

Clean Water State Revolving Fund Green Project Reserve

- Final -



City of Potlatch Wastewater Facility Project **SRF Loan #WW 1104** **\$1,200,000**

Final Green Project Reserve Justification **Categorical GPR Documentation**

PREMIUM ENERGY EFFICIENT MOTORS AND PUMPS WITH VFDS (Energy Efficiency). Premium energy efficient motors and pumps with VFDS will be installed as part of the new Land Application System. GPR Business Case per Section 3.2-2: *Use of premium efficiency motors and VFD pumps in a new project.* (\$15,200).

PUMP STATION

Summary

- The City of Potlatch constructed a Land Application System (LAS) funded with a FY11 SRF Loan. The LAS includes a pump station with premium pumps and variable frequency drives (VFDs).
- Loan amount = \$1,200,000¹
- GPR-eligible = Grundfos Pump System with Premium Energy-Efficient Motors with Variable Frequency Drives (VFDs)
- Green portion of loan = 1.3% (\$15,200)



Description

Energy efficient practices in the LAS include a treated effluent pump station utilizing two 15Hp premium energy efficient motors with VFDs to control the energy output of the motors with a feedback loop.

- Grundfos Model 84Z05096 pumps contain two (2) Baldor 15Hp, Premium Efficiency EISA 2007 Motors² NEMA Nominal Efficiency = 90.2%³.
- NEMA Nominal Efficiency of equivalent 15 Hp EPAct Motors = 89.5%⁴
- The pump VFDs are AllenBradley Power Flex 400, model 22C D022N 103.

GPR Justification

VFDs:

- The Baseline Standard Practice for comparison is a standard Epact motor that is not controlled by a VFD⁵.
- VFD efficiency data were calculated using the Baldor Adjustable Speed Drive Energy Savings Calculator⁶ (for pump applications).
- The combined annual energy savings for utilizing VFDs is estimated to be 18,144kWh/year per motor/VFD system - corresponding to a cost savings of \$1814/year (at an energy cost of 0.1\$/kwh) when compared to the Baseline Standard Practice.
- With an estimated incremental cost increase of \$5,000 the simple payback is 2.76 years per VFD.

Motors:

- Premium motor energy savings over the EPAct motor = \$30/yr⁷.
- With an estimated incremental cost increase of \$200 the simple payback is 6.7 years per system.

Conclusion

- The premium energy-efficient pumps/VFDs are categorically GPR eligible as they are cost effective i.e. 2.76 year and 6.7 year payback periods.
- **GRP Costs Identified**
VFDs (2 @ \$5,000 ea = \$10,000) + Pumps (2 @ \$2,600 ea = \$5,200) = **Total = \$15,200**
- **GPR Justification:** The Pump/VFD system is Categorically GPR eligible (Energy Efficiency) per Section 3.2-2 page 9⁸: *Use of premium efficiency motors and VFD pumps in a new project where they are cost effective.*

¹ FY11 SRF Loan Agreement

² Grundfos Motor Data, Page 5, Baldor TEFC Motors for Grundfos pumps

³ Correspondence with M. Morse, PE, Taylor Engineering April 25, 2013

⁴ NEMA MG-1 Table 12-11 Full Load Efficiencies of EPAct Efficient Electric Motors

⁵ NYS Energy Research and Development Authority, Energy Evaluation Memorandum, Village of Greenport WWTP Upgrade 8-2009

⁶ [http://www.baldor.com/support/software_download.asp?type=BE\\$T+Energy+Savings+Tool](http://www.baldor.com/support/software_download.asp?type=BE$T+Energy+Savings+Tool)

⁷ Productive EnergySolutions Motor Slide Calculator, energy cost @ \$0.10/kWh

⁸ Attachment 2. April 21, 2010 EPA Guidance for Determining Project Eligibility