



**Holland
Board
of Public
Works**

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April 29, 2010

VIA ELECTRONIC FILING

Mr. G. Vinson Hellwig
Air Quality Chief
Michigan Department of Natural Resources
and Environment
Constitution Hall, 3rd Floor North
525 West Allegan Street
P.O. Box 30260
Lansing, MI 48909

Ms. Mary Jo Kunkle
Executive Secretary
Michigan Public Service Commission
P.O. Box 30220
6545 Mercantile Way
Lansing, MI 48911

Re: City of Holland – Holland Board of Public Works Electric Resource Plan
MDEQ Proposed Permit to Install 25-07, State Registration No. B2357
MPSC Case U-16077

Dear Mr. Hellwig and Ms. Kunkle:

In response to the email request from Mr. Steve Kulesia dated April 19, 2010 that Holland provide answers to the questions posed by the Sierra Club in an April 16, 2010 letter to the Commission, please see the attached document.

A
Community
Owned
Utility

Sincerely,

David G. Koster
Operations Director

Electricity

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Water

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Waste
Treatment

Attachment



RESPONSES TO SIERRA CLUB QUESTIONS ON HOLLAND'S ELECTRIC PLAN

1. Do the total project costs for the CFB coal plants in Tables 5-25 and 5-26 include AFUDC or other financing costs?

Response: Yes. Table 5-25 includes the cost characteristics for the 2x300 MW CFB. Capital costs for the Wolverine Power Supply Cooperative, Inc. proposed Rogers City project were taken from the Wolverine Power Cooperative Electric Generation Alternatives Analysis dated June 2009. Black & Veatch added to this capital cost an allowance based on Black & Veatch experience for owner's costs and AFUDC. Table 5-26 includes the cost characteristics for the 70 MW CFB. The total project cost includes an allowance based on Black & Veatch experience for owner's costs including AFUDC or financing costs.

2. Do the total project costs for the GE 2x1 7EA option presented in Table 5-14 include AFUDC or other financing costs?

Response: Yes. The total project costs included in Table 5-14, GE 2x1 7EA Cost Characteristics include an allowance based on Black & Veatch experience for owner's costs such as AFUDC and other financing costs.

3. Do the total project costs for the biomass co-firing option presented in Table 5-2 include AFUDC or other financing costs?

Response: Yes. The total project costs included in Table 5-2, Biomass Co-firing Technology Characteristics include an allowance based on Black & Veatch experience for owner's costs such as AFUDC and other financing costs.

4. Provide the workpapers for the levelized costs presented in the following Tables:
For the biomass co-firing option presented in Table 5-2.
For the wind energy options presented in Table 5-5.
For the CFB options presented in Tables 5-25 and 5-26.
For the hydroelectric option presented in Table 5-8.
For the GE 2x1 7EA combined cycle option presented in Table 5-13.

Response: Table 5-2, 5-5, 5-25, 5-26, 5-8, and 5-13 present generic performance and cost information for various resources screened in the analysis. Spreadsheet models used to calculate the levelized costs are proprietary to Black & Veatch. With fuel prices forecasts from Appendix A, and economic data contained in the report, the tables contain sufficient input assumptions to estimate the potential indicative range of levelized costs.

5. Provide the source data and documents for the estimate that the CO₂ emissions from a CFB will be 115 lbs per MBTu.

Response: The CO₂ emission rate in the report is a typographical error. The CFB CO₂ emission rate used for the modeling analysis was 220 lb/MMBtu for coal, and 154

lb/MMBtu for the 30 percent biomass co-firing option. The correct emission rates were used to model these units in Strategist.

6. *Reference page 5-11 of the Holland Board of Public Works Power Supply Study.*

Provide the source data and documents which formed the basis for the assumed biomass fuel cost of \$3.00/MBTu for forestry residues.

Response: The cost of \$3.00/MBtu is a general assumption that Black & Veatch used for the delivered cost of biomass type fuels. The cost is intended to capture the cost of wood and transportation for delivery. Black & Veatch considers this to be a reasonable assumption for the quantities of biomass evaluated within the study.

Specify the heat content (BTu per pound or ton) assumed for the forestry residues.

Response: A specific heat content was not assumed to derive the delivered cost. In general, forest residue biomass wood waste will have a bone dry heat content of approximately 8700 Btu/lb, which is consistent with the delivered fuel price assumption used. Delivered heat content will be dependent upon the moisture content of the fuel, and quantity of other materials collected in the fuel.

7. What heat rate(s) did Black & Veatch assume for the CFB with 30 percent biomass co-firing option?

Response: The full load heat rate assumed for coal firing in the CFB was 11,148 Btu/kWh. The full load heat rate assumed for the CFB for 30 percent biomass co-firing was 11,659 Btu/kWh.

8. *Reference page 1 -3 of the Holland Board of Public Works Power Supply Study.*

Specify each of the new industrial loads that are expected in the near term.

Specify the MW demand and MWh sales that are expected to be made to each of these new industrial loads.

Specify the year(s) in which these new loads are expected to be experienced.

Response: The significant new loads that are anticipated are expressed in Table 3-1 under the column "Future Additions". One existing customer has indicated increases in demand are expected and two new large customers have announced plans to locate significant production facilities in our service territory. The additional consumption from these customers is listed in Table 3-1. Specifically, Request Foods, the existing customer, is planning an expansion in Holland, which represents a 1 MW demand increase. Finally, two battery manufacturers have announced plans for lithium-ion battery production in Holland. Based on the best information Holland has, LG Chem and Johnson Controls-Saft combined bring an anticipated peak demand of 11.4 MW and 18.7 MW respectively. These loads are expected to phase in between 2010 and 2014.

9. Specify the planned and forced outage rates assumed by Black & Veatch in its Strategist modeling for each of the following options.

The 2x1 GE 7EA combined cycle.

Each of the CFB options.

Each CFB with biomass co-firing option.

Response: The forced outage rates for the different options are as follows:

2x1 GE 7EA combined cycle. 3 percent

Each of the CFB options. 4.5 percent

CFB with biomass co-firing option. 4.5 percent

The planned outage rates for the different options are as follows:

2x1 GE 7EA combined cycle. 2 percent

Each of the CFB options. 5.5 percent

CFB with biomass co-firing option. 5.5 percent

10. Provide the Holland Board of Public Works actual monthly MWh sales during 2009 and 2010 to date.

Response: The Holland Board of Public Works operates on a fiscal year that runs from July 1 through June 30. However, Holland understands the request to be on a calendar year basis. As such, the data is presented below as MWh sales.

Month	2009 Sales	2010 Sales	% Change
January	74,000.281	77,120.082	4.2% Up
February	70,902.794	72,514.271	2.3% Up
March	68,715.263	72,765.526	5.9% Up
April	70,117.298		
May	69,440.552		
June	70,869.391		
July	80,498.531		
August	81,691.199		
September	80,255.484		
October	74,697.032		
November	72,003.691		
December	72,595.902		

11. Provide the Holland Board of Public Works monthly MW peak demands in each month of 2009 and 2010 to date.

Response: Again, the Holland Board of Public Works operates on a fiscal year that runs from July 1 through June 30. However, Holland understands the request to be on a calendar year basis. As such, the data is presented below as MW net system demand including system losses.

Month	2009 Peaks	2010 Peaks	% Change
January	148.17 MW	149.09 MW	0.6% Up
February	142.78 MW	148.56 MW	4.0% Up
March	141.69 MW	142.72 MW	0.7% Up
April	148.52 MW		
May	161.35 MW		
June	205.96 MW		
July	174.91 MW		
August	184.27 MW		
September	173.31 MW		
October	145.55 MW		
November	146.29 MW		
December	150.58 MW		

12. Provide the workpapers for Figures 3-4 and 3-5 in the *Holland Board of Public Works Power Supply Study*.

Response: See attached files. (Fig 3-4.pdf and Fig 3-5.pdf)

13. Provide the source data and documents for the assumed combined cycle unit heat rates presented in Table 5-13.

Response: The assumed combined cycle heat rates were developed using software packages licensed by Black & Veatch. GE 7EA performance was estimated with GE GTP Estimator. This performance was used in Thermoflow GTPPro software to estimate performance at the various ambient conditions. GE APPS software was used to model

the LMS 100 performance. As such there is no source data and documents as such. The models contain data from GE and assumptions based on Black & Veatch experience.

14. Do the levelized costs presented in Tables 5-2, 5-13, 5-25 and 5-26 include any CO₂ costs? If the answer is yes, please specify the CO₂ costs included.

Response: Table 5-2 presents the biomass co-firing technology characteristics. The levelized costs in this table do not include CO₂ costs. Table 5-13 presents GE 2x1 7EA combined cycle designed for supplemental firing performance characteristics and therefore CO₂ costs are not relevant to this table. Table 5-14 presents the cost characteristics for the GE 2x1 7EA. The levelized costs in this table do not include CO₂ costs. Table 5-25 presents the 2x300 MW CFB cost characteristics. The levelized costs in this table do not include CO₂ costs. Table 5-26 presents the 70 MW CFB cost characteristics. The levelized costs in this table do not include CO₂ costs. CO₂ costs were considered separately in the Strategist™ modeling for all of these alternatives. CO₂ cost assumptions are included in Appendix A.

15. Reference page 7-2 of the *Holland Board of Public Works Power Supply Study*. Is it correct that Black & Veatch assumed a price of \$500 per MWh for emergency energy purchases throughout the study period?

Response: Yes. Black & Veatch assumed \$500/MWh for the emergency energy purchase price. This price was assumed for the entire study period.

16. Reference page 7-2 of the *Holland Board of Public Works Power Supply Study*. Provide the source documents for the assumed price of emergency energy purchases of \$500 per MWh throughout the study period.

Response: The emergency energy price input in the model is an assumption to limit the amount of emergency energy bought from the spot energy market. The emergency energy price value needs to be higher than the highest cost generating resource on the system, in order for it to dispatch the generating resources against load. Historically, in 2008, the highest cost generating resource has been close to \$500/MWh.

17. Provide the Board of Public Works' 2007, 2008 and 2009 annual energy generation (MWh) broken down by fuel type (natural gas, coal, oil, etc).

Response: The Holland Board of Public Works owns seven generating units within the Holland city limits (3 coal, 1 natural gas, 1 oil and 2 oil/gas). Holland also has ownership in two other coal plants through Michigan Public Power Agency. In addition to these resources, Holland purchases power from the wholesale market within the Midwest Independent System Operator footprint. The following break down of MWh, net of station power usage, consists of owned generation and market purchases. These values are being reported on a fiscal year basis. Zero is used where station power usage meets or exceeds generation in a particular year.

Year	Coal	Gas	Oil	Market
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2007	603,605	19,977	0	478,423
2008	624,109	20,065	0	404,655
2009	523,274	4,505	0	426,344

18. Specify the annual costs assumed by Black & Veatch for storing coal combustion byproducts.

Response: Coal combustion byproducts annual costs are imbedded in the O&M cost assumptions used for the Holland proposed 70 MW CFB. A 2007 cost of \$13.30/ton was assumed based upon data from the existing Holland ash hauling and disposal contracts. As no formal proposals were available, O&M costs for the Wolverine Power Supply Cooperative, Inc. proposed Rogers City project were taken from the Wolverine Power Cooperative Electric Generation Alternatives Analysis dated June 2009. Similarly, O&M costs for the Consumers Energy's proposed Karn/Weadock Generating Complex were taken from Consumers Energy June 2009 Electric Generation Alternatives Analysis. Existing operations at this site store coal combustion products in onsite landfills.

19. Reference the Benefits discussed in Section 7.12 of the *Holland Board of Public Works Power Supply Study*. Please explain why the 2x1 GE 7EA combined cycle plant option could not be a waste heat source for the City's snow melt system and potential expansion of this system into supplemental or direct building heat and provide any documents that support this conclusion.

Response: There are two primary reasons why the 2x1 GE 7EA combined cycle option was not considered to supply the waste heat source for the City's snow melt system. First, the existing GE 7EA unit proposed to be incorporated into this option is physically located at a different site location which would require the routing of expensive pipelines through the City to the current snow melt system. Second, the dispatch of this unit, which would be expected to have other participants as well as sell energy into the market from time to time would be constrained somewhat during winter months by the need to remain online to meet the snow melt system needs.

20. Provide the workpapers and the source materials for the benefit credits presented in Table 7-6 of the *Holland Board of Public Works Power Supply Study*.

Response: The estimates for annual costs were developed by Holland and Black & Veatch. The annual costs are shown in Table 7-6. Work papers for these costs are included in the attached file, entitled **Community Benefits Work Papers**.

21. Reference Table 7-8 of the *Holland Board of Public Works Power Supply Study*. For the option "Buying 5 MW blocks of 70 MW net CFB unit using 30 percent biomass as fuel to be built by HBPW in 2016, specify the years in which each of the 5 MW blocks would be purchased.

Response: The expansion plan selected 4 blocks of 5 MW to be added in 2016. (All 4 blocks were added in 2016.

22. Reference page 7-4 of the *Holland Board of Public Works Power Supply Study*.

Specify the capital cost assumed by Black & Veatch for the CFB option with a carbon capture and suppression system.

Specify the heat rate assumed by Black & Veatch for the CFB option with a carbon capture and suppression system.

Response: The capital cost for the CFB plant with a carbon capture and compression system was assumed to be \$586 million with no DOE grants available. If DOE grants were available, the cost was assumed to be \$ 279.96 million.

The heat rate of the for the CFB plant with a carbon capture and compression system is assumed to be 19,220 Btu/kWh and 24,996 Btu/kWh at maximum and minimum output levels, respectively.

23. Reference page 7-9 of the *Holland Board of Public Works Power Supply Study*. Provide the source data and documents that form the basis for the 27 percent capacity factor assumed by Black & Veatch for new wind farms.

Response: Black & Veatch made this assumption based on reported data for wind plants in the area. Black & Veatch researched data available from the Energy Velocity database subscription service and determined that the 53 MW Harvest Windfarm in the State of Michigan produced 132.935 MWh of energy in 2009. This equates to a capacity factor of about 28 percent. In 2008 the capacity factor for this plant was 30 percent. The smaller wind farms in Michigan recorded 14 to 24 percent capacity factors in the recent past. So Black & Veatch decided to model the average of the maximum capacity factors (average of 24 and 30 percent) which was 27 percent. This assumption is favorable to wind generation.

24. Reference page 7-7 of the *Holland Board of Public Works Power Supply Study*. Please identify the transmission cost adder Black & Veatch added for each resource.

Response: Transmission costs were derived from published tariffs. Refer to the attached file. (Transmission Rates.pdf)

25. Provide the source documents for the CO₂ emissions presented in Figure 8-1, the SO₂ emissions presented in Figure 8-2 and the NO_x emissions presented in Figure 8-3.

Response: Refer to the attached files. (Figure 8.1.pdf, Figure 8.2.pdf, Figure 8.3.pdf)

26. Please explain whether Black & Veatch allows for the purchase of economy energy in the periods modeled by Strategist. If the answer is yes, please provide the price(s) assumed for this economy energy. If the answer is no, please explain why not.

Response: Yes, the model considers purchase of economy energy. Black & Veatch modeled purchase of economy energy in Strategist. The rationale for modeling economy energy is explained in the original report on page 7-2, in the 4th and 5th paragraphs. The economy energy prices assumed are presented in the attached spreadsheet (Energy prices.pdf).