BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF THE VOLUNTARY REQUEST OF ROCKY MOUNTAIN POWER FOR THE APPROVAL OF RESOURCE DECISION TO REPOWER WIND FACILITIES	))))))))	**DOCKET NO. 17-035-39** **DPU Exhibit 2.0 Dir** **Testimony and Exhibits** **Daniel Peaco**

FOR THE DIVISION OF PUBLIC UTILITIES
DEPARTMENT OF COMMERCE
STATE OF UTAH

CONFIDENTIAL

Testimony of

Daniel Peaco

On Behalf of the Division of Public Utilities

September 20, 2017

CONFIDENTIAL-SUBJECT TO UTAH PUBLIC SERVICE COMMISSION RULES 746-1-601 and 603

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ATTACHMENTS

DPU Exhibit 2.1 DIR, Resume of Daniel Peaco

DPU Confidential Exhibit 2.2 DIR, Estimated Value of Incremental Repowering Generation – First 10 Years

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I. Introduction

Q. What is your name and business address?

A. My name is Daniel Peaco. I am employed by Daymark Energy Advisors, Inc. (Daymark) as a Principal Consultant. My business address is 48 Free Street, Portland, Maine 04101.

Q. On whose behalf are you testifying in this proceeding?

A. I am submitting testimony on behalf of the Utah Division of Public Utilities (Division) with regard to the Application for Approval of Resource Decision to Repower Wind Facilities filed on June 30, 2017 (the "Application" or the "Filing") by Rocky Mountain Power ("RMP" or the "Company") with the Utah Public Service Commission (the Commission) for approval of its plan to repower certain existing wind resources. This matter has been designated as Docket No. 17-035-39.

Q. Please summarize your professional experience and qualifications.

A. I have more than 35 years of a broad set of policy, planning and decision support experience in electric power industry planning. With respect to the subject of this testimony, my consulting practice has included a number of engagements in which I have provided expert testimony related to energy, economic, and environment assessments of proposed transmission and renewable energy projects.

I have been employed at Daymark since 1996 and currently serve as Chairman of our Board, a position I have held since 2002.

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Q. Have you previously testified before the Utah Public Service Commission or other commissions?

A. This is my first appearance before the Utah Public Service Commission. I have testified on numerous occasions before a significant number of state and provincial regulatory commissions and siting authorities across the U.S. and Canada. My resume and a complete listing of my expert witness appearances are included in DPU Exhibit 2.1 DIR.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to examine the economics, reliability, and risks of the 12 repowering projects proposed by the Company. The assessments included in my testimony focus on whether any or all of the repowering projects are likely to be lowest reasonable cost resources, the short-term and long-term impacts on Utah ratepayers, and the resulting economic risks to Utah ratepayers.

In particular, my testimony includes the following issues:

- For each of the projects, does the Company's analysis demonstrate that each of the 12 projects will deliver cost-effective energy to Utah ratepayers?
- Is the Company's modeling analysis sound, and does it provide an accurate representation of the economic benefits of each of the 12 projects to Utah Ratepayers?
- Does the Company's analysis of the repowering projects reasonably consider all of the uncertainties that have bearing on the risk to Utah ratepayers that the projects may not deliver cost-effective energy?

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Q. What exhibits are you sponsoring?

A. I am sponsoring two Exhibits in this testimony, as follows:

- DPU Exhibit 2.1 DIR is my resume;
- DPU Confidential Exhibit 2.2 DIR presents the calculation of the Estimated Value of Incremental Repowering Generation – First 10 Years.

II. Summary of Conclusions

Q. Please summarize your conclusions and recommendations regarding the issues addressed in your testimony.

A. Based upon my review, I offer the following conclusions:

- The Company's conclusion that the proposed repowering projects will provide significant energy cost savings to Utah ratepayers is not supported by its own analysis. Its own 30-year analyses show that savings to the Company's customers under plausible assumptions could be as low as $41 million (or lower), which is approximately 4% of the $1.13 billion investment. The Company's 20-year analyses show the potential for a net loss to customers over that period. By contrast, approval of the proposed plan would assure the Company the opportunity to earn a return on investment [redacted].
- The Company's analysis of the repowering project economics is significantly flawed. I have identified a number of problems with the methodology and

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analysis that cause me to conclude that the savings analysis is not a sound or reasonable basis for supporting the Company's recommendation.

- The Company's proposal is structured to have the ratepayers assume nearly all of the risk inherent in these projects. These risks include the natural gas pricing and carbon pricing policies that the Company has evaluated and many other important risks that the Company has not evaluated. These additional risks include PTC qualification for each facility, project feasibility and cost, completion of projects on schedule for PTC qualification, and potential changes in federal tax policy.

Based upon these conclusions, I find that:

- The Company's analysis of the economic benefit to ratepayers is not a sound basis for determining the merits of these projects;
- The Company's repowering projects cannot be considered for approval in this case unless and until the Company provides a new analysis that addresses the methodology problems I have identified and fully and adequately addresses the full range of risks that the Company is asking its ratepayers to bear.

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III. The Company Has Not Demonstrated Lowest Reasonable Cost Energy Benefits

A. Repowering Projects Overview

Q. Please briefly describe RMP's proposal for the wind repowering projects.

A. The Company is proposing a program to spend approximately $1.13 billion to repower a substantial number of turbines, currently totaling 999.1 MW, at 12 of its existing wind farms in Wyoming (594 MW), Washington (304.6 MW), and Oregon (100.5 MW).[1] This program will replace the wind turbine equipment on those facilities, utilizing existing towers, foundations and energy collection systems, but replacing the nacelle, hub, rotor, and blades.

The Company's witnesses refer to this proposed program to repower these facilities as "the repowering project". In fact, the program is a collection of independent projects bundled together in the Company's proposal. In my testimony, I refer to the program as "the repowering projects" for this reason.

Q. How did the Company choose the projects to be repowered?

A. The Company targeted those existing facilities that began operations between 2006 and 2010. These facilities will no longer qualify for production tax credits (PTCs) once they reach 10 years of operation. The repowering program is intended to make investments to allow these facilities to qualify for PTCs for a new 10-year period at the end of the first 10 years of operation.

[1] Direct Testimony of Cindy A. Crane, lines 29-32.

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Q. How does the repowering affect the power output of these facilities?

A. The Company indicates that repowering will increase the annual energy production and the aggregate nameplate capacity. The installed nameplate capacity increase is a total of [redacted], with the increase at each wind farm ranging from [redacted] increase in installed nameplate capacity.[2] However, the Company cannot utilize any of the increased nameplate capacity under the current Large Generator Interconnection Agreements (LGIA).[3] The aggregate annual energy production increase from the repowering projects under the current LGIA limits is 550,601 MWh/year, an average increase of 19%.[4] The Company also assumes that the repowering projects will extend the life of the existing facilities by 10 years. The existing turbines reach the end of their 30-year economic life between years 2036 and 2040. The incremental energy in the last 10 years of the repowered projects lives is approximately [redacted] GWh/year, the full output of the projects in aggregate.[5]

B. The Company's Assessment of Economic Benefits

Q. What is the stated purpose of the proposed repowering projects?

A. Company witness Ms. Crane describes the repowering projects in terms of delivering cost-effective energy to Utah customers, with the benefits to be derived from the incremental energy production over levels that the existing turbines would otherwise

[2] Direct Testimony of Timothy Hemstreet, CONFIDENTIAL Exhibit TJH-3.
[3] Direct Testimony of Rick Link, Exhibit RTL-1.
[4] Direct Testimony of Timothy Hemstreet, lines 267-269.
[5] See, e.g., Link Testimony Workpaper "Repowering Results Direct Testimony.xlsm", Price-Policy Annual – PaR worksheet, Row 51.

provide, requalifying the facilities for PTCs, reducing operating costs, extending the facilities' useful lives, and enhanced voltage support and power quality.[6]

Ms. Crane claims the Company is proposing the projects because it believes the projects "will save customers money" and that the projects "will deliver cost-effective energy to Utah customers."[7] It is clear that the sole benefit offered to customers by the Company in proposing these projects is potential energy cost savings.

Q. How has the Company assessed the benefits of the projects?

A. The Company has conducted analysis of the repowering projects over two different study periods (20 and 30 years), and presented benefits calculations in several ways using multiple models. The Company provided these benefits across nine price-policy scenarios consisting of three natural gas price scenarios and three CO_2 price scenarios. First, the Company has presented results using the same modeling tools and methods used in the Integrated Resource Plan (IRP) analysis to evaluate system portfolios over a 20-year planning period (2017-2036).[8] Consistent with the IRP analysis, the Company conducted this analysis using the System Optimizer (SO) model, as well as the Planning and Risk (PaR) model.

The SO model is primarily used to develop long-term resource portfolios to meet a target planning reserve margin. The model selects capacity resources to produce a least-cost resource portfolio given a defined set of assumptions. The primary output of the SO

6 Direct Testimony of Cindy A. Crane, lines 164-178.
7 Id. at lines 165-166 and 177-178.
8 Direct Testimony of Rick Link, lines 175-263.

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model is a schedule of capacity resource additions, but the Company has also used the output to calculate benefits of the repowering proposal in terms of reduction in the present value of revenue requirements (PVRR).[9]

The PaR model uses the resource portfolio output from the SO model to perform more detailed system dispatch modeling, accounting for needed operating reserves and incorporating uncertainty with the use of stochastic variables.[10] The PaR analysis of each price-policy scenario includes 50 modeling iterations, with the reported value being the mean resulting PVRR over the 20-year planning period.[11]

In addition to the stochastic mean results, the Company has calculated "risk-adjusted PVRR" results. According to the Company, the "risk-adjusted PVRR is calculated by adding five percent of system variable costs, from the 95th percentile of the distribution of system variable costs, to the stochastic-mean PVRR."[12]

These 20-year analyses include levelized capital revenue requirements "to avoid potential distortions in the economic analysis of capital-intensive assets that have different lives and in-service dates."[13]

The Company uses this analysis to demonstrate that the projects are cost-effective additions to the resource portfolio in the IRP.

[9] Direct Testimony of Rick Link, Table 2 (p. 28).
[10] The variables treated stochastically are load, wholesale electricity and natural gas prices, hydro generation, and thermal unit outages. Id. at lines 211-212.
[11] Id. at lines 193-223.
[12] Id. at lines 246-263.
[13] Id. at lines 412-416.

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Q. Please describe the 30-year analysis conducted by the Company.

A. The second benefits analysis conducted by the Company is a 30-year annual revenue requirement analysis.[14] This analysis extends beyond the 20-year period considered in the IRP (2017-2036) through 2050, covering the entire depreciable life of the repowered projects under the assumption that the projects have a 30-year economic life. The 20-year analysis ends in 2036, meaning that analysis does not consider the life extension period that begins as the when the existing facilities begin to retire in the 2036 to 2040 period. The Company's extension of the analysis to 30 years seeks to capture the life extension value it has assumed.

The Company's 30-year analysis uses nominal annual values for the capital revenue requirements, rather than the levelized capital revenue requirement values used in the 20-year analysis discussed above. This 30-year analysis uses an extrapolation method to extend the 20-year SO and PaR analysis, meaning the values for years 2037-2050 are not developed in the same manner as the values for years 2017-2036. The SO and PaR analyses only extend through 2036, with extrapolated values being used thereafter for many of the components of the economic benefits analysis.

[14] See Id. at lines 401-454. Note that the analysis extends to 2050 in order to capture the full 30-year depreciable life of all of the repowered projects. Therefore, the analysis extends from 2017-2050, a period of 33 years. In this testimony I will refer to this as the "30-year" analysis.

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Q. What are the stated benefits of the repowering projects for RMP ratepayers under the various methods used by the Company?

A. Based on the 20-year analyses, the Company provided ranges of benefits across the nine scenarios. For the SO model analysis, the scenarios results ranged from a net cost to customers of $33 million (Low Gas, Zero CO_2) to a net benefit of $103 million (High Gas, High CO_2). For the PaR model analysis, the stochastic mean results ranged from a net cost to customers of $43 million (Low Gas, Zero CO_2) to a net benefit of $80 million (High Gas, High CO_2). For the PaR model analysis, the risk-adjusted PVRR results ranged from a net cost to customers of $44 million (Low Gas, Zero CO_2) to a net benefit of $85 million (High Gas, High CO_2).[15]

The Company's 30-year economic analysis of the combined repowering projects shows a range of benefits in nine cases with combinations of natural gas price and CO_2 price forecasts. The Low Gas, Zero CO_2 scenario results in $41 million in net present value (NPV) benefits. The benefit values range to a high value of $589 million NPV in the High Gas, High CO_2 scenario.[16]

The Company's testimony relies primarily on the results of the 30-year analysis as its demonstration of the customer benefits that the combined projects will provide.[17]

[15] Direct Testimony of Rick Link, Table 2 (p. 28).
[16] Id. at Table 3 (p. 32).
[17] Direct Testimony of Cindy A. Crane, lines 185-192; Direct Testimony of Rick Link, lines 665-668 and Table 3.

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Q. How do these benefit levels compare to the costs of the project?

A. As I mentioned earlier, the Company has estimated the cost of the repowering projects to be $1.13 billion. The Company's economic analysis is based on a NPV of incremental revenue requirements over the 30-year life of the project to be [redacted].[18] The benefits to customers that the Company has estimated, compared to the project costs, varies depending on whether the analysis period is 20 years (consistent with the IRP), or extended to cover the assumed 30-year life of the assets. The 20-year PaR stochastic mean analysis, for example, includes two cases where the benefits are less than the costs and, for those cases with positive benefits, the benefits range from 2% to 7% of the investment cost of $1.13 billion. In the 30-year analysis, the Company's analysis shows benefits in all cases, and the values range from a low of 4% of investment cost to more a high of 52% in the case with high natural gas and carbon emissions pricing.[19]

Q. How does the Company benefit if the repowering project proposal is approved?

A. The Company's proposal, as reflected in its analysis, provides a regulated return on its investments, based on an assumed approved rate of return. With this application, the Company seeks to obtain assurances that the Commission will provide it the opportunity to earn that return on these investments.

[18] See, e.g. Link Testimony Workpaper "Repower Results Direct Testimony.xlsm", Price-Policy Annual – PaR worksheet, cells D89, D90, and D91 for [redacted] of the projects expressed in terms of present value. These values are the difference in costs between the no repowering case and the repowering case and therefore represent the costs.

[19] Values calculated based on Direct Testimony of Rick Link, Tables 2 and 3.

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Q. What is the magnitude of the return on investment for the project as proposed?

A. According to the workpapers provided by the Company, the NPV of the capital recovery portion of the project costs [redacted][20] [redacted] [redacted] [redacted] [redacted][21]

Q. Is the Company's return on investment dependent on the level of benefits realized by the combined repowering projects?

A. No it is not. Under the proposal, the Company would recover the cost of the project plus a return on investment, regardless of whether or not benefits materialize.

Q. Do you agree with the Company's position that this analysis demonstrates that the projects will save customers money and that the projects will deliver cost-effective energy to Utah customers?

A. No, I do not.

Even if you accept the results of the analysis as reasonable and complete, which I do not, these results do not provide assurance that customers will realize cost savings commensurate with the size of the investment. Its own analysis shows that there is uncertainty as to whether the projects, in the aggregate, are lowest reasonable cost

[20] See, e.g. Link Testimony Workpaper "Repowering Results Direct Testimony.xlsm", Price-Policy Annual – PaR worksheet, cell D89.

[21] RMP Response to Data Request DPU 9.1 and 9.2. Compiled from Link Testimony Workpapers (e.g. "IRP Repower LGIA Limit v13 WIC Dunlap.xlsx", Generic worksheet, line 1731)

resources, and shows that the potential benefits rely on long-term value in years 20 to 30 of the project life.

In the 20-year analyses, the SO results provide that one of the nine cases results in net costs to customers, and in the PaR model results, two of the nine cases result in net costs to customers (Low Gas, Zero CO_2 and Low Gas, Medium CO_2).[22]

Only the results of the 30-year analysis show net benefits in all price-policy scenarios. The low end of the range of the savings outcomes presented by the Company is $41 million, or 4% of the original investment.[23] These are very modest savings for a 30-year investment designed purely to save customers money. Only those cases that have high natural gas prices and high carbon pricing produce savings for customers comparable to the return that the Company assumes it will receive under any of the assumptions in the nine scenarios, outcomes that are possible but are unlikely. There is very little certainty that customers will see significant, if any, cost savings from these projects. The Company's analysis of the projects shows that the Company will see much higher benefits from these projects than will the Company's ratepayers.

These results make clear that the benefits are contingent on the Company's assumptions of value in the very long term, years 20 to 30 of the analysis, as only in the 30-year analysis do any of the cases show benefits to customers approaching the return that the Company would realize from the projects.

[22] Direct Testimony of Rick Link, Table 2 (p. 28).
[23] Direct Testimony of Rick Link, Table 3 (p. 32).

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Finally, I have significant concerns regarding the Company's analysis with respect to methodology and consideration of risks to ratepayers. The Company's analysis of the projects does not consider the full risks that customers would bear and the Company's methodology has a number of problems.

IV. The Company's Modeling Does Not Provide Reasonable Results

Q. Please describe your concerns with the results of the Company's modeling analysis.

A. I have two primary concerns with the Company's analysis. First, the Company has not provided a project-by-project analysis to assess whether each project provides net benefits to customers. The Company has concluded that, as a bundle, the repowering projects produce net benefits to customers. However, since each project has unique characteristics, a project-by-project analysis is necessary to determine which, if any, projects should be approved. I discuss this issue in more detail below.

My second concern is that the Company's modeling methodology is not well suited to the evaluation of these repowering projects. I have identified problems with its 20-year modeling and its method of extrapolating those results to 30 years. As a result, the Company's analysis of the economic benefit to ratepayers is not a sound basis for determining the merits of these projects

A. Lack of Project-by-Project Analysis

Q. Please describe your concerns regarding the lack of project-by-project analysis.

A. The Company has presented the proposal as a bundle of repowering projects at 12 different sites. The benefits of the projects have been presented for all projects together as a single project, rather than a calculation of the benefits of each project individually. Other than the common timing objective for purposes of PTC qualification, the 12 repowering projects are independent investment decisions. The repowering of

each project should be a discrete decision, supported by economic analysis demonstrating benefits for that project.[24]

Most of the costs have been presented on a project-by-project basis, as well as some of the benefits (e.g. PTC benefits). However, some of the primary benefits, such as reduction in net power cost (NPC), are calculated from results of the SO and PaR models. The Company executed these model runs with a base case (no repowering projects) and a change case (with all 12 of the repowering projects) and calculated the change in NPC. With this structure, it is not possible to separate out the change in NPC attributable to each repowering project.

Q. How would a project-by-project calculation of benefits help in the evaluation of the proposal?

A. The data provided by the Company shows that the projects differ in size, cost, and in incremental energy production. With these differences, some of the repowering projects will perform better than others. The Company's results indicate that, in some cases, the economics of the aggregate of all projects have low or even negative benefits. Some of the projects are likely to impose net costs to customers under some scenarios. The Company has not conducted benefit-cost analysis for each project.[25] Without project-by-project modeling analysis, I am unable to determine each project's contribution to the Company's overall benefits analysis of the projects in aggregate.

[24] Given the PTC qualification rules (discussed later in this testimony), the repowering decision is actually made on a turbine-by-turbine basis. The Company has not provided economic benefits results on either a project-by-project or a turbine-by-turbine basis.

[25] RMP's Response to Data Request DPU 10.1.

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Q. What are the project-specific characteristics that could impact the economics of repowering?

A. The economic benefits of repowering derive primarily from the additional PTC revenue, as well as the value of the incremental energy created by the increase in capacity factor. The investment costs required for repowering vary by project, as well as the magnitude of the increase in project output.

Q. Have you performed any analysis to demonstrate project variability?

A. Yes. The benefits of the repowering projects are based, in part, on the improvement in project capacity factor achieved after repowering. I have compared the Company's evaluation of each project's capacity factor before and after repowering, presented in Table 1.[26]

	Pre-Repower Capacity (MW)	Pre-Repower Capacity Factor	Post-Repower LGIA Limited Capacity Factor	Increase in Capacity Factor
Marengo 1	140.4	29.3%	39.5%	10.2%
Marengo 2	70.2	27.1%	36.5%	9.4%
Leaning Juniper	100.5	26.5%	35.0%	8.5%
Seven Mile Hill 2	19.5	41.7%	47.8%	6.1%
Seven Mile Hill 1	99.0	39.1%	44.9%	5.8%
McFadden Ridge	28.5	37.3%	43.1%	5.8%
High Plains	99.0	35.3%	40.8%	5.5%
Dunlap Ranch	111.0	40.0%	45.1%	5.1%
Goodnoe Hills	94.0	26.8%	31.9%	5.1%
Glenrock 1	99.0	35.0%	39.3%	4.3%
Glenrock 3	39.0	33.2%	37.0%	3.8%
Rolling Hills	99.0	31.3%	34.7%	3.4%

Table 1. Project-specific capacity factor impact of repowering

[26] Source: Direct Testimony of Rick Link, REDACTED Exhibit RTL-1.

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These data demonstrate that there are a wide range of values between the projects, indicating that some projects can achieve greater capacity factor gains than others. In particular, the Leaning Juniper, Marengo 1, and Marengo 2 projects achieve significantly larger capacity factor gains than other projects.

The increase in capacity factor is a meaningful differentiator in the economic analysis of each of the projects. For example, the Leaning Juniper and Seven Mile Hill 1 projects are very similar in nameplate capacity. But after repowering, the Leaning Juniper project will produce an additional 24,145 MWh more than the Seven Mile Hill 1 project due to higher efficiency gains. This additional energy holds significant value to customers, both from PTC revenue and energy value. Over a 10-year period beginning in 2020, this additional 24,145 MWh from the Leaning Juniper project would yield PTC revenue of [redacted] (NPV) and energy revenue of [redacted] (NPV), for a total of [redacted].[27] If this analysis were extended for the full 30-year project life, the additional 24,145 MWh per year would provide more value for that energy in an analysis of Leaning Juniper compared to Seven Mile Hill 1.

This analysis demonstrates that the specific characteristics of each project can have a significant impact on the relative value of the repowering investment.

[27] CONFIDENTIAL Exhibit 2.2 provides the details of this calculation.

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Q. Has the Company provided isolated benefits analysis for any of the projects?

A. Yes, the Company's testimony provides some benefits analysis for the Leaning Juniper and Goodnoe Hills projects in isolation.

After the Company performed its analysis on the original group of 11 projects (analyzed for the IRP), the Company removed the Leaning Juniper project from the repowering bundle to test whether or not the total net benefits increased or decreased. The Company's analysis showed that benefits declined when the Leaning Juniper was excluded from the repowering, so it concluded that the project should remain in the proposal. The Company reasoned that since the Leaning Juniper project is net beneficial despite having the lowest capacity factor (and would therefore produce the least PTC revenue), the other projects must also be net beneficial.[28]

The Company also provided an analysis of the Goodnoe Hills project in isolation. This project was added to the proposal after completion of the IRP, so the Company was able to compare model runs from the IRP with the 11 original projects (including Leaning Juniper) with the updated analysis including Goodnoe Hills.[29]

Q. Do you agree with the Company's rationale for isolating only the Leaning Juniper project from the initial group of 11 projects modeled?

A. No. The Company states that it was selected because it had the lowest capacity factor.[30] While this is true, as noted above, it actually has one of the highest capacity factor gains

[28] Direct Testimony of Rick Link, lines 303-324.
[29] Id. at lines 325-334.
[30] Id. at lines 307-311.

after repowering (see Table 1). Given that the benefits are based, in part, on the incremental energy from repowering, it is not obvious that it is the lowest value project and it could be that the Leaning Juniper project is one of the more beneficial projects. The Company's assertion that the Leaning Juniper project is the least economic of all the projects did not consider the high incremental energy resulting from the repower of the project and, therefore, is not supported by the information provided.

Q. What were the economic benefits calculated by the Company for these projects?

A. The Company states that the incremental risk-adjusted PVRR benefits of the Leaning Juniper project are $7 million, and the incremental benefits of the Goodnoe Hills project are $18 million.[31] These values are based on the 20-year PaR analysis, and are based on model runs for the Medium Gas, Medium CO_2 case only.[32] The Company has not conducted this analysis for other scenarios, or for the 30-year analysis.[33]

Q. How do these values compare to the total benefits?

A. The total risk-adjusted PVRR benefits for all 12 projects (including Leaning Juniper and Goodnoe Hills) total $15 million in the Medium Gas, Medium CO_2 case.[34] The comparison of total benefits to the benefits of each project is summarized in Figure 1.

[31] Id. at lines 314-317 and 326-328. The Link testimony cites $20 million in benefits for the Goodnoe Hills project, but this value was corrected to $18 million in RMP's Response to DPU Data Request 7.1.
[32] RMP's Responses to Data Requests DPU 9.3 and 9.5. See also workpapers cited in RMP's Responses to DPU Data Requests 5.9 and 7.1.
[33] RMP's Responses to Data Requests DPU 9.3 and 9.5.
[34] Direct Testimony of Rick Link, Table 2 (p. 28).

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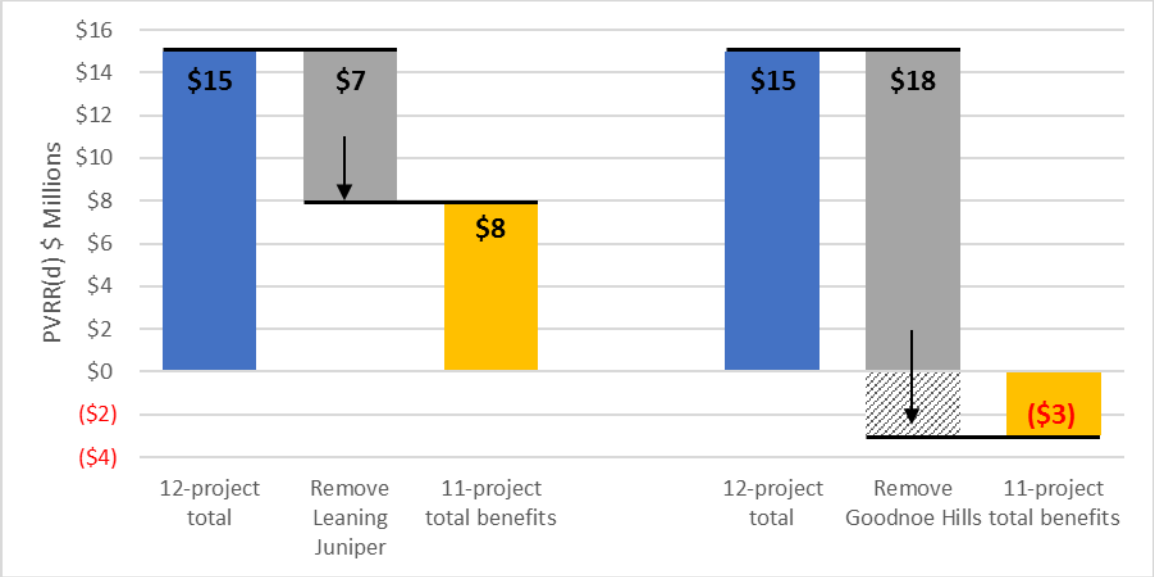

Figure 1. Project impact on 20-year risk-adjusted PVRR(d) results, Medium Gas, Medium CO_2 case

Q. What do you conclude based on this analysis?

A. Since the full bundle of projects yields net benefits of $15 million, and the benefits of the Leaning Juniper and Goodnoe Hills projects are $7 million and $18 million, respectively, these numbers suggest that, in the Medium Gas, Medium CO_2 case, the net benefits of the other ten projects would be net negative.

This analysis demonstrates the importance of a project-by-project analysis to determine which, if any, of the repowering projects are in the best interest of customers and provide net benefits under a range of futures. Only with that analysis can the Commission make an informed decision on each of the repowering projects.

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B. Methodological Issues with the Company's Modeling

Q. What are the inconsistencies in results that indicate methodological issues?

A. As described above, the Company has presented the results of benefits analysis across nine price-policy scenarios. I have reformatted those results for the 20-year PaR (stochastic mean) (Table 2) and the 30-year annual revenue requirement analysis (Table 3), preserving the Company's convention of showing positive values as a net cost and negative values as indicating net benefit.[35]

	Zero CO_2	Med CO_2	High CO_2
Low Gas	43	9	(17)
Med Gas	(24)	(13)	(35)
High Gas	(40)	(34)	(80)

Table 2. PaR Stochastic Mean PVRR(d) - 20-Year Analysis Net (Benefit)/Cost ($ Millions)

	Zero CO_2	Med CO_2	High CO_2
Low Gas	(41)	(245)	(344)
Med Gas	(362)	(359)	(401)
High Gas	(400)	(274)	(589)

Table 3. Annual Revenue Req. PVRR(d) – 30-Year Analysis Net (Benefit)/Cost ($ Millions)

I observe several anomalies in these results. For example, I expect the project benefits to increase with increasing fuel prices because the incremental wind would be displacing higher cost generation. This is true in most scenarios, except in the Medium CO_2 column

[35] Direct Testimony of Rick Link, Tables 2 and 3.

of the 30-year analysis. In this set of results, the Low and High Gas scenarios show similar results (-$245 million and -$247 million net cost, respectively), while the Medium Gas scenario shows the lowest net projects cost (-$359 million) of those three scenarios. There are similar issues when comparing results for the Medium Gas and High Gas cases with Zero and Medium CO_2 assumptions. I expect that the net projects costs would be lower when the CO_2 prices increase (as is the case in the Low Gas scenarios). However, these scenarios show higher project costs in the Medium CO_2 results in both the 20- and 30-year results.

I believe that there are two core causes of these issues. First, I believe that the SO modeling that the Company has conducted produces unrealistic changes in resource portfolios with the addition of a small amount of incremental wind energy. Second, I believe that the extrapolation method used by the Company in the 30-year analysis does not appropriately reflect changes in revenue requirement.

Q. Please describe how the Company has used the SO model to evaluate the repowering projects in the 20-year analysis.

A. The Company uses the SO model to determine resource portfolios for each of the price-policy scenarios, which can alter the selection of resource additions as the economics change from case to case. This 20-year analysis uses the models, data and least-cost planning criteria used in the Company's IRP.

For the economic analysis of the repowering projects, the Company first ran the SO model to produce 20-year (2017-2036) results for the nine price-policy scenarios assuming the projects are not repowered. Then, the Company ran the SO model to

produce a second set of results for those nine price policy scenarios assuming the projects are repowered (18 model runs total). For each policy-price scenario, the Company derived net cost or benefit of the repowering projects by taking the difference in PVRR between the no repowering and with repowering cases (those results with subsequent PaR simulation results are depicted in Table 2).

This modeling approach evaluates the repowering projects in a somewhat different manner that other resource options included in the modeling. The SO model performs an optimization over the 20-year period, building a portfolio of resources selected from a set of options defined in the model. In the analysis conducted for the repowering projects, the SO model does not include the repowering projects as an option that can be selected by the model in the optimization. Rather, the Company conducted a "with vs. without" analysis of the repowering projects allowing the remainder of the portfolio to be selected by the model in each case. This modeling allows for the possibility that the repowering projects could change the optimal portfolio of resources, but SO does not directly determine whether the repowering projects are part of the least cost mix. In the Company's repowering analysis, the determination of the projects' value is derived by taking the difference in cost between the pairs of "with and without" model runs.

Q. Please describe the method used by the Company to develop the 30-year analysis.

A. The Company elected to present a 30-year analysis of the repowering projects using an extrapolation method to extend the 20-year SO and PaR model results. This method uses the SO and PaR 20-year analysis as a starting point, but it does not directly extend the analysis in those models.

In the extrapolation methods, the Company used the PaR and SO model output of system costs and benefits during the 2028-2036 period as the basis for extrapolating the results for the remaining years of the assumed 30-year life of the projects. On an annual basis, net benefits for the 2028-2036 period were divided by incremental MWh of energy from the repowering projects. This stream of annual dollars per MWh benefit was levelized over that same time period, and then escalated at inflation through 2050. This value, in dollars per MWh, was multiplied by the annual incremental energy from the repowering projects to yield nominal dollars of system impact from the repowering projects.[36]

Q. Please describe why you believe the Company's 20-year modeling produces unrealistic changes in resource portfolios with the addition of a small amount of incremental wind energy.

A. In the 20 years simulated in the SO and PaR analyses, the existing wind projects continue to operate in the "no repowering" cases, reaching the end of the facilities' economic life at or near the end of the 20-year simulation period. As a result, the change between the cases is only the incremental energy produced by the repowering project, approximately a 19% increase in energy production at those facilities and no increase in capacity delivered to the system.

I expect the addition of this relatively small amount of incremental wind energy (relative to the size of the PacifiCorp system represented in the model) in the repowering case would have little or no impact on the resource portfolio. I reviewed the SO model

[36] Direct Testimony of Rick Link, lines 455-470.

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workpapers for a few of those cases with anomalous results to examine the resource portfolio changes in the model results.

I found that some of the scenarios show very significant and disproportionate changes in resource portfolio relative to the limited amount of incremental energy being added by the repowering. For example, the Medium Gas, Medium CO_2 case included the following changes relative to the no repowering case:[37]

- An average increase in nameplate capacity over the period of [redacted]
- Individual year nameplate capacity increases of as much as [redacted]
- A [redacted] of a [redacted] unit and a [redacted] in a [redacted],
- Accelerated implementation of [redacted] projects,
- An increase in new [redacted] projects, totaling more than [redacted] by the last year of the model analysis, and
- An [redacted] in system fixed costs of nearly [redacted] PVRR.

Overall, the magnitude of these changes is [redacted] to the incremental energy provided by the repowering projects.

My review of the other cases found [redacted]. I have included a chart of the annual changes in system fixed costs in Figure 2, showing the [redacted] year to year values and the

[37] Derived from Link Testimony Workpapers on SO output. See, e.g. "SO Portfolio SENS-RPN-EEN-MM_1705241827.xlsm" and "SO Portfolio SENS-RPN-EEN-MM_1705241827.xlsm", Portfolio worksheets.

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[redacted].[38] In the chart, each line reflects the change in fixed costs for one of the price-policy scenarios. For display purposes, I have not included the series legend, as the data is intended to convey the [redacted].

Confidential Figure 2. Annual Change in System Fixed Costs

Q. Why do you believe the results of the model exhibit these characteristics?

A. I have not been able to conduct more detailed model diagnostics. However, there are at least two potential reasons for these results.

First, there is the possibility that there are some problems with the input data with some or all of the cases. We have not discovered any specific issues in our review that point to this explanation, but I cannot rule that out at this point.

[38] Source: Workpapers to Direct Testimony of Rick Link, "Repower Results Direct Testimony.xlsm", Price-Policy Annual - PaR worksheet, Rows 68, 167, 266, 365, 464, 563, 662, 761, and 860.

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Second, the results observed can be the result of limitation of the SO model as it is used by the Company in this case. From my review of the results, it is apparent that the Company has modeled resource options as discrete choices, such as a new combined cycle that can be added only in its entirety, with a total capacity of [redacted]. Given this construct, it is entirely possible that even very small changes, such as the addition of the incremental energy from the repowering projects, could cause changes in the selection or timing of much larger, discrete resource options. The non-linearity in the modeling can produce very anomalous results of this type. In general, using a high-level planning model such as SO to measure benefits associated with very small changes to the system is prone to issues of this type. The model is better suited to compare larger scale changes to the system across portfolios. It is not well-suited to accurately measure value of small individual resource changes, which is the case for these repowering projects either individually or collectively.

Q. What are the issues with this extrapolation method?

A. There are two primary issues with the method used by the Company to extrapolate the 20-year analysis results for the remaining years of the assumed 30-year life of the repowering projects. The first is whether an extrapolation is a reasonable proxy for an extension of the model results. The second is whether the extrapolation can reasonably be applied to a period with significantly different incremental energy from the repowering projects.

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Q. Please explain your assessment of the first issue with the extrapolation method.

A. First, as noted above, the extrapolation method uses system benefits results from the 2028-2036 portion of the 20-year analysis. The Company used this period because it immediately follows the retirement of the Dave Johnston coal plant.[39] However, this period also reflects a [redacted] period for changes in system costs in the SO model results. The levelized results, therefore, are [redacted] that result from changes in portfolio of resources selected in the SO model. The fixed cost component ($/MWh) for the Medium Gas, Medium CO_2 case, one of five components of system net benefits extrapolated in the Company's analysis, is depicted in Figure 3. The period through 2036 includes the values as modeled, and the period thereafter includes the values calculated through the Company's extrapolation method.[40] The extrapolation method assumes that a reasonable trend can be deduced from the data in the period, an assumption that is not reasonable in this case. The model results make clear that [redacted] in this period. The Company's assumption that extrapolations will provide a reasonable proxy for results that the modeling would have produced if the model analysis had been extended directly is not reasonable.

[39] Direct Testimony of Rick Link, lines 471-481.

[40] Source: Link Testimony Workpapers. "Repower Results Direct Testimony.xlsm", Price-Policy Annual - PaR worksheet, Rows 77 and 86.

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Confidential Figure 3. Modeled and extrapolated change in system fixed costs (Medium Gas, Medium CO_2)

Q. Please explain your assessment of the second issue with the extrapolation method.

A. The second issue pertains to the change in incremental energy during the extrapolation period. For all years represented in the SO model through 2036, the incremental energy is the difference in production between the existing turbines and the repowering turbines, approximately 550 GWh/year. The Company assumes the economic life of the existing turbines and the repowered turbines is 30 years. The existing turbines reach the end of their 30-year economic life between years 2036 and 2040, with the incremental energy in the last 10 years of the repowered projects' lives approximating [redacted] GWh/year. The extrapolation method unitizes the change in system benefits based on incremental generation (in MWh). The extrapolation then assumes that every incremental MWh of energy from wind will yield that same proportional impact to fixed system costs. This

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approach assumes that the relationship between changes in fixed system costs and incremental energy will demonstrate the same proportionality during a period with 550 GWh of incremental generation and a later period with greater than [redacted] GWh of incremental generation.

There are no SO model results that show how the portfolio would change with a [redacted] GWh/year increment. There is a substantial amount of energy value in the last 10 years of the assumed project lives that are based on an unsupported assumption that the volatile results from years 2028 to 2036, based on 550 GWh/year, can reasonably applied to the life extension period of the analysis.

Q. Please summarize your concerns with the Company's modeling methodology.

A. The Company's use of the SO model to conduct an economic analysis consistent with the IRP methodology suffers from the limitations of that modeling approach, which cannot reasonably capture differences in model results for relatively small changes in system resource – in this case an increment of 550 GWh/year of energy. The extrapolation of the model results past 2036 is problematic due to the problems inherent in the 20-year analysis and due to the fact that much of the extrapolation period is the life extension portion of the repowered projects with a much higher level of incremental energy. Taken together, I conclude that the modeling analysis of the repowering project is not reasonable and I do not recommend relying on the results in making decisions on these projects.

V. The Company's Analysis Does Not Reasonably Address Risk

Q. Please describe your concerns regarding the treatment of risk in the Company's analysis.

A. As previously discussed, the Company's multiple analyses shows a relatively small level of net benefits to customers. In the 20-year analyses (SO, mean stochastic PaR, and risk-adjusted PaR) multiple price-policy scenario results show net costs to customers, and the other scenarios show only limited net benefits compared to project costs. The 30-year analysis results anticipate net benefits to customers in all cases, but some of the price-policy scenarios show limited benefits compared to project costs.

The two risk factors assessed in these scenarios (fuel price and carbon price), represent the only explicit treatment of risk factors in the Company's analysis, and I have concerns with the Company's treatment of both.

There are a variety of additional factors that could negatively impact the actual economics of these projects, and could potentially result in the repowering projects inducing net cost to customers, rather than yielding net benefits.

Finally, my primary concern is that, as proposed, all risk factors are borne entirely by ratepayers, and do not impact the benefits yielded by the Company.

Q. Please provide an overview of the fuel price forecasts used by the Company in this analysis.

A. The Company developed low, high, and two medium fuel price assumptions for the price-policy scenarios. The scenarios were chosen by the Company after reviewing third-

party forecasts from EIA and non-public vendor sources.[41] The low-price scenario assumes growth in price-inelastic gas, technology improvements, stagnant LNG exports, and expanding resource supply. One medium scenario was selected from one of the vendor forecasts and is "reasonably aligned with other base-case forecasts."[42] The other medium price (used only with the Zero CO_2 price assumption), is the April 2017 Official Forward Price Curve (OFPC). The OFPC uses forward market prices (observed April 26, 2017) for 72 months, and then transitions to the first (vendor-based) medium price forecast. The high-price scenario is based on risk aversion, in which natural gas developers are reluctant to commit capital before demand, and the associated price response, materializes. The vendor forecast included periods of boom-bust cycles, and the Company smoothed these cycles because "the timing is difficult to predict with accuracy."[43]

Q. How do the four selected natural gas forecasts compare to current futures prices?

A. The Company's four forecasts (Low, OFPC, Medium, and High) are compared against NYMEX forward prices as of September 11, 2017 in Figure 4.[44]

[41] Direct Testimony of Rick T. Link, lines 534-564.
[42] Id. at line 552.
[43] Id. at lines 556-559.
[44] Id. at Exhibit RTL-2.

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Confidential Figure 4. Natural gas price forecasts

This figure demonstrates that current market expectations of gas prices, as seen in Henry Hub natural gas futures, are significantly lower than the Company's medium gas base case and lower than even its lowest gas price forecast in many years.

Q. Given the comparison of current market forwards with the Company's gas scenarios, do you have any concerns with the representation of benefits based on these scenarios?

A. Yes I do. Natural gas prices drive a significant portion of the benefits of the repowering projects. Given that, in the 20-year analysis, several price-policy scenarios using the low gas price forecast result in net costs to customers, it is critical to assess these forecasts in particular and the potential risks posed to customers. Since the current market outlook, as reflected in the forward prices, most closely aligns with the low gas forecast, I am

concerned that the repowering projects will not produce the net benefits to customers as described by the Company, as many of their conclusions on value rely on the Medium Gas scenarios.

Q. What are your concerns regarding the Company's treatment of carbon price risk?

A. The Company has evaluated the projects using three carbon price scenarios.

I do not have any particular issues with the three specific scenarios selected by the Company. Rather, I think it is important to recognize that there is currently no policy imposing a price on carbon emissions. Therefore, similar to the discussion on the natural gas forecasts, given the information available today, the scenarios with zero carbon price correspond with the current policy and near-term outlook on such policies. The zero carbon price scenarios yield net costs to customers in some price-policy scenarios.

Q. How does the Company's treatment of natural gas price and CO_2 price risk affect your assessment of the price-policy scenarios?

A. Based on the forgoing discussion, taken together, the price-policy scenario that most closely reflects expectations of future market conditions given the information available today is the Low Gas, Zero CO_2 scenario. In the Company's analysis, this scenario produces net costs to customers in the 20-year analyses, and the lowest level of net benefits in the 30-year analysis.

Given that the repowering proposal is being pursued for economic reasons and not for reliability or other purposes, I believe the Company should be required to demonstrate benefits to customers under this scenario.

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Q. What are some additional risk factors that the Company has not addressed?

A. There are a number of project specific risk factors that could reduce or eliminate project benefits to ratepayers, including:

- PTC qualification
- Corporate tax rate
- Cost estimates
- Production estimates
- Project life

This list is not exclusive, but includes several key risks associated with the repowering. It is important to reiterate that these are potential risks that could reduce benefits or increase the costs of the repowering projects. As currently proposed, these impacts would be borne entirely by customers and not by the Company.

A. PTC Qualification

Q. Please describe the risks associated with PTC qualification.

A. The Company has proposed the repowering project as an economic project designed to yield benefits to customers. The qualification for ten additional years of PTC revenue is a primary driver of benefits, and the project would not be economically viable without the full value of the PTC applied.

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Q. Please describe the three requirements the Company cites it must meet in order to qualify for the PTC.

A. Under IRS rules, in order for the proposed repowering projects to qualify for the full value of the PTC, the proposed repowering projects must satisfy three requirements: the 5% Safe Harbor requirement, be placed in service by December 31, 2020, and meet the 80/20 Rule.

Q. Please describe the 5% Safe Harbor as it pertains to repowered facilities.

A. To qualify for the full value of the PTC (rather than a lower "phase out" value), the repowering projects must begin construction in 2016. The Safe Harbor requirement states that, in general, construction of a facility will be considered as having begun in the calendar year in which (1) the taxpayer pays or incurs 5% or more of the total cost of the facility, and (2) thereafter, the taxpayer makes continuous efforts to advance towards completion of the facility. Additionally, the 5% Safe Harbor is applied only with respect to the cost of new property used to retrofit an existing facility. Therefore, only expenditures paid or incurred that relate to new construction should be considered for purposes of the 5% Safe Harbor. The 5% requirement is applied per each project or wind farm, not on an individual turbine basis.[45]

[45] Direct Testimony of Timothy Hemstreet, lines 108-113. RMP Response to Data Request DPU 3.4.

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Q. Is the Company in compliance with the 5% Safe Harbor rules for the proposed repowering projects?

A. The Company has asserted that it has made sufficient equipment purchases to satisfy the 5% Safe Harbor rules for each of the repowering projects, given the current project cost estimates.[46]

[redacted][47] [redacted]

[redacted] If project costs exceed expectations and the 2016 expenditures are not at least 5% of the total, the projects could lose some or all PTC revenue.

Q. Has the Company provided any analysis of the risk of potential cost overruns that would cause the 2016 expenditures to be insufficient for compliance with the 5% Safe Harbor rules?

A. No. The Company states it has not performed any analysis of this risk.[48]

Q. Please describe the "Continuous Efforts" requirement under the 5% Safe Harbor.

A. Once a project begins construction (or complies with the 5% Safe Harbor rule), the project developer must make continuous efforts to complete the project. Whether a taxpayer makes continuous efforts to advance the facility will be determined by the

[46] Direct Testimony of Timothy Hemstreet, lines 122-133.
[47] RMP Response to Data Request OCS 1.50.
[48] RMP's Response to Data Request DPU 3.4.

relevant facts and circumstances. These can include but are not limited to: paying or incurring additional amounts included in the total cost of the facility; entering into binding written contracts for components or future work on construction of the facility; obtaining necessary permits; and performing physical work of a significant nature (see above). Certain disruptions (severe weather/natural disasters, licensing delays, supply shortages, etc.) will be considered out of the taxpayer's control and therefore, will not be considered when evaluating the taxpayer's continuous effort.[49]

The IRS has issued guidance indicating that regardless of development activities, the project developer can meet the continuous effort requirement if the project is in service by the end of the fourth calendar year following the year construction began. Therefore, given the purchases made by the Company in 2016, the projects must be placed in service by December 31, 2020 to meet this requirement.[50]

Q. Please describe what is meant by "placed in service" by December 31, 2020

A. The IRS and the courts hold that an electric generating facility is "placed in service" when the facility is ready and available for its specifically assigned function. Historically, the IRS has looked to five factors in evaluating whether an electric generating facility is ready and available for its specifically assigned function. These are: (1) Approval of required licenses and permits; (2) Passage of control of the facility to the taxpayer; (3)

[49] IRS Notice 2013-29.
[50] Direct Testimony of Timothy Hemstreet, lines 108-121.

Completion of critical tests; (4) Synchronization to the power grid for generating electricity to produce income; and (5) Commencement of daily and regular operation.[51]

Q. Is there risk that some or all of the repowering projects might not be in service by the end of 2020?

A. Yes. Aside from the ordinary issues that might cause a development delay for a wind project (e.g. permitting, financing, etc.), the Company has also noted that its equipment suppliers are facing unprecedented demand for turbines, and that construction contractors and critical equipment (such as cranes) are similarly in high demand.[52] Unavailability of either equipment or labor could cause delays such that the projects are not fully in service by December 31, 2020 and thus would not qualify for the PTC.

Q. Has the Company provided any analysis of the risk of ineligibility for the PTC due to failure to meet the Continuous Effort requirement?

A. No, the Company has stated it has not performed any analysis with regard to this risk.[53]

Q. Has the Company provided any analysis of the risks of becoming ineligible for the PTC due to permitting delays?

A. No, the Company has stated it has not assessed any risk of "lost" PTC revenue due to permitting delays.[54]

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[51] IRS: Rev. Rul. 76-256; Rev. Rul. 76-248, Wind (PLR 201311003). See also Hecimovich & Americus. 2015. Placed-in-Service Date Issues. Deloitte. https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-placed-in-service-date-issues.pdf

[52] Direct Testimony of Timothy Hemstreet, lines 523-545.

[53] RMP Response to Data Request DPU 3.5.

[54] RMP Response to Data Request DPU 3.24.

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Q. Has the Company provided any mechanism for damage recovery due to "lost" PTC due to not being in service by December 31, 2020?

A. No, the Company has stated that it considers it highly unlikely that the wind projects will not achieve commercial operation by December 31, 2020. The Company provides no proposed mechanism in the case that this does not happen, nor does it provide any formal assessment of this risk.[55]

Q. Please describe the 80/20 rule as it pertains to retrofitted facilities.

A. Regarding retrofitted facilities, a retrofitted facility may qualify as originally placed in service even though it contains some used property, provided that fair market value of the used property is not more than 20% of the facility's total value. The facility's total value is calculated as the cost of the new property plus the value of the used property. It is important to note that in the case of a single project comprised of multiple facilities (as is the case here), the 80/20 Rule is applied to each individual facility comprising the single project. In other words, the 80/20 Rule is applied to each individual wind turbine retrofit in the project and not to the project as an aggregate.[56]

Q. How does the Company calculate the "fair market value" and are there any issues with this approach?

A. The Company's filing notes that fair market value of the retained components is "based on net book value."[57] [redacted]

[55] RMP Response to Data Request DPU 7.21.
[56] Direct Testimony of Timothy Hemstreet, lines 139-150.
[57] Id. at lines 166-169.

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[redacted][58]

Q. Is there risk associated with the qualification of the repower projects under the 80/20 rule?

A. Yes, there are two types of risk. First, there is the risk that the Company's interpretation of the fair market value of the retained components is not accepted by the IRS. The second risk is that if the costs of the repowering are less than expected, the new equipment might not comprise 80% of the value of the facility. In either case, the turbines that do not comply with the 80/20 rule would not be eligible for the PTC.

Q. Has the Company provided any assessment of the risks of not meeting the 80/20 requirement?

A. No, the Company has stated it has not performed a formal assessment of the risk of not meeting the 80/20 requirement.[59]

[58] RMP Response to Data Request DPU 1.13.
[59] RMP Response to Data Request DPU 3.6.

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Q. Has the Company provided any other formal assessment of the risk that the IRS deems the repowered projects ineligible for the PTC?

A. No. The Company has stated that it has assessed each of the relevant criteria for qualifying for the full available value of the PTC, but it does not provide any formal assessment of the risk.[60]

B. Corporate Tax Rate

Q. Please describe the risks associated with the corporate tax rate assumptions.

A. As discussed above, the primary driver of the repowering proposal is to secure PTC revenue. Since PTCs are an after-tax benefit, in order to appropriately treat these revenues in a PVRR(d) analysis, the value must be grossed up using the Company's corporate tax rate. The Company has performed its analysis grossing up PTC revenues based on a tax rate of [redacted].[61]

If this tax rate were to decrease, the grossed-up value of the PTCs would decrease as well. With the current efforts in the federal government to lower the corporate tax rate, this presents a risk to customers that the benefits of the projects will decline in the future.

Q. Has the Company analyzed how changes in corporate tax rate would impact the estimated project benefits?

A. No it has not.[62]

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60 RMP Response to DPU Data Request 3.3.

61 Link Testimony Workpapers. See, e.g. "IRP Repower LGIA Limit v13 WIC LJ.xlsm", Repower sheet, cell D86.

62 RMP Response to OCS Data Requests 7.1, 7.2, and 7.3.

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Q. Have you prepared an estimate of the impact a change in corporate tax rate would have on the calculation of benefits?

A. Yes, I have. Using the workpapers provided by the Company in support of the Direct Testimony of Rick Link, I tested several tax rates to assess the impact on PTC benefits in the 20-year PaR (stochastic mean) analysis and the 30-year Annual Revenue Requirement analysis. The change in NPV PTC benefits are shown in Table 4.

Corporate Tax Rate	PTC Benefits ($M NPV)
Original Rate [redacted]	[redacted]
35%	[redacted]
25%	[redacted]
15%	[redacted]

Table 4. Corporate tax rate scenario impacts, NPV of PTC benefits

The impacts of the change in PTC value on the 20-year net benefits from the PaR (stochastic mean) analysis, according to the calculation methods used by the Company, are show in Table 5.

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Price-Policy Scenario	PaR Stochastic Mean PVRR(d) (Benefit)/Cost ($ Million)			
	Original Rate [redacted]	35%	25%	15%
Low Gas, Zero CO_2	43	[redacted]	[redacted]	[redacted]
Low Gas, Medium CO_2	9	[redacted]	[redacted]	[redacted]
Low Gas, High CO_2	(17)	[redacted]	[redacted]	[redacted]
Medium Gas, Zero CO_2	(24)	[redacted]	[redacted]	[redacted]
Medium Gas, Medium CO_2	(13)	[redacted]	[redacted]	[redacted]
Medium Gas, High CO_2	(35)	[redacted]	[redacted]	[redacted]
High Gas, Zero CO_2	(40)	[redacted]	[redacted]	[redacted]
High Gas, Medium CO_2	(34)	[redacted]	[redacted]	[redacted]
High Gas, High CO_2	(80)	[redacted]	[redacted]	[redacted]

Table 5. Corporate tax rate scenario impacts, 20-year PaR Stochastic Mean PVRR(d)

The impacts of the change in PTC value on the 30-year benefits, according to the calculation methods used by the Company, is shown in Table 6.

Price-Policy Scenario	Annual Revenue Requirement PVRR(d) (Benefit)/Cost ($ Million)			
	Original Rate [redacted]	35%	25%	15%
Low Gas, Zero CO_2	(41)	[redacted]	[redacted]	[redacted]
Low Gas, Medium CO_2	(245)	[redacted]	[redacted]	[redacted]
Low Gas, High CO_2	(344)	[redacted]	[redacted]	[redacted]
Medium Gas, Zero CO_2	(362)	[redacted]	[redacted]	[redacted]
Medium Gas, Medium CO_2	(359)	[redacted]	[redacted]	[redacted]
Medium Gas, High CO_2	(401)	[redacted]	[redacted]	[redacted]
High Gas, Zero CO_2	(400)	[redacted]	[redacted]	[redacted]
High Gas, Medium CO_2	(274)	[redacted]	[redacted]	[redacted]
High Gas, High CO_2	(589)	[redacted]	[redacted]	[redacted]

Table 6. Corporate tax rate scenario impacts, 30-year Annual Revenue Requirement PVRR(d)

Q. What do you conclude from this analysis?

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A. I conclude that, all else equal, a change in the corporate tax rate could have a substantial impact on the value of the PTC benefits [redacted]

I caveat this conclusion by noting that a change in the corporate tax rate could impact many components of this analysis (such as debt rates and discount rates) as well as broader market conditions (such as electricity demand and cost of capital investments). I am not suggesting that a change in tax rate will yield the specific results numbers in the tables above. Rather, I have isolated the impact of the corporate tax rate to provide an indication of the risk to ratepayers associated with the rate assumption.

C. Project Costs

Q. Please describe the risks related to project costs.

A. There are multiple risks to customers associated with the repowering project costs. If the projects' actual costs do not reflect the estimates provided by the Company, there could potentially be significant impacts on customers.

First, as discussed at the beginning of my testimony, the total benefits of the project in many price-policy scenarios are very small (or negative) when compared to the project's total costs. Therefore, a small percentage increase in the costs could significantly reduce or eliminate customer benefits.

Second, the qualification for the PTC is dependent on actual project costs in two ways. First, if the total project costs are high enough that the 2016 purchases do not make up at least 5% of the costs, the project will fail the 5% Safe Harbor rule. Second, if the final project costs are low enough such that the new repowering investment is not at least 80% of the total facility value, the facility could fail the 80/20 test, described above.

As I previously discussed, the PTC revenue is critical to the viability of the projects, so a large capital cost deviation could have a severe impact on project benefits. The Company has stated that it has not assessed the risks of a cost overrun impacting PTC qualification.[63]

D. Production Estimates

Q. Please describe the risks associated with project generation estimates.

A. The benefits of the project are reliant on the PTC revenue, as well as the incremental energy from the enhanced efficiency and capacity of the repowered projects. The Company's analysis is therefore very sensitive to the assumptions of the future production of both the existing projects (without repowering) as well as the repowered projects.

Q. Can you estimate the potential magnitude of the risk?

A. Yes. As an example of the potential risk, I have calculated the impact of a small underperformance of the repowered resources on PTC revenue. The Company's 30-year

[63] RMP Response to Data Request DPU 3.4.

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analysis includes a total incremental PTC benefit of $[redacted] (NPV), consisting of three components: PTC revenue from the repowered units, plus PTC revenue generated from existing units before the repowering is conducted, minus the PTC revenue that would have been earned by existing units without repowering. These values are summarized in Table 7.

PTC Source	$ Million NPV
Repowered units	[redacted]
Existing units before repowering	[redacted]
Remaining PTC from existing units (status quo case)	[redacted]
Total PTC benefit	[redacted]

Table 7. PTC value components

The top value is derived from the Company's assumptions of generation from the repowered projects. If the resources produce less than predicted, the PTC revenue will be correspondingly reduced. Therefore, a 1% reduction in generation from the repowered facilities would result in an [redacted] (NPV) decrease in net benefits. This represents a risk to customer benefit estimates associated with the output assumptions.

Q. What do you conclude based on this analysis?

A. The PTC revenue represents a critical component of the economic benefits of the project, and the Company's revenue estimates are based entirely on assumed capacity factors. Wind generation is highly variable, and there is definite potential that actual project generation could be less than assumed.

For some of the scenarios resulting in lower net benefits, even a small decrease in generation could result in net costs to customers.

The PTC risk of the negative consequences of lower generation is borne entirely by ratepayers.

E. Project Life

Q. Please describe the risks associated with project life.

A. The economic benefits analysis presented by the Company is dependent on the assumptions of project life of the wind resources in both the status quo (no repowering) case and the repowering analysis.

The incremental energy from the repowered projects escalates after the 2036-2040 period, when the existing projects are assumed to retire in the status quo case. This incremental energy drives the significant benefits in the later years of the 30-year analysis.[64] The benefits during this period are dependent on assumptions of project life in two ways.

First, the incremental energy is highest and yields the most benefits after the existing projects are assumed to retire. If the existing projects would actually be able to stay in service beyond the assumed 30 years, the amount of incremental energy would be reduced along with the Company's assumed benefits.

Second, the repowered projects are assumed to stay in service for the 30-year depreciable life. If the actual projects were to retire prior to the 30 years, the Company's estimates of benefits would be overstated as presented in the application.

[64] See, e.g., Direct Testimony of Rick Link, Figure 5, p. 35.

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Q. Has the Company provided support for its project life assumptions?

A. No. The Company has assumed that wind projects have 30-year depreciable lives, and that the project ceases generation at the end of that period. This assumption is consistent between the existing projects and the repowered projects.

The Company has not conducted analysis on the remaining life of the existing wind facilities,[65] nor has it performed any studies to demonstrate that existing resources will need to retire at the end of the 30-year depreciable life.[66]

Q. What do you conclude regarding the risk associated with project life?

A. I have not evaluated whether the 30-year assumption is appropriate for the assets currently in place or for the repowered projects. However, based on my review of the economic analysis, it is clear that assumptions of project life have significant impact on the benefits calculations, as much of the increase in benefits in the 30-year analysis show that the life extension assumptions contribute directly to the Company's estimates of the value of the projects. It is also important to note that the risks associated with project life assumptions are borne entirely by ratepayers.

[65] RMP Response to Data Request OCS 4.6.
[66] RMP Response to Data Request DPU 3.18.

VI. The Company Has Not Demonstrated Need for the Reliability Components of the Projects

Q. Please describe the reliability components of the proposed projects.

A. According to the filing, "the Company has identified the need to add two features to the wind turbine capabilities of the repowered facilities that will improve the reliability of the transmission system for eastern Wyoming."[67] These are the WindFREE and WindINERTIA features on the GE turbines.

The WindFREE system provides reactive power to the grid, and the WindINERTIA feature provides inertial response capability during under-frequency events.[68]

Q. Has the Company provided any analysis demonstrating the need for these components?

A. No. In response to a data request for analysis supporting need, the Company referenced a Western Electricity Coordinating Council (WECC) study identifying a general need for reactive power.[69] However, the Company has provided no analysis specific to these facilities or locations.

Q. Has the Company performed any analysis calculating the benefits of these components?

A. No. The Company has stated that it "believes that the benefits outweigh the costs", but admits that it has not conducted the studies needed to determine the benefits.[70] The

[67] Direct Testimony of Timothy Hemstreet, lines 392-396.
[68] Id. at lines 402-424.
[69] RMP Response to DPU Data Request 3.15.
[70] RMP Responses to DPU Data Requests 3.15 and 3.16.

Company has also stated that the cost of stand-alone voltage control devices is more expensive than the WindFREE technology, but has provided no analysis supporting this claim.[71]

Q. Are these components required for the project to qualify for the PTC?

A. No, the Company has confirmed that these components are not required to meet the 80/20 rule required for PTC qualification.[72]

Q. What is your recommendation regarding these reliability components?

A. I recommend that the Commission deny pre-approval of these components. The Company has not conducted any analysis demonstrating the need for these expenditures and has not provided any evidence that the components will yield any benefits to customers.

VII. Conclusions and Recommendations

Q. Does the Company's analysis demonstrate that each of the 12 repowering projects will deliver cost-effective energy to Utah ratepayers?

A. No, it does not. The Company's analysis presents the economics of all 12 projects as a bundled analysis, providing insufficient information to make a determination on a project by project basis. The bundled analysis of the 12 projects does not provide a high degree of assurance that the combined package of the 12 projects will be cost effective for Utah ratepayers.

[71] RMP Response to OCS Data Request 1.19.
[72] RMP Response to DPU Data Request 7.20.

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Q. Is the Company's modeling analysis of the repowering projects sound and does that analysis provide an accurate representation of the economic benefits of each of the 12 repowering projects?

A. No, it is not. I have found that the SO model analysis produces anomalous results that are likely a result of the limitations of that model, as used by the Company, to reasonably evaluate the relatively small change in incremental energy that the repowering projects provide. The modeling is also problematic for the longer-term analysis that relies on an extrapolation of the problematic results from the 20-year SO model and applies that extrapolation to the life extension period of the projects with a much different energy contribution than was included in the SO model.

Q. Does the Company's analysis provide a reasonable representation of the all of the uncertainties that have bearing on the risk to Utah ratepayers?

A. No, it does not. The Company has not provided any analysis on several key risks that, as proposed, are risks that would be borne by ratepayers. These risks include uncertainty regarding the ability of the projects to qualify for production tax credits, the potential for changes in the corporate tax rate, project cost uncertainty, project energy production estimate uncertainty, and assumptions regarding project life. I have described these risks and have shown that they are of sufficient magnitude outweigh the benefits that the Company has assessed.

Q. Are the repowering projects likely to be lowest reasonable cost resources?

A. While it is possible that they could be lowest reasonable cost resources, there is a significant probability that they are not. The Company's analysis points to relatively low

value to ratepayers. Given the issues I have identified with the Company's modeling and the lack of consideration of several important risk factors, I view the Company's results as not sufficient to provide confidence that these projects are lowest reasonable cost.

Q. What are the short-term and long-term impacts to Utah ratepayers?

A. The Company's presentation on the projects relies on significant benefits in the first ten years resulting from PTC qualification and benefits in years 20 to 30 of project life associated with extending the life of the assets. The PTC benefits, if realized, would mitigate much of the cost in the first 10 years, however, the risks regarding PTC qualification and changes in corporate tax rates could materially alter that outlook. Conversely, much of the benefit in the Company's analysis is derived from years 20 to 30 of the projects, the life extension period. These benefits have been estimated using an extrapolation analysis that is problematic, relies on obtaining 30 years of life, and are only realized in the very long term.

Q. Based on your findings, what are your recommendations at this time?

A. I recommend that the repowering projects not be approved based on the analysis presented by the Company unless or until the Company provides new analysis that is project-specific and fully addresses the methodology and risk issues that I have discussed in this testimony. Further, I recommend the reliability projects included with the proposed repowering projects not be approved in this case.

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Q. Does this conclude your testimony?

A. At this time, yes, it does. There are currently outstanding data requests to which the Company has not yet responded. If additional, relevant information becomes available, I will supplement this testimony as appropriate.