



DOCKET NO. D2015.8.64

QF Petition from Greycliff Wind Prime, LLC
to Set Terms and Conditions

Before the Public Service Commission
of the State of Montana

**NORTHWESTERN ENERGY'S
RESPONSE TESTIMONY AND EXHIBITS**

November 2015

1 Department of Public Service Regulation
2 Montana Public Service Commission
3 Docket No. D2015.8.64
4 QF Petition to Set Terms and Conditions
5 Greycliff Wind Prime, LLC
6
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8

9 **PREFILED RESPONSE TESTIMONY**
10 **OF BLEAU J. LAFAVE**
11 **ON BEHALF OF NORTHWESTERN ENERGY**
12

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1 **Witness Information**

2 **Q. Please state your name and business address.**

3 **A.** My name is Bleau J. LaFave. My business address is 3010 West 69th
4 Street, Sioux Falls, South Dakota 57108.

5
6 **Q. By whom are you employed and in what capacity?**

7 **A.** I joined NorthWestern Energy (“NorthWestern”) in July 1994 as Project
8 Engineer, where I was responsible for the design, construction, and
9 customer connections for natural gas expansion in South Dakota. My
10 current position is Director Long Term Resources. My responsibilities
11 include overseeing the long-term supply growth strategies for
12 NorthWestern, including large project development and acquisitions.

13
14 **Q. Please summarize your educational and employment experiences.**

15 **A.** I earned a Bachelor of Science degree in Mechanical Engineering from
16 the South Dakota School of Mines and Technology in 1994. After
17 completing my degree, I was employed by NorthWestern Public Service
18 as a Project Engineer. Working for NorthWestern, I have held several
19 positions, including Operations Engineer, Huron Area Engineer, Aberdeen
20 Area Engineer, Maintenance Process Leader, Support Services Process
21 Leader, Corporate Procurement Manager, Director of Utility Services,
22 Director of Large Project Development, Director South Dakota/ Nebraska
23 Supply Planning and Development, Director Long Term Resources, and

1 Vice President of Operations for NorthWestern Services Corporation, a
2 former subsidiary of NorthWestern Public Service Company. During this
3 time, I served in many operations and administration functions with a
4 focus on operations management, procurement, logistics, contracts, fleet,
5 facilities, utility engineering, measurement, project development, supply
6 development, planning, acquisitions, and customer service.

7

8 **Q. Have you ever testified before the Montana Public Service
9 Commission (“Commission”)?**

10 **A.** Yes. I have testified in several Commission proceedings, including the
11 Spion Kop Wind Generation Project (Docket No. D2011.5.41), the
12 Greenfield Wind, LLC Qualifying Facility (“QF”) Petition (Docket No.
13 D2014.4.43), and the Greycliff Community Renewable Energy Project
14 (“CREP”) Power Purchase Agreement (“PPA”) Petition (Docket No.
15 D2015.2.18).

16

17

Purpose of Proceeding

18 **Q. Please explain the purpose of this proceeding.**

19 **A.** This proceeding was instituted by Greycliff Wind Prime, LLC (“Greycliff”)
20 for purposes of establishing the terms of a PPA with NorthWestern under
21 the provisions of § 69-3-603, MCA. Greycliff asserts that it has
22 established itself as a QF under the Public Utility Regulatory Policies Act
23 of 1978 (“PURPA”) and is entitled to a contract under which it will sell

1 electric power from a proposed 26 megawatt (“MW”) wind farm at
2 NorthWestern’s avoided costs of energy and capacity. Although there are
3 numerous provisions which must be established for such a contract, the
4 controlling provision is likely the determination of NorthWestern’s avoided
5 cost, as that calculation has a significant impact on the financial viability of
6 the proposed project.

7

8 **Q. Has Greycliff proposed contract terms?**

9 **A.** Yes. Greycliff has proposed as contract terms the last proposed contract
10 negotiated by Greycliff and NorthWestern for a 20-MW wind farm that was
11 to be a Community Renewable Energy Project (“CREP”) under Montana’s
12 Renewable Power Production and Rural Economic Development Act, §
13 69-3-2001, MCA, et seq, with some modifications. See Exhibit C attached
14 to the Greycliff Petition. However, the standards applicable to a CREP
15 project are not the same as the standards applicable to a QF project.
16 Moreover, the Commission rejected the proposed Greycliff CREP project
17 because of concerns that, as proposed and priced, it was not a cost-
18 effective resource for NorthWestern. Commission Order No. 7395d
19 entered in Docket No. D2015.2.18.

20

21 **Purpose of Testimony**

22 **Q. What is the purpose of your testimony?**

1 **A.** The purpose of my testimony is to sponsor and explain NorthWestern's
2 position on the necessary and correct contract terms for a PPA with
3 Greycliff for its proposed 26-MW wind farm to be constructed as a QF
4 under PURPA. My testimony will first address the required price terms to
5 make the PPA compliant with PURPA. Second, I rebut the testimony of
6 Greycliff's witness, Mr. Robert Walker, regarding his estimation of
7 NorthWestern's avoided costs and Greycliff's assertion that it has
8 established a legally enforceable obligation ("LEO"). Lastly, I address the
9 non-price terms necessary to create a viable PPA, one which imposes
10 upon Greycliff an enforceable legal obligation to provide electric power to
11 NorthWestern in a manner which will not harm the economic interests of
12 NorthWestern's customers. My testimony regarding the non-price terms
13 will be filed separately.

14 Specifically, in this testimony, I provide:

- 15 (1) Two avoided cost rates, net of integration costs and real time
16 pricing adjustments. One avoided cost rate has no adder for
17 carbon impacts; one has an adder for carbon impacts.
- 18 (2) The calculation of integration costs which must be netted against
19 the avoided cost of energy and capacity being provided by
20 Greycliff.
- 21 (3) A rebuttal to the testimony of Mr. Robert Walker.

22
23

1 **Greycliff's Avoided Cost Rate**

2 **Q. What method did NorthWestern use to calculate the avoided cost for**
3 **the Greycliff QF project?**

4 **A.** NorthWestern used a differential revenue requirements method. As
5 explained in detail in the Prefiled Response Testimony of Luke P. Hansen
6 ("Hansen Response Testimony"), NorthWestern's resource portfolio was
7 modeled with and without Greycliff in the portfolio, and a differential
8 revenue requirement resulted from the two model runs.

9
10 **Q. Why is this the appropriate method for the calculation of avoided**
11 **costs in this case?**

12 **A.** This method most cleanly and clearly represents the costs that
13 NorthWestern can avoid by purchasing energy and capacity from Greycliff.
14 It is the most accurate of the methods typically used for estimating
15 avoided costs. This method reflects the fact that power purchases from
16 Greycliff will offset market purchases and owned or contractually
17 committed resources in certain hours. The PowerSimm™ differential
18 revenue requirements model simulates over and over again, hour-by-hour,
19 Greycliff's effect on NorthWestern's supply portfolio and identifies how
20 many purchased megawatt hours ("MWh") and/or internal generation
21 MWh would be offset over the next 25 years when NorthWestern would
22 have to replace purchased or generated power for its customers by
23 purchases from Greycliff. Each MWh has an avoided cost which is added

1 together for a total value each year and divided by the total annual output
2 of the Greycliff facility. The 25-year levelized rate is calculated yielding a
3 rate for energy and capacity for the Greycliff facility.

4

5 **Q. What are NorthWestern's avoided costs as estimated using the**
6 **differential revenue requirements methodology?**

7 **A.** The avoided cost for purchasing energy and capacity from the Greycliff
8 project is \$33.66 per MWh levelized for 25 years (excluding the
9 environmental attributes) and \$42.82 per MWh levelized for 25 years
10 (including the environmental attributes) as described in the Hansen
11 Response Testimony.

12

13 **Q. What does NorthWestern propose as the total avoided cost rate**
14 **when regulation and capacity has been deducted for the Greycliff QF**
15 **project?**

16 **A.** The total avoided cost for purchasing the energy and capacity from the
17 Greycliff project is \$29.43 per MWh levelized for 25 years (excluding the
18 environmental attributes) and \$38.58 per MWh levelized for 25 years
19 (including the environmental attributes). Exhibit__(BJL-1) provides a
20 breakdown of NorthWestern's current total avoided cost.

21

22 **Q. Why have you presented two avoided cost calculations, one with and**
23 **one without environmental attributes?**

1 **A.** PURPA does not require NorthWestern to purchase the environmental
2 attributes of a QF facility. As long as Greycliff contractually commits itself
3 both to establish and to transfer the RECs for the project to NorthWestern,
4 it is NorthWestern's view that Greycliff can elect to receive the avoided
5 costs calculated by NorthWestern using an adder for environmental
6 attributes. According to the PPA proposed by Greycliff and attached as
7 Exhibit C to its Petition, Greycliff is willing to convey those attributes to
8 NorthWestern, including appropriately qualified RECs, and thus
9 NorthWestern is willing to pay an avoided cost rate with an adder for the
10 environmental attributes of the project as long as NorthWestern is entitled
11 to any and all attributes from the facility, including any future attributes.

12
13 **Q. Greycliff is an intermittent resource. The forward price used in the
14 model includes firm energy and capacity. For estimating the value of
15 offset purchases from Greycliff generation, how was the forward
16 price forecast adjusted to represent the intermittency of wind?**

17 **A.** Using an average of the historic difference between the Day Ahead ("DA")
18 firm prices and Real Time ("RT") for NorthWestern, a deduction was
19 calculated to estimate the forecasted real time prices that would represent
20 the value that an intermittent resource would receive for a non-
21 dispatchable resource. This difference in price represents the market
22 value between firm dispatchable resources and intermittent resources
23 delivered by Greycliff that Greycliff would receive in the market. The RT

1 price still includes a capacity component because RT transactions are
2 contracted to be delivered at a specific time and location. By using the RT
3 price, Greycliff is receiving the benefit of this short-term capacity that, for
4 the most part, it will not be providing.

5
6 **Q. What wind integration rate does NorthWestern propose be applied to**
7 **the Greycliff QF project?**

8 **A.** As shown in Exhibit__(BJL-1), the wind integration rate is estimated to be
9 \$1.99 per MWh for the Greycliff QF project.

10
11 **Q. How did NorthWestern determine the cost for wind integration?**

12 **A.** The integration of the resource consists of three integration requirements.
13 This intermittent resource will require additional spinning reserves, non-
14 spinning reserves, and regulation. The spinning and non-spinning
15 reserves are calculated using the current Transmission System tariff
16 required rate escalated by 2% per year providing a 25-year levelized
17 estimated rate of \$0.97 and \$0.53 per MWh, for spinning and non-spinning
18 reserves respectively. The regulation estimate assumes that any
19 incremental regulation will be provided by the Dave Gates Generating
20 Station ("DGGS"). Using the study discussed in the Greycliff CREP
21 docket regarding comparison of the actual integration capacity
22 requirements to the 2010-2011 GENIVAR study and updating the 25-year
23 price forecasts as of July 6, 2015, the incremental estimated costs for the

1 additional operation of DGGS are \$47,690.53 annually for Greycliff or
2 \$0.49 per MWh based on the forecasted output.

3

4 **Q. Why did NorthWestern base the regulation rate on DGGS?**

5 **A.** DGGS is the marginal resource for regulating reserves. Additional
6 integration for any intermittent resource will require incremental usage of
7 DGGS. Since Greycliff will cause the additional usage of this resource,
8 the incremental variable costs of DGGS were deducted from the
9 calculated avoided cost.

10

11 **Q. Are there any additional transmission upgrade costs that need to be**
12 **discounted from the QF rate?**

13 **A.** This project was reviewed in May of 2015 when the project was a CREP
14 project. At that time, there were not any issues identified with the project
15 that would require transmission upgrades. Until a contract is executed,
16 the project cannot be submitted into the Transmission Study Queue. At
17 that time a formal study to determine what, if any, transmission upgrades
18 are required would be performed. If a PPA is executed, it should reflect
19 that any transmission upgrade costs associated with the Greycliff project
20 will be paid by Greycliff.

21

1 **Avoided Cost Rate Proposed by Greycliff**

2 **Q. Have you reviewed the avoided cost rate proposed by Greycliff in**
3 **this matter?**

4 **A.** Yes.

5
6 **Q. How does the avoided cost rate calculated by NorthWestern for**
7 **Greycliff compare to Greycliff's proposed avoided cost rate?**

8 **A.** Greycliff's proposed avoided cost rate is substantially higher than
9 NorthWestern's currently calculated levelized avoided cost of \$38.58 per
10 MWh. Its proposed rate of \$50.35 is \$11.77 per MWh higher than the rate
11 calculated by NorthWestern.

12
13 **Q. How did Greycliff calculate its proposed avoided cost rate?**

14 **A.** It didn't calculate an avoided cost rate under any accepted methodology
15 for estimating avoided costs. The testimony of Greycliff's witness, Mr.
16 Walker, makes clear that Greycliff did not perform any avoided cost
17 calculations. In Greycliff's testimony, there are no references as to what
18 costs, if any, can be avoided by NorthWestern by purchasing energy and
19 capacity from the project.

20
21 **Q. Mr. Walker in his testimony at page 4 testifies that Greycliff's**
22 **proposed avoided cost rate is reasonable because it was consistent**
23 **with what Greycliff had proposed before; because NorthWestern had**

1 testified in the Greycliff CREP docket that the project was cost-
2 effective; because it was lower than the standard offer rate found in
3 NorthWestern's QF-1 tariff; and because it was consistent with the
4 methodology and the avoided cost rate from the Greenfield docket
5 (Docket No. D2014.4.43). Can you please respond to each of these
6 contentions raised by Mr. Walker?

7 A. The rate proposed by Greycliff is not consistent with what it proposed
8 previously. It does not matter that NorthWestern advocated in the
9 Greycliff CREP docket that the CREP bid price was cost-effective. As I
10 testified in that docket, and as was pointed out by several of the
11 Commissioners at the hearing in that docket, cost-effectiveness and
12 avoided costs are not the same. In this context, cost-effectiveness is a
13 regulatory concept that was developed because of certain laws and is
14 meant to test whether the price of a project is "cost-effective" when
15 compared to other utility resources. As defined by federal law, avoided
16 costs are costs that the utility avoids by purchasing energy from a QF if
17 that QF has energy to sell to the utility. QF avoided cost determinations
18 are not reviewed for cost-effectiveness.

19

20 It was clearly shown in the Greycliff CREP docket that a determination that
21 a rate is cost-effective does not mean that the rate must equal the avoided
22 costs of the utility. In the Greycliff CREP docket, the proposed CREP bid
23 price (\$49.02 per MWh) was higher than the then-calculated avoided cost

1 (\$45.01 per MWh) for that project at that time. As I stated in my testimony
2 in that docket, if the avoided cost was the only standard for cost-
3 effectiveness, the Greycliff PPA price would not be cost-effective because
4 the calculated avoided cost was lower.

5
6 The QF-1 rate was discussed in the Greycliff CREP docket as one
7 reference point for cost-effectiveness. The QF-1 tariff rate for QFs equal
8 to or less than 3 MW has no effect on the avoided cost rate for a large QF
9 like Greycliff. The Commission recognized this fact in Order No. 7395d, ¶
10 33 in the Greycliff CREP docket.

11
12 The avoided cost calculation that was used in the Greycliff CREP docket
13 was the same method used to calculate the avoided costs in the
14 Greenfield docket, which, as noted above, resulted in an avoided cost that
15 was lower than the CREP PPA price. That rate, the avoided cost rate
16 calculated for the Greycliff CREP project (\$45.01 per MWh), however, was
17 not the rate proposed by Greycliff in July 2015 or in this docket.

18

19 **Q. Is the avoided cost rate calculated by NorthWestern in the Greycliff**
20 **CREP docket an appropriate avoided cost rate for resolution of this**
21 **docket?**

22 **A.** No. That rate does not reflect NorthWestern's current avoided cost. As
23 market prices have continued to decline, the avoided cost rate has also

1 decreased. Additionally, the avoided cost rate calculated for the Greycliff
2 CREP docket was based on a 20-MW wind farm. Greycliff has increased
3 the size of the facility to a nameplate capacity of 26 MW. This change
4 affects the avoided cost calculation. The avoided cost calculated in the
5 Greycliff CREP docket also considered the project's environmental
6 attributes, by using a market price forecast that included carbon. If
7 Greycliff does not convey the environmental attributes to NorthWestern,
8 the non-carbon price forecast should be used which would reduce the
9 avoided cost for the Greycliff project.

10

11 **Q. Greycliff relied on the avoided cost calculations done by**
12 **NorthWestern for the Greenfield project as a test for reasonableness**
13 **of its proposed avoided cost rate. Please explain why it is necessary**
14 **to calculate the avoided cost for the Greycliff project and it is not**
15 **reasonable to use the Greenfield calculations.**

16 **A.** First, of all, the Greenfield rate of \$53.99 per MWh was a separately
17 negotiated rate between two parties as a settlement of a contested case
18 before the Commission. This rate was not reflective of the avoided cost
19 rates proposed by NorthWestern in that docket. Additionally, although the
20 process for calculating the avoided cost for the Greenfield project and the
21 avoided cost calculation process for the Greycliff project are very similar,
22 there are some changes to the inputs, which result in differences between
23 the two rates.

1 The changes are as follows:

- 2 • The electricity and natural gas market purchase price forecasts have
3 declined significantly since the evaluation of the Greenfield project. A
4 comparison of the price forecasts used for the Greenfield avoided cost
5 calculation to the price forecasts used for the Greycliff avoided cost
6 calculation in this docket is included in the Hansen Response
7 Testimony. This change significantly reduces the avoided cost for
8 Greycliff.
- 9 • Because it has a signed PPA, Greenfield must be included in the base
10 model as part of the NorthWestern portfolio ahead of Greycliff. This
11 results in a lower avoided cost rate for Greycliff, because less market
12 purchases are required with a fuller portfolio.
- 13 • As described in the Hansen Response Testimony, the Greycliff model
14 uses an Energy Information Administration escalation rate instead of
15 the escalation rate included in NorthWestern's 2013 Electricity Supply
16 Resource Procurement Plan. This change increases the proposed
17 avoided cost rate for Greycliff.
- 18 • Greycliff's output by hour will differ from the output at Greenfield which
19 may lead to a change in costs that can be avoided.
- 20 • The Greenfield avoided cost model included all of the environmental
21 attributes and a carbon forecast. If Greycliff's offer does not include
22 the environmental attributes, the estimated cost that can be avoided by

1 NorthWestern's customers must be reduced to reflect a market price
2 forecast that does not include carbon.

3 • Greenfield's avoided cost model utilized the zonal regulation method
4 used in the QF-1 dockets. As discussed in the Greenfield QF and
5 Greycliff CREP dockets, NorthWestern utilized the incremental variable
6 cost of DGGs rather than the zonal method to estimate the cost for
7 regulation.

8

9 **Q. Why do changes in the market price forecast affect an avoided cost**
10 **calculation?**

11 **A.** A significant portion of the costs that can be avoided by purchasing power
12 from Greycliff are market purchases. As shown in the Hansen Response
13 Testimony, if the market price forecast goes down, the avoided costs
14 follow.

15

16 **Q. Do you agree with Mr. Walker that the avoided cost rate proposed by**
17 **Greycliff in this docket is reasonable?**

18 **A.** No, the proposed rate has no basis in the actual cost that can be avoided
19 by NorthWestern's customers by purchasing energy and capacity from
20 Greycliff. The proposed rate does not even reflect the calculated avoided
21 cost that was provided by NorthWestern in the Greycliff CREP docket,
22 which, as indicated above, is no longer reasonable since the current
23 avoided cost for this project is lower given declining forward market prices.

1 **Q. As support for the effective rate of \$50.35 per MWh, Mr. Walker, again**
2 **on page 4 of his testimony, asserts that NorthWestern “offered to**
3 **charge nothing for wind integration cost from Greycliff’s proposal in**
4 **[the CREP] docket.” Do you agree with this statement?**

5 **A.** No. As indicated in my testimony in that docket, the models that were
6 used as examples provided that NorthWestern’s customers would have
7 been charged for the regulation service. Notwithstanding that fact, the
8 avoided cost clearly identified a regulation charge in the examples. In
9 order to represent the total cost of the Greycliff CREP PPA, the regulation
10 cost was added to the PPA price. NorthWestern’s testimony in that docket
11 discusses whether this rate was cost effective – NOT that the price
12 matched the avoided cost. The avoided cost was lower.

13
14 The avoided cost also needs to include the increased ancillary costs for
15 the Greycliff project. As I discussed previously, Greycliff will increase
16 regulation costs, spinning reserve costs, and supplemental reserve costs,
17 which are calculated in my attached Exhibit__(BJL-1).

18
19 This is the most effective means to calculate the forecasted avoided cost
20 for a QF project.

21

22

23

1 Legally Enforceable Obligation

2 **Q. Greycliff, in its Petition, asserts that it has established an LEO with**
3 **NorthWestern by complying with the requirements established by**
4 **the Commission in Order No. 6444e (in Docket No. D2002.8.100). Do**
5 **you agree with Greycliff that it has established an LEO?**

6 **A.** No. The Commission in Order No. 6444e, ¶ 47, provided that a QF may
7 establish an LEO under the following circumstances: “a QF must tender
8 an executed power purchase agreement to the utility with a price term
9 consistent with the utility’s avoided costs, with specified beginning and
10 ending dates, and with sufficient guarantees to ensure performance during
11 the term of the contract, and an executed interconnection agreement.” As
12 demonstrated by my testimony, Greycliff has not signed a contract with an
13 obligation to deliver energy at NorthWestern’s avoided cost.

14
15 **Q. Did Greycliff ever ask NorthWestern for its current avoided cost**
16 **calculations?**

17 **A.** No. Greycliff’s witness, Mr. Walker, admits this fact.

18
19 Contract Terms

20 **Q. Are the terms of the contract proposed by Greycliff to NorthWestern**
21 **in July of 2015, and attached to its Petition as Exhibit 3, reasonable**
22 **terms and conditions that NorthWestern would accept? Why?**

1 **A.** No. Although this contract is similar to the CREP contract signed with
2 Greycliff earlier this year, there have been several changes made to the
3 document and some items that remain in the agreement that are not
4 acceptable for a QF PPA.

5

6 **Q. What terms should be changed or negotiated?**

7 **A.** As agreed, NorthWestern will provide additional testimony on the
8 appropriate contract terms for this project by November 19, 2015.

9

10 **Q. Does this conclude your response testimony?**

11 **A.** Yes, it does.

Avoided Cost
 Without Carbon Forecast

Firm Energy & Capacity Value	\$	33.66
DA Firm vs. RT price	\$	(2.23)
Wind Generation Integration		
Regulation - 25 Year Levelized	\$	(0.49)
Spinning Reserve Service (BA Tariff)	\$	(0.97)
Supplemental Reserves Service (non-spin; BA Tariff)	\$	(0.53)
Avoided Cost	\$	29.43

Avoided Cost
 With Carbon Forecast

Firm Energy & Capacity Value	\$	42.82
DA Firm vs. RT price	\$	(2.23)
Regulation - 25 Year Levelized	\$	(0.49)
Spinning Reserve Service (BA Tariff)	\$	(0.97)
Supplemental Reserves Service (non-spin; BA Tariff)	\$	(0.53)
Avoided Cost with Carbon Forecast	\$	38.58

Discount Rate 7.03%

Assumes Regulation, Spinning and Supplemental Reserves are available.

REGULATION

Name Plate Capacity	25.0 MW
Regulation Percentage	18%
Regulation Capacity (MW)	4.5 MW
Regulation Cost 25 Year Levelized	\$ 0.88 \$/KW-Mon
Monthly Rate	\$ 3,974.21
Annual Rate	\$ 47,690.53
Forecasted Capacity Factor	44.1%
Forecasted Output (MWh)	96,660
Forecasted Reg Cost (\$/MWh)	\$ 0.49

Mid-C ICE Day Ahead vs. Powerdex Hourly

Greycliff Generation
 PowerSimm Projections
 Discount Rate 7.03%

	Annual			DA vs. RT		Firm vs. Spot			Offset Purchases
	ATC	Heavy Load	Light Load	Heavy Load	Light Load	Heavy Load	Light Load	Total	
2016	96,647	55,849	40,798	\$ (3.92)	\$ (1.35)	\$ (218,691.97)	\$ (55,273.09)	\$ (273,965.06)	\$ (183,811.74)
2017	96,660	56,014	40,646			\$ (219,338.44)	\$ (55,066.57)	\$ (274,405.00)	\$ (190,111.98)
2018	96,657	56,150	40,507			\$ (219,871.30)	\$ (54,878.14)	\$ (274,749.44)	\$ (192,008.85)
2019	96,660	55,840	40,820			\$ (218,655.48)	\$ (55,302.74)	\$ (273,958.22)	\$ (194,452.49)
2020	96,661	56,008	40,653			\$ (219,315.68)	\$ (55,075.68)	\$ (274,391.36)	\$ (188,603.24)
2021	96,661	55,808	40,852			\$ (218,533.43)	\$ (55,345.82)	\$ (273,879.25)	\$ (186,326.11)
2022	96,661	56,317	40,343			\$ (220,525.70)	\$ (54,656.66)	\$ (275,182.36)	\$ (220,649.22)
2023	96,662	55,546	41,116			\$ (217,507.20)	\$ (55,702.99)	\$ (273,210.18)	\$ (215,258.16)
2024	96,661	56,029	40,632			\$ (219,396.20)	\$ (55,047.31)	\$ (274,443.51)	\$ (220,249.40)
2025	96,663	56,125	40,537			\$ (219,774.68)	\$ (54,919.11)	\$ (274,693.79)	\$ (231,032.14)
2026	96,660	56,436	40,224			\$ (220,989.86)	\$ (54,495.50)	\$ (275,485.36)	\$ (235,186.12)
2027	96,663	56,312	40,351			\$ (220,504.95)	\$ (54,667.38)	\$ (275,172.34)	\$ (231,582.48)
2028	96,658	55,869	40,788			\$ (218,772.36)	\$ (55,259.27)	\$ (274,031.63)	\$ (231,239.39)
2029	96,663	55,979	40,683			\$ (219,201.94)	\$ (55,117.16)	\$ (274,319.10)	\$ (250,474.63)
2030	96,661	56,015	40,646			\$ (219,341.97)	\$ (55,066.44)	\$ (274,408.41)	\$ (249,084.25)
2031	96,662	55,803	40,859			\$ (218,513.56)	\$ (55,355.23)	\$ (273,868.79)	\$ (250,899.85)
2032	96,659	56,111	40,548			\$ (219,720.01)	\$ (54,933.50)	\$ (274,653.50)	\$ (251,622.61)
2033	96,662	56,104	40,558			\$ (219,691.36)	\$ (54,946.91)	\$ (274,638.27)	\$ (252,300.91)
2034	96,661	55,860	40,801			\$ (218,734.66)	\$ (55,276.89)	\$ (274,011.55)	\$ (254,838.23)
2035	96,662	56,061	40,601			\$ (219,523.55)	\$ (55,005.62)	\$ (274,529.17)	\$ (256,654.96)
2036	96,665	55,980	40,685			\$ (219,204.98)	\$ (55,119.96)	\$ (274,324.95)	\$ (225,858.61)
2037	96,657	55,979	40,678			\$ (219,202.26)	\$ (55,110.11)	\$ (274,312.37)	\$ (224,675.22)
2038	96,661	56,149	40,512			\$ (219,866.12)	\$ (54,885.45)	\$ (274,751.57)	\$ (223,745.65)
2039	96,660	55,845	40,815			\$ (218,676.21)	\$ (55,295.71)	\$ (273,971.92)	\$ (221,197.13)
2040	96,660	56,113	40,547			\$ (219,727.52)	\$ (54,932.60)	\$ (274,660.12)	\$ (225,068.96)

(\$215,607.77)

	Day Ahead			Real-time			Basis		
	Peak	Off Peak	All	Peak	Off Peak	All	Peak	Off Peak	All
2010	\$ 35.98	\$ 28.80	\$ 32.84	\$ 33.93	\$ 27.67	\$ 31.19	\$ (2.05)	\$ (1.14)	\$ (1.66)
2011	\$ 29.12	\$ 16.99	\$ 23.80	\$ 25.46	\$ 16.98	\$ 21.74	\$ (3.66)	\$ (0.02)	\$ (2.07)
2012	\$ 22.54	\$ 15.13	\$ 19.28	\$ 18.62	\$ 14.15	\$ 16.65	\$ (3.92)	\$ (0.98)	\$ (2.62)
2013	\$ 36.82	\$ 26.85	\$ 32.43	\$ 31.63	\$ 25.05	\$ 28.74	\$ (5.18)	\$ (1.80)	\$ (3.69)
2014	\$ 38.67	\$ 27.63	\$ 33.82	\$ 32.39	\$ 24.63	\$ 28.98	\$ (6.28)	\$ (3.00)	\$ (4.84)
YTD 2015	\$ 26.63	\$ 20.66	\$ 24.03	\$ 24.54	\$ 19.50	\$ 22.34	\$ (2.09)	\$ (1.16)	\$ (1.69)
	\$ 31.77	\$ 22.73	\$ 27.81	\$ 27.86	\$ 21.38	\$ 25.02	\$ (3.92)	\$ (1.35)	\$ (2.79)

NorthWestern Energy
 D2014.1.5 Avoided Cost Filing
 25-Year Levelized Rate for New Wind

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	105 MW Regulation for Load and Wind				60 MW Regulation for Load			Change for 45 MW Additional Regulation
	Updated current pricing from planning model				Updated current pricing from planning model			
Fuel Expenses								
	Units	Price	Total		Units	Ave. Price	Total	Total
Natural Gas Fuel Costs (Dekatherms) /1	3,296,876	\$3.78	\$ 12,476,939		2,675,524	\$3.78	\$ 10,125,450	\$ 2,351,490
Diesel Fuel Costs (Gallons) /2	1,293,569	\$3.52	\$ 4,557,591		1,049,774	\$3.52	\$ 3,698,635	\$ 858,956
Compressor Electricity Bill /3			\$ 559,177				\$ 559,177	\$ -
Total Fuel Expense			\$ 17,593,708				\$ 14,383,262	\$ 3,210,446
Revenue Credits								
	Per NWE	Supply	Total		Per NWE	Supply	Total	Total
Mid-C Forward Market Price (\$/MWh) /4	\$41.67	\$ 41.67	\$ 41.67		\$ 41.67	\$ 41.67	\$ 41.67	
Discount to Mid-C (\$/MWh)	(\$7.00)	(\$7.00)	(\$7.00)		(\$7.00)	(\$7.00)	(\$7.00)	
Project Energy (aMW)	27	7	34		18	7	25	
Hours/Year	8,760	8,760	8,760		8,760	8,760	8,760	
Total Revenue Credits	\$ 8,200,570	\$ 2,126,074	\$ 10,326,644		\$ 5,467,047	\$ 2,126,074	\$ 7,593,120	\$ 2,733,523
Cost of Regulation			\$ 7,267,064				\$ 6,790,142	\$ 476,923
Annual Cost per MW of Regulation								

Wind Integration Rate Applicable to All Wind Facilities

Annual Rate per MW of Nameplate Wind (\$/MW-Year)	\$ 10,598
Monthly Rate per MW of Nameplate Wind (\$/MW-month)	\$ 883
Monthly Rate per kW of Nameplate Wind (\$/kW-month)	\$ 0.88

Operating Reserve Service

OATT Schedule 5 & Schedule 6

For a Transmission Customer's load and/or generation located in the Transmission Providers's Control Area, The Transmission Customer's Operating Reserve Requirement shall be determined in accordance with applicable WECC and Northwest Power Pool (NWP) guidelines.

Operating Reserve Minimum Requirement 3% of hourly integrated generation
 Spinning Reserve Minimum Requirement 50% of minimum Operating Reserve Requirement

Integrated Generation (MW)	Requirement (MW)	Current Rates (kw/month)	Greycliff Annual Cost	Cost per MW	Year																									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
25.00	0.75	\$ 8.40	\$ 75,597.28	\$ 0.78	\$ 0.80	\$ 0.81	\$ 0.83	\$ 0.85	\$ 0.86	\$ 0.88	\$ 0.90	\$ 0.92	\$ 0.93	\$ 0.95	\$ 0.97	\$ 0.99	\$ 1.01	\$ 1.03	\$ 1.05	\$ 1.07	\$ 1.10	\$ 1.12	\$ 1.14	\$ 1.16	\$ 1.19	\$ 1.21	\$ 1.23	\$ 1.26	\$ 1.28	\$ 1.31
	0.37	\$ 7.25	\$ 32,623.83	\$ 0.34	\$ 0.34	\$ 0.35	\$ 0.37	\$ 0.38	\$ 0.40	\$ 0.42	\$ 0.44	\$ 0.45	\$ 0.47	\$ 0.50	\$ 0.52	\$ 0.54	\$ 0.56	\$ 0.59	\$ 0.62	\$ 0.64	\$ 0.67	\$ 0.70	\$ 0.73	\$ 0.76	\$ 0.80	\$ 0.83	\$ 0.87	\$ 0.91	\$ 0.95	\$ 0.99

25 year levelized

	Greycliff
Operating Reserve Minimum Requirement	\$0.97 \$/MWh
Spinning Reserve Minimum Requirement	\$0.53 \$/MWh

Escalation Rate	2%
Discount Rate	7.03%

7
8
9 **PREFILED RESPONSE TESTIMONY**
10 **OF LUKE P. HANSEN**
11 **ON BEHALF OF NORTHWESTERN ENERGY**
12

13 **TABLE OF CONTENTS**

14	<u>Description</u>	<u>Starting Page No.</u>
15	Witness Information	2
16	Purpose of Testimony	2
17	NorthWestern’s Current Avoided Cost	3
18		
19	<u>Exhibit</u>	
20	Avoided Cost – Greycliff	Exhibit__(LPH-1)

1 **Witness Information**

2 **Q. Please state your name and business address.**

3 **A.** My name is Luke P. Hansen, and my business address is 40 East
4 Broadway, Butte, Montana 59701.

5
6 **Q. By whom are you employed and in what capacity?**

7 **A.** I am employed by NorthWestern Energy (“NorthWestern”) as an analyst in
8 Energy Supply.

9
10 **Q. Please summarize your educational and employment experiences.**

11 **A.** I graduated from Montana Tech in 2003 with a Bachelor of Science
12 degree in Business and Information Technology. Prior to joining
13 NorthWestern, I was a supervisor of Gas Supply at Cascade Natural Gas.
14 I joined NorthWestern in November 2013 as an Energy Supply Analyst. In
15 this position, I assist in the development of the Electric Supply Resource
16 Procurement Plan and the Montana Renewable Portfolio Standard
17 Compliance filing. I am the NorthWestern employee who is trained to
18 utilize the PowerSimmTM software that is necessary to model
19 NorthWestern’s electric supply portfolio.

20
21 **Purpose of Testimony**

22 **Q. What is the purpose of your testimony in this docket?**

1 **A.** The purpose of my testimony is to detail the energy and capacity rate that
2 was calculated for the proposed Greycliff Wind Prime, LLC (“Greycliff”)
3 Qualifying Facility (“QF”) project using the PowerSimm™ model and to
4 describe changes made to the modeling variables that affected the overall
5 avoided cost calculations.

6

7

NorthWestern’s Current Avoided Cost

8 **Q.** Has NorthWestern specifically conducted avoided cost calculations
9 for the Greycliff QF project?

10 **A.** Yes.

11

12 **Q.** What is the avoided cost for energy and capacity that NorthWestern
13 can avoid by purchasing the output of the Greycliff QF project?

14 **A.** The avoided cost for energy and capacity that NorthWestern can avoid by
15 purchasing the output of the Greycliff QF project is \$33.66 per megawatt-
16 hour (“MWh”) if no carbon adder is included and \$42.82 per MWh if a
17 carbon adder is included in the calculation. Both of these are 25-year
18 levelized rates. Exhibit__(LPH-1) details the calculation of the avoided
19 cost for the Greycliff QF project using the PowerSimm™ modeling.

20

21 **Q.** How did NorthWestern determine the levelized avoided cost for
22 energy and capacity?

1 **A.** NorthWestern calculated the 25-year levelized energy and capacity rate
2 by modeling the Greycliff wind resource using the PowerSimm™ software.
3 PowerSimm™ models the effect of changes to NorthWestern’s energy
4 supply portfolio and allows for analysis of potential additional resources.
5 PowerSimm™ first calculates the hourly dispatch of NorthWestern’s
6 supply portfolio and then compares the Greycliff energy production to that
7 supply portfolio. Only after this comparison is made can the value of the
8 Greycliff wind resource be calculated.

9
10 Greycliff’s avoided cost rate is dependent on when it estimates that it will
11 be producing electricity and when that electricity is delivered to
12 NorthWestern’s supply portfolio. For example, if Greycliff produces and
13 delivers energy when NorthWestern’s supply portfolio is short (i.e., when
14 generation is less than load), it receives the market purchase price for
15 electricity that NorthWestern would otherwise have purchased.
16 Alternatively, if the project produces and delivers energy when
17 NorthWestern’s supply portfolio is long (i.e., when generation is greater
18 than load) and the market price is higher than the variable cost of Colstrip
19 Unit 4 (“CU4”), it receives the variable cost of CU4 because that is the
20 resource that can be backed down to account for the Greycliff production.
21 Finally, if Greycliff produces and delivers energy when NorthWestern’s
22 supply portfolio is long and the market price is lower than the variable cost

1 of CU4, it receives the price NorthWestern would receive for selling
2 excess energy in the market.

3

4 Determining if Greycliff's estimated production offsets market purchases
5 or requires excess sales by NorthWestern is accomplished by comparing
6 NorthWestern's supply portfolio without Greycliff's production to the
7 portfolio with Greycliff's production using the PowerSimm™ model. The
8 portfolio without Greycliff's estimated production is NorthWestern's current
9 supply portfolio. This base portfolio includes all owned and contracted
10 resources. Greycliff's estimated production is then added to this portfolio
11 and modeled. The PowerSimm™ modeling output contains the market
12 purchases and sales for the portfolios with and without Greycliff. A
13 comparison of the two portfolios determines, by hour, if Greycliff's
14 estimated production offsets market purchases when NorthWestern's
15 supply portfolio is short or creates excess sales when the portfolio is long.
16 Greycliff's production that offsets purchases is multiplied by the
17 corresponding market purchase price to determine the amount paid to
18 Greycliff. Production that offsets excess sales volumes is multiplied by the
19 corresponding CU4 variable cost during times when the market sales price
20 is higher than the variable cost of CU4 to determine the amount paid to
21 Greycliff. Production from Greycliff during times that the portfolio is long
22 and the market sales price is lower than the variable cost of CU4 is

1 multiplied by the price NorthWestern would receive in the market for
2 energy sold.

3

4 The hourly values of Greycliff's production are then summed for each year
5 to determine Greycliff's total annual energy and capacity rate. The net
6 present value of these annual rates is then calculated and levelized over
7 the average yearly production for the Greycliff project to determine the
8 proposed avoided cost rate for this project.

9

10 **Q. Does the calculation performed by NorthWestern to determine the**
11 **avoided cost rate for the Greycliff project treat the Greenfield project**
12 **as an avoidable resource?**

13 **A.** No. The Greenfield resource is included in the base portfolio as it has a
14 contract to sell energy to NorthWestern and NorthWestern has an
15 obligation to purchase the output. This resource is treated the same as
16 every other owned and contracted renewable resource in the supply
17 portfolio for modeling in PowerSimm™.

18

19 **Q. Did NorthWestern modify any of the inputs, such as the market price**
20 **forecast or escalation rates, used in the 2013 Electricity Supply**
21 **Resource Procurement Plan ("2013 Plan") when it calculated the**
22 **avoided cost rate for Greycliff?**

1 **A.** Yes. The generation history of all renewable and hydro resources that
 2 were included in the 2013 Plan was updated in PowerSimm™. All new
 3 renewable resources that have secured a contract with NorthWestern
 4 since the 2013 Plan was filed were also included.

5
 6 The market forecasts for carbon dioxide, coal, natural gas, and electricity
 7 were also updated. The forecasts for natural gas and electricity prices
 8 were updated as of the close of business on July 6, 2015. Forward
 9 market prices were used in the model through July 2020 and then were
 10 escalated thereafter at the Energy Information Administration (“EIA”)
 11 annual escalation rate from the 2015 EIA Annual Energy Outlook.

12
 13 **Q. Can you please compare the electricity and natural gas prices used**
 14 **to calculate the Greenfield avoided cost rate with those used to**
 15 **calculate the avoided cost rate for Greycliff?**

16 **A.** Yes, the table below compares the electricity (on-peak, off-peak and flat)
 17 prices as well as the natural gas prices used to calculate the energy and
 18 capacity rate for the Greenfield resource and the Greycliff resource.

Table 1

25-Year Levelized Prices (\$/MWh)	On-Peak (\$/MWh)	Off-Peak (\$/MWh)	Flat (\$/MWh)	Natural Gas (\$/MMBtu)
Greenfield forecast	\$56.22	\$41.52	\$49.75	\$5.04
Greycliff forecast	\$44.75	\$34.33	\$40.16	\$3.78
Variance	(\$11.47)	(\$7.19)	(\$9.59)	(\$1.26)

1 Table 1 clearly demonstrates that the market prices for both electricity and
2 natural gas have declined substantially since the Greenfield rate was
3 calculated.

4

5 **Q. Does this conclude your response testimony?**

6 **A.** Yes, it does.

CERTIFICATE OF SERVICE

I hereby certify that an original and ten copies of NorthWestern Energy's Response Testimony and Exhibits in Docket No. D2015.8.64 have been hand delivered to the Montana Public Service Commission with three copies to the Montana Consumer Counsel this date. It has also been e-filed on the PSC website, emailed to counsel of record, and mailed to the remainder of the service list as follows:

Will Rosquist
MT Public Service Commission
Box 202601
Helena, MT 59620-2601

Monica Tranel
Montana Consumer Counsel
111 N. Last Chance Gulch Ste 1B
P.O. Box 201703
Helena, MT 59620-1703

Michael J. Uda
Uda Law Firm, P.C.
7 Sixth Street West
Power Block West, 4H
Helena, MT 59601

Patrick Pelstring
National Renewable Solutions
328 Barry Avenue, Ste. 100
Wayzata, MN 55391

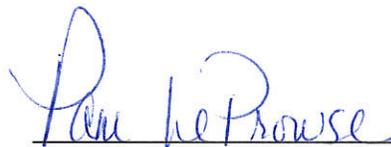
Sarah Norcott
NorthWestern Energy
208 N. Montana Ave Suite 205
Helena, MT 59601

John Alke
NorthWestern Energy
208 N. Montana Ave Suite 205
Helena, MT 59601

Joe Schwartzenberger
NorthWestern Energy
40 E. Broadway
Butte, MT 59701

Pam LeProwse
NorthWestern Energy
40 E. Broadway
Butte, MT 59701

Date: November 16, 2015



Pam LeProwse
Administrative Assistant
Regulatory Affairs