

A methanol renaissance in Canada refuels the biofuels debate

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Kevin Henderson of Methanex Corp. at the re-opened methanol plant in Medicine Hat

Photograph Jeff Noon

Between 2001 and 2006, the world's largest methanol producer shuttered four plants in Canada. Vancouver-based Methanex Corp. decommissioned one of its three methanol plants in Medicine Hat in 2001 and demolished its two remaining facilities in the city in 2005, before closing and demolishing yet another facility in Kitimat, B.C., in 2006.

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When Methanex announced the closing of its Kitimat plant, then-president and CEO Bruce Aitken referenced high natural gas prices and said: "It just doesn't make long-term economic sense to manufacture methanol in North America with high-cost energy." That was late 2005 when AECO natural gas spot prices reached \$12 per million Btu, before the widespread use of hydraulic fracturing in tight gas reservoirs created an oversupply of the commodity, which caused spot prices to fall precipitously.

Since then, Methanex has reopened its methanol plant in Medicine Hat, which is again producing 560,000 tonnes of methanol per year. “We are currently evaluating options for other potential plant sites in North America,” says Kevin Henderson, vice-president of North America for Methanex, which is also in the process of disassembling two plants in Chile and moving them to Geismar, Louisiana. The company is not the only Canadian methanol producer looking to expand its operations in North America. Improved economics and growing demand for the fuel have also led - Montreal-based Enerkem and Sidney, B.C.-based Blue Fuel Energy Corp. to ramp up methanol production domestically. For the first time in years, methanol production in Canada is on the rise.

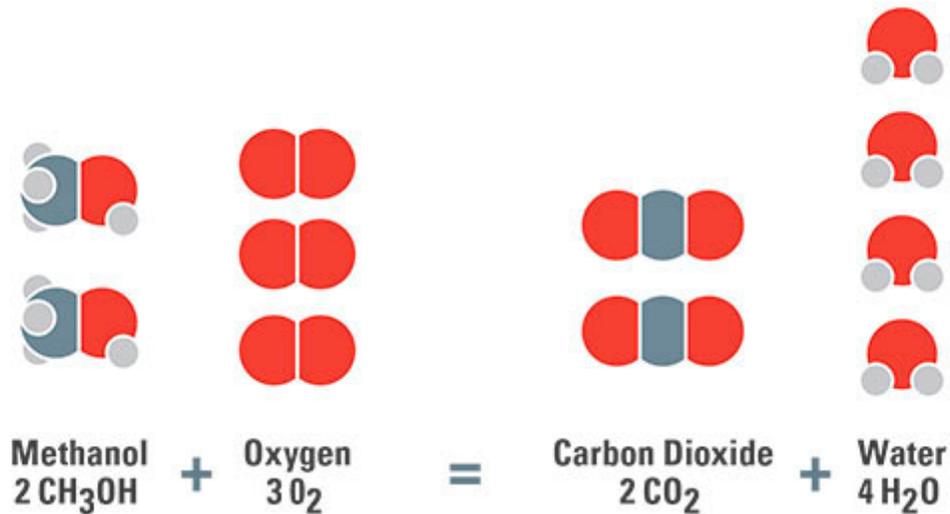
When he released his groundbreaking 2005 study, *Beyond Oil and Gas: The Methanol Economy*, Nobel laureate George Olah predicted that methanol would offer the world a less carbon-intensive fuel. The promise of methanol was widely touted: it is a cleaner burning fuel than gasoline and it can be made from natural gas, coal, biomass, municipal waste and even carbon dioxide. Methanol production boomed during the 1990s until 2006, when natural gas prices spiked and caused a bust in the North American sector.

Now methanol producers are experiencing a global resurgence with China and Israel leading the way in using methanol as a transportation fuel. Chinese carmakers like Geely, Chery International, Shanghai Maple and Shanghai Automotive Industry Corp. are producing new cars that can run on a methanol blend, which now accounts for eight per cent of China’s vehicle fuel. There are 160,000 taxis in the country running on M85 (a fuel with an 85 per cent methanol and a 15 per cent gasoline blend). Most of China’s domestic methanol production comes from the gasification of coal.

At the same time, Israel is seeking to decrease its dependence on imported oil and make use of its new-found natural gas reserves. It is currently experimenting with vehicles that run on M15 – which contains the opposite methanol proportions as M85 – while many European countries are also considering promoting methanol-based car fuel blends.

What Is Methanol?

Methanol is a liquid petrochemical and the basis for hundreds of chemicals and products including paint, solvents, synthetic fibers like olefin, carpets, windshield washer fluid, formaldehyde, insulation and particle board. Compared to gasoline, methanol reduces hydrocarbon emissions by 30 to 40 per cent with M85 and up to 80 per cent with M100 fuels.



Closer to home, a political fight in Washington, D.C. over a major piece of legislation, the Open Fuel Standard Act, could significantly impact North American methanol demand, if passed. This bill, which was first introduced in 2011 and reintroduced in June 2013, has been blocked in Congress as special interest groups have lobbied intensively to keep methanol out of the North American fuel mix.

If passed, the Open Fuel Standard (OFS) would open up the U.S. transportation fuel market to methanol, and other alternative energy sources. "Right now there are 12 million flex fuel vehicles on the road in the U.S. that can run on E85 [which is 85 per cent ethanol]," says Gregory Dolan, CEO of the Washington, D.C.-based Methanol Institute. "The problem is that ethanol has 40 per cent less energy than gasoline." And while methanol also contains less energy than gasoline, it is cheaper and doesn't require farmland to produce.

The Methanol Institute is just one lobby group hoping to get the Renewable Fuel Standard (RFS) repealed, and replaced with the OFS. According to Dolan, the problem with the RFS is that it is based on the assumption that 10 per cent of every gallon of gasoline will be ethanol, and it locks out methanol. The goal to have 36 billion gallons of renewable fuel in the transportation mix by 2020 is unrealistic, Dolan says, and methanol should be allowed into the market because it is less than half the cost of ethanol and burns cleaner than gasoline.

Even without the OFS, the North American methanol industry is predicted to grow by 26 per cent by 2020 thanks to low-cost natural gas feedstock. "Just two years ago, we had two methanol plants operating in the U.S.," Dolan says. "Now because of the shale revolution, there are a dozen methanol plants in the works, and the U.S. expects to become a net exporter of methanol in two years."

Bill Gwozd, a leading natural gas analyst and senior vice-president of gas services with Ziff Energy, an affiliate of Solomon Associates, believes the future of methanol production in Canada is

bright. "If we are thinking of exporting natural gas from Canada, it wouldn't hurt to also export a finished product," Gwozd says. "It should be methanol."

Unlike the U.S., however, Canada has no fuel standard. New methanol plant builds are focused on either export markets or methanol for industrial uses. For instance, the majority of Methanex's 560,000 tonnes of production in Medicine Hat goes to market by rail or truck to B.C. or to the U.S. Pacific Northwest to become formaldehyde for the wood products industry or for use in gas pipeline - dehydration. As for methanol's potential as an automotive fuel, Henderson says there's an opportunity to blend it with gasoline, as is being done in China, and an opportunity to create dimethyl ether, a fuel that has much lower CO2 emissions and less particulate emissions than diesel.

Similarly Blue Fuel is in the process of building two methanol plants near Chetwynd, in northeastern B.C., where it has access to abundant natural gas and access to a rail route to the West Coast. "One plant will make gasoline for the North American market," says Juergen Puetter, president and CEO of Blue Fuel Energy. "The other plant will make methanol which will be transported from Chetwynd to the coast by rail. We have an offtake agreement for methanol with China."

One other tantalizing possibility for methanol is that it could transform the carbon capture and storage business into a carbon recycling system. Methanex partnered with Carbon Recycling International to build the world's first commercial-scale carbon recycling plant in Iceland, named the George Olah Plant as a tribute to the aforementioned scientist who pioneered the technology.

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The plant, completed in 2011, captures carbon dioxide emissions from the nearby geothermal HS Orka plant and hydrogen from an electrolytic process to produce renewable methanol. The product is used as vehicle fuel in Iceland and is also being shipped to the Netherlands, where it is blended into gasoline. The plant itself, which reclaims 5,000 tonnes of carbon dioxide emissions from the atmosphere every year, has garnered interest from European firms struggling under the pressure to reduce emissions so their home countries can meet their emission reduction obligations under the European Trading Scheme.

In June, Quebec-based Enerkem opened the world's first "waste-to-biofuels" project in Edmonton, which will convert biomass from municipal waste into methanol. The plant will take 100,000 tonnes of municipal waste, which cannot be recycled or composted, and convert it into gas using Enerkem's thermochemical process, and then into liquid methanol. A similar plant is under construction in Varennes, Quebec. Whether the methanol produced from Enerkem's plants, Blue Fuels' plants or Methanex's plants ever make it into the Canadian vehicle fuel mix remains to be seen.

For about a decade, starting in 1989, concern over smog in Los Angeles prompted the California Energy Commission to conduct a methanol experiment with major fuel producers providing M85 at selected pumps and some city buses and fleet vehicles getting converted for methanol use. By the end of the next decade, gasoline became cheaper and cleaner and the impetus for expanding methanol diminished.

Today, the interest in methanol as an alternative to gasoline is gaining momentum in North America, despite obstacles to passing the OFS in U.S. Congress. A Canadian national standard, support from the government and co-operation from major industry retail distributors are needed before methanol is blended into Canadian auto fuel. In true Canadian fashion, the government and industry players may be watching to see what happens in the United States with fuel standard legislation before taking action here.

“It starts with the government coming up with a fuel standard,” Methanex’s Henderson says. Like California in the ‘80s and ‘90s, blended fuels already exist in a number of countries in Europe as well as in Israel and China. It could happen in Canada too, where there is an abundance of natural gas, new methanol plant builds and the world’s largest methanol producer based in Vancouver. Right now, however, Canadian methanol producers are focused on export markets.

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