APPENDIX III

Supplemental Information for Implementing Section 602(b)(13)

Under Section 602(b)(13) of the Federal Water Pollution Control Act, as amended, any municipality or intermunicipal, interstate, or State agency that is a recipient of Clean Water State Revolving Fund (CWSRF) assistance must certify that it has studied and evaluated the cost and effectiveness of the proposed project or activity and that it has selected, to the maximum extent practicable, a project or activity that maximizes the potential for water and energy conservation, as appropriate. As stated in *Interpretive Guidance for Certain Amendments in the Water Resources Reform and Development Act to Title VI of the Federal Water Pollution Control Act*, each CWSRF must ensure that applicants complete a cost and effectiveness analysis that meets the minimum statutory requirements. It is further recommended that each CWSRF program develop specific criteria and/or guidance for an analysis that meets these minimum requirements. This appendix contains examples, resources, and background information on some possible approaches to this type of analysis. Nothing contained herein constitutes a requirement.

Introduction

Analyzing the cost and effectiveness of a proposed project or activity will usually involve comparing a set of alternative that achieve a given water quality objective or address a given need based on a common set of monetary and nonmonetary factors. Monetary factors are often evaluated using a present worth analysis. Nonmonetary factors are influenced by National, Regional, State, and/or local considerations and priorities and may include climate-related considerations, stormwater management priorities, specific contaminants of concern, socioeconomic factors, and others.

Present Worth Analysis

Present worth analysis offers a standard method for calculating and comparing the costs of alternative approaches, including capital, operations and maintenance (O&M) costs, and the salvage value of the system/asset at the end of the projected useful life. Other costs may also be relevant, such as mitigation costs and cost savings associated with energy and water efficiency. Definitions and examples are provided in the following sections.

Oregon's Guidelines for facilities planning[1] provides a list of the elements found in a comprehensive life cycle cost present worth analysis (adapted):

1. The analysis converts all costs to present day dollars;
2. The planning period is normally 20 years, but may be any period determined reasonable by the engineer and concurred on by the State or federal agency, particularly if the useful life of the project or the loan terms vary;
3. The discount rate is from an accepted authority;
4. The total capital cost includes both construction plus non-construction costs;

[1] http://www.deq.state.or.us/wq/loans/docs/FacilitiesPlansGuidelines.pdf

5. Annual O&M costs are converted to present day dollars using a uniform series present worth (USPW) calculation;
6. The salvage value of the constructed project is estimated using the anticipated life expectancy of the constructed items using straight line depreciation calculated at the end of the planning period and converted to present day dollars;
7. The present worth of the salvage value is subtracted from the present worth costs;
8. The net present value (NPV) is calculated for each technically feasible alternative as the sum of the capital cost (C) plus the present worth of the uniform series of annual O&M (USPW (O&M)) costs minus the single payment present worth of the salvage value (SPPW(S)):

$$NPV = C + USPW\ (O\&M) - SPPW\ (S)$$

9. A table of the capital cost, annual O&M cost, salvage value, present worth of each of these values, and the NPV is developed for each alternative;
10. Short lived asset costs should also be included in the life cycle cost analysis if determined appropriate by the consulting engineer or State. Life cycles of short-lived assets can be tailored to the facilities being constructed and be based on generally accepted design life. Different features in the system may have different life cycles.

Pennsylvania's *Handbook for PENNVEST Wastewater Projects*[2] contains example present worth analyses for wastewater treatment plant, decentralized system, and land application projects.

<u>Nonmonetary Factors</u>

Nonmonetary factors are used to analyze each alternative's minimization of negative and/or maximization of positive technical, environmental, and socioeconomic outcomes. Such an analysis can also incorporate National, Regional, State, and local objectives. Examples of some nonmonetary factors are listed below.[3] Not all of these will apply to every State, project type, or community; this list is intended to provide ideas only.

<u>National, Regional, State, or Local Priorities</u>

- Current National priorities defined by the U.S. EPA, such as sustainability
- Region-specific considerations, including:
  - Climate resilience
  - Water quality objectives/initiatives
- Other State-specific or local priorities
  - Consolidation/regionalization
  - Contaminants of concern

<u>Technical Factors</u>

- Project location and physical aspects
- Project reliability

[2] http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-47480/381-5511-113.pdf

[3] Some nonmonetary factors, such as energy savings through conservation, also have a monetary component.

- Project feasibility and operability
  - Presence of qualified personnel to operate and maintain infrastructure
  - Flexibility and adaptability to future conditions and demographics
  - Project's compatibility with current infrastructure

<u>Environmental Factors</u>

- Opportunities for water conservation, reuse, and/or recapture
- Opportunities for energy conservation, including alternative energy sources
- Opportunities to recover and recycle other resources (e.g., nutrients)
- Use of green infrastructure
- Other environmental impacts, including:
  - Land use impacts
  - Impacts to wildlife and/or habitat
  - Impacts to wetlands or other critical water bodies
  - Impacts on air/water quality

<u>Socioeconomic Factors</u>

- Specific industries using or served by the infrastructure or project type
- Local trends and/or demographics affecting need or demand
- Environmental justice considerations
- Project acceptability to community

<u>Integrating Cost and Effectiveness</u>

Once communities have considered the appropriate monetary and nonmonetary factors associated with each project alternative, a project can be selected. There is no requirement that communities select the least-cost alternative; therefore, communities can equally weight cost and effectiveness in selecting the best alternative. Such an analysis can be done qualitatively or quantitatively. Some ideas for each approach are provided below.

<u>Qualitative Assessment</u>

While an analysis of monetary factors will always be quantitative, it will not always be possible or desirable to quantify nonmonetary factors. Therefore, an integrative analysis of monetary and nonmonetary factors is necessary. A qualitative assessment might involve a cost summary of the alternatives plus a description of the nonmonetary factors, including significance and impact on project selection.

<u>Quantitative Assessment</u>

Nonmonetary factors can be evaluated using a numerical scoring system that assigns a maximum point value to each nonmonetary factor and then scoring each alternative accordingly. Cost could be evaluated within the same scoring system or separately. An overall score is calculated for each alternative and compared to the other alternatives.

Because of the water and energy conservation provision in section 602(b)(13)(B), these factors should be emphasized in both the monetary and nonmonetary analysis, as applicable (*see Appendix I for energy and water conservation resources*).