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# Pyrolysis Oil: Heat, Electricity, Green Transportation Fuel, and Chemicals too

by

Randal R. Goodfellow

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**DATE**: Thursday May 13, 2010.
**TIME:** Refreshments, Registration and Networking: 06:30 p.m.; Seminar: 07:00 p.m. – 08:00 p.m.
**PLACE:** Algonquin College, 1385 Woodroffe Ave., School of Advanced Technology, Building-T, Room T129
**PARKING:** No fee after 5:00 p.m. at the Visitors' Parking Lots 8 & 9. Please respect restricted areas.
**Admission:** Free. Registration required. To ensure a seat, please register by e-mail contacting:
Wahab Almuhtadi almuhtadi@ieee.org or Raed Abdullah raedabdullah@ieee.org.

## Abstract

Fast pyrolysis is recognized by the U.S. Department of Energy and other like global Agencies as a strategic technology platform that will have a significant impact on both stationary and transportation fuel supply. The significance of fast pyrolysis is that it can very efficiently transform widely available solid ligno-cellulosic, non-food biomass into to a liquid which can be used for chemicals or fuels.

The first development Rapid Thermal Processing (RTP™) and its fast pyrolysis process was done by Ensyn in 1984 and built its first commercial plant in 1989 to produce specialty chemicals. Ensyn is the world's first and only company to develop a dependable fast pyrolysis technology. To date, its technology and equipment has been deployed—either by Ensyn or under license—in seven biomass plants across North America. The largest is the Ensyn-owned facility in Renfrew, Ontario, Canada, with a capacity to process 100 bone dry tonnes of feedstock per day. The product of fast pyrolysis is pyrolysis oil; Ensyn is currently manufacturing pyrolysis oil to be used in the production of specialty chemicals, as a fuel in thermal applications and in turbines to produce electricity, also the use of pyrolysis oil in medium speed diesels to produce electricity is advancing rapidly and will soon be ready for deployment. Work is ongoing through a joint venture on the production of transportation fuel. Ensyn utilizes a circulating fluidized bed design for its reactor, characterized by the movement of heated sand around the reactor vessels. In this process, a gas (not air) enters the bottom of the reactor, and hot sand is introduced, creating a whirlwind of sand with a temperature of 500 to 525 degrees Celsius. Upon contact with the whirlwind, feedstock particles are flash vaporized, leaving a gas and some remaining solids. Upon leaving the reactor, gases are combined with a spray of previously made pyrolysis oil; this condenses the gas into new pyrolysis oil. The solids that remain are a combination of sand and char, which are redirected to a second vessel. In here, the char parts of the mixture are ignited by the introduction of air. This provides the necessary combustion to heat up the sand mixture to the temperatures required for the flash vaporization in the reactor vessel. This is a key factor in increasing the net energy balance, and consequently the GHG reduction, of the end product.

## Bio

**Randal R. Goodfellow** is the Senior Vice President, Corporate Relations. When Mr. Goodfellow joined Ensyn in 2008, he was already well known to the company, as Ensyn had been a longstanding client of his consulting firm. In his current capacity, he oversees the public affairs, government relations and communications activities of the company. A consultant since 1991, Mr. Goodfellow has advised senior executives from the private, public and academic sectors on policy and communications issues related to bio-energy, bio-chemicals and renewable resource product generation. He was the founding President of BioProducts Canada. Mr. Goodfellow has a BSc (Agr) from McGill University.