Canadian biofuel plans derailed

logen cancels a pioneering facility to turn crop waste into ethanol.

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A leading biofuels company whose products have powered Formula 1 racing cars has hit a major bump in the road.

logen Corporation

logen's demonstration facility in Ottawa can produce up to 2 million litres of cellulosic ethanol each year.

Canadian company logen Energy in Ottawa announced on 30 April that it has shelved plans to build a large-scale facility in Manitoba to produce fuel ethanol from cellulose, the long molecular chain of sugars that forms the fibrous material in plants.

Instead, the company will "refocus its strategy and activities", leading to a smaller development programme and the loss of 150 jobs, its joint owners Royal Dutch Shell and logen Corporation said in a statement. logen Corporation would not comment further on the story and Shell did not respond to *Nature*'s questions.

In the past decade, growing concerns about climate change, rising energy consumption and dependence on foreign oil have prompted countries and companies to invest in biofuel production.

Most fuel ethanol is made by fermenting the sugars in grains or sugar cane, but cellulosic ethanol can be made from municipal waste, wood chips, grass, and the stalks, leaves and stems of food crops. It is seen as a more sustainable biofuel because it does not divert food from dinner tables to biorefineries. But cracking apart the tough cellulose molecules is a lot harder than brewing up simple sugars.

Cracking stuff

logen opened the world's first demonstration plant for producing cellulosic ethanol in Ottawa in 2004. Its process uses enzymes to break down the cellulose in wheat, oat and barley straw to glucose, which is then converted to ethanol.

Although the plant's production capacity is nearly 2 million litres per year, its output peaked at just 581,042 litres in 2009. In 2008, logen suspended plans to build a commercial-scale cellulosic ethanol facility in Iowa, and in 2011 it decided not to set up a plant in central Saskatchewan.

"This shouldn't be seen as a black mark on the industry," says Scott Thurlow, president of the Canadian Renewable Fuels Association. "There is still lots of opportunity in Canada."

Canadian law requires the annual petrol production to contain an average of 5% ethanol, but it has no targets for cellulosic biofuels. By contrast, the US Renewable Fuel Standard, part of the Energy Independence and Security Act of 2007, mandates the United States to produce increasing volumes of cellulosic biofuels each year, until it reaches a target of 60.5 billion litres in 2022. "But nobody is producing it, really," says Jamie Stephen, who studies cellulosic biofuels at the University of British Columbia, Vancouver.

US output was supposed to reach around 2 billion litres this year, but the Environmental Protection Agency projects that companies will collectively achieve only 2% of that goal. Six companies — American Process in Atlanta, Georgia; Fiberight in Catonsville, Maryland; INEOS Bio in Lisle, Illinois; KiOR in Pasadena, Texas; KL Energy Corp in Rapid City, South Dakota; and ZeaChem in Lakewood, Colorado — are expected to produce around 40 million litres of cellulosic biofuel in 2012.

Hard sell

Despite favourable government policies, loans and grants, companies continue to strain to bring cellulosic biofuel to market. "For one thing, capital costs are higher," says Stephen. "Cellulosic ethanol plants cost four to six times more than corn ethanol plants."

Fluctuations in the price of oil also pose a challenge for the industry, says Wallace Tyner, an energy economist at Purdue University in West Lafayette, Indiana. For cellulosic biofuels to be competitive with fossil fuels, the price of oil must surpass US$120 per barrel, he says, which the US Energy Information Administration's Annual Energy Outlook 2012 suggests may not happen until 2035 — if at all.

Iogen Corporation

Iogen's cellulosic ethanol has powered Formula 1 race cars.

Add in fickle government policies and erratic feedstock supplies, and the industry is unwilling to make big bets on large production facilities, he says.

The biochemical conversion process used by many companies presents its own problems. "The ethanol it produces doesn't fit well with our current fuel system. It hits a blend wall of 10% — 15% for some vehicles," says Tyner. "There isn't room for much more ethanol."

An alternative thermochemical process can turn cellulose into a mixture of fuels that avoid this blend wall. Enerkem, which runs a commercial demonstration plant in Westbury, Quebec, produces a mixture of gasoline, diesel, naphtha and aviation fuels from old electricity poles. KiOR expects to begin producing gasoline and diesel from southern yellow pine trees at its Columbus, Mississippi facility at the end of the year.

Tyner says that current projections for a boom in cellulosic biofuels are unrealistic. "But I'm not saying it's not going to happen by 2050."

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