

Renewable fuel oil that can help fuel a sawmill's bottom line

Ontario “liquid wood” producer Ensyn Corp. is ramping up production of its renewable fuel oil and has put the welcome mat out to the forest industry, noting that its biofuel facilities—when attached to an existing sawmill—can help to improve the economics of a mill.

By Tony Kryzanowski

Ensyn Corp. is a well-established Canadian producer of bio-oil from wood residues, and has been producing bio-oil since 1989, dedicated primarily to specialty chemicals and heating fuels.

But the company is now ramping up its production capacity, embarking on a wider commercialization of its renewable fuels in North America and putting out a bigger welcome mat to the Canadian forest industry.

The privately-held company's main manufacturing facility is located in Renfrew, Ontario where it consumes about 70 bone dry tonnes (BDT) of wood fibre daily to produce three million gallons per year of a liquid fuel known as renewable fuel oil (RFO). It is used as a heating fuel and can serve as a renewable feedstock for refineries for the production of gasoline and diesel.

The company was founded by Bob Graham, Ensyn's Chairman and Chief Executive Officer, and Barry Freil, Ensyn's Chief Technology Officer, while the two were pursuing post-graduate studies at the University of Western Ontario in the early 1980s. They developed and patented Ensyn's rapid thermal processing (RTP) technology, which converts solid biomass to high yields of a liquid product—or “liquid wood”—in less than two seconds.



The conversion process takes place in a 45' high riser reactor where the wood fibre is injected and meets a tornado of hot circulating sand heated to about 500 degrees Celsius. The vaporized wood and sand exits the top of the riser into a cyclone where the sand and byproduct char are separated from the vapors and the vapors are drawn off and cooled into the liquid RFO biofuel. The sand and char byproduct is returned to the reheater where the char is burned off

and generates the heat for the system. The process yields about 70 per cent by weight from the dry feedstock.

Ensyn's RFO heating business is fully commercial. Contracts have been established with two hospitals in New Hampshire. Memorial Hospital in North Conway, New Hampshire has switched its entire heating fuel needs to Ensyn's

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renewable fuel oil. In September, Ensyn signed a seven year contract to supply Valley Regional Hospital in Claremont, New Hampshire with 250,000 gallons a year of its bio-oil, which also represents complete conversion of their fuel needs to Ensyn's renewable fuel oil.

These contracts are being serviced with production from the company's facility in Renfrew.

Petroleum-based heating fuels are commonly used throughout Eastern Canada and the American Northeast, which makes Renfrew, about 90 kilometres west of Ottawa, an ideal location for Ensyn's production facility.

The refinery application of its RFO, which Ensyn calls, "refinery co-processing", is in the last stages of commercialization. Ensyn and its partners have carried out over 200 demonstrations of this technology—many at commercial refineries. UOP, a subsidiary of manufacturing giant Honeywell, is Ensyn's technology partner in this commercialization. Ian Barnett, Ensyn's Executive Vice President, describes Honeywell as "the world's

leading technology provider to petroleum refineries."

Under this application, Ensyn's RFO is fed directly into existing refinery fluid catalytic crackers (FCC). The RFO is converted into gasoline and diesel. The company believes that this application is a game changer due to the size of the opportunity, Ensyn's economics, and the ease of deployment based on leveraging existing refinery and downstream infrastructure.

The company is currently completing a \$4 million enhancement at its Renfrew facility that will allow it to operate 24 hours a day, seven days a week to meet growing market demand. It received a \$1.5 million grant from Ontario's Centre for Research and Innovation in the Bio-Economy (CRIBE) for this work.

The lead general contractor on the construction project was Kilmarnock Enterprise from Smiths Falls, Ontario, the lead electrical contractor was Valley Automation & Controls Inc. from Renfrew, and Leekor Engineering Inc. from Ottawa was responsible for reviewing and approving the structural and civil designs.

The project is allowing the company to

source and store a wider variety of feedstock and will convert the plant from a mixed-use chemicals and fuels plant into a dedicated biofuels facility.

Ensyn can accept all types of wood waste for its process. Prior to use, the wood waste must be reduced to a size of less than a quarter inch in diameter with moisture content of six to seven per cent. It has tested over 100 different feedstocks. Originally, wood waste from a hardwood flooring plant in Renfrew supplied all of their raw material. That flooring plant has since shut down, but the company has been able to find sufficient wood waste suppliers within about a 150 kilometre radius of Renfrew to support their operations.

At a time when there is considerable interest within the forest industry and government in both value-added opportunities and bio-product development to find new markets for forest products, Ensyn believes it has a lot to offer.

"From a government, industry and local community perspective, we're

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providing the wood industry with a new value-added product use for its residues at a time when the market for residues has been somewhat stressed due to the shifting of the pulp business to the tropics and the fibreboard business moving to Asia," says Barnett,

Ensyn believes that its biofuel facilities, when attached to an existing sawmill or pulp mill, can help to improve the economics of those facilities and provide employment in areas experiencing financial distress. Also, the biofuel plant provides a home for forest residues like pre-commercial thinnings and slash piles.

"What we're seeing in some areas we are working in is that pre-commercial thinning is not being carried out in an optimal way because the market for the residuals is poor," says Barnett. "So, we believe that a value-added home for the residuals using our technology will allow the forests to be managed in a more efficient way, generating higher yields."

Ensyn's recent focus is on developing a string of new projects in North America and internationally, including Brazil. Its

business model is to build, own and operate bio-oil production facilities with partners, who could be either raw material suppliers or end users.

Several factors are helping to improve the current marketability of Ensyn's product. Barnett says greater environmental concern about burning fossil fuels and their contribution to climate change as well as global turmoil raising concerns about energy security have worked in their favor.

"Today, there are both formal and informal supports for renewable energy that weren't in place 15 years ago," he says.

Ensyn's potential has caught the eye of leading industrial players including technology provider UOP, fibre producers such as Brazil's Fibria Celulose S.A., and potential end users such as energy giant Chevron. Barnett says they are working with numerous leading North American fibre producers as well.

The company has a long history of partnering with industrial entities. It initiated commercial operations in 1989 with Red Arrow, a food flavorings company from Wisconsin, and this relationship continues today. This was followed by

the development and then sale of its petroleum upgrading business to Ivanhoe Energy Inc in 2005 for \$100 million.

Since the Ivanhoe sale, Ensyn has been squarely focused on further developing and expanding its biofuels business. It commissioned its commercial bio-oil manufacturing facility in Renfrew in 2007 and followed that by signing a strategic alliance agreement with UOP, to create Envergent Technologies LLC. Envergent provides engineering services and supplies Ensyn's RTP equipment to projects developed by Ensyn and its partners, with performance guarantees.

The company's partnership with Fibria Celulose S.A. involves developing projects in Brazil. The initial project has been announced at Fibria's 2.6 million ton per year Aracruz mill, north of Rio de Janeiro. This project will produce 20 million gallons per year of RFO for use in Brazil and for export. Barnett says that they have various similar size projects in the works in North America.

A 20 million-gallon per year facility consumes about 400 BDT of wood residuals per day. Ensyn also has a five million-gallon UOP plant design, which

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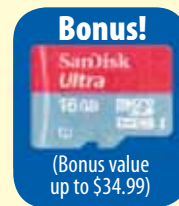
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would consume 100 BDT per day. Barnett says the total project cost of one of its larger facilities is around \$100 million. Each takes one to two years to build. The footprint of a bio-oil production plant based on Ensyn's technology is relatively small because the process works so quickly and there is very little product in the system at any one time in this continuous process.

Raw material consistency is fairly important in the performance of Ensyn's

bio-oil production system, and this is something that it evaluates as part of a system design. The pre-processing equipment required on the front end of a project to bring the material down to that quarter inch or less material size and with the correct moisture content also factors into a system's design and cost.

"The ability to burn wood material into liquids is not in question because we've done it for many, many years," says Barnett. "The wood handling is something

that is tailored to suit the circumstances of each individual project, but all of that equipment is off the shelf."

Ensyn expects to make a number of announcements over the next year related to new projects, additional contracts for its bio-oil and new joint ventures with large wood fibre suppliers and customers.



CALENDAR

March 17, 19 & 24

Woodland Operations Learning Foundation (WOLF) Spill Response Course, Slave Lake, AB (March 17), Edson, AB (March 19), Cochrane, AB (March 24)
1-866-293-9653, www.w-o-l-f.ca

March 18-20

World of Wood Convention Las Vegas, NV
703-820-6696, www.iwpawood.org

March 23

Woodland Historical Resource Course, Rocky Mountain House, AB
780-432-1177
capf.ca/event_registration-public.cfm

March 24-26

NAWLA Leadership Summit, Scottsdale, AZ
800-527-8258, www.nawla.org

April 8-9

Council of Forest Industries Annual Convention, Prince George, BC
604-684-0211, www.cofi.org

April 18-19

College of Alberta Prof. Forest Technologists' Assoc. AGM, Edmonton, AB,
780-432-1962, www.capft.ca

April 22-23

First Annual Forestry Summit Thunder Bay, ON
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