Drinking Water State Revolving Fund Green Project Reserve
- Final -

Comore Loma Water Corp. Drinking Water Project

SRF Loan #DW 1407 (pop. 1,023)

$3,050,000

Final Green Project Reserve Justification

Business Case GPR Documentation

1. INSTALLS PREMIUM ENERGY EFFICIENT PUMPS WITH VFDS (Energy Efficiency). Business Case GPR per 3.5-1: *Energy efficient …new pumping systems… including variable frequency drives* ($207,200).
2. INSTALLS A SCADA SYSTEM (Energy Efficiency) Business Case GPR per 3.5-1: *energy efficient retrofits…;* also, per 3.5-7: *automated and remote control systems (SCADA) that achieve substantial energy savings* ($135,695).
3. INSTALLS ADVANCED FLUORESCENT LIGHTING (Energy Efficiency). Business Case GPR per 3.5-6: *Upgrade of lighting to energy efficient sources such as metal halide pulse start technologies, compact fluorescent, light emitting diode, etc.* ($3,318.26).

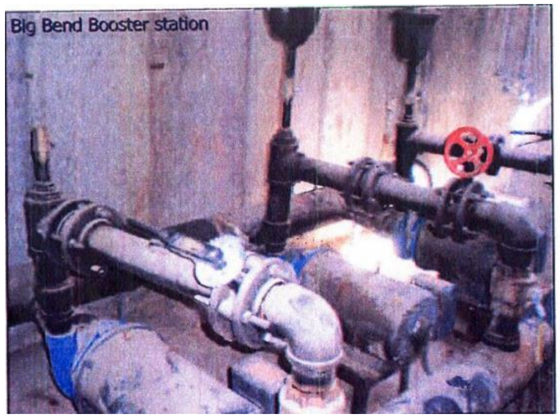
State of Idaho SRF Loan Program
July 2016

1. NEW PREMIUM ENERGY EFFICIENT PUMPS & VFDS

Summary

- A total of 7 new pumps will be installed and equipped with variable frequency drives (VFDs).
- Loan amount = $3,050,000
- Energy savings (green) portion of loan = 7% ($207,200)
- Simple pay-back period = 1.4 years (VFD) and 8.7 years (motor)

Background



- The Comore Loma water system is located southeast of Ammon in Bonneville County in the foothills bordering and east of the Snake River plain.
- The entire water system currently encompasses approximately four square miles. This rural home subdivision consists of over three hundred large homes on lots of one acre or two acres with a few over five acres.
- The system consists of four pressure zones. All wells are located in Zone 1. There are two booster pump stations that pump water from Zone 1 to Zone 2. Zone 1 and Zone 2 each have a storage tank which sets pressure for the zone during static or near static conditions.
- The system is short on redundancy, overall well capacity, storage capacity and emergency power supply.
- A few lots currently cannot be served drinking water due to the lack of pumping stations and storage.

Calculated Cost Effectiveness of Improvements[1]

***Motor Analysis*[2]:** Big Bend Booster Pump Station

- The new motors are premium energy-efficient 100-HP models; the motor efficiency will be at least 95.4%[3].
- A similar EPAct motor would have a motor efficiency of approximately 94.5%[4].
- Energy savings of the Premium Energy-Efficient motor over the EPAct motor = 3,158 kWh/yr. = $315.80/yr[3].
- EPAct motor cost = $7,300; Premium motor cost = $8,700. Simple pay-back period for the cost difference of the Premium motor over the EPAct motor = **4.4 years**[3].

Motor Analysis: Tank No.1 Booster Pump Station

- The new motors are premium energy-efficient 75-HP models; the motor efficiency will be at least 95.4%[4].
- A similar EPAct motor would have a motor efficiency of approximately 94.1%[5].
- Energy savings of the Premium Energy-Efficient motor over the EPAct motor = 3,803 kWh/yr. = $380.30/yr[3].
- EPAct motor cost = $5,800; Premium motor cost = $6,900. Simple pay-back period for the cost difference of the Premium motor over the EPAct motor = **2.9 years**[3].

Motor Analysis: Well No.7 Pump

- The new motor is a premium energy-efficient 400-HP model; the motor efficiency will be at least 96.2%[4].
- A similar EPAct motor would have a motor efficiency of approximately 95.4%[5].
- Energy savings of the Premium Energy-Efficient motor over the EPAct motor = 9,161 kWh/yr. = $916.10/yr[3].
- EPAct motor cost = $22,500; Premium motor cost = $30,500. Simple pay-back period for the cost difference

[1] WEG Electric Motor Payback Tool, energy cost @ $0.10/kWh.
[2] Design pump specification.
[3] NEMA Table 12-12 Full Loan Efficiencies for 60 HZ NEMA PREMIUM Efficiency Electric Motors
[4] NEMA MG-1 Table 12-11 Full Load Efficiencies of EPAct Efficient Electric Motors

of the Premium motor over the EPAct motor = **8.7 years**[3].

VFD Analysis:

Big Bend Booster PS

- WITHOUT A VFD: New 100-HP pumps without VFDs have a motor efficiency = 95.4%[4]. Annual MWH utilized for this new system = 358.41; energy cost approximately = $35,841.
- WITH A VFD: New 100-HP pump with a VFD has a motor efficiency = 95.4%; VFD efficiency = 98%. Overall efficiency = 93.5%. Annual MWH utilized for this new system is = 258.42; energy cost approximately = $25,842.
- Therefore, using a VFD for the new pumps provides a decrease in energy consumption of 99.99 MWH for a savings = $9,999 annually. At a typical VFD cost of $13,500 the pay-back period = **1.4 years**.

VFD Analysis:

Tank No.1 Booster Pump Station

- WITHOUT A VFD: New 75-HP pumps without VFDs have a motor efficiency = 95.4%[4]. Annual MWH utilized for this new system = 310.18; energy cost approximately = $31,018.
- WITH A VFD: New 75-HP pump with a VFD has a motor efficiency = 95.4%; VFD efficiency = 98%. Overall efficiency = 93.5%. Annual MWH utilized for this new system is = 223.64; energy cost approximately = $22,364.
- Therefore, using a VFD for the new pumps provides a decrease in energy consumption of 86.54 MWH for a savings = $8,654 annually. At a typical VFD cost of $9,800 the pay-back period = **1.4 years**.

VFD Analysis:

Well No.7 Pump

- WITHOUT A VFD: New 400-HP pump without VFDs have a motor efficiency = 96.2%[4]. Annual MWH utilized for this new system = 1490; energy cost approximately = $149,000.
- WITH A VFD: New 400-HP pump with a VFD has a motor efficiency = 96.2%; VFD efficiency = 98%. Overall efficiency = 94.3%. Annual MWH utilized for this new system is = 1074; energy cost approximately = $107,400.
- Therefore, using a VFD for the new pump provides a decrease in energy consumption of 416 MWH for a savings = $41,600 annually. At a typical VFD cost of $60,000 the pay-back period = **1.4 years**.

Conclusion

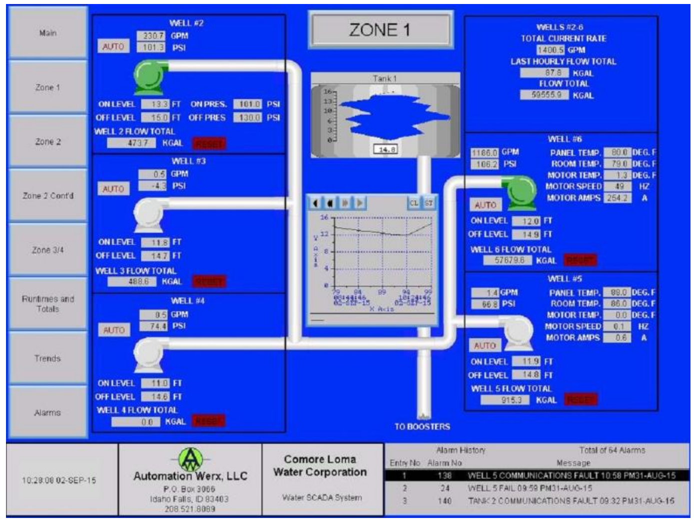
- **GRP Costs Identified** :

  VFDs (7 @ $4,000) = $129,900
  Pumps = $77,300
  Total = $207,200

- **GPR Justification**: The Pump/VFD system is Business Case GPR-eligible (Energy Efficiency) per Section 3.5-1: *Energy efficient retrofits, upgrades, or new pumping systems and treatment processes (including variable frequency drives (VFDs).*

2. SCADA Control Technology

Summary



- Energy efficiencies will be realized from the upgrade of the SCADA system to improve remote electronic sensing and control of the water system. The specific upgrades will be monitor flows in real-time and will accumulate daily flow totals. Additionally, real-time meters will be programmed to enable the operator to quickly determine how long each well runs daily.
- Loan amount = $3,050,000
- Estimated energy efficiency (green) portion of loan = 5% ($135,695)
- Estimated total annual energy and labor savings = $ **43,002**

Background/ Results

- Installing a supervisory control and data acquisition (SCADA) will considerably reduce labor costs, reduce energy consumption, and monitor the system.
- The deficiencies in the existing system are that the tank overflows at times, no flow metering and accumulation of data.

Energy Efficiency Improvements

- The proposed SCADA improvements will result in process energy savings to the district by minimizing the troubleshooting and travel time of system operators, maximize the life of the system equipment, and providing automated reports of the system that allow the district to make informed decisions about their water system.
- Remote SCADA monitoring saves labor costs = 2 people 6 hour per day in the summer + 1 person 1 hour per day in the winter = $43,002/yr. in labor costs.[5]

Conclusion

- Preliminary Estimate: SCADA savings would be approximately $43,002 per year in labor costs = payback of 3.2 years, therefore SCADA costs are GPR-eligible.
- Additional process cost savings will be delineated during the design stage by the design engineer in the Final GPR Justification.
- **GPR Costs**:

  SCADA =**$135,695**
- **GPR Justification**: SCADA system costs are GPR-eligible by a Business Case per 3.5-7: *automated and remote control systems (SCADA) that achieve substantial energy savings.*

[5] Cost savings delineated by the design engineer.

3. Energy Efficient LIGHTING

Summary

- Energy efficiency from the installation of light emitting diode (LED) exterior lighting.
- Loan amount = $3,050,000
- Estimated energy efficiency (green) portion of loan < 1% ($3,318.26)

Energy Efficiency Improvements[6]

- LED lighting is approximately 58% more energy efficient than typical high pressure sodium lighting for relatively the same light output.[4]
- Lighting at Tank 1 BPS (896 sq. ft.) LED 26 Watts/fixture, 6 fixtures, 156 Watts
- Lighting at Big Bend BPS (720 sq. ft.) LED 26 Watts/fixture, 6 fixtures , 156 Watts
- Lighting at Well 7 (480 sq. ft.) LED 26 Watts/fixture, 2 fixtures , 52 Watts
- Exterior Lighting LED at 50 Watts (1) per building
- Emergency Lighting at 1 Watt (1) per building.

Conclusion

- Upgrading the exterior lighting to LED lighting results in energy savings.
- **GPR Costs**[7]: LED Lighting = $3,318
- **GPR Justification**: LED lighting is GPR-eligible by a Business Case per 3.5-6: *Upgrade of lighting to energy efficient sources (such as metal halide pulse start technologies, compact fluorescent, light emitting diode, etc.).*

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[6] Comore Loma Conceptual Design Information GPR, Prepared by Schiess & Associates, 08/10/2015
[7] July 25, 2016 Scoresby – McNeill discussion