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Municipal Water Efficiency Eco-Cluster:

ARLA FOODS

Case Study

A program of:

Toronto and Region Conservation Authority

Project Summary

View of Arla Foods (Google 2018)

Arla Foods Inc. (Arla Foods) participated in York Region's (ICI) Capacity Buyback Incentive program to identify water conservation opportunities at their facility. The facility had previously implemented water efficiency measures recommended in a York Water audit report, so the post audit verified the installed measures and identified additional ones.

A co-benefit of the water conservation measures is the avoidance of 212 tonnes/year of GHG broken down as follows:

- 7 tonnes/yr less GHG associated with electricity Toronto previously used to pump and treat the water that is now conserved
- 86 tonnes/yr less GHG associated with natural gas that Arla Foods previously used to heat the portion of the conserved water that was heated onsite to make hot water
- 119 tonnes/yr less GHG associated with fixing steam traps based on a steam trap survey that was conducted at the facility by a third party

Assuming that the water conservation measures remain in place for at least 10 years, the water conservation study will result in the avoidance of 1,224,000 m^3 of water use and 212 tonnes of GHG emissions.

About Arla Foods

Arla Foods is a 100-year old international dairy cooperative company owned by over 12,500 dairy farmers. Arla Foods operates a 6,777 m^2 facility located at 675 Rivermede Road in Concord, Ontario. The Rivermede facility makes fresh cheeses, including bocconcini, mozzarella, ricotta, mascarpone, parmesan, and asiago, among others.

Process & Resource Consumption

Arla Foods' major processes include milk pasteurization, cheese production, and packaging. Significant ancillary processes include CIP (clean-in-place) systems to sanitize production processes, and a steam boiler for process heating (e.g. pasteurization). Manual cleaning is also performed to wash floors, plastic totes, tools, etc., using spray nozzles.

Typical spray nozzle currently being used.

Resource consumption includes:

Natural gas

- Steam boiler heating
- Hot water for CIP
- Domestic hot water
- Hot water for manual cleaning activities

Electricity

- Lighting
- Process machinery
- Ancillary equipment (air compressors, pumps, controls, electronics, etc.)
- HVAC systems (heating, ventilation, and air conditioning)

Water

- Steam
- Pasteurization
- CIP
- Domestic
- Manual cleaning activities
- Boiler makeup
- Cooling water

The Case for Water Conservation

Due to the high rate of utility consumption by industrial facilities and the rising costs of utilities, food manufacturers are constantly seeking ways to remain competitive. One approach is to increase sales by selling more product and identifying new markets. However, given the typically tight margins of manufactured products, significant sales are required to generate additional profit. A more effective approach for generating additional profit is for manufacturers to make more money on what they are already selling by reducing baseline costs associated with the manufacturing process. Methods for doing so can include cutting labour, reducing waste generation, and using less energy and water. The preferred methods are reducing waste and consuming fewer utilities as they can significantly improve bottom lines and avoid layoffs. Reducing utility use, such as water consumption, is particularly effective. For example, if a manufacture's product sells at 5% margin and they reduced water consumption by $10,000 per year, the equivalent increase in sales that would be required to generate the additional $10,000 per year would be $200,000 per year.

Realizing the effectiveness of reducing utility use, Arla Foods participated in York Region's ICI Capacity Buyback Incentive program in 2014 and 2017.

York Region's ICI Capacity Buyback Incentive Program

Since Arla Foods is located in York Region, it was eligible to participate in York Region's ICI Capacity Buyback Incentive program. The program entitles ICI facilities located in York Region to a no-cost water audit and wastewater quality assessment (the wastewater portion is optional). York Region also offers an incentive program, which provides financial incentives to facilities that participate in the program that implement the recommended permanent process changes. For high-volume water consumers such as Arla Foods, reducing water use is an excellent way to be profitable and reduce its environmental footprint. Arla would also be eligible to receive a financial incentive based on the water it saves. There are additional economic benefits if the water is heated due to the natural gas required to heat the water to the required temperature. The combustion of the natural gas also impacts the facility's greenhouse gas (GHG) emissions.

Enviro-Stewards conducted water efficiency assessments of Arla Foods under the Region's program in 2014 and 2017.

Summary of Savings

The table below provides a summary of the estimated savings associated with the opportunities identified at Arla Foods. The numbers include the measures implemented from the 2014 assessment and the water conservation opportunities identified in the 2017 assessment.

Environmental Savings

Water savings (m^3/yr)
122,395

Electricity savings (kWh/yr)
146,874

Electricity GhG savings[1] (tonnes CO_2eq/yr)
7

Natural Gas savings (m^3/yr)
45,913

Natural Gas GhG savings[2] (tonnes CO_2eq/yr)
86

Total GhG savings (tonnes CO_2eq/yr)
212

NOTES:

[1]GHG savings estimates based on the following:

Associated with water use in Ontario:

0.05 $kgCO_2e/kWh$ * 1.2 kWh/m^3 = 0.06 $kgCO_2e/m^3$

0.05 $kgCO_2e/kWh$ – Environment and Climate Change Canada: Canada National Inventory Report, 1990-2014, Part 3, 2016

1.2 kWh/m^3 – adapted from Water Research Foundation & Electric Power Research Institute: Electricity Use and Management in the Municipal Water Supply and Wastewater Industries, 2013

Associated with natural gas combustion in Ontario:

Ontario natural gas combustion = 1.879 kg CO_2e/m^3

[2]Assumes City water temperature of 12°C, heated water temperature of 30°C, and a boiler efficiency of 80%.

Economic Savings

Incentive amount[1] ($)	Economic savings ($/yr)	Average Payback (years)
$50,000	$710,700	1.4

NOTES:

[1]Actual potential incentives are $211,612; however, the York Region program has an incentive cap of $50,000 per facility.

Summary

(image on the right) Component of CIP system.

1. Arla Foods was able to participate in York Region's ICI Capacity Buyback Incentive Program, which provided them with a water audit at no-cost.
2. Arla Foods received an incentive of $19,487 from the implemented measures and potentially $30,513 can be incentivized from the identified opportunities in 2017.
3. Additionally, Arla Foods realizes additional monetary savings associated with the water conservation measures identified in their water conservation plan.
4. The total identified water savings of 122,395 m^3/year also have significant GHG savings of 212 tonnes of CO_2e/year associated with reduced hot water consumption and pumping.

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