

## Fuelling Change Part 2: Ethanol and the environment

Wed Jul 23, 2008

By Melissa Mancini

DURHAM -- Ethanol is supposed to be the next great thing in environmental gas innovation.

But there are many research programs ongoing in Durham looking at ways to improve ethanol or create technologies that will be even greener than the present form of the fuel additive.

Dr. Dario Bonetta, a science professor at UOIT, is one of the researchers studying how to make ethanol from plants that are not "economically important" like corn.

The research will try to determine how to mutate properties of inedible plants so cellulose can be easily extracted and used in the production of biofuels such as ethanol.

"The majority of the plant is actually not the seed, so the majority of the mass of the plant is from everything else: stock, leaves, whatever. So the idea is that you want to be able to utilize all of those other parts of the plant rather than utilizing things that are expensive to make like seeds," he said.

If it was possible to use these parts of the plant to produce ethanol then less land, fertilizer and time would be needed to make the fuel, Dr. Bonetta said.

"It's a question of how much can you produce on an acre of land and how much of that can you actually convert to ethanol," he said.

"Corn is really bad, you have to seed it lots, fertilize it all the time . . . it's not that easy to grow, so you don't want to invest a lot of energy and fertilizers which are derived from petrochemicals to grow the plants that you are going to ultimately make into ethanol."

He said producers want to be able to put these properties into crops that are grown on land that is not traditionally used for agriculture, referred to as marginal land, areas that nobody uses for growing food. For example, in the U.S. they are looking at a crop called switchgrass, he said.

Researchers at UOIT are also looking at alternate ways to fuel cars that have nothing to do with ethanol or fuel at all.



### What's the cost of transporting goods?

The federal government is trying to determine which mode of transportation is best for goods. Right now Transport Canada is in the middle of an exhaustive study which explores the complete cost of transporting goods by rail, road, plane and water. The results of the study are due out Aug. 15.

According to 2007 data from Transport Canada, most trucks that deliver goods have a capacity of about 30 metric tonnes. Trucks cost about \$3.58 per kilometre to operate in traffic, \$3.12 per kilometre to operate when the roads are clear. So a trip from Montreal to Toronto would cost about \$1,560, if there is no vehicle congestion. This number does not factor in the cost of road repairs, but the study due out this summer will include such costs.

A train car has the capacity of about 60 metric tonnes. A train car from Montreal to Toronto on the Canadian Pacific Railway costs between \$1,400 to \$1,500 per car, according to a consultants report for Transport Canada.

The August report will take into account the capital and operating costs of each mode of transportation as well as the social costs of transporting goods: accidents, road congestion, air pollution, greenhouse gases and noise.

The nation will have to wait a bit longer to find out what the real cost of bringing goods home will be.

Dr. Greg Rohrauer is an assistant engineering professor at the university and one of the lead professors working with students on the Eco-car competition. The competition is a three-year program and sponsors include General Motors and Natural Resources Canada. Participating schools are given choices for four categories to power their green vehicle. The choices are all equally environmentally friendly. The first involves a hybrid with less than 50 kilowatts of electric power. The second was also a hybrid with more than 50 kilowatts of power. The third choice was to build a type of electric car. The last possibility was a fuel-cell vehicle.

UOIT students will be building a 2009 model year Saturn Vue powered by electricity only, if their application is approved.

This kind of contest helps train students to think like environmentally friendly car designers, said Dr. Rohrauer. It also offers future car builders the opportunity to have hands-on experience in the green car industry.

"They are not just working on a imaginary model," he said.

This is especially important because there are so many technologies that are new and expensive now, like fuel cell vehicles, that may be industry standard by the time these students get out into the world, said Dr. Rohrauer.

"They can expose themselves to things manufacturers want," he said. "It's a view into the future."

---

This is Part 2 in a 4-part series.