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Greenhouse to utilize CO₂, waste heat from adjacent ethanol plant

By Holly Jessen | January 04, 2013

Across the road from Greenfield Ethanol-Chatham, construction on Truly Green greenhouses is ongoing. The innovative project will utilize the waste heat and CO₂ from the 195 MMly ethanol plant in Chatham, Ontario, Canada, to grow a whopping 22 million kilograms of fresh juicy tomatoes yearly, when completed.

Angelo Ligori, ethanol plant manager described it as a rare opportunity to harness the CO₂ released in the ethanol process to grow food. The ethanol plant will update its older technology, which currently doesn't include waste heat recovery or a thermal oxidizer. The new technology will condense stack heat through a series of exchanger systems, allowing the ethanol plant to supply hot water to the greenhouse. The water will then be returned to the ethanol plant through an expanded cooling water loop. "Once this project gets done, our energy footprint will be significantly reduced, so it's a win-win," he told *Ethanol Producer Magazine*.



Greenfield Ethanol-Chatham is one of four Canadian facilities operated by the company.
Greenfield Ethanol

The project received a \$3.2 million grant from Ontario's Ministry of Agriculture, Food and Rural Affairs. The funding will be used to offset the cost of engineering and specialized equipment, said Greg DeVries, owner of Cedarline Farms and CEO and part owner of Truly Green. Construction will be completed in four phases. When complete, tomato greenhouses will cover a total of 90 acres sitting on 120 acres of land located across the street from the ethanol plant. The first phase, construction of a 22.5 acre greenhouse, is under way now, with an expected completion date in July.

The total cost to add additional technology and equipment at the ethanol plant hasn't yet been determined, Ligori said, although he did say it would be a multi-million dollar project. It will, however, create an extra revenue stream for the company, as Truly Green will pay Greenfield for the hot water and CO₂ supplied. "It's the type of thing that helps our bottom line, especially with the tight margins," he said, adding that additional benefits include creating jobs and making the ethanol plant more environmentally friendly. "I couldn't think of a better scenario," he said.

The first phase will create up to 90 direct and indirect jobs to construct and operate the greenhouse, according to an Ontario government press release. When all four phases are completed that number goes up to 400 direct and indirect jobs. It will also lower heating costs for the greenhouse by 40 percent and increase tomato production by 5 percent.

The DeVries family, which is working with an investment group on this project, has been in the farming business since 1948, DeVries told EPM. In 2006 the family diversified its farming operation with the addition of sweet bell pepper greenhouses, which have been expanded to 16 acres.

The idea of building a greenhouse next to the Chatham ethanol plant is one the two companies have been working on for a while. Greenhouses require year-round heat, which adds up to 40 percent of the cost of operation. Natural gas boilers are used to produce hot water and CO₂ is captured from boiler exhaust to help increase plant health and yield. A big challenge, however, is that the largest demand for CO₂ is in the summer, which is also the time of the lowest demand for heat, DeVries said. That problem is solved with working with the ethanol plant, which can supply the greenhouse with all the heat and CO₂ it needs all year long.

Another neat part of the story is that the farming operation produces corn and also includes a feedlot, he said. This means the company could deliver a load of corn to the ethanol plant, leave with distillers grains for its feedlot—all at the same time that heat and CO₂ is being used to grow tomatoes in the greenhouse. "It's an amazing story," he said, adding that it's beneficial for the local economy, the farming operation, the greenhouse and the ethanol plant. "I get goose bumps thinking about it," he said. Once the project is proved out, DeVries sees it as something that could develop into partnerships between other ethanol plants and greenhouse operations.

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