Operational since 1805, the distillery needed to install a reliable method for managing its “thick slop” or whole stillage in order to accommodate a planned 50% increase in production. After evaluating alternatives to the traditional energy-intensive “dry house” process that manages the whole stillage, Maker’s Mark selected anaerobic treatment of the high-strength stillage to produce renewable energy and a more environmentally friendly solution.

Prior to the installation of the anaerobic system, Maker’s Mark was giving the whole stillage to local farmers; however, this practice had become problematic and was impacting its ability to increase production.

“All of our whole stillage was given away at no cost to local farmers for cattle feed; the material is about 8% solids so it is a liquid feed,” said Dennis Potter, director of distillery and environmental operations for Maker’s Mark.

According to Potter, several factors influenced their decision to seek out an alternative process. “One was risk. Our production of distilled alcohol was reliant on when (and if) farmers could come to pick up the stillage. If farmers did not come, we had to shut down production. It was difficult to plan production under this model,” Potter explained.

“Another reason was our desire to expand the distillery’s output. There are not enough local farmers to consume the stillage from expanded production, so our expansion was dependent on finding an alternative system for handling the stillage.”

**Total Solution**

Faced with the increasing challenge of disposing the spent grains from the distillery process, Maker’s Mark turned to Ecovation, a division of Ecolab, Inc. Ecovation analyzed the waste streams, selected the waste treatment and energy conversion processes and was responsible for the detailed design and construction of the facility.

Bob Franklin, vice president, project delivery, for Ecovation said, “The core of the treatment process is Ecovation’s patented MFT, a high-rate anaerobic treatment process.”

According to Franklin, filtrate from the distillery’s spent grain (thick slop) is treated aerobically in an enclosed reactor to produce biogas with high methane content. The influent stream has a COD concentration of 30,000 mg/L and the reactor achieves 90% removal efficiency. The reactor converts the organic compounds to methane and CO$_2$ with very little biological yield.

This anaerobic process consumes far less power and produces much less sludge than a comparable aerobic system. The biogas is collected, compressed, dried and transported to the boilers at Maker’s Mark where it augments their natural gas, resulting in an approximate 25% reduction in natural gas consumption. The MFT effluent, along with the distillery’s process wastewater and sanitary waste, are polished by a modified activated sludge system with integrated clarifier and denitrifying capability prior to discharge into the adjacent river.

According to Potter, Maker’s Mark selected Ecovation’s system because of its small footprint and because the high-rate
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For a demonstration, please visit our website at www.plasmawhirl.com.

**Specifications**

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<th>Max. Flowrate</th>
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**Challenges**

Maker’s Mark was pleased that they didn’t face too many challenges during the project. “Because we were not replacing the existing system handling our stillage, we did not have too many installation challenges,” Potter said.

According to Ecovation, challenges of the project included the initial solids separation, biogas handling and making the most of the existing aerobic system, including keeping the treatment facility in operation during the construction process.

“For solids separation, Ecovation surveyed current technologies and chose a screw press in lieu of a more traditional centrifuge,” Franklin said. “The screw press is a low-rpm, small horsepower device that dewatered the spent grains to produce a 58% solids cake. Maker’s Mark distributes this byproduct as animal feed.”

In addition, Maker’s Mark wanted to maximize the energy benefit of the biogas that the MFT produced. After studying the usage of natural gas at the distillery, Ecovation concluded that injecting the biogas into the natural gas stream would allow Maker’s Mark to consume the biogas in their boiler equipped with oxygen trim without any modification to the boiler burner controls, Franklin explained.

The biogas is compressed to 25 psi with a two-stage compressor and cooled to 40°F to remove moisture before it is transported in a 2,500-ft pipeline to the boiler room.

According to Potter, one of the biggest challenges was taking the existing wastewater system’s sequencing batch reactors

anaerobic reactor did not require the retention time of regular anaerobic digesters. “We found a regular digester would require 10 to 13 days to treat our stillage, whereas Ecovation’s system can treat it in 6 to 8 hours,” Potter said. “Another reason we chose Ecovation was because they were willing to provide a turnkey approach. Ecovation handled the design from the stillage coming off the bottom of our stills all the way through to discharge in a local waterway. Their enthusiasm and breadth of knowledge within the wastewater/energy industry is what solidified our choice.”
(SBRs), and turning them into a continuous discharge set-up.

In order to maximize the usage of the existing wastewater SBR treatment tankage and equipment, Ecovation selected Advent’s patented AIS, integrated aerobic treatment system for polishing the effluent prior to direct discharge.

“The AIS includes a clarifier within an anoxic tank as well as an aerobic tank,” Franklin said. “Construction was staged such that two tanks were always available as equalization or aerobic treatment and final effluent quality was always maintained during the conversion.”

Fortunately for Maker’s Mark, project scheduling was not an issue because the distillery expansion was scheduled for completion in 2010.

Outcome

Ecovation developed the project under a design-build agreement with a six-month technical assistance and operations contract. The facility construction was completed in May 2008 and has gone through its commissioning phase.

Some of the key project benefits include: an increase in production, significant cost savings over a conventional dry house option, lower operating cost as compared to a dry house approach, offset of purchased natural gas by 15% to 30% from renewable energy and lower greenhouse gas emissions by renewable fuel substitution.

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