Biofuels

Sustainability
FAQs

What are biofuels?

Biofuels are any kind of fuel made from living things, or from the waste they produce, including:

- Wood, wood chippings and straw.
- Pellets or liquids made from wood.
- Biogas (methane) from anaerobic waste water treatment.
- Ethanol, diesel or other liquid fuels (including used cooking oil) made by processing plant material.

What is the difference between biomass and fossil fuel-derived energy?

Biomass-derived energy is fundamentally different from fossil fuel-derived energy because biomass recycles carbon, whereas fossil fuels introduce carbon that has previously been 'locked away' to the atmosphere. Biomass is deemed 'carbon neutral' – the carbon dioxide (CO_2) generated during combustion is equivalent to that which was originally bound from the atmosphere through photosynthesis.

Are biofuels climate-friendly?

In principle, biofuels derived from plant-based sources are a way of reducing greenhouse gas emissions by replacing long carbon cycle fossil fuels which release greenhouse gases that had been locked away. Although the burning of biofuels also releases CO_2, plants absorb (capture) a comparable volume of the gas from the atmosphere while growing, as part of the photosynthesis process.

Does Sappi plan to increase its use of biofuels?

Yes. The focus throughout the group is on **promoting recycling** and **recovering materials**.

As the pulp and paper industry is highly capital intensive, it is difficult to change processes quickly. Nevertheless, we are moving towards **replacing fossil fuels with biomass** wherever economically viable.

In South Africa, we have commissioned a third-party service provider to assess the **renewable energy options** – both solar and wind – for Sappi's mills with the aim of providing a zero carbon emission generation source with the lowest tariff for each mill.

Our 1.5 Future Energy Technologies and Decarbonisation cluster is focused on exploring and developing novel technologies - including biofuels - for fuel shift and deep decarbonisation in terms of Scope 1 and 2 emissions. This aligns with our commitment to decarbonising our operations in the decades ahead to 2050 – with specific targets defined in our science-based targets. The initial part of our decarbonisation journey will largely involve the deployment of known technology such as biomass boilers – but we cannot achieve net zero with today's technology. The cluster's role is to identify, assess and champion new and emerging technologies which will be fundamental to meeting our net zero aspirations. The cluster has a particular focus on scanning or developing the future and new technologies required to dramatically reduce energy requirements in pulp and papermaking processes and energy supplies.

Fast facts

- Enhancing energy self-sufficiency, improving energy-use efficiency and decreasing our reliance on fossil fuels, thereby reducing our carbon footprint, are key strategic goals.
- Black liquor, created during pulp production, is a biofuel and a primary renewable fuel source used to generate steam and power in our integrated pulp and paper mills.
- Black liquor is the 5th most important fuel in the world. It is the world's most prominent biofuel-derived energy source.
- Globally 53.9% of the energy we generate is derived from renewable resources.
- 66.5% of the renewable energy used is our own black liquor.

sappi

Biofuels

Continued

Sustainability FAQs

Does Sappi use biofuels?

Yes. Overall, biofuels are a significant fuel source. At a mill-specific level, the extent to which biofuel is used depends on the type of mill and pulping process. Globally, **53.9%** of the energy we generate is derived from **renewable sources**: black liquor, bark, sludges and purchased biomass. Sappi North America's use of renewable energy is over 75%. This is a significant competitive benefit, not just in terms of costs but also in terms of customers choosing papers with a lower environmental footprint.

Deriving energy from renewable fuels such as biofuels replaces the use of fossil fuel-derived energy and avoids introducing new carbon into the atmosphere.

The **black liquor** produced in our integrated mills is the **dominant renewable fuel source**. Globally, 66.5% of renewable energy generated is our own black liquor.

What is black liquor?

Pulpwood chips are digested (cooked under pressure in white cooking liquor) into pulp by removing lignin, hemicellulose and other extractives from the wood to free the cellulose fibres. The resulting spent liquor, weak black liquor, is a diluted aqueous solution of extractives, and the inorganic chemicals used to make up white cooking liquor.

Black liquor contains more than half of the energy content of the digested wood. As a renewable biomass-derived fuel, black liquor replaces fossil fuels, with a corresponding reduction in greenhouse gas emissions. Globally, black liquor is the fifth most important fuel in the world after coal, oil, natural gas and gasoline[1]. Being derived from wood, a renewable resource, it is the world's most prominent biofuel-derived energy source.

How does black liquor generate energy?

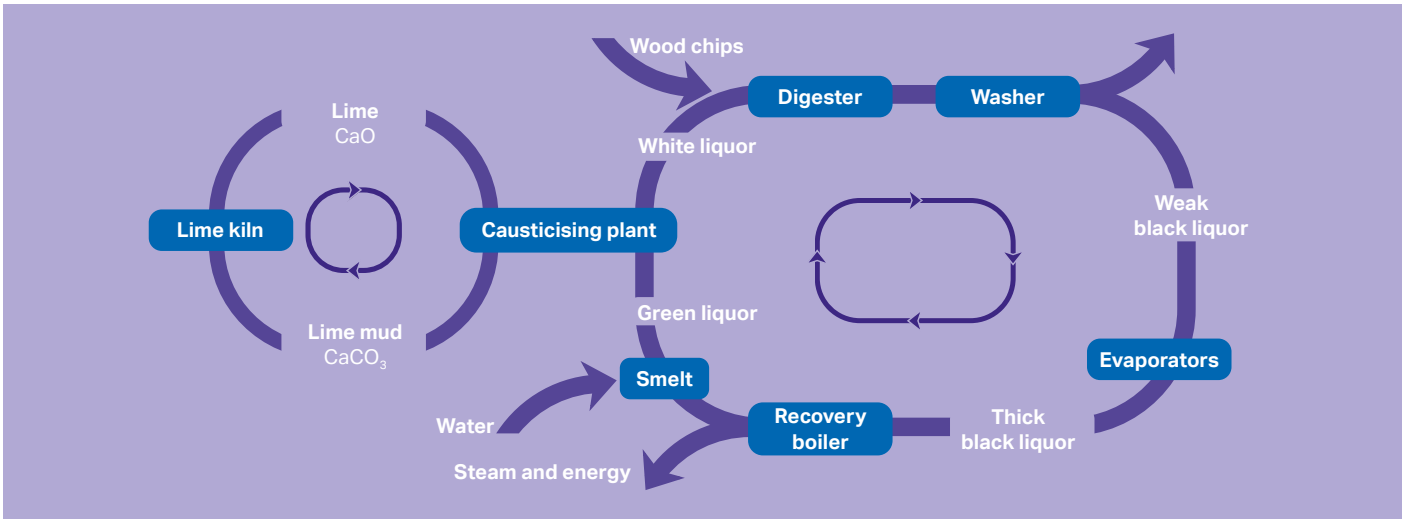
The recovery process starts by concentrating weak black liquor in concentrators and evaporators. The resulting thick black liquor is then burned in a recovery boiler to produce steam and energy, which is used in the mill.

How does black liquor fit into the pulping process?

The inorganic chemicals originally used to make up the white cooking liquor are recovered as a smelt from the recovery boiler.

The smelt is dissolved in water to form raw green liquor which is then causticised with unslaked lime (calcium oxide), yielding white cooking liquor again. The precipitated lime mud (calcium carbonate), resulting from the cauticising reaction is washed and heated to a high temperature in a lime kiln to be regenerated as calcium oxide and re-used to causticise raw green liquor again.

The kraft recovery process[2]



[1] *http://ktappi.kr/xml/21624/21624.pdf*

[2] *https://www.greencarcongress.com/2016/06/20160601-kraft.html*

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