Fuel in the trees: Hope for alternative revolution

BY CHRISTOPHER BURNS
BDN STAFF

Seven years ago, many in Maine held high hopes for a "marriage of manufacturing and technology" promised by a new owner of the longstanding Old Town mill. That owner, Patriarch Partners, planned — with the help of University of Maine researchers — to put Maine's forests to work in a new way: by producing cellulosic, or wood-based, ethanol that would power our cars.

A $30 million U.S. Department of Energy grant won by the mill's previous owner, the bankrupt Red Shield Environmental, was supposed to help with the eventual launch of a biorefinery in Old Town.

But the development of ethanol didn't keep Patriarch Partners from going the way of Red Shield in 2014. When the mill reopened again under Wisconsin-based papermaker Expera Specialty Solutions in January, cellulosic ethanol wasn't part of the business plan. Now, Expera plans to close up shop in Old Town at the end of the year.

While it's possible a new owner could restart a biorefinery at the mill, cellulosic ethanol has not proven to be economically viable, and some doubt it ever will be. The future of ethanol as a potential bright spot for Maine's forest economy is less certain today than it had looked a decade ago.

Advanced research

While Expera opted not to continue operating the Old Town mill's biorefinery, the university has continued work at its pilot plant on the mill's campus.

"UMaine's biorefinery research program is ongoing," said Jake Ward, UMaine's vice president of innovation and economic development. "Our R&D activity was not interrupted" by the August 2014 exit of Old Town Fuel and Fiber.

Ward said the university is open to working with a new mill owner to restart a biorefinery, but whether the university's work continues at the mill depends on that owner's intentions for the site.

The university's research began back in 2006 when it received a $6.9 million National Science Foundation grant to fund its Forest Bioproducts Research Institute and support research into developing ethanol from Maine's abundant supply of wood. The endgame was to enable the private sector to eventually create a viable biorefinery.

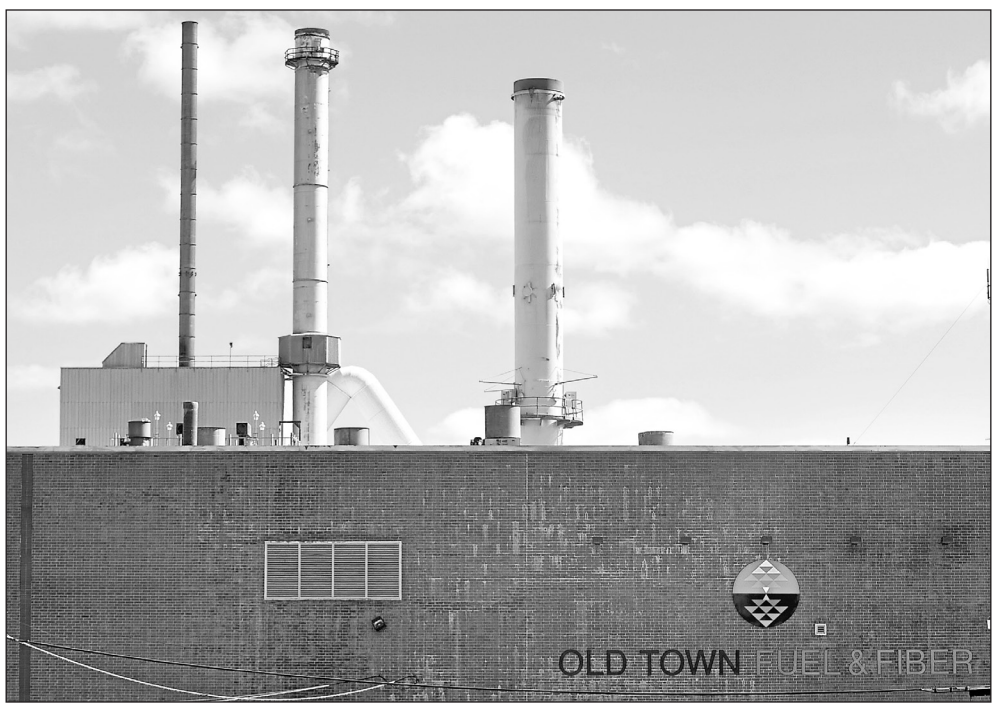
The grant would help Maine "again propel forward in the critical research and development that will enable us to better compete in the 21st century economy," Gov. John Baldacci said at the time.

The university partnered with Red Shield, and later Patriarch Partners, to set up a pilot plant on the mill's campus where much of this research could be put to work. Since then, Stephen Shaler, director of the UMaine School of Forest Resources, said that university faculty members have made "a tremendous amount of progress" with research into producing ethanol from wood.

At the university's pilot plant in Old Town, cellulose, or sugar, is extracted from wood prior to the pulping process. It's then converted into ethanol, a process that university researchers have helped to develop. Shaler said the pilot plant can extract up to 10 tons of cellulose a day. While it can be used to produce fuel, it can also be used to make plastics and chemicals.

And by extracting cellulose from the wood prior to pulping, it still allows the wood to be made into pulp or paper, which have a higher value than ethanol.

"Wood fuel tends to be of a lower value than other value-added products you can make from wood, such as pulp and lumber," he said.



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The Old Town Fuel & Fiber mill is seen in Old Town in September 2014.

If cellulosic ethanol is to become integrated into Maine's forest economy, it needs to coexist, not compete, with existing pulp or paper production, Shaler said.

'A tough market'

Although the university has refined the technical process of converting cellulose from wood into ethanol, Shaler said that the leap to commercialization has proven elusive.

UMaine economics professor Jonathan Rubin has studied alternative fuels and noted that cellulosic ethanol production is still a capital-intensive and costly process, meaning, at least for now, large-scale production isn't cost-effective.

A Congressional Research Service report published in January put the construction cost of one cellulosic ethanol plant, with a capacity of 30 million gallons per year, at $225 million. A corn ethanol plant that produces 40 million gallons annually, on the other hand, would cost $80 million.

Higher startup costs and the uncertainty around cellulosic ethanol's competitiveness "can potentially wreak havoc on [the] emerging industry," the report states.

Additionally, Rubin said that falling crude oil prices have chipped away at the economic competitiveness of cellulosic ethanol.

"With petroleum prices falling, it's a tough market [for ethanol]," Rubin said. "It would help if petroleum prices went up."

Crude oil prices have fallen to about $45.55 a barrel from more than $100 in mid-2014. As a result, the national average for gasoline prices had fallen to a six-and-a-half-year low of $2.27 a gallon, as of Oct. 19. The U.S. Energy Information Administration forecasts that prices will remain around their current mark through 2016.

Although conditions aren't ideal right now, Rubin estimates Maine could harvest about 3.9 million tons of tree tops and limbs each year — including 1.2 million tons currently used to produce electricity — to process into fuel, which is enough to feasibly run "a modest-sized plant."

Uncertainty

Less than a decade ago, federal energy policy offered hope that wood-based ethanol would one day be in demand. The Energy Independence and Security Act of 2007, signed into law by President George W. Bush, expanded the Renewable Fuel Standard, mandating that ethanol production reach 36 billion gallons annually by 2022. Sixteen billion gallons of that amount would come from cellulosic ethanol.

Even with the role of cellulosic ethanol enshrined in law, production has never reached the legally prescribed levels.

Ethanol derived from corn has a tight grip on the biofuel marketplace. In 2013, the U.S. consumed about 13.2 billion gallons of ethanol; 95 percent was sourced from corn and about 5 percent from sugarcane. (U.S. gasoline consumption, including ethanol, totaled 134.5 billion gallons.) Ethanol production in 2013 consumed about 5.1 million bushels of corn, or 38 percent of that year's harvest.

Perhaps it's no surprise that the federal government has backed producers of corn-based ethanol with about $50 billion in subsidies since 2005, according to researchers from the Institute of Agriculture at the University of Tennessee. Meanwhile, cellulosic ethanol producers, who were expected to phase out reliance on corn-based fuel, have received about $928 million in federal support since 2007, by one estimate.

Since cellulosic ethanol production has fallen well short of the levels mandated under the Renewable Fuel Standard, the U.S. Environmental Protection Agency has repeatedly slashed the mandate every year since 2010. In 2013, the EPA cut the production mandate to 810,185 gallons from 1 billion.

Even with scaled-back mandates, production reached only 510,000 gallons in 2013, according to the U.S. Department of Energy's Alternative Fuel Data Center, about 0.05 percent of the original goal.

Failure to meet the legislated mandates has spurred talk of repealing the Renewable Fuel Standard, which could do away with a key part of the federal support that has propped up what little cellulosic ethanol production exists today.

If this uncertainty continues, it could further undermine the ability of cellulosic ethanol to ever make its way into consumers' gas tanks, much less produce jobs in rural Maine. The uncertainty around cellulosic ethanol could signal to a prospective Old Town mill buyer that a biorefinery operation may not be worth the cost.

Still, while cellulosic ethanol hasn't proven its economic viability, Shaler said that finding new value-added forest products is necessary to make the forest economy more robust and resistant to market downturns.

"Having another market, another use for the wood, allows us to get the optimal value from the wood," he said. "[The forest economy] becomes more resilient, more flexible."

VOC

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Today, there are some tricks to get water to work for caffeine extractions, although the VOC extraction route has not been abandoned. Indeed, CO_2, which is dirt cheap, simple, non-toxic, and so volatile that it is a gas except under certain conditions, is now widely used for decaffeination. Under high pressure, CO_2 can exist as a liquid capable of dissolving non-polar, greasy compounds. Simply release the pressure, and the CO_2 vanishes into thin air, leaving behind the extracted material.

This high-pressure CO_2 technology is what Tom's of Maine takes advantage of to circumvent the use of VOCs more harmful than CO_2 (which is just about all of them). They employ CO_2-extracted hop oils in their deodorants on the premise that if hops can preserve beer, perhaps they can protect our armpits from odor-causing bacteria. They also use CO_2-extracted oils from chamomile flowers for their soothing properties.

As we become increasingly aware of the toxicological impacts of our modern industries, we need to consider more than the sourcing of our feedstocks and the properties of our products. The ways we choose to process our feedstocks into products play an important role in eliminating dangerous components from the waste stream. Replacing benzene or chloroform extractions with CO_2 extractions substitutes the generation of hazardous VOC waste with CO_2, the ultimate benign VOC.

Reuben Hudson is a postdoctoral fellow in chemistry at Colby College in Waterville.

DARYN SLOVER | SUN JOURNAL

"The big red sign does not reflect the people that live here, because we support Ben Chin," said Barbara Rankins, a tenant at 101 Pine St. in Lewiston. Rankins said she did not know that the sign went up outside her living room window until someone tagged her on Facebook at midnight Sunday. By 2 a.m., Rankins made "we support Ben Chin for mayor" signs and put them in her windows. Rankins said the building owner is Lewiston landlord Joe Dunne.

Steed

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come in the form of a crass sign.

Racism is at the core of the very real problems we have to tackle in order to make progress, to become a destination, to retain a workforce that will propel this state's economy. We can't become the Maine we imagine when we suggest racist incidents and commentary are merely exceptional outbursts.

Racism, we must acknowledge, goes beyond tempter tantrums and political statements; it is institutionalized and abstract. It manifests itself in ways whites can rarely perceive. If we are to confront it, then we must first admit that it is part of our reality. Otherwise, we render ourselves incapable of curing this illness.

Alex Steed has written about and engaged in politics since he was a teenager. He's an owner-partner of a Portland-based content production company and lives with his family, dogs and garden in Cornish.

DARREN FISHELL | BDN

Jim Wellehan, the former owner of Lamey-Wellehan shoes, spoke out against a $15 minimum wage in Portland earlier this month. He previously advocated for raising the national minimum wage to $10.10 an hour.

Wage

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because work-study is taxable employment. Either the cost of gross tuition will increase or financial aid will decrease, resulting in the same net effect on students.

And last, the public sector. Because of quirks in Portland's charter, the city will not be required to abide by this law. Certainly the City Council could vote to increase wages, but even the mayoral candidate who supports the initiative believes taxes already are too high. It is hard to envision a scenario where the council votes to increase the cost structure of the city and raise the taxes necessary to pay for it. So we will be left with one set of rules for the private sector and a different set for government.

The proponents of this referendum come from a well-meaning place. But their arguments are based in macroeconomic theory, not on-the-ground reality. Debate theory until you are blue in the face, but this referendum will help large businesses crush small businesses. Who is better equipped to handle a significant cost increase: Rosemont Market or Whole Foods? Play It Again Sports or Dick's Sporting Goods?

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The proposal is cribbed nearly verbatim from Seattle, home to Starbucks, Microsoft and Amazon — all Fortune 500 companies. Portland's largest employers are hospitals. It sets the ordinance in stone for five years, abandoning the ability to act and react as circumstances dictate. And even Jim Wellehan, lauded by President Barack Obama on wage issues, thinks this proposal goes too far. The simple fact is most Maine employers want to do right by their people — they live here, too. Let's give them the opportunity to do right instead of forcing them off a cliff.

Michael Cianchette is former chief counsel to Gov. Paul Le-Page, a Navy reservist who served in Afghanistan and in-house counsel to a number of businesses in southern Maine.