

Burlington Electric Department

Economic Impact of McNeil Generating Station

A Report from:

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Introduction

Burlington Electric Department’s McNeil Station is a 50 MW wood-fired electricity generating facilityⁱ that operates in the ISO-New England region. This facility provides an important market for biomass chips, produced in the forests of Vermont and nearby New York, and provides electricity to consumers in the City of Burlington, Vermont, and surrounding communities, as well as the entire ISO-New England market and is currently the largest generator in Vermont in terms of energy production (following the retirement of Vermont Yankee).

Innovative Natural Resource Solutions LLC (INRS) was commissioned by Burlington Electric Department to analyze the economic impacts associated with operations of McNeil Station. This economic analysis is an update of a similar study performed in the spring of 2020. The analysis is for one year, and uses 2022 data whenever possible. There were a few occasions when 2022 data was not available; in those cases, the latest available data was utilized.

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Executive Summary

In 2022, the expenses to operate McNeil Station – inclusive of wood fuel, operations, maintenance, and other expenses (but excluding non-cash expenses such as depreciation, and cash expenses such as capital additions that do not appear in a financial statement of expenses) was \$25,858,867. The facility generated an estimated \$33,346,332 in revenue – from the sale of electricity, Renewable Energy Certificates (RECs), capacity and Volt Ampere Reactive (VAR) payments.

In addition to its recorded expenses, McNeil made purchases of capital assets not included in the above accounting treatment of “expenses” of \$2,243,900.



McNeil Station provides significant economic benefit to Vermont and the surrounding region through the operations of the facility, purchase, and handling of wood fuel, and avoided societal cost of carbon emissions. Note the table below differs from a traditional income statement in that it includes dollars spent on wood purchases (not the amount of wood consumed and expensed), the expenditures on capital additions (which do not appear on an income statement), and a calculated value of CO2 savings (based on an assumption of carbon neutrality). The facility, Vermont’s largest wood-using and largest energy producing facility, provides:

- \$38.4 million in annual direct economic impact, 69 percent of which is in Vermont (see Table 1 below); and
- \$87.2 million in annual direct, indirect, and induced economic impact, 66 percent of which is in Vermont (see Table 5 on page 14).

	Direct		
	Vermont Only	Total Impact	Jobs
Wood Fuel Purchases	\$ 4,953,577	\$ 12,142,622	48
* Swanton Yard Expense	\$ 808,174	\$ 808,174	2.5
* Railroad Expense	\$ 1,800,000	\$ 1,800,000	2
* Waste Wood Chipping Expense	\$ 96,106	\$ 96,106	
Fuel - Non-Wood Purchases	\$ 7,793	\$ 77,926	
Payroll Expense	\$ 3,300,000	\$ 3,300,000	34
Overhead Expense	\$ 1,170,637	\$ 1,170,637	
Property Tax Expense	\$ 1,609,254	\$ 1,609,254	
Other Operating Expenses	\$ 941,028	\$ 3,764,110	
Capital Purchases	\$ 560,975	\$ 2,243,900	
Carbon (avoided \$)	\$ 11,397,071	\$ 11,397,071	
Total	\$ 26,644,614	\$ 38,409,800	87

Table 1. Direct Economic Impact, 2022



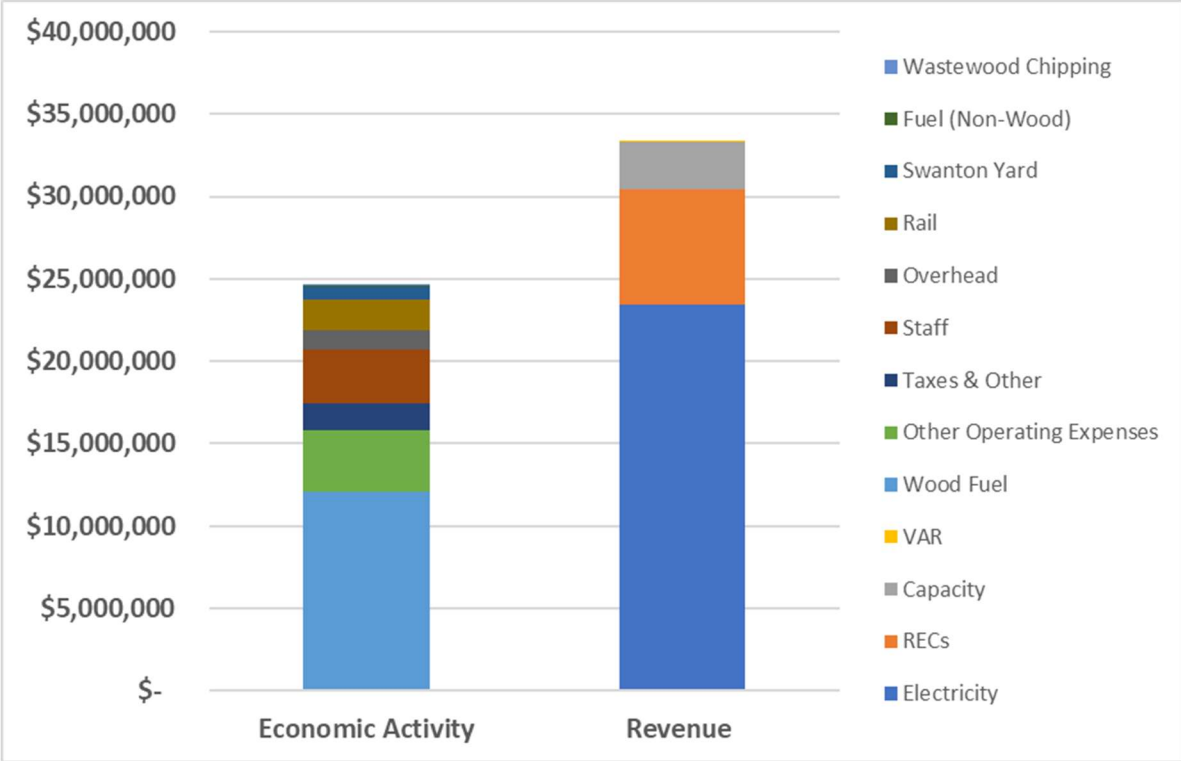


Figure 1. Economic Activity and Revenue

Wood Fuel

McNeil Station procures biomass fuel from loggers and others in the forest products industry. The vast majority of this fuel (88.4%) is procured as chips – generally obtained from harvesting projects that utilize in-woods chippers to produce fuel. In these harvesting operations the majority of the wood harvested is used for other purposes, such as sawlogs for lumber or pulpwood for papermaking, and the balance of the tree such as the tops and limbs are then chipped and used by McNeil as fuel, referred to as “in-woods chips.” An additional 9.7% of fuel is mill residue (bark, mill chips, hog chips, and sawdust) from sawmills – the residuals generated when round logs are sawn into boards. McNeil Station does purchase some small volumes of roundwood (from lower value trees not appropriate for lumber or other higher value uses), which can be stored and used during time periods when loggers are unable to operate due to soft ground conditions – generally during the spring mud season. Fuel purchased as roundwood only made up 0.3% of McNeil’s fuel supply in 2022. Lastly McNeil operates a waste wood yard for Vermonter’s (including businesses) to dispose of clean untreated wood waste which is then chipped for fuel for McNeil (1.6%).



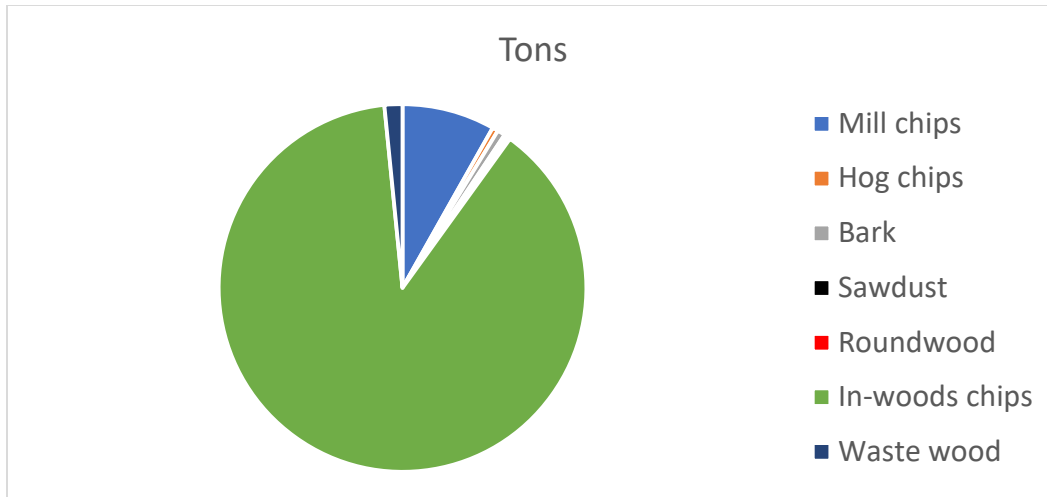


Figure 2. Wood Fuel Type, by Volume

The generation station purchased a total of 351,378 green tons of wood fuel in 2022ⁱⁱ, making it the largest consumer of wood in Vermont, using wood equivalent to about 16 percent of Vermont’s total timber harvest.ⁱⁱⁱ McNeil Station purchases wood from nine Vermont counties, as well as from proximate counties in New York. Unlike fossil fuels that are imported from outside of the State and region, or other renewable generation sources that do not require ongoing fuel expenses (e.g., solar and wind), biomass electricity generation creates local economic benefits through ongoing wood fuel purchases. Assuming an average wood fuel price of \$35 per green ton^{iv}, McNeil Station purchased \$12.1 million in wood fuel in 2022. The figure below shows estimated wood fuel purchases in each Vermont county. In addition to what is shown below, the facility purchased \$7.2 million in fuel from Clinton, Essex, Franklin, and Warren Counties in New York.



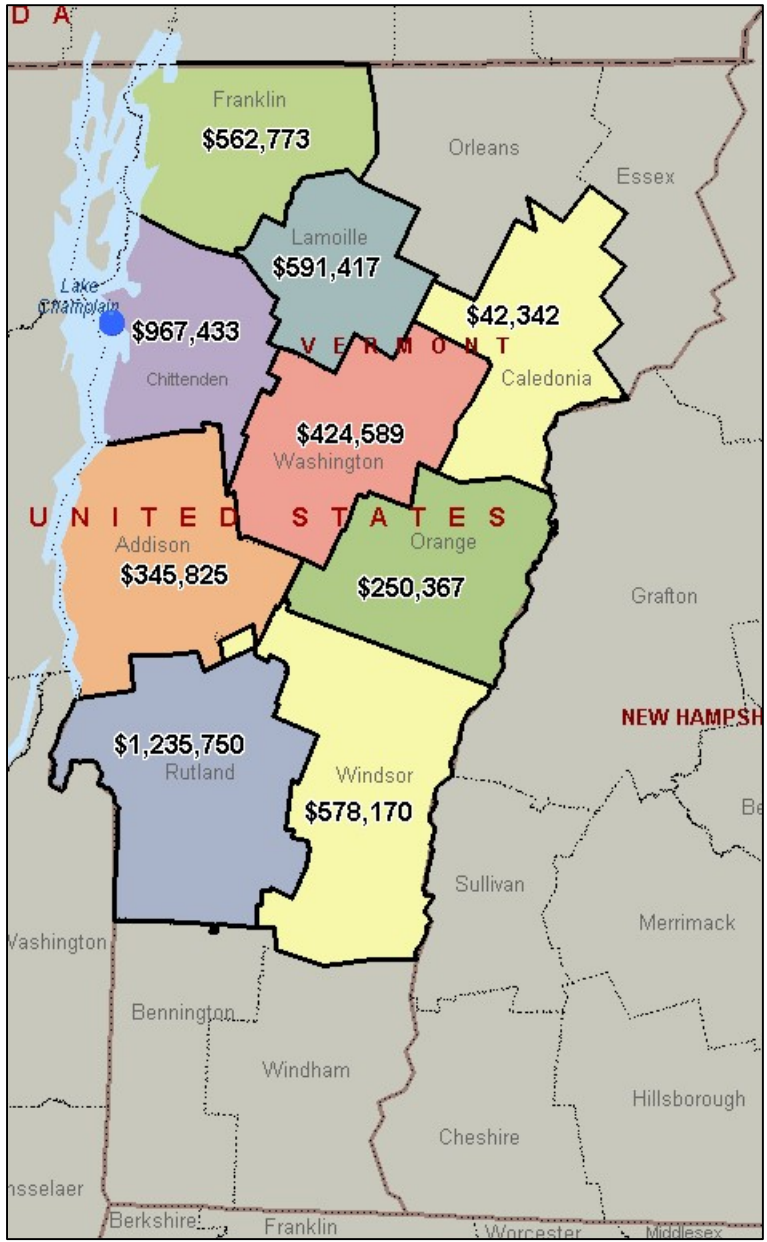


Figure 3. Wood Fuel Purchases by Vermont County, 2022 (estimated)^y



In addition to dollars directly spent on wood fuel, the market for biomass fuel created by McNeil Station creates jobs. Logging crews produce biomass as part of a mix with other forest products, including sawlogs and pulpwood. The figure below shows how multiple products can be generated from a single tree or timber stand.

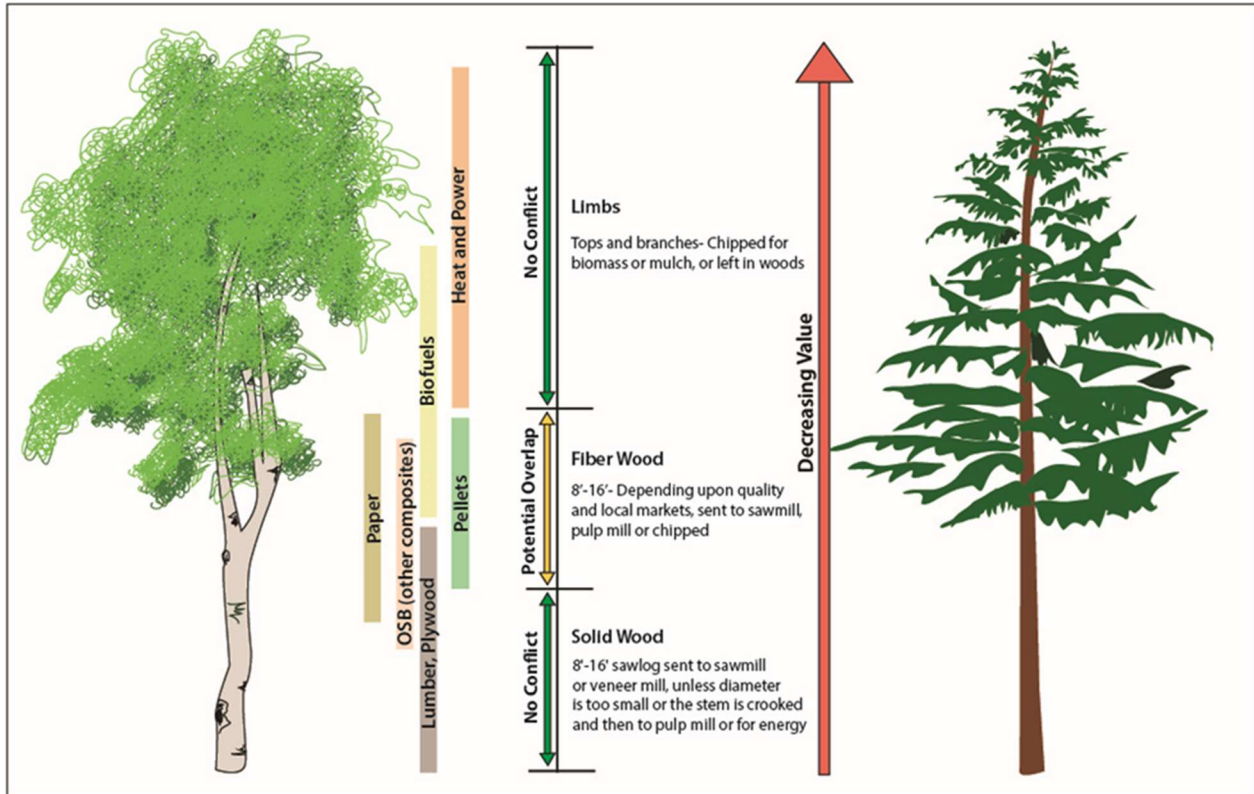


Figure 4. *Sawlogs, Pulpwood and Biomass Can All Be Generated from a Timber Harvest*

Assuming that a 4-person logging crew (exclusive of trucking) can produce 35 loads per week, at 30 tons per load, these 4 loggers would generate an estimated 1,050 tons of wood per week. Because loggers cannot work the entire year (often spring and fall mud season conditions keep loggers from operating for extended periods of time), we assume 45 weeks of operation per year. Given the above assumptions, McNeil Station’s annual wood use directly supports the production of 30 full-time (FTE) logging jobs. According to data from the US Bureau of Labor Statistics^{vi}, the average wage for a logging equipment operator in Vermont is \$40,017 per year. Using this wage, the market created by McNeil Station results in an estimated \$1.2 million in logging wages annually.

In addition to logging jobs, providing wood fuel to the facility requires trucks, and thus generates trucking jobs. Again assuming 30 tons per load, McNeil Station’s wood use requires 11,713 deliveries per year, or 45 deliveries per day (assumes 260 delivery days). Assuming that each truck can make 2.5 deliveries per day, this means that McNeil Station supports 18 trucks and FTE truckers. According to data from the US Bureau of Labor Statistics^{vii}, the average wage for trucker in Vermont \$51,150 per year. Using this wage, the market created by McNeil Station results in \$920,700 in trucking wages annually.



Wood Handling, Rail Transport, and Waste Wood Operations

In addition to the employment related to wood purchases described above, McNeil Station has a unique situation where most of the wood fuel used at the facility is required to be delivered to a remote yard in Swanton, Vermont and then sent to the facility via a short-line rail carrier. This arrangement, which adds to the delivered cost of wood fuel, was established to decrease truck traffic in the area around McNeil Station.

In 2022, the majority of wood fuel purchased by McNeil Generating Station was delivered to Swanton, unloaded, stored on site, and re-loaded into rail cars. Operations at this yard cost McNeil Station roughly \$808,000 in 2022. The Swanton yard employs an estimated 2.5 people to conduct these activities.^{viii} Assuming a wage similar to an agricultural equipment operator at \$37,230^{ix}, the operation of the Swanton yard provides an estimated \$93,075 in wages annually.

Moving this wood from Swanton to McNeil Station by rail in Burlington costs an additional \$1.8 million per year. The vast majority of this is the charge for trains, but also includes switching fees, weather-related delays, and charges for snow trains. The short-line rail uses two individuals to operate each chip train. Assuming a wage of \$64,150^x, these two rail jobs provide \$128,300 in wages annually.

INRS notes that the yard and rail costs, spread over all wood fuel used (including any delivered directly to McNeil Station via truck) add \$7.42 per ton to the average cost of fuel. Assuming 1.6 green tons of wood fuel are used to generate a megawatt hour of electricity^{xi}, this means an increased fuel cost of \$11.88 per MWh associated with the permit requirement to deliver the majority of the wood to Swanton yard and then transport to McNeil via rail.

In addition to wood procured via forestry operations and from mill residues, McNeil Station has an on-site wood waste yard where individuals can drop off pallets, untreated lumber, tree trimmings and other clean wood for use as a fuel. McNeil Station then pays a contractor to come in three times annually to grind the wood waste, allowing it to be sized for use as biomass fuel. This costs roughly \$90,000 per year. In 2022 McNeil Station's waste wood program generated 5,573 tons of wood fuel for use at the facility^{xii}. At an avoided cost of \$50 per ton (avoided tipping fee)^{xiii}, the waste wood yard provided Vermont residents and businesses a value of \$278,650 in 2022.



Plant Operations

Operating McNeil Station requires a professional staff to operate the facility. As an intermediate to baseload generator (depending on season), McNeil Station is staffed around the clock for the entire year and is always available for generation (with the exception of planned maintenance periods and unplanned outages). McNeil Station employs 34 full time staff, with an annual payroll of \$3.3 million and overhead (benefits, employee costs, etc.) of nearly \$1.2 million. Total staffing costs for McNeil Station are roughly \$4.5 million annually.

McNeil Station makes an annual Payment in Lieu of Tax to the City of Burlington. In 2022 that PILT was \$1.6 million.

There are a number of costs associated with plant operations that can be described as “Miscellaneous Operating Expenses.” These include utilities, materials & supplies, dues, outside technical services, repairs and maintenance, professional training, phones, and publications. In 2022, these costs were roughly \$3.8 million.

Thus, McNeil Station is responsible for the creation of a total of 87 jobs at the facility and in the wood fuel supply chain, with total wages for these positions estimated to be \$5.6 million annually as discussed in more detail below.



Generation Revenue & Operating Expenses

McNeil Station generated 228,981 MWh of electricity for sale in 2022 and received payments for electricity and Renewable Energy Certificates (RECs) associated with this generation. Additionally, the facility received capacity payments from ISO-New England for being available to generate electricity when called upon, and Volt Ampere Reactive (VAR) payments for the value of generation near an electricity load center (the City of Burlington).

As shown in the table below, these generation-related revenues provided an estimated \$33.3 million in revenue to McNeil Station in 2022.

	Electricity sales (MWh)		228,981
Electricity			
	Electricity revenue (\$/MWh)	\$	102.35
	Electricity Revenue	\$	23,436,975
Renewable Energy Certificates			
	REC Revenue (\$/MWh)	\$	30.56
	REC Revenue	\$	6,998,656
Capacity			
	Capacity (\$/kw/kW month)	\$	4.22
	Capacity (\$ / MW month)	\$	4,215
	MW per month		52
	Total Capacity Payment	\$	2,886,229
VAR Payments			
	VAR Payments	\$	24,472
Total			
	Total Generation Revenue	\$	33,346,332

Table 2. Generation-based Revenue, 2022

This is revenue brought in through operations of the facility in the New England wholesale electric markets operated by ISO-NE. Importantly, the total revenue is not included in calculating the total economic impact of McNeil Station because in part these same funds that are used to purchase wood fuel, pay employees, and cover other expenses. To include the total revenue in the final calculation would be double counting. However, for the period examined, McNeil’s revenues exceeded its expenses materially (see below in the Section on Direct Economic Impact).

Additionally, McNeil Station’s operations support the electricity grid in Northwestern Vermont. According to information provided by the Vermont Electric Power Company (VELCO), if McNeil Station was not operating, that could create a “problem for the local area encompassing the City of Burlington, Essex and Winooski”, and that “the 34.5 kV lines around McNeil could be overloaded during relatively heavy load days.”^{xiv}

While generating an estimated \$33,346,332 in revenue, the facility incurred \$25,858,867 in expenses^{xv} – wood fuel, operations, maintenance, and taxes (PILT).





Summary – Direct Economic Impact

Based on the information above, in 2022 McNeil Station had a direct economic impact of \$38.4 million, 69 percent of which is in Vermont (much of remainder is associated with wood fuel purchases from proximate New York)^{xvi}.

	Direct		
	Vermont Only	Total Impact	Jobs
Wood Fuel Purchases	\$ 4,953,577	\$ 12,142,622	48
* Swanton Yard Expense	\$ 808,174	\$ 808,174	2.5
* Railroad Expense	\$ 1,800,000	\$ 1,800,000	2
* Waste Wood Chipping Expense	\$ 96,106	\$ 96,106	
Fuel - Non-Wood Purchases	\$ 7,793	\$ 77,926	
Payroll Expense	\$ 3,300,000	\$ 3,300,000	34
Overhead Expense	\$ 1,170,637	\$ 1,170,637	
Property Tax Expense	\$ 1,609,254	\$ 1,609,254	
Other Operating Expenses	\$ 941,028	\$ 3,764,110	
Capital Purchases	\$ 560,975	\$ 2,243,900	
Carbon (avoided \$)	\$ 11,397,071	\$ 11,397,071	
Total	\$ 26,644,614	\$ 38,409,800	87

Table 3. Direct Economic Impact, 2022

McNeil Station is responsible for the creation of 87 jobs at the facility and in the wood fuel supply chain, with total wages for these positions estimated to be \$5.6 million annually.

Importantly, these jobs are maintained as long as McNeil Station is operating and using wood fuel. This is in contrast with some other forms of renewable electricity generation, where most jobs are associated with the development and construction of generation units, not their ongoing operations.

The revenue in excess of economic activity (purchases excluding capital and expenses) in 2022 was roughly \$8.5 million, which provides a benefit to the owners of McNeil Generating Station^{xvii}, all of which are based in Vermont. This money circulates in the Vermont economy, and encourages continued operation of and investment in the facility. To be clear, McNeil Generating Station has not had revenues in excess of expenses every year of operation.



Multiplier Effect

INRS has reviewed relevant literature to estimate the multiplier effect for each relevant area of economic activity. The multiplier effect, used in economics to provide an understanding of the economic impact of activities, is defined as:

“Multiplier effect: means the cumulative economic activity arising from the fact that the biomass electric power generation industry’s direct effect contribution spreads across the state’s economy by creating and supporting jobs, incomes, and taxes. The biomass electric power generation industry supports its supply industries in the region by making purchases from them (indirect effect). These supply industries include commercial logging, marketing research, truck transportation, and maintenance and repair construction. In addition, workers in the biomass electric power generation industry and its supply industries spend their earnings in the region’s services industries (induced effect), such as restaurants, medical services, grocery stores, real estate, and retail stores.”^{xviii}

The table below shows the multipliers used for each economic activity, and the reference determined through a literature review.

	Multiplier	Reference
Wood Fuel Purchases	3.10	Plymouth State
* Swanton Yard Expense	3.10	Plymouth State
* Railroad Expense	1.71	ASLRRRA
* Waste Wood Chipping Expense	2.10	Hardy, Stevenson & Assoc
Fuel - Non-Wood Purchases	1.00	xx
Payroll Expense	4.39	Plymouth State (calculated)
Overhead Expense	4.39	Plymouth State (calculated)
Property Tax Expense	1.78	Plymouth State (calculated)
Other Operating Expenses	1.60	Plymouth State (calculated)
Capital Purchases	1.69	Polecon Research (calculated)
Carbon (avoided \$)	1.00	xx

Table 4. Multipliers by Category



Summary – Total Economic Impact

Using the information above, after adjusting for the multiplier effect, the total economic impact of McNeil Station is estimated at \$87.2 million; 66 percent of this impact is in Vermont.

	Direct, Indirect & Induced	
	Vermont Only	Total Impact
Wood Fuel Purchases	\$ 15,356,089	\$ 37,642,128
* Swanton Yard Expense	\$ 2,505,339	\$ 2,505,339
* Railroad Expense	\$ 3,078,000	\$ 3,078,000
* Waste Wood Chipping Expense	\$ 201,823	\$ 201,823
Fuel - Non-Wood Purchases	\$ 7,793	\$ 77,926
Payroll Expense	\$ 14,487,000	\$ 14,487,000
Overhead Expense	\$ 5,139,096	\$ 5,139,096
Property Tax Expense	\$ 2,864,472	\$ 2,864,472
Other Operating Expenses	\$ 1,505,644	\$ 6,022,576
Capital Purchases	\$ 948,048	\$ 3,792,191
Carbon (avoided \$)	\$ 11,397,071	\$ 11,397,071
Total	\$ 57,490,375	\$ 87,207,623

Table 5. Total Economic Impact

As in the direct evaluation above the revenue in excess of economic activity (purchases excluding capital purchases and expenses) in 2022 was roughly \$8.5 million, which provides a benefit to the owners of McNeil Generating Station^{xix}, all of which are based in Vermont. This money circulates in the Vermont economy, and encourages continued operation of and investment in the facility. Importantly, McNeil Generating Station has not had revenues in excess of expenses every year of operation.



Endnotes

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- ⁱ <https://www.burlingtonelectric.com/mcneil/>
- ⁱⁱ Personal communication, Burlington Electric Department staff, Material Report 2022
- ⁱⁱⁱ Calculated from Vermont Forest Resource Harvest Summary - 2021.
https://fpr.vermont.gov/sites/fpr/files/doc_library/2021%20Harvest%20Report.pdf. Assumes 1 cord is equivalent to 2.5 green tons.
- ^{iv} Personal communication, Burlington Electric Department staff
- ^v Estimates based on an average price of \$39.80 per green ton.
- ^{vi} May 2021 State Occupational Employment and Wage Estimates – Vermont.
https://www.bls.gov/oes/current/oes_vt.htm#45-0000
- ^{vii} May 2021 State Occupational Employment and Wage Estimates – Vermont.
https://www.bls.gov/oes/current/oes_vt.htm#45-0000
- ^{viii} Personal communication, Burlington Electric Department staff
- ^{ix} May 2018 State Occupational Employment and Wage Estimates – Vermont.
https://www.bls.gov/oes/current/oes_VT.htm#45-0000
- ^x U.S. Bureau of Labor Statistics, Occupational Outlook Handbook, Transportation and Material Moving, Railroad Workers. <https://www.bls.gov/ooH/transportation-and-material-moving/railroad-occupations.htm>
- ^{xi} “Amended and Restated Power Purchase Agreement, Public Service of New Hampshire and Berlin Station,” Approved in Docket DE-10-195 of the New Hampshire Public Utilities Commission. Section 6.1.2(a)(2) implies that facility, a 70 MW biomass unit, would burn 1.6 tons of fuel per MWh.
- ^{xii} Personal communication, Burlington Electric Department staff
- ^{xiii} <https://cswd.net/a-to-z/wood/>
- ^{xiv} Email from VELCO (Hantz Presume) to Burlington Electric Department (Casey Lamont), July 15, 2019
- ^{xv} Personal communication, Burlington Electric Department staff
- ^{xvi} For the categories “Other Operating Expenses” and “Capital Expenditures,” it was assumed that 25% of the activity is in Vermont. For “Fuel: Non-Wood,” it was assumed 10% of the economic activity was in Vermont.
- ^{xvii} The joint owners of McNeil Generating Station are Burlington Electric Department, Green Mountain Power, and the Vermont Public Power Supply Authority.
- ^{xviii} Daniel S. Lee, College of Business Administration, Plymouth State University (New Hampshire). *Economic Contribution of the Biomass Electric Power Generation Industry in New Hampshire: Calendar Year 2016*. March 1, 2017
- ^{xix} The joint owners of McNeil Generating Station are Burlington Electric Department, Green Mountain Power, and the Vermont Public Power Supply Authority.

