FUEL WOOD INTO LIQUID FOR IMPROVED LOGISTICS AND EASIER USE

A major problem with traditional fuelwood, chopped firewood and woodchip, is the low energy density, which keeps the handling and transport costs high. Low energy density together with an unsuitable format has also excluded woodfuel from many applications, for instance from use in vehicles. Finnish and international R&D work has resulted in improved technology capable for efficient large-scale production of wood liquid fuel. A test plant will start in Porvoo in Finland this autumn and a larger commercial plant is planned for 2004.

Finland has long traditions in processing liquid from wood. Tar was before the development of the timber processing industry the main export product and still today, you can find old tar burning pits in the forests. Use of refined wood fuel products has also traditions. For instance during the Second World War vehicles were largely powered by woodgas produced in an oven attached directly to the vehicle or built on the trailer. Actually, tar and woodgas are products very close to the new wood liquid fuel.

The production of wood liquid fuel is based on rapid pyrolysis. Crushed wood is heated in an airborne bed reactor to 500-600 °C for some seconds, which leads to a separation of gas, liquid and solid material. The gas is liquefied by rapid cooling. The process is efficient: 60-70 % of the dry weight of the wood is transformed into liquid. The product is a liquid and not tar since it contains 20 % water. The energy content for wood liquid fuel is about half of that for normal mineral oil. The product cannot be mixed with mineral oil.

The liquid can be burned in heating plants and boilers now heated by mineral oil. It can even be used in diesel engines. However, the replacement of mineral oil with wood liquid fuel requires some technical changes in the burning facilities or engines. Wood liquid fuel is sour and requires for instance rust-resistant pipes and tanks. Burning of wood liquid fuel is as clean as mineral oil and there are no net emissions of carbine dioxide. Compared with traditional wood fuels wood liquid fuel is cleaner to use.

Production of wood liquid fuel is still expensive and it cannot compete with heavy (industrial) heating oil. In the first place, it is a substitute for light heating oil in large burners. At the moment small one-family house burners are not a primary target for conversion to wood liquid fuel. The annual consumption of light heating oil in Finland is 2.5 million tonnes. The target for the producer, the big Finnish energy company Fortum, is to replace 0.5 million tonnes of this with wood liquid fuel.

The competitiveness and market share of wood liquid fuel hangs much on the national taxation policy. There are several arguments for tax relieve for wood liquid fuel. In the first place, there are of course the zero net emissions of carbon dioxide. Another substantial benefit is a positive impact on the employment due to an increased harvesting of wood residues. Production of wood liquid fuel also increases market opportunities for small sized wood, which encourages forest owners to do their cleanings and first thinnings in time.

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Sources:
