

A snapshot of the Finnish bioenergy landscape 2019

Sector Overview

Finland has become a global leader in the utilization of wood-based biomass for energy production, thanks to its exceptionally strong forest sector and extensive investments in bioenergy R&D&I since the 1980s.

Today, the Finnish bioenergy sector encompasses the whole value chain from forest management and feedstock harvesting to bioenergy supplies. Modern Finnish pulp mills are versatile bio-refinery hubs that offer attractive ecosystems and investment opportunities for developing new products and technologies. Emerging bio-based forest industry is geared to producing biofuels and other value-added products based on wood. More than 300 companies and organizations employ over 20,000 people in Finland.

Finland is Europe's most heavily forested country with 86% of its land area covered by forest of which 90% is PEFC-certified. In 2017, a total of 63 million cubic metres of roundwood was harvested for use by the forest industries, while 9 million cubic metres of roundwood was processed into wood chips or fuelwood. The quantity exceeded the previous year's felling volume by 2 million cubic metres and was the highest ever recorded. Finland's forests grow by 100 million cubic metres annually with the maximum sustainable stemwood felling potential of approximately 85 million cubic metres of logs, pulpwood and energy wood. As such, only 86% of this potential was used in 2017. In Lapland, the annual growth is 13 million cubic metres half of which remain currently unutilized.

2018 was a record breaking year for the usage of Finnish fuelwood with an increase by 4% (3.9 TWh) compared to the previous year. This can be attributed to the increase in the use of forest industry waste (black liquor) and side-streams, since the use of solid fuelwood was at the 2017 level. The growth in the use of fuelwood accounted for more than half of the growth in renewable energy in Finland, as hydropower production was lower than in 2017 and wind power increased only by 1.1 TWh.

The use of wood chips increased by about 3% in 2018, but was still at a lower level than in 2012–2014. The long downward trend in the use of wood chips in combined electricity and heat production turned last year to a 4% growth. In separate heat production, the growth trend in the use of wood chips continued in 2018 (+2%) and can be attributed to a more active use of logging residues, which was up 19% compared to 2017, while the share of small wood and tree stumps declined.

Finland has committed itself to a target of 38% share of renewable energy in gross final energy consumption in 2020.

Part of the commitment, the Finnish parliament passed new legislature in February 2019 mandating that the share of biofuels used in Finland's road traffic will be gradually increased to 30% by the year 2029. Finland has also set a world-leading advanced biofuel target of 10%. A share of all light fuel oil that is intended for heating, construction machines and fitted motors, will be replaced by bio-based fuel oil starting from 2021. By 2028, there will be a distribution obligation of 10% for bio-based fuel oil. Currently, the biofuels' share of transport fuels in Finland is 18%.

Main Players

The forest product manufacturer [Stora Enso](#) produces quality wood pellets – made from wood shavings, dry chips and sawdust by-products from our own sawmills – offer a reliable, renewable source of energy for residential, commercial or industrial heating. 2 kilograms of pellets produce the approximately the same amount of heat as 1 litre of oil. Moreover, when the pellets burn, they release the same amount of carbon dioxide that the wood biomass absorbs during its growth, making them carbon-neutral. The company also produces drop-in biofuels and other fuels produced from biomass sources.

In 2017, the Finnish energy producer [Neste](#) and Bioenergy La Tuque started an R&D cooperation with the objective of studying the potential of using forest residues as a raw material in biofuel production in La Tuque, Canada. Currently, Neste is the world's largest producer of renewable diesel, which is produced entirely from waste and residues. The company's share of the world's total renewable diesel production capacity is 60%.

Finnish energy company [St1](#) also produces ethanol from biowaste and residues.

[Metsä Fiber](#), which is part of [Metsä Group](#), is a producer of wood-based bioproducts, including biochemicals and bioenergy. The company operates a next-generation bioproduct mill in Äänekoski, which reached its nominal production capacity of 1.3 million tonnes in 2018 – the second year of operating. The Äänekoski mill, which is 240% energy self-sufficiency, increases the share of renewable energy in Finland for more than 2 percentage points.

Also part of Metsä Group is the innovation company [Metsä Spring](#), which seeks to find and develop new, forward-looking business concepts for the industrial processing of wood raw material into added-value bioproducts and renewable energy. Metsä Group has named as its goal to create bioproduct concepts that use 100% of the production side streams and generate zero waste.

[UPM](#) is a Finnish forest company with the aim to create value from renewable and recyclable raw-materials. 56% of the company's company's net income (EBIT) came from biorefining in 2018. Wood-based renewable diesel and naphtha for transportation and petrochemicals use are part of UPM's product portfolio. The biofuel is made out of tall oil, which is a side-stream of pulp production from the company's Lappeenranta biorefinery.

Current Investments

UPM is planning a new biorefinery in Kotka, Finland, with the annual production capacity of 500,000 tonnes of biofuel for transportation use. The raw material for the product would be forest residues and vegetable oil.

[Kaidi](#), which is part of the Chinese Sunshine Kaidi New Energy Group, plans to build a biodiesel refinery in Kemi with an estimated annual production of 200,000 metric tons of biofuel, of which 75% will be biodiesel and 25% biogasoline. Kaidi's annual need for wood will be approximately 2,8 million cubic meters. The plant will also utilize sawmill and chemical forest industry side-streams. The total investment for the plant is estimated to be up to EUR 1 billion.

[Boreal Bioref](#) is planning a biorefinery in the town of Kemijärvi in Eastern Lapland. The Kemijärvi biorefinery will be the first in the world to produce microcrystalline cellulose (MCC) on an industrial scale. It

is estimated that the refinery will use 2.8 million cubic metres of thinning wood and wood chips as raw material each year. The total value of the biorefinery investment is said to be EUR 950 million.