La Porte Water System Improvements
SRF Project No. DW 10144501
Green Project Reserve Business Case

La Porte Water System Improvements

Summary

- This project includes three business cases including energy efficient materials, high efficiency motors and variable frequency drives.
- Loan Amount: $3,500,000
- Principal Forgiveness: $2,325,000
- Total Loan and Principal Forgiveness: $5,825,000
- GPR Portion of the loan is $137,826: $121,811 for construction based on bid pricing and $16,014.60 for planning and design engineering.
- The entire GPR amount falls within the Energy Efficiency GPR category.

La Porte Water System Cases

Drinking Water SRF Project #10144501
Green Project Reserve Business Case #1
Preliminary Engineering Report
Water Supply, Treatment, Storage and
Distribution System Improvements
LaPorte, Indiana Water Department

Treatment Plant Filter Room Energy Efficiency

Summary

- Addition of 1380 square feet of low maintenance, plastic paneling and wall insulation on interior of exterior walls of Filter Room at the Lake Street Treatment Plant. Low maintenance wall surface will eliminate the need to repaint the walls. Walls are currently constructed of 3 courses of brick with no insulation.
- Addition of 3560 square feet of low maintenance, plastic ceiling paneling on interior of ceiling. Low maintenance ceiling surface will eliminate the need to repaint the walls. Roof is currently constructed of precast concrete panels.
- Replacement of two, 195,000 Btu gas fired unit heaters with more efficient gas fired radiant heaters.
- Construction Cost = $82,466.00
- Planning and Design Cost = $3,520.20
- Annual Energy Savings = 2903 Therms
- Annual Energy Cost Savings = $1,574

Background

- The Filter Room at the Lake Street Treatment Plant houses six anthracite media gravity filters, with three filters on each side of the central operating corridor. Four filters were constructed in 1928 and 2 additional filters were added in 1950.
- Filter Room walls are of triple brick construction and ceiling is precast concrete panel type with membrane roofing.

- Filter Room windows were replaced with thermopane windows in 1998.
- The room has high moisture atmosphere related to the large filter water surface area. Painted interior wall and ceiling surfaces have routine paint failures. Components of the gas fired unit heaters periodically malfunction due to high moisture content.

Results

- Addition of plastic paneling on walls with insulation, plastic paneling on the ceiling and more efficient gas fired radiant heaters will reduce energy consumption in the Filter Room by 2903 Therms annually.

Other Benefits

- Maintenance for repainting of interior Filter Room brick wall surfaces and precast concrete ceilings will be eliminated and is the basis for adding the plastic paneling. Accordingly, the construction cost determined in this comparison only considers the cost of installing the wall insulation.
- Maintenance for gas fired unit heaters will be reduced and is the basis for replacing the unit heaters. Accordingly, the cost of the new unit heaters is not included in the construction cost of making these energy efficient revisions.

Conclusion

- By replacing plastic paneling on walls with insulation, plastic paneling on the ceiling and utilizing more efficient gas fired radiant heaters unit heaters, energy consumption in the Filter Room will be reduced by 59.1%, or 2903 Therms annually.
- At 0.539 cents per Therm, energy reductions from the new radiant heaters and insulation will save $1,574 per year.

Drinking Water SRF Project #10144501
Green Project Reserve Business Case #2
Preliminary Engineering Report
Water Supply, Treatment, Storage and
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LaPorte, Indiana Water Department

East Treatment Plant Well Pump High Efficiency Motors and Variable Frequency Drives

Summary

- The proposed three new wells at the East Treatment Plant will be provided with premium efficiency motors.
- Variable frequency drive equipment will be provided to allow the well pump motor speed to be varied for each of the three new well pumps.
- Construction Cost = $32,811.00
- Planning and Design Cost = $6,757.20
- Annual Energy Savings = 4958 kw-hr for Premium Efficiency Motors and 119,621 kw-hr for variable frequency drives = 124,579 kw-hr total savings
- Annual Energy Cost Savings = $407 for Premium Efficiency Motors and $9,809 for variable frequency drives = $10,215 total savings

Background

- The three new well pumps will pump groundwater to a fixed elevation at the Forced Draft Aerators. However, the pumping level in the well varies with the flow rate of water pumped. As higher flow rates are pumped from the well, the pumping level is lowered and the friction losses of water through pipe and fittings increases. The difference between the normal water level in the well when no pumping is taking place and the pumping level during well operation is known as "draw down".
- The presence of the variable speed drives means that the speed of the pump motor can be reduced so that lower pumped flows are produced with lower draw down and less energy utilization to make up static pumping head and friction losses. Without the VFD's, pump motors are only run at full speed, the draw down is greater which increases static pumping head, friction losses and energy utilization.
- As an example, rather than turning on one well pump at a rated capacity of 700 gpm, two wells can be operated at 350 gpm each, with less draw down, less static pumping head and lower friction losses, and less energy utilization.

Results

- The use of premium efficiency motors will reduce energy consumption for the three new well pumps by 4,958 kw-hr annually.
- The addition of variable frequency drives will reduce energy consumption for the three new well pumps by 119,621 kw-hr annually.

Other Benefits

- The fine sand formations for aquifers utilized for water supply in LaPorte, IN typically include small amounts of silt. At higher pumped flow rates, the fine silt particles migrate to the well casing where they accumulate and reduce the capacity of the well. The ability to pump at lower flow rates will reduce the entrance velocity of water entering the well and the ability of fine particles to migrate, increasing the time between well cleanings, and reducing maintenance cost.

Conclusion

- By adding premium efficiency motors and variable frequency drives for each of the three new wells, energy consumption for the proposed well field will be reduced by 56.4%, or 124,579 kw-hr annually.
- At 8.2 cents per kW/hr, energy reductions from the premium efficiency motors and variable frequency drives will save $10,215 per year.

Drinking Water SRF Project #10144501
Green Project Reserve Business Case #3
Preliminary Engineering Report
Water Supply, Treatment, Storage and
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LaPorte, Indiana Water Department

Camp Summit Booster Station High Efficiency Motors and Variable Frequency Drives

Summary

- The proposed three new booster pumps will be provided with premium efficiency motors.

- Variable frequency drive equipment will be provided to allow the booster pump motor speed to be varied for each of the three new booster pumps.
- Construction Cost = $6,532.00
- Planning and Design Cost = $5,737.20
- Annual Energy Savings = 4,256 kw-hr (Current Water Use) and 14,980 kw-hr (Future Water Use)
- Annual Energy Cost Savings = $350 (Current Water Use) and $1,228 (Future Water Use)

Background

- Three, 400 gpm booster pumps will be included in the proposed Booster Station which is required to boost water pressure at the end of the existing City of LaPorte water distribution system in order to deliver flows approximately 2 miles away to the State of Indiana's Department of Corrections Facility located at Camp Summit. Water is pumped to a 50,000 gallon elevated tank located on the Camp Summit property.
- One of the 400 gpm pumps is a standby pump, leaving 800 gpm of firm pump station capacity to deliver fire flows on the maximum day water use period.
- Although the booster station pumps will normally pump to a relatively fixed elevation in the Elevated Tank, pressure on the suction side of the pumps decreases as flow through the pump station increases. The presence of the variable speed drives means that the speed of the pump motor can be reduced so that lower pumped flows are produced, resulting in higher available suction pressures and less energy being required to deliver flow to the elevated tank.

Results

- The addition of variable frequency drives will reduce energy consumption for the the new booster pump station by 4,256 kw-hr/year (Current Water Use) and 14,980 kw-hr/year (Future Water Use).
- For this type of horizontal 30 Horsepower pump motor, only premium efficiency motors are available. No credit is taken for providing premium efficiency motors.
- This is a project whose cost effectiveness gets better as development in the service area takes place and water use increases. In the near term view, the project is not cost effective, saving $350/year and having a construction cost of $24,000, resulting in a payback period that far exceeds the life expectancy of the variable frequency drive equipment. In the future condition, a savings of $1,228/year results in a payback period of 19.5 years which is within the life expectancy of the Variable Frequency Drive equipment.

Other Benefits

- Use of the variable speed pumps will make higher suction pressures available more frequently to the distribution system customers on the suction side of the proposed booster station.
- The variable frequency drives will allow slow ramping up and ramping down of pump speed to minimize hydraulic surge conditions that could damage pipelines.

Conclusion

- By adding variable frequency drives, energy consumption for the proposed Camp Summit Booster Station will be reduced by 30.1%, amounting to 4,256 kw-hr/year (Current Water Use) and 14,980 kw-hr/year (Future Water Use).
- At 8.2 cents per kW-hr, energy reductions from the addition of variable frequency drives will save $350/yr (Current Water Use) and $1,228/yr (Future Water Use).