

Minnesota Pollution Control Agency and Environmental Quality Board Wastewater Treatment Facilities

This document is designed to help Project Proposers utilize the [Minnesota Climate Calculator](#) (Calculator) to answer item 18: Greenhouse Gas (GHG) Emissions/Carbon Footprint related to wastewater treatment facilities. Project proposers **must** include the excel file when submitting the Environmental Assessment Worksheet (EAW).

Project information

The first step is to enter the background information of the project including construction start date, operation year, lifetime, acreage, and square footage of buildings as highlighted in red below. Per the [U.S. Energy Information Administration](#), sewage treatment facilities are classified as commercial buildings.

The cells highlighted in green allows project proposers to identify energy that is from renewable sources. Entering a percentage value in either field will result in lower emission under the building energy category. The top cell in highlighted in green asks project proposers if any of the electricity generated **onsite** is from renewable sources, or if any of the electricity comes from renewable energy credits. The second asks project proposers if any of the natural gas comes from renewable sources.

Project Information

Enter information into all yellow cells. Results may not calculate if fields are left blank, as highlighted by the red x marks construction projects, select the Apply Defaults button to populate the Construction Duration with the default data from t

Project Name	Wastewater Facility	
Project Category (primary)	Subp. 18, Wastewater	✓
Project Category (secondary)		
Location (County)	Sherburne	✓

Construction Start Date	1/1/2026	✓
Operational Year	2027	✓
Operational Lifetime (Years)	40	✓

Building Construction Project?	Yes
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Construction Stage	Duration (Days)	Default*	✓
Demolition	20.0	20.0	
Site Preparation	10.0	10.0	
Grading	20.0	20.0	
Building Construction	230.0	230.0	
Architectural Coatings	20.0	20.0	
Paving and Landscaping	20.0	20.0	

*Defaults are dependent on total project acreage and are only applicable to bui

Total Project Acreage	10.0	✓
Residential Building Area (sq ft)		✓
Commercial Building Area (sq ft)	30,000.0	✓
Industrial Building Area (sq ft)		✓
Institutional Building Area (sq ft)		✓
Other Building Area (sq ft)		✓

Electricity Provider	Grid Average
Portion of Building Electricity Consumption to be Generated On-Site via Renewables or Supplied through the Purchase of Renewable Energy Credits (RECs)	50%
Portion of Building Natural Gas Consumption to be Supplied from Renewable Sources	50%

Applicable emission sources

Next is to determine what the applicable emission sources. Project proposers are advised to start with “Apply Defaults” but then to review what information they have available and modify which sources to include. The Applicable Emission Sources are broken out into two project phases, Construction and Operation.

Applicable Emission Sources

Information is provided below on emission sources potentially applicable to your project depending on the project category selected in the section above. Select the 'Apply Defaults' button to include all applicable sources, or manually select "Yes" or "No" to indicate which emission sources to estimate GHG emissions for in this calculator. The red x mark will appear until a selection is made for all emission sources.

Project Phase	Emission Source	Include Emission Source?	Applicable to Project Category?
Construction	Material inputs	Yes	Yes
Construction	Transportation of material inputs	Yes	Yes
Construction	Employee commuting	Yes	Yes
Construction	Construction equipment	Yes	Yes
Construction	Land use change (construction)	Yes	Yes
Construction	Construction waste	Yes	Yes
Operation	Building energy consumption	Yes	Yes
Operation	Coal production	No	No
Operation	Natural gas and oil products	No	No
Operation	Industrial processes	No	No
Operation	HFC leakage	No	No
Operation	Land use change (operations)	No	No
Operation	On-road vehicles	No	No
Operation	Treatment of waste on-site	Yes	No
Operation	Treatment of wastewater on-site	Yes	Yes
Operation	Treatment of waste off-site	No	No
Operation	Enteric fermentation	No	No
Operation	Manure management	No	No

Apply Defaults
Reset Button

User inputs

After determining the Applicable Emission Sources, project proposers move on to the User Inputs tab to populate specific information within each emission source.

Construction phase

There are six emission sources under the construction phase. Project proposers should attempt to populate each source; however, it is understood that data may not be available at the time of preparing the EAW. When data is not available, project proposers may use defaults when available. Project proposers should note that defaults are used. If project proposers think the default values are not appropriate for the project, then they can toggle the “Include Emission Source to ‘No’.

Project Phase	Emission Source	Include Emission Source?	Applicable to Project Category?
Construction	Material inputs	No	Yes
Construction	Transportation of material inputs		

- Material Inputs:
 - Project proposers should enter the estimated amount of material such as concrete, asphalt, etc. (if known). The calculator will calculate the transportation of the material depending on where the material was sources (domestic or imported).
- Employee Commuting:
 - Daily average number of employees commuting to the site during different staged of construction.
 - The average one-way commute length.
 - The percentage of transportation mode. If employee commuting habits are unknown, then 100% single occupancy vehicle should be used.

Note: Employee commuting calculations are tied to the Construction Stage duration input fields on the Project Background tab. If these fields are blank, the Calculator will create a warning that inputs are incomplete.

Construction Stage	Duration (Days)	Default*
Demolition		26.7
Site Preparation		4.0
Grading		8.0
Building Construction		293.3
Architectural Coatings		13.3
Paving and Landscaping		13.3

Apply Defaults

Reset Button

Data must be entered to quantify emissions from employee commuting.

*Defaults are dependent on total project acreage and are only applicable to building construction projects.

- **Construction Equipment:**
 - There are 15 types of construction equipment listed. Project proposers will enter the number of hours per day that a piece of equipment is used (if known).
 - The default number of hours per day is based on the project acreage input in D17 on the Project Background tab.
 - If a piece of equipment used on site is not included on the list, project proposers may model the equipment after a similar piece of equipment. Equipment information can be found below or on the Assumptions Tab starting on B101. MPCA recommends including any assumption on the Notes Tab.

Table 1. Construction equipment.

Equipment type	Horsepower	Load Factor	Btu/hp-hr
Air Compressors	37	0.48	7,684.73
Cement and Mortar Mixers	10	0.56	7,709.24
Concrete/Industrial Saws	33	0.73	7,774.65
Cranes	367	0.29	7,133.38
Excavators	36	0.38	7,938.58
Forklifts	82	0.20	7,126.94
Generator Sets	14	0.74	7,684.18
Graders	148	0.41	7,182.18
Pavers	81	0.42	7,119.22
Paving Equipment	89	0.36	7,134.75
Rollers	36	0.38	7,935.40
Rubber Tired Dozers	367	0.40	7,195.40
Scrapers	423	0.48	7,151.74
Tractors/Loaders/Backhoes	84	0.37	7,164.18
Welders	46	0.45	7,683.89

- A second options for calculating emissions from construction equipment is as follows:
 - Project proposers enter the estimated fuel consumption of equipment in the natural gas and oil products emission source within the Operation Emission Phase.
 - If this option is utilized, users must change the option to 'yes' to include natural gas and oil products.

Project Phase	Emission Source	Include Emission Source?	Applicable to Project Category?
Construction	Material inputs	Yes	Yes
Construction	Transportation of material inputs	Yes	Yes
Construction	Employee commuting	Yes	Yes
Construction	Construction equipment	Yes	Yes
Construction	Land use change (construction)	Yes	Yes
Construction	Construction waste	Yes	Yes
Operation	Building energy consumption	Yes	Yes
Operation	Coal production	No	No
Operation	Natural gas and oil products	Yes	No

- Land Use Change (Construction):
 - This section account for emissions associated with modifying the land as in converting grassland to an impervious surface (i.e. new building). Project proposers should enter changes that occur under the construction section.
- Construction Waste:
 - Only enter material from any demolition that occurred.

Operation phase

- Building Energy Consumption:
 - Building energy consumption is determined based on the type of building and square footage.
 - The U.S. Energy Information Administration classifies municipal wastewater treatment plants, particularly publicly owned treatment works (POTWs) as [commercial building](#), which includes space heating, space cooling, water heating, ventilation and air handling, lighting, refrigeration, office equipment, on-site power generation. These default values are from [Energy Information Administration \(EIA\)- Commercial Buildings Energy Consumption Survey \(CBECS\) Data](#) and listed below.
 - Project proposers are strongly encouraged to use real world data if available.

Table 2. Energy consumption.

Building Type	Energy Intensity (Btu/sq ft/year)			
	Electricity	Natural Gas	Propane	Kerosene or Fuel Oil
Commercial	30,766	35,535	0	1,662

- Coal Production:
 - There are no anticipated coal production emissions associated from WWTFs.
- Natural Gas and Oil Products:
 - Project proposers may enter any additional fuel (i.e. natural gas, renewable natural gas, gasoline, etc.) utilized to run the wastewater treatment facility not accounted for in the Building Energy Consumption section. This could include mobile sources such as nonroad or on road (if not accounted for in the designated section).
- Industrial Process Emissions:
 - This section accounts for the emissions associated with the extraction of raw materials. There are no anticipated industrial process emissions associated from WWTFs.
- HFC Leakage:
 - These emissions are based on the square footage of the building(s) and percentage of the building(s) that utilize air conditioning.
- Land Use Change (Operation):

- See Land Use Change (Construction) above. There are no anticipated emissions from WWTFs.
- On-Road Vehicles:
 - Enter the estimated vehicle miles traveled per year for the associated speed bin.
 - An alternative for on-road vehicles, if the speed bins are unknown, is to enter the amount of fuel used in the natural gas and oil products.
- Treatment of waste on-site:
 - While the biosolids may be shipped to another location for final treatment/use, this is where the treatment and quantity should be recorded. Emissions from the transportation of the biosolids should be factored in based on the fuel usage under natural gas and oil products.
 - Options for waste treatment are landfills (MSW), Combustion, composting, and anaerobic digestion (wet or dry).
 - Not included as a treatment options is land applications. Project proposers can use an alternative tool (see [insert my Item 18 Guidance doc]). Project proposers may also provide a narrative in item 18b.
- Treatment of wastewater on-site:
 - Project proposers should enter the population served by the treatment plant. All other variables are constants and are on the Constants tab or as seen below.

Table 3. Wastewater constants.

Data element	Value	Units
BOD	0.09	Kg/person/day
BOD emission factor	0.60	Kg CH4/kg BOD
Percent anaerobically digested	12.65%	Percent
Protein	35.7	Kg/person/year
Nitrogen content in protein	16%	Percent
Fraction of nitrogen not consumed	1.75%	Percent
N2O emission factor	0.005	Kg N2O/kg BOD

Source: EPA State Inventory Tool (January 2025)

- Treatment of waste off-site:
 - This section accounts for waste generated by households and is not applicable to WWTFs.
- Enteric Fermentation and Manure Management:
 - There are no anticipated emissions for this category.