

**BEFORE THE
Washington Utilities and Transportation Commission**

In the Matter of

PACIFIC POWER AND LIGHT
COMPANY

Petition For a Rate Increase Based on
a Modified Commission Basis Report,
Two-Year Rate Plan, and Decoupling
Mechanism.

UE-152253

**Corrected
Cross-Answer Testimony of
Jeremy I. Fisher, PhD**

**On Behalf of
Sierra Club**

REDACTED

April 7 8, 2016

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Exhibit List

Exhibit No. JIF-4 17 Response to Sierra Club DR 1.13(~~b~~)

Exhibit No. JIF-2 18 ~~Response to Sierra Club DR 1.13(d-e)~~ Response to Sierra Club 1.11

*This corrected testimony corrects the numbering of the exhibits. No other changes have been made to the testimony.

1 **1. INTRODUCTION AND PURPOSE OF TESTIMONY**

2 **Q Are you the same Jeremy Fisher that submitted direct testimony in these**
3 **proceedings?**

4 **A** Yes.

5 **Q What is the purpose of your testimony?**

6 **A** I offer specificity on two concerns raised by Staff's witness Mr. Jeremy Twitchell
7 in his direct testimony. In particular, I address the feasibility of performing
8 updated analyses in response to requests from this Commission and its Staff, and
9 specifically the feasibility of performing System Optimizer Model ("SO Model")
10 analyses in a rapid timeframe. In addition, I address Mr. Twitchell's assessment
11 of PacifiCorp's ("Company") treatment of dispatch costs based on the new mine
12 plan at Bridger Coal Company in late 2013.

13 **Q Do you have any recommendations for the Commission considering your**
14 **comments below?**

15 **A** I do not have any additional recommendations beyond those provided in my direct
16 testimony with regard to the Company's filed case in this proceeding. However,
17 based on the issues discussed in this proceeding, I do have two general
18 recommendations that the Commission may consider for ongoing procedural
19 matters with PacifiCorp. First, I recommend that the Commission require that
20 Staff and intervenors be granted access to PacifiCorp's SO Model in future cases.
21 Second, I recommend that the Commission require that PacifiCorp incorporate the
22 reasonably attributed variable costs of production to Bridger in both forward long-
23 term planning modeling, as well as in net power cost GRID modeling. These
24 avoidable costs should include both variable operations and maintenance
25 expenses, as well as the amortized cost of future expected capital incurred at
26 Bridger coal mine.

1 **2. SYSTEM OPTIMIZER MAY BE READILY UPDATED**

2 **Q Prior to this proceeding, had the Commission raised concerns about updated**
3 **information regarding the Bridger SCR analysis?**

4 **A**Yes. In his testimony, Mr. Twitchell noted that the Commission’s November 25,
5 2013 Acknowledgment Letter for PacifiCorp’s 2013 IRP had previously
6 “requested two analyses of the Company in its 2013 IRP Update: a break-even
7 analysis that would identify the levelized forward price for natural gas at which
8 gas conversion would become cost effective, and an updated analysis based on
9 current data.”¹ The Acknowledgment Letter cited by Mr. Twitchell specifically
10 identified gas price futures that were, at the time, “trading below \$5.00 per million
11 Btu (MMBtu) into the next decade, which is somewhat lower than forecasts
12 available at the time of the Company’s coal analysis.”²

13 **Q At the time of the Commission’s request, was PacifiCorp fully committed to**
14 **proceeding with installation of SCRs at Bridger 3 & 4?**

15 **A**No. As discussed in my Direct Testimony, the Company did not issue its Full
16 Notice to Proceed (FNTP) on the SCR project until December 2, 2013³ – one
17 week after the Commission made its requests in the IRP acknowledgement letter.

18 **Q What is your opinion of the Company’s responsibility to re-evaluate its**
19 **decision before committing to significant expenditures on behalf of**
20 **ratepayers?**

21 **A**As I stated in my direct testimony, the Company bore a responsibility to assess
22 decisions that could extend the lives of its aging coal plants up to the time that the
23 decision is made and beyond to ensure that the decision remained cost effective.⁴

¹ Direct Testimony of Jeremy B. Twitchell (JBT-1CT) page 22, lines 5-8.

² Washington Utilities and Transportation Commission. PacifiCorp 2013 IRP Acknowledgement Letter – Attachment. Docket UE-120416. Page 3.

³ Direct Testimony of Dr. Jeremy Fisher (JIF-1T) page 8 at line 18

⁴ Direct Testimony of Dr. Jeremy Fisher (JIF-1T) page 46 at 17-19.

1 This responsibility is borne by the Company regardless of the Commission's
2 request, but the Commission's request should have acted as an overt reminder of
3 that responsibility.

4 **Q When did PacifiCorp perform the updated analysis as requested by the**
5 **Commission?**

6 **A** As far as I know, never. Mr. Twitchell testified that no response came from the
7 Company until the IRP Update on March 31, 2014, and even then the Company
8 did not perform either of the updated analyses based on current data.⁵ Mr. Link
9 had performed a breakeven analysis in the pre-approval proceedings in Utah⁶ and
10 Wyoming⁷ eight months before the Commission's November 2013
11 Acknowledgment Letter. The only update performed by Mr. Link was to assess
12 whether gas prices in September 2013, two months before the Commission's
13 request, were above or below a notional breakeven price.

14 **Q Could the Company have performed a more comprehensive analysis in the**
15 **week before the FNTF date of December 2, 2013?**

16 **A** Yes. The System Optimizer framework makes it fairly straightforward to update
17 fundamental assumptions like gas and coal prices, market energy prices, online or
18 retirement dates, and new resource costs. As I discuss below, the SO Model runs
19 fairly quickly, and the Company's post-processing stream would have allowed for
20 a rapid turnaround assessment before December 2, 2013.

⁵ Direct Testimony of Jeremy B. Twitchell (JBT-1CT) page 22, lines 5-8.

⁶ Rebuttal Testimony of Mr. Rick Link in Utah Public Service Commission Docket 12-035-92, page 31. February, 2013.

⁷ Rebuttal Testimony of Mr. Rick Link in Wyoming Public Service Commission Docket 20000-418-EA-12, pages 35-36. March 2013.

1 **Q Did Mr. Twitchell identify any other occasions in which PacifiCorp failed to**
2 **appropriately respond to a request for additional analysis?**

3 **A** Yes. In this docket, Staff requested that PacifiCorp “quantify those costs [of
4 replacement power during gas conversion] and compare them to any replacement
5 power costs modeled during the period of SCR installation.”⁸ It is my opinion that
6 the Company’s response to Staff’s request was inaccurate, or at least
7 demonstrated a poor understanding of a basic request. The Company responded
8 that “the costs of the replacement power cannot be isolated as the system
9 optimizer model (SO Model) rebalances the system when resource availability
10 changes through dispatch and market transactions on an economic basis.”⁹ In fact,
11 based on my experience using the SO Model, it would have been fairly
12 straightforward to respond to Staff’s data request.

13 **Q Does the Company have the ability to quantify the costs of replacement**
14 **power during gas conversion as compared to the cost of replacement power**
15 **during the period of the SCR installation?**

16 **A** Certainly. This analysis is very straightforward in the SO Model framework. It
17 entails simply performing a single scenario analysis in which the date of the gas
18 conversion is shifted back by a few months, from January-February 2016 and
19 2017 (Bridger 3 & 4, respectively) to April-May (or September-November, as
20 used by Staff) of 2015 and 2016, respectively. Comparing the costs of this
21 scenario to the base case would reveal the relative difference between the cost of
22 replacement power during the period of the gas conversion and the period of the
23 SCR installation, as well as any change in benefit incurred by reducing coal
24 generation earlier than the end of the year. I agree with Mr. Twitchell’s
25 assessment that this request would have been “well within the Company’s

⁸ Exhibit No. JBT-15, PacifiCorp response to Staff Data Request 15.

⁹ Exhibit No. JBT-15, PacifiCorp response to Staff Data Request 15.

1 abilities to perform”¹⁰ and one that the Company “could have reasonably met
2 within 10 business days”.¹¹

3 **Q Why are you confident that the Company could have performed the analysis
4 update and replacement power assessment within a short timeframe?**

5 **A** I have worked directly with the SO Model regarding PacifiCorp’s planning
6 process, as well as in an ongoing project on behalf of the Michigan Public Service
7 Commission. I am familiar with the model’s operation, and I know that the model
8 can be rapidly modified to meet both the Commission’s and Staffs’ requests.

9 I reviewed PacifiCorp’s use of the SO Model on behalf of Sierra Club during
10 proceedings on the Company’s 2015 IRP before the Oregon Public Utility
11 Commission (OPUC docket LC 62).¹² In order to perform this review, Sierra Club
12 purchased a license to the System Optimizer software. My colleagues and I were
13 able to use inputs provided by PacifiCorp to both replicate the Company’s outputs
14 and to perform several sensitivity analyses (as discussed in Sierra Club’s IRP
15 comments). Those analyses included modifications to the Company’s assumed
16 energy prices and the disposition of its coal-fired resources, similar to those that
17 were requested by Commission staff this docket.

18 The SO Model structure is certainly complex. However, one of the program’s key
19 capabilities is the ease with which it enables scenario analysis. After having
20 defined a base or reference case, users are able to construct scenarios that differ
21 from the reference case only in specific parameters or inputs. These scenarios can
22 then be layered over top of the reference case inputs, such that only the desired
23 parameters are altered without requiring that the user re-define the rest of the
24 scenario (namely, those inputs or parameters that do not change from the
25 reference to the scenario case). In fact, the system is designed, and used by

¹⁰ Direct Testimony of Jeremy B. Twitchell (JBT-1T) page 42 at lines 17-18

¹¹ Direct Testimony of Jeremy B. Twitchell (JBT-1T) page 43 at line 1

¹² See “Sierra Club’s Comments on PacifiCorp’s 2015 IRP”, Oregon Docket LC 62
<http://edocs.puc.state.or.us/efdocs/HAC/lc62hac134513.pdf>

1 PacifiCorp, to accommodate ongoing updates as new information is made
2 available. Updates to thermal resource parameters, transmission buildouts, and
3 new gas and energy market price forecasts are dated and overlaid into the analysis
4 structure.

5 Given this capability, it should have been very straightforward for the Company
6 to respond to the Commission's several requests for updated analyses. Indeed,
7 while Mr. Twitchell generously noted that it "may have taken a day or two for the
8 models to actually run,"¹³ in my experience such model runs would have taken
9 less than a day to execute. While the input development that the Company would
10 have had to perform in order to fully update its SCR analysis in light of changing
11 fuel price forecasts would have taken longer than a day, it still would have been
12 reasonable to complete such an analysis in the week between when the Company
13 received the Commission's request and when it issued its FNTP. Had the
14 Company truly been pressed for time, it could have requested a short extension of
15 time to complete the task. But again, rushed conditions or request for an
16 extension of time should not have been necessary, as the Company bore the
17 responsibility to maintain an updated analysis up to, and beyond, the date that the
18 decision to proceed was finalized.

19 **Q Do you believe it is appropriate to predict alternative model outcomes based**
20 **on different input assumptions, even without access to the SO Model?**

21 **A** Yes, although such analyses are necessarily limited. I agree with Mr. Twitchell
22 that "without access to the SO Model, it is impossible to predict *exactly* how [the
23 system] would respond"¹⁴ to changes in inputs. However, while lacking access to
24 exact predictions, it is still reasonable to use data such as was provided in these
25 proceedings to estimate the impact of simple assumption or input changes.
26 Indeed, without access to the SO Model, intervening parties have no choice but to

¹³ Direct Testimony of Mr. Jeremy B. Twitchell (JBT-1T) page 42 at lines 21-12

¹⁴ Direct Testimony of Mr. Jeremy B. Twitchell (JBT-1T) page 33 at lines 4-5; emphasis added

1 perform such analyses as the best possible means of scrutinizing PacifiCorp's
2 decisions.

3 These *ad hoc* analyses are generally limited by the information provided by the
4 Company from their own SO analyses. For example, if the Company's assessment
5 of the impact of high and low gas price impacts had not been approximately linear
6 (i.e. directly predicted the outcome in a straightforward way), it would be
7 impossible for parties to assess the outcome at alternative gas price markers.
8 However, other compelling questions, such as whether the Company's anticipated
9 transmission upgrades in the Gateway West project are potentially avoidable if
10 Bridger retires in full (rather than replaced with gas), or whether additional
11 qualifying facilities under PURPA change the assessment of need, or whether the
12 variable cost of Bridger plant is higher than modeled by the Company, are nearly
13 impossible to assess without direct access to the SO Model.

14 **Q Do you have any recommendations for the Commission considering these**
15 **comments?**

16 **A** Yes. Considering the extent to which the Company's analyses using the SO
17 Model inform its resource decisions and planning, I echo Mr. Twitchell's
18 comments that "if the Company is going to rely on the SO Model to support
19 future prudence reviews, then it must find a way to make the model accessible to
20 intervening parties."¹⁵ I recommend that as part of its findings in this case, the
21 Commission require PacifiCorp to ensure that both staff and intervening parties
22 be allowed access to its SO Model in future prudence reviews and related
23 proceedings.

¹⁵ Direct Testimony of Jeremy B. Twitchell (JBT-1T) page 32 at lines 10-11

1 **3. THE COMPANY'S PORTRAYAL OF COSTS AT BRIDGER UNDERVALUES VARIABLE**
2 **COST**

3 **Q Mr. Twitchell testified that the Company's evaluation of updated coal costs**
4 **should not have reduced projected generation at Bridger because "Bridger**
5 **units 3 & 4 would remain among the lowest-cost resources in the Company's**
6 **profile on an average variable cost basis, and are below the model's**
7 **projected prices at the six market hubs where the Company transacts."¹⁶ Do**
8 **you agree with his assessment?**

9 **A** No. Mr. Twitchell's assessment is correct only if one takes the Company's
10 portrayal of variable costs at the Bridger plant at face value. The Company's
11 portrayal of the variable cost of operation at Bridger plant underrates its
12 production costs in the SO Model, particularly in out-years.

13 **Q How does the Company undervalue the variable cost of operation at Bridger**
14 **plant in the SO Model?**

15 **A** There are two specific costs that the Company mischaracterizes and undervalues
16 at Bridger: (a) variable operations and maintenance costs ("O&M") and the (b)
17 cost of coal procured from the Bridger mine. Taken together, these costs would
18 likely result in a substantially lower dispatch of Bridger in the SO model.

19 **Q Please explain how the Company mischaracterizes variable O&M costs at**
20 **Bridger in the SO Model.**

21 **A** The Company's SO Model does not distinguish between variable and fixed O&M
22 expenses at Bridger¹⁷ or any of the Company's coal plants. Instead, the
23 Company's practice is to cluster both expenses into an annual fixed cost, which is
24 then bundled with amortized capital costs. Overall, the only variable cost of

¹⁶ Direct Testimony of Jeremy B. Twitchell (JBT-1T) page 36, line 18 to page 37, line 1.

¹⁷ See response to Sierra Club DR 1.13(b), attached as Exhibit JIF-4 17. Sierra Club asked for the entries for Bridger in the variable O&M file used in the SO Model analysis of this case. The Company responded that "the referenced file "CAPEX_VOM.gms" does not contain entries for the Jim Bridger plant.

1 production that is seen by the SO Model for Bridger is the cash cost of coal (a
2 fraction of the overall coal cost) and emissions costs for carbon dioxide (CO₂)
3 when applicable.

4 A significant portion of Bridger's O&M costs are indeed variable in nature, and
5 the Company even acknowledges that a significant portion are considered variable
6 for the purposes of dispatch.¹⁸ Nonetheless, the Company models no variable
7 O&M costs in the SO Model, or apparently even in the net power cost GRID
8 model¹⁹ used for ratemaking purposes.

9 In response to a discovery request, the Company provided a breakdown of O&M
10 costs it expects to be incurred at Bridger,²⁰ broken into run rate costs, routine
11 expenses, overhaul costs, and costs incurred for specific environmental
12 equipment. Within these categories, the Company broke down labor, chemical,
13 and "other" expenses. Following the Company's guidance that "reagent costs for
14 emission [*sic*] control equipment are assumed to be variable O&M,"²¹ in my own
15 testimony I assumed that chemical costs were variable. While it is likely that
16 elements of labor and "other" are also variable in nature, in my testimony I erred
17 on the conservative side and assumed all non-chemical costs were fixed.

18 Chemical costs amounted to about [REDACTED] % of total O&M incurred at Bridger 3 & 4
19 from 2016-2030. To put this in context, the Company anticipates average O&M
20 costs at Bridger 3 & 4 of about \$ [REDACTED] per year (2016-2030).²² By
21 comparison, the Company's SO Model reports total fuel costs at Bridger 3 & 4 of
22 about \$ [REDACTED] per year. Thus, variable O&M costs amount to an increment

¹⁸ See response to Sierra Club DR 1.13(d-e), attached as Exhibit JIF-2 17. In SC DR 1.13(d), the Company affirmed that variable O&M costs were assumed for the purposes of Bridger at the present time (i.e. operational dispatch). The Company then explained in SC DR 1.13(e) that "for modeling purposes, the reagent costs for emission [*sic*] control equipment are assumed to be variable O&M."

¹⁹ See response to Sierra Club DR 1.13(g). "Only coal fuel supply expenses for Jim Bridger are included in the Generation and Regulation Initiative Decision Tool's (GRID) dispatch decision for Jim Bridger."

²⁰ Response to Sierra Club DR 1.13(b), 1st Supplemental.

²¹ See response to Sierra Club DR 1.13(e).

²² Sierra Club DR 1.13(b), 1st Supplemental. Dollar year not given in workpaper; appears to be in constant 2011\$ or 2012\$.

1 of about █% above the Company's modeled variable production costs.²³ These
2 variable O&M costs at Bridger are not captured in either the Company's SO
3 Model or its GRID model. This means that the Company's models underestimate
4 the short run variable cost of Bridger, and thus the savings achievable when
5 Bridger does not run.

6 **Q Please explain how the Company mischaracterized the cost of coal procured**
7 **for Bridger's use in the SO Model.**

8 **A** In the SO Model, the cost of coal delivered to Jim Bridger specifically excludes
9 the depreciation and amortization of both past as well as expected future capital
10 investments.²⁴ In UT docket 13-035-184, the Company explained that "the cash
11 operating costs per the SCR analysis exclude all non-cash costs (depreciation,
12 depletion, and amortization) for past capital investments."²⁵

13 I agree that past investments are appropriately regarded as sunk and therefore
14 unavoidable, however, expected future capital investments at the coal mine should
15 generally be avoidable, and should therefore largely be a component of the
16 variable cost of production – at least in out years. If it is economic for the
17 Company to take less coal from the mine in future years because the costs of coal
18 are outweighed by the benefits of acquiring energy from other resources, the
19 Company's model should (and can) logically reflect these decisions. Right now,
20 the Company's model does not (and cannot) reflect these decisions because a
21 significant fraction of the cost of the coal is considered pre-sunk: i.e. incurred as
22 an unavoidable fixed cost, regardless of the likely or possible future generation at

²³ Of the ~\$█ million in O&M costs, █% should be considered variable (or \$█ million). As an increment to the currently variable fuel costs, this would entail an increment of █%.

²⁴ See Company response to Sierra Club 1.11(e), attached as Exhibit JIF-18. A review of Company workbooks confirms that the amortization of expected future capital investments are excluded from forward-looking cash costs.

²⁵ Exhibit JIF-7. Rebuttal Testimony of Mrs. Cindy Crane in Utah Docket 13-035-184, page 5 at 108-111. June 2014. Emphasis added.

1 the plant. The Company's model should regard future capital costs at the mine as
2 largely avoidable and therefore part of the variable cost of production.

3 One useful analog is with regards to take-or-pay contracts for fuel. When a plant
4 enters a take-or-pay contract with a fixed cost provision, the only fixed
5 component of the fuel price are liquidated damages that would be incurred
6 through withdrawing from the contract. The plant incurs all other costs of the fuel
7 as effectively avoidable (i.e. variable with the production of the plant), and
8 therefore should dispatch with these costs incurred on a variable basis.

9 Similarly, capital costs for the Bridger Coal Mine that the Company may incur at
10 any time in the future are, to a large extent, avoidable based on the amount of
11 consumption at the plant. These avoidable expenses should therefore be modeled
12 as a variable cost. To do otherwise ensures a less than optimal result.

13 To put the impact of this adjustment in perspective, the amortized capital costs at
14 Bridger mine amount to ■% - ■% of the total cost of production.²⁶ In the current
15 modeling, these costs are simply passed through as fixed expenses, bypassing
16 even the SO Model and are simply entered as line item "additions" into Mr. Rick
17 Link's post-processing analysis.

18 Incurring future capital costs at the Bridger mine as a variable cost of fuel would
19 increase the cost of fuel supplied to Jim Bridger plant by roughly another ■% -
20 ■%, in addition to the variable O&M costs I discussed earlier.

²⁶ Based on 4-Unit OPEX-CAPEX, BCC Production-Operating Schedules in Attachment to Sierra Club DR response 4.33 CONF.

1 **Q What is your response to Mr. Twitchell's assessment that increasing coal**
2 **costs at Bridger would likely not reduce the generation pattern of the plant**
3 **because the plant's variable cost is well below market energy prices?**²⁷

4 **A** I disagree with Mr. Twitchell on this count. In my opinion, PacifiCorp
5 undervalues the variable cost of production at Jim Bridger by 25% or more in
6 normal SO Modeling. This error would be even more pronounced once the new
7 fuel costs are applied. Indeed, without adjusting the variable cost of fuel provided
8 to Jim Bridger from the Bridger mine at all, but just accounting for Bridger's
9 reasonable variable O&M and the updated fuel costs, the variable cost of Bridger
10 increases by ■% from 2015-2020, and ■% from 2021-2030. Adding in the
11 impact of reasonably avoidable future capital expenses would increase the cost
12 from what was modeled by ■% or more, a substantial increase.

13 When we take into account the fact that regional energy prices had substantially
14 dropped along with gas prices by the time the full notice to proceed was issued, I
15 believe that Bridger's cost of production would have been marginal in multiple
16 months of the year relative to forward-looking market energy prices. In other
17 words, I think that Bridger should dispatch at a lower capacity factor in the
18 forward-looking SO model, taking into account reasonable variable costs.

19 **4. RECOMMENDATIONS**

20 **Q Please summarize your conclusions and recommendations.**

21 **A** First, I responded to Mr. Twitchell's concerns that the Company could not
22 provide adequate SO Model results in a timely fashion when requested by staff or
23 required by the Commission. Based on my experience with the SO Model, it is
24 my opinion that the Company has the expertise and resources to respond rapidly
25 to requests to provide updates within the SO Model framework. The model is
26 flexible and readily modified. Both Staff's request to assess the impact of the date

²⁷ Direct Testimony of Jeremy B. Twitchell (JBT-1T) page 36, line 12 to page 37, line 5.

1 of the gas conversion, and this Commission's more pressing request to have the
2 Company provide an updated assessment of the economic benefit of the Bridger 3
3 & 4 SCRs prior to moving forward on the project can be quickly executed within
4 the SO framework. The fact that the Company did not provide these runs to the
5 Commission, Staff, or other intervenors effectively handicapped this Commission
6 at a critical juncture.

7 I agree with Mr. Twitchell that parties should be able to access a copy of the
8 Company's forward-modeling software (in this case, the SO Model) such that
9 decisions may be reviewed without the Company's filter – either on timing or in
10 content. I recommend that, as part of the outcome of these proceedings, the
11 Commission require that parties be granted access to PacifiCorp's SO Model in
12 future prudence review cases.

13 Second, I responded to Mr. Twitchell's assessment that increasing coal costs at
14 Bridger were unlikely to cause the plant to dispatch differently because of its
15 competitive nature on a variable basis. I found that the Company's failure to
16 separate variable and fixed O&M costs substantially undervalued the cost of
17 production. Further, I found that the Company's inclination to pass through future
18 capital costs incurred at the Bridger mine as fixed expenses, rather than avoidable
19 costs, also significantly undervalued the variable cost of production. Taken
20 together, along with the increased cost of coal in the late 2013 mine plan and
21 lower cost of market power with decreasing gas costs, the Bridger plant could, or
22 should, have dispatched within the SO Model at a lower capacity factor. In other
23 words, the Company may be dispatching Bridger non-economically today, and is
24 likely over-estimating its economic value through dispatch in the forward model. I
25 recommend that on a forward going basis, this Commission require that the
26 Company appropriately account for variable O&M costs and avoidable coal
27 expenses in the variable cost of production in both the SO Model and the net
28 power cost GRID model.

1 **Q** **Does this conclude your testimony?**

2 **A** It does.