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December 10, 2013

**PUBLIC DOCUMENT**

Burl W. Haar  
Executive Secretary  
Minnesota Public Utilities Commission  
121 7<sup>th</sup> Place East, Suite 350  
St. Paul, Minnesota 55101-2147

**RE: PUBLIC Response Comments of the Minnesota Department of Commerce, Division of Energy Resources**  
Docket No. E015/M-13-907

Dear Dr. Haar:

Attached are the **PUBLIC** response comments of the Minnesota Department of Commerce, Division of Energy Resources (Department) in the following matter:

Petition of Minnesota Power for Approval of Investments and Expenditures in the Bison 4 Wind Project for Recovery through Minnesota Power's Renewable Resources Rider under Minn. Stat. §216B.1645.

Based on our review of the information provided by Minnesota Power in its reply comments, the Department recommends that Minnesota Public Utilities Commission **approve** Minnesota Power's petition.

Sincerely,

/s/ CRAIG ADDONIZIO  
Financial Analyst

CA/lt  
Attachment

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

PUBLIC COMMENTS OF THE  
MINNESOTA DEPARTMENT OF COMMERCE  
DIVISION OF ENERGY RESOURCES

DOCKET NO. E015/M-13-907

**I. BACKGROUND**

On September 27, 2013, Minnesota Power (MP or the Company) filed a petition with the Minnesota Public Utilities Commission (Commission) to request approval of investments and expenditures related to the development of the Bison 4 Wind Project (Bison 4 or the Project). The Company filed this petition pursuant to Minn. Stat. §216B.1645 (Power Purchase Contract or Investment).

On November 12, 2013, the Department filed comments requesting additional information from MP regarding its capacity factor assumption for Bison 4.

On November 22, 2013, MP filed reply comments.

**II. CAPACITY FACTOR ASSUMPTION**

*A. BISON 1 CAPACITY FACTOR*

On page ten of its comments, the Department noted that the capacity factor assumed for Bison 4 in MP's petition (46.5 percent) was slightly higher than the capacity factors assumed for Bisons 1, 2, and 3 (45.12 percent, 41.31 percent, and 39.8 percent, respectively). The Department requested that MP provide additional information regarding Bison 4's assumed capacity factor

and explain the differences between Bison 4 and the other, geographically similar Bison projects.<sup>1</sup>

In its reply comments, MP clarified that the expected average annual generation of Bison 1 of 300,000 MWh on a capacity of 81.8 MW equates to a capacity factor of 41.9 percent, not 45.12 percent, as stated by the Department. While the Department appreciates the updated information from MP, the Department notes that its calculation of a 45.12 percent capacity factor relied on information provided by MP in its petition for approval of investments and expenditures in Bison 1.<sup>2</sup> On page 10 of that petition, the Company stated:

With an installed nameplate capacity of 75.9MW and an estimated net capacity factor of about 45 percent, Minnesota Power projects the Bison I Project will have an annual energy output of approximately 300,000MWh.

As indicated in MP's reply comments, the actual nameplate capacity of Bison 1 (81.8MW) is higher than the capacity initially planned and presented in MP's Bison 1 petition (75.9MW). While it is possible that the additional capacity lowered Bison 1's overall capacity factor, the Department expects that any such reduction would be small, and that Bison 1's expected annual generation would have increased and the original capacity factor assumption would have been largely preserved. The Department notes, however, that this calculation has no impact on its recommendations in this Docket.

*B. DIFFERENCES BETWEEN BISON 4 AND PRIOR BISON PROJECTS*

With respect to the differences between Bison 4's capacity factor and the capacity factors of the first three Bison projects, MP cited three main reasons for Bison 4's higher estimated capacity factor: superior turbine placement, higher hub heights, and larger rotors. On page three of its reply comments, MP stated that the terrain immediately surrounding the sites secured for Bison 4's turbines have characteristics which are better for wind production than the sites chosen for Bisons 1, 2, and 3, such as hilltops and ridges running parallel to the prevailing wind direction. MP also stated that turbines create wake, which can lower the capacity factor of turbines which are located downwind, and that Bison 4's turbine spacing is better than prior Bison projects, which reduces such wake losses. Additionally, the Company stated that wind speed generally increases as elevation increases, and because Bison 4 turbines will have a higher hub height than the first three Bison projects (92.5 meters versus 80 meters), average wind speeds will be slightly higher for Bison 4 than for Bisons 1, 2, and 3. Lastly, the Company stated that Bison 4 turbines will also have a larger rotor diameter (113 meters versus 101 meters) allowing each turbine to intercept more wind and produce more energy.

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<sup>1</sup> See the Department's comments, pages 10-11.

<sup>2</sup> See MP's March 23, 2009 petition in Docket No. E015/M-09-285.

The Department appreciates the information from MP and concludes that MP's explanation is reasonable.

*C. BISON 4 CAPACITY FACTOR CALCULATIONS*

In its reply comments, MP described the process its wind energy consultant used to determine Bison 4's expected annual energy production. First, MP's consultant conducted an analysis that treated Bisons 1, 2, and 3 as a single wind farm and calculated the expected annual production of that single wind farm as if Bison 4 did not exist. The consultant then conducted a second analysis that treated all four Bison projects as a single wind farm and calculated the expected annual production of that wind farm. Bison 4's estimated annual output was then calculated as the difference in the output of these two "wind farms."

As noted above, the wake produced by one turbine can affect production at a different turbine that is downwind from the first. Some planned Bison 4 turbines will be placed upwind of existing Bison turbines and are expected to reduce production at those existing turbines. MP's method of calculating Bison 4's expected output accounts for these expected losses by calculating the *net* output created by Bison 4. Bison 4's actual output is expected to be higher than 835,000 MWh per year, as stated in MP's petition, but some of Bison 4's expected output is, in a sense, reassigned to Bisons 1, 2, and 3 to offset wake losses created by Bison 4.

The Department concludes that this approach is reasonable.

*D. CONCERNS RELATED TO BISONS 1, 2, AND 3*

As described above, the Department concludes that MP's analysis of Bison 4's capacity factor is reasonable, as it accounts for wake losses at Bisons 1, 2, and 3 created by Bison 4. The Department notes, however, that MP's analysis accounts for the difference between the Company's *current* estimate of expected output at Bisons 1, 2, and 3 as a group, and the Company's *current* estimate of output at all four Bison projects as a group. The Department notes, however, that MP's *current* estimate of expected output at Bisons 1, 2, and 3 is *lower* than the sum of its *initial* estimates of output at Bison 1, 2, and 3 included in the Company's petitions for approval of investments and expenditures in each of those three projects.<sup>3</sup> Table 1 summarizes these differences.

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<sup>3</sup> See Docket Nos. E015/M-09-285, E015/M-11-234, and E015/M-11-626.

**Table 1**  
**Estimated Energy Output at MP's**  
**Bison Wind Projects**

	Initial Petitions	Study of Bison 1, 2, and 3 as a Single Wind Facility		Study of Bison 1, 2, 3, and 4 as a Single Wind Facility			
	Estimated Avg. Annual Output (MWh)	Estimated Avg. Annual Output (MWh)	Reduction from Initial Estimates		Estimated Avg. Annual Output (MWh)	Reduction from Bison 1, 2, and 3 Study	
	[a]	[b]	(MWh)	(%)	[e]	(MWh)	(%)
			[c]=[b]-[a]	[d]=[c]/[a]		[f]=[b]-[e]	[g]=[f]/[b]
	<b>[TRADE SECRET DATA BEGINS...]</b>						
Bison 1	300,000						
Bison 2	380,000						
Bison 3	365,000						
Total	1,045,000						
	<b>[TRADE SECRET DATA ENDS]</b>						

Sources: [a]: MP's petitions in Docket Nos. E015/M-09-285, E015/M-11-234, and E015/M-11-626  
 [b]: Attachment to MP's Reply Comments  
 [c]: Attachment to MP's Reply Comments

The Company's analysis appropriately accounts only for the difference shown in column [f], which is the difference in the current estimates for Bisons 1, 2, and 3 as a group versus all four Bison projects. The Department has a minor concern, however, about the difference shown in column [c], which is the difference between MP's initial estimates of output at Bisons 1, 2, and 3 and its current estimates.<sup>4</sup> The initial estimates and the current estimates likely would have resulted in the same outcomes in the Bison 1, 2, and 3 Dockets, but in this Docket, because the bids are so tightly clustered, a similar reduction in Bison 4's expected output could raise Bison 4's levelized cost enough that an alternative to Bison 4 would appear to be a more attractive option.

The Department concludes that MP's estimates for Bison 4 in this Docket are reasonable, but notes that this issue highlights the benefits of having a diversified portfolio of wind resources consisting of both owned facilities and power purchase agreements (PPAs). The Department notes that with the addition of Bison 4, MP's wind resources will be heavily weighted towards

<sup>4</sup> The Department also notes that, as described above, Bison 1's nameplate capacity is higher than initially planned, and thus the reduction in expected output is even more notable.

owned facilities. Thus, the Department puts MP on notice that the Company should be prepared to justify such heavy reliance in future resource planning dockets.

### **III. DEBT EQUIVALENCE ADJUSTMENT**

In its comments, the Department removed the debt equivalence adjustments from MP's estimates of the levelized costs of PPA proposals because the ratings agencies impute debt only for PPAs with fixed capacity charges.<sup>5</sup> In reply comments, the Company pointed out that Standard & Poor's (S&P) report describing its methodology for imputing debt for PPAs, included as Attachment 1 to the Department's comments, states that S&P considers an implied capacity payment for energy-only PPAs. After further review, the Department agrees that S&P does impute debt for energy-only PPAs. However, while the balance sheet impact of a PPA may be an indirect cost, there are similarly indirect benefits associated with PPAs (e.g. the developer bears all construction risk, the utility enjoys price certainty, production risks may be assigned to the developer, etc.), which the Company did not attempt to quantify. While debt equivalence adjustments are more easily quantified than indirect benefits, including an indirect cost without indirect benefits would provide an inaccurate financial picture. Thus it may be appropriate to consider the debt equivalence adjustment as *part* of an analysis of PPA proposals, but unless there is similar quantification of the indirect benefits the main analysis should estimate and compare levelized costs without debt equivalence adjustments to avoid an asymmetric treatment of the costs and benefits of PPAs.

As noted in the Department's comments, the exclusion of debt equivalence adjustments ultimately had no impact on the final rankings of available alternatives to Bison 4.

### **IV. CONCLUSION AND RECOMMENDATIONS**

The Department recommends that the Commission:

- Find that Bison 4 is an eligible energy technology under Minn. Stat. §216B.1645.
- Find that MP's petition meets the requirements set forth in Minn. Stat. §216B.1645, subd. 1.
- Approve the investment and expenditure for Bison 4, under Minn. Stat. §216B.1645, as requested by MP in its petition and detailed by the Department in Attachment 2 to its comments.
- Limit MP's Bison 4 cost recovery, under Minn. Stat. §216B.1645, subd. 1, through the renewable rider to the amounts of the initial cost estimates included by the Company in

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<sup>5</sup> See the Department's comments, pages 8-10.

its petition in this matter, and detailed by the Department in Attachment 2 to its comments. Clarify that the Company will have the opportunity to seek recovery of other costs on a prospective basis, with no deferred accounting, in a subsequent rate case.

- Require MP to file with the Commission the following information:
  - Written notification when delivery of all wind turbines to the site is completed.
  - The date that Bison 4 becomes operational.
  - The dates and amount of any curtailment due to the use of the AC transmission system. MP should file this information as soon as practical after a curtailment event.
  - The date the installation of the PhaseRaisers for the Center-Heskett transmission upgrade is complete.
  - The date the upgrade of the Center-Heskett transmission upgrade is complete.

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