 2009 (Attached as Exhibit 8).

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[15] Preliminary Analysis of Waxman-Markey (H.R.2454) Using NEMS for PacifiCorp. http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/Environment/WM-NEMS-Roadshow-draft-9-11-09.pdf (Attached as Exhibit 8).

Q What do you recommend for a CO_2 price forecast?

A The Synapse CO2 price forecasts represent a reasonable range of utility, government, and third-party estimates, and provide a reasonable range of sensitivities for use in forward planning cases.

Q Do you have any other concerns about CO_2 pricing as pertains to this case?

A Yes. The Company's CO_2 price forecast for the IRP planning process (upon which this modeling case is based) extends beyond 2030 (the end of the analysis period here), rising over time. It is unclear how the model accounts for future rising CO_2 prices, if at all, in the end period extending to the 2037 retirement of Bridger 3 and 4. Higher future CO_2 prices would reasonably be expected to have an impact on resource decisions today, even if they extend beyond the analysis period.

3. GAS PRICE INCLUDES UNSUPPORTED CO_2 PRICE ADDERS

Q Is the Company gas price forecast reasonable?

A The Company's initial derivation and continued revision of the base gas price forecast appears generally to be reasonable. However, I have significant concerns about the Company's adjustment of gas prices based on forecast CO_2 prices. In the presence of a CO_2 price forecast, the Company assumes that natural gas prices are higher than they would be in the absence of a CO_2 price. In fact, the assumption is that for approximately every \$24 of (real 2012\$) CO_2 price, the natural gas price is increased by \$1/MMBtu.[16] This assumption leads to natural

[16] The difference between the base case natural gas price at the Company high CO_2 price trajectory ("\$34") and the gas price at a zero CO_2 price shows that gas prices increasing as CO_2 prices increase (in real 2012\$) (see Confidential Attachment OCS 12.3). My calculations show that a linear fit (forced to a zero intercept) between the gas price difference and CO_2 price has a slope of 23.5, meaning that for each dollar of gas price increase, CO_2 has increased by about \$24.

gas prices in the High CO_2 price case that are 15-25% higher than Base Case prices.

Q Why does the Company increase natural gas prices in the presence of a CO_2 price?

A Mr. Link describes the basis of this adjustment in a hypothetical (Link Direct, p11, lines 224-231):

> This [adjustment] is primarily driven by the relatively high level of carbon content in coal as compared to natural gas. With rising CO_2 prices, generating resources with lower CO_2 emissions, such as natural gas-fueled resources, begin to displace coal-fueled generation, thereby increasing the demand for natural gas within the electric sector of the U.S. economy. Displacement of coal generation is also influenced by low or zero emitting renewable generation sources; however, not enough to entirely offset increased natural gas demand.

To my knowledge, however, there is currently no definitive evidence that such a trend would occur, or if it did, that it would have the dramatic impact on natural gas prices Mr. Link assumed. In fact, from the evidence that I have reviewed, I have seen few instances in which integrated system models have actually predicted increasing natural gas prices with higher CO_2 prices.[17] In absence of significant evidence, or consistent and definitive modeling results, the supposition

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[17] Review of data from 2009 Energy Modeling Forum #22 (Fawcett, A. A. K. V. Calvin, F.C. de la Chesnaye, J.M. Reilly, and J. P. Weyant. 2009 “Overview of EMF 22 U.S. Transition Scenarios. Energy Economics, Vol. 31, pp. S198-S211. http://emf.stanford.edu/files/res/2369/fawcettOverview22.pdf), US DOE EIA Annual Energy Outlook 2012, EIA NEMS run for “Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009” (see http://www.eia.gov/oiaf/servicerpt/hr2454/index.html); EPA modeling of Waxman-Markey Discussion Draft (April 2009), EPA modeling of American Clean Energy and Security Act of 2009 (June, 2009), Clean Energy Jobs and American Power Act of 2009 (October 2009), and American Power Act of 2010 in the 111th Congress (June 2010) (see http://www.epa.gov/climatechange/EPAactivities/economics/legislativeanalyses.html).

that natural gas prices will increase in the presence of a CO_2 price is premature and inappropriate.

4. Reasonable Range of CO_2 and Gas Prices Increases Liability Risk

Q What are the results of modifying the Company's gas and CO_2 price forecasts?

A The results of the multiple linear regression, discussed previously, were also applied to the updated gas prices, and the Synapse low, mid and high CO_2 prices to estimate a PVRR(d) for each set of assumptions. Table 2 displays these results.

Table 2. Net benefit of retrofitting both Jim Bridger 3 & 4 under updated gas price, Synapse CO_2 price forecasts, and Company post-hoc corrections, using simple linear regression. *Low gas and high gas cases deviate from September 2012 forecast.

(millions 2012$)	Low Gas*	Base Gas (Sept.2012)	High Gas*
Synapse Low CO_2	[redacted]	[redacted]	[redacted]
Synapse Mid CO_2	[redacted]	[redacted]	[redacted]
Synapse High CO_2	[redacted]	[redacted]	[redacted]

With low gas prices, neither the low, mid or high CO_2 prices result in a net benefit from the installation of SCR. With base gas prices, only the low CO_2 price assumption favors SCR installation; a mid CO_2 price results in a PVRR(d) of [redacted] million, which I regard as too close to the margin of error to be definitive. High gas prices favor SCR installation regardless of the CO_2 price level.

Q Are Synapse's results the outcome of an optimization or production cost model?

A No. The Synapse results simply review the outcome of the Company's optimization model and test alternative outcomes from very generic changes to input assumptions. It is not clear if the outcome from an optimization or production cost model, appropriately modified, would produce the same results. I expect, however, that without additional modifications to the model structure or inputs, that the order of magnitude would remain the same within these results.

Q You have questioned the avoided transmission costs and incorporating the cost of remediating the Bridger coal mine – do these results address those outstanding questions?

A They do not. I address these issues individually and in turn below. Any modifications resulting from avoided transmission costs, avoidance of the remediation cost of the Bridger coal mine, or any other changes would be in addition to the results shown above.

5. Analysis Does Not Take Into Account Opportunity to Avoid or Defer Gateway Investments

Q What is the relevance of this transmission project to this case?

A If Jim Bridger units 3 & 4 were to be retired and replaced with capacity closer to PacifiCorp's load centers, it is quite likely that anticipated transmission expenditures could be avoided or deferred, with system savings in the hundreds of millions of dollars, depending on anticipated need.

In particular, I am concerned about the upcoming planned expenditures for the Gateway West Transmission Project, a transmission capacity expansion that extends directly through Jim Bridger.

It is not clear that the Company has adequately considered the opportunity to avoid transmission expenses by retiring units and replacing them with generation (or demand side management) closer to load centers.

Q What is the Gateway West Transmission Project?

A The Gateway West Transmission Project is jointly proposed by Idaho Power and Rocky Mountain Power to build and operate approximately 1,100 miles of new high voltage transmission lines between the Windstar Substation in Wyoming and the Hemingway Substation in Idaho. The project would include about 300 miles of 230 kV and 800 miles of 500 kV in new transmission lines and parallel three existing Western Electricity Coordinating Council (WECC) rated Paths. The Gateway West Transmission Project is currently planned in five segments – Windstar to Aeolus, Aeolus to Jim Bridger, Jim Bridger to Populus, Populus to Midpoint and Midpoint to Hemingway. Figure 4, below, shows a map of these major substations and proposed segments.

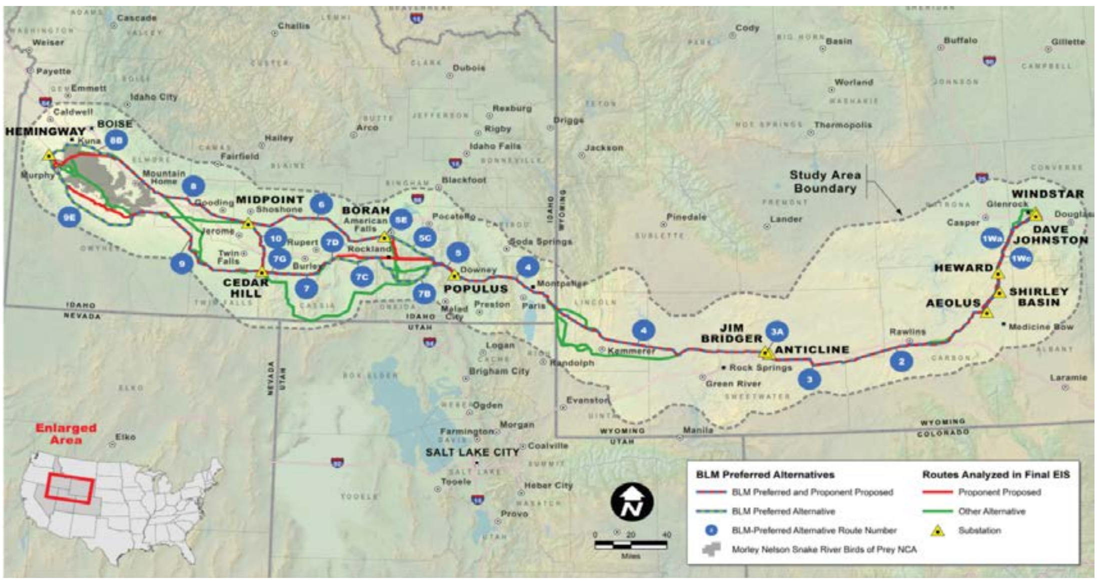

Figure 4. Map of Gateway West project from project website. Windstar is the furthest east point. Hemingway is the furthest west.
Source: http://www.gatewaywestproject.com/ (Attached as Exhibit 9).

Of particular concern to this case is the segment between Jim Bridger and Populus.

Q What is the configuration and capability of the existing transmission system, west of the Jim Bridger Generating Station?

A The current transmission system, <u>west</u> of the Jim Bridger Generating Station is also referred to as the Bridger West Path or WECC Path #19. It is comprised of the three 345 kV lines originating at the Jim Bridger Generation Station, as shown in Table 3, below. The Bridger West Path has an East to West rating of 2,200 MW with no established rating West to East.

Table 3. Current Bridger West Path segments and rating. Source: 2011 WECC Path Rating Catalog.

Bridger West Path Segments (Existing)	WECC Path Rating
Jim Bridger – Borah 345 kV	2200 MW (East to West)
Jim Bridger – Kinport 345 kV	
Jim Bridger – Goshen 345 kV	

Q How well is the Bridger West Path utilized at its current capability?

A Based on studies and analyses for the years 2007 to 2009, the Bridger West Path is highly utilized and as of 2009, had zero available transfer capability (ATC) for 95% of the year.[18] The path is, however, designed to be highly utilized to this level to accommodate the output of the Jim Bridger Generation Station, and therefore, such utilization is expected and appropriate.

Q What is the configuration of the proposed segment of the Gateway West Transmission Project?

A The proposed plan relevant to the transmission system west of the Jim Bridger Generating Station (Segment 4: Jim Bridger-Populus) is to add the Populus 500 kV & 345 kV buses, the 3 Mile Knoll 345 kV bus, and two Bridger-Populus 500 kV transmission lines to the existing transmission system.[19]

Q How does this change the Bridger West Path and what capability will be achieved after these additions are in service?

A As a consequence of Gateway West transmission additions, the enhanced Bridger West Path will be as shown in Table 4, below.

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[18] WECC Path Reports, 10-Year Regional Transmission Plan, Western Electricity Coordinating Council, September 2011 (Attached as Exhibit 10).

[19] Gateway West Comprehensive Progress Report, Idaho Power Company, Submitted to WECC, November 2008 (Attached as Exhibit 11).

Table 4. Current Bridger West Path segments and rating. Source: 2011 WECC Path Rating Catalog.

Bridger West Path Segments (Existing and Proposed)	**WECC Path Rating**
Jim Bridger - 3 Mile Knoll 345 kV	5,200 MW
Jim Bridger - Populus #1 345 kV	
Jim Bridger - Populus #2 345 kV	
Jim Bridger - Populus #1 500 kV	
Jim Bridger - Populus #2 500 kV	

The new path rating for the Bridger West Path will be 5,200 MW, by adding 3,000 MW of capability to the existing path rating of 2,200 MW.[20] In some documents[21] the project appears to be divided into two phases. It appears that the first phase may entail the installation of the first 500 kV line, and the second phase entails the installation of the second.

Q What are the expected in-service dates of the Gateway West Transmission Project?

A The proponents of the project, Idaho Power and Rocky Mountain Power, anticipate that the project will be brought online in phases between 2016 and 2021. Information provided by the Company suggests that two phases of the segment from Bridger to Populus will be brought online in [redacted].[22] The link, however, is modeled in [redacted] in the GRID model.[23]

Q How much will the Gateway West Transmission Project cost?

A The Company has indicated that the segments between Windstar and Populus will cost about [redacted].[24] The individual segments between Windstar and Populus are shown in Table 5, below.

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[20] Gateway West Transmission Line DRAFT EIS, US Bureau of Land Management, Chapter 1, Table 1.3-1, Neglecting additional 200 MW path rating not in presently in service, Published 2011 (Attached as Exhibit 12).
[21] Attach OCS 1.4-1 CONF (Attached as Exhibit 13).
[22] Attach OCS 1.4-1 CONF (Attached as Exhibit 13). See Jim Bridger to IPC East transmission segment.
[23] Attach OCS 1.4-2 CONF (Attached as Exhibit 14). In-Service date [redacted].
[24] Confidential Attachment OCS 11.2 (Attached as Exhibit 15).

Table 5. Cost of Windstar to Populus transmission line segments

Transmission Line Segments	Cost ($ millions)
Windstar – Aeolus	[redacted]
Aeolus – Bridger	[redacted]
Bridger – Populus	[redacted]
Total	[redacted]

It is not at all clear if these costs are for the entirety of the Gateway West project, or for the first phase of the project only. The evidence indicates that, based on a rough per-mile cost, that the cost of the Bridger – Populus segment may represent the cost of the first phase only (i.e. a single 500 kV line).

Q How will the enhanced Bridger West Path be utilized in the future?

A From a forward looking congestion analysis based on production cost model runs of 2019 and 2020 data sets, the Bridger West Path would not be heavily utilized or congested in 2020. In this expected future case, the Bridger West Path operated above 75% utilization for only 2.71% of the year.[25] This study assumed that only Phase 1 of the Gateway West transmission project was in service with a 3,700 MW rating for the Bridger West Path.

Q What is the opportunity to avoid transmission expenditures?

A The Bridger 3 & 4 units currently have a combined capacity of about 700 MW. If the [redacted] transmission line from Bridger to Populus no longer had to carry this load, the existing infrastructure could carry an additional 700 MW of capacity from other locations (i.e. wind further upstream, as suggested by the Company).[26]

In my opinion, the Company has not taken this potential into account. Indeed, the Company agrees that the "retirement of Jim Bridger 3 & 4 would reduce the need to transport thermal resources westward beyond the proposed Anticline substation

[25] WECC Path Reports, 10-Year Regional Transmission Plan, Western Electricity Coordinating Council, September 2011 (Attached as Exhibit 10).
[26] See OCS Data Request 11.4 (Attached as Exhibit 16).

and existing Populus substations from Wyoming to the Company's load centers, but it would not avoid the need for more transmission capacity out of Wyoming."[27] These two points to not agree with one other, as Populus is outside of Wyoming. The Company further states the "existing transmission system in Wyoming is highly constrained east of Bridger and limits the Company's ability to reliably transport low cost energy… sources therein." [28] However, the segment questioned here is west, not east of Jim Bridger. Were the Company to defer or avoid the cost of a 500 kV line by putting a replacement capacity resource at a different location (i.e. not at Bridger), the savings could easily be in the hundreds of millions of dollars.[29]

6. ANALYSIS DEPENDENT ON RECOVERY OF COSTS FOR SEPARATE ENTITY COAL COMPANY

Q What is the Company's planning proposal for the Bridger Coal mine if Bridger 3 or 4 are retired?

A According to Mr. Link, "the analysis takes into consideration how the fueling plan for the Jim Bridger plant would change if Jim Bridger Unit 3 and/or Unit 4 were to stop burning coal."[30] The Company explains that "there would be insufficient generation demand at the Jim Bridger plant to support the continued operation of the Bridger Coal surface operation in either the two-unit or three-unit operation,"[31] and therefore the Company would immediately begin the reclamation and closure of the surface mining operation. The Company asserts that it would be required by Wyoming rules to begin immediate remediation of

[27] OCS Data Request 1.83 (Attached as Exhibit 17).
[28] OCS Data Request 1.83 (Attached as Exhibit 17).
[29] For example, generic costs for a single kV circuit with a 1,500 MW capacity are approximately $1.8 million per mille (see Generation & Transmission Model Methodology & Assumptions, Western Renewable Energy Zones, Black & Veatch, June 2009, Attached as Exhibit 18). At 200 miles, avoiding a single circuit line could avoid around $360 million.
[30] Direct Testimony of Rick T. Link. Page 15, lines 300-302
[31] Response to OCS Data Request 4.7(b). September 26, 2012.

the coal mine under Wyoming statute.[32] To support the expensive (and near-term) closure process, the Company would need to collect additional fees from Bridger 1 & 2 in the form of a higher coal cost in the near term.

The overall impact of this decision on this CPCN analysis is that the Company burdens the decision to close Bridger 3 and/or 4 with significantly higher costs for coal at Jim Bridger, and additional capital costs for the coal mine incorporated into the gas conversion case.

Q What impact does this higher coal cost have on the analysis results?

A In the Company's base case, the difference due to the adjustment in fuel and capital costs at the Bridger mine amount to about $[redacted] million in favor of retaining coal generation at the Bridger 3 & 4 units.[33] This difference in outcome amounts to nearly half of the Company estimated total $[redacted] million benefit of maintaining coal generation at Bridger 3 & 4 under the Company's base gas (December 2011) and base CO_2 ($16/ton in 2021).[34]

Q What is the problem with the adjustment for the cost of coal at Jim Bridger?

A There are two issues with the attachment of the outcome of this analysis to the fate of the Bridger coal mine:

3. The sheer scale of the adjustment, nearly half of the favorable outcome of maintaining Bridger, shows that the Company has tied the fate of Jim Bridger generating unit to the profitability of the Bridger Coal Company. The

[32] Company cites to Wyoming Statutes Title 35 – Public Health and Safety, Chapter 11 – Environmental Quality, Article 4- Land Quality, 35- 11-402 Establishment of Standards (a) (iii) in response to OCS Data Request 4.8, September 26, 2012 (Attached as Exhibit 20)

[33] See response to Data Request OCS 12.3 (Attached as Exhibit 21), November 2 2012. In Attach 12.3 CONF. In case where JB3&4 are coal, adjustment to coal cost is -$15.6 M [Coal Adjustments D126] and to fixed costs are -$38.6 M [Mine Capital Adjustments D20]; in retirement case, adjustment to fuel is +$129.6 M [Coal Adjustments D280] and to capital cost is -$0.2 M [Mine Capital Adjustments D79]. Total difference is $183.6 M.

[34] Company re-adjusted figures in response to OCS 12.3 and supplied revised values in worksheet dated 11/2/2012.

Company would literally be operating a generating station just so that it could pay off the remediation costs of a mining interest.

4. Bridger Coal Company could feasibly sell coal to other facilities, maintaining surface operations and offsetting remediation costs, and therefore not burden the Bridger unit with the costs of an accelerated remediation process.

Q Why is the impact of remediation a problem for the analysis outcome?

A Maintaining the profitability of a coal mine is an unusual and probably inappropriate reason to spend on an expensive environmental retrofit required for the continued operation of an electric generating unit. The conclusion that cases in which PVRR(d) results fall between [redacted] million and the breakeven point in favor of SCR installation, therefore, are questionable and strongly dependent on a requirement that ratepayers assume responsibility for Bridger Coal Company's profitability. This category of questionable cases includes the updated base gas price (September 2012) at the mid and low Synapse CO_2 prices as well as the updated low gas price at the zero CO_2 price.

Q Has the Company calculated potential savings from sales of Bridger coal to other entities?

A No. The Company states that it would be unable to sell Bridger coal. According to the Company, "Bridger Coal Company is located in southwest Wyoming, a relatively small niche market. The vast majority of the coal produced in this region is consumed locally either by the "trona" patch companies or power plants."[35] The Company goes on to describe the lack of demand for this particular brand of coal, and that "the lack of competitive transportation alternatives undermines the ability of Southwest Wyoming coals to economically compete with coals from other production basins." It is not clear if the Company has issued any form of market exploration to see if such sales could or should be pursued.

[35] Response to OCS Data Request 6.25

Q Is there any evidence showing that Bridger coal could be sold economically?

A Yes. Although I am not in possession of PacifiCorp fuel contracts or information regarding transportation costs, Company information shows that Bridger coal could competitively supply at least [redacted] PacifiCorp coal plants in the case that Jim Bridger 3 & 4 are taken out of service.

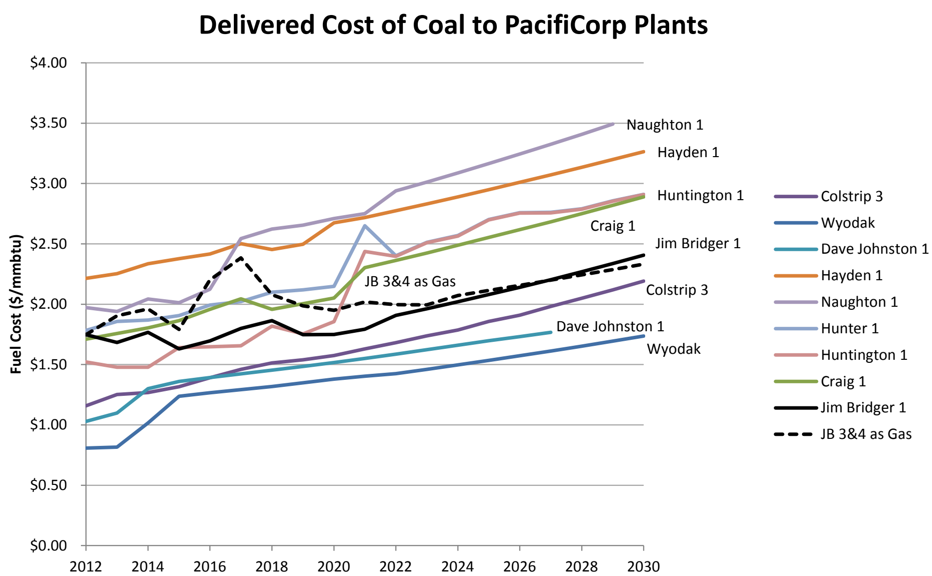

Figure 5. Confidential. Source: Master Assumptions (10 - Coal Fuel Cost No Refuel) and PVRR_Tables_Final_JB3+4 (Coal Adjustments)

Figure 5, above, shows the delivered cost of coal as assumed by the Company in this analysis (excluding Cholla). The expected long-run cost of coal at [redacted] are all more expensive than the expected cost of Bridger coal from 2020 through most of the analysis period, and both [redacted] coals are over a dollar per MMBtu more expensive than Bridger after 2016. Accordingly, purchasing Bridger coal could represent a cost savings to these [redacted] plants.

Without additional information about the potential transportation costs from Bridger to other generators, or about the potential capital costs required to enable significant export from Bridger mine, I cannot definitively state the expected cost of transporting the coal from Bridger mine to other PacifiCorp sites. However, Black Butte mine, which delivered approximately 42% of Jim Bridger's coal supply in 2011,[36] also delivers coal to North Valmy station in northern Nevada, about 500 (road) miles distant. In 2011, Black Butte delivered coal to Jim Bridger at an average price of $1.87/MMBtu, and to Valmy at $2.87/MMBtu.[37] If the differential here of approximately $1/MMBtu is due to transportation costs alone, evidence indicates that Bridger mine coal could be delivered to other PacifiCorp locations at a competitive price to their anticipated supply costs.

Q How would selling Bridger mine coal benefit the economics of the decision to install SCR at Jim Bridger?

A The Company has assumed that the Jim Bridger unit alone should bear the cost of an accelerated mine closure, and has tied the fate of the Jim Bridger coal unit to that of the mine. If these costs can be decoupled, i.e. if the Company can find a reasonable strategy such that it could still recover costs for the Bridger mine closure, then the Company would not need to make this inverted decision – that of choosing to maintain a plant simply to recover mine remediation costs. Selling Bridger mine coal to third parties, or other PacifiCorp generating units, could provide such an opportunity. Under this assumption, even if continuing mine operation is not optimal from the mine's standpoint, if the overall burden to ratepayers is reduced then the solution is an improvement.

Q What is your recommendation for this analysis regarding coal prices?

A The Company has not substantiated that Bridger Coal Company can only sell coal to the Bridger Plant or that the Bridger Plant can only purchase coal from the Bridger Coal Company. If it is possible for Bridger Coal Company to sell its coal, than it should be projected to do so at the market price, and if it is possible for the Bridger Plant to purchase coal, than it should be projected to do so at the market

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[36] US DOE EIA. Form 923. 2011. Schedule 5.
[37] US DOE EIA. Form 923. 2011. Schedule 5. Simple average for 2011 reported data.

price. Unless the Bridger Coal Company and Bridger Plant are in fact a single business entity, the appropriate way to evaluate the impact of future coal prices on Bridger Plant operations is to use the opportunity cost of coal at the market price.

While I have not reviewed projections of the future market price of coal, I can say the following. If the market price for coal is higher than price currently charged by Bridger Coal Company to Bridger Plant, that higher price should be used in analysis, and if the market price for coal is lower than the projected price that will be charged by Bridger Coal Company to Bridger Plant in the event of accelerated surface mine reclamation due to Bridger 3 & 4 retirement, that lower market price should be used in analysis. As in any forward looking planning, decisions regarding the future operating strategy for Bridger 3 & 4 should be based on analysis using the future market prices for coal and not the Bridger Coal Company price.

7. Conclusions and Recommendations

Q In the sections above, you describe concerns with three areas of the Company's analysis. Does this mean that you agree and concur with all of the Company's remaining analysis and conclusions?

A Not at all. Due to the extremely short window in which we were able to review confidential materials from the Company, I am unable to comment at this time on other elements of the Company's analysis.

Q Are you able to draw any firm conclusions on the outcome of this analysis?

A At this time, my conclusions are attenuated by the limited scope of Company materials and analysis that I have had the opportunity to review. From the three major areas I have discussed here, (a) gas and CO_2 prices, (b) the opportunity to avoid transmission investments, and (c) the assumption Jim Bridger generating station must make whole Bridger Coal Company, it is my opinion that there is sufficient evidence to show that the retrofit of Bridger is not in the best interests of ratepayers. The analysis shows a marginal, at best, outcome for ratepayers in a reasonable and updated base case. Further, the Company's continued inability to find opportunities to protect ratepayers against inefficient investments shows that the investment is not merely marginal, but a net liability for consumers.