

Drinking Water State Revolving Fund Green Project Reserve

- Final -



Sugar City Drinking Water Project
SRF Loan #DW 1806 (pop. 1,367)
\$3,700,000

Final Green Project Reserve Justification

Categorical & Business Case GPR Documentation

INSTALLS PREMIUM ENERGY EFFICIENT MOTORS/VFD CONTROLLERS FOR BOOSTER PUMPS AND NEW WELL (Energy Efficiency). Business Case GPR per 3.5-1: *Energy efficient ...new pumping systems...including VFDs (\$55,669).*

ENERGY-EFFICIENT PUMPS/ VFDs

Summary

- The City purchased and installed premium energy-efficient booster pumps with a variable frequency drives (VFD).
- Loan amount = \$3,700,000
- Estimated energy efficiency (green) portion of loan = 1.5% (\$55,669) (Final)

Background

- The City required an additional well to meet City water demands. This will require a new 1,500 gpm vertical turbine well pump.
- The City required an additional storage tank to provide the storage capacity required for current demand. A series of three (3) new booster pumps will be provided with the new storage tank.
- Provision of VFDs on the pumps provides a much tighter range for pressure fluctuation. The VFDs save energy by assisting in maintaining constant system pressure and reducing electrical consumption at times of pump start-up.

GPR Justification¹

The Baseline Standard Practice for comparison is a standard motor that is not controlled by a VFD². Published operating curves by the pump manufacturer provided VFD efficiency data:

- **Premium Efficiency Motors**
 - The vertical turbine pump has a premium efficiency 150 hp motor (95.0% efficient) at an additional cost of \$3,658. A standard efficiency 150 hp motor has an efficiency of approximately 92% at 75% full load. If the pump runs for 1,730 hours per year at 3% higher efficiency, an energy savings of approximately 5,813 KWH per year will be realized. At \$0.08/KWH, the City will see a total cost savings of \$465 per year. At \$465 per year of energy savings using a premium efficiency motor, the payback period for the cost differential between a standard and premium efficiency motor (\$3,658) is 7.9 years, which is less than the 20-year useful life of the pump/motor.



- The booster pumps are horizontal centrifugal pumps with premium efficiency (95.0% efficient) motors. The 60 hp and 150 hp premium efficiency motors cost approximately \$13,756 total. A standard efficiency motor has an efficiency of approximately 92% at 75% full load. If the pumps run for 1081 hours per year at 3% higher efficiency, an energy savings of approximately 5,804 KWH per year will be realized. At \$0.08/KWH, the City will see a total cost savings of \$465 per year. At \$465 per year of energy savings using a premium efficiency motor, the payback period for the cost differential between a standard and premium efficiency motor (\$3,580) is 7.7 years, which is less than the 20-year useful life of the pump/motor.

¹ 1-22-2020 email Forsgren - IDEQ

² NYS Energy Research and Development Authority, Energy Evaluation Memorandum, Village of Greenport WWTP Upgrade 8-2009.

- **Variable Frequency Drive (VFD)**

- The combined annual energy savings for utilizing a VFD with a premium motor is estimated to be 26,158 KWH per year @ \$0.08/KWH = cost savings of \$2,090 per year. This equates to an energy reduction of 36%. This assumes that the average pumping rate with a VFD will be reduced from the peak rate of 900 gpm for the pump to an average of 441 gpm.

Conclusion

- The premium efficiency motor and VFDs for the well house are GPR-eligible since the motor payback period (7.9 years for the well pump and 7.7 years for the booster pumps) is less than the useful life of the pumps/motors (20 years) and the combined premium efficiency motor and VFD achieve greater than 20% reduction in energy consumption.
- **GRP Costs Identified:** New premium energy efficient pump/motors and VFDs = \$55,669.
- **GPR Justification:** Categorical and Business Case per GPR 3.2-2 & 3.4.1: *projects that achieve a 20% reduction in energy consumption; if there is less than a 20% reduction in energy efficiency, then it may be justified using a business case; energy savings and payback ... [must] not exceed the useful life of the asset; also, per 3.5-9: VFDs can be justified based upon substantial energy savings.*