

BIOENERGY SERIES

An introduction to biomass: does renewable always mean sustainable?

Welcome to our new series on Bioenergy.

Bioenergy will be important in the race to cut global CO₂ emissions and reach net zero. It is currently estimated by the International Energy Agency ("IEA") to account for around 55% of renewable energy and over 6% of global energy supply.¹ The IEA's Net Zero Emissions by 2050 Scenario anticipates a rapid increase in the use of bioenergy to displace fossil fuels by 2030.

The term "bioenergy" encapsulates a wide range of energy sources generated from organic matter. It includes biomass (such as crops, wood pellets and waste matter), biogases and biofuels. Of the total global bioenergy demand anticipated by the IEA in 2050, around 60% will be solid bioenergy, almost 30% liquid biofuels and over 10% biogases.²

The first three articles in our Bioenergy series will focus on biomass, sometimes called solid bioenergy.

What is biomass?

Biomass is a form of organic material which can be used to produce energy through incineration to produce heat or steam for making electricity, or to produce biogas or biofuels through various alternative conversion processes. A key benefit of biomass over other renewable sources of energy such as wind and solar is that it is not intermittent and can be stored more easily. In particular, biomass incineration can be used to provide a stable and predictable baseload power to electricity grids.

Biomass is derived from plants and other organic materials. The main examples are:

- Woody biomass, such as:
 - Wood pellets, which can be produced from sawdust, shavings and industrial waste but may also be produced from virgin wood, logs and branches.
 - Logs.
 - Smaller, unprocessed residual pieces of wood, such as sawdust, bark chips and branches from the forestry industry.

All woody biomass may originate from short rotation forestry, conventional forestry or specific plantations.

- Food crops, such as soy and corn.
- Short rotation crops, such as willow and poplar trees and miscanthus grasses.
- Waste, including animal waste and manure, sewage sludge and some types of organic household waste.
- Algae, in particular oil-rich algae.

¹ [Bioenergy - IEA](#)

² [What does net-zero emissions by 2050 mean for bioenergy and land use? - Analysis - IEA](#)

Biomass = renewable = sustainable?

Biomass is typically called a 'renewable' energy source because it cannot be depleted – crops and trees can be regrown and waste is always produced through human (and animal) activity. However, this does not address whether all biomass is 'sustainable' or 'clean'.

Origin, supply chain and end purpose should be properly assessed to establish whether a type of biomass may be truly described as sustainable and / or renewable. We examine below a number of key issues for companies looking to use biomass to reduce their carbon emissions, in particular in relation to EU and Swiss law.

Deforestation

Woody biomass has been the subject of controversy in the context of deforestation. Even if wood itself is renewable as a material, this does not mean the way it is harvested is sustainable and/or is not harmful to biodiversity or air quality. If the rate of harvesting trees for biomass exceeds the rate of growth of the trees planted as replacements, this would lead to a decline in trees in that area and it can no longer be considered sustainable.

Illegal logging and deforestation are areas of recent focus for the EU. The EU Deforestation Regulation ("**EUDR**") applies to 'relevant commodities', which include "*fuel wood, in logs, in billets, in twigs, ... wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms.*"³ It bans the import into, and export from, the EU of those 'relevant commodities' unless they are both (a) deforestation-free and (b) produced in accordance with the laws of the country of production.

Notably, for the first time, the EUDR targets deforestation and forest degradation that may be legal in the country of production. Timber and therefore woody biomass, whatever the country of origin, shall only be traded within the EU if it "*has been harvested from the forest without inducing forest degradation [i.e. from land that has been converted from a primary forest] after 31 December 2020.*"⁴

For more information on the EUDR, please see the article in HFW's February 2023 Commodities bulletin [here](#) and the update prepared upon the adoption of the EUDR in June 2023, [here](#).

To date, Swiss law does not contain a regulation on deforestation similar to the EUDR. It is however expected that the introduction of such a regulation into Swiss law will be discussed soon by the Swiss Parliament.

Biodiversity and land change

Converting forests, grasslands or land previously used for food crops into land for biomass production gives rise to a number of issues, including food shortages, biodiversity destruction and the negative impacts of monoculture.

Whilst the EUDR seeks to disincentivise cutting down primary forests for timber, there is little by way of regulation or incentive at the international level for other changes of land use. Beyond voluntary certification schemes such as the Roundtable on Sustainable Biomaterials and the Sustainable Biomass Programme, there are no compulsory or legal international standards of biomass production that consider biodiversity conservation, food security or soil / air health. This is in contrast to the position, for example, taken when formulating the CORSIA⁵ sustainable aviation fuel criteria which currently consider greenhouse gas emissions and land use change and which are set to become even more stringent in 2024. For more information on sustainable aviation fuel, see the article in the May 2023 edition of HFW's Sustainability quarterly, [here](#).

Net zero claims and greenwashing

There is a significant time lag between the moment a tree is cut down and the moment a replacement tree has regrown sufficiently to be able to absorb an equivalent amount of carbon. From a legal or regulatory aspect, this time lag increases the risk of inaccuracies and makes it difficult to confirm that the carbon produced from incineration is not more than the carbon absorbed by the biomass during its lifetime. This can make it risky to identify biomass as being a 'net zero' or 'near zero emissions' fuel. For a company planning to use biomass to reduce the carbon emissions in its supply chain, it will be key to ensure accuracy of reporting to avoid greenwashing allegations, further investigations by regulatory bodies and reputational harm.

³ EU Reg Annex I

⁴ EU Reg Art 2(13)

⁵ CORSIA is the Carbon Offsetting and Reduction Scheme for International Aviation

Supply chain emissions

A number of issues arise here and are likely to become increasingly important as focus on supply chain emissions increases. Actors in the supply chain, including shippers and traders, are likely to find themselves under pressure from end users to reduce emissions. For example:

- Some types of biomass, such as residues from the forestry industry and animal waste materials, require very little processing. Others however, including wood pellets, require many steps (such as crushing, drying and compressing the raw materials) to ensure that they are an effective fuel. Wood pellets must also be coated in a hydrophobic material (typically a type of oil) to ensure that the contents remain dry and flammable. The transport of products used to produce the biomass will also impact supply chain emissions.
- The initial growth of trees used for biomass may involve fertilisers. The production of those fertilisers and their transport to plantations will impact the calculation of supply chain emissions.
- Transportation of biomass to the power plant for end use will also have an impact.

Key takeaways

- For traders of woody biomass, the rapidly developing regulatory framework within the EU and Switzerland should be the first port of call to ensure that their product can be traded and within what parameters.
- Companies planning to use biomass to reduce the carbon emissions in their supply chain and/or to demonstrate their commitment to decarbonisation should research carefully to identify a source with verifiable net zero credentials.
- Supply chain actors should expect to see an increasing focus on supply chain emissions as both voluntary decarbonisation initiatives and mandatory obligations such as sustainability reporting requirements bite.

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