

Staff Interrogatories – Second Set

General Questions

1. Has an agency of another state (e.g., Michigan) reviewed this system for inclusion of megawatt hours going to MIRECs?

Yes – Michigan

The project is also registered as Green-e Energy eligible as indicated on the MIRECS website.

- a. If so, please provide a hyperlink, docket, or case identification number for the application and approvals.

MIRECS ID: GEN234

Projects in Michigan are approved by the MIRECS administrator. The status of the project can be found on the MIRECS website: <http://www.mirecs.org/public-reports/>

2. How were the percentages in Section “G.10.e - List all fuel types used by the facility and respective proportions” determined?

A significant portion of the solid biomass fuel and all of the liquid biomass fuel consumed in the boilers is a byproduct of the pulping process. Due to the difficulty in measuring biomass fuel quantities and the variable fuel heating values to the boiler in real time, the amount of steam from biomass fuels is calculated as the difference from the fossil fuel steam output of the boiler from the total steam produced. The electricity produced by each fuel type is then determined based on the percentage of steam produced from each fuel. The respective proportion of steam from fossil fuels is calculated from the measured fossil fuel consumption in each boiler using measured flow, boiler design data, and engineering factors. The fossil fuel quantities are determined from field measurements and adjusted for accounting purchasing and inventory records.

The actual percentages listed in G.10.e were calculated based on the actual 2012 fuel usage and steam production. The detailed methodology for these calculations is described in the document “Renewable Energy Credit Calculation, Verso Quinnesec Mill-TG2 – New Project Multi-fuel Generation Assets- Methodology for calculating the electricity production associated with renewable fuels” (TG2 REC Calculation).

3. How is the “fuel heat content” determined for each the following:

- a. Natural gas

The natural gas fuel heat content is provided monthly with the invoice. The accounting department determines the fuel heat content of the provided natural gas using the invoice conversion factor. See Attachment A.

- b. Coal

The calculation uses a fixed factor which is the facility accounting standard conversion factor of 24 mmBTU/ton. An attached typical analysis indicates 25 mmBTU/ton. See Attachment B.

- c. Bark

The heating value of bark is not used in the calculations as it is quite variable. The quantity of steam from biomass is determined by difference between actual steam

Staff Interrogatories – Second Set

production and theoretical steam from natural gas and coal. The bark energy content is tested routinely by the mill lab and occasionally by an external lab. See examples in Attachments C & D.

d. Black liquor

The heating value of black liquor is not used in the calculations. The quantity of steam from biomass is determined by difference between actual steam production and theoretical steam from natural gas. The black liquor energy content is tested routinely by the mill lab and occasionally by an external lab. See attachments E & F.

4. Does Verso Quinnesec Mill have any laboratory analysis for these fuels that specifies the “fuel heat content?”

a. If so, please submit a most recent copy.

Please see answers and attachments for question 3.

5. How was the boiler efficiency determined for the package boiler, waste fuel and recovery boiler?

Package Boiler: *The efficiency is not used in the calculations. All the steam from the Package Boiler is provided by natural gas and therefore the renewable steam percentage from the boiler is zero. The Original Equipment Manufacturer (OEM) design efficiency for the Package Boiler is 82.9% at 50% Maximum Continuous Rating and 82.6% at 100% Maximum Continuous Rating.*

Waste Fuel Boiler: *The efficiency for coal and natural gas specified in the design data from the OEM is 82.8%.*

Recovery Boiler: *The OEM did not provide a design efficiency estimate for natural gas in the boiler. The efficiency used in the calculations was estimated by Verso by using the design efficiency for black liquor and correcting for the moisture content to obtain a value for natural gas. Natural gas is typically less than 1% of the fuel input to the Recovery Boiler. The design data is 65.7% to 66.6%.*

6. How often are those boiler efficiencies determined?

We rely on the OEM design efficiencies. We do not have recent efficiency information.

7. Explain the 3 tables on the page entitled “Renewable Energy Allocation Calculation Method” and how each table progresses into the next.

Fossil Fuel Boiler Efficiencies – Factors

This table lists the fuel conversion factor from purchased units to mmBTU, the boiler efficiency used in calculating the steam output from the specific fuel, the heat required by produce one pound of steam, and the resulting calculation factor to convert fuel consumption to pounds of steam in (# steam / unit of fuel).

Steam From Fossil Fuels by Boiler

Using the steam conversion factors calculated in the previous table, the amount of steam from each fossil fuel for each boiler is determined from the fuel use with the exception of the

Staff Interrogatories – Second Set

Package Boiler. The Package Boiler sole fuel is Natural Gas, therefore all steam from the unit is attributed to Natural Gas.

Renewable Steam Ratio by Boiler

The total steam from each boiler is listed in the column “Boiler K# Steam”. The “Fossil K# Steam” calculated in the previous table is subtracted from the total to determine the “Renewable K# Steam” and subsequent “Renewable Steam %”. The “Coal %” and “NG %” are based on their pro rata share of the total steam.

8. What is the time frame for the final table which seems to have peak and off-peak generation? *In Michigan, there is an incentive to generate on peak by providing Incentive Renewable Energy Credits for on peak production. The time frame is dictated by the Michigan Public Service Commission per Michigan statute P.A. 295 of 2008 as follows:*

“...peak demand time as: the period of time between 0600 hours Eastern Standard Time (EST) through 2200 hours EST, Monday through Friday excepting New Year’s, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day or if the holiday occurs on a Sunday, the Monday immediately following the holiday. This definition is consistent with the Midwest Independent Transmission System Operator, Inc. (MISO) Third Revised Sheet No. 110”.

9. On the page entitled “Calculated Station Service” why and how does heat rate vary for the condensing turbine?

The turbine generator has two automatic extractions in addition to the condensing section. The extractions provide process steam to the pulp and paper mill. The quantity of the steam required by the process varies seasonally with mill heating demand. In the summer the need for steam from the extractions is reduced and condenser load increases. This results in a lower heat rate overall. In the winter the steam requirements of the mill increase and the condenser load decreases as a proportion of total steam input and consequently the heat rate for the unit increases.

10. For section G.1, does the term “KSCFH” mean thousand standard cubic feet per hour?

Yes.

11. In Section G. 10c, in addition to the heat content for the fuels used by the plant, what is the expected moisture, ash, and sulfur content for each of the fuel types listed, bark/solid woody waste, purchased wood harvest residuals, black liquor, natural gas, and coal?

Woody waste and purchased wood harvest residuals: For typical analysis please see Attachment D.

Black Liquor: Please see Attachment F for sample analysis.

Natural Gas: Please see Attachment A for typical analysis.

Coal: Please see Attachment B for typical analysis.

	<i>Moisture</i>	<i>Ash</i>	<i>Sulfur</i>
--	-----------------	------------	---------------

Staff Interrogatories – Second Set

Woody Biomass	44%	4%	0.04%
Black Liquor (ash as NaOH)	29%	39%	5%*
Natural Gas	4# H ₂ O/MMCF	N/A	2 ppm as H ₂ S
Coal	6%	9%	0.95%

**Recovered from the boiler as Na₂S to be reused in the pulping process*

12. Please describe the source and process for determining the above values, how they may be verified, as well as the frequency of this determination under a regular schedule of operation.
Coal and natural gas are not tested by the mill and we rely on the supplier specifications. For natural gas the monthly invoice includes a fuel value. For woody waste and black liquor, the mill collects samples and testing is conducted by a third party laboratory.
13. Will the company meet the applicable sections of the GATS Operating Rules, including the documentation requirements for Multi-Fuel Generating Units in Section 6.5 and Appendix C of the GATS Operating Rules on an ongoing basis?
Fossil fuels are measured according to Appendix C. Biomass fuels are calculated by difference as described in Question 2 above. Accounting records are available to support the amount of total biomass purchased by the facility and the amount allocated to fuel. Verso believes this accounting method for renewable generation meets the intent of the GATS documentation requirements.
14. Does the company expect to qualify for the Wholesale Generation Also Serving On-Site Loads in Section 6.3.5 of the GATS Operating Rules? If so, will the company meet the operating requirements on an ongoing basis?
The facility does not sell energy in the Wholesale Market.
15. Please indicate the frequency with which the generation (MWh) resulting from the renewable biomass resource will be calculated and reported to the GATS tracking system.
Monthly
16. Please describe the source of the biomass fuel described as purchased wood harvest residuals and sold wood processing residuals, including the states or region from which the material originates, and the estimated number of suppliers that will be used.
Wood harvest residuals are fuels produced from lower value wood components produced from forest logging operations such as tops, limbs, and undesirable species for which a higher value market does not exist.
- Mill Residuals include bark that is removed from roundwood at pulp mills, sawmills, or other primary forest products manufacturing operations. Other byproduct mill residues produced from manufacturing operations and used as fuel include sawdust, shavings, and residual chips.*

Staff Interrogatories – Second Set

The primary source of the material is Northern Michigan and Northern Wisconsin. The purchased biomass material is from approximately 35 different suppliers.

17. If forestry wood biomass resources are used (i.e., the application lists “thinning or tree trimming”), explain the commitment and measures that will be undertaken to ensure procurement from sustainable forest management operations.

Approximately 80% of renewable energy production originates with fuel produced as a byproduct of the facility pulping operations. This wood is harvested in accordance with our stated Sustainability Principles which includes to “Procure wood from sustainably managed forests”. As part of our efforts to insure our wood is harvested sustainably, in 2013 76% of the purchased wood was certified fiber as represented by the following certification schemes:

<i>SFI</i>	<i>15%</i>
<i>CSA</i>	<i>19%</i>
<i>FSC</i>	<i>21%</i>
<i>ATFS</i>	<i>9%</i>
<i>Master Logger</i>	<i>12%</i>

All sources of Verso fiber have been certified numerous times to the FSC and PEFC chain of custody standards (BV-PEFCCOC-US005202-2, BV-COC-301978). All previous FSC and PEFC risk assessments, including risk of illegal logging, have been rated the lowest possible ratings. Most of Verso’s supply comes from US. A minor component is imported from Canada. The Canadian imports must comply with the US’s Lacey Act which assures no illegal wood.

Biomass purchased to supplement own made byproduct is considered a waste product of either logging operations or a wood processing facility. In our specification for purchased biomass we include the following statement:

“Biomass Fuel shall be residuals of forest products and will include processed woody material made up of wood chips, bark and sawdust...”

Both purchased wood harvest residuals and mill residuals meet the “Renewable energy resource” definition of renewable portfolio standards enacted by State of Ohio and set forth in Section 3706.25 and 4928.01 :

“Energy derived from nontreated by-products of the pulping process or wood manufacturing process, including bark, wood chips, sawdust, and lignin in spent pulping liquors...”

Turbines – Equipment Description

18. Please provide a complete equipment description for the steam turbine generator and backpressure generator, including equipment manufacturer/model/date of manufacture.

TG1 Backpressure Turbine Generator:

- *Alstom (Stal Laval)*
- *Rating 28 MW*
- *600# inlet*
- *65# outlet*
- *Start up 1985*

TG2 Double Automatic with Condensing Turbine Generator:

- *Siemens SST400*
- *Rating 31 MW*
- *600# inlet*
- *165# automatic extraction*
- *65# automatic extraction*
- *Condensing outlet*
- *Start up 2011*

Natural gas

19. Is the natural gas metered prior to combustion in the boiler?

Yes

20. If so, provide the following information for each natural gas meter. Include locations for all meters on process flow diagram.

i. Meter Type / Manufacturer / Model.

Package Boiler: dp-orifice / Rosemount / 3051CG2AD2A1AH2E5L4DF

Waste Fuel Boiler: dp-orifice / Rosemount / 3051CD2AO2A1AH2E5

Recovery Boiler: dp-orifice / Rosemount / 1151DP4E22B3

ii. Is it a revenue grade meter?

No gas meters on the boilers are revenue grade.

iii. What is the guaranteed accuracy (in %) of the meter?

From vendor information specifications:

Package Boiler: +/- 0.065% of span

Waste Fuel Boiler: +/- 0.065% of span

Recovery Boiler: +/- 0.2% of span

Coal

Staff Interrogatories – Second Set

21. Does Verso Quinnebec Mill have scales that measure the weight of the coal before it enters the boiler?

There is no scale ahead of the boiler for coal. Consumption of coal is based on accounting records of purchases and changes in inventory. In 2013, coal use accounted for less than 0.1% of steam produced.

22. If so, provide the following information for the coal scales of the facility. Include locations for all scales on the process flow diagram.

- a. Scale Type / Manufacturer / Model.
- b. Dates of last calibration and last material weight test.
- c. What is the guaranteed accuracy (in %) of the scale?

Not applicable.

Bark

23. Provide the following information for the bark belt scales. Indicate locations for all scales on the process flow diagram.

- a. Scale Type / Manufacturer / Model.
Strain gauge load cells on belt conveyor idlers / Milltronics-Siemens / MSI
- b. Date of last calibration.
There are two units:
Hogged fuel reclaim: 8/17/2012
Hog fuel to bin: 8/23/2013
- c. What is the guaranteed accuracy (in %) of the belt scale?
From vendor information specifications:
0.5% of operating range.

24. Has the bark been sent to a laboratory for analysis of the bark's energy content?

- a. If so, please submit a copy of a recent lab report that is representative of the actual quality.
Please see Attachment D.

Black liquor

25. Has the black liquor been sent to a laboratory for analysis of its energy content?

- a. If so, please submit a copy of a recent lab report that is representative of the actual quality.
Please see Attachment F.

26. For Section G.10c, how does Verso Quinnebec Mill convert the energy content for black liquor from gallons to short tons?

The value listed is based on the facility accounting standard and is not based on a specific analysis. An illustrative example using typical factors follows:

Staff Interrogatories – Second Set

$$\frac{0.0423 \text{ mmBTU}}{\text{gal BL}} * \frac{1 \text{ gal BL}}{8.33 * 1.26 \text{ (s.g.) lb BL}} * \frac{1 \text{ lb BL}}{0.695 \text{ lb OD BLS}} * \frac{2000 \text{ OD lb BLS}}{\text{OD T BLS}} = 11.6 \frac{\text{mmBTU}}{\text{OD T BLS}}$$

27. Provide the following information for the black liquor flow transmitter. Indicate locations for all flow transmitters on the process flow diagram.
- Scale Type / Manufacturer / Model.
*Mag flow tube / Yokogawa / AM21ODN-AA1-LSA *A*
 - Date of last calibration.
October 2012
 - What is the guaranteed accuracy (in %) of the flow transmitter?
+/- 0.5% of flowrate
28. Provide the following information for the black liquor refractometer. Indicate locations for all refractometers on the process flow diagram.
- Scale Type / Manufacturer / Model.
Refractometer / Electron Machine / MPR E-scan
 - Date of last calibration.
Calibration adjustments with 3x per week lab checks using TAPPI procedure
 - What is the guaranteed accuracy (in %) of the refractometer?
+/- 0.5% of span

Staff Interrogatories – Second Set

Index to Attachments

- A Natural Gas Supplier Analysis
- B Coal Supplier Typical Analysis
- C Verso Lab Bark Fuel Value & Moisture Testing Results
- D External Lab Bark Elemental and Fuel Value Analysis
- E Verso Lab Black Liquor Testing Results
- F Eternal Lab Black Liquor Elemental Analysis

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

9/2/2014 12:03:15 PM

in

Case No(s). 14-0432-EL-REN

Summary: Response to Second Staff Interrogatories electronically filed by Mr. Rex Zhang on behalf of VERSO QUINNESEC LLC and Brooks, Steven Mr.