City of Victor FY12 Water System Project
SRF Loan #DW 1208
$2,000,000

Final Green Project Reserve Justification

Business Case GPR Documentation

1. INSTALLS 7,400 FEET OF NEW DIP WATER DISTRIBUTION SYSTEM PIPING (Water Efficiency). Business Case GPR per the criteria requirements 2.4-1…*reducing water consumption*; per 2.4-3: *Efficient water use…reducing the amount of energy required by a drinking water system…therefore, there are also energy and financial savings*; also per 2.4-4: *Proper water infrastructure management should address where water losses could be occurring in the system and fix or avert them;* also per 2.5-2: *Distribution pipe replacement …to reduce water loss and prevent water main breaks*; also (Energy Efficiency) Business Case GPR per 3.5-1: *Energy efficient…upgrades;* and, per 3.5-5: *Projects that achieve the remaining increments of energy efficiency.* ($1,034,889).

2. INSTALLS UPGRADED PREMIUM ENERGY EFFICIENT PUMPING SYSTEM IN THE NORTH WELL (Energy Efficiency). Categorically GPR-eligible per 3.2-3: *NEMA premium efficiency motors*; also a Business Case GPR per 3.5-1: *…new pumping systems (includes variable frequency drives.* ($97,500).

1. Distribution System Upgrade

Summary

- The shallow and undersized water distribution system piping under the Main Street of the City of Victor requires replacement in order to: (i) prevent freezing in winter, (ii) reduce pumping costs, and (iii) provide adequate drinking water flow.
- Estimated loan amount = $2,000,000
- Estimated energy efficient (green) portion of loan = $1,034,889 (52%)

Background[1]

- The existing distribution pipelines on Main Street are not buried deep enough to prevent freezing in the winter. During the winter, businesses along Main Street must run water to prevent the pipes from freezing.
- Current peak daily water demand = 52 gpm.
- There are currently 7400 LF of undersized 6" diameter DIP distribution pipe on Main Street. The project will replace that pipe with 7400 LF of 10" diameter DIP distribution pipe.

Results

- Replacing these lines with properly sized lines at appropriate depths will result in: (i) saving water as there will not be a need to run water continuously in the winter to prevent freezing; and (ii) saving energy through reduced pumping costs for less water in the winter, along with less energy to pump through properly sized lines (reduced friction factor).
- Excess winter usage– which is directly attributable to preventing freezing in the lines - accounts for approximately 18% of the system pumping requirements.

Conclusion

- The replacement of undersized water distribution pipe with properly sized pipe decreases system friction, increases water flow, and saves energy by reducing the amount of pumping required.
- **GPR Costs**: Distribution System Piping Upgrades = $1,034,888.93
- **GPR Justification**: The prioritized replacement of undersized water distribution piping as recommended in the Facility Planning Study is GPR-eligible by a Business Case (Water Efficiency) GPR per the criteria requirements 2.4-1…*reducing water consumption*; 2.4-3: *Efficient water use…reducing the amount of energy required by a drinking water system…therefore, there are also energy and financial savings*; also (Energy Efficiency) Business Case GPR per 3.5-1: *Energy efficient…upgrades;* and, per 3.5-5: *Projects that achieve the remaining increments of energy efficiency.* ($1,034,889).

[1] City of Victor April 2011 Facilty Plan Amendment 2

2. New Premium Energy Efficient Pump & VFD

Summary

- In order to meet requirements for source redundancy the City of Victor is constructing the North Well project which will have a premium pump equipped with a variable frequency drive (VFD).
- Loan amount = $2,000,000
- Energy savings (green) portion of loan = 4.8% ($97,500)
- Simple pay-back period = 5 years

Background

- As a result of growth over the past 10 years, water consumption has risen in the City of Victor. According to IDAPA the City does not presently meet the source redundancy requirement.
- A new pump system project has been specified for the City which exceeds IDAPA requirements. To achieve optimal energy efficiency, the system design specifies a premium efficiency pump with a VFD controller.
- The VFD contributes to energy efficiency as it allows the pump to operate at a reduced horse power or drive frequency, requiring less energy than a standard drive which operates at a set frequency independent of flow requirements.

Results

- The pump specified for the project is a 300 Hp vertical hollow shaft premium efficient, RUSI type turbine pump, 3ph/60cy/460v/1800rpm 2100 GPM @ 432' TDH.
- It is assumed the pump will operate continuously (8760 hr/yr) on an approximate normal distribution duty cycle.
- The pump will be equipped with a VFD. The VFD will save energy by assisting in maintaining constant system pressure; it will also reduce electrical consumption at times of pump start-up. The VFD specified is ABB Model ACH550-UH-414A-4, 3ph/60ch/460v, NEMA 1 enclosure.

GPR Justification

Motor Analysis

- The difference in motor efficiency from a regular drive to a premium motor is 94.5% to 95.8%
- Premium motor energy savings over the EPAct motor = $3,298/yr[1]; payback period = 5 years.

VFD Analysis:

- VFD cost = $30,000; estimate pump operation = 8760 hr/yr (normal distribution duty cycle), motor efficiency = 95.8%, and energy costs = $0.09/kWh;
- Annual cost savings of the VFD over standard drive = $60,000[2] with a payback period of 0.5 years[2]

Conclusion

- By installing an energy efficient pump/VFD on a new well the City can save up to $64,000/yr. in energy costs
- Payback periods: Pump = 5 years; VFD = 0.5 years.
- **GPR Costs**: VFD = $30,000
  Pump = $67,500
  Total = $97,500
- **GPR Justification**: The project is Categorically GPR-eligible per Section 3.2-3 (Energy Efficiency) *NEMA premium efficiency motors*; also per a Business Case by Section 3.5-1: …*new pumping*

[1] WEG Electric Corp. Motor Energy Savings Estimator at http://www.weg.net/green/us/save-money.html, energy cost @ $0.09/kWh
[2] WEG Electric Corp. VFD Energy Savings Estimator at http://www.weg.net/green/us/save-money.html

systems (includes variable frequency drives)[1].

[1] 2010 EPA Guidelines for Determining Project GPR-Eligibility. Attachment 2.