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 REVISED SUPPLEMENTAL RESPONSE TESTIMONY AND EXHIBITS

March 2016

Department of Public Service Regulation
Montana Public Service Commission
Docket No. D2015.8.64
QF Petition to Set Terms and Conditions
Greycliff Wind Prime, LLC

PREFILED REVISED SUPPLEMENTAL RESPONSE TESTIMONY

OF BLEAU J. LAFAVE

ON BEHALF OF NORTHWESTERN ENERGY

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Exhibit

Total Avoided Cost Calculation	Exhibit__(BJL-1)_rev_2

Witness Information

Q. Please state your name and business address.

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

Q. Are you the same Bleau J. LaFave who filed response, additional response, and supplemental response testimonies in this docket?

A. Yes, I am.

Purpose of Testimony

Q. What is the purpose of your revised supplemental response testimony?

A. The purpose of this testimony is to update NorthWestern Energy's ("NorthWestern") current avoided costs for the Greycliff Wind Prime, LLC ("Greycliff") project given recent modifications to the project by Greycliff.

Greycliff's Avoided Cost Rate

Q. What recent modifications affected the avoided cost calculation that you previously provided for the Greycliff project?

A. After I filed supplemental response testimony, Greycliff notified NorthWestern of two changes that affect the avoided cost calculation. First, Greycliff requested a change to the project's commercial operation date from 2016 to 2018. Because of this change, Greycliff asked

NorthWestern to recalculate the 25-year levelized cost. Second, Greycliff notified NorthWestern that the project output would be reduced from 96,000 megawatt-hours ("MWh") to 88,044 MWh annually. Each of these changes affects the calculation of avoided costs as shown in Exhibit__(BJL-1)_rev_2.

Q. How does moving the start date of the project from 2016 to 2018 affect the avoided cost calculation?

A. Not considering other adjustments, the avoided cost will increase due to dropping off years 2016-2017 and adding 2041-2042. NorthWestern based the original calculation of avoided costs on a project delivering power starting in 2016 with operation through 2040 utilizing a forward price curve from July 6, 2015. NorthWestern used the July 6, 2015 price curve because it was close to the date that Greycliff contacted NorthWestern about its QF project. In January, Greycliff notified NorthWestern of the requested change to the start date for the project. Since this is a substantial change, NorthWestern must use a new price forecast to accurately reflect NorthWestern's avoided costs. The new forward price curve used by NorthWestern is from January 15, 2016.

Q. If the price forecast from July 6, 2015 were to remain the basis of NorthWestern's avoided cost calculation, what would the total monetary effect be?

A. NorthWestern's avoided cost based on the July 2015 price forecast would have been higher than the revised cost proposed here. The market price 25-year levelized forecast for electricity in January 2016 was approximately $4.65 per MWh lower than the market price 25-year levelized forecast in July 2015; the avoided costs based on the January price curve are about $3.80 per MWh lower.

Q. What effect will the reduced production levels have on the avoided costs for the Greycliff project?

A. A project with a smaller output will receive a few pennies more for its energy, but because several of the costs such as regulation, reserves, and network upgrades are either based on capacity or are fixed, the lower output will increase the amounts deducted for these costs on a per MWh basis. As a result, the new proposed avoided cost rate that includes the environmental attributes is about $0.70 lower per MWh.

Q. Have you made any other modifications to the avoided cost calculation in this testimony?

A. Yes, I added a capacity value to the calculation after Greycliff pointed out that it was lacking in NorthWestern's previous calculation.

Q. What did you use to calculate the capacity value for Greycliff, and how did it change the avoided cost?

A. NorthWestern calculated the ownership costs of an internal combustion engine generator to be $151.37 per kW-year starting in 2019. NorthWestern also assumed a 5% contribution of capacity value of the interconnection capacity rating in the interconnection agreement. As shown on page 3 Exhibit__(BJL-1)_rev_2, the capacity value for the Greycliff project adds $1.98 per MWh to the avoided cost rate.

Q. Why did you use 2019 as the start date for a capacity contribution?

A. Under NorthWestern's 2015 Electricity Supply Resource Procurement Plan ("2015 Plan") which will be filed March 31, 2016, NorthWestern estimates its first capacity expense will not occur until 2019 and selects the internal combustion engine as the preferred resource.

Q. What is the net effect of all of these changes on the avoided costs for Greycliff?

A. The avoided costs for Greycliff increased from $34.04 to $36.04 per MWh.

Q. Does this conclude your revised supplemental response testimony?

A. Yes, it does.

Avoided Cost
Without Carbon Forecast

Firm Energy	$	31.16
DA Firm vs. RT price	$	(1.99)
Interconnection Network Upgrades	$	(5.02)
Transmission Network Upgrades	$	-
Capacity Value		$1.98
Wind Generation Integration		
Regulation - 25 Year Levelized	$	(0.52)
Spinning Reserve Service (BA Tariff)	$	(0.61)
Supplemental Reserves Service (non-spin; BA Tariff)	$	(1.09)
Avoided Cost	**$**	**23.91**

Avoided Cost
With Carbon Forecast

Firm Energy	$	43.28
DA Firm vs. RT price	$	(1.99)
Interconnection Network Upgrades	$	(5.02)
Transmission Network Upgrades	$	-
Capacity Value	$	1.98
Wind Generation Integration		
Regulation - 25 Year Levelized	$	(0.52)
Spinning Reserve Service (BA Tariff)	$	(0.61)
Supplemental Reserves Service (non-spin; BA Tariff)	$	(1.09)
Avoided Cost with Carbon Forecast	**$**	**36.04**

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	$	0.84	$/KW-Mon
Monthly Rate	$	3,787.28	
Annual Rate	$	45,447.38	
Forecasted Capactiy Factor		40.2%	
Forecasted Output (MWh)		88,054	
Forecasted Reg Cost ($/MWh)	$	0.52	

Mid-C ICE Day Ahead vs. Powerdex Hourly

Greycliff Generation
PowerSimm Projections

Discount Rate	7.03%

	Annual ATC	Annual Heavy Load	Annual Light Load	DA vs. RT Heavy Load	DA vs. RT Light Load	Firm vs. Spot Heavy Load	Firm vs. Spot Light Load	Total	Annual Deduction Offset Purchases
									($175,036.18)
2018	88,303	51,275	37,027	$ (3.92)	$ (1.35)	$ (200,783.35)	$ (50,163.93)	$ (250,947.28)	$ (121,943.33)
2019	88,044	51,269	36,775			$ (200,756.51)	$ (49,822.85)	$ (250,579.36)	$ (127,485.72)
2020	88,044	51,226	36,818			$ (200,588.06)	$ (49,881.13)	$ (250,469.18)	$ (126,530.40)
2021	88,044	51,527	36,517			$ (201,767.17)	$ (49,473.19)	$ (251,240.36)	$ (123,997.38)
2022	88,044	51,493	36,551			$ (201,633.96)	$ (49,519.27)	$ (251,153.23)	$ (144,402.62)
2023	88,044	51,201	36,843			$ (200,490.12)	$ (49,915.02)	$ (250,405.14)	$ (144,984.35)
2024	88,044	50,952	37,092			$ (199,516.31)	$ (50,251.93)	$ (249,768.24)	$ (149,901.73)
2025	88,044	51,107	36,937			$ (200,122.01)	$ (50,042.37)	$ (250,164.39)	$ (167,647.54)
2026	88,044	51,334	36,710			$ (201,013.40)	$ (49,733.97)	$ (250,747.38)	$ (172,468.57)
2027	88,044	51,446	36,598			$ (201,452.19)	$ (49,582.15)	$ (251,034.35)	$ (211,005.00)
2028	88,044	51,141	36,903			$ (200,256.52)	$ (49,995.83)	$ (250,252.36)	$ (215,950.23)
2029	88,044	51,196	36,848			$ (200,472.65)	$ (49,921.05)	$ (250,393.70)	$ (230,904.84)
2030	88,044	51,164	36,880			$ (200,346.83)	$ (49,964.60)	$ (250,311.42)	$ (230,424.32)
2031	88,044	51,149	36,895			$ (200,286.93)	$ (49,985.32)	$ (250,272.24)	$ (233,700.62)
2032	88,044	51,426	36,618			$ (201,374.63)	$ (49,608.98)	$ (250,983.62)	$ (235,589.87)
2033	88,044	51,579	36,465			$ (201,971.37)	$ (49,402.53)	$ (251,373.91)	$ (236,366.55)
2034	88,044	51,176	36,868			$ (200,393.45)	$ (49,948.47)	$ (250,341.92)	$ (238,514.79)
2035	88,044	51,246	36,798			$ (200,669.22)	$ (49,853.05)	$ (250,522.26)	$ (239,650.97)
2036	88,044	51,188	36,856			$ (200,439.57)	$ (49,932.51)	$ (250,372.08)	$ (216,449.95)
2037	88,044	51,322	36,722			$ (200,965.50)	$ (49,750.55)	$ (250,716.05)	$ (219,033.92)
2038	88,044	51,443	36,601			$ (201,440.92)	$ (49,586.06)	$ (251,026.98)	$ (219,314.92)
2039	88,044	51,444	36,600			$ (201,445.09)	$ (49,584.61)	$ (251,029.70)	$ (215,573.73)
2040	88,044	51,296	36,748			$ (200,864.10)	$ (49,785.62)	$ (250,649.73)	$ (179,212.16)
2041	88,044	51,104	36,940			$ (200,111.53)	$ (50,046.01)	$ (250,157.54)	$ (177,560.01)
2042	88,028	51,102	36,925			$ (200,105.58)	$ (50,025.77)	$ (250,131.35)	$ (171,927.52)

		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)

Capacity Additions

Small Aeroderivative		2019	
Ownership Costs	$	140.00	Per kW-year
Fixed O&M Costs	$	11.37	Per kW-year
Credible Capcity		5%	

						$1.98
	$/MW		MW		$/MWh	
2018	0	$	-	$	-	
2019	151365.5377	$	189,206.92	$	2.15	
2020	151365.5377	$	189,206.92	$	2.15	
2021	151365.5377	$	189,206.92	$	2.15	
2022	151365.5377	$	189,206.92	$	2.15	
2023	151365.5377	$	189,206.92	$	2.15	
2024	151365.5377	$	189,206.92	$	2.15	
2025	151365.5377	$	189,206.92	$	2.15	
2026	151365.5377	$	189,206.92	$	2.15	
2027	151365.5377	$	189,206.92	$	2.15	
2028	151365.5377	$	189,206.92	$	2.15	
2029	151365.5377	$	189,206.92	$	2.15	
2030	151365.5377	$	189,206.92	$	2.15	
2031	151365.5377	$	189,206.92	$	2.15	
2032	151365.5377	$	189,206.92	$	2.15	
2033	151365.5377	$	189,206.92	$	2.15	
2034	151365.5377	$	189,206.92	$	2.15	
2035	151365.5377	$	189,206.92	$	2.15	
2036	151365.5377	$	189,206.92	$	2.15	
2037	151365.5377	$	189,206.92	$	2.15	
2038	151365.5377	$	189,206.92	$	2.15	
2039	151365.5377	$	189,206.92	$	2.15	
2040	151365.5377	$	189,206.92	$	2.15	
2041	151365.5377	$	189,206.92	$	2.15	
2042	151365.5377	$	189,206.92	$	2.15	

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

	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	$3.96	$ 13,057,493	2,675,524	$3.96	$ 10,596,589	$ 2,460,905
Diesel Fuel Costs (Gallons) /2	1,293,569	$3.59	$ 4,647,751	1,049,774	$3.59	$ 3,771,803	$ 875,948
Compressor Electricity Bill /3			$ 559,177			$ 559,177	$ -
Total Fuel Expense			$ 18,264,422			$ 14,927,568	$ 3,336,853
Revenue Credits							
	Per NWE	Supply	Total	Per NWE	Supply	Total	Total
Mid-C Forward Market Price ($/MWh) /4	$43.56	$ 43.56	$ 43.56	$ 43.56	$ 43.56	$ 43.56	
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	$ 8,647,138	$ 2,241,851	$ 10,888,989	$ 5,764,759	$ 2,241,851	$ 8,006,609	$ 2,882,379
Cost of Regulation			$ 7,375,433			$ 6,920,959	$ 454,474
Annual Cost per MW of Regulation							

Wind Integration Rate Applicable to All Wind Facilities

Annual Rate per MW of Nameplate Wind ($/MW-Year)	$ 10,099
Monthly Rate per MW of Nameplate Wind ($/MW-month)	$ 842
Monthly Rate per kW of Nameplate Wind ($/kW-month)	**$ 0.84**

Operating Reserve Service
OATT Schedule 5 & Schedule 6
For a Transmission Customer's load and/or generation located in the Transmission Provider's Control Area, The Transmission Customer's Operating Reserve Requirement shall be determined in accordance with applicable WECC and Northwest Power Pool (NWPP) 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 Rates (kw/month)	Greycliff Annual Cost	Cost per MW 2015	2016	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10 2026	11 2027	12 2028	13 2029	14 2030	15 2031	16 2032	17 2033	18 2034	19 2035	20 2036	21 2037	22 2038	23 2039	24 2040	25 2041	25 2042
Operating Reserve Minimum Requirement	25.00	0.75	$ 8.40	$ 75,600.00	$ 0.86	$ 0.88	$ 0.89	$ 0.91	$ 0.93	$ 0.95	$ 0.97	$ 0.99	$ 1.01	$ 1.03	$ 1.05	$ 1.07	$ 1.09	$ 1.11	$ 1.13	$ 1.16	$ 1.18	$ 1.20	$ 1.23	$ 1.25	$ 1.28	$ 1.30	$ 1.33	$ 1.35	$ 1.38	$ 1.41	$ 1.44	$ 1.47
Spinning Reserve Minimum Requirement		0.38	$ 7.25	$ 32,625.00	$ 0.37	$ 0.38	$ 0.39	$ 0.40	$ 0.42	$ 0.44	$ 0.46	$ 0.48	$ 0.50	$ 0.52	$ 0.54	$ 0.57	$ 0.59	$ 0.62	$ 0.65	$ 0.68	$ 0.71	$ 0.74	$ 0.77	$ 0.80	$ 0.84	$ 0.88	$ 0.91	$ 0.95	$ 1.00	$ 1.04	$ 1.09	$ 1.13

25 year levelized	Greycliff	
Operating Reserve Minimum Requirement	**$1.09**	$/MWh
Spinning Reserve Minimum Requirement	**$0.61**	$/MWh

Escalation Rate	2%
Discount Rate	7.03%

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	**NorthWestern Energy**															
2	**Revenue Requirement - Regulated**															
3	**Greycliff Wind Prime (Projects 172 & 202)**															
4	**Network Upgrades**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
5			2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
6	**Rate Base:**															
7																
8	Project Capitalize? (yes = capital, no = expense)	**yes**	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955
9																
10	Less:															
11	Accumulated Depreciation (Book Life)		95,681	191,363	287,044	382,726	478,407	574,089	669,770	765,451	861,133	956,814	1,052,496	1,148,177	1,243,859	1,339,540
12	Deferred Income Taxes		22,051	94,087	155,571	207,613	251,102	286,816	318,864	350,912	383,071	415,119	447,278	479,326	511,485	543,533
13																
14	Total Year End Rate Base		$ 3,448,223	$ 3,280,505	$ 3,123,340	$ 2,975,616	$ 2,836,446	$ 2,705,051	$ 2,577,321	$ 2,449,592	$ 2,321,752	$ 2,194,022	$ 2,066,182	$ 1,938,452	$ 1,810,612	$ 1,682,882
15																
16	Average Annual Rate Base		$ 3,507,089	$ 3,364,364	$ 3,201,922	$ 3,049,478	$ 2,906,031	$ 2,770,748	$ 2,641,186	$ 2,513,457	$ 2,385,672	$ 2,257,887	$ 2,130,102	$ 2,002,317	$ 1,874,532	$ 1,746,747
17																
18	Return (Avg. Rate Base*Cost of Capital)	7.03%	$ 246,548	$ 236,515	$ 225,095	$ 214,378	$ 204,294	$ 194,784	$ 185,675	$ 176,696	$ 167,713	$ 158,729	$ 149,746	$ 140,763	$ 131,780	$ 122,796
19	Operating Expenses		-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Property Taxes	3.70%	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940
21	MCC/MPSC Taxes	0.29%	1,591	1,452	1,456	1,449	1,435	1,400	1,364	1,356	1,347	1,309	1,271	1,234	1,196	1,158
22	Depreciation		95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681	95,681
23	Deferred Income Taxes @ 35%		22,051	72,036	61,484	52,042	43,489	35,714	32,048	32,048	32,159	32,048	32,159	32,048	32,159	32,048
24	Income Taxes		50,677	(37,013)	(13,619)	4,253	18,098	23,285	23,645	29,703	35,603	31,751	27,631	23,779	19,660	15,808
25																

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
2	**Revenue Requirement - Regulated**															
3	**Greycliff Wind Prime (Projects 172 & 202)**															
4	**Network Upgrades**		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
5			2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
26	**Total Revenue Requirement**		$ 548,488	$ 500,611	$ 502,037	$ 499,744	$ 494,939	$ 482,804	$ 470,354	$ 467,424	$ 464,443	$ 451,459	$ 438,430	$ 425,446	$ 412,416	$ 399,432
27																
28																
29																
30																
31																
32	**Income Taxes:**															
33	Revenues		$ 548,488	$ 500,611	$ 502,037	$ 499,744	$ 494,939	$ 482,804	$ 470,354	$ 467,424	$ 464,443	$ 451,459	$ 438,430	$ 425,446	$ 412,416	$ 399,432
34	Property Taxes		131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940
35	MCC/MPSC Taxes		1,591	1,452	1,456	1,449	1,435	1,400	1,364	1,356	1,347	1,309	1,271	1,234	1,196	1,158
36	Operating Expenses		-	-	-	-	-	-	-	-	-	-	-	-	-	-
37		**MACRS**														
38		**yes**														
39	Tax Depreciation	**15**	158,684	301,499	271,349	244,373	219,936	197,720	187,247	187,247	187,564	187,247	187,564	187,247	187,564	187,247
40	Tax Depreciation	**7**	49,403	84,667	60,466	43,180	30,873	30,838	30,873	15,419	-	-	-	-	-	-
41	Montana Corporate Income Tax		8,685	(6,343)	(2,334)	729	3,102	3,990	4,052	5,090	6,101	5,441	4,735	4,075	3,369	2,709
42	Interest Expense (Based on Avg. Rate Base)	2.23%	78,208	75,025	71,403	68,003	64,804	61,788	58,898	56,050	53,200	50,351	47,501	44,652	41,802	38,952
43	Federal Taxable Income		$ 119,977	$ (87,629)	$ (32,244)	$ 10,069	$ 42,848	$ 55,127	$ 55,979	$ 70,322	$ 84,290	$ 75,171	$ 65,417	$ 56,298	$ 46,544	$ 37,425
44																
45	Federal Income Tax @ 35%	35.00%	$ 41,992	$ (30,670)	$ (11,285)	$ 3,524	$ 14,997	$ 19,294	$ 19,593	$ 24,613	$ 29,501	$ 26,310	$ 22,896	$ 19,704	$ 16,290	$ 13,099
46																
47	Federal Taxable Income		$ 119,977	$ (87,629)	$ (32,244)	$ 10,069	$ 42,848	$ 55,127	$ 55,979	$ 70,322	$ 84,290	$ 75,171	$ 65,417	$ 56,298	$ 46,544	$ 37,425
48	Montana Corporate Income Tax		8,685	(6,343)	(2,334)	729	3,102	3,990	4,052	5,090	6,101	5,441	4,735	4,075	3,369	2,709
49	Montana Corporate Taxable		$ 128,662	$ (93,972)	$ (34,578)	$ 10,798	$ 45,950	$ 59,117	$ 60,031	$ 75,412	$ 90,391	$ 80,612	$ 70,152	$ 60,373	$ 49,913	$ 40,134
50																
51	Montana Corporate Income Tax @ 6.75%	6.75%	$ 8,685	$ (6,343)	$ (2,334)	$ 729	$ 3,102	$ 3,990	$ 4,052	$ 5,090	$ 6,101	$ 5,441	$ 4,735	$ 4,075	$ 3,369	$ 2,709
52	Greycliff LGIA															
53																
54	Project Output		87,830	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044
55	Cost per MWh		$ 6.24	$ 5.69	$ 5.70	$ 5.68	$ 5.62	$ 5.48	$ 5.34	$ 5.31	$ 5.28	$ 5.13	$ 4.98	$ 4.83	$ 4.68	$ 4.54
56	Levelized Cost per MWh	25	**$5.02**													
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Network Upgrades

Substation	$2,560,382
Real Estate	$46,557
Metering	$0
Relaying	$403,324
Transmission Line	$209,972
EMS	$8,995
Communications[1]	$336,725
SUBTOTAL	**$3,565,955**

1. The Customer will be responsible for providing the following communications:
a. Telephone circuit to meter
b. Data channel to NWE SOCC center
c. Ring down circuit to the generation control center

	A	Q	R	S	T	U	V	W	X	Y	Z	AA
1	**NorthWestern Energy**											
2	**Revenue Requirement - Regulated**											
3	**Greycliff Wind Prime (Projects 172 & 202)**											
4	**Network Upgrades**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
5		2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
6	**Rate Base:**											
7												
8	Project Capitalize? (yes = capital, no = expense)	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955	$ 3,565,955
9												
10	Less:											
11	Accumulated Depreciation (Book Life)	1,435,221	1,507,855	1,580,488	1,653,122	1,725,755	1,798,388	1,871,022	1,943,655	2,016,289	2,088,922	2,161,556
12	Deferred Income Taxes	575,692	583,038	557,616	532,195	506,773	481,351	455,930	430,508	405,086	379,665	354,243
13												
14	Total Year End Rate Base	$ 1,555,042	$ 1,475,062	$ 1,427,850	$ 1,380,639	$ 1,333,427	$ 1,286,215	$ 1,239,003	$ 1,191,792	$ 1,144,580	$ 1,097,368	$ 1,050,157
15												
16	Average Annual Rate Base	$ 1,618,962	$ 1,515,052	$ 1,451,456	$ 1,404,245	$ 1,357,033	$ 1,309,821	$ 1,262,609	$ 1,215,398	$ 1,168,186	$ 1,120,974	$ 1,073,762
17												
18	Return (Avg. Rate Base*Cost of Capital)	$ 113,813	$ 106,508	$ 102,037	$ 98,718	$ 95,399	$ 92,080	$ 88,761	$ 85,442	$ 82,123	$ 78,804	$ 75,486
19	Operating Expenses	-	-	-	-	-	-	-	-	-	-	-
20	Property Taxes	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940
21	MCC/MPSC Taxes	1,121	1,038	1,039	1,025	1,011	997	983				
22	Depreciation	95,681	72,633	72,633	72,633	72,633	72,633	72,633	72,633	72,633	72,633	72,633
23	Deferred Income Taxes @ 35%	32,159	7,347	(25,422)	(25,422)	(25,422)	(25,422)	(25,422)	(25,422)	(25,422)	(25,422)	(25,422)
24	Income Taxes	11,688	38,391	75,953	74,480	73,007	71,535	70,062				
25												

	A	Q	R	S	T	U	V	W	X	Y	Z	AA
2	**Revenue Requirement - Regulated**											
3	**Greycliff Wind Prime (Projects 172 & 202)**											
4	**Network Upgrades**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
5		2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
26	**Total Revenue Requirement**	$ 386,402	$ 357,857	$ 358,181	$ 353,375	$ 348,570	$ 343,764	$ 338,959	$ 264,595	$ 261,276	$ 257,957	$ 254,638
27												
28												
29												
30												
31												
32	**Income Taxes:**											
33	Revenues	$ 386,402	$ 357,857	$ 358,181	$ 353,375	$ 348,570	$ 343,764	$ 338,959	$ 264,595	$ 261,276	$ 257,957	$ 254,638
34	Property Taxes	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940	131,940
35	MCC/MPSC Taxes	1,121	1,038	1,039	1,025	1,011	997	983				
36	Operating Expenses	-	-	-	-	-	-	-	-	-	-	-
37												
38												
39	Tax Depreciation	187,564	93,624	-	-	-	-	-	-	-	-	-
40	Tax Depreciation	-	-	-	-	-	-	-	-	-	-	-
41	Montana Corporate Income Tax	2,003	6,579	13,016	12,764	12,512	12,259	12,007	7,125	6,972	6,819	6,666
42	Interest Expense (Based on Avg. Rate Base)	36,103	33,786	32,367	31,315	30,262	29,209	28,156	27,103	26,051	24,998	23,945
43	Federal Taxable Income	$ 27,671	$ 90,891	$ 179,818	$ 176,331	$ 172,845	$ 169,359	$ 165,872	$ 98,426	$ 96,313	$ 94,200	$ 92,087
44												
45	Federal Income Tax @ 35%	$ 9,685	$ 31,812	$ 62,936	$ 61,716	$ 60,496	$ 59,276	$ 58,055	$ 34,449	$ 33,710	$ 32,970	$ 32,230
46												
47	Federal Taxable Income	$ 27,671	$ 90,891	$ 179,818	$ 176,331	$ 172,845	$ 169,359	$ 165,872	$ 98,426	$ 96,313	$ 94,200	$ 92,087
48	Montana Corporate Income Tax	2,003	6,579	13,016	12,764	12,512	12,259	12,007	7,125	6,972	6,819	6,666
49	Montana Corporate Taxable	$ 29,674	$ 97,470	$ 192,834	$ 189,095	$ 185,357	$ 181,618	$ 177,879	$ 105,551	$ 103,285	$ 101,018	$ 98,752
50												
51	Montana Corporate Income Tax @ 6.75%	$ 2,003	$ 6,579	$ 13,016	$ 12,764	$ 12,512	$ 12,259	$ 12,007	$ 7,125	$ 6,972	$ 6,819	$ 6,666
52	Greycliff LGIA											
53												
54	Project Output	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,044	88,028
55	Cost per MWh	$ 4.39	$ 4.06	$ 4.07	$ 4.01	$ 3.96	$ 3.90	$ 3.85	$ 3.01	$ 2.97	$ 2.93	$ 2.89
56	Levelized Cost per MWh											
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Department of Public Service Regulation
Montana Public Service Commission
Docket No. D2015.8.64
QF Petition to Set Terms and Conditions
Greycliff Wind Prime, LLC

PREFILED SUPPLEMENTAL RESPONSE TESTIMONY

OF LUKE P. HANSEN

ON BEHALF OF NORTHWESTERN ENERGY

TABLE OF CONTENTS

Description	Starting Page No.
Witness Information	2
Purpose of Testimony	2

Exhibit

Avoided Cost – Greycliff	Exhibit__(LPH-1)_rev

Witness Information

Q. Please state your name and business address.

A. My name is Luke P. Hansen, and my business address is 11 East Park Street, Butte, Montana 59701.

Q. Are you the same Luke P. Hansen who filed response testimony in this docket?

A. Yes, I am.

Purpose of Testimony

Q. What is the purpose of your supplemental response testimony in this docket?

A. The purpose of this testimony is to provide a revised avoided cost computation of firm energy for Greycliff Wind Prime, LLC ("Greycliff") reflecting the changes discussed in the Prefiled Revised Supplemental Response Testimony of Bleau J. LaFave -- specifically, the reduction in the annual estimated production for the Greycliff project, the new anticipated commercial operation date in year 2018, and new market price forecasts from January 15, 2016 given the change in operation date.

Q. In addition to the changes noted above, are there any other changes to the Greycliff avoided cost calculation for firm energy?

A. Yes. Given Greycliff's decision to move the start date of the project to 2018, NorthWestern also updated the Colstrip variable operation and maintenance costs used in the calculation with more current information.

Q. What effect did the update to the Colstrip information have on the calculation of avoided cost for firm energy?

A. There was an increase in the variable operation and maintenance costs from a levelized cost of $3.18 to $4.29 per MWh and a decrease in the fuel cost for Colstrip. The levelized Colstrip fuel price went from $1.40 to 1.01 per MMBtu.

Q. Have you attached a revised Exhibit__(LPH-1) to this testimony incorporating the changes described above?

A. Yes.

Q. Does this conclude your supplemental response testimony?

A. Yes, it does.

WACC - 7.03% nominal, annual

Summary: NPV and Annualized $/MWh of Avoided Costs, WITHOUT Carbon Price Impact

NPV Of Avoided Costs	$ 31,883,457
Levelized Payment	$ 31.16

Summary Table: Annual Wind QF Generation and Avoided Costs WITHOUT Carbon Price Impacts

Year	Greycliff Generation (MWh)	Excess Sales (MWh)	Offset Purchases (MWh)	Average Sales Avoided Cost ($/MWh)	Average Offset Purchase Price ($/MWh)	Total Sales Avoided Cost ($)	Total Avoided Cost of Purchases ($)	Total Avoided Cost ($)	Average Avoided Cost ($/MWh)
2018	88,303	45,394	42,909	$ 11.29	$ 24.18	$ 512,530	$ 1,037,470	$ 1,550,000	$ 17.55
2019	88,044	43,250	44,794	$ 12.18	$ 25.89	$ 526,842	$ 1,159,787	$ 1,686,629	$ 19.16
2020	88,044	43,567	44,478	$ 12.36	$ 27.48	$ 538,405	$ 1,222,400	$ 1,760,805	$ 20.00
2021	88,044	44,591	43,453	$ 13.55	$ 29.10	$ 604,340	$ 1,264,699	$ 1,869,039	$ 21.23
2022	88,044	37,422	50,622	$ 12.47	$ 29.56	$ 466,838	$ 1,496,137	$ 1,962,975	$ 22.30
2023	88,044	37,067	50,977	$ 12.72	$ 30.86	$ 471,440	$ 1,573,145	$ 2,044,585	$ 23.22
2024	88,044	35,203	52,841	$ 12.64	$ 32.53	$ 444,842	$ 1,718,674	$ 2,163,516	$ 24.57
2025	88,044	29,041	59,003	$ 13.15	$ 33.24	$ 381,934	$ 1,961,070	$ 2,343,004	$ 26.61
2026	88,044	27,486	60,558	$ 13.42	$ 34.65	$ 368,799	$ 2,098,497	$ 2,467,296	$ 28.02
2027	88,044	14,039	74,005	$ 13.11	$ 35.79	$ 184,034	$ 2,648,283	$ 2,832,317	$ 32.17
2028	88,044	12,068	75,976	$ 13.75	$ 37.05	$ 165,953	$ 2,815,128	$ 2,981,081	$ 33.86
2029	88,044	6,853	81,191	$ 13.48	$ 38.48	$ 92,364	$ 3,123,886	$ 3,216,250	$ 36.53
2030	88,044	6,995	81,049	$ 13.17	$ 40.25	$ 92,133	$ 3,262,449	$ 3,354,582	$ 38.10
2031	88,044	5,830	82,214	$ 15.35	$ 41.85	$ 89,510	$ 3,440,606	$ 3,530,115	$ 40.09
2032	88,044	5,400	82,644	$ 15.61	$ 43.69	$ 84,312	$ 3,610,591	$ 3,694,903	$ 41.97
2033	88,044	5,256	82,788	$ 15.63	$ 45.62	$ 82,166	$ 3,776,882	$ 3,859,048	$ 43.83
2034	88,044	4,160	83,885	$ 16.29	$ 47.40	$ 67,760	$ 3,975,752	$ 4,043,512	$ 45.93
2035	88,044	3,821	84,223	$ 16.43	$ 49.44	$ 62,759	$ 4,163,764	$ 4,226,523	$ 48.00
2036	88,044	11,929	76,115	$ 16.52	$ 52.46	$ 197,070	$ 3,992,989	$ 4,190,059	$ 47.59
2037	88,044	11,126	76,918	$ 17.21	$ 54.53	$ 191,504	$ 4,194,267	$ 4,385,772	$ 49.81
2038	88,044	11,123	76,922	$ 17.52	$ 56.84	$ 194,915	$ 4,371,917	$ 4,566,833	$ 51.87
2039	88,044	12,436	75,609	$ 19.09	$ 59.60	$ 237,449	$ 4,506,083	$ 4,743,532	$ 53.88
2040	88,044	25,093	62,951	$ 19.46	$ 62.52	$ 488,201	$ 3,935,607	$ 4,423,808	$ 50.25
2041	88,044	25,551	62,493	$ 19.82	$ 65.17	$ 506,459	$ 4,072,693	$ 4,579,152	$ 52.01
2042	88,028	27,522	60,506	$ 20.20	$ 68.70	$ 556,024	$ 4,156,457	$ 4,712,482	$ 53.53

WACC - 7.03% nominal, annual

Summary: NPV and Annualized $/MWh of Avoided Costs, WITH Carbon Price Impact

NPV Of Avoided Costs	$ 44,293,698	$
Levelized Payment	$ 43.28	$/MWh

Summary Table: Annual Wind QF Generation and Avoided Costs WITH Carbon Price Impacts

Year	Greycliff Generation (MWh)	Excess Sales (MWh)	Offset Purchases (MWh)	Average Sales Avoided Cost ($/MWh)	Average Offset Purchase Price ($/MWh)	Total Sales Avoided Cost ($)	Total Avoided Cost of Purchases ($)	Total Avoided Cost ($)	Average Avoided Cost ($/MWh)
2018	88,303	45,394	42,909	$ 12.52	$ 24.18	$ 568,466	$ 1,037,470	$ 1,605,935	$ 18.19
2019	88,044	43,250	44,794	$ 13.50	$ 25.89	$ 584,060	$ 1,159,787	$ 1,743,847	$ 19.81
2020	88,044	43,567	44,478	$ 13.22	$ 27.48	$ 575,784	$ 1,222,400	$ 1,798,184	$ 20.42
2021	88,044	44,591	43,453	$ 14.56	$ 29.10	$ 649,156	$ 1,264,699	$ 1,913,854	$ 21.74
2022	88,044	37,422	50,622	$ 32.40	$ 39.56	$ 1,212,586	$ 2,002,354	$ 3,214,940	$ 36.52
2023	88,044	37,067	50,977	$ 33.61	$ 41.27	$ 1,245,692	$ 2,104,075	$ 3,349,767	$ 38.05
2024	88,044	35,203	52,841	$ 34.42	$ 43.37	$ 1,211,723	$ 2,291,733	$ 3,503,456	$ 39.79
2025	88,044	29,041	59,003	$ 36.07	$ 44.53	$ 1,047,379	$ 2,627,506	$ 3,674,885	$ 41.74
2026	88,044	27,486	60,558	$ 37.45	$ 46.42	$ 1,029,368	$ 2,810,966	$ 3,840,334	$ 43.62
2027	88,044	14,039	74,005	$ 37.97	$ 48.04	$ 533,094	$ 3,555,212	$ 4,088,306	$ 46.43
2028	88,044	12,068	75,976	$ 39.85	$ 49.82	$ 480,896	$ 3,784,960	$ 4,265,856	$ 48.45
2029	88,044	6,853	81,191	$ 40.48	$ 51.77	$ 277,422	$ 4,203,325	$ 4,480,747	$ 50.89
2030	88,044	6,995	81,049	$ 41.49	$ 54.10	$ 290,211	$ 4,384,573	$ 4,674,784	$ 53.10
2031	88,044	5,830	82,214	$ 43.58	$ 56.27	$ 254,058	$ 4,626,136	$ 4,880,194	$ 55.43
2032	88,044	5,400	82,644	$ 45.12	$ 58.70	$ 243,675	$ 4,851,491	$ 5,095,167	$ 57.87
2033	88,044	5,256	82,788	$ 46.37	$ 61.26	$ 243,754	$ 5,071,682	$ 5,315,437	$ 60.37
2034	88,044	4,160	83,885	$ 48.66	$ 63.69	$ 202,406	$ 5,342,231	$ 5,544,637	$ 62.98
2035	88,044	3,821	84,223	$ 50.14	$ 66.40	$ 191,580	$ 5,592,615	$ 5,784,196	$ 65.70
2036	88,044	11,929	76,115	$ 52.16	$ 70.13	$ 622,266	$ 5,337,946	$ 5,960,212	$ 67.70
2037	88,044	11,126	76,918	$ 54.71	$ 72.93	$ 608,688	$ 5,609,948	$ 6,218,636	$ 70.63
2038	88,044	11,123	76,922	$ 56.76	$ 76.08	$ 631,323	$ 5,852,002	$ 6,483,324	$ 73.64
2039	88,044	12,436	75,609	$ 58.28	$ 79.56	$ 724,770	$ 6,015,230	$ 6,740,000	$ 76.55
2040	88,044	25,093	62,951	$ 61.94	$ 83.31	$ 1,554,373	$ 5,244,352	$ 6,798,725	$ 77.22
2041	88,044	25,551	62,493	$ 64.26	$ 86.83	$ 1,641,811	$ 5,425,980	$ 7,067,791	$ 80.28
2042	88,028	27,522	60,506	$ 66.24	$ 91.25	$ 1,823,084	$ 5,520,861	$ 7,343,945	$ 83.43

CERTIFICATE OF SERVICE

I hereby certify that an original and ten copies of NorthWestern Energy's Revised Supplemental 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:

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Date: March 29, 2016

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