French Island Plant's Annual Environmental and Operations Performance Report – 2020

2020 Highlights:

Using nearly 5 million tons of MSW and wood waste has enabled the plant to produce enough electricity to power ~10,000 homes for five days a week for the past 33 years.

Burning MSW instead of landfilling it has resulted in saving over 300,000 metric tons of carbon dioxide equivalent (CO2e) emissions since 1987.

300,000 metric tons of CO2e = Greenhouse Gas (GHG) emissions from over 70,000 passenger vehicles driven for one year; or 38 million gallons of gasoline consumed or 360 million pounds of coal burned!

Executive Summary

Xcel Energy's French Island Generating plant employed 33 people in 2020. Its two boilers operated over 10,000 hours and including its two combustion turbines, the plant generated nearly 75,000 MWH of electricity – enough to serve ~ 9,000 homes[1].

Plant personnel worked safely and selflessly throughout the pandemic to keep the area's waste processed and to keep making electricity for the area.

The plant's environmental performance in 2020 continued to be excellent. The plant was able to safely and successfully conduct its required stack tests for all pollutants in late March and April after most businesses were forced to work from home. The test results continue to show the emissions from both boilers are orders of magnitude below the emission limits.

Despite the nationwide shut down, a few maintenance/upgrade activities occurred throughout the plant in 2020 to increase reliability and efficiency and enhance worker safety.

[1] WI residents use an average of 8.4 MWH per year; US residents use an average of 10.76 MWH per year.

Introduction

Xcel Energy's French Island Generating plant burns refuse-derived fuel (RDF) in combination with wood biomass and railroad ties in two fluidized bed boilers to generate electricity. The boilers have the capacity to generate 29 megawatts (MW) of electricity. The plant is under contract with La Crosse County to accept a minimum of 73,000 tons of municipal solid waste (MSW) annually and to process at least 66% into refuse-derived fuel (RDF). In 2020, the plant accepted ~ 72,000 tons of MSW, and processed 72% of it into RDF.

Two oil-fired combustion turbines are also located at the plant to provide up to 168 MW of electricity when needed during times of peak demand, typically very hot or very cold days. The oil is stored in a 3-million gallon aboveground storage tank at the site.

The plant must comply with very strict environmental regulations set forth by both the Environmental Protection Agency (EPA) as well as the Wisconsin Department of Natural Resources (WDNR). The major environmental regulations governing its operations include the federal Large Municipal Waste Combustor rules, and the WDNR's regulations for air, water and solid and hazardous wastes.

Production/Contract

Since the 2002 pollution control upgrades, the plant has been able to achieve all contract-related production requirements. As previously stated, the plant processed 72% of the MSW into RDF; the plant's 5-year average yield rate is at ~ 75%.

In 2020, the plant diverted 1848.55 tons of MSW due to several fires in the RDF plant and in the wood handling system. The plant also took a processing plant outage to install a second slow speed grinder[2]

The collaborative arrangement between Xcel Energy and La Crosse County is just one example of an on-going commitment to find win-win solutions to regional solid waste and waste-to-energy challenges. The current contract was extended to now expire in 2030.

[2] This device replaced the flail mill installed in 1988. It is the newest technology and will improve safety and reliability.

Air Quality

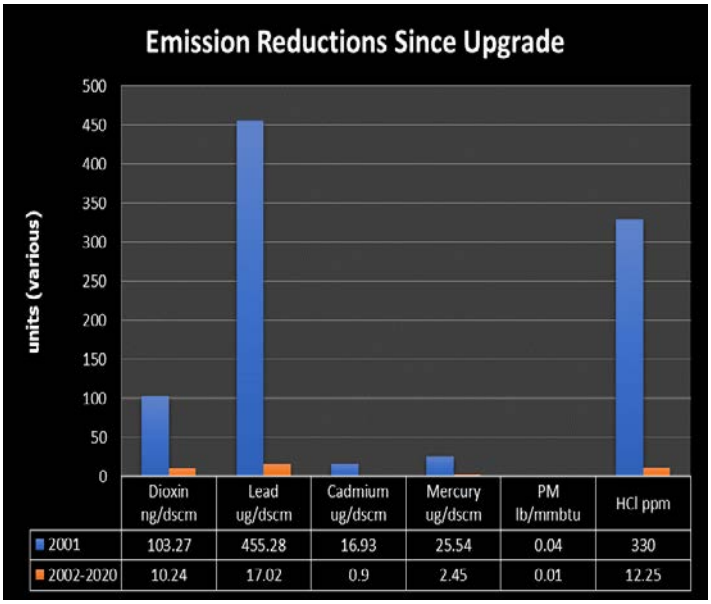
The plant must meet all requirements outlined in its Title V air operating permit and must certify compliance to the WDNR annually. Its most recent permit was received in June of 2018 and will remain in effect for 5 years. A renewal application will be sent to WDNR in 2022 to keep this permit active until a new permit is issued. The 2018 permit is similar to the one issued in 2010 but incorporates some Federal Plan changes primarily impacting stack test frequency and monitor availability for the pollutants that are continuously monitored at the plant.

In 2002, enhanced pollution control equipment was installed on both boilers to reduce emissions of sulfur dioxide (SO_2), nitrogen oxides (NOx), and particulate matter (PM). Monitors were also installed to continuously record emissions of SO_2 and NOx as well as carbon monoxide (CO) and opacity and are used to demonstrate continuous compliance with the emission limits for these pollutants. The total tons of emissions of many pollutants are reported to the WDNR annually through its Air Emissions Inventory program, and the plant must pay a fee for its emissions of certain pollutants[3].

In 2020, the plant emitted 244 tons of NOx, 37 tons of SO_2, 46 tons of volatile organic compounds (VOCs) and 6 tons of particulate matter resulting in an air emission fee payment to the WDNR of $18,242.11

There are several regulated pollutants that cannot be monitored continuously thereby requiring the plant to demonstrate compliance by conducting annual tests of the flue gas exiting the stacks. The following pollutants are in this category: dioxins/furans, lead, cadmium, mercury, particulate matter and hydrogen chloride (HCl). Figure 1 shows the stack test results for the years 2002-2020 as compared to 2001 (prior to the pollution control equipment upgrade). Figure 2 shows 2020 stack test results compared to the permit limits.

Figure 1. Emission Reductions Since Upgrade Based on Stack Tests



[3] Fees are paid for pollutants if the amount emitted exceeds thresholds outlined in s. NR 438 Wisconsin Adm. Code. The formula used to calculate the fees was revised in 2013 resulting in a higher payment than in previous years.

Figure 2. 2020 Stack Test Results Compared to the Permit Limit:

Pollutant	Permit Limit[4]	B1 Result	B2 Result
Dioxins/ Furans (ng/dscm)	30	Not tested	10.97
Cadmium (mg/dscm)	0.040	≤ 0.00023	< 0.00023
Lead (mg/dscm)	0.44	0.00133	0.00098
Mercury (mg/dscm)	0.080	≤ 0.00031	< 0.00022
Particulate (mg/dscm)	27	0.524	1.249
HCl (ppm)	29	2.4	4.6
Benzene (mg/sec)	35	22.10	Not tested
Dioxins/ Furans TEQ (ng/sec)	14.4	0.12	Not tested
Chromium (mg/sec)	0.55	<0.0688	Not tested
Arsenic (mg/sec)	0.354	<0.0139	Not tested
Nickel (mg/sec)	0.35	0.1488	Not tested

Toxic Release Inventory (TRI)

EPA's Toxic Release Inventory (TRI) program was initiated in 1988 to inform the public about chemicals being used by manufacturing facilities in their communities. The program was later expanded to include many industries (including fossil fuel-fired electric utilities) requiring them to report emissions of certain chemicals that exceed EPA-specified use thresholds. The French Island plant is required to report under this program because of the two oil-fired combustion turbines located at the plant. Because it is somewhat unusual to have fossil fuel-fired generation at the same plant site as a waste combustor, Xcel Energy believes the French Island plant is the only waste combustor in the country required to report its emissions under this program.

The TRI reports contain information about the types and amounts of certain chemicals "released" each year to the air, water and land; as well as the quantities of each sent to other facilities for recycling, reuse or disposal (La Crosse County landfill). The primary releases from the French Island plant are metals contained in the ash and sent to the La Crosse County landfill for disposal.

The French Island plant has been reporting its data through the TRI program since 1998.

Figure 3 shows the TRI data reported to the EPA for 2018 - 2020. The report is due annually by July 1st.

Figure 3. French Island Plant TRI Data 2018 – 2020

Chemical[5]	2018 Total	2019 Total	2020 Total
HCl	40,640	31,801	5,578
Ammonia	500	540	540
Manganese	25,856	26,724	24,900
Lead	11,902	10,646	9,737
Mercury	47	39	37
Zinc	27,516	31,340	29,630
Dioxins	4.1	5.9	6.4
PACs[6]	5	2	2
Total	138,470	101,092	70,424

[4] Most limits are corrected to 7%O_2

[5] All chemicals reported in pounds, except dioxins which are reported in grams.

[6] Polycyclic Aromatic Compounds

Title V Permit Renewal

The current Title V air operating permit was issued on June 27, 2018. This permit is in effect for 5 years. A permit renewal application will be sent to the WDNR in 2022. The new permit increased required monitor availability to at least 90% of the operating hours per quarter and 95% of the hours per year. It also allows stack tests to be conducted from 9-15 months from previous test instead of annually. There were no other major changes.

Clean Air Interstate Rule

The Clean Air Interstate Rule (CAIR) was an EPA initiative designed to reduce emissions of sulfur dioxide (SO_2) and nitrogen oxides (NOx) from fossil fuel-fired boilers and combustion turbines located in 28 states that contribute to air quality problems in downwind states. Because the boilers at the French Island plant do not burn any fossil fuels, this rule impacted only the oil-fired combustion turbines and required the installation of continuous monitoring systems for NOx and SO_2 on the turbines. As has been the case with many EPA rules, this rule was challenged in court and was remanded back to EPA in 2008 for changes. In 2010, the CAIR replacement rule, referred to as the Clean Air Transport Rule (CATR) was proposed which impacted 31 upwind states including Wisconsin and the turbines at the French Island plant. This rule was challenged as well, and in 2011 the EPA issued its Cross State Air Pollution Rule (CSAPR) to replace the CATR. Later in 2011 the U.S. Court of Appeals issued a stay of the CSAPR pending completion of judicial review. The court subsequently vacated CSAPR in 2012. The CAIR was in effect for 2013 and 2014 and beginning in 2015, the turbines again became regulated under CSAPR. The SO_2 limits in CSAPR are more stringent than those appearing in the CAIR, yet the turbines meet both limits. The plant has been submitting its annual NOx emissions data since 2009 and SO_2 emissions data since 2010 to the EPA as required under the original CAIR.

NR 445

The 2004 revisions to the state's air toxics rule (s. NR 445 Wisconsin Administrative Code) allow waste combustors to burn more than 50% RDF if they are demonstrating the Lowest Achievable Emission Rate (LAER) for certain toxics over WDNR's threshold limits, or if they can show via a multi-pathway risk assessment that the plant's emissions are not putting nearby residents at an increased risk for cancer. Stack tests for dioxins and furans, benzene, formaldehyde, acetaldehyde and various metals were conducted in 2009 while burning 70% RDF and 100% RDF. These emission rates were used in a multi-pathway risk assessment for the plant conducted by the WDNR. The results of the assessment indicate the plant's emissions are not causing an increased risk of cancer to its nearby residents. This state-only rule therefore requires the plant to meet more stringent emission limits than any other waste combustor in the country.

Greenhouse Gas Reporting Rule

In 2009, an EPA rule took effect requiring any facility that emits more than 25,000 metric tons of carbon dioxide equivalents (CO_2e)[7] to report its emissions to the EPA beginning 1/1/2010. This program covers approximately 85% of the nation's greenhouse gas emissions and applies to roughly 10,000 facilities including the French Island generating plant. The rule requires facilities to report their emissions, not reduce them. For the French Island plant, the rule requires quarterly flue gas analysis to identify the portion of the gas that is shown to contain biogenic (renewable) carbon. The plant's 2020 samples showed an average biogenic[8] carbon content of 70%.

Carbon Capture Study

In 2015, Xcel Energy contracted with an outside engineering firm to calculate the amount of greenhouse gas emissions that were saved by burning MSW at the French Island plant over the course of fifteen years (2000 – 2015) as opposed to landfilling that same amount of waste.

The study looked at two kinds of emissions: *baseline emissions* which would have been released if the plant had not been running and *project emissions* produced as a result of plant operations. The two major sources of baseline emissions included 1) the avoided methane emissions from decomposing waste at a landfill, and 2) the avoided greenhouse gas emissions from displacing grid-based electricity. This second source looked at the average emissions from several other power plants in the region and compared it to emissions from the French Island plant.

The study concluded that the French Island plant is <u>carbon negative</u> by 43% per ton of garbage when compared to landfilling that same amount of waste for the period stated above.

Water Quality

The provisions outlined in the plant's Wisconsin Pollutant Discharge Elimination System (WPDES) permit enable the plant to discharge non-contact cooling water into waters of the state (i.e., the Joe Lynn Slough and the Black River). All contact process wastewater is discharged to the La Crosse Publicly Owned Treatment Works (POTW). The annual fee paid to the WDNR under s. NR 101, Wisconsin Administrative Code for the WPDES permit is $250. The plant continues to maintain compliance with its WPDES permit.

The current WPDES permit went into effect on April 1, 2018 and will remain in effect for 5 years. A renewal application will be sent to WDNR in 2022 to keep the permit active until a new permit is issued.

The present WPDES permit requires the plant to perform a thermal discharge study to demonstrate the extent of the thermal mixing zone near the cooling water discharge; this study

[7] CO_2, methane, nitrous oxide (N_20), and fluorinated gases such as sulfur hexafluoride (SF_6)

[8] Produced or originating from a living organism

began in the summer of 2018 and will continue periodically throughout the duration of the permit. Results will be submitted to WDNR in 2022 as part of the renewal process.

Clean Water Act Section 316(b)

In 2014, standards were promulgated by the EPA under Section 316(b) of the Clean Water Act. The 316(b) rule establishes location, design, construction and capacity requirements for cooling water intake structures in order to minimize environmental impacts by reducing impingement[9] and entrainment[10] of fish and aquatic organisms at the water intake structure.

The 316(b) regulations apply to any facility withdrawing more than 2 million gallons per day of cooling water. The French Island plant withdraws approximately 55 million gallons per day used primarily for once-through cooling.

Conditions of the 2014 rule have already been incorporated into portions of the current WPDES permit. In addition, the plant has future capital projects planned to retrofit the existing traveling screens in order to comply with this rule.

Storm Water

The plant is authorized to discharge storm water into the waters of the state under the authority of a WPDES General Industrial Storm Water Discharge permit. The stormwater permit was issued on June 15, 2016 and recently expired (May 31, 2021). The facility is currently waiting for this permit to be reissued by WDNR.

The plant is classified as a Tier II facility and therefore has implemented a storm water pollution prevention plan (SWPPP) to monitor and manage storm water runoff at the site. An annual Tier II storm water fee of $130 was paid to the state in 2020. The WDNR periodically inspects the plant to ensure the facility is complying with the best management practices (BMPs) described in this plan. In addition, the plant routinely conducts maintenance and housekeeping activities to ensure compliance with its SWPPP and provisions of the storm water permit.

[9] When fish and other organisms are trapped against screens as water is drawn into the facility's cooling system.

[10] When fish are drawn into the facility (very young organisms are most susceptible) and exposed to pressure and high temperatures causing their death.

Solid Waste/Recycling

In 2020, the plant burned nearly 52,000 tons of RDF; > 25,000 tons of wood biomass and nearly 28,000 tons of railroad ties. The amount of solid fuels burned at the plant is fairly consistent from year to year as shown in Figure 4.

Since the plant began burning RDF and biomass in 1987, it has burned over 1.6 million tons of RDF and nearly 2.5 million tons of wood and railroad ties.

Figure 4. Tons of solid fuels burned from 2018 – 2020

Fuel (tons)	2018	2019	2020
RDF	52,950	57,549	51,826
Wood	33,220	32,523	25,349
Ties	25,914	29,141	27,544
Total	112,084	119,213	104,719

In 2020, the plant sent ~ 11,900 tons of ash to the La Crosse County landfill for disposal.

The plant is committed to recycling the components of the MSW it receives that cannot be turned into RDF. As such, the plant installed a non-ferrous metal separator in 2010 to collect primarily aluminum cans for recycling and sent 286 tons of aluminum for recycling in 2020. The plant has been recycling its ferrous metal for several years and sent 1973 tons of ferrous metal to AMG in St. Paul, MN for recycling in 2020.

Because the plant burns fuel derived from municipal solid waste (MSW) it must operate under the authority of a WDNR Solid Waste Facility Operation License (License #3776). The 2020 license fee paid to the WDNR was $7,700. The RDF processing building operates under license #3138; and, was required to pay a license fee to the WDNR in 2020 of $550.

Neither the combustion plant nor the RDF processing building has ever violated any of the terms of their operating licenses since commencing operation.

Maintenance & Improvement Activities

The plant performs routine maintenance on its equipment to keep them running well and to help avoid unanticipated "down time". The schedule for the various maintenance activities is determined by the Maintenance Supervisor using guidelines developed by the equipment's manufacturer, internal Xcel Energy guidelines based on similar equipment throughout its system, historical maintenance records and visual observation of performance, among other things. In 2020 the plant completed over 1240 preventative maintenance work orders.

Major Capital Projects and Purchases –

- **Installation of a new, automated fire sprinkler system on the wood processing equipment**
- **Another FLIR camera installed (heat sensitive camera for fire reduction)**
- **Completed overhaul of U1 turbine**
- **Plant uninterruptable power supply refurbished to ensure reliability**
- **Turbine Patch Ring**
- **Traveling screen gearboxes**
- **Stairs for C1**
- **Installation of a second slow speed shredder**

2020 Plant Tours

As a result of the pandemic, very few tours were able to be conducted at the French Island generating plant in 2020. Tours are normally offered on the first Thursday of each month between the hours of 10am and 3pm.

The tours include a viewing of the plant DVD and a walk through of the processing and steam plant operations. If applicable, a 15-minute plant environmental presentation is shown. Brey Maurer 608/793-0003 or Dee Dee Kerska 608/793-0083 can be contacted to set up a plant tour. Tours at this time are still suspended. This may change in the near future, so please feel free to call to discuss some options.