

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File

FROM: Izabel Hartman

DATE: July 13, 2016

SUBJECT: State Revolving Fund Project No. 5634-01
Ypsilanti Community Utilities Authority (McGregor Pump Station Improvements)
Green Project Reserve (GPR) Funding Cost Calculation

The purpose of this memo is to document the cost calculations for the green reserve funding for the Ypsilanti Community Utilities Authority, SRF Project No. 5634-01. The total loan amount is \$1,995,000. The portion of the project that qualifies as green is the installation of Variable Frequency Drives (\$255,000). The total construction cost for the entire SRF project is \$1,598,000. In order to determine the percentage of non-construction costs associated with the green portion of the project, a proration was applied, as shown below:

$$255,000 / 1,598,000 = 0.1596$$

$$1,995,000 \times 0.1596 = 318,402$$

The total amount of green reserve costs for this project comes to \$318,402.

Per the Project Priority List, if the GPR amount is less than \$1M, then principal forgiveness is \$100,000.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Izabel Hartman, Project Manager, Revolving Loan Section, Office of Drinking Water and Municipal Assistance

FROM: Doug Early, Environmental Engineer, Southeast Michigan District Office, Water Resources Division

DATE: July 30, 2015

SUBJECT: Ypsilanti Communities Utilities Authority – Project No. 5634-01
Qualification for Green Project Reserve Funding

The purpose of this memo is to document the basis for determining that the Ypsilanti Community Utilities Authority (YCUA), SRF Project No. 5634-01, qualifies for the green project reserve funding.

YCUA proposed the installation of variable frequency drive (VFD) pumps at the McGregor Effluent Pump Station to improve energy efficiency.

Specifically, the VFD's are estimated to provide a 38.4% energy savings (greater than the 20% reduction in energy consumption requirement). This type of project is categorically eligible for funding under the green project reserve.

McGregor Effluent Pump Station Improvements
State Revolving Fund
Green Project Reserve Business Case

Summary

- Installation of variable frequency drives (VFDs) to improve energy efficiency.
- Loan amount: \$1,920,400.
- Energy saving (green) portion of loan: \$438,950.
- Annual energy savings: 1,097,063 kWh.

Background

- Currently, pump operation in the station is controlled by the level in the wet well. Due to rapid fluctuations in the wet well level, pumps are started and stopped frequently. The almost continuous cycling results in decreased life of the pumps.
- Existing pumps run at constant speed, providing little operational control.

Results

- The existing constant speed pumps will have the motors rewound for inverter duty and VFDs will be installed for each pump.
- The pump motors will have the same efficiency, energy use reduction will result from the VFDs.

Energy Efficiency Improvements Calculations

- Installation of VFDs at similar pump stations in the Authority wastewater system have resulted in average energy use reductions of 35%.
- Improved energy efficiency: 1,097,063 kWh per year.
- At \$0.08 per kWh, annual savings will be $1,097,063 \text{ kWh} * \$0.08 = \$87,765$ per year.

Conclusion

- The use of VFDs will have a noticeable impact on energy consumption will allow more control over the on/off cycling of the pumps.
- These changes will result in an estimated energy savings of almost \$87,765 per year.

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>2012 Unit Price</u>	<u>2012 Cost</u>	<u>2016 Cost</u>	<u>GPR</u>	<u>GPR Cost</u>
Mobilization	1	l.sum	\$50,000.00	\$50,000.00	\$56,275.44	No	\$0.00
Variable Frequency Drives	5	each	\$60,000.00	\$300,000.00	\$337,652.64	Yes	\$337,652.64
Check Valve, Installed	5	each	\$50,000.00	\$250,000.00	\$281,377.20	No	\$0.00
Rewind Pump Motors	5	each	\$30,000.00	\$150,000.00	\$168,826.32	No	\$0.00
Electrical and Instrumentation	1	each	\$300,000.00	\$300,000.00	\$337,652.64	No	\$0.00
Restoration	1	l.sum	\$262,500.00	\$262,500.00	\$295,446.06	No	\$0.00
Construction Total				\$1,312,500.00	\$1,477,230.31		\$337,652.64
30% Engineering, Inspection, Administration and Contingencies				\$393,750.00	\$443,169.09		\$101,295.79
Inflation	3%	Total		\$1,706,250.00	\$1,920,399.41		\$438,948.44

Notes:

1. Costs presented are based on 2012 prices.
2. Useful life is total weighted cost divided by total project cost.

Energy saving calculator for pumps

The results were calculated using ABB EnergySave tool. EnergySave is an interactive energy saving calculator for comparing AC drive control against traditional flow control methods in applications such as fan and pump. Over the years the formulas behind the tools have been developed and enhanced along with the the pump and fan manufacturers in order to provide accuracy.

Results

Annual energy saving
Saving percentage

105.23 MWh
38.4 %

Energy consumption

70 MWh
60 MWh
50 MWh
40 MWh
30 MWh
20 MWh
10 MWh
0 MWh



with existing control method

273.76 MWh

with ABB drive control

168.53 MWh

Economic Results

Annual saving
CO₂ reduction

8418 \$
52.6 t/year

For more information or to customize your responses use the advance mode. Settings > Mode > Advanced

Settings

Flow control method
Motor power
Motor efficiency class
Annual running time
Duration curve
100% flow
90% flow
80% flow
70% flow
60% flow
50% flow
40% flow
30% flow
Energy price

On/off control
298.28 kW
IE1 / eff2
1460 h
Bell curve
5 %
10 %
15 %
20 %
20 %
15 %
10 %
5 %
.08 \$/kWh

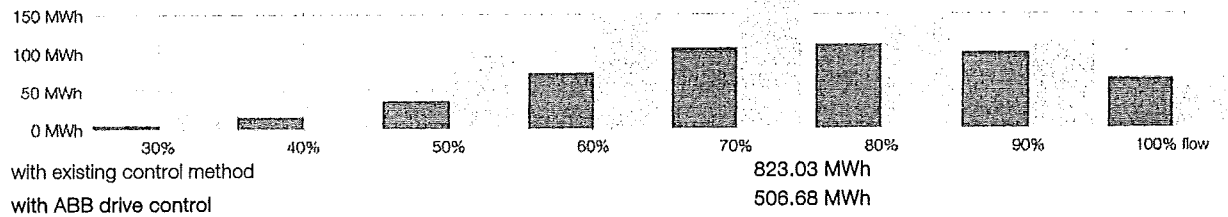
Energy saving calculator for pumps

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Results

Annual energy saving **316.35 MWh**
 Saving percentage **38.4 %**

Energy consumption
 200 MWh



Economic Results

Annual saving **25308 \$**
 CO₂ reduction **158.2 t/year**

For more information or to customize your responses use the advance mode. Settings > Mode > Advanced

Settings

Flow control method	On/off control
Motor power	149.14 kW
Motor efficiency class	IE1 / eff2
Annual running time	8760 h
Duration curve	Bell curve
100% flow	5 %
90% flow	10 %
80% flow	15 %
70% flow	20 %
60% flow	20 %
50% flow	15 %
40% flow	10 %
30% flow	5 %
Energy price	.08 \$/kWh

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