



Bio-oil from forest biomass through pyrolysis

Green Fuel Nordic Oy is a biorefining company based in Finland. Their business model is based on utilising innovative, commercially used fast pyrolysis technology in the production of an advanced bio-oil. They use renewable, domestic forest biomass as their resource, which opens a new refinement path for this precious forest fortune.

With the chosen fast pyrolysis technology, renewable domestic forest biomass can be prepared into liquid, low-carbon and sulphur-free fast pyrolysis bio-oil. Fast pyrolysis bio-oil can be harnessed directly for industrial and municipal electricity and heat production to replace light and heavy fuel oil and gas. It can also be refined into products equivalent to regular transport fuels. In addition, the chemicals industry offers interesting longer-term applications.

The Green Fuel Nordic fast pyrolysis bio-oil production process comprises multiple parts, working together to form a functioning bio-oil refinery. The heart of the fast-pyrolysis focused bio-oil refinery is the pyrolysis unit, where pre-treated biomass is turned into fast pyrolysis bio-oil. Biomass pre-treated to the correct particle size and moisture level is fed to the reactor together with hot (approximately 500 °C) sand, causing the biomass to vaporise. Vaporisation occurs in nearly oxygen-free conditions to prevent combustion. The resulting gas is directed into a cyclone, where sand and carbon residue are mechanically separated from the gas flow. The gas passes through the cyclone into a condenser, where it cools down and condenses into fast pyrolysis bio-oil. Finally, the resulting fast pyrolysis bio-oil is filtered before it exits the pyrolysis unit. The energy for the production comes from carbon residuals from the vaporisation, separated with the circulating sand and burnt in the combustion chamber.

Raw material for fast pyrolysis consists only of forest biomass, acquired from local sawmills and biomass supply companies.

The planned biorefinery investments of Green Fuel Nordic improve energy self-sufficiency while supporting distributed energy production, which is strategically important for Finland. The operation also provides support in achieving the RES (renewable energy sources) goal set for Finland. At the same time, they do their part to boost employment in areas adversely affected by the forest industry's restructuring and provide a new local refinement path for forest biomass.

About two tons of bio-ash is produced per day as a bio-oil by-product. Using bio-ash as forest fertiliser helps to restore previously lost nutrients to the forest. It also reduces the use of unrenovable mineral-based fertilizers. Bio-ash is best suited for forestry peat lands with plenty of nitrogen and thick peat, but lacking phosphorus and potassium. In addition to providing these nutrients, wood ash also increases microorganism activity, which accelerates the decomposition of organic matter in the soil.



Photo: Green Fuel Nordic Ltd.

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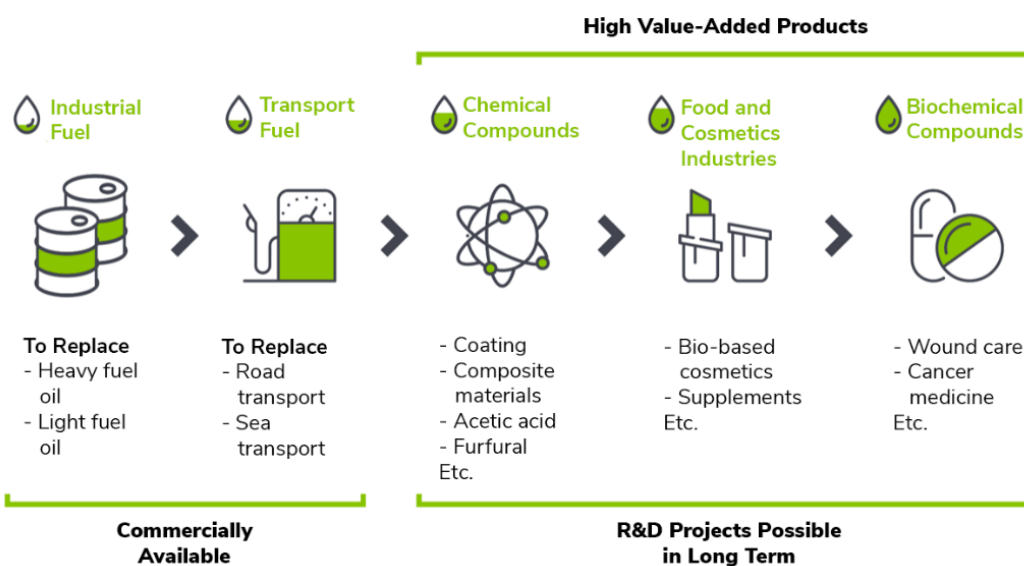
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ADDITIONAL INFORMATION

GFN Lieksa Oy produces the bio-oil, with parent company Green Fuel Nordic Oy being responsible for sales, marketing and product development. The Green Fuel Nordic (GFN) bio-oil refinery is located in the town of Lieksa, in the industrial area of Kevätniemi. This industrial area offers an ideal location for a bio-oil refinery from the company’s point of view: raw material sourcing, and additional investments in both bio-oil production and further refinement processes can take place in the same site. The bio-oil refinery uses approximately 90,000 solid-m³ of raw material per year, refined into 24,000 tons of bio-oil. The company’s goal is to increase production capacity in Lieksa while staying within the regulatory limits.



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ABOUT BRANCHES

BRANCHES is a H2020 “Coordination Support Action” project, that brings together 12 partners from 5 different countries. The overall objective of **BRANCHES** is to foster knowledge transfer and innovation in rural areas (agriculture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.



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THE PARTNERSHIP

