Welcome to Pyrocell

Pyrocell – a company jointly owned by Setra and Preem – provides an important link in the value chain for renewable fuel. Setra has the raw material, sawdust, while Preem has refineries and filling stations. The sawdust will be processed into bio-oil at Pyrocell's pyrolysis plant, which is being built alongside Setra's Kastet sawmill in Gävle, ready for further processing at Preem's refinery in Lysekil.

Soon you'll be able to fill your tank with liquid sawdust at a filling station near you!

About Pyrocell

Owners and business concept

Founded in June 2018, Pyrocell is jointly owned by Preem and Setra. The company's business concept is to produce bio-oil from a forestry by-product. In spring 2019, the company decided to invest in a pyrolysis plant adjacent to Setra's Kastet sawmill in Gavle.

Setra has the raw material, sawdust, while Preem has refineries and filling stations. The pyrolysis plant in Kastet creates a strong new value chain for renewable fuels, from forest to tank.

In the future, there may be a case for investing in pyrolysis plants at Setra's other sawmills.

History

Setra has long been investigating the potential to make greater use of the by-products generated by its sawmills and processing units, primarily chips and sawdust. The aim has been to increase both the economic value and the climate benefit of the products.

In 2016, Setra initiated a feasibility study into bio-oil production based on pyrolysis, the purpose of which was to examine whether a pyrolysis plant could be integrated with the sawmill in Gävle and the nearby combined heat and power plant. This concept formed the basis for the application to Klimatklivet that was submitted in spring 2017. Klimatklivet is a

Swedish government funding initiative that supports local and regional measures to reduce emissions of carbon dioxide and other gases that affect the climate. In early summer, Setra received the great news from Klimatklivet that the plant had been granted SEK 117 million in investment aid.

With the investment secured, work began on applying for an environmental permit. Consultations were held in the summer of 2017 and a final application was submitted to the Environmental Permit Office in Dalarna in late December. Following supplementary information and statements, an environmental permit was obtained for the business in October 2018.

In parallel, discussions were held between Preem and Setra about a collaboration. A letter of intent was signed in summer 2016 and the decision to set up a joint company, Pyrocell, followed a year later.

Preem's goal is to promote the development of more sustainable biofuel production. The fuel company has initiated a range of projects and partnerships with various other parties, with a view to finding sustainable raw materials and processing techniques. Converting sawdust into bio-oil at a pyrolysis plant is fully in line with Preem's strategy.

In spring 2019, the boards of Preem and Setra took the final decision to invest in the pyrolysis plant in Gävle, giving the green light for technology procurement and staffing of the project to begin. Construction of the pyrolysis plant is set to commence in autumn 2019.

The Kastet pyrolysis plant

Background

In spring 2019, the boards of Setra and Preem took the investment decision to have Pyrocell build a pyrolysis plant next to Setra's Kastet sawmill in Gävle. Sawdust from the mill will be used to produce pyrolysis oil, which will then be used as a renewable raw material in the production of biofuel at Preem's refinery in Lysekil.

The process of procuring a technology supplier began in the winter of 2018/2019. By the summer of 2019, a deal had been signed with the Dutch company Technip to build a plant based on BTG-BTL's pyrolysis technology. At the same time, the Swedish project organisation was set up and the relevant appointments made.

The project will start work in autumn 2019. with the aim of having an operational pyrolysis plant up and running during 2021.

Process description

Sawdust from the nearby sawmill, and other plants, is received through a closed conveyor system and taken to an enclosed storage area. From the storage area, the sawdust is carried to a dryer, where it is dried to a moisture content of around 5%. The air in the dryer is heated using steam from the process. The annual sawdust consumption will be approximately 84,000 tonnes (55% moisture content).

From the dryer, the sawdust is sent via an intermediate storage area to the pyrolysis reactor. In the reactor, the sawdust is rapidly heated to around 500°C without any access to oxygen,

creating the pyrolysis gas. The coke, the non-volatile part of the fuel, is separated from the pyrolysis gas and burned in a combustion chamber, while the remaining gas is piped off to a condenser.

In the condenser, the pyrolysis gas cools into bio-oil. The bio-oil is purified before being pumped to the storage tank. The non-condensable gases are burned together with the coke in the combustion chamber.

The flue gases from the combustion chamber are used for the production of steam. Some of the steam produced is used to preheat the air for the sawdust dryer and the excess is passed back to the sawmill and used in its drying kilns. The flue gases from the combustion chamber are cleaned in a dust separator before heading up the chimney.

The plant has been designed around BTG-BTL's pyrolysis concept. Annual production of pyrolysis oil will total around 25,000 tonnes.

Environment

The major environmental benefit of the system is that the pyrolysis oil produced will replace fossil crude oil in the production of petrol and diesel. This is hugely beneficial for the climate, since pyrolysis oil produces as much as 80 to 90% less greenhouse gas emissions than the fossil alternative.

The pyrolysis plant's environmental footprint is comparable to that of a small-scale biofuel boiler (5–10 MW). The plant will be responsible for a certain amount of emissions to air, noise and waste.

- The flue gases from the combustion of the coke and non-condensible gases contain dust and nitrogen. Dust will be removed using an electrostatic filter. Regular control measurements will be taken to verify that values fall within the limits of the permit. The limit values are stricter than those set out in EU Directives for biomass-fired boilers in the same size class.
- The area around Kastet is already subject to noise from local industries and from traffic on the roads and railway. However, the pyrolysis plant will not make any major difference, with estimates showing a theoretical increase of around 0.3 dBA to the overall noise levels locally. Its immediate neighbours will find it very hard to tell whether or not the pyrolysis plant is in operation. Noise levels will fall within the guidelines recommended by the Swedish Environmental Protection Agency.
- The residual products will mainly derive from the purification of the flue gases (bottom ash and fly ash). The volume will amount to around 1,000 tonnes per year.
- The number of trucks coming and going around the sawmill site will decline slightly, because the sawdust will be used on site rather than being transported elsewhere (the sawdust has previously been used for pellet production and as a fuel for district heating). The pyrolysis oil will be transported from the plant by tanker.
- The bio-oil has a strong, slightly smoky odour. To avoid the risk of nuisance odours, the bio-oil storage facility will therefore be fitted with filters for the exhaust air.
- The risk of dust formation is judged to be low because the sawdust is largely handled within closed systems.

- There are no process water discharges from the plant.

The overall assessment is that the pyrolysis plant will have limited environmental impact.

Pyrolysis oil

Pyrolysis oil is a dark brown liquid with a strong and slightly smoky odour and a low pH value. According to the CLP Regulation, which contains rules on the classification, labelling and packaging of chemical products, the oil is not classified as flammable or hazardous to the environment.

Pyrolysis oil can be used to replace fossil oil, for example in heating boilers in the energy sector and in industry more widely. It can also be used as raw material in chemical manufacturing or, as in the case of Pyrocell, to produce biofuels, which will play a significant role in the transition to a fossil-free transport sector.

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