Assessments Efficiency Report

Report Summary

Pumps

8 pumps with a

-$609,881.98

ANNUAL SAVINGS POTENTIAL

xvb

June 19th, 2017

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

Plant A / Pump 1

Baseline	Modification 1
19 %	**117 %**
OPTIMIZATION RATING	OPTIMIZATION RATING
$42,793.04	**-$8,939.56**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Modification 1
Pump efficiency (%)	05.46	30.21	81.95
Motor rated power (hp)	200.00	25.00	200.00
Motor shaft power (hp)	127.98	23.15	127.98
Pump shaft power (hp)	127.98	23.15	127.98
Motor efficiency (%)	95.47	92.94	95.47
Motor power factor (%)	82.90	83.52	82.90
Motor current (amps)	151.41	27.93	151.41
Motor power (hp)	100.00	18.58	100.00
Annual Energy (MWh)	**876.00**	**162.78**	**876.00**
Annual Cost	**52,560.00**	**9,766.96**	**52,560.00**

ASSESSMENT INPUT DATA

	Baseline	Modification 1
Pump & Fluid		
Pump Type	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00
Specific Gravity	01.00	01.00
Stages	01.00	01.00
Fixed specifc speed?	Yes	Yes
Motor		
Line Frequency	60 Hz	60 Hz
Horse Power	200.00 hp	200.00
Motor (RPM)	1,780.00	1,780.00
Efficiency Class	Energy Efficient	Energy Efficient
Voltage	460.00	460.00
Full-Load Amps	225.80	225.80
Size Margin	00.00	00.00
Field Data		
Operating Fraction	01.00	01.00
Cost (kW/hr)	00.06	00.06
Flow Rate (gpm)	100.00	1,500.00
Head (ft)	277.00	277.00
Load Estimated Method	Power	Power
Motor Power (kW)	100.00	100.00
Voltage	460.00	460.00

Plant A / Pump 2

Baseline	Cheaper Cost	Smaller Input
203 %	**203 %**	**203 %**
OPTIMIZATION RATING	OPTIMIZATION RATING	OPTIMIZATION RATING
-$234,532.24	**-$234,532.24**	**-$234,532.24**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

Bigger Motor	Less Flow
203 %	**203 %**
OPTIMIZATION RATING	OPTIMIZATION RATING
-$234,532.24	**-$234,532.24**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Cheaper Cost	Smaller Input	Bigger Motor	Less Flow
Pump efficiency (%)	178.75	85.80	178.75	178.75	178.75	178.75
Motor rated power (hp)	200.00	14,000.00	200.00	200.00	200.00	200.00
Motor shaft power (hp)	482.88	1,006.04	482.88	482.88	482.88	482.88
Pump shaft power (hp)	482.88	1,006.04	482.88	482.88	482.88	482.88
Motor efficiency (%)	83.39	85.43	83.39	83.39	83.39	83.39
Motor power factor (%)	91.49	25.87	91.49	91.49	91.49	91.49
Motor current (amps)	592.66	4,260.89	592.66	592.66	592.66	592.66
Motor power (hp)	432.00	878.22	432.00	432.00	432.00	432.00
Annual Energy (MWh)	**3,784.32**	**7,693.19**	**3,784.32**	**3,784.32**	**3,784.32**	**3,784.32**
Annual Cost	**227,059.20**	**461,591.44**	**227,059.20**	**227,059.20**	**227,059.20**	**227,059.20**

ASSESSMENT INPUT DATA

	Baseline	Cheaper Cost	Smaller Input	Bigger Motor	Less Flow
Pump & Fluid					
Pump Type	End Suction Slurry	End Suction Slurry	End Suction Slurry	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00	1,780.00	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00	01.00	01.00	01.00
Specific Gravity	01.00	01.00	01.00	01.00	01.00
Stages	01.00	01.00	01.00	01.00	01.00
Fixed specifc speed?	Yes	Yes	Yes	Yes	Yes
Motor					
Line Frequency	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Horse Power	200.00 hp	200.00	200.00	200.00	200.00
Motor (RPM)	1,780.00	1,780.00	1,780.00	1,780.00	1,780.00
Efficiency Class	Energy Efficient	Energy Efficient	Energy Efficient	Energy Efficient	Energy Efficient
Voltage	460.00	460.00	460.00	460.00	460.00
Full-Load Amps	225.80	225.80	225.80	225.80	225.80
Size Margin	12.00	12.00	12.00	12.00	12.00
Field Data					
Operating Fraction	01.00	01.00	01.00	01.00	01.00
Cost (kW/hr)	00.06	00.06	00.06	00.06	00.06
Flow Rate (gpm)	12,344.00	12,344.00	12,344.00	12,344.00	12,344.00
Head (ft)	277.00	277.00	277.00	277.00	277.00
Load Estimated Method	Power	Power	Power	Power	Power
Motor Power (kW)	432.00	432.00	432.00	432.00	432.00
Voltage	460.00	460.00	460.00	460.00	460.00

Building 1 / Plant B / Pump 1

Baseline	Modification 1
19 %	**117 %**
OPTIMIZATION RATING	OPTIMIZATION RATING
$42,793.04	**-$8,939.56**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Modification 1
Pump efficiency (%)	05.46	30.21	81.95
Motor rated power (hp)	200.00	25.00	200.00
Motor shaft power (hp)	127.98	23.15	127.98
Pump shaft power (hp)	127.98	23.15	127.98
Motor efficiency (%)	95.47	92.94	95.47
Motor power factor (%)	82.90	83.52	82.90
Motor current (amps)	151.41	27.93	151.41
Motor power (hp)	100.00	18.58	100.00
Annual Energy (MWh)	**876.00**	**162.78**	**876.00**
Annual Cost	**52,560.00**	**9,766.96**	**52,560.00**

ASSESSMENT INPUT DATA

	Baseline	Modification 1
Pump & Fluid		
Pump Type	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00
Specific Gravity	01.00	01.00
Stages	01.00	01.00
Fixed specifc speed?	Yes	Yes
Motor		
Line Frequency	60 Hz	60 Hz
Horse Power	200.00 hp	200.00
Motor (RPM)	1,780.00	1,780.00
Efficiency Class	Energy Efficient	Energy Efficient
Voltage	460.00	460.00
Full-Load Amps	225.80	225.80
Size Margin	00.00	00.00
Field Data		
Operating Fraction	01.00	01.00
Cost (kW/hr)	00.06	00.06
Flow Rate (gpm)	100.00	1,500.00
Head (ft)	277.00	277.00
Load Estimated Method	Power	Power
Motor Power (kW)	100.00	100.00
Voltage	460.00	460.00

Building 1 / Plant B / Pump 2

Baseline	Cheaper Cost	Smaller Input
203 %	**203 %**	**203 %**
OPTIMIZATION RATING	OPTIMIZATION RATING	OPTIMIZATION RATING
-$234,532.24	**-$234,532.24**	**-$234,532.24**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

Bigger Motor	Less Flow
203 %	**203 %**
OPTIMIZATION RATING	OPTIMIZATION RATING
-$234,532.24	**-$234,532.24**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Cheaper Cost	Smaller Input	Bigger Motor	Less Flow
Pump efficiency (%)	178.75	85.80	178.75	178.75	178.75	178.75
Motor rated power (hp)	200.00	14,000.00	200.00	200.00	200.00	200.00
Motor shaft power (hp)	482.88	1,006.04	482.88	482.88	482.88	482.88
Pump shaft power (hp)	482.88	1,006.04	482.88	482.88	482.88	482.88
Motor efficiency (%)	83.39	85.43	83.39	83.39	83.39	83.39
Motor power factor (%)	91.49	25.87	91.49	91.49	91.49	91.49
Motor current (amps)	592.66	4,260.89	592.66	592.66	592.66	592.66
Motor power (hp)	432.00	878.22	432.00	432.00	432.00	432.00
Annual Energy (MWh)	**3,784.32**	**7,693.19**	**3,784.32**	**3,784.32**	**3,784.32**	**3,784.32**
Annual Cost	**227,059.20**	**461,591.44**	**227,059.20**	**227,059.20**	**227,059.20**	**227,059.20**

ASSESSMENT INPUT DATA

	Baseline	Cheaper Cost	Smaller Input	Bigger Motor	Less Flow
Pump & Fluid					
Pump Type	End Suction Slurry	End Suction Slurry	End Suction Slurry	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00	1,780.00	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00	01.00	01.00	01.00
Specific Gravity	01.00	01.00	01.00	01.00	01.00
Stages	01.00	01.00	01.00	01.00	01.00
Fixed specifc speed?	Yes	Yes	Yes	Yes	Yes
Motor					
Line Frequency	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Horse Power	200.00 hp	200.00	200.00	200.00	200.00
Motor (RPM)	1,780.00	1,780.00	1,780.00	1,780.00	1,780.00
Efficiency Class	Energy Efficient	Energy Efficient	Energy Efficient	Energy Efficient	Energy Efficient
Voltage	460.00	460.00	460.00	460.00	460.00
Full-Load Amps	225.80	225.80	225.80	225.80	225.80
Size Margin	12.00	12.00	12.00	12.00	12.00
Field Data					
Operating Fraction	01.00	01.00	01.00	01.00	01.00
Cost (kW/hr)	00.06	00.06	00.06	00.06	00.06
Flow Rate (gpm)	12,344.00	12,344.00	12,344.00	12,344.00	12,344.00
Head (ft)	277.00	277.00	277.00	277.00	277.00
Load Estimated Method	Power	Power	Power	Power	Power
Motor Power (kW)	432.00	432.00	432.00	432.00	432.00
Voltage	460.00	460.00	460.00	460.00	460.00

Assessment Name

Baseline	Modification 3	Modification 2
93 %	**92 %**	**92 %**
OPTIMIZATION RATING	OPTIMIZATION RATING	OPTIMIZATION RATING
$44,871.82	**$2,851.14**	**$2,850.52**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

Modification 1
92 %
OPTIMIZATION RATING
$2,851.14
ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Modification 3	Modification 2	Modification 1
Pump efficiency (%)	-144.98	86.43	80.26	80.26	80.26
Motor rated power (hp)	05.00	400.00	200.00	200.00	200.00
Motor shaft power (hp)	-56.37	94.56	101.19	101.19	101.19
Pump shaft power (hp)	-56.37	94.56	101.19	101.19	101.19
Motor efficiency (%)	-51.91	93.67	94.36	94.36	94.36
Motor power factor (%)	117.58	57.05	76.46	76.46	76.46
Motor current (amps)	82.69	158.46	125.86	125.86	125.86
Motor power (hp)	81.00	75.31	80.00	80.00	80.00
Annual Energy (MWh)	**638.60**	**593.73**	**700.80**	**700.80**	**700.80**
Annual Cost	**638,604.00**	**593,732.18**	**35,040.00**	**35,040.00**	**35,040.00**

ASSESSMENT INPUT DATA

	Baseline	Modification 3	Modification 2	Modification 1
Pump & Fluid				
Pump Type	End Suction ANSI/API	End Suction ANSI/API	End Suction ANSI/API	End Suction ANSI/API
Pump RPM	1,784.00	1,780.00	1,785.00	1,780.00
Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00	01.00	01.00
Specific Gravity	01.00	01.00	01.00	01.00
Stages	03.00	02.00	02.00	02.00
Fixed specifc speed?	No	No	No	No
Motor				
Line Frequency	50 Hz	60 Hz	60 Hz	60 Hz
Horse Power	05.00 hp	200.00	200.00	200.00
Motor (RPM)	1,485.00	1,780.00	1,780.00	1,780.00
Efficiency Class	Standard Efficiency	Specified	Specified	Specified
Voltage	464.00	460.00	460.00	460.00
Full-Load Amps	06.70	225.00	225.00	225.00
Size Margin	03.00	00.00	00.00	00.00
Field Data				
Operating Fraction	00.90	01.00	01.00	01.00
Cost (kW/hr)	01.00	00.05	00.05	00.05
Flow Rate (gpm)	1,841.00	1,840.00	1,840.00	1,840.00
Head (ft)	175.85	174.85	174.85	174.85
Load Estimated Method	Power	Power	Power	Power
Motor Power (kW)	81.00	80.00	80.00	80.00
Voltage	481.00	480.00	480.00	480.00

New Assessment

Baseline	Modification 1
788 %	**791 %**
OPTIMIZATION RATING	OPTIMIZATION RATING
-$79,536.20	**-$79,924.36**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Modification 1
Pump efficiency (%)	330.52	67.31	333.73
Motor rated power (hp)	200.00	9,000.00	200.00
Motor shaft power (hp)	26.11	128.20	26.11
Pump shaft power (hp)	26.11	128.20	26.11
Motor efficiency (%)	88.53	53.57	88.53
Motor power factor (%)	39.86	08.30	39.86
Motor current (amps)	69.27	2,622.05	69.27
Motor power (hp)	22.00	173.32	22.00
Annual Energy (MWh)	**192.72**	**1,518.32**	**192.72**
Annual Cost	**11,563.20**	**91,099.40**	**11,563.20**

ASSESSMENT INPUT DATA

	Baseline	Modification 1
Pump & Fluid		
Pump Type	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00
Specific Gravity	01.00	01.00
Stages	01.00	01.00
Fixed specifc speed?	Yes	Yes
Motor		
Line Frequency	60 Hz	50 Hz
Horse Power	200.00 hp	200.00
Motor (RPM)	1,780.00	1,485.00
Efficiency Class	Energy Efficient	Energy Efficient
Voltage	460.00	460.00
Full-Load Amps	225.80	225.80
Size Margin	66.00	66.00
Field Data		
Operating Fraction	01.00	01.00
Cost (kW/hr)	00.06	00.06
Flow Rate (gpm)	1,234.00	1,246.00
Head (ft)	277.00	277.00
Load Estimated Method	Power	Power
Motor Power (kW)	22.00	22.00
Voltage	460.00	460.00

Plant B / Pump 1

Baseline	Modification 1
19 %	**117 %**
OPTIMIZATION RATING	OPTIMIZATION RATING
$42,793.04	**-$8,939.56**
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Modification 1
Pump efficiency (%)	05.46	30.21	81.95
Motor rated power (hp)	200.00	25.00	200.00
Motor shaft power (hp)	127.98	23.15	127.98
Pump shaft power (hp)	127.98	23.15	127.98
Motor efficiency (%)	95.47	92.94	95.47
Motor power factor (%)	82.90	83.52	82.90
Motor current (amps)	151.41	27.93	151.41
Motor power (hp)	100.00	18.58	100.00
Annual Energy (MWh)	**876.00**	**162.78**	**876.00**
Annual Cost	**52,560.00**	**9,766.96**	**52,560.00**

ASSESSMENT INPUT DATA

	Baseline	Modification 1
Pump & Fluid		
Pump Type	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00
Specific Gravity	01.00	01.00
Stages	01.00	01.00
Fixed specifc speed?	Yes	Yes
Motor		
Line Frequency	60 Hz	60 Hz
Horse Power	200.00 hp	200.00
Motor (RPM)	1,780.00	1,780.00
Efficiency Class	Energy Efficient	Energy Efficient
Voltage	460.00	460.00
Full-Load Amps	225.80	225.80
Size Margin	00.00	00.00
Field Data		
Operating Fraction	01.00	01.00
Cost (kW/hr)	00.06	00.06
Flow Rate (gpm)	100.00	1,500.00
Head (ft)	277.00	277.00
Load Estimated Method	Power	Power
Motor Power (kW)	100.00	100.00
Voltage	460.00	460.00

Plant B / Pump 2

Baseline	Cheaper Cost	Smaller Input
203 %	203 %	203 %
OPTIMIZATION RATING	OPTIMIZATION RATING	OPTIMIZATION RATING
-$234,532.24	-$234,532.24	-$234,532.24
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

Bigger Motor	Less Flow
203 %	203 %
OPTIMIZATION RATING	OPTIMIZATION RATING
-$234,532.24	-$234,532.24
ANNUAL SAVINGS POTENTIAL	ANNUAL SAVINGS POTENTIAL

ASSESSMENT RESULT DATA

	Existing	Optimal	Cheaper Cost	Smaller Input	Bigger Motor	Less Flow
Pump efficiency (%)	178.75	85.80	178.75	178.75	178.75	178.75
Motor rated power (hp)	200.00	14,000.00	200.00	200.00	200.00	200.00
Motor shaft power (hp)	482.88	1,006.04	482.88	482.88	482.88	482.88
Pump shaft power (hp)	482.88	1,006.04	482.88	482.88	482.88	482.88
Motor efficiency (%)	83.39	85.43	83.39	83.39	83.39	83.39
Motor power factor (%)	91.49	25.87	91.49	91.49	91.49	91.49
Motor current (amps)	592.66	4,260.89	592.66	592.66	592.66	592.66
Motor power (hp)	432.00	878.22	432.00	432.00	432.00	432.00
Annual Energy (MWh)	**3,784.32**	**7,693.19**	**3,784.32**	**3,784.32**	**3,784.32**	**3,784.32**
Annual Cost	**227,059.20**	**461,591.44**	**227,059.20**	**227,059.20**	**227,059.20**	**227,059.20**

ASSESSMENT INPUT DATA

	Baseline	Cheaper Cost	Smaller Input	Bigger Motor	Less Flow
Pump & Fluid					
Pump Type	End Suction Slurry	End Suction Slurry	End Suction Slurry	End Suction Slurry	End Suction Slurry
Pump RPM	1,780.00	1,780.00	1,780.00	1,780.00	1,780.00
Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Kinematic Viscosity (cST)	01.00	01.00	01.00	01.00	01.00
Specific Gravity	01.00	01.00	01.00	01.00	01.00
Stages	01.00	01.00	01.00	01.00	01.00
Fixed specifc speed?	Yes	Yes	Yes	Yes	Yes
Motor					
Line Frequency	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Horse Power	200.00 hp	200.00	200.00	200.00	200.00
Motor (RPM)	1,780.00	1,780.00	1,780.00	1,780.00	1,780.00
Efficiency Class	Energy Efficient	Energy Efficient	Energy Efficient	Energy Efficient	Energy Efficient
Voltage	460.00	460.00	460.00	460.00	460.00
Full-Load Amps	225.80	225.80	225.80	225.80	225.80
Size Margin	12.00	12.00	12.00	12.00	12.00
Field Data					
Operating Fraction	01.00	01.00	01.00	01.00	01.00
Cost (kW/hr)	00.06	00.06	00.06	00.06	00.06
Flow Rate (gpm)	12,344.00	12,344.00	12,344.00	12,344.00	12,344.00
Head (ft)	277.00	277.00	277.00	277.00	277.00
Load Estimated Method	Power	Power	Power	Power	Power
Motor Power (kW)	432.00	432.00	432.00	432.00	432.00
Voltage	460.00	460.00	460.00	460.00	460.00