

Green Project Business Case Example

Project Name: Wastewater Collection / Treatment Project
Project Owner: City of XXXXX, Idaho

The American Reinvestment and Recovery Act (ARRA) requires certain State Revolving Fund (SRF) Programs to target a portion of their funding toward “Green Reserve” projects. Following is a narrative or “business case” to describe the green benefits of the above project:

Technical Aspects

The City’s funding application is broken into three packages:

- Collection System Improvements
- Pump Station & Force Main Upgrades
- Wastewater Treatment System Upgrades

Each improvement schedule contains infrastructure components that will increase energy efficiency and incorporate solutions that will result in environmental benefits and system sustainability. The primary sources of expected energy efficiencies are:

- Reduction of I&I into the sewage collection system,
- Replacement of the existing pumps and motors with new high efficiency models,
- New force main installation, and
- Land application of treated wastewater (reclaimed water)

These are described in more detail below:

- Proposed collection system pipe replacements are expected to reduce system Inflow & Infiltration (I&I). Total sewage to the existing lift station is currently 29.2 million gallons (MG) per year. I&I reduction is expected to reduce total flows by 30%, to 20.4 MG per year, saving energy (less pumping) and improving system energy efficiency.
- Pump and motor upgrades at the City’s sewage lift station will increase energy efficiency by approximately 8%. This is based on typical industry improvements in motor and pump efficiency since the existing pumps were installed in the late 1980’s. Motor efficiencies have increased by approximately 5% since the 1980’s. Pump efficiencies have increased by approximately 3%.
- Installation of a new force main will increase energy efficiency by decreasing the friction losses in the pipe. As a result, the lift station pumps will consume less energy to move the fluid. Typical smoothness degradation of this pipe material over time is between 15% and 25% based on hydraulic pipe flow coefficients.
- Treatment system improvements would include construction of a system to facilitate land application of effluent from the City’s sewage lagoons. This environmentally-innovative solution would use treated wastewater effluent to irrigate cash crops such as hybrid poplars, Christmas trees, or alfalfa. This would allow the City to maintain zero discharge to the Payette River during summer months, and reduce discharge during spring and fall. The plantation would provide carbon sequestration by removing carbon dioxide (CO₂) gases in the atmosphere. CO₂ is the largest contributor to anthropogenic climate change. The following table summarizes carbon sequestration benefits if hybrid poplars are used:

Table 1 - Hybrid Poplar Tree Plantation Carbon Sequestration				
Plantation Area (acres)	CO₂ Seq. (tons/ac*yr)¹	CO₂ Seq. (tons/yr)	Annual City of XXX CO₂ Emissions (tons/yr)²	CO₂ Emissions Offset (%/yr)
20	17.6	352	7885	4.5

1- Source: Washington State University Hybrid Poplar Research Program.

2- Source: United States Environmental Protection Agency. The U.S. average CO₂ emissions per person is 20,750 lbs/yr. The City of XXX has a population of 760 (2007).

Financial Aspects

Potential cost savings can only be approximated at this time. More exact figures can be calculated as the engineering design advances for each component of the system. At this time (funding application) the following components of the system are anticipated as “green benefits”:

- New Submersible Sewage Handling Pumps, Lift Station \$ 50,000
 - New Pump Station & Control System, Land Application System 150,000
 - Effluent Piping, Land Application System 54,000
 - Spray Irrigation Piping, Land Application System 5,000
- \$260,000

Other

This project will also provide other less quantifiable environmental benefits. I&I is not only a concern for the efficiency of the sewage collection, pumping, and treatment system, but is also a potential threat to surface water and groundwater. A sewage collection system that leaks allows raw untreated sewage to enter the groundwater and potentially surface waters down gradient. Groundwater is the source for the City of XXXX’s potable water system. Protection of this source is crucial for the safety of the water system users.

Additionally, the reduction in overall sewage flow to the lagoons will decrease the amount of treatment chemicals needed annually. This will reduce operation and maintenance costs and the potential for chemical spills. By eliminating effluent discharge to the Palouse River, water quality downstream of the outfall would improve, resulting in many positive effects for both aquatic life and human users. Ultimately, the proposed improvements will allow the City of XXX to meet Idaho DEQ/EPA discharge requirements and avoid the violations that currently plague their system.

Written By: (Author’s Name), XXXX Engineering, 4/1/2009, on behalf of the City of XXXXX