Energy Smart Industrial: Wells Rural Electric/Newmont Industrial Case Study

by
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May 10, 2011

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BPA ENERGY EFFICIENCY

WELLS RURAL ELEC. CO.

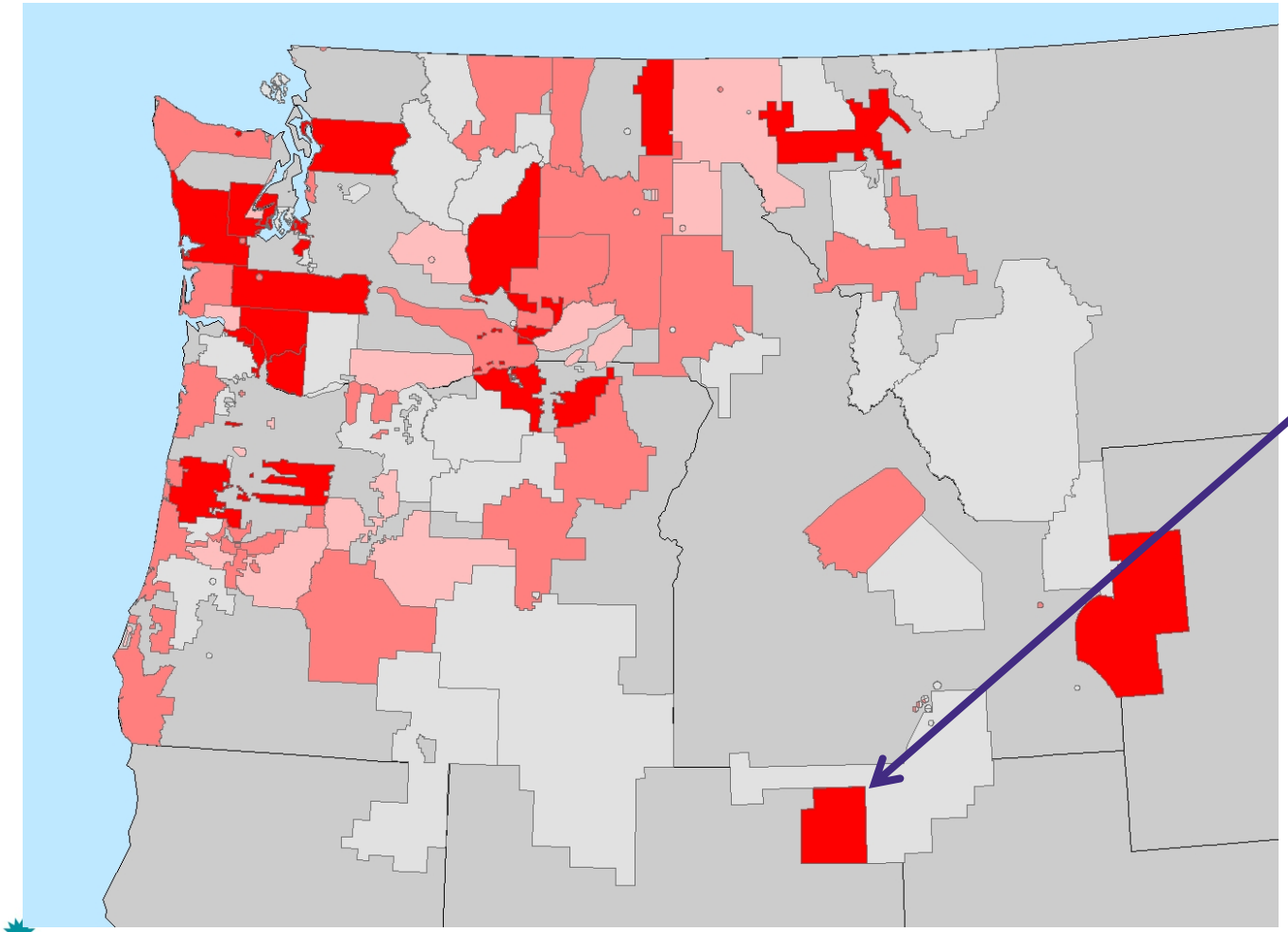
Overview

- Wells Rural Electric Company
- Newmont Mining Corporation
- Conservation Mindset
- Identified Projects
- Future Challenges
- Lessons Learned

Wells Rural Electric Company

- Serves Northeastern Nevada
  - 10,000 square miles of service territory
  - 1,398 miles of power lines
  - Incorporated in 1958
  - Started serving three mining loads in 1985
  - 5,905 total customers
  - 661,218,000 kWh/yr mining load
  - 793,145,000 kWh/yr total utility load
  - Three customers utilize 83% of the utility load

Wells Rural Electric Company



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"Old" Conservation Mindset

- WREC
  - Spend CRC budget
  - Focus on Residential, Small Commercial and Irrigation
  - Used as public relations tool
  - Approach: WREC engineers and accountants worked with Newmont

Newmont Mining Corporation

- 1964 – Gold discovered in Nevada
- 1985 – Gold Quarry site opened for production
- Gold Quarry production 1.8 million ounces in 2010
- Currently over 2,000 employees
- Estimated 590,000,000 kWh/yr (67 aMW) at Gold Quarry site

"Old" Conservation Mindset

- Newmont
  - Focus on production during boom times
  - No investment in long term savings during bust times
  - Past conservation assessment (PACE) was a waste of time
  - WREC's rates were affordable

Reasons for Changes

- What has changed?
  - Higher power prices
  - Tiered rates coming
  - Climate change and carbon tax
  - TS power plant requirements
  - BPA’ s Energy Smart Industrial Program!

"Current" Conservation Mindset

- WREC
  - Savings can be cost-effective alternative to market rates and new resources
  - Focus on conservation cost and availability in all rate classes, including industrial
  - Complete team effort

"Current" Conservation Mindset

- Newmont
  - Can affect bottom line power costs
  - Can affect overall productivity
  - Can offset TS Power Plant requirements
  - Can offset future growth
  - Creates a positive public image

Big Picture View

- New People, New Approach
- Create a vision of the value energy efficiency creates for all parties
- Get a blend of corporate, regional and local folks involved in the process
- Inform top local Newmont management of ESI program and get buy-in for energy efficiency

ESI Time Frame

- Nov 2009, WREC opts into ESI Program
- Jan 2010, initial contact between Jeff Hare and Tommi Reynolds
- May 2010, face-to-face meeting between Jeff Hare and Tommi Reynolds
- June 2010 – First ESI, WREC, Newmont meeting
- Aug 2010 – Meeting with top Gold Quarry management

ESI Time Frame

- Oct 2010 – Site scoping visit completed
- Nov 2010 – Lighting audit conducted
- Feb 2011 – Review scoping report and lighting audit with Gold Quarry team
- Mar 2011 – Mill 5 compressed air analysis completed, Track and Tune
- April 2011 – Mill 6 process fan analysis completed, custom project

Potential Projects

- Lighting Upgrade
- Mill 5 Compressed Air System
- Mill 6 Process Fans
- Other Possible Projects

- Currently identified almost 5 aMW in possible savings at Gold Quarry site

Facility Wide Lighting

- Lighting audit performed by two contractors
- Covered Mill 5, Mill 6 and Admin Buildings
- Baseline: ~6.1 M kWh/yr, ~4,500 fixtures
- Est. energy savings: ~2,600,000 kWh/yr
- Est. project cost: $876,702
- Est. simple payback: 3.3 years after utility incentive of 70%

Newmont Gold Quarry – Mill 6

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Mill 5 Compressed Air

- Six separate compressed air systems
- Baseline: Total 3,385 hp, 11.1 M kWh/yr
- Looking for low cost/no cost changes (T&T)
- Energy engineer identified 4.4 M kWh/yr savings
- Estimated annual savings of $132,000
- Estimated project cost $150,000 plus tracking system

Mill 6 Process Fans

- Identified six large process fans totaling 4,150 hp that use inlet damper control
- Three fans average less than 20% open on the damper, two average 40% open
- Baseline: 13.8 M kWh/yr
- Est. savings: XXX kWh/yr

Fan Systems

Other Possible Projects

- Mill 5: Ball and Sag Mill upgrades
  - 17,000 total hp
- Mill 6: Compressed Air
  - 1,100 total hp
- Cooling Tower Optimization
  - 2,100 total hp

Cooling Tower

Challenges Going Forward

- Financial
  - Large project funding
  - Stability of BPA/Utility programs
- Mining is currently in a boom cycle
- Personnel turnover – risk losing key players
  - Newmont, BPA, ESI, Utility
- Create on-going value for energy efficiency for Newmont, long term vision

Lessons Learned

- ESI program framework opened doors at WREC and Newmont
- Correct day-to-day personnel on all fronts
- Upper management/corporate support, buy-in and direction
- Relationships and trust with on-site personnel
- Engineering experience
- Program funding

Lessons Learned

- "Rome wasn't built in a day"
  - 10 months between first meeting and first system study
- Must find VALUE for all parties, push that value to all levels


EfficiencyMATTERS

St. Helens WWTP Retrofit

by
Tim Lammers, Energy Services Supervisor, Columbia River PUD
Layne McWilliams, Water/Wastewater Sector Specialist

May 10, 2011

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Project Participants

- City of St. Helens – owner and operator of the WWTP
- Boise, Inc. – majority of the load and revenue to the plant
- SolarBee, Inc. – equipment supplier
- Columbia River PUD – energy provider
- Energy Smart Industrial / BPA – conservation program technical assistance and facilitation
  - Cascade Energy as Technical Service Provider (TSP)
  - ESI Partner
  - BPA industrial engineers, efficiency staff, and contracting officers

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Project Summary

- Baseline Facility
  - Primary and Secondary Lagoon System
    - Primary has seven surface aerators
    - Secondary has internal baffles to create three zones
    - 24 surface aerators over first two zones plus a settling zone
  - Phase 1 project focused on Secondary Lagoon
    - Normally running five to six aerators in Zone 1 and one aerator in Zone 2
    - Baseline energy associated with Secondary Lagoon = 3.9 million kWh

Photo Source: Google Earth

(Note: Plant shown before the pulp mill and two paper machines shut down.)

Secondary Lagoon Zone 3
5 acres

Secondary Lagoon Zone 2
10 acres

Baffle to Split Zones

Secondary Lagoon Zone 1
21 acres

Image from Google Earth dated August 14, 2010.

Typical operations before SolarBee installation.

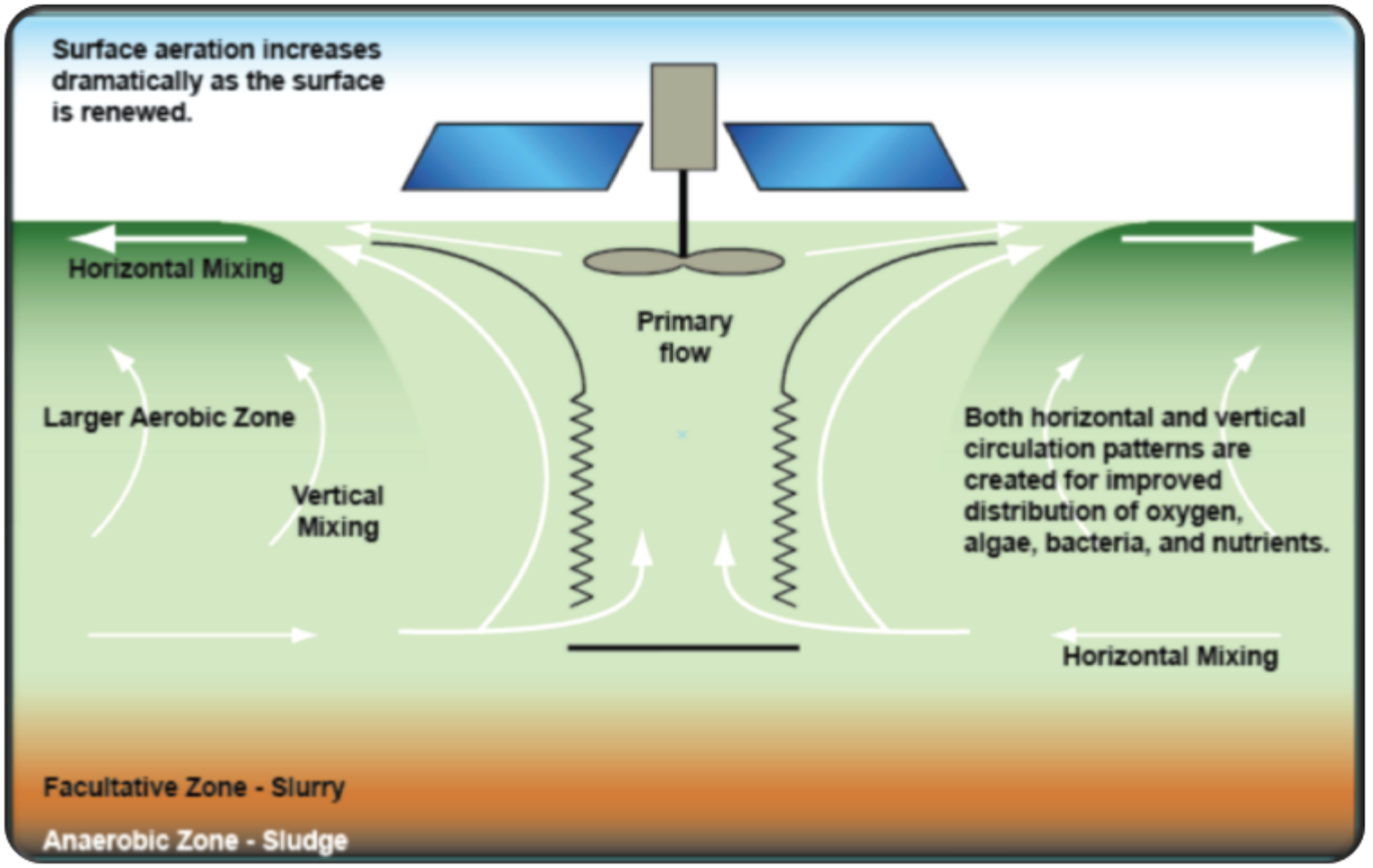
Five running in Zone 1.

One running in Zone 2.

Project Summary

- Replace excess “aeration” with more effective “circulation”
  - Seven SolarBee circulators installed
    - Five circulators installed in Zone 1
    - Two circulators installed in Zone 2
  - SolarBee estimated 30 to 60 hp of aeration could be eliminated for each circulator installed
    - Aeration horsepower reduction occurs via reduced runtime and reduced number of aerators on line
    - The “solar” part of the installation is ignored. The circulators are equipped with shore power because they need to run 24/7 regardless of weather. The DC brushless motor draws less than 1/10th hp.

Installed Circulator


Surface aeration increases dramatically as the surface is renewed.
Horizontal Mixing
Primary flow
Larger Aerobic Zone
Vertical Mixing
Both horizontal and vertical circulation patterns are created for improved distribution of oxygen, algae, bacteria, and nutrients.
Horizontal Mixing
Facultative Zone - Slurry
Anaerobic Zone - Sludge

Project Results

- 0.75 hp of circulators have displaced an average of 253 hp of aeration – or approximately 1.8 million kWh
  - 36.1 hp per circulator vs. 41.4 hp per circulator estimated
    - This is 87% of the originally estimated savings
  - No degradation in effluent quality
  - No discernible increase in odor

Aerator Run Matrix: Pre-Project

Baseline Operation Schedule

Sunday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100								
2	150								
3	100								
4	75	x	x	x	x	x	x	x	x
5	100								
6	100								
7	100								
8	75								
9	100								
10	100								
11	100	x	x	x	x	x	x	x	x
12	100								
13	50								
14	100	x	x	x	x	x	x	x	x
15	100								
16	75								
17	100	x	x	x	x	x	x	x	x
18	75	x	x	x	x	x	x	x	x
19	75								
20	75								
21	75	x	x	x	x	x	x	x	x
22	75								
23	75								
24	100								
Total Operating Power		525	525	525	525	525	525	525	525

Monday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100								
2	150								
3	100								
4	75	x	x	x	x	x	x	x	x
5	100	x	x	x	x	x	x	x	x
6	100								
7	100								
8	75								
9	100	x	x	x	x	x	x	x	x
10	100								
11	100								
12	100								
13	50								
14	100								
15	100	x	x	x	x	x	x	x	x
16	75	x	x	x	x	x	x	x	x
17	100								
18	75								
19	75								
20	75	x	x	x	x	x	x	x	x
21	75								
22	75								
23	75								
24	100	x	x	x	x	x	x	x	x
Total Operating Power		625	625	625	625	625	625	625	625

Tuesday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100								
2	150	x	x	x	x	x	x	x	x
3	100	x	x	x	x	x	x	x	x
4	75								
5	100								
6	100								
7	100								
8	75								
9	100								
10	100								
11	100								
12	100	x	x	x	x	x	x	x	x
13	50								
14	100	x	x	x	x	x	x	x	x
15	100								
16	75								
17	100								
18	75								
19	75	x	x	x	x	x	x	x	x
20	75								
21	75								
22	75	x	x	x	x	x	x	x	x
23	75								
24	100								
Total Operating Power		600	600	600	600	600	600	600	600

Wednesday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100								
2	150								
3	100								
4	75								
5	100								
6	100	x	x	x	x	x	x	x	x
7	100								
8	75	x	x	x	x	x	x	x	x
9	100								
10	100								
11	100	x	x	x	x	x	x	x	x
12	100								
13	50								
14	100								
15	100								
16	75								
17	100	x	x	x	x	x	x	x	x
18	75	x	x	x	x	x	x	x	x
19	75								
20	75								
21	75	x	x	x	x	x	x	x	x
22	75								
23	75								
24	100								
Total Operating Power		525	525	525	525	525	525	525	525

Thursday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100								
2	150								
3	100	x	x	x	x	x	x	x	x
4	75								
5	100								
6	100								
7	100	x	x	x	x	x	x	x	x
8	75								
9	100								
10	100	x	x	x	x	x	x	x	x
11	100								
12	100								
13	50	x	x	x	x	x	x	x	x
14	100								
15	100								
16	75								
17	100	x	x	x	x	x	x	x	x
18	75								
19	75	x	x	x	x	x	x	x	x
20	75								
21	75								
22	75								
23	75	x	x	x	x	x	x	x	x
24	100								
Total Operating Power		600	600	600	600	600	600	600	600

Friday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100								
2	150	x	x	x	x	x	x	x	x
3	100								
4	75								
5	100								
6	100	x	x	x	x	x	x	x	x
7	100								
8	75								
9	100								
10	100								
11	100								
12	100								
13	50	x	x	x	x	x	x	x	x
14	100								
15	100								
16	75								
17	100								
18	75								
19	75								
20	75								
21	75	x	x	x	x	x	x	x	x
22	75	x	x	x	x	x	x	x	x
23	75								
24	100	x	x	x	x	x	x	x	x
Total Operating Power		550	550	550	550	550	550	550	550

Saturday

Aerator	Nameplate Power (HP)	0	3	6	9	12	15	18	21
1	100	x	x	x	x	x	x	x	x
2	150								
3	100	x	x	x	x	x	x	x	x
4	75								
5	100								
6	100								
7	100								
8	75								
9	100	x	x	x	x	x	x	x	x
10	100								
11	100								
12	100								
13	50								
14	100	x	x	x	x	x	x	x	x
15	100								
16	75	x	x	x	x	x	x	x	x
17	100								
18	75								
19	75								
20	75								
21	75								
22	75								
23	75	x	x	x	x	x	x	x	x
24	100								
Total Operating Power		550	550	550	550	550	550	550	550

Pre-project average of 567 hp (nameplate) on-line.

Aerator Run Matrix: Post-Project

Aerator	Nameplate Power (HP)	EEM Operation Schedule																																																					
		Sunday								Monday								Tuesday								Wednesday								Thursday								Friday								Saturday							
		0	3	6	9	12	15	18	21	0	3	6	9	12	15	18	21	0	3	6	9	12	15	18	21	0	3	6	9	12	15	18	21	0	3	6	9	12	15	18	21	0	3	6	9	12	15	18	21	0	3	6	9	12	15	18	21
1	100																			x	x	x	x	x																																	
2	150																																																								
3	100																							x	x	x	x	x																								x	x	x	x	x	x
4	75							x	x	x	x	x	x																							x	x	x	x	x	x																
5	100														x	x	x	x																								x	x	x	x	x											
6	100																x	x	x	x	x	x																							x	x	x	x	x	x							
7	100																																									x	x	x	x	x	x	x									
8	75																																									x	x	x	x	x	x	x	x								
9	100																																																	x	x	x	x	x	x	x	x
10	100		x	x	x	x	x																								x	x	x	x	x																						
11	100	x	x	x	x	x	x	x	x																																																
12	100																																	x	x	x	x	x	x	x	x																
13	50	x																																															x	x	x	x	x	x	x	x	x
14	100									x	x	x	x	x	x																							x	x	x	x	x	x														
15	100																							x	x	x	x	x	x																							x	x	x	x	x	x
16	75	x	x	x	x	x	x																							x	x	x	x	x	x																						
17	100																		x	x	x	x	x																								x	x	x	x	x						
18	75																									x	x	x	x	x	x	x	x																								
19	75																									x	x	x	x	x	x	x	x																								
20	75	x	x	x	x	x	x	x	x																																																
21	75																																	x	x	x	x	x	x	x	x																
22	75									x	x	x	x	x	x	x	x																																								
23	75																	x	x	x	x	x	x	x	x																																
24	100										x	x	x	x	x	x	x																																								
Total Operating Power		300	350	350	350	350	350	250	250	250	350	350	350	275	375	275	375	275	275	375	375	375	275	375	275	350	350	350	250	225	325	325	325	350	350	250	250	350	350	350	350	375	375	275	375	375	375	375	325	350	350	350	350	350	350	350	350
HP Savings		225	175	175	175	175	175	275	275	375	275	275	275	350	250	350	250	325	325	225	225	225	325	225	325	175	175	175	275	300	200	200	200	250	250	350	350	250	250	250	250	175	175	275	175	175	175	175	225	200	200	200	200	200	200	200	200

During M&V period, an average of 315 hp (nameplate) was on-line (reduction of 253 hp).

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The Utility's Perspective

- The customer brought the SolarBee product to our attention.
- We had some skepticism about whether or not the SolarBee product would meet the requirements of the treatment plant.
- This was one of our first Energy Smart Industrial projects and we are very happy to have the kWh savings.

Project Financial Results

- Total Cost of Project = $374,992 (as reported)
- Annual Energy Savings = $71,868
- Maximum ESI Incentive = $482,000 (25 cents / kWh)
- Actual Incentive Payment = $262,494 (70% cap)

- Simple Payback w/o Incentive = 5.2 years
- Simple Payback with Incentive = 1.6 years

Lessons Learned

- Technical:
  - Understand the technology early and up-front (e.g. don't get hung up on the issue of fuel switching).
  - Would wait longer for M&V to allow operator to standardize run times and allow system to stabilize. *In 5 months following M&V, the plant has taken an additional 85 hp off-line.*

- Administrative:
  - Talk to top management and Board early to ensure everyone is on the same page for this unique project.

Next Steps

- Phase 2 in progress
  - Will add two circulators to Primary Lagoon and displace an estimated 40 hp of aeration.

Primary Lagoon serves City of St. Helens' flow before it is mixed with Boise flow in Secondary Lagoon.

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EfficiencyMATTERS

Cascade Steel Rolling Mills, Inc.

For over 40 years, Cascade Steel Rolling Mills has been providing the Western U.S. and Canada with high quality steel products produced from recycled scrap metal at our state-of-the-art electric arc furnace steel mill.

Our products include reinforcing bar (rebar), coiled reinforcing bar, wire rod, merchant bar and other specialty products. We pride ourselves in the quality of our products, our competitive pricing and our exceptional customer service.

Founded in 1968, Cascade Steel Rolling Mills is a steel manufacturing facility that takes recycled metal and turns it into high-quality finished steel products. Located in McMinnville, OR, our electric arc furnace (EAF) mini-mill produces a wide range of hot rolled products such as reinforcing bar (rebar), coiled reinforcing bar, wire rod, merchant bar and other specialty products.

Steel Mill and Manufacturing Process

Our steel manufacturing process begins at our 80+ acre facility in the melt shop with the melting of scrap metal in our electric arc furnace. The molten steel is then sent to the refining furnace, where adjustments are made to produce a specific grade of steel. Our melt shop's enhanced steel chemistry refining capabilities allow us to produce special alloy grades of steel not currently produced by other mills on the West Coast. Finally, molten steel is cast into long bars called billets in our five-strand continuous billet caster. In fiscal 2009, we produced 401,000 short tons of steel billets.

Steel Mill and Manufacturing Process

Our facilities include two computerized rolling mills that allow for synchronized operation of the rolling mills and related equipment. The billets produced in the melt shop are reheated in two natural gas furnaces into a plastic-like state and then hot-rolled through one of the two rolling mills to form them into the desired shapes to produce the desired end products. In fiscal 2009, we produced 381,000 tons of steel products.

Corporate Strength

Cascade Steel was acquired in 1984 by Schnitzer Steel Industries, Inc., a global leader in the metals recycling industry that has been in business for over a century. As a Schnitzer subsidiary and part of our parent company's vertical integration, we purchase all of the processed scrap metal we use through Schnitzer's Metals Recycling Business. Being part of a Fortune 1000 company has enabled us to grow stronger and introduce cost efficiencies and state-of-the art environmental controls into our operations.

To maintain our competitive edge, we are frequently investing in improvements to our facilities. Recent additions and enhancements have increased our operating efficiency, increased the types and volume of products that we can produce and improved the quality of finished products.

It is this commitment to increased efficiency and to the needs of our local community that has led us to pursue the programs offered by the Bonneville Power Administration under the Energy Smart Industrial program and specifically the position of the Energy Project Manager.

The Role of the Energy Project Manager

Needs to have "Boots on the Ground" at the faciity.

Needs to have a passion for efficiency.

Needs to understand the culture.

Needs to have access to the decision makers.

Needs to have a strong relationship with the local utility.

The Energy Project Manager becomes the conduit through whom energy saving ideas flow.

The Energy Project Managers are generally not decision makers but information collectors.

Through the Energy Project Manager Program, Cascade Steel rolling Mills has saved and targeted over 10,440,520 kWh/yr.