

Waukesha® Power. connection plus

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Poultry Plant Lowers 'Cost-per-bird' Using Waukesha Engine

Through a well-planned combined heat and power (CHP) system, Banham Poultry, the main supplier to England's largest supermarket chain, is now making all of its electricity on-site and using "waste" heat for heating and cooling as well.

After an August 1998 fire completely destroyed its main processing facility the search for another site uncovered an early 1800s cider works a mile and a half away. Thirteen months later it is a modern facility employing 350, with activity going on around the clock, seven days a week, although actual processing takes about a shift and a half.

"It probably would have been more beneficial to build from a greenfield site but time didn't permit that because our customers weren't prepared to wait that long," admits Robin Goram, Associate Director Engineer, Banham Poultry Limited. "We also own farms and hatcheries that produce chickens and we didn't have a place for them to go, so we had to get a site up and running rapidly."

Around 42 to 49 days after a chick is hatched it's a "broiler," ready for processing. The chicks Banham uses come from local farms, the majority of which are in a 60 mile range. Every week, 575,000 birds are brought in live and leave ready for the frying pan, rotisserie, barbecue grill or however customers want them. The birds are sold across the UK by the island nation's largest supermarket chain. Chickens are brought in and "dispatched" on the

same day, portioned the following day and then shipped fresh to stores. Banham Poultry Ltd. uses a lot of energy during this process, about three megawatts each day. Recently, a natural gas fueled engine/generator set was brought on line to meet nearly all of the plant's needs.

Once all the combined heat and power (CHP) systems are in operation the engine/generator will not only provide all the electrical power the facility requires, heat from the engine will also be used to provide hot process water and run absorption chillers. The cogeneration plant uses all of the heat produced by the engine. The engine's jacket water (coolant) is used to warm process water to 90° while the exhaust can heat water to 125° to run an absorption chiller. Any excess heat not required by the chiller will also be used to heat water. This way about 80 percent of the engine's energy is used.

"We pay different rates for energy according to time of day," Goram explains. "Because the electricity here in the southeast of England is generated by nuclear plants, the rate is very cheap from 12:30 a.m. to 7:30 a.m. But we do very little processing then, so we buy power from the grid during this time period. For the other half of the day, the rate is the highest so that is when we run the engine/generator package."

"Everything is done at a cost-per-unit basis, literally a "cost per bird." While I won't divulge what our cost for electricity per chicken is, I will say that with the CHP



According to Banham's Associate Director Engineer, Robin Goram, "with the Waukesha Engine, we hope to reduce our energy costs by 50%."

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system we hope to reduce our energy costs per bird by 25 to 35 percent. This is important because we are a very, very large user of energy. And we will save even more once the digester gas system is up and running and providing some of the fuel for the engine. Then we hope to reduce our cost by up to 50 percent per bird.

Banham prides itself on being an environmentally friendly, or "green", company. The water that carries the away the effluent is cleaned and filtered before being returned to a local river, the sludge that comes off the water is made into fertilizer and the methane from the digester process will soon be used to provide 15 percent of the fuel for the engine. Interestingly, the byproducts of offal, manure and other litter are put to use as well. The offal is recycled into feed, while other leftovers are burned to generate electricity.

Goram would like all of the plants to be totally green, no refrigerants or other gases that can contribute to the greenhouse effect. "People in the UK are very concerned about what's going on with global warming, and if we can put something in place that helps ease the problem and is cost effective, we will do it. We're not a large company, we're a family business and we pride ourselves on three things: quality, quality and quality. We do what we say, never let a customer down, and we're very successful because of this."

With 22 years of experience at Banham, Goram is in charge of the day-to-day equipment operations and supervises a staff of 30. Cost savings are an important part of his job; making power on-site is a logical extension of the constant goal of cost reduction. As he puts it, "we keep wanting another slice of the cake and eventually will wind up with all of it. For example, we have to buy natural gas to run the engine, but eventually we will use some gas produced on site to add to it."

"We had originally looked at diesel-powered generators to handle peak periods, but when we realized how much the fuel costs would be we quickly changed our minds," Goram explains. "When we started doing the 'number crunching' we came to the conclusion that a two-and-a-half megawatt, natural-gas fueled engine/generator would best fill our needs, especially once the CCL was factored in."

"Contrary to what many people might believe, poultry processing is a fast-moving industry subject to the whims of supermarket shoppers. If you invest in it, you want very rapid paybacks. The engine/generator package is expected to have a four-to-five year payback, which may be considered long for the industry we're in, but the fact that a government climate key almost pays us to use the engine makes it all worthwhile. And, we're always going to need energy. On the other hand, micro-turbines were considered briefly but the return on the investment wasn't there."



The engine provides 2.5 MW of power plus heat for process water and to run absorption chillers.

Because the Attleborough plant is in the middle of a highly populated area, the engine is located in an acoustic enclosure as sound attenuation was a factor. There have been no complaints from the neighbors about any engine noise. Local laws dictate that no engine noise can be heard 10 meters from the building. The CCL actually made permitting the engine easier.

In the future, surplus power produced at the Attleborough facility may be transported via the local grid for use at other Banham Poultry sites. Nearby sites include farms, hatcheries and processing centers. Banham insists on strict quality control and either owns its own farms, or contracts for the entire production of a farm as well as buying chickens from local growers.

The Banham Poultry CHP facility relies on a Waukesha 12V-ATGL engine which produces around 2.5 Megawatts of continuous 50 Hz power at 1000 rpm. The engine is manufactured by Waukesha Engine, Waukesha, Wisconsin, USA and drives a Leroy Somer generator. Through cogeneration, the distributed generation system is reaching 80% efficiency.

"If I left this job and took similar position with any company that is a large user of electricity and heat, I would recommend and insist on installing a CHP system. Especially where there's a demand for both electricity and heat. There is a lot of equipment that can be run with heat - chillers, air-conditioning and the like - and with today's cost of energy, distributed generation or on-site power, makes a lot of sense." ■

Waukesha Power connection plus

The Waukesha Power connection plus is intended to enhance and promote communications to all areas of the Waukesha Engine Family.

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