

Confidential per WAC 480-07-160
Exh. TJH-1TC
Docket UE-21____
Witness: Timothy J. Hemstreet

**BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,

Complainant,

v.

PACIFICORP dba
PACIFIC POWER & LIGHT COMPANY

Respondent.

Docket UE-21____

PACIFICORP

CONFIDENTIAL DIRECT TESTIMONY OF TIMOTHY J. HEMSTREET

July 2021

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Confidential Exhibit No. TJH-2C—New Wind and Wind Repowering Project Costs

Exhibit No. TJH-3—Ekola Flats Site Plan

Exhibit No. TJH-4—TB Flats Site Plan

Exhibit No. TJH-5—Cedar Springs Site Plan

Exhibit No. TJH-6—Major Components of a Wind Generator

Confidential Exhibit No. TJH-7C—Wind Repowering Project Details

Exhibit No. TJH-8—Existing and Repowered Turbine Power Curve Comparison

1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. Please state your name, business address, and present position with PacifiCorp.**

3 A. My name is Timothy J. Hemstreet. My business address is 825 NE Multnomah
4 Street, Suite 1800, Portland, Oregon 97232. My title is Managing Director of
5 Renewable Energy Development for PacifiCorp. I am testifying for PacifiCorp dba
6 Pacific Power & Light Company (PacifiCorp or the Company).

7 **Q. Briefly describe your education and professional experience.**

8 A. I hold a Bachelor of Science degree in Civil Engineering from the University of Notre
9 Dame in Indiana and a Master of Science degree in Civil Engineering from the
10 University of Texas at Austin. I am also a Registered Professional Engineer in the
11 state of Oregon. Before joining PacifiCorp in 2004, I held positions in engineering
12 consulting at CH2M HILL (now Jacobs Engineering, Inc.) and environmental
13 compliance at RR Donnelley Norwest, Inc. Since joining PacifiCorp, I have held
14 positions in environmental policy and compliance, engineering, project management,
15 and hydroelectric project licensing and program management. In 2016, I assumed a
16 role in renewable energy development, focusing on PacifiCorp’s wind repowering
17 effort, and assumed my current role in June 2019, in which I oversee the development
18 of renewable energy resources that enhance and complement PacifiCorp’s existing
19 renewable energy resource portfolio.

20 **Q. Have you testified in previous regulatory proceedings?**

21 A. Yes. I have previously sponsored testimony in all of the states in which PacifiCorp
22 does business as a public utility.

1 **II. PURPOSE OF TESTIMONY**

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

3 A. The purpose of my testimony is to explain and support the development and
4 implementation of new wind projects and the upgrades to repower existing wind
5 resources and demonstrate that these investments were prudent and in the public
6 interest. Specifically, I address certain projects that were part of the Company’s
7 energy resource strategy, Energy Vision 2020, including the new wind projects
8 Ekola Flats, TB Flats, and Cedar Springs II (collectively referred to as the New Wind
9 Projects), and the repowering of the Dunlap wind facility. I also address upgrades to
10 repower the Foote Creek I wind facility. I will refer the repowering of the Dunlap
11 and Foote Creek I wind facilities collectively as the Wind Repowering Projects. I also
12 explain the costs for these projects as contained in this limited-issue rate filing, and
13 explain the drivers of cost changes that have occurred during the development and
14 construction of the projects.

15 **III. SUMMARY OF TESTIMONY**

16 **Q. Please summarize your testimony.**

17 A. My testimony demonstrates that acquisition, development and construction of the
18 New Wind Projects and the associated transmission facilities described in the
19 testimony of Mr. Richard A. Vail that form Energy Vision 2020 (collectively, the
20 Combined Projects) are prudent and in the public interest. The Combined Projects
21 will provide substantial customer benefits after they achieve commercial operation.
22 My testimony explains how the Company has developed, procured, and implemented
23 the New Wind Projects to deliver this outcome.

1 Further, through its Wind Repowering Projects, PacifiCorp is leveraging past
2 investments in its wind fleet and enhancing the future value of these resources for the
3 benefit of its customers. By executing wind turbine equipment purchases in late
4 2016, PacifiCorp secured the opportunity to repower and renew these resources and
5 to thereby qualify the repowered facilities for the full value of the production tax
6 credits (PTCs) for another 10-year period. Repowering provides a unique opportunity
7 to take advantage of efficiency and reliability improvements in wind generation
8 technology and return PacifiCorp's wind fleet to like-new condition while enhancing
9 performance and minimizing maintenance expenditures.

10 The Company has prudently pursued the development and construction of the
11 New Wind Projects and Wind Repowering Projects to deliver the energy, capacity,
12 and full production tax credit benefits from these zero-emissions resources to
13 customers while successfully managing challenging construction conditions presented
14 by the coronavirus pandemic.

15 IV. NEW WIND PROJECTS

16 **Q. What is the purpose of this section of your testimony?**

17 A. In this section of my testimony, I discuss and provide support for the New Wind
18 Projects that were part of the Company's Energy Vision 2020 initiative.

19 **Q. Please describe the New Wind Projects.**

20 A. The New Wind Projects include:

- 21 • Ekola Flats Wind Project - a nominal 250 megawatts (MW) wind facility
22 located in Carbon County, Wyoming and associated infrastructure;
- 23 • TB Flats Wind Project - a nominal 500 MW wind facility located in Carbon

1 and Albany County, Wyoming and associated infrastructure; and
2 • Cedar Springs Wind Project - a nominal 400 MW wind facility located in
3 Converse County, Wyoming and associated infrastructure, of which a nominal
4 200 MW (Cedar Springs II) is owned and operated by the Company and
5 200 MW (Cedar Springs I) is being delivered to the Company under a power
6 purchase agreement (PPA).

7 Each wind facility will consist of a number of 2.0 MW to 4.3 MW wind
8 turbine generators (WTGs) to achieve the facility's respective nameplate capacity, an
9 electrical collection system, 34.5 kilovolt (kV) to 230 kV collector substation(s), a
10 230 kV tie-line between the wind project and the point of interconnection substation,
11 meteorological towers, access roads, an operations and maintenance (O&M) building
12 and required communication and control facilities (*e.g.*, metering, hardware, software,
13 and associated communication circuits and related equipment).

14 **Q. Please provide an overview of the New Wind Projects and the associated**
15 **transmission facilities as identified and presented in the 2017 Integrated**
16 **Resource Plan (IRP).**

17 A. To support its participation in the Renewables Request for Proposals (2017R RFP)
18 included in the 2017 IRP Action Plan, PacifiCorp secured development and
19 implementation rights for the 250 MW Ekola Flats wind project and the 500 MW
20 TB Flats wind project, which were ultimately selected from competitive market
21 respondents as successful final shortlist projects in the 2017R RFP. In addition, the
22 2017R RFP final shortlist resulted in PacifiCorp executing a PPA for the third-party
23 delivered 200 MW Cedar Springs I wind project and a build-transfer agreement

1 (BTA) for procurement of the third-party delivered 200 MW Cedar Springs II wind
2 project. The competitive market solicitation conducted through the 2017R RFP
3 confirmed the economics and deliverability of these specific wind facilities, which are
4 now nearly fully in service and providing energy to customers.

5 The New Wind Projects rely upon the newly constructed Aeolus to
6 Bridger/Anticline transmission line and associated network upgrades, which relieves
7 existing congestion and allows interconnection of the New Wind Projects. In turn,
8 the benefits generated by the New Wind Projects—zero-fuel-cost generation that
9 lowers net power costs and provides 10 years of federal PTCs—support cost-effective
10 development of the transmission projects. Together, the New Wind Projects and the
11 associated transmission facilities provide significant savings to customers over the
12 lives of the resources. As further detailed in the testimony of Mr. Vail, construction of
13 the transmission facilities was completed before year-end 2020.

14 **Q. Why did the Company implement acquisition and construction of the New Wind**
15 **Projects and related transmission facilities?**

16 A. As further described in the testimony of Mr. Rick T. Link, the Company implemented
17 the acquisition and construction of these projects to deliver a time-sensitive
18 opportunity for customers that was identified in the Company’s 2017 IRP preferred
19 portfolio (*i.e.*, addition of approximately 1,100 MW of new wind resources and the
20 associated new transmission infrastructure by 2020). Following competitive market
21 engagement in the 2017R RFP, the Company executed the necessary agreements to
22 ensure that the New Wind Projects had effective implementation plans and were
23 positioned to support the associated transmission facilities.

1 **Q. Did the Company's submittal of benchmark resources in the 2017R RFP**
2 **preclude other competitive market proposals from being selected for**
3 **implementation?**

4 A. No. As explained in the testimony of Mr. Link, the Company's benchmark resources
5 (Ekola Flats and TB Flats) represent only a portion of the competitive market wind
6 facilities that were determined to be viable in the 2017R RFP considering
7 interconnection, permitting, construction, performance, and implementation.
8 PacifiCorp received a robust competitive market response to the 2017R RFP, with the
9 Company's benchmark resources ultimately being successful in that process, in
10 addition to the third-party Cedar Springs projects described above.

11 **Q. Please describe the time-sensitive nature of these New Wind Projects.**

12 A. The time-sensitive nature of these projects was primarily driven by the pending
13 phase-out of federal PTCs for new wind resources and the time period involved to
14 construct a major transmission line. In Internal Revenue Code section 45, the Internal
15 Revenue Service (IRS) provides for PTCs at the 2021 full rate of 2.5 cents per
16 kilowatt-hour of electrical energy production by a wind facility. The PTCs are
17 available for a 10-year period that begins when the facility is placed in service.
18 The Protecting Americans from Tax Hikes Act of 2015 (the PATH Act) extended the
19 availability of the PTCs for wind facilities under construction before January 1, 2020.
20 The PATH Act extension, however, also provided for a phase-out of the PTCs. Wind
21 facilities that began construction before January 1, 2017, will realize the full PTC
22 credit, which is the case for the Energy Vision 2020 Wind Projects. If a wind facility
23 begins construction in 2017, the PTCs are reduced by 20 percent. The PTCs are

1 reduced by 40 percent if construction begins in 2018, and by 60 percent if
2 construction begins in 2019. Under the PATH Act, PTCs are not available for wind
3 facilities that begin construction after December 31, 2019.

4 The facilities must be placed into commercial operation by the end of the
5 fourth calendar year following the year in which construction began or otherwise
6 meet specific IRS requirements for demonstrating the “continuity requirement”
7 throughout the implementation timeline. To ensure customers receive the full value of
8 PTCs, the new wind facilities included in Energy Vision 2020 began construction
9 before January 1, 2017, with a plan to be placed in-service by year-end 2020, barring
10 any changes to the law or qualification under other IRS guidance.

11 **Q. Have there been changes to these qualification requirements relevant to the New**
12 **Wind Projects since the PATH Act was enacted?**

13 A. Yes. In recognition of the impact of the coronavirus pandemic on wind energy
14 projects across the United States, the IRS issued a notice (Notice 2020-41) providing
15 for a one-year extension in the Continuity Safe Harbor such that wind projects such as
16 PacifiCorp’s that began construction in 2016 must be in-service prior to
17 January 1, 2022, in order to qualify for the full value of PTCs.

18 **Q. Do the New Wind Projects meet the IRS’s “start-of-construction” criteria to**
19 **obtain the full value of PTCs?**

20 A. Yes. Each of the projects will use WTG equipment acquired before
21 December 31, 2016. These equipment transactions satisfy the start of construction
22 “safe-harbor” requirements under the PTC guidance issued by the IRS and therefore
23 qualify the Energy Vision New Wind Projects for the full value of PTCs.

1 **Q. Before proceeding, did the Company obtain other state regulatory approvals for**
2 **the New Wind Projects?**

3 A. Yes. To capture the substantial customer benefits resulting from this time-limited
4 opportunity and in accordance with applicable state regulatory statutes, the Company
5 received certificates of public convenience and necessity from the Wyoming Public
6 Service Commission and the Idaho Public Utilities Commission and regulatory
7 approval from the Public Service Commission of Utah.¹

8 **Q. Did the Company perform preliminary evaluations of the wind potential at each**
9 **New Wind Project site?**

10 A. Yes. Wind potential studies for each of the New Wind Projects were completed by
11 the individual project developers and were also validated with a third-party wind
12 resource evaluation firm as part of the 2017R RFP process. As reflected in
13 Confidential Table 1, wind assessments for each of the New Wind Projects indicated
14 that the sites have favorable wind regimes suitable for high performance wind energy
15 generation.

¹ *In the Matter of the Amended Application of Rocky Mountain Power for Certificates of Public Convenience and Necessity and Nontraditional Ratemaking for Wind and Transmission Facilities*, Wyoming Public Service Commission, Docket No. 20000-520-EA-17 (Record No. 14781), Memorandum Opinion, Finding, and Order Approving Stipulation (Oct. 8, 2018); *In the Matter of the Application of Rocky Mountain Power for a Certificate of Public Convenience and Necessity and Binding Ratemaking Treatment for New Wind and Transmission Facilities*, Idaho Public Utilities Commission, Case No. PAC-E-17-07, Order No. 34104 (Jul. 20, 2018) and Order No. 34139 (Sep. 6, 2018); *Application of Rocky Mountain Power for Approval of a Significant Energy Resource Decision and Voluntary Request for Approval of Resource Decision*, Utah Public Service Commission, Docket No. 17-035-40, Order (June 22, 2018).

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Confidential Table 1: New Wind Projects Capacity Factor Estimates

New Wind Projects Net Capacity Factors (P50 Assessment)		
<u>Project Name</u>	<u>Project Size (Nameplate MWs)</u>	<u>Project Net Capacity Factor (a) (b)</u>
Cedar Springs II	199.8	
Ekola Flats	250.9	
TB Flats	503.2	

1 The 2017R RFP evaluation team also reviewed the wind resource assessments
 2 for each project and independently determined whether the wind data for each project
 3 supported the proposed capacity factors or whether adjustments to the proposed
 4 capacity factor for a project were warranted when assessing project benefits.

5 **Q. Did the Company collaborate with the U.S. Fish and Wildlife Service in**
 6 **developing and implementing the New Wind Projects?**

7 A. Yes. The Company has engaged the U.S. Fish and Wildlife Service regarding
 8 developing and implementing the Energy Vision 2020 Wind Projects. The Company
 9 has implemented post-construction monitoring at several projects that incorporates
 10 feedback from the Agency. Additionally, the Company submitted incidental eagle take
 11 permit applications to the U.S. Fish and Wildlife Service for all projects which are
 12 processing with the Agency. Additionally, as I describe in more detail below, the
 13 Company worked pro-actively with the developer of the Cedar Springs II facility to
 14 adjust the turbine layout for the project to reduce the potential for avian impacts. This
 15 resulted in a reduction in the number of WTGs at the project to avoid areas of the site
 16 with higher potential avian impact and was made possible by the use of WTGs with a
 17 higher nameplate capacity at the project than originally anticipated to maintain the
 18 project’s nominal 200 MW capacity.

1 **Q. How did the Company generate the cost information for construction, operation,**
2 **and maintenance of the individual wind facilities through their useful life?**

3 A. The Company assessed life cycle costs for the New Wind Projects using information
4 submitted by the various project proponents in the 2017R RFP and validated against a
5 variety of sources. For example, initial installation costs and run rate O&M cost
6 projections were incorporated into the respective facility's 2017R RFP proposals.
7 Transmission interconnection costs were confirmed against the respective wind
8 facility's transmission interconnection studies. PacifiCorp's internal project
9 management and administrative costs were estimated based on the Company's
10 experience with construction of past wind facilities and other recent generation
11 resource additions.

12 The Company also applied contingencies to the Ekola Flats and TB Flats self-
13 build projects to account for project uncertainties. Contingencies carried in the Cedar
14 Springs project costs are to the account of the third-party developers responsible for
15 delivering those projects. O&M cost estimates were developed based on the
16 Company's experience with currently operating wind facility O&M budgets and
17 third-party contracts for the Company's existing wind facilities. Ongoing capital
18 costs were estimated based on the Company's experience and indicative costs
19 provided by WTG suppliers for critical capital components.

1 **Q. Have there been any material changes to the scope or overall economics of the**
2 **New Wind Projects since PacifiCorp began work on them following their**
3 **selection in the 2017R RFP?**

4 A. No. Project permitting and rights of way acquisition proceeded as planned for the
5 Ekola Flats and TB Flats projects but an issue did arise related to U.S. tariff impacts
6 and other unfavorable market conditions, which negatively impacted previously
7 established WTG equipment supply pricing. The U.S. tariff impacts on Ekola Flats
8 and TB Flats WTG equipment required PacifiCorp to re-engage the originally
9 shortlisted WTG suppliers for these projects to submit updated WTG capital costs,
10 run rate O&M costs, and equipment performance information. Although WTG
11 equipment costs increased, the Company's market re-engagement resulted in higher
12 capacity WTG equipment and favorable operations and maintenance contract costs
13 for the projects that resulted in reduced ongoing operations costs for the projects.
14 These efficiency improvements and cost reductions maintained the customer benefits
15 of the projects despite the increased WTG equipment cost resulting from the tariffs.
16 However, these additional WTG supply costs reduced the ability of the projects to
17 absorb additional construction cost increases incurred as a result of impacts of the
18 coronavirus pandemic within their original budget estimates.

19 **Q. What is the expected operational life of the New Wind Projects?**

20 A. The anticipated operational life of the New Wind Projects has been assessed at
21 30 years, which aligns with the Company's currently approved depreciable life for
22 wind resources.

1 **Q. What were the cost forecasts for the New Wind Projects when PacifiCorp**
2 **included those projects in its last general rate case, docket UE-192021 (2021 Rate**
3 **Case)?²**

4 A. The forecasted costs for these projects in the Company's 2021 Rate Case were
5 approximately \$1.23 billion. The individual projects costs are shown in Confidential
6 Exhibit No. TJH-2C.

7 **Q. What are the total capital costs included in this case for the New Wind Projects?**

8 A. The costs included in this case for these projects are also approximately \$1.23 billion.
9 The as-filed amounts for the individual project costs are shown in Confidential
10 Exhibit No. TJH-2C, which also indicates the cost changes as compared to the 2021
11 Rate Case.

12 **Q. Do the as-filed costs in this case reflect all costs anticipated by the Company for**
13 **these projects?**

14 A. No. The total capital costs included in this case reflect amounts that have been placed
15 in service for the projects as of May 2021, except for the TB Flats facility, which also
16 includes forecasted costs to complete construction activities through July 2021, when
17 the project is expected to be fully in service. There are ongoing costs associated with
18 completing construction of the facilities that are not reflected in the as-filed amounts
19 associated with achievement of final construction and turbine supply contract
20 milestones, resolution of punch list items, site reclamation and demobilization,
21 processing of final invoices, and other remaining project start-up tasks.

² *WUTC v. Pac. Power & Light Co.*, Docket Nos. UE-191024, UE-190750, UE-190929, UE-190981, UE-180778 (cons.), Order 09 / 07/ 12 (Dec. 14. 2020).

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1 **Q. Have the Company's forecasted capital costs for the New Wind Projects**
2 **increased over the costs included in the 2021 Rate Case?**

3 A. Yes. The Company's current forecasted costs for the New Wind Projects are shown in
4 Confidential Exhibit No. TJH-2C, and indicate that on an overall basis, the New Wind
5 Projects are forecast to cost approximately \$ [REDACTED] million more than anticipated when
6 the Company filed its 2021 Rate Case in December 2019.

7 **Q. Please explain the cost differences.**

8 A. The cost differences are driven primarily by reduced costs at the Cedar Springs II
9 project associated with site layout and turbine changes offset by increased costs
10 associated with construction delays resulting from the coronavirus pandemic at the
11 Ekola Flats and TB Flats projects.

12 **Q. What drove the cost changes at the Cedar Springs II facility?**

13 A. The Company worked with the project developer and the U.S. Fish and Wildlife
14 Service to consider and reduce potential avian risks associated with the facility.
15 Through this effort, the Company was able to identify the opportunity to increase the
16 nameplate capacity of some of the WTGs used at the facility, allowing WTGs that
17 were sited in areas of higher avian risk to be dropped from the site plan. The
18 nameplate capacity of a number of WTGs was increased from 2.52 MW to 2.82 MW,
19 allowing a reduction of 8 WTGs from the site plan. This reduction in WTGs had no
20 material impact to the overall energy production from the facility, while reducing the
21 cost of the project and the future cost of operating and maintaining the project.

1 **Q. What has been the impact of the coronavirus pandemic on construction timing**
2 **and costs for Ekola Flats and TB Flats?**

3 A. WTG component deliveries for these facilities began in spring 2020, but impacts
4 from the coronavirus pandemic on the global wind turbine supply chain,
5 transportation logistics, and production capacity stretched out the equipment delivery
6 periods and resulted in inefficient delivery of WTG components as they became
7 available. This, coupled with delays to construction productivity as a result of
8 adherence to worker safety plans adopted to address recommendations from public
9 health authorities in response to the pandemic, pushed construction efforts later into
10 the year and into periods with less favorable wind conditions for efficient
11 construction. Coupled with the WTG supply issue, the net result is that the costs of
12 the Ekola Flats and TB Flats projects have increased since the Company filed its 2021
13 Rate Case, as shown in Confidential Exhibit TJH-2C. The forecasted costs shown in
14 this exhibit reflect the current estimate of the project costs when all construction
15 activities are completed, all WTGs are in service, and costs associated with
16 addressing the impacts of the pandemic on the projects are resolved. While the TB
17 Flats project is not yet fully in service, and construction activities are ongoing,
18 I believe the forecasted costs for the project accurately reflect the remaining work
19 given the current understanding of construction productivity and costs with
20 completion of the project while still addressing construction issues associated with
21 the pandemic.

1 **Q. Did construction delays impact TB Flats to a greater degree than Ekola Flats?**

2 A. Yes. At Ekola Flats, although project construction was delayed, all turbines were able
3 to be placed in service by the end of 2020, with all major construction and turbine
4 erection activities completed. However, at TB Flats, equipment delivery delays,
5 compounded with reduced construction productivity as a result of coronavirus
6 impacts and adherence to safety protocols made it impossible for construction to be
7 completed before the end of the year as planned. As a result, the delivery to site and
8 erection of 28 of the 132 WTGs at the project was delayed into 2021 to avoid the
9 unfavorable winter construction period, further extending the construction period and
10 resulting in relatively higher cost impacts.

11 **Q. When did construction of the New Wind Projects begin?**

12 A. Site construction of the projects began in mid-2019 following receipt of all necessary
13 regulatory approvals and applicable permits and authorizations from other local, state,
14 tribal or federal governmental agencies that have jurisdiction over the construction or
15 operation of the New Wind Projects, including approval from the Wyoming Industrial
16 Siting Council.

17 **Q. What is the current construction status of the Ekola Flats wind facility?**

18 A. All WTGs at the Ekola Flats wind facility were placed in-service on December 30,
19 2020, and the project has been producing energy and associated PTC benefits for
20 customers since that time. At this time, contractors continue to work through final
21 scope items necessary to achieve final project completion milestones and to address
22 contractor punch list items. Site restoration work also continues and will be
23 completed this summer. A site plan showing the Ekola Flats wind facility is shown in

1 Exhibit No. TJH-3.

2 **Q. What is the current construction status of the TB Flats wind facility?**

3 A. For the TB Flats wind facility, 116 of the 132 WTGs comprising total generation
4 capacity of 434.4 MW have been erected, commissioned, and are now serving
5 customers. Due to the turbine equipment delivery delays associated with the
6 pandemic, 28 WTGs were unable to be delivered to the site during the construction
7 season in time to allow for their erection in 2020 prior to the onset of winter weather
8 conditions and high wind speeds that preclude efficient delivery, construction,
9 commissioning, and maintenance activities. As a result, construction activities at the
10 project were halted during the winter so they could resume when weather conditions
11 were more favorable. Completion of the remaining 28 WTGs resumed in Spring
12 2021 and all of the remaining 28 WTGs have been erected, with 12 now fully
13 commissioned. Electrical and communications completion is underway and
14 commissioning activities are proceeding for the remaining 15 WTGs. These final
15 turbines are anticipated to be in service this summer. Following commissioning
16 completion, demobilization and site restoration will be completed, and punch list
17 items addressed. A site plan showing the TB Flats wind facility is shown in Exhibit
18 No. TJH-4.

19 **Q. What is the current construction status of the Cedar Springs II wind facility?**

20 A. All WTGs at the Cedar Springs II wind facility were placed in service in December
21 2020 and are now serving customers. At this time, contractor punch list items,
22 including site restoration work, continues and will be completed this summer. A site
23 plan showing the Cedar Springs II wind facility is shown in Exhibit No. TJH-5.

1 **Q. Please explain why the Energy Vision 2020 New Wind Projects are prudent and**
2 **in the public interest.**

3 A. The information and analysis in the Company's 2017 IRP, 2019 IRP and in this case
4 demonstrate that the New Wind Projects are prudent and in the public interest given
5 their ability to meet the Company's need for energy and capacity to reliably serve its
6 customers. The New Wind Projects provide a range of benefits to Washington
7 customers, including PTCs, net power cost savings, renewable energy credits that
8 may be sold or used for Renewable Portfolio Standard compliance, reduced
9 emissions, and generation diversification. The New Wind Projects are an essential
10 element of the Company's diversified resource portfolio that is needed to serve
11 customers, and as described more fully in the testimony of Mr. Link and Mr. Vail, the
12 New Wind Projects and associated transmission projects will provide net benefits to
13 all customers.

14 **V. WIND REPOWERING PROJECTS**

15 **Q. What is the purpose of this section of your direct testimony?**

16 A. In this section of my testimony, I discuss and provide support for the repowering of
17 the Dunlap and Foote Creek I wind facilities or the Wind Repowering Projects.

18 **A. OVERVIEW OF WIND REPOWERING AND PROJECT SCOPE**

19 **Q. Please briefly describe what repowering a wind facility entails.**

20 A. Repowering broadly describes the upgrade of an existing, operating wind facility with
21 new WTG equipment that can increase a facility's generating capacity and the amount
22 of electrical generation produced from the facility. Specifically, PacifiCorp's
23 repowering plan for the Dunlap wind facility involved replacing the nacelle, hub and

1 rotor of the WTG and for the Foote Creek I facility involved replacement of the
2 existing WTGs. See Exhibit No. TJH-6 for a depiction of a wind turbine and its
3 various components.

4 **Q. Please describe the Wind Repowering Projects.**

5 A. The Dunlap Wind facility is a 111 MW wind facility located in Medicine Bow,
6 Wyoming, with 74 WTGs and an original commercial online date of October 1, 2010.
7 Without repowering, the facility would have been retired in 2040. The Foote Creek I
8 Wind facility is a 41 MW wind facility located in Arlington, Wyoming, with 68 WTGs
9 and an original commercial online date of April 22, 1999. Without repowering, the
10 facility would have been retired in 2029.

11 **Q. Please explain why repowering is feasible for these wind facilities.**

12 A. The Dunlap and Foote Creek I wind facilities began commercial operations in 2010
13 and 1999, respectively. The Dunlap facility has been economically repowered, or
14 upgraded, with new technology that will improve its efficiency and increase its
15 generation output, without incurring the cost to replace the existing towers,
16 foundations, and energy collection systems, which are of sufficient design to
17 accommodate more modern equipment now available. The existing foundations and
18 towers, although approximately 10 years old, are adequately designed to
19 accommodate larger, more modern WTG equipment and still have a sufficient
20 remaining useful life to economically justify the associated investment. Because
21 PacifiCorp repowered its Dunlap facility in a way that allowed the Company to reuse
22 the existing infrastructure of the towers, foundations, and energy collection systems,

1 the energy and PTC benefits were realized with a lower capital investment than would
2 have been required for the redevelopment of the entire site.

3 At the Foote Creek I facility developed more than 20 years ago, the original
4 WTG equipment had a low generating capacity (600 kilowatt) and the towers and
5 foundations supporting the nacelle and rotor did not have the necessary height or
6 design strength to accommodate the installation of modern, larger nacelles and rotors
7 capable of generating a much greater amount of electricity per WTG. Thus, for the
8 Foote Creek I facility, as with older facilities of its type, repowering involved the
9 removal of all of the old wind turbine equipment, including towers, foundations, and
10 energy collection system, and replacement with new equipment and energy collector
11 circuits appropriately sized for the new equipment. Repowering at the Foote Creek I
12 facility resulted in the replacement of the 68 existing small-capacity wind turbines
13 currently at the site with just 13 modern wind turbines.

14 **Q. When did PacifiCorp initiate its Wind Repowering Projects?**

15 A. PacifiCorp began the Wind Repowering Projects in the fall of 2016 and authorized
16 the acquisition of safe harbor equipment to facilitate repowering of its fleet of
17 General Electric turbines in early December 2016.

18 **Q. Did PacifiCorp's 2017 IRP evaluate repowering both of the facilities described
19 above?**

20 A. Yes, for Dunlap, which was part of the Energy Vision 2020 wind repowering
21 projects,³ but not Foote Creek I. When the 2017 IRP was developed, PacifiCorp had

³ The Energy Vision 2020 wind repowering projects also included the follow facilities: High Plains, Glenrock I, Glenrock III, Goodnoe Hills, Leaning Juniper, Marengo I, Marengo II, McFadden Ridge, Rolling Hills, Seven Mile Hill I, Seven Mile Hill II. These projects were included in the Company's rates as part of its 2021 general

1 not assessed repowering Foote Creek I. After finalization of the 2017 IRP, however,
2 PacifiCorp evaluated repowering the Foote Creek I facility and determined that it
3 could be repowered and provide economic benefits to customers, similar to the other
4 facilities evaluated in the 2017 IRP. Mr. Link describes the Company's analysis of
5 the wind repowering project in the 2017 IRP.

6 **Q. As you note above, the scope of repowering at Foote Creek I is different than**
7 **repowering at the Company's Dunlap facility. Can you provide additional**
8 **background on the Company's decision to repower Foote Creek I?**

9 A. Foote Creek I was the Company's first wind energy facility and reached commercial
10 operation in April 1999 as a demonstration project to evaluate the feasibility of
11 utility-scale wind energy. The facility was developed in partnership with the Eugene
12 Water & Electric Board (EWEB) and the Bonneville Power Administration (BPA).
13 As developed, Foote Creek I was co-owned by EWEB (21.21 percent ownership) and
14 PacifiCorp (78.79 percent ownership), with BPA taking 37 percent of the facility's
15 output through a 25-year cost-based PPA. As the first utility-scale wind energy
16 project in Wyoming, Foote Creek I was sited at one of the most favorable wind sites
17 in the United States and enjoys the highest wind speeds of any of the Company's
18 wind projects. Unlike the remainder of the facilities the Company repowered, the
19 Foote Creek I project is unique in that it was co-owned and also had a third-party PPA
20 associated with the resource.

rate case. See, *WUTC v. Pacific Power & Light Company*, Docket Nos. UE-191024, UE-190750, UE-190929, UE-190981, and UE-180778 (cons.), Order 09 / 07 / 12 approving and adopting settlement stipulation subject to conditions (Dec. 14, 2020).

1 The Foote Creek I facility originally consisted of 68 turbines with a 600-
2 kilowatt generating capacity, a rotor diameter of 42 meters and towers that support a
3 40 meter hub height. Although employing the latest technology when originally
4 installed, the existing turbines were costly to operate and maintain relative to the
5 Company's more modern turbines that have a much higher nameplate capacity, larger
6 rotor diameters, and taller towers. Accordingly, the operations and maintenance costs
7 of the Foote Creek I facility were the highest of all of the Company's owned wind
8 resources on a per-MW basis since the maintenance requirements for these smaller
9 turbines are similar to those of larger turbines, but the capacity of the Foote Creek I
10 turbines is much less.

11 The costs associated with continued operation of the existing turbines at Foote
12 Creek I for both the Company and EWEB were also anticipated to increase after the
13 expiration of the BPA PPA in April 2024 since 37 percent of the costs of the project
14 would no longer be covered through the cost-based PPA. Similarly, BPA was
15 required to take higher cost energy from the project until the PPA expired. For these
16 reasons, PacifiCorp, EWEB, and BPA were all motivated to explore whether the
17 existing Foote Creek I project could be unwound in order to achieve an outcome more
18 favorable to customers as compared to continuing to operate the facility through its
19 planned 30-year asset life. Repowering the facility presented the opportunity to
20 realize this outcome for customers.

21 **Q. What was necessary to achieve that outcome?**

22 A. Because of the very favorable wind conditions at the site, the Company was interested
23 in repowering the facility so that customers could benefit from the low-cost energy

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1 that could be generated at the site with modern wind turbine equipment qualified at
2 100 percent of the value of the PTC. To achieve that, however, it was necessary for
3 the Company to acquire EWEB's ownership share of the facility and to cancel the
4 existing PPA with BPA. The Company negotiated a PPA termination agreement with
5 EWEB and BPA, and a purchase and sale agreement with EWEB for its interests in
6 the facility. The termination of the PPA was negotiated to be effective upon
7 PacifiCorp's acquisition of EWEB's interest in the project, and the closing of the
8 purchase and sale agreement with EWEB was contingent upon the Company
9 obtaining necessary regulatory and permitting approvals related to repowering as well
10 as satisfactory commercial arrangements for turbine supply and construction that
11 ensured repowering could occur.

12 **Q. How much did the Company pay EWEB for its interests in the facility?**

13 A. PacifiCorp paid EWEB approximately [REDACTED] for its interests in the facility.

14 **Q. Did the Company incur costs to terminate the Foote Creek I PPA with BPA?**

15 A. No. Under the termination agreement, BPA paid an early termination payment for the
16 facility in the amount of [REDACTED]—the Company's
17 78.79 percent ownership share of the facility—was paid to the Company. This
18 payment to the Company and EWEB reflected the fact that BPA realizes savings by
19 terminating the PPA early and replacing the power with lower cost energy resources.

20 **Q. Were these amounts consistent with the Company's expectations?**

21 A. Yes; these payments were consistent with the Company's economic analysis of the
22 Foote Creek I repowering project, which is described by Mr. Link.

1 **Q. Did the Company enter other commercial arrangements related to repowering at**
2 **Foote Creek I?**

3 A. Yes, the Company executed a turbine supply agreement with Vestas and executed a
4 balance of plant construction contract with Thorstad Companies, Inc. Both contracts
5 were awarded following competitive solicitation processes. When these contracts
6 were finalized, the Company proceeded to close on the purchase of EWEB's interest
7 in the project and terminate the PPA. The Company also purchased the wind energy
8 lease rights for the Foote Creek I facility.

9 **Q. Why did the Company purchase the wind energy lease rights for Foote Creek I?**

10 A. The Company was operating the Foote Creek I facility under land rights that were
11 subleased from Chandar Energy Land Associates, Inc. (CELA), which held the master
12 wind energy lease rights with the ultimate property owners upon whose land the
13 Foote Creek I turbines are located. The wind energy lease payments due to CELA
14 under the sublease were production-based and were costly compared to what the
15 Company pays for similar production-based wind energy leases, even given the high-
16 value wind energy resource at the site. The Company was able to negotiate the
17 purchase of the master wind energy leases from CELA at a cost that improved the
18 economics of the Foote Creek I repowering project relative to continuing to operate
19 under the existing sublease. Additionally, the master wind energy lease rights can be
20 renewed for a total term of up to 99 years, providing potential future customer
21 benefits even beyond the asset life of the repowered Foote Creek I facility.

1 **Q. Were there unique permitting requirements related to Foote Creek I as**
2 **compared to the other repowering projects?**

3 A. Yes. It was necessary for the Company to obtain a new Certificate of Public
4 Convenience and Necessity from the Wyoming Public Service Commission related to
5 repowering the facility, and a new Conditional Use Permit from Carbon County,
6 Wyoming. The Company also had to obtain concurrence from the Bureau of Land
7 Management (BLM) that repowering was consistent with the existing right of way
8 grant from BLM for the facility, and the Company worked with the U.S. Fish and
9 Wildlife Service to review the locations of the new turbines on the existing project
10 footprint to evaluate potential avian impacts associated with the new turbine layout.

11 **Q. When did the Company finally approve repowering the Foote Creek I facility?**

12 A. The Company approved repowering the facility on June 25, 2019. The Company
13 then closed on the purchase of EWEB's interest in the facility on July 24, 2019.
14 Following approval of the repowering project, the Company was able to negotiate the
15 purchase of the master wind leases and incorporated this change in the project scope.
16 The Company subsequently closed on the purchase of the master wind energy lease
17 rights from CELA on August 8, 2019.

18 **Q. What benefits will customers realize from wind repowering?**

19 A. Repowering the Company's Dunlap and Foot Creek I wind facilities requalifies them
20 for PTCs, which are benefits that are passed through to customers in this case.
21 Additionally, repowering increases the amount of emissions-free energy produced
22 from the repowered facilities by 17 to 59 percent, depending on the facility, as shown
23 in Confidential Exhibit No. TJH-7C. Further, by replacing older WTG equipment,

1 which is subject to more failure and maintenance issues than newer equipment,
2 repowering will reduce PacifiCorp's ongoing operating costs. Finally, repowering the
3 wind facilities with new WTG equipment will extend the useful life of the Dunlap
4 facility by 10 years and the Foote Creek I facility by 21 years, creating substantial
5 energy and capacity benefits for customers in the future when these wind facilities
6 would otherwise have been retired from service.

7 **B. REQUALIFICATION FOR PTCS**

8 **Q. Does PacifiCorp's Wind Repowering Project qualify for the full value of the PTC**
9 **under IRS guidance you discussed earlier in your testimony?**

10 A. Yes. Consistent with IRS guidance, a facility owner can demonstrate that
11 construction of a facility has begun in the year in which at least five percent of the
12 applicable project costs are incurred. If wind turbine equipment is purchased and
13 delivered in 2016, and the equipment comprises at least five percent of the applicable
14 project costs, a PTC "safe harbor" is created for the wind facilities subsequently
15 constructed. To meet this requirement, PacifiCorp executed a safe harbor equipment
16 purchases with General Electric International, Inc. (GE) in December 2016, and took
17 delivery of equipment with a value sufficient to give the Company the ability to
18 repower its GE wind fleet and qualify the repowered wind facilities for 100 percent of
19 the PTC value. For the Foote Creek I facility, PacifiCorp will use safe harbor
20 equipment obtained from Berkshire Hathaway Energy Renewables (BHER), a
21 Berkshire Hathaway Energy affiliate, which similarly made safe harbor equipment
22 purchases from Vestas in December 2016 of equipment that was used to qualify the
23 Foote Creek I project for 100 percent of the PTC value.

1 **Q. What other requirements must repowered projects satisfy to qualify for the**
2 **PTC?**

3 A. On May 5, 2016, the IRS issued Notice 2016-31 (Notice), which provides guidance
4 on various aspects of qualifying for the PTC and whether new tax credits can be
5 claimed when wind turbines are repowered or retrofitted. The Notice generally
6 provides that the repowering costs must equal at least four times the fair market value
7 of the equipment that the owner retains from the original facility for the repowered
8 turbines to qualify for new PTCs. Thus, 80 percent of the fair market value of the
9 repowered WTG must result from repowering project costs while the value of the
10 retained components cannot exceed 20 percent of the fair market value of the new
11 facility. This “80/20” test is applied on a turbine-by-turbine basis. Each wind
12 turbine—composed of a foundation, tower, and machine head (including nacelle, hub
13 and rotor)—is considered a separate facility.

14 **Q. Are both the Wind Repowering Projects subject to this 80/20 test?**

15 A. No. Because the Foote Creek I facility will be repowered without using any retained
16 components—meaning the tower and foundations of the existing turbines at the site
17 will not be reused—the 80/20 test does not apply to this repowered facility. Thought
18 of another way, the applicable repowering costs at this project, on a per-turbine basis,
19 would equal 100 percent of the repowering costs at this facility since there are no
20 retained components, satisfying the 80/20 test.

1 **Q. Do the Dunlap wind turbines that PacifiCorp has repowered meet the 80/20 test?**

2 A. Yes. The Dunlap repowering project has been scoped to ensure that the 80/20 test,
3 which is applied at the time the turbine is repowered, will be met for each turbine
4 repowered.

5 **Q. Have recent changes to federal tax laws impacted the ability of the repowering
6 projects to qualify for PTCs?**

7 A. No. The Tax Cuts and Jobs Act enacted into law in December 2017 does not change
8 the repowered facilities qualification for the full value of PTCs.

9 **C. INCREASED ENERGY BENEFITS FOLLOWING REPOWERING**

10 **Q. Once repowered, how do the energy benefits of the Dunlap and Foote Creek I
11 wind facilities increase?**

12 A. Repowering of Dunlap will involve the replacement of the existing machine heads
13 including the nacelle, hub and rotor, while the Foote Creek I facility will employ
14 entirely new wind turbines with new foundations and taller towers. The new nacelles
15 have generators that have a greater nameplate generating capacity than the equipment
16 that is removed. For example, the nameplate rating of each turbine at Dunlap will
17 increase from 1.5 MW to 1.85 MW, while at the Marengo facility, the generator
18 nameplate rating will increase from 1.8 MW to 2.0 MW. At Foote Creek I, the new
19 turbines installed at the site will have generator nameplate ratings of 2.0 MW and
20 4.2 MW, replacing existing turbines with a 0.6 MW nameplate rating. Details
21 regarding the wind turbine upgrades, in-service dates, and resulting energy benefits
22 are shown in Confidential Exhibit No. TJH-7C.

1 In addition to the larger generators in the repowered turbines, the new turbines
2 also include larger blades, which will increase the rotor-swept area of the wind
3 turbines. A larger rotor-swept area allows more of the wind energy flowing past the
4 wind turbine to be captured and converted by the wind turbine into electricity.
5 Because the size of the rotors will increase, the repowered turbines will also include
6 more robust hubs, main shafts, bearings and couplings, and gearboxes suitable to
7 handle the greater torque exerted by the larger rotors.

8 **Q. Will the larger blades installed with repowering increase the potential for avian**
9 **impacts at the wind facilities?**

10 A. Not necessarily. Although the larger blades will increase the overall risk zone (rotor-
11 swept area) of the repowered wind turbines, this does not necessarily correlate with
12 an increased risk of avian impacts at existing turbine sites. PacifiCorp will continue
13 to implement its current informed-curtailment protocols employed at sites with higher
14 avian usage after repowering to minimize avian impacts. Informed-curtailment
15 involves the shutdown of wind turbines when species of interest are in the vicinity.
16 PacifiCorp's informed-curtailment protocols avoid avian impacts regardless of the
17 rotor-swept area. Additionally, PacifiCorp performs monthly monitoring at all of its
18 wind facilities and reports all findings to state wildlife agencies and the U.S. Fish and
19 Wildlife Service. PacifiCorp will continue this monthly monitoring to determine if
20 the new turbine blades cause additional impacts to avian species and will engage with
21 the appropriate agency to discuss and, if prudent and practicable, implement
22 additional avoidance, minimization, or mitigation measures.

1 **Q. Are there other ways that the Company has attempted to minimize avian**
2 **impacts?**

3 A. Yes. At the Foote Creek I facility, the significant reduction in the number of turbines
4 required with site repowering means that less of the overall project site area will be
5 covered by wind turbines. This has allowed the Company to adjust the layout of the
6 wind turbines at the project site to avoid areas of higher avian use such as the edges
7 of Foote Creek Rim.

8 **Q. How did PacifiCorp determine the amount of additional generation that will be**
9 **produced from the repowered wind turbines?**

10 A. For the Dunlap wind facility, where the turbine locations and turbine hub heights are
11 not changing, PacifiCorp worked with its consultant, Black & Veatch (B&V), to use
12 the extensive data history from PacifiCorp's facilities to derive estimates of the
13 energy production expected from repowering. This analysis used millions of data
14 points from the operational record of the wind facilities and incorporated additional
15 modeled wake losses anticipated from the new equipment. Wake losses are the
16 reduction in generation at turbines downwind of other turbines due to reduced wind
17 speed and increased turbulence in the airflow—or wake—behind a turbine.

18 Based on its analysis, PacifiCorp and B&V estimate that energy production
19 following repowering will increase as shown in Confidential Exhibit No. TJH-7C,
20 and as further discussed below. These results reflect as accurately as possible the
21 energy production that would have occurred from the repowered turbines under the
22 same operational conditions and availability as the existing equipment. However,
23 these repowering energy estimates may be conservative. They are based solely on the

1 different equipment performance specifications of the newer equipment and do not
2 account for expected improvements in operational availability of the wind facilities
3 following repowering. Availability of the wind turbines likely will improve after
4 repowering given the additional sensors and condition monitoring systems in the
5 repowered turbines that should allow for improved diagnostics and implementation of
6 preventative maintenance measures that can reduce turbine down-time. Additionally,
7 PacifiCorp will operate the new turbines under service agreements with the turbine
8 suppliers GE and Vestas with performance guarantees and incentives that are likely to
9 result in more availability and generation than PacifiCorp has achieved in the past
10 under similar wind conditions. These contracts are discussed in more detail later in
11 this testimony.

12 **Q. How did the energy estimate methodology differ for the Foote Creek I facility?**

13 A. At the Foote Creek I facility, B&V evaluated historical project generation and
14 availability data from the existing Foote Creek I turbines, local and project-specific
15 meteorological information, and the new proposed turbine layout to model the
16 anticipated energy output of the repowered wind project, similar to the approach used
17 by the Company to estimate the energy output for its New Wind Projects.

18 **Q. Why was this approach most suitable for Foote Creek I?**

19 A. This approach was most suitable because the turbine locations are changing at Foote
20 Creek I, as discussed above, and also because the turbine hub heights are increasing
21 from 40 meters to 80 meters. Thus, the wind conditions—wind speeds, turbulence
22 intensity, and inflow angle to the wind turbines—experienced by the existing turbines
23 may not be representative of what the new turbines will experience. For these

1 reasons, wind modeling was relied upon to develop the energy estimate for Foote
2 Creek I.

3 **Q. What are the major power production advantages of the new equipment?**

4 A. The larger rotor size and improvements in blade design of the new equipment
5 generate more power at all ranges of wind speeds. Additionally, some of the new
6 turbines begin producing power at a lower wind speed than the existing equipment;
7 thus, the turbines can produce energy during lower wind conditions in which the
8 current equipment may sit idle. Because the new turbines will have an increased
9 generator capacity, the turbines will also produce more energy when wind speeds are
10 high and the turbines are at their maximum output. Exhibit No. TJH-8 illustrates
11 these power production advantages and compares the power curve of an existing wind
12 turbine to that of a repowered wind turbine.

13 **Q. How much additional energy will the repowered wind facilities produce?**

14 A. As shown in Confidential Exhibit No. TJH-7C, the Dunlap and Foote Creek I
15 repowered wind facilities are estimated to increase generation by 160 gigawatt-hours
16 per year, a combined increase of 31.3 percent.

17 **D. REDUCED ONGOING OPERATIONAL COSTS FOLLOWING**

18 **REPOWERING**

19 **Q. Aside from increased generation and the associated PTC benefits, what other
20 benefits will be realized with the Wind Repowering Projects?**

21 A. The Wind Repowering Projects will lower the ongoing capital costs of operating the
22 existing wind facilities. PacifiCorp's turbine-supply contracts for repowering,
23 consistent with wind industry standards for new equipment, will include a two-year

1 warranty on the new equipment. This will reduce capital costs associated with
2 replacing or refurbishing the equipment currently in service. Additionally, the new
3 turbine equipment associated with repowering, will obviate, to a large extent, capital
4 costs associated with major turbine component replacements and refurbishments
5 (generators, gearboxes, blades, and small components). After the two-year warranty
6 period for the new equipment expires, these costs are expected to be lower than the
7 costs for the current equipment that has now been in service for up to 12 years.

8 The repowering project will also result in more certainty related to ongoing
9 operations and maintenance costs of the existing wind facilities. PacifiCorp will
10 operate the repowered projects under full-service agreements with the turbine
11 equipment suppliers who will be responsible for operating and maintaining the new
12 turbines for a fixed cost while attaining a guaranteed availability of the turbines.
13 Under these agreements, failure to meet the guaranteed availability, if not the result of
14 an excusable event defined in the contract, will result in the payment of liquidated
15 damages to the company. Customers will benefit by having operations and
16 maintenance costs fixed for the term of the agreement. Thus, there is greater cost
17 certainty related to the run-rate capital expenditures and operations and maintenance
18 costs of the repowering projects.

19 **E. EXTENSION OF WIND FACILITY ASSET LIFE AFTER REPOWERING**

20 **Q. What is the current asset life of the wind facilities that will be repowered?**

21 A. All of the existing wind facilities are currently being depreciated assuming a 30-year
22 asset life. The Dunlap and Foote Creek I wind facilities PacifiCorp has repowered
23 were previously scheduled to be retired in 2040 and 2029, respectively.

1 **Q. Has repowering the Dunlap and Foote Creek I wind facilities extended their**
2 **useful operating lives beyond the previously planned retirement dates?**

3 A. Yes, repowering the wind facilities extends their life 30 years from the repowering
4 date, adding approximately 10 years or more to their planned retirement dates. Thus,
5 with repowering, the Dunlap and Foote Creek I wind facilities PacifiCorp will both be
6 scheduled to be retired in 2050.

7 **Q. How does repowering extend the useful life by 30 years from the repowering**
8 **date?**

9 A. The repowering projects have been designed by the turbine equipment suppliers to
10 meet the same design requirements that apply to WTGs used in new wind facility
11 construction. The wind turbine equipment suppliers were contractually required, as
12 would be the case with a new wind facility, to have their wind turbine designs for the
13 repowering projects certified by an independent third party to ensure that they meet or
14 exceed applicable International Electrotechnical Commission design standards used
15 in the wind turbine industry. These design standards are intended to ensure that the
16 equipment is appropriate for the site conditions and will perform satisfactorily over
17 the standard design life.

18 **Q. What factors have been independently reviewed to assess and certify the design?**

19 A. The third-party design assessment evaluated the site-specific load assumptions based
20 upon the climatic conditions at each facility and assessed the control and protection
21 systems for the wind turbine and their ability to meet the site design conditions. It
22 also assessed the electric components, the rotor blades, hub, machine components

1 (i.e., drivetrain, main bearing and gearbox), and the suitability of the existing tower
2 upon which the new wind turbine equipment was installed.

3 **Q. Did the design certification also evaluate the ability of the existing foundations to**
4 **handle the loads associated with the repowered turbines?**

5 A. No. The design certification assessed the design loads and the design assumptions
6 regarding the ability of the new turbines and the existing towers to handle those loads.
7 But as with new wind facility development, the facility owner must provide a
8 foundation suitable to handle the loads imparted by the tower on the foundation.

9 **Q. Has PacifiCorp reviewed the existing foundations to ensure they are capable of**
10 **handling the new turbines?**

11 A. Yes. PacifiCorp retained B&V to evaluate the ability of the existing foundations to
12 handle the loads of the repowered turbines. B&V's evaluation indicates that the
13 existing foundations are suitable for the repowered turbines.

14 **Q. Has PacifiCorp evaluated the foundations to determine if they are suitable for a**
15 **30-year service life following repowering?**

16 A. Yes. For the foundations in which fatigue loading is a controlling design variable,
17 B&V assessed the ability of the foundations to handle the estimated fatigue loading
18 anticipated for a 30-year period following repowering and determined that all the
19 foundations are able to accommodate the additional loading.

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1 **F. PROJECT COSTS AND CONSTRUCTION STATUS**

2 **Q. What were the cost forecasts for the Wind Repowering Projects when PacifiCorp**
3 **included those projects in the 2021 Rate Case?**

4 A. The forecasted costs for these projects when the Company filed the 2021 Rate Case in
5 December 2019 were approximately \$212.9 million. The individual projects costs are
6 shown in Confidential Exhibit No. TJH-2C.

7 **Q. What are the total capital costs included in this case for the Wind Repowering**
8 **Projects?**

9 A. The costs included in this case for these two projects are approximately \$201.6
10 million. The as-filed amounts for the individual project costs are shown in
11 Confidential Exhibit No. TJH-2C, which also indicates the cost changes as compared
12 to the 2021 Rate Case. Similar to the earlier discussion in my testimony for the New
13 Wind Projects, the costs filed in this case reflect amounts that have been placed in
14 service for the projects as of May 2021. At the Foote Creek I project there are
15 ongoing costs associated with achieving final contractual milestones, site reclamation,
16 and other activities that are not reflected in the as-filed amount, but are included in
17 the current project forecast amount also shown in Confidential Exhibit No. TJH-2C.

18 **Q. How did the capital costs for the Wind Repowering Projects change as compared**
19 **to the costs included in the 2021 Rate Case?**

20 A. The cost of the Dunlap project is approximately \$[REDACTED] million less than what was
21 previously filed in the 2021 Rate Case, while the cost of the Foote Creek I project has
22 increased by approximately \$[REDACTED] million.

1 **Q. Has PacifiCorp completed the majority of construction of the Wind Repowering**
2 **Projects?**

3 A. Yes. The Dunlap repowering project was placed in service on September 7, 2020,
4 and the repowered Foote Creek I project was placed in service on March 24, 2021.
5 Some minor additional work to address site reclamation and revegetation continues,
6 and remaining contractor punch list items continue to be addressed.

7 **Q. What drove the cost changes at these projects as compared to the amounts filed**
8 **in the 2021 Rate Case?**

9 A. At Dunlap, the project benefitted from early delivery of nearly all WTG equipment to
10 the project site in late 2019, avoiding logistics and WTG supply issues that were
11 experienced in 2020 at the New Wind Projects and Foote Creek I as a result of the
12 coronavirus pandemic. Additionally, the Dunlap project was the last repowering
13 project of the Company's fleet of General Electric WTGs, with all the other projects
14 repowered in 2019. Thus, the Dunlap project benefitted from productivity
15 improvements that were realized during the course of the Company's 2019
16 repowering effort as a result of improved work methods and more experienced work
17 crews.

18 At Foote Creek I, construction of the project was delayed for similar reasons
19 as the Ekola Flats and TB Flats projects, with WTG supply, transport logistics, and
20 construction productivity all negatively impacted as a result of the pandemic. This
21 delayed completion of the project into early 2021, increasing project costs.

1 **VI. CONCLUSION AND RECOMMENDATION**

2 **Q. Please summarize your recommendation to the Commission.**

3 A. I recommend that the Commission find the acquisition and construction of the New
4 Wind Projects, associated transmission facilities, and the Wind Repowering Projects
5 to be prudent and in the public interest. These projects will allow Washington
6 customers to enjoy resource diversification and provide access to high capacity factor,
7 low-cost wind energy resources that will provide ongoing customer benefits.

8 **Q. Does this conclude your direct testimony?**

9 A. Yes.