

Canadian C2+ Petrochemical Report

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Dynamotive Energy Systems Corporation of Vancouver, BC is building a 200 tonnes/day plant on a 22 acre site in Guelph, ON to make BioOil from waste wood from construction and demolition sites collected and processed by its partner, MegaCity Recycling. Dynamotive has developed a process called "fast pyrolysis" in which cellulose is exposed to very high temperatures in an oxygen-free environment for an extremely short time (a few seconds). The short residence time is the key to the process. BioOil is not a hydrocarbon, retaining the chemical structure of its original materials, but it can replace fuel and heating oil. Dynamotive is putting it through extensive testing to demonstrate its suitability for such replacement and has sold very small quantities. The material is price competitive with conventional oil products when oil prices are above \$30 a barrel, but faces resistance from conservative buyers. The process can use any type of cellulosic material e.g. sawdust, bark, corn hulls, bagasse from sugar cane. It has been demonstrated in two pilot plants of 2 t/d and 10 t/d in BC. These plants will be moved to Guelph and used for research on the lignocellulosic part of municipal solid waste and sewage sludge. The company has another plant at West Lorne, ON and a R&D facility at Waterloo University. Dynamotive started in 1991, is a public company, and is of course so far reporting losses.

Dynamotive is also conducting research into chemicals that could potentially be produced by its process. Some 50% of BioOil made from wood is oxygen and 25% is water. The remaining 25% contains hundreds of chemical compounds. The most abundant are acetic acid, hydroxyacetaldehyde and levoglucosan at levels of 3-10%. Pyrolytic lignin can be separated by adding water; it is made up of phenolic fragments and has been proposed as a replacement for phenol in phenol-formaldehyde resins. Single-ring phenolics are also present and could have uses as flavor chemicals. Levoglucosan is anhydroglucose; with additional pre-treatment and hydrolysis following pyrolysis, it could produce ethanol, but the economics of this process have not yet been explored. Finally, the process produces charcoal and Dynamotive is looking at applications for this in heat production, power generation and briquette manufacturing. The idea of "Terra Char" is also being promoted: using the char as a soil amendment. It could also have value as a means of carbon sequestration.