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August 6, 2009

Darrell Nitschke, Secretary  
North Dakota Public Service Commission  
State Capitol Building, Dept 408  
600 East Boulevard  
Bismarck, ND 59505-0480

**RECEIVED**

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**PUBLIC SERVICE COMMISSION**

**Re: FOLLOW-UP TO INFORMAL HEARING  
INFORMATION ON RENEWABLE SCREENING  
PSC CASE NOS. PU-08-907 AND PU-08-908**

Dear Mr. Nitschke:

Northern States Power Company, a Minnesota corporation (“Xcel Energy” or the “Company”), appreciates the opportunity to have presented our supplemental information regarding our Nobles and Merricourt projects at the North Dakota Public Service Commission’s (the “Commission”) July 29, 2009 informal hearing. As requested by Commissioner Kalk, we are supplying additional background information regarding our process for screening various technologies for consideration in our overall resource planning process – in particular, renewable technologies. We expect that these issues will be further explored in our Resource Plan work with the Commission, and look forward to that continued dialogue.

### **Overview**

Before using our Strategist model to analyze various resource scenarios, we first review the relative cost and feasibility of generation alternatives, including renewables. We use general, publicly available information from industry sources, as well as information from recent competitive bidding programs or our own experience in developing resources. This initial screening allows us to select those resource types that are most viable and cost effective for more in-depth analysis.

The results of our screening analyses of various renewable energy options have been consistent over the last several Resource Plan cycles. Generally speaking, wind turbine technology provides the most economical electrical power among available renewable options. Our region has a rich, high-quality, wind resource, and turbine technology has advanced considerably, bringing down costs and improving reliability. Opportunities to cost-effectively use other types of renewable resources tend to be limited to cases where existing plants can be refurbished or converted, thus taking advantage of existing infrastructure.

A summary of recent screening information for renewable-based generating resources is presented in the paragraphs that follow. We look forward to further discussions of this kind of comparative information as the Commission considers our pending Resource Plan and we begin development of our upcoming Resource Plan.

## Screening Results

### 1. *Biomass Generation*

The Company draws on three sets of experiences to evaluate the relative cost of biomass on our system:

- *Competitive bidding*, through which we secured three contracts totaling 110 MW of biomass resources, using either wood waste or turkey litter.
- *General resource contracting*, through which we secured just over 12 MW of biomass resource from anaerobic digestion of manure and from food processing waste.
- *Company-developed resources*, where we are developing the Bay Front Boiler #5 biomass gasification project (“Bay Front”), currently pending before the Commission for an Advanced Determination of Prudence determination.<sup>1</sup> Such “brownfield” biomass projects typically lower capital costs than “greenfield” biomass projects, or projects that are constructed at a new site.

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<sup>1</sup> The cost information of the Bay Front project was previously provided to the Commission in a non-public document, Attachment A, to the Company’s Advanced Determination of Prudence application (North Dakota Docket No. PU-09-216).

Based on this experience, we estimate the costs for biomass generation ranges roughly from \$100 to \$150 per MWh.<sup>2</sup> Conversions of existing plants tend to be in the lower half of the range, while new biomass plant proposals tend to be at the higher end of the range.

## 2. *Geothermal Generation*

We do not have comparable experience developing or contracting for geothermal resources, so our screening analysis focuses primarily on research from industry and government sources. Based on our review, a geothermal resource of the magnitude to support utility-scale, electric generation is not readily available in the Upper Midwest.

For example, the Department of Energy states that hydrothermal resources, which are reservoirs of steam or hot water used in geothermal generation, are primarily located in the western states, Alaska, and Hawaii.<sup>3</sup> Likewise, the Geothermal Energy Association reports that as of November 10, 2006, geothermal electric power was being generated in only five U.S. states: Alaska, California, Hawaii, Nevada, and Utah.<sup>4</sup> Given the design of this resource, these locations make sense. Utility scale geothermal generation depends on a large heat source very close to the surface of the earth, which is very site specific. Cost effective geothermal situations are in active seismic zones of the west coast and intermountain zone, but not here in the Upper Midwest.

While the Department of Energy (“DOE”) has published cost data suggesting that geothermal generation can produce electricity in the range of \$50 per MWh,<sup>5</sup> we are not aware of any geothermal source in our region, and thus, do not consider it a viable candidate for power generation in the foreseeable future. Because we update our Resource Plan on a regular basis, our continued screening will identify whether there are any technology breakthroughs that may make this or any other resource a viable option for consideration in future plans.

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<sup>2</sup> This range is a generalized representation of the contract costs. The costs of each contract are subject to trade secret designation. If the Commission wishes, we can provide more detail

<sup>3</sup> <http://www1.eere.energy.gov/geothermal/faqs.html>

<sup>4</sup> <http://www.geo-energy.org/publications/reports/GEA%20World%20Update%202007.pdf>

<sup>5</sup> <http://www1.eere.energy.gov/geothermal/faqs.html>

### 3. *Solar Generation*

Solar energy can be converted to electricity in two ways:

- *Photovoltaic (“PV”) devices or “solar cells*, which changes sunlight directly into electricity. PV systems are often used in remote locations that are not connected to the electric grid.<sup>6</sup>
- *Solar Power Plants*, which use solar energy to indirectly produce electricity when the heat from solar thermal collectors is used to heat a fluid, which produces steam that is used to power generator. There are 15 known solar electric generating units operating in the United States at the end of 2006, 10 in California, and 5 in Arizona. No statistics are being collected on solar plants that produce less than 1 MW of electricity, so there may be smaller solar plants in a number of other states.<sup>7</sup>

The Company’s experience with solar generation has been with the use of PV devices, mainly in Colorado. Colorado, along with the rest of western states and southern states, has higher levels of solar installations than the Upper Midwest, due to the higher quality solar resource as shown in publications of the National Renewable Energy Laboratory.<sup>8</sup> The Energy Information Administration also released a report in May of 2009, in which it stated that “in sunny locations, however, the cost of solar generation can be as low as 23 cents per kilowatt-hour or \$230 per MWh.”<sup>9</sup>

While the Company has experience with solar PV generation in our region, the projects have been few in number and small in size. Our Renewable Development Fund grant program selected four projects, of which two are progressing (2 MW and 400 kW). Power Purchase Agreements (“PPAs”) have not been completed. However, after applying grant proceeds, we estimate they will fall roughly a range from \$150 to \$200 per MWh. We are also proposing, for possible economic stimulus program funding, a demonstration project that would combine solar, battery, and load

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<sup>6</sup> <http://www.eia.doe.gov/kids/energyfacts/sources/renewable/solar.html>

<sup>7</sup> *Id.*

<sup>8</sup> [http://www.nrel.gov/gis/images/map\\_pv\\_national\\_lo-res.jpg](http://www.nrel.gov/gis/images/map_pv_national_lo-res.jpg)

<sup>9</sup> <http://www.eia.doe.gov/oiaf/ieo/solar.html>

control to test system impacts. Our cost estimates for the solar portion of the project are in line with these estimates, such that the costs are approximately \$180/MWh after the application of DOE funding.

#### 4. *Wind Energy*

As the Commission is aware, we have extensive experience in developing wind resources on our system via both PPAs and Company-owned resources. We currently have over 1,300 MWs of wind on our system, which have been developed over the past 15 years. The Upper Midwest has rich wind resources, and new developments in technology have driven costs down over time.

In this proceeding, the Commission has the actual costs of our proposed wind projects to compare to other resources, as well as comparative information from a wind bidding process that indicates our proposed projects are competitive. This information provides greater certainty for the Commission when assessing the prudence of our proposal, since the costs are known.

### **Results**

Our screening work indicates that wind turbine technology represents the most cost-effective renewable resource for our system. While we are also developing other renewable resources on our system when appropriate, we believe this screening verifies that wind energy is the most viable resource for large-scale deployment on our system.

The next step of our planning analysis is to compare the most viable of all generation types via modeling in by Strategist. Comparing wind to other generation options allows us to determine the best resource mix for our system, and develop the size, type and timing of resource development to meet our customers' needs. As discussed at the informal hearing, we believe our analysis supports a finding that the Nobles and Merricourt projects meet the reasonable and prudent standard of the ADP statute.

We regularly revisit and update our cost estimates and appraisals of the commercial viability of various generating options as part of our Resource Planning process. We look forward to discussions with the Commission as we prepare our next Resource

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Plan and will seek your input concerning any additional resources to include in our screening efforts.

We appreciate the Commission's consideration of this additional information. We are available to provide any additional information the Commission or Staff require.

Please contact me at 612-330-6732 if you have any questions.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "James Alders". The signature is fluid and cursive, with a prominent initial "J" and a long, sweeping underline.

JAMES ALDERS  
DIRECTOR REGULATORY ADMINISTRATION

cc: Illona Jeffcoat-Sacco  
Mike Diller  
Annette Bendish