

Company plans biorefinery for zero-emission heating oil in Maine

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By Tux TurkelStaff Writer

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A research and development company that has spent nearly 20 years honing new ways to turn woody waste into commercially viable energy and chemicals says it is close to building a biorefinery in Maine that will produce zero-emission heating oil.

Biofine Developments Northeast Inc. of Bangor said it has formed a partnership with New Hampshire-based wholesale energy supplier Sprague Resources LP to help produce and market a patented biofuel made from 100 percent ethyl levulinate, an organic chemical compound often referred to as EL.

Biofine said it hopes to finalize the site of its first biorefinery within the next month and be operating by 2023. The plant would process 100 tons a day of cellulose-based waste, primarily from paper and lumber mills, to make 3 million gallons of heating oil a year. It also would produce a side stream of renewable chemical byproducts that can be sold.

Biofine is working with Treadwell Franklin Infrastructure Capital, a developer and financier involved in other Maine ventures, to help it bring the project to commercial scale and raise \$70 million from private investors.

Those partnerships signal what could be a major development for Maine's energy and forest product markets, as well as a new and unexpected tool in the state's ambitious quest to slash greenhouse gas emissions linked to climate change.

Policy makers in Maine and across the Northeast are pushing homes and businesses to dump boilers and furnaces that run on oil in favor of efficient electric units, namely heat pumps. But if a 100 percent concentration of Biofine's fuel – known as EL100 – can be made at competitive prices and widely distributed in the region, heating oil could become a locally produced, renewable energy source.

That would be of special interest in Maine, where six in 10 homes still rely on oil as their primary heat source. Residents and businesses would be able to burn the cleaner fuel without making any changes to their heating equipment.

“This puts the heating oil industry in a unique position,” said Mike Cassata, Biofine's chief development officer. “The infrastructure is already in place. They have the expertise for distribution and storage. They could help lead the green energy movement.”

Independent testing shows that EL100 gives off zero greenhouse gas emissions, according to Biofine. The company said it also has worked with industry labs to make sure EL100 can be burned safely in existing equipment, and conducted a small trial earlier this year in buildings at the University of Maine at Presque Isle. The company also received a \$750,000 grant from the Maine Technology Institute to support commercial development.

Biofine was founded by Stephen Fitzpatrick, who remains its president and chief executive. Fitzpatrick has been striving for years to bring the technology to market, starting at a small-scale plant in Gorham in 2006. He has since worked extensively with UMaine's Forest Bioproducts Research Institute. They jointly operate a pilot plant at the institute's facility next to the ND Paper mill in Old Town.

The Old Town mill was a candidate for the biorefinery in 2017, but it became unavailable. A subsequent plan to locate at the former Verso paper mill in Bucksport also fell through, with that site now slated to become a salmon farm. Cassata declined to identify the latest planned location.

THE FUTURE OF OIL

The potential for a biorefinery in Maine is exciting news for the National Energy & Fuels Institute, the Washington, D.C., trade group representing oil, propane and biofuel dealers. The industry has been trying to slow a steady migration of heating oil customers to

alternatives including natural gas and heat pumps and is under pressure to transition to cleaner fuels.

In September, the group pledged that the heating oil industry would cut carbon emissions by 40 percent by 2030, and eliminate fossil energy use by 2050. The resolution was backed by various state dealer groups, including the Maine Energy Marketers Association.

To get to zero, the industry needs a 100 percent renewable replacement that performs well at extremely cold temperatures and is produced in the Northeast, where most of the country's heating oil is consumed. Biofine could check all those boxes.

"Biofine is the most significant development for our industry that has occurred, in my opinion," said Sean Cota, president and chief executive of the National Energy & Fuels Institute.

EL100 also could complement the move to electrify heating in the Northeast, Cota said. Oil-fired furnaces work well in extreme cold, so they could take some of the pressure off the electric grid on frigid days, Cota said. That's when more costly generators are needed to meet hours of peak demand, which is expected to grow as more heat pumps are installed.

"If policymakers are serious about actual climate-change reduction," Cota said, "renewable heating fuels will get them there faster than anything else, and at no cost to the consumer."

But consumer cost and interest will likely emerge as marketing issues.

For instance, the industry has for years been blending concentrations of vegetable-based oil into petroleum fuel, creating a product called Bioheat. Concentrations of between 5 percent and 20 percent are common, and have been shown to lower key emissions without hurting heating equipment.

The Bioheat fuel known as B-20 (20 percent biodiesel) is available in Maine, and was selling this week in the Portland area for \$1.64 a gallon. That's only a few cents above the average price for regular heating oil.

But Bioheat isn't well promoted in Maine. Cota, of the dealers' group, estimated that Bioheat makes up less than 7 percent of heating oil sold in the Northeast.

Sprague Resources has years of experience selling a range of Bioheat blends and is among the largest distributors of biodiesel fuel in the region. Based in Portsmouth, Sprague is a publicly traded energy company and major wholesale fuel supplier for the Northeast. It operates a tank farm and terminal in Portland Harbor.

Sprague CEO David Glendon said Biofine's technology and strategic location make it a logical partner. Sprague said it sees the potential to both blend EL100 with petroleum to lower emissions, and use it as a standalone product for both heating and transportation.

Sprague acknowledged that price will be an important consideration for customers. Cassata said Biofine expects to be able to produce EL100 at prices that can compete with conventional fuel. So it will be up to Sprague and dealers to promote the benefits of a zero-carbon product, and up to consumers to choose it.

'NOT JUST AN IDEA'

At the moment, the potential benefits of renewable heating oil haven't drawn much attention at the Maine Climate Council, the body set up to prepare a far-reaching action plan for lawmakers to consider next year. Reflecting a recent law, the goal is to reduce greenhouse gas emissions in the state by 45 percent by 2030, and 80 percent by 2050.

The council's draft report, being finalized now for release Dec. 1, suggests looking into a requirement that a certain percentage of heating fuels sold in Maine be renewable.

"This would encourage the development of renewable fuels and technologies in Maine, such as biofuels made from wood biomass, biodiesel from used vegetable oils, and fuels made from anaerobic digesters on farms," the draft report says.

A similar requirement already exists for electricity supply, called a Renewable Portfolio Standard. As part of Maine's climate legislation, that mandate is being raised from 40 percent now to 80 percent in 2030.

Biofine is a member of Biobased Maine, the trade group promoting sustainable manufacturing and biomass solutions. The group's executive director, Marina Bowie, said the planned biorefinery would help create new markets for waste wood from sawmills and the state's surviving paper mills. To her, the partnership with Sprague is a key indicator that the project is on a path to reality.

"For a company like Biofine looking to scale up, getting purchase agreements with a big company like Sprague is huge," she said. "It's not just an idea anymore. It's a real thing and it's coming to Maine."

Bowie noted that heating oil is the market entry point for Biofine, but the chemical byproducts will likely have an even higher value. The economics will be helped by a new Maine law that extends tax credits to the production of renewable chemicals and biofuels.

But Biofine is at a critical point, Bowie said. Many companies validate their technologies at universities at a demonstration level, but stumble when they can't raise enough capital to reach commercial scale.

“They need funding to overcome the valley-of-death stage,” she said.

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