Water and Energy Assessment for Specialty Fish Processor

Client
A food processor, located in Brooklyn, NY, is a producer of various specialty fish products such as smoked salmon. They purchase frozen fish and thaw them with flowing city water as the first processing step. The company uses approximately 30 million gallons of water per year at a cost of $245,000. The major portion of this water is used in the thawing process.

Opportunity Areas
The fish thawing operation requires regular monitoring of the fish to avoid over-thawing or under-thawing. The water flow rate, incoming water temperature, fish size, and total fish load can vary. Therefore, the time and water volume needed for proper thawing of any given load of fish has wide process variation.

Objectives
Identify the best practices in the food industry for fish thawing. Evaluate alternative methods of thawing fish such as air thawing, still water thawing, etc. Identify methods of monitoring or controlling the thawing rate. Determine whether there is an optimum process that can minimize water use.

Work Performed
NYSP2I, in collaboration with Industrial & Technology Assistance Corporation (ITAC) and Energy Concepts, developed a baseline of water use for the fish thawing operation. The amount of heat energy needed to thaw a known quantity of fish, the amount of heat available from an on-site CHP system, thawing models, and thawing tests were all part of the engineering evaluation. Incoming city water averaged 54°F for 2009 with a low of 35°F.

The best practices for thawing fish recommend that fish be thawed in flowing water in the range of 61-70°F to minimize bacterial growth. The recommended optimum final fish temperature for filleting is 32-45°F. This information provided a target for the final process parameters.

Results
Air thawing equipment was both costly and expensive to operate so was not considered as a viable option. Thawing in still water requires chemical treatment and is very slow and therefore was not feasible. Recovering additional waste heat from the on-site electricity generation system (CHP) can provide enough hot water to thaw fish year round with 63°F water. The estimated water use would become 7.8 million gallons per year at a cost of $57,000. This represents a 75% reduction in water use. This is also the least costly option as well as most similar to the existing practices at the company. The thawing process would also become more consistent due to reduced thawing variables. The equipment cost and the water savings provides a simple payback of approximately 7 months.

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