10.0 Energy Efficiency Projects for Wastewater Equipment

The purpose of this section is to provide guidance on how to prepare an engineering report/environmental information document (ER/EID) for a project that improves energy efficiency for wastewater treatment works. Some examples of energy efficiency projects include:

To utilize this section, energy efficiency must be improved by at least 20 percent or greater for annual average energy usage or offer some form of energy generation that replaces traditional power sources by at least 20 percent annually.

- Improvements to a wastewater treatment plant (WWTP) to allow energy generation from biogas generated from anaerobic digesters.
- Improving the efficiency of energy use through modifying operations and maintenance (O&M) practices.

This section only applies to projects similar to the above-listed examples. Some projects may consist of replacing equipment that operates at marginally better efficiencies. If this is the case and the equipment replacement is across the entire WWTP or is part of a collection system expansion, then the guidance in Section 3.0 or Section 4.0 must be followed. If this is the case and the equipment replacement is minor project at the WWTP or part of a rehabilitation/replacement of a collection system improvement, then the guidance in Section 5.0 or Section 6.0 must be followed.

Some projects may qualify for Minor ERs/EIDs. (See Section 1.4.1 for the details of when these are allowed.) For Minor ERs/EIDs, complete the tables provided in Appendix N for the requirements in each section.

For Major ERs/EIDs, the guidance may allow alternative data, methodologies, and the way material is presented; *however, the format must always be followed*. Each subsection will advise if these are allowable.

- Alternative data sets other than those specified in this section *may be* proposed in certain subsections. *In all cases, alternative data sets must be identified, discussed, justified and compared with the corresponding data set specified in the guidance.* An acceptable rationale for the preferred alternative data set to the one specified in the guidance *must be provided* if it is to be approved.
- Alternative methodologies must be specified and discussed, and the findings compared with the findings based on the corresponding methodologies in the guidance. All alternative methodologies must include supporting data, calculations, assumptions and documentation so that results can be replicated.
- If material is presented in alternative manner, the required discussion must be in the body of the ER/EID. Supporting information (e.g., maps, calculations, supporting data, etc.) may be included in an appendix rather than the body of the ER/EID. A tabular display of the data is encouraged where practicable.

As stated in Section 2, the report must follow the prescribed format in the guidance. ERs/EIDs for projects under this section must follow the format below:

Upfront Information
1.0. Executive Summary
2.0. Current Situation
  2.1. Existing Energy System Summary
  2.2. Energy System Operations and Maintenance Plan
  2.3. Energy Usage, Demand, and Distribution
3.0. Future Situation
  3.1. Population Projections
  3.2. Future Energy Demand and Availability
4.0. Purpose and Need
5.0. Alternatives Analysis
  5.1. Alternatives Description
  5.2. Present Worth Analysis
  5.3. Alternatives Analysis Summary
  5.4 Proposed Project Description
6.0. Environmental Information Document
7.0. Financial Analysis
8.0 Public Participation

10.1 Upfront Information

Prepare the upfront information (e.g., Table of Contents, Appendices) in accordance with Section 2.2.1.

10.2 Executive Summary

Prepare the Executive Summary in accordance with Section 2.2.2.

10.3 Current Situation

Defining the current situation will help determine the purpose and need of the project. For energy efficiency projects, the current situation should contain the following information regarding the existing system this project will enhance.

10.3.1 Project Location Map

Requirements

It is important to provide a good reference as to the facility(ies) where the proposed project is located. Following the guidelines in Section 2.1.5, include and reference a detailed and labeled project location map that should be placed either in the body of the ER/EID or in one of the appendices.

10.3.2 Existing Energy System Summary

Requirements

Summarize the system process (collection, WWTP, or other) and all components in detail, especially those striving for increased efficiency or processes that could involve energy generation. Discuss where energy is used, including a breakdown of use percentages per equipment or the resources that could be applied toward energy generation. Provide any additional system flowcharts or outlines or plans to supplement the discussion in an appendix of the ER/EID.

Minor ERs/EIDs

- Complete Table 2.1.1in Appendix N to summarize the system processes and components.
- Include a figure that shows a physical layout of the facility(ies) where the project will occur. Include this figure in the body of the ER/EID or in an appendix. List the reference in the table.
- Provide a conceptual diagram of the facility(ies) where the project will occur. Include this diagram in the body of the ER/EID or in an appendix. List the diagram reference in the table.
- Complete Table 2.1.2 in Appendix N and include in the body of the ER/EID.
- Include any additional system flowcharts, outlines, or plans in an appendix of the ER/EID. List the reference in the table.

Table E.12.1 in Appendix E provides an example of how Table 2.1.2 would be completed.

10.3.3 Energy System Operations and Maintenance Plan

Requirements

Provide a brief discussion regarding the system's efficiency based on execution of the current O&M plan. Provide the O&M manual and/or plan as well as documentation that this plan is being followed. If necessary, this information may be supplied on a CD or DVD.

Include any information about the ease or difficulty in achieving top efficiency or reduced energy usage. Provide appropriate information regarding system costs, time to service, downtime, etc. that would decrease if the system's efficiency were enhanced.

Minor ERs/EIDs

- Complete 2.2.1 in Appendix N and include in the body of the ER/EID.
- Provide the O&M manual or plan as well as documentation that the O&M plan is being followed in an appendix of the ER/EID. List the appendix Reference in the table.

10.3.4 Energy Usage, Demand, and Distribution

Requirements

This section will help to better determine the need for the project. Detail, with justification, the peak time energy demands for the system.

Include an energy distribution assessment by estimating in percentages the amount of energy each process currently uses. Provide this information in both narrative and tabular form. Additionally, provide labeled and detailed graphs along with the description.

Minor ERs/EID

- Complete Tables 2.3.1 and 2.3.2 in Appendix N and include in the body of the ER/EID.
- Provide any supporting information in an appendix of the ER/EID.

Table E.12.2 in Appendix E provides an example of how Table 2.3.2 would be completed.

10.4 Future Situation

In addition to characterizing the current situation, the future situation must be described since what happens in the future may contribute to the need for the project. This section discusses how to determine the future population as well as the future energy demand and availability.

10.4.1 Population Projections

Requirements

In certain situations, the future population for the project area may be required. Future situation data for population should be provided in circumstances where expenses for the project will be altered across the entire customer base of the LGU. If this is the case, refer to the Wastewater Treatment Workbook and Section 3.4 for the methodology to use to determine future population and flow.

Minor ERs/EIDs

- All tables required in the Wastewater Treatment Workbook found in the Toolbox must be placed in the body of the ER/EID.
- Include all supporting information required by Section 3.4 must be included in an appendix of the ER/EID.

10.4.2 Future Energy Demand and Availability

Requirements

If there are any pending expansion plans, provide specific information on the proposed expansion and include an estimated timetable that incorporates a completion time. Discuss how the proposed energy efficiency project will be integrated into the expanded treatment works. Include a figure that shows where the energy improvements will occur as well as a timeline showing when the improvements will occur. Provide other additional information in tabular or graphical form that may be helpful to describe the future energy demands.

Minor ERs/EIDs

- Complete Table 3.2.1 in Appendix N and provide this table in the body of the ER/EID.
- Include the figure discussed above, and provide other additional information in an appendix of the ER/EID.

10.5 Purpose and Need

Complete the Purpose and Need statement in accordance with Section 2.2.3.

10.6 Alternatives Analysis

10.6.1 Alternatives Description

The first part of the alternatives analysis summarized in Section 2.2.5 consists of describing the alternatives considered for the project. Describing the alternative provides the opportunity to consider the impacts and benefits related to each alternative under consideration and provides the groundwork related to the present worth analysis (see Section 2.2.4). For energy efficiency projects, the following must be considered:

- No-Action Alternative
- Optimum Operation of Existing Facilities
- Project Alternatives
- Preferred Alternative

Requirements

The details of what is needed for the description of the alternatives will be discussed in Sections 10.6.1.1 through 10.6.1.4 below.

Minor ERs/EIDs

- Each of the alternatives discussed in the sections below must be included by using Tables 5.1.1 through 5.1.7 in Appendix N, as needed, for each alternative.
- Each alternative description must include the following:
    - A description of each alternative as described in the sections below. Where appropriate, include figures and maps.
    - For feasible alternatives, include preliminary design information for the proposed project, including preliminary design criteria for the proposed unit(s), operations and maintenance, etc.
    - For feasible alternatives, the capital cost and present worth as derived from the present worth analysis.
    - For all alternatives, a discussion regarding why the alternative was accepted or rejected, including capital cost, present worth, and environmental impacts.
- Place the tables for each alternative in the body of the ER/EID with all supporting information in an appendix.

Major ERs/EIDs

For Major ERs/EIDs, include the information as discussed above in the requirements for Minor ERs/EIDs. However, the information may be presented in narrative form, or in some combination of narrative with tables. Supporting documentation must be included in an appendix to the ER/EID.

10.6.1.1 No-Action Alternative

Describe what would happen if the proposed energy efficiency project were not constructed. Describe present and future environmental (e.g., carbon footprint) and economic (e.g., increase power costs if the project is not implemented) impacts. Address potential future energy demands and availability. Provide an estimation of the projected energy use without the project in kilowatts per month.

10.6.1.2 Optimum Operation of Existing Facilities

In this alternative, discuss what could be done to increase the energy efficiency of the WWTP and/or collection system without making any improvements beyond the typical O&M for the wastewater infrastructure.

10.6.1.3 Project Alternatives

Provide an analysis and describe any alternative that would increase the energy efficiency. Discuss each alternative's feasibility, environmental impact, cost, estimated completion time and maintenance. Provide information on possible installation time and if any equipment would be down for a certain time period. Provide information on how each alternative would handle this situation, if applicable. Each alternative generated must be a separate alternative in the alternative description, present worth analysis, and alternatives.

For each alternative considered, provide a new monthly energy usage (kw/month) and project the monthly energy savings in kilowatts per month.

For each alternative, provide an updated energy distribution discussion (in a percentage format) and compare it with the other alternatives as well as the current energy distribution. Provide the distribution percentages in tabular format for better comparison.

10.6.1.4 Preferred Alternative

The project selected as the preferred alternative may be a combination of the above alternatives. Describe the preferred alternative by summarizing and referring back to any other alternative descriptions as necessary. Provide the rationale as to why this alternative is the preferred alternative.

10.6.2 Present Worth Analysis

Complete the present worth analysis in accordance with Section 2.2.4.

10.6.3 Alternatives Analysis Summary

Complete the alternatives analysis in accordance with Section 2.2.5.

10.6.4 Proposed Project Description

Prepare the proposed project description in accordance with Section 2.2.6.

10.7 Environmental Information Document

Complete the environmental information document in accordance with Section 12.

10.8 Financial Analysis

Complete the financial analysis in accordance with Section 2.2.7 if the cost is spread across the population or Section 2.2.8 if it is not spread across the population.

10.9 Public Participation

Complete the public participation section in accordance with Section 2.2.9.