



B3 Sustainable Buildings 2030 (SB 2030) Wastewater Treatment Plant (WWTP) Review

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January 2018

B3 SB 2030 Wastewater Treatment Plant Review

Introduction

As part of the wastewater financial assistance program, Minn. R. 7077.0272, Subp. 2, D, requires, “An analysis of all feasible treatment alternatives that are capable of meeting the applicable effluent, water quality and public health requirements for 20 years.” To be considered compliant with the B3 (Buildings, Benchmarks, and Beyond) SB 2030 Wastewater Treatment Plant (WWTP) Review Process this analysis should include the following, as outlined in Parts 1 through 5 of this document:

- Data Entry into B3 Benchmarking and an energy audit of existing facility
- Documentation of energy conservation measures (ECMs) that were considered for inclusion in the project, even if they are not implemented
- Anticipated performance metrics under several load conditions
- Evaluation of opportunities for renewable energy generation on-site
- Evaluation of water savings potential

Following the SB 2030 WWTP Review Process is a recommendation for non-exempt projects. For the purposes of this document, “should” is used to reflect that this is a recommended process. Any non-exempt projects, which do not submit timely and adequate responses to parts 1 through 5 of the SB 2030 WWTP Review will be considered non-compliant with this process.

Related Documentation:

All SRF projects will need to complete a Cost and Effectiveness Certification Form {FWCA Section 602(b)(13)}

Project teams should review the Cost and Effectiveness guidance document on the Minnesota Pollution Control Agency (MPCA) web page at:

<https://www.pca.state.mn.us/sites/default/files/wq-wwtp2-46a.pdf>. Part of that analysis is considerations for energy efficiency and renewable energy opportunities.

Exemptions

All SRF projects complete B3 SB 2030 WWTP Review Exemption Checklist to determine if the project is exempt from the B3 SB 2030 WWTP Review Process and additional energy efficiency planning or design considerations. If exempt, please send a copy of the exemption form to the CSBR at sb2030@b3mn.org. If not exempt, please send a copy of the Minnesota CWRF Cost and Effectiveness Checklist, Certification form, and an electronic version of the facility plan to the CSBR at sb2030@b3mn.org

B3 Guidelines Tracking Tool Entry

Non-exempt projects will be enrolled in the B3 Guidelines Tracking tool to document results of Parts 1 through 5 below. This includes all of the ECMs considered for a project, anticipated performance metrics, and the energy audit results. Contact sb2030@b3mn.org to set up a project file.

This B3 SB 2030 WWTP Review Process may be updated as new standards become available, project teams should verify that they are using the most recent published version available on <http://www.b3mn.org/2030energystandard/>.

Part 1. Evaluating Energy Performance of Existing Facilities

Part 1 is only applicable for existing WWTPs. An evaluation of the energy performance of existing operations should be conducted as part of the initial project planning to identify significant opportunities to improve plant performance. Benchmarking is the first step to identify whether opportunities are likely, while an audit will identify specific opportunities. Existing facilities need to enter energy data into the B3 Benchmarking tool.

B3 Benchmarking has been enhanced for Wastewater Treatment plants to provide wastewater treatment plant energy performance and to track energy performance over time. This adds to the building benchmark tool that has been available for state and municipal buildings for years.

Learn more about B3 Benchmarking: <https://mn.b3benchmarking.com/>

Learn more about B3 Benchmarking & WWTPs:

<http://mn.b3benchmarking.com/WastewaterTreatmentPlants>

Check with your City about access through an existing account or create a new account.

Account Access: <https://mn.b3benchmarking.com/default>

Below are examples of audit tools available:

- Minnesota Technical Assistance Program (MNTAP) can perform wastewater energy assessments to improve the energy performance of existing facilities, and can identify additional auditor and audit resources.
<http://www.mntap.umn.edu/industries/facility/potw/>
- Local utilities offer building audits and may support wastewater process audits.
- Nationally there are independent contractors who specialize in energy audits for wastewater plants.

- The Environmental Protection Agency (EPA) Energy Use Assessment Tool, an Excel spreadsheet can be used to log plant energy consumption and estimated an energy footprint for plant equipment. <https://www.epa.gov/sustainable-water-infrastructure/energy-efficiency-water-utilities>

The performance evaluation results should be included in the facilities plan evaluation of existing facilities.

Part 2. Evaluation of specific Energy Conservation Measures (ECMs)

At a minimum, the following ECM types should be considered:

1. Monitoring of energy usage for the wastewater treatment facility with integration of real-time measurements into SCADA of the following:
 - a. Whole plant energy
 - b. Individual treatment process (e.g. secondary treatment and biosolids treatment) and/or large equipment with high run times.
 - c. Individual pump stations in the collection system.
2. Installation of high efficiency equipment for all treatment processes. Consider equipment that will operate as close to its peak efficiency relative to flows and loadings at various stages of growth and seasonal fluctuations.
3. Address existing over-aeration in secondary treatment, biosolids treatment, or effluent
4. Allow for the temporary removal of capacity to operate at part load, at conditions that are closer to design, if that allows for lower energy consumption
5. Reduce head in pump and blower systems
6. Thickening of biosolids to reduce the amount needed to haul, land apply, or dispose.

This list of minimum ECMs may be amended when information is available from actual results achieved from facilities implementing specific measures.

For, additional ECMs and detailed descriptions of the above measures refer to following documents:

- Minnesota B3 SB 2030 WWTP Review ECM list
- www.b3mn.org/2030energystandard/download/WWTP_ECMList.pdf
- MnTAP Energy Efficiency Opportunities for Wastewater Treatment Plants <http://www.mntap.umn.edu/industries/facility/potw/>

- Innovative Energy Conservation Measures at wastewater treatment Facilities
<https://www.epa.gov/sites/production/files/2016-01/documents/p1008sbm.pdf>
- Energy Best Practices Guide: Water & Wastewater Industry, by Wisconsin focus on energy: https://focusonenergy.com/sites/default/files/WW-Best-Practices_web_1.pdf
- Energy Conservation in Water and Wastewater Treatment Facilities, WEF Manual of Practice No. 32: <https://www.e-wef.org/Default.aspx?TabID=251&productId=5308>

Part 3. Flexible Operation

To account for the significant variation in load that a WWTP will encounter during its operational life, WWTP projects should document efficient operation metrics at several flow conditions. Estimate steady-state energy consumption for the plant and key equipment in its planned configuration, to guide optimization decisions. Make estimates for the following anticipated flow conditions:

1. minimum anticipated flow, or flow at facility start-up
2. average dry weather design flow
3. average wet weather design flow
4. peak hourly wet weather design flow
5. and 4 evenly spaced increments between the average dry weather and peak hourly design flow
6. Any additional circumstance believed to represent a large portion of the operational needs of the facility if not captured in the above parameters

Energy consumption and load descriptions should include the following for each of the anticipated flow conditions:

1. Gross consumption and treated volume
2. kWh/MGD treated
3. kWh/lb BOD removed
4. energy use (Btu or Therms) per pound of solids treated or gallons of fuel used per unit biosolids spread.
5. A description of the flow condition and assumed permit levels

Part 4. Renewable Energy Opportunities

Consideration should be given for the implementation of renewable energy opportunities:

1. Utilization of biogas recovered from anaerobic biosolids treatment processes.
2. Recovering heat from biosolids treatment processes or other heat production processes.
3. Installation of a combined heat and power system for biosolids treatment.
4. Solar and wind power generation at the facility

Part 5. Water Conservation Opportunities

Opportunities to reduce the consumption of potable water sources should be considered as part of the facility plan alternatives analysis.

1. The reuse of treated wastewater within the wastewater treatment plan on the site grounds.
2. The reuse of treated wastewater for other locations.