

First Year SEM Completion Report

Presented to:



City of Astoria

Wastewater Treatment Plant

Provided by:



Submitted by:

ENERGY350

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Portland, OR 97214

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Energy Trust Project Number: PE16210

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EXECUTIVE SUMMARY	5
1.0 SEM PRACTICES.....	9
1.1 ENERGY COMMITMENT AND GOAL	10
1.2 ENERGY TEAM MEETINGS AND ACTIVITIES	10
1.3 EMPLOYEE ENGAGEMENT	10
1.4 ENERGY MAP	11
1.5 ENERGY TREASURE HUNT.....	11
1.6 OPPORTUNITY REGISTER & PROJECT IMPLEMENTATION	11
1.7 ENERGY PERFORMANCE TRACKING PRACTICES	13
1.8 ENERGY MANAGEMENT ASSESSMENT & PERSISTENCE PLANNING	13
2.0 ENERGY SAVINGS DOCUMENTATION	15
3.0 APPENDIX.....	16
ENERGY COMMITMENT AND GOAL	17
ENERGY MAP	18
OPPORTUNITY REGISTER	20
ENERGY MANAGEMENT ASSESSMENT (EMA) RESULTS.....	24
EMPLOYEE ENGAGEMENT EXAMPLES	25
BOTTOM-UP CALCULATION ADDITIONAL DETAILS	28

Executive Summary

This report details the accomplishments of City of Astoria's Wastewater Treatment Plant (City of Astoria) during their participation in Energy Trust of Oregon's First Year Strategic Energy Management offering (First Year SEM). Starting in October 2019, the facility developed an SEM program that has resulted in total energy savings of 539,995 kWh (determined using bottom-up calculations, see the Excel-based energy tracker).

We would like to thank Sarah Hammond, Energy Champion, and the rest of the energy team for their commitment to SEM. The entire energy team worked diligently to develop a strong program, including:

- Maintaining an active energy team of 10 participants
- Participating in regular energy team meetings and check-in calls with the SEM Coach
- Conducting a treasure hunt and value graphing event that led to the identification of 53 energy saving opportunities
- Completing an Energy Management Assessment that characterized the state of SEM practices at City of Astoria and additional opportunities for future implementation.
- Expanding communications of SEM beyond the energy team to key stakeholders

These SEM practices resulted in a variety of energy saving projects, including:

- Blower Optimization significantly reduced the runtimes of their 9 blower/mixer units (total input power of 132.8 kW) from 8,139hrs/yr to 4,529hrs/yr,
- A series of projects to turn off or down four 10 kW heaters across all their pump and lift stations.

Energy Savings for First Year SEM were calculated using bottom-up engineering calculations. The following table summarizes the energy savings and Energy Trust incentive for City of Astoria's First Year SEM engagement.

Table 1: Energy Savings and Incentive Summary

	Electricity
Baseline Period	10/09/2017 – 09/30/2019
Engagement Period	10/01/2019 – 11/30/2020
Reporting Period	10/01/2019 – 09/30/2020
Predicted Baseline Usage ¹	1,544,516 kWh
Annual Savings	539,995 kWh
Percent Savings	34.96 %
Annual Utility Cost Savings (1)	\$39,582/yr
Energy Trust Incentive (2)	\$21,600
Energy Trust Milestones Achieved (3)	\$3,000
Total Energy Trust Incentive	\$24,600

(1) Assumes energy cost of \$0.0733/kWh

(2) Incentive rate is \$0.04/kWh verified savings

(3) 3 out of 3 milestones were achieved. Each milestone is worth \$1,000.

Figure 1, below, illustrates the energy savings achieved by City Astoria during First Year SEM.

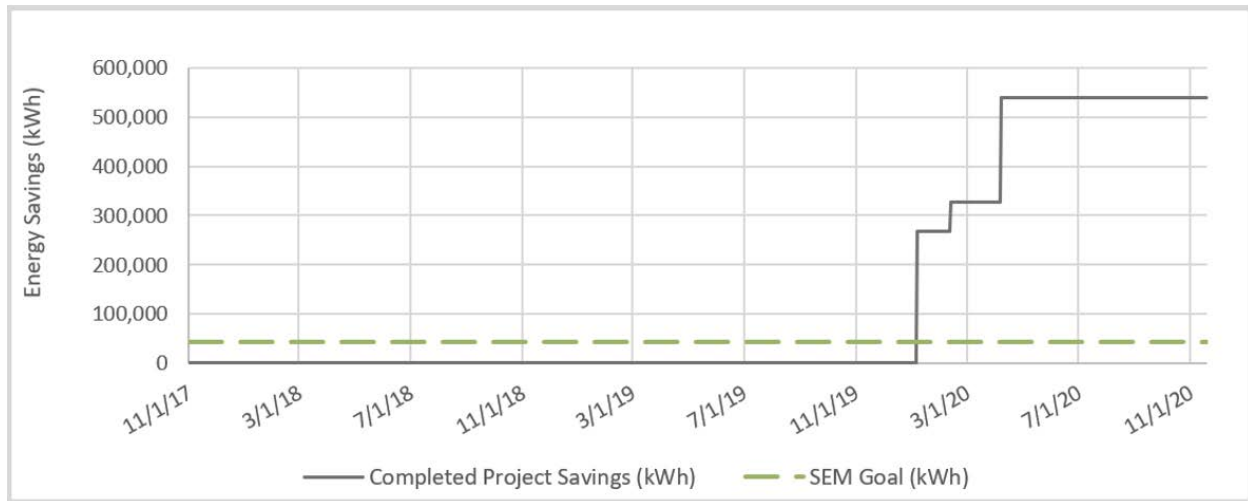


Figure 1: Progress towards energy savings goal over time. (See the Excel-based energy tracker for additional details)

¹ An energy model is not used to document savings for this engagement. Therefore, this reflects the average annual energy use during the baseline period and is used for determining the percent savings. This value includes electric energy use for all meters serving spaces where bottom-up calculations were performed.

The energy team utilized a number of important tools as part of First Year SEM, including the opportunity register, energy map, Energy Management Assessment and energy tracker. These tools have been submitted to Energy Trust as part of First Year SEM completion documentation.

PERSISTENCE OF ENERGY SAVINGS

SEM is most successful when it is embraced over the long term. The above-mentioned SEM practices, projects and tools are all integral to maintaining and growing energy savings. Energy Trust recommends that City of Astoria keep their Program Delivery Contractor involved in SEM practices and leverage their support where needed.

NEXT STEPS

SEM:

After a successful First Year engagement focused on their WWTP, City of Astoria intends on enrolling in another year of SEM. In their next engagement year, City of Astoria plans on expanding their SEM scope across public works to the freshwater side and reinvest incentives from their First Year SEM engagement into additional efficiency upgrades.

SEM Projects:

City of Astoria also plans on conducting a value graphing exercise to re-prioritize energy projects on their opportunity register and determine which energy projects to complete in the coming SEM engagement. The top priority projects currently on the opportunity register are further optimizing blowers and mixer run-time and to-be-determined opportunities in other aspects of public works operations. These projects are low in cost and are expected to yield significant energy savings.

Capital Projects:

During First Year SEM, City of Astoria identified the following potential capital projects:

- Aeration Blower VFDs – The site’s blowers are operated fixed speed with on/off manual control. The blowers may benefit from the addition of VFDs so that they could be turned down in times of low aeration demand.
- Pump & Lift Station VFDs- The City has noted that the fixed speed pumps at multiple pump and lift stations can be retrofitted with VFD controls in order to reduce their idle power when possible.
- Aquatics Center Pool Cover – This project involves purchasing and deploying a pool cover for the main pool area at the aquatics center to reduce evaporation, savings both pool heating and space

HVAC energy. The project was uncovered and scoped by the SEM team. This is an Existing Buildings project with the reference number is ETECPS1545645112.

We recommend that City of Astoria continues to work with their PDC Account Manager to identify and implement capital projects.

1.0 SEM Practices

First Year SEM began in October 2019 and included 6 workshops and a number of important on-site activities and events. The sixth workshop will be held in December 2020. The First Year SEM schedule of events is as follows:

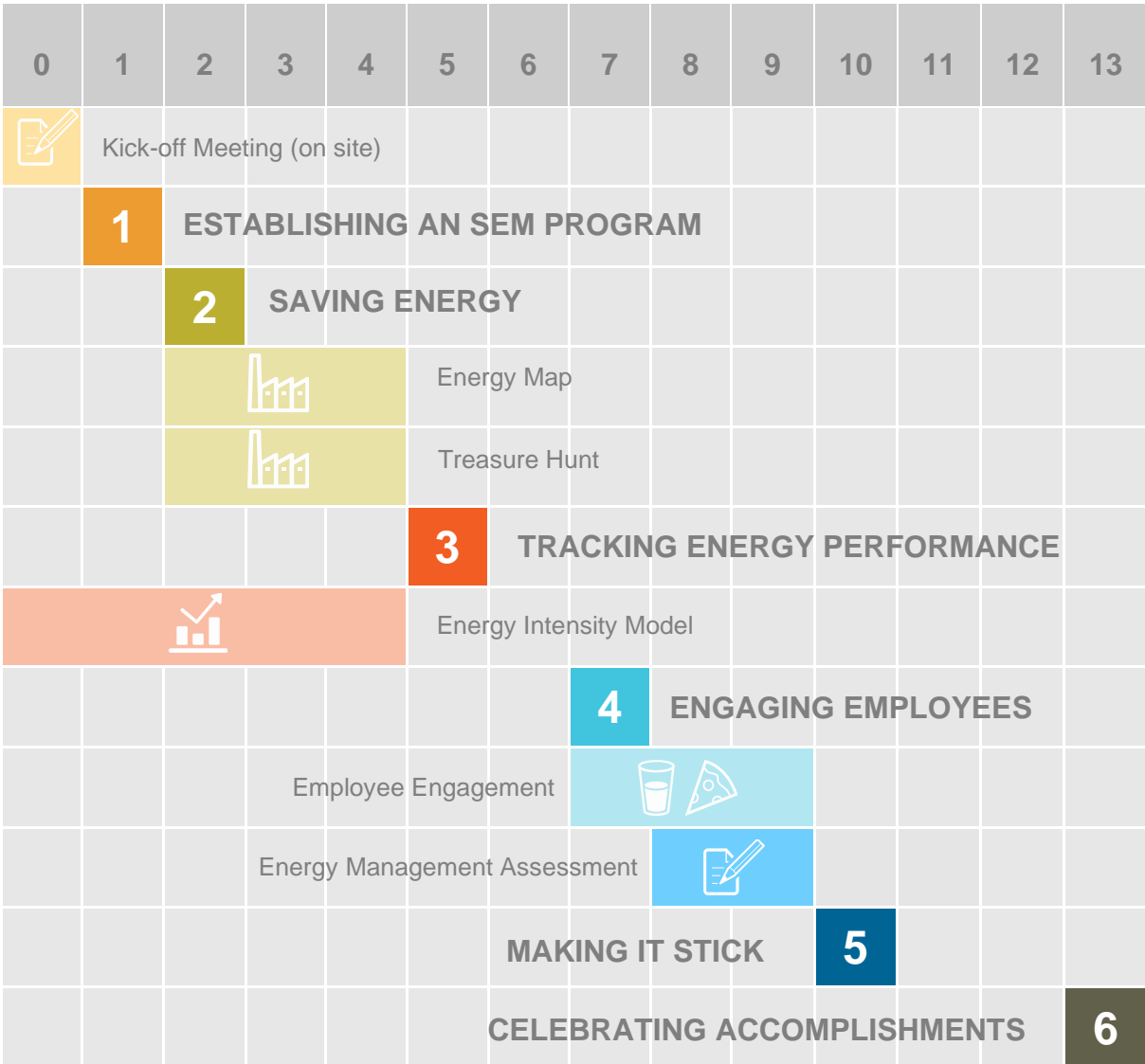


Figure 2: First Year SEM Progression of Events

1.1 Energy Commitment and Goal

City of Astoria's SEM Energy Commitment and Goal statement (included in the Appendix) included a goal of 3% energy savings by the end of their First Year SEM engagement. This goal was exceeded early in the engagement. The energy team has shown a commitment to SEM by focusing on the following energy management components of their First Year SEM program activities:

- Holding regular meetings with their cross functional energy team
- Implementing high-priority items in the opportunity register
- Tracking energy performance

1.2 Energy Team Meetings and Activities

City of Astoria's energy team is composed of 10 employees, including an Executive Sponsor, Energy Champion and Data Master. The energy team meets monthly to address the following agenda items:

- Discuss energy project updates, barriers to project completion and next steps
- Review, update and reprioritize the opportunity register
- Review energy performance using the energy tracker
- Discuss employee engagement activities

The SEM Coach, who typically attends these meetings remotely, assists the energy team in assessing the status of their opportunity register and model and helps the site determine key next steps.

1.3 Employee Engagement

Engaging employees beyond the immediate energy team is a key part of maintaining a culture of energy management. These activities rely on the creativity and efforts of each site's energy team. While COVID-19 has prevented the roll-out of many traditional employee engagement events, City of Astoria has found creative solutions to engage employees that adhere to local public health guidance. This includes maintaining a structured approach to raising energy awareness and communicating regular updates across their facility by:

- Addressing energy related matters during regular energy team meetings
- Distributing SEM updates via city-wide newsletters (see example in Appendix)
- Creating and posting signage throughout their facilities to highlight the priority of operating with energy efficiency in mind (see example in Appendix)
- Developing an employee suggestion path for energy related improvements
- Featuring energy efficiency on the public facing City Manager's Facebook page

- Incorporating SEM and energy efficiency goals in facility's staff meetings

1.4 Energy Map

City of Astoria created an energy map during the engagement. A PDF of the energy map is included in the Appendix. The energy map was used to identify areas of focus and contains the following energy account centers (EACs):

- Blowers/ Mixers
- Pump Stations
- Lift Stations
- Lighting
- HVAC
- Facility Lab

1.5 Energy Treasure Hunt

City of Astoria completed a half-day energy treasure hunt during their engagement. The treasure hunt kickstarts the process of identifying and implementing energy saving projects and provides the initial list of potential projects. After the treasure hunt, these projects are assessed through a value graphing exercise that helps prioritize each idea based on an estimate of energy savings and associated costs/efforts. These projects are entered into the opportunity register, which is a tool used to identify, track and prioritize energy projects on site.

Table 2: Treasure Hunt details

Treasure Hunt, 2/11/2020		
Site Participants:	PDC Participants:	Areas Covered:
Cindy Moore Sarah Hammond Seyrra Croy Jim Hatcher Bryce Majors Steve Meadows Jeff Harrington Chris Gramson Nathan Crater Nathan Barber	Dave Hall Kelson Redding Phillip Maddi	Entire facility and two pump/lift stations

1.6 Opportunity Register & Project Implementation

The opportunity register serves as the energy team's central resource for all energy projects and acts as a project management tool for projects in process. City of Astoria's opportunity register is maintained by

Sarah Hammond and is updated on at least a monthly basis. Note that the completed opportunity register is a companion document (electronic) to this report.

Below is a summary of the City of Astoria's opportunity register at the end of this engagement:

- 74 total projects identified
- 47 projects implemented during this engagement
- 3 in progress
- 5 remaining
- 19 canceled due to cost, effort, lack of savings potential and/or time constraints

The top energy projects that were completed:

- Opportunity 2 – Blower Optimization. City of Astoria significantly reduced the runtimes of their 9 blower/mixer (total input power of 132.8 kW) from an average of 8,139hrs/yr to an average of 4,529hrs/year, while maintaining necessary DO levels. City of Astoria is currently manually staging their blowers and mixers based on DO levels. During the rainy winter months, there is sufficient DO in the influent so most blowers and mixers are only cycled on for 15 minutes per day. During the shoulder seasons City of Astoria increases the blower and mixer runtimes to 12 hours per day. Finally, during the dry summer months, City of Astoria runs their blowers and mixers 24 hours per day. City of Astoria has a robust data collection system that tracks daily blower and mixer runtimes. This data was used to inform both the baseline blower and mixer runtimes in addition to the average blower and mixer runtimes after the optimization effort was implemented.
- Opportunities 21, 28, 61, 62 and 63 – These are a series of projects to turn off or down five 10 kW electric resistance heaters across all of City of Astoria's pump and lift stations. These heaters were previously energized year-round with a 75°F setpoint. They have since been turned off. City of Astoria now only energizes the heaters when there is a high freeze risk due to prolonged forecasted temperatures below freezing.

Of the remaining projects on the opportunity register, we recommend that City of Astoria focus on optimizing blowers and mixer run-time, and to-be-determined opportunities in other aspects of public works operations.

There were 12 capital projects identified during this engagement. Here are a few of the projects identified:

- Aeration Blower VFDs – The site's blowers are operated fixed speed with on/off manual control. The blowers may benefit from the addition of VFDs so that they could be turned down in times of low aeration demand.

- Pump & Lift Station VFDs- The City has noted that the fixed speed pumps at multiple pump and lift stations can be retrofitted with VFD controls in order to reduce their idle power when possible.
- Aquatics Center Pool Cover – This project involves purchasing and deploying a pool cover for the main pool area at the aquatics center to reduce evaporation, savings both pool heating and space HVAC energy. The project was uncovered and scoped by the SEM team. This is an Existing Buildings project with the reference number is ETECPS1545645112.

We recommend that City of Astoria continue to work with their PDC Account Manager to identify and implement capital projects.

1.7 Energy Performance Tracking Practices

City of Astoria uses an Excel-based energy tracking tool to track energy performance. The tool is updated by Energy Champion, Sarah Hammond, on a monthly basis. The tracking tool output is a graphic that illustrates energy performance and progress toward goal over time.

Energy savings and progress to goal are shared with the energy team during monthly meetings, to all city staff through periodic newsletters and to city council through periodic updates and an annual presentation. For all other energy performance tracking details, see Excel-based energy tracking tool and opportunity register.

1.8 Energy Management Assessment & Persistence Planning

The Energy Management Assessment (EMA) was completed on 07/24/2020. An EMA is a facilitated review of SEM practices that helps participants assess progress and plan for continued success. Ideally, an EMA should be conducted at least every other year. To maintain the persistence of energy savings achieved from the implemented opportunities, the energy team should periodically review the implemented opportunities and ensure that the recommendations and persistence strategies are still in place. The bullets below provide high level review of the EMA results. Refer to the Appendix for further detail.

Resulting Recommendations/Takeaways:

- Overall, the EMA results reflect how the energy team is working diligently in meeting the expectations of the SEM program at their facility. The results also highlighted the following priority focus areas with opportunity for further future development:
- Employee Engagement - Employee awareness, training and involvement
- Policy & Goals - Formalized (written) energy policy and energy goal
- Communication - Organization-wide practices for sharing energy information

Steps to Ensure Persistence of SEM Practices:

- Continue to meet regularly as an energy team
- Continue to use range of mediums to communicate the priority of energy conservation
- Continue to share savings with all staff, city leadership and the public

SEM Practices to Improve or Focus on in the Future:

- Finalize an official energy policy
- Further engage and empower employees beyond the energy team
- Increase access to and comfort with utilizing energy data across energy team

2.0 Energy Savings Documentation

City of Astoria's Wastewater Treatment Plant is an aerated lagoon system that is used to process both stormwater and municipal waste. Their facility has six primary energy account centers: Blowers/Mixers, Pump Stations, Lift Stations, Lighting, HVAC and Facility Lab. All primary account centers and their associated support areas are included in the scope of the SEM engagement and are each served by one of seven meters included in the energy tracker. While the operation of the facility was consistent throughout the baseline period, a forecasted regression model was not used to document savings. A forecasted regression model was attempted; however, a suitable model that was expected to meet the criteria in Energy Trust's Energy Intensity Modeling Guide could not easily be developed. All the attempted forecasted regression models had excessively high projected fractional savings uncertainty (FSU) values at the expected savings for the engagement. Therefore, bottom-up calculations were used to document SEM savings. The energy tracker has the following filename:

- PE16210 CityofAstoria 2020FirstYearSEM EnergyTracker.xlsx

City of Astoria's SEM engagement was minimally impacted by COVID-19. The primary impacts from COVID-19 were:

- Changes in protocols to keep staff safe and healthy
- Increase in remote work for administrative staff
- Staffing disruptions due to illnesses and lack of childcare

While COVID-19 resulted in several changes to the operation of the facility, the energy team was still able to complete several impactful energy projects during this engagement. Bottom-up calculations were performed for fourteen completed opportunities (grouped into three sets of calculations). The calculation details are included in the accompanying electronic energy tracker. Additional calculation details that did not fit in the energy tracker are shown in the Appendix. Additionally, note that the verification of the completed projects was impacted by COVID-19. Social distancing policies were in effect and there were significant limitations on field work due to public health concerns. Therefore, the verification of the completed activities relied more heavily on customer provided data as opposed to data collected directly by the SEM coaching team.

3.0 Appendix

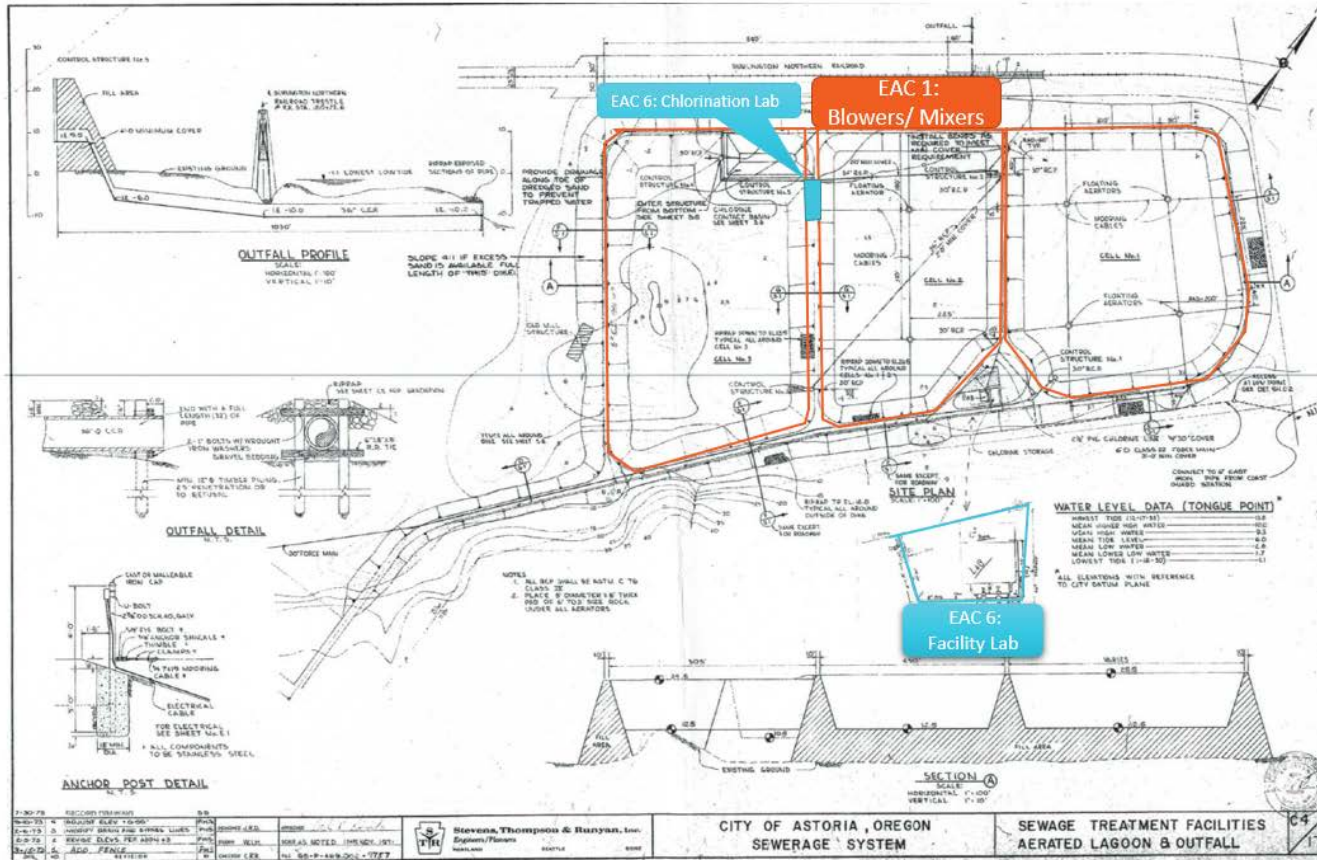
- Energy Commitment and Goal
- Energy Map
- Opportunity Register
- Energy Management Assessment (EMA) Results
- Employee Engagement Examples
- Bottom-Up Calculation Additional Details

Energy Commitment and Goal

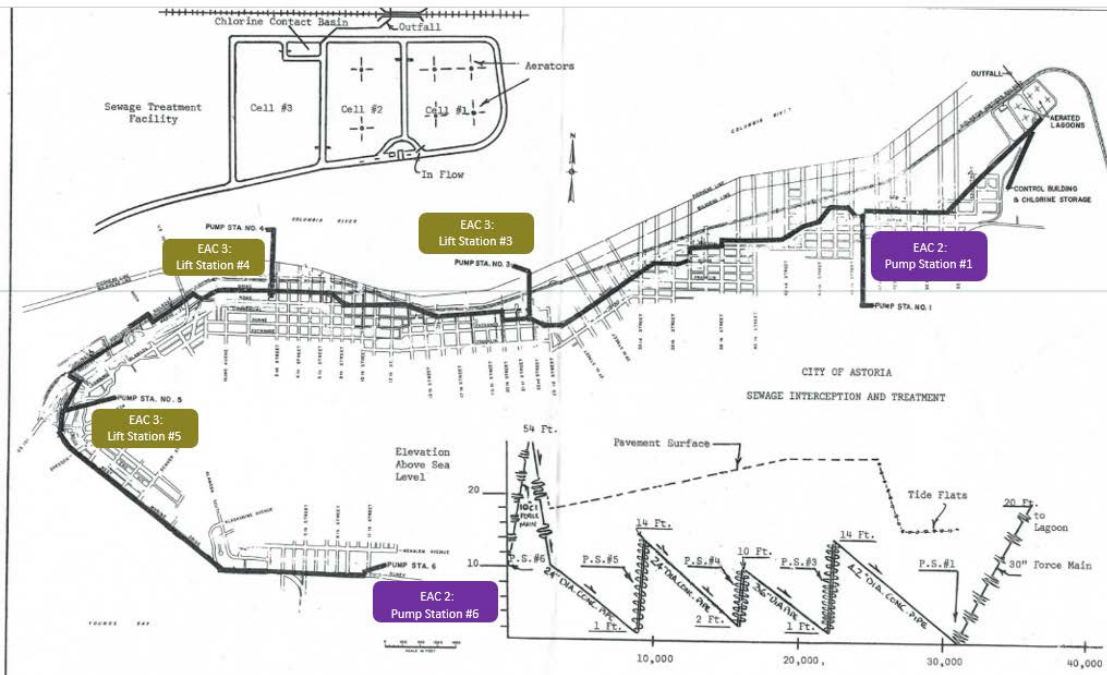
The City of Astoria is committed to improving energy efficiency and conservation at our wastewater treatment plant and associate facilities by becoming more conscientious of our energy use and optimizing our operations to reach a 3% or greater energy savings cost this year.

Energy Map

City of Astoria WWTP - Layout and Energy Account Center Mapping

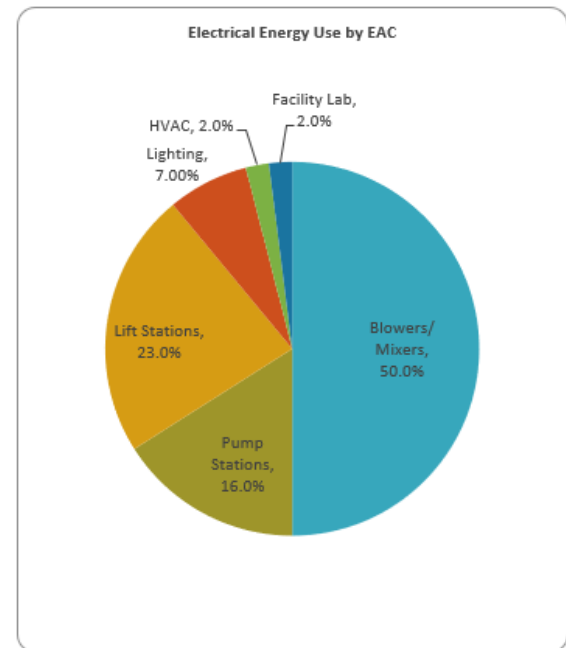


Support Systems
EAC 1: Blowers/Mixers
EAC 2: Pump Stations - (Includes Lighting)
EAC 3: Lift Stations - (Includes Lighting)
EAC 6: Facility Lab - (Includes Lighting, HVAC & Chlorination Lab)



Approximate Electrical Energy Use By EAC (kWh)

#	Energy Account Center	kWh	% of Total
-			
1	Blowers/ Mixers	441,588	50.0%
2	Pump Stations	141,308	16.0%
3	Lift Stations	203,130	23.0%
4	Lighting	61,822	7.00%
5	HVAC	17,664	2.0%
6	Facility Lab	17,664	2.0%
	Miscellaneous	0	0.0%
	Total	883,175	100.0%



Opportunity Register

Energy Project		1 Identify		2 Prioritize	3	4 Implement			5 Ensure Persistence	
Opp. #	Opportunity Name	Description	System*	Energy Impact	Next Step	Completed Date*	Status*	Backslide Risk	Persistence Strategy Description	
1	Blower Optimization	Modify blower operations	Blowers	Gems	Need new DO Probes - Attempted turning off 1 blower per pond from 12/6 and stopped on 12/16. Decided to start exercising on 12/16 due to conditions	12/16/2019	Completed	High	Review Monthly/ Set Outlook Reminder	
46	Winter to Spring ramp up	Winter to spring blower mixer ramp up march (1/3) May (2/3) June 1/1)	Blower/ Mixers	Gems	Create a log sheet. & ensure DO probes are reading properly	4/6/2020	Completed	High	Write SOP	
47	Exercising requirements?	Investigate frequency of requirement of exercising mixers and blowers	DO Probes	Gems		3/3/2020	Completed	Low	Encourage accountability	
2	Blower Optimization - Scheduling	Exercising schedules	Blowers /Mixers	Quick wins	started exercising schedule on 12/16/19. Each blower kicks on for 15 minutes each day and there are 9 blowers in total. 4 - 20 hp and 5 - 15 hp motors. Starting on 4/6/20, each aerator is running 12 hours per day. Went to 24 hr operations on 8/13/20	8/13/2020	Completed	High	Review Monthly and write SOP	
3	Lights in Lab & WWTP Office	Motion Sensor light switches, switch to LED lights in Lab	Lighting	Quick wins		5/7/2020	Completed	Low	Automated	
4	Heat - Weather proofing	Door seals, window coverings, insulation	Weather Proofing	Quick wins		7/1/2020	Completed	Low	Review Annually/ Set Outlook Reminder	
8	Lagoons	Replace Headworks Light with LED	Lighting	Quick wins		3/3/2020	Completed	Low	Ongoing as-needed Maintenance	
10	Program Lab Heater to maintain 70F	Program Lab Heater to maintain 70F	Lab Heater	Quick wins		2/11/2020	Completed	Low	Post a sign with key message(s)	
11	Program Office Heater	Program Office Heater	Office Heater	Quick wins		2/11/2020	Completed	Low	Post a sign with key message(s)	
12	Optimize Office Fridge temp	Optimize Office Fridge temp	Fridge	Quick wins		3/3/2020	Completed	Low	Post a sign with key message(s)	
19	PS1 Exhaust Fan, Increase Temperature Setpoints	PS1 Exhaust Fan, Increase Temperature Setpoints	Exh Fan	Quick wins		5/1/2020	Completed	Low	Automated/ Check Quarterly/ Post a sign	
21	PS3 Turn Heaters Off	PS3 Turn Heaters Off	Heaters	Quick wins		2/12/2020	Completed	Low	Post a sign with key message(s)	

Energy Project		1 Identify		2 Prioritize	3	4 Implement			5 Ensure Persistence	
Opp. #	Opportunity Name	Description	System*	Energy Impact		Next Step	Completed Date*	Status*	Backslide Risk	Persistence Strategy Description
22	PS1 Upgrade Lights to LED	PS1 Upgrade Lights to LED	Light	Quick wins			5/1/2020	Completed	Low	Fixture installed for LED Lights only
28	LS4 Exhaust Fan on thermostat	LS4 Exhaust Fan on thermostat (turn off in winter)	Exhaust Fan	Quick wins			5/1/2020	Completed	Medium	Post a sign with key message(s)
29	PS1 Exhaust fans on thermostats	PS1 Exhaust fans on thermostats	Exhaust Fan	Quick wins		Optimize setting during summer	3/13/2020	Completed	Low	Post a sign with key message(s)
30	LS3 Exhaust Fan on thermostat	LS3 Exhaust Fan on thermostat (turn off in winter)	Exhaust Fan	Quick wins			5/1/2020	Completed	Medium	Post a sign with key message(s)
36	Night time Exercising of the blowers	Night time Exercising of the blowers	Blowers	Quick wins		Starting on 4/6/20 running from 6pm to 6am then on 8/13 running for 24hrs/day Question - This opportunity only applies during winter, yes? Is daily exercising needed? Answer: Exercising usually happens from late fall through early summer. The run 24/7 during mid to late summer depending on conditions.	4/6/2020	Completed	High	Write SOP
37	Lower intensity lighting	Lower intensity lighting	Lighting	Quick wins		Work order issued/ Change from photo cell to switch	5/6/2020	Completed	Low	Post a sign with key message(s)
39	bathroom LED lights	bathroom LED lights	Lighting	Quick wins			5/1/2020	Completed	Low	Maintenance as needed
40	Close the door between the office and the lab	Close the door between the office and the lab	Office	Quick wins			2/12/2020	Completed	High	Post a sign with key message(s)
41	Lower Hot Water Heater Temps	Lower Hot Water Heater Temps	Water Heater	Quick wins			2/12/2020	Completed	Low	Post a sign with key message(s)
42	Turn off incubators when not in use	Turn off incubators when not in use	Lab	Quick wins			2/12/2020	Completed	High	Post a sign with key message(s)
43	Programmable thermostat in lab office	Programmable thermostat in lab office	Office	Quick wins			2/12/2020	Completed	Low	Post a sign with key message(s)
48	Turn off heat trace for sodium hydroxid line	Turn off heat trace for sodium hydroxid line - June, July, August (Maybe Sept). Freezes at 45 degree.	pH	Quick wins		Turn off in June and then turn back on in september	3/13/2020	Completed	Low	Automated

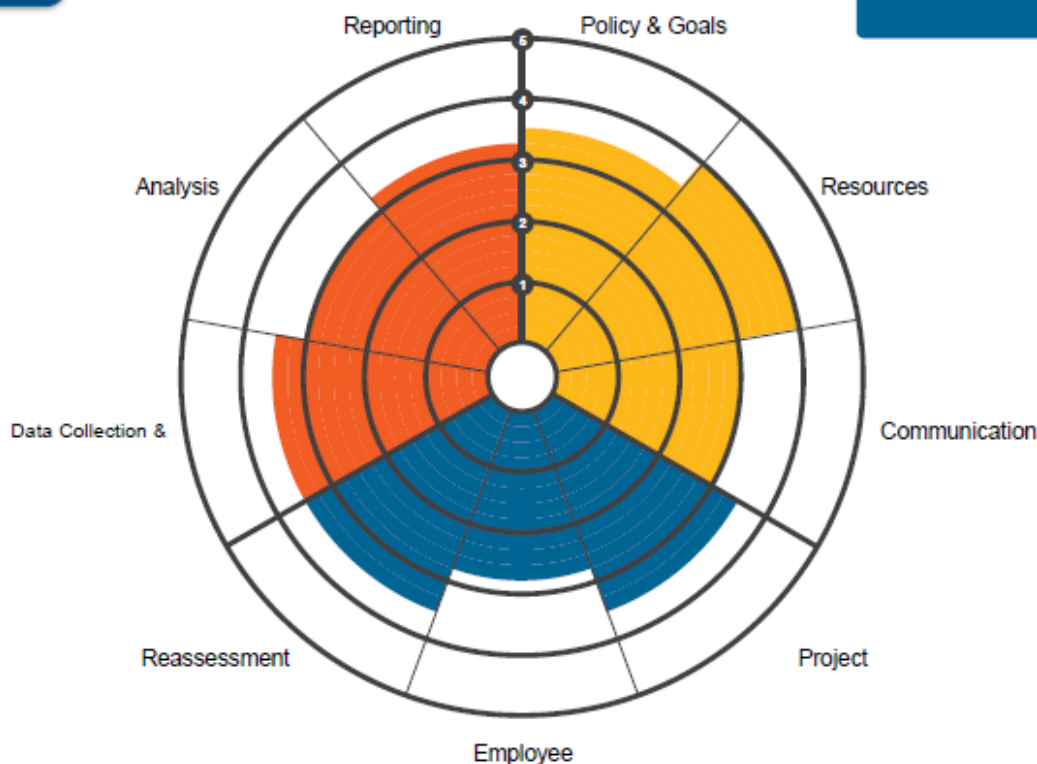
Energy Project		1 Identify		2 Prioritize	3	4 Implement			5 Ensure Persistence	
Opp. #	Opportunity Name	Description	System*	Energy Impact		Next Step	Completed Date*	Status*	Backslide Risk	Persistence Strategy Description
50	Occupancy sensors for lab lights	Occupancy sensors for lab lights	Lighting	Quick wins			5/7/2020	Completed	Low	Automated
51	Spot check power to headworks light	Spot check power to headworks light	Lighting	Quick wins			2/12/2020	Completed	High	Establish recurring maintenance work order
57	LS3 Exhaust Fan, Increase Temperature Setpoints	LS3 Exhaust Fan, Increase Temperature Setpoints	Exh Fan	Quick wins		set at 70 degrees	5/1/2020	Completed	Low	Automated/ Check Quarterly/ Post a sign
58	LS4 Exhaust Fan, Increase Temperature Setpoints	LS4 Exhaust Fan, Increase Temperature Setpoints	Exh Fan	Quick wins		set at 70 degrees	5/1/2020	Completed	Low	Automated/ Check Quarterly/ Post a sign
59	LS5 Exhaust Fan, Increase Temperature Setpoints	LS5 Exhaust Fan, Increase Temperature Setpoints	Exh Fan	Quick wins		set at 70 degrees	5/1/2020	Completed	Low	Automated/ Check Quarterly/ Post a sign
60	PS6 Exhaust Fan, Increase Temperature Setpoints	PS6 Exhaust Fan, Increase Temperature Setpoints	Exh Fan	Quick wins		set at 70 degrees	5/1/2020	Completed	Low	Automated/ Check Quarterly/ Post a sign
61	PS1 Turn Heaters Off	PS1 Turn Heaters Off	Heaters	Quick wins			2/12/2020	Completed	Low	Post a sign with key message(s)
62	LS4 Turn Heaters Off	LS4 Turn Heaters Off	Heaters	Quick wins			2/12/2020	Completed	Low	Post a sign with key message(s)
63	LS5 Turn Heaters Off	LS5 Turn Heaters Off	Heaters	Quick wins			2/12/2020	Completed	Low	Post a sign with key message(s)
65	LS3 Upgrade Lights to LED	LS3 Upgrade Lights to LED	Light	Quick wins			5/1/2020	Completed	Low	Maintenance as needed
66	LS4 Upgrade Lights to LED	LS4 Upgrade Lights to LED	Light	Quick wins			5/1/2020	Completed	Low	Maintenance as needed
67	LS5 Upgrade Lights to LED	LS5 Upgrade Lights to LED	Light	Quick wins			5/1/2020	Completed	Low	Maintenance as needed

Energy Project		1 Identify		2 Prioritize	3	4 Implement			5 Ensure Persistence	
Opp. #	Opportunity Name	Description	System*	Energy Impact		Next Step	Completed Date*	Status*	Backslide Risk	Persistence Strategy Description
68	PS6 Upgrade Lights to LED	PS6 Upgrade Lights to LED	Light	Quick wins			5/1/2020	Completed	Low	Maintenance as needed
73	LS5 Exhaust Fan on thermostat	LS5 Exhaust Fan on thermostat (turn off in winter)	Exhaust Fan	Quick wins			5/1/2020	Completed	Medium	Post a sign with key message(s)
74	PS6 Exhaust Fan on thermostat	PS6 Exhaust Fan on thermostat (turn off in winter)	Exhaust Fan	Quick wins			5/1/2020	Completed	Medium	Post a sign with key message(s)
25	LS5 Pumps on VFD	LS5 Pumps on VFD	Pump	Strategic / Capital		Installed - Monitoring Results	8/31/2020	Completed	Low	Encourage accountability
31	PS1 Rebuild Pumps	PS1 Rebuild Pumps	Pumps	Strategic / Capital		Scheduled for 3rd week in July, to be completed by 8/1/20	8/7/2020	Completed	Low	On Annual Maintenance Schedule
55	Office & Lab LED lighting	Install LED lights in lab & office	Lighting	Strategic / Capital			5/1/2020	Completed	Low	Maintenance as needed
69	LS3 Rebuild Pumps	LS3 Rebuild Pumps	Pumps	Strategic / Capital		On annual maintenance schedule	8/7/2020	Completed	Low	On Maintenance Schedule
70	LS4 Rebuild Pumps	LS4 Rebuild Pumps	Pumps	Strategic / Capital		On annual maintenance schedule	8/7/2020	Completed	Low	On Maintenance Schedule
71	LS5 Rebuild Pumps	LS5 Rebuild Pumps	Pumps	Strategic / Capital		On annual maintenance schedule	8/7/2020	Completed	Low	On Maintenance Schedule
72	PS6 Rebuild Pumps	PS6 Rebuild Pumps	Pumps	Strategic / Capital		On annual maintenance schedule	8/7/2020	Completed	Low	On Maintenance Schedule
56	Turn off 2 blowers/exhaust fans in Denver Storage	Turn of blowers/exhaust fans in Denver Storage	Primary Process				4/1/2020	Completed	Low	Post a sign with key message(s)

Energy Management Assessment (EMA) Results



ENERGY MANAGEMENT ASSESSMENT




This diagram illustrates your organization's current practices for managing energy relative to industry best practices. The size of each wedge indicates your organization's strength in each area. The diagram was generated with data provided by your peers in a facilitated interview. These results should guide and focus your efforts as you develop your Strategic Energy Management practices. A detailed report, with recommended improvements, will be provided at the end of the Core Strategic Energy Management program.

Program Element	Primary Assessment Point	Score
COMMITMENT	Policy & Goals	3.50
	Resources	4.00
	Communication	3.00
PLANNING AND IMPLEMENTATION	Project Management	3.50
	Employee Engagement	2.75
	Reassessment	3.50
MEASURING AND REPORTING	Data Collection & Availability	3.50
	Analysis	3.00
	Reporting	3.25

Priority Focus Areas:


- 1) Employee Engagement - Employee awareness, training and involvement
- 2) Policy & Goals - Formalized (written) energy policy and energy goal
- 3) Communication - Organization-wide practices for sharing energy information

Employee Engagement Examples

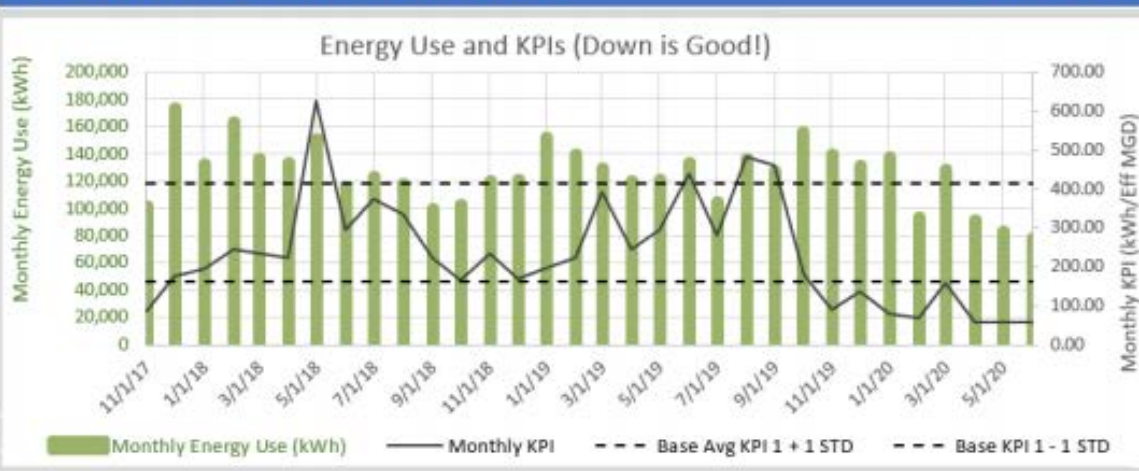


in this issue >>>

- The latest results and happenings from Public Works' energy saving effort.
- What is SEM and how does it work?
- Tips on how you can save energy.
- How can you contribute?



ENERGY SAVINGS NEWSLETTER JULY 2020



Key:
 kWh: kilowatt hour
 KPI: Key Performance Indicator
 Eff MGD: Effluent Million Gallons per Day

Projected Results to Date:

Energy Savings (kWh/yr)	291,236
Energy Cost Savings (\$/yr)	21,551
Homes Powered	24
CO2 Reduced (Lbs/yr)	349,483

SEM Goal:

Energy Savings (kWh/yr)	42,000
Energy Cost Savings (\$/yr)	3,108
Homes Powered	3
CO2 Reduced (Lbs/yr)	50,400

Strategic Energy Management (SEM) focuses on no and low cost operations and maintenance improvements that deliver energy savings. Most participants in the program typically see energy savings of 5% in the first year. Public Works established an Energy Team that consists of Cindy Moore, Jim Hatcher, Bryce Majors, Steve Meadows, Chris Gramson, Nathan Barber, Seyra Croy, Sarah Hammond And Jeff Harrington. Several other members of the Public Works Operations staff have assisted in this effort by completing projects that contribute to the energy savings goal. Our Energy Team has been working alongside a cohort of peers all working towards the same ultimate goal... saving energy. This cohort consists of the City of Warrenton, De Yang Seafood's, Warrenton

What is SEM and how does it work?

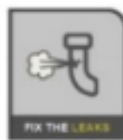
Fiber and Pacific Seafood. We have participated in a Treasure Hunt with the goal of identifying energy savings opportunities and a series of workshops focusing on organizational fundamentals, energy tracking and performance monitoring, identifying waste and energy saving opportunities and employee engagement. We have two workshops left that focus on sustaining strategic energy management and recognizing achievements. We are proud to report that our Energy Team has completed more energy projects than any other first-year SEM site. Our projected results to date are phenomenal and we have blown our 3-5% goal out of the water (see projected results to date and goals in a column to the left).

You can help save energy!!



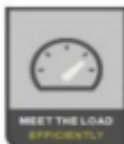
Turn off lights, equipment and other technology when not in use.

- Is equipment left running during breaks?
- Are spaces being conditioned when no one is present for long stretches?



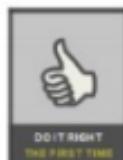
Leaks are by definition wasted energy!

- Leaks may be visible, like doors or windows left open. Or invisible, like in compressed air systems. Look for them in compressed air, nitrogen, HVAC duct systems, valves, doors & windows, and seal things up where you can!



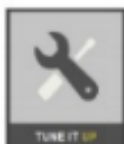
How much energy do we need to get this job done?

- Can you think of any equipment or other processes that might be oversized for the task they are performing?



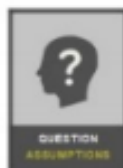
Rework, over processing, scrap/waste all result in excess energy consumption.

- How can we support each other to improve processes to get things right the first time?



Equipment runs most efficiently when it is tuned up and running as it should be.

- Do filters need replacement?
- Have temporary fixes been addressed with permanent solutions?
- Are sensors calibrated?



Why are things done this way? Maybe for good reason, maybe not.

- Let's be open to conversations about whether things can be done more efficiently!



Savings only last as long as we can keep them up. How can we help each other make saving energy a habit?



TAKE IT HOME! Apply these ideas at home to save money and help take pressure off our energy systems.

- Go to www.energytrust.org/residential/ to learn about incentives & more



Do you have energy savings ideas?

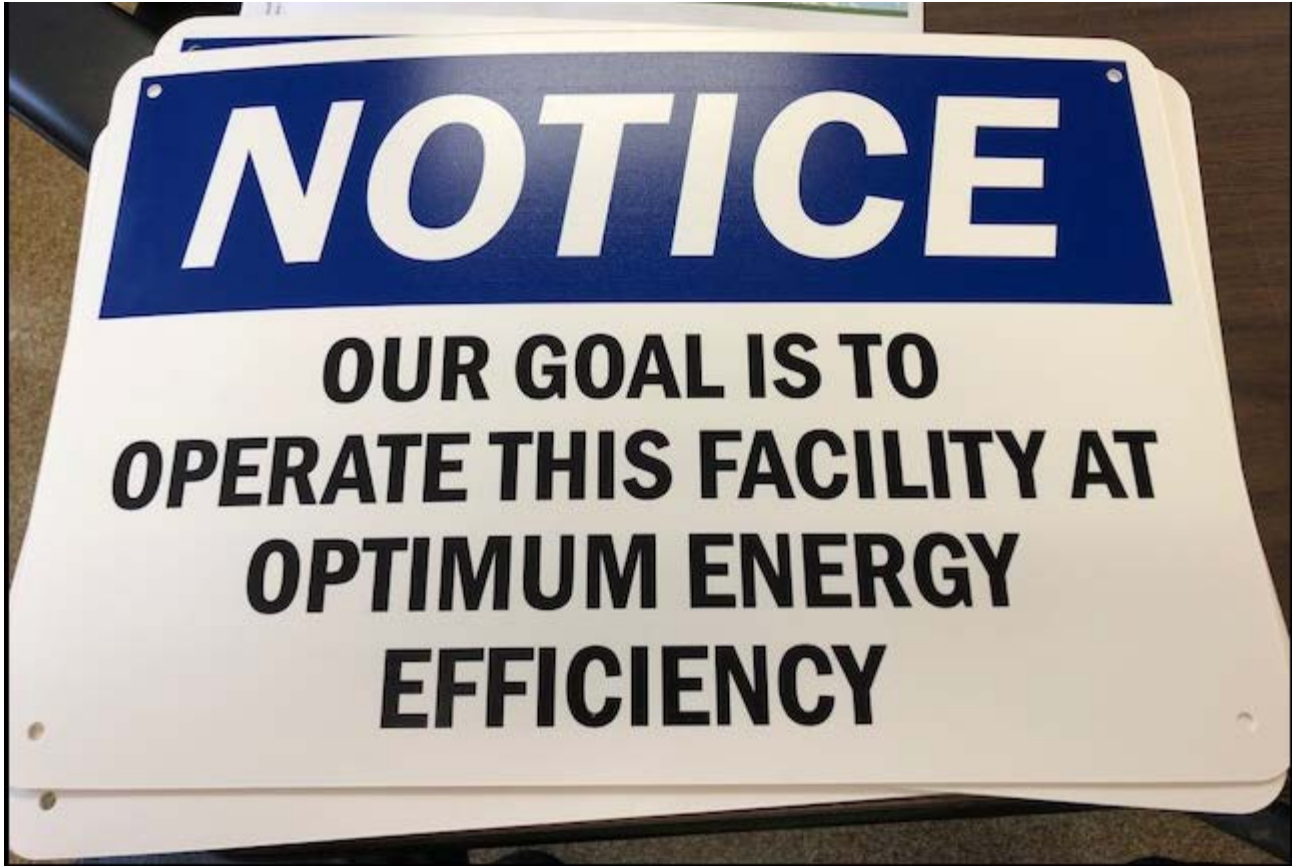
Contact a member of the Energy Management Team:

Cindy Moore: cmoore@astoria.or.us
 Jim Hatcher: jhatcher@astoria.or.us
 Sarah Hammond: shammond@astoria.or.us
 Seyrra Croy: scroy@astoria.or.us

We look forward to hearing from you!

This publication is brought to you by Public Works Administration.
 Thanks for tuning in!

Sincerely,
 Sarah Hammond



Bottom-Up Calculation Additional Details

OPPORUNTITY #2 – BLOWER AND MIXER OPTIMIZATION

Assumptions

Nominal Voltage (V)	480
Blower Power Factor	0.72
Mixer Power Factor	0.77

	Blower 2	Blower 3	Blower 4	Blower 5	Blower 6	Blower 7	Blower 8	Blower 9	Blower 10	Mixer 2	Mixer 3	Mixer 4	Mixer 5	Mixer 6	Mixer 7	Mixer 8	Mixer 9	Mixer 10	TOTAL
Rated Power (hp)	3	3	3	2	2	3	3	2	2	20	20	20	15	15	20	20	15	15	183
Input Current (amps)	4.50	4.50	4.50	2.60	2.60	4.50	4.50	2.60	2.60	22.00	22.00	22.00	17.00	17.00	22.00	22.00	17.00	17.00	132.8
Average Input Power (kW)	2.7	2.7	2.7	1.6	1.6	2.7	2.7	1.6	1.6	14.0	14.0	14.0	10.8	10.8	14.0	14.0	10.8	10.8	132.8
Baseline Average Blower Run Hours/day (November - April)	22.5	22.0	22.4	13.4	21.2	21.7	22.5	21.7	21.7	22.0	22.0	22.0	22.0	21.6	21.7	13.4	21.7	21.7	
Baseline Average Blower Run Hours/day (May - Oct)	23.8	23.8	23.8	23.6	23.7	23.8	23.4	23.8	23.3	23.8	23.8	23.8	23.8	23.8	23.8	23.2	23.8	23.3	
EEM Average Blower Run Hours/day (November - April)	11.54	11.34	10.23	11.35	11.03	0.43	10.01	11.07	9.70	11.59	11.39	11.36	11.41	11.03	0.81	10.79	11.07	11.05	
EEM Average Blower Run Hours/day (May - Oct)	15.77	15.77	15.77	15.77	15.56	7.49	15.95	16.26	16.26	15.77	15.73	15.73	15.77	15.14	8.33	15.94	16.26	16.26	
Energy Savings (November - April) (kWh)	5,371	5,238	5,972	575	2,894	10,441	6,116	3,018	3,389	26,619	27,149	27,209	20,919	20,806	53,415	6,636	21,022	20,954	267,741
Energy Savings (May - Oct) (kWh)	3,913	3,914	3,914	2,208	2,295	7,976	3,644	2,122	1,984	20,385	20,498	20,497	15,753	17,006	39,400	18,658	14,786	13,821	212,772
Annual Energy Savings (kWh)	9,285	9,152	9,885	2,783	5,188	18,416	9,760	5,140	5,373	47,004	47,646	47,705	36,671	37,811	92,815	25,294	35,807	34,775	480,513

DateTime	Mixer 2 Daily Runtime (Hrs)	Mixer 3 Daily Runtime (Hrs)	Mixer 4 Daily Runtime (Hrs)	Mixer 5 Daily Runtime (Hrs)	Mixer 6 Daily Runtime (Hrs)	Mixer 7 Daily Runtime (Hrs)	Mixer 8 Daily Runtime (Hrs)	Mixer 9 Daily Runtime (Hrs)	Mixer 10 Daily Runtime (Hrs)	Blower 2 Daily Runtime (Hrs)	Blower 3 Daily Runtime (Hrs)	Blower 4 Daily Runtime (Hrs)	Blower 5 Daily Runtime (Hrs)	Blower 6 Daily Runtime (Hrs)	Blower 7 Daily Runtime (Hrs)	Blower 8 Daily Runtime (Hrs)	Blower 9 Daily Runtime (Hrs)	Blower 10 Daily Runtime (Hrs)
02/01/20	0.2	0.2	0.5	0.5	0.0	0.0	0.2	0.0	0.2	0.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
02/02/20	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/03/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/04/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/05/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/06/20	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/07/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/08/20	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/09/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/10/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/11/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/12/20	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/13/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/14/20	0.2	0.2	0.5	0.5	0.2	0.2	0.0	0.0	0.0	0.2	0.2	0.0	0.5	0.2	0.0	0.0	0.0	0.0
02/15/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/16/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/17/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/18/20	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/19/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/20/20	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/21/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/22/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/23/20	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/24/20	11.6	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0
02/25/20	24.0	11.6	11.6	11.6	11.9	11.9	11.9	11.9	11.9	11.6	11.6	0.0	11.6	11.9	0.0	0.0	11.9	0.0
02/26/20	16.3	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0	24.0	24.0	0.0	0.0	24.0	0.0
02/27/20	24.0	16.3	16.3	16.3	16.3	2.5	16.3	16.3	16.3	16.3	16.3	13.9	16.3	16.3	0.0	0.0	16.3	0.0
02/28/20	24.0	24.0	24.0	24.0	24.0	0.0	14.1	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0	0.0	24.0	0.0
02/29/20	24.0	24.0	24.0	24.0	24.0	0.0	0.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0	0.0	24.0	0.0