

As it aims to complete the project by the middle of this year, **James Barrett** finds out about the 'world's first' industrial wood-to-renewable diesel facility being built in Finland

# From wood to wheels

**A** wood-based biofuels project continues apace in Finland as UPM, a company which integrates bio and forest industries to make sustainable products, began installing the process equipment last summer.

The construction of the facility, located in Lappeenranta, started in 2012 and the foundation stone was laid in the autumn of that year. UPM claims the project is valued at €150 million (\$200 million) and it will be using crude tall oil (CTO) as feedstock to produce renewable diesel.

This feedstock is abundant, especially in Finland and some parts of Scandinavia as it is a residue available from the pulp industry. The annual production is approximately 100,000 tonnes of renewable diesel for transport.

The industrial scale investment is the first of its kind globally and is completed without any public investment grants.

'We will take the crude tall oil from our three Finland-based pulp mills to make a significant portion of our advanced biofuels,' says Teemu Lindberg, UPM director of biofuels production and technology, 'but we will also source from other local and regional outlets if required.'

CTO is a residue of a chemical pulping process that contains natural extractive components of wood, mainly generated in the production of sulphate cellulose from softwood. It is currently extracted from the pulping process and distilled or burned for energy in boilers.

The tall oil is taken away as a residue from a crude



Lofty ambitions: UPM calls its wood-based advanced biofuels project 'a world's first'

sulphate soap which is created during the pulping process, so essentially UPM will be re-using a residue of its own existing process. 'Converting whole CTO into biofuels at a commercial scale is being done here for the first time anywhere,' says Lindberg.

The Lappeenranta biorefinery's capacity will mean its CTO demand will only be a minor addition to the overall total demand of

the product. UPM claims it will not affect the demand-supply balance but says the plant is an important first step to drive the development of wood-based biofuels in reaching the EU's renewable fuel targets in a sustainable way.

Lindberg also points to a recent study by renewable energy consultancy Ecofys which also confirms sufficient quantities of CTO are available for renewable diesel production

without any risk of causing indirect land use change.

The job of putting in the facility's process equipment began in June 2013. Once operational, the arriving CTO will first be pre-treated to remove impurities and excess water.

'We developed the production process at our own biorefinery development centre. The whole process from CTO to pure renewable

diesel is also performed and controlled at the same biorefinery site and is based on hydrotreatment,' explains Lindberg. 'The main process steps are pretreatment of CTO, hydrotreatment, recycle gas purification and fractionation.'

Firstly, the CTO has to be purified as it does contain large amounts of impurities, solid particles, elements and metals which all have to be removed before introducing it to the hydrogenation reactor.

'We use our own proprietary technology for pretreatment,' says Lindberg. 'During hydrotreatment we remove sulphur, nitrogen and oxygen compounds before distilling the remaining liquid to separate the diesel product.'

UPM says the construction of the biorefinery is running according to schedule, with Lindberg adding he and his team are determined the facility will be up and running by mid-2014.

The end product, which UPM has branded BioVerno, is a drop-in renewable diesel with a high energy content and no blending limits. It also fulfils the limits set by the EN590 diesel standard.

'As our product is a hydrocarbon, it resembles

fossil diesel and therefore can work in all diesel vehicles. There is no need to modify car engines or fuel distribution systems, plus its stability is better compared to traditional biodiesel,' explains Lindberg. 'Greenhouse gas emission reduction is as high as 80% compared to fossil diesel.'

Lindberg was cautious when asked about the future of the plant post-completion, but he did elude to the fact UPM may diversify its feedstock in-take.

'We will only use raw materials from outside the food chain which are highly sustainable,' he reveals. 'We are experimenting in our laboratories with other raw materials which may help us expand our platform, but I cannot say which ones at this moment.'

'Overall, the Lappeenranta biorefinery represents an important stepping stone for UPM moving into the biofuels market. We are also studying various technologies for converting solid wood into biofuels, which is the second step in our biofuels strategy. We believe that avenue is an opportunity for renewal of the industry, and the investments are benefitting both local and EU economies and employment figures.' ●



Work at the Lappeenranta facility continues on schedule

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