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TURNING CANADIAN WOOD WASTE INTO GREEN BIO-COAL



Made-in-Canada bio-coal is competing to supplant traditional coal currently used for heat and power in much of the world. This novel renewable energy source comes as a growing number of jurisdictions, including Ontario, ban construction of traditional coal-fired power plants and impose strict regulations and restrictions on existing facilities.

Bio-coal responds to the challenge on multiple levels: it is carbon neutral; free of mercury, nitrous oxides and sulfur oxides; is odour-free and moisture-proof; and can be used in existing coal-fired power plants without retrofitting. It also provides Canada's logging industry with a valuable new market for biomass waste, including the millions of trees killed by mountain pine beetles. Canada currently processes only 30% of its available forest biomass into commercial products.

Vancouver-based Global Bio-Coal Energy (GBCE) plans to begin producing 320,000 tonnes annually of this eco-friendly fuel by the end of 2015 at a new plant in Lumby, a small community in BC's Okanagan Valley. A second plant is planned for Watson Island near Prince Rupert. A total of 12 plants are planned in BC where waste fibre is available.

The business made it this far due in large part to the University of British Columbia's Biomass & Bioenergy Research Group (BBRG), an international leader in this field, and to BioFuelNet, which provided critical seed funding and support to develop and commercialize a process for producing high-quality bio-coal from low-quality wood waste from sawmills and forestry operations.

Production was initially scheduled to begin in 2010 but additional testing at UBC revealed that GBCE's chosen technology for turning woodchips into bio-coal used too much energy to be cost-effective. GBCE turned again to UBC, which had been developing a new application for an established technology that had been manufactured in Montréal for decades.

It was about this time that BioFuelNet launched as an NCE.

"The BioFuelNet funding came in at a critical time," says Shahab Sokhansanj, BBRG's founder and lead research advisor. "BioFuelNet's support enabled us to continue with funding graduate student research in this area but with an even stronger focus on student-industry involvement and interactions."

After considerable research and testing, the team developed a new process for producing high-quality bio-coal from lingo cellulosic biomass or "hog fuel," a mix of wastes and residues from sawmills and forest harvesting operations.

The process, known as torrefaction, subjects the biomass to conditions of extreme heat and low oxygen to remove moisture from the product, making it easier to store and transport. It cuts energy costs by 20% compared to conventional bio-coal production methods. It also conserves more than 85% of the dry weight of the original biomass, while enriching most of the carbon and thus boosting its energy value.

The result is a bio-coal product with energy properties similar to those of traditional coal, minus the big carbon footprint. Coal is the dirtiest of all fossil fuels, responsible for a third of the world's carbon dioxide emissions.

"What's great about this technology is its lower cost and simplicity of use. You can effectively use any fibre existing in Canada," says Sonia Shoukry, President and Chair of GBCE. "That's good news for a lot of companies here in BC because it gives them a new market for their biomass."

The company expects to hire more than 40 full-time new employees and begin its first shipments of bio-coal later this year to customers in Europe, Korea and the United States, as well as a local cement plant in Vancouver.

"Initially, in the first phase we will be producing 80,000 tons per year," she says. "After testing and validating we will quickly add two larger Wyssmont units, bringing our total production to 320,000 tons per year."

The research won't end there. Shoukry hopes to continue working with UBC's team to improve the quality of its bio-coal product to make it suitable for use in other industries, including steel production. The system is designed to tailor-make bio-coal to the specifications and needs of a diverse list of clients.