

Biomass – Frequently Asked Questions

1. What is biomass?

Bioenergy is produced from organic material known as biomass. Biomass contains carbon absorbed by trees and plants through photosynthesis. When used for energy, it comes in a range of different forms, from waste wood, to compressed wood pellets, agricultural and energy crops, like willow, miscanthus, and straw, to biogas and biofuels.

Biomass power is the second largest producer of low carbon energy and accounts for about 13% of UK electricity generation.¹ It provides firm consistent power, complementing other forms of renewable energy, like wind and solar, and ensuring the UK has a continuous, secure energy supply with a mix of technologies in the system.

2. Is Biomass sustainable?

The UK's bioenergy sustainability governance arrangements are regarded as some of the most comprehensive in the world. Sustainability criteria include land use criteria and GHG emissions savings criteria, requiring that life-cycle emissions associated with biomass meet certain thresholds to ensure they're delivering significant savings compared to fossil fuels.² Sustainability criteria considers the full associated emissions of harvesting, transporting, and using the biomass.

Voluntary independent certification schemes, like the Sustainable Biomass Program (SBP) are also used by industry to audit and demonstrate compliance with relevant sustainability regulation. SBP-certified material has also been benchmarked by Ofgem to fully meet the UK sustainability requirements. The SBP includes over 30 forestry specific indicators to ensure that forests are maintained or increased, biodiversity is preserved, and that forests of high conversion value are protected. Indicators also measure against air and water quality, conservation, and biodiversity.³

On the domestic feedstock side, 2.73 million tonnes of waste wood was used to generate low-carbon, consistent energy in biomass power stations in the UK in 2022. Waste wood is wood that has come to the end of its life – it cannot be reused or recycled. Using it in biomass power stations is a great example of the circular economy in action. Waste wood generates low-carbon electricity, while also diverting non-recyclable wood away from landfill and from export to countries with weaker environmental regulations.

¹ DESNZ (2023), "Digest of UK Energy Statistics", <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

² Ofgem, "Biomass Sustainability Reporting" <https://www.ofgem.gov.uk/environmental-and-social-schemes/renewables-obligation-ro/applicants/biomass-sustainability>

³ Sustainable Biomass Program, "Overview", https://sbp-cert.org/wp-content/uploads/2018/10/SBP_Overview_Final_Mar18.pdf

In addition, the 2023 Biomass Strategy committed to further enhancing the criteria by developing a Cross Sectoral Sustainability Framework which will ensure the same sustainability principles are being followed across all bioenergy sectors. The industry has been supportive of this and looks forward to seeing it delivered.

3. Is Biomass using a carbon accounting loophole?

The industry accounts for carbon in accordance with internationally agreed and peer reviewed carbon accounting methodologies, set out by the UN IPCC. The UN IPCC counts CO₂ emissions from the combustion of biomass in the Agriculture, Forestry and Other Land-Use (AFOLU) sector which recognises the change in carbon stocks when the biomass is harvested.

As such, while the CO₂ emissions are recorded, they are not included in the energy sector emissions total, as they have already been counted in the land use sector. This prevents double counting of carbon, while ensuring that the full life cycle emissions are accounted for.⁴

It is also reflected in the UK's Streamlined Energy and Carbon Reporting⁵.

4. If biomass emits CO₂, shouldn't we prioritise other renewables?

Bioenergy systems – like biomass – operate within the biogenic carbon cycle, meaning the carbon is absorbed, stored, and emitted by organic matter like soil, trees, plants, and grasses. In the biogenic cycle, carbon is removed from the atmosphere by photosynthesis and eventually circles back to the atmosphere as CO₂ when the organic material degrades.

Unlike bioenergy, fossil fuels don't exist in an exchange loop, they merely release carbon that would have stayed locked underground if it hadn't been dug up for use in energy production, causing a permanent increase in atmospheric CO₂.⁶ This distinction is confirmed by the UN IPCC within their peer reviewed and internationally agreed Greenhouse Gas Emissions Inventory⁷, as well as within the UK Government's Greenhouse Gas Conversion Factors.⁸

⁴ UN IPCC, (2019) See 2.3.3.4 (Chapter 2, page 2.4) "IPCC 2019 Refinement of the 2006 Guidelines for National Greenhouse Gas Inventories", https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/2_Volume2/19R_V2_2_Ch02_Stationary_Combustion.pdf

⁵ HM Government, (2021) "UK ETS: Monitoring and reporting biomass in installations", <https://www.gov.uk/government/publications/uk-emissions-trading-scheme-uk-ets-monitoring-and-reporting-biomass-in-installations>

⁶ IEA Bioenergy (2021), "Press Release – Applying a Science-Based Systems Perspective to Dispel Misconceptions about Climate Effects of Forest Bioenergy", <https://www.ieabioenergy.com/blog/publications/press-release-applying-a-science-based-systems-perspective-to-dispel-misconceptions-about-climate-effects-of-forest-bioenergy/>

⁷ See 2.3.3.4 (Chapter 2, page 2.4) of the IPCC 2019 Refinement of the 2006 Guidelines for National Greenhouse Gas Inventories. https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/2_Volume2/19R_V2_2_Ch02_Stationary_Combustion.pdf

⁸ See Methodology Documentation <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023>

To ensure our energy security and help us achieve Net Zero more quickly, we need a range of renewable and low carbon technologies in the system. Biomass power plays an important role in that. By providing firm consistent power, it complements other forms of renewable energy, like wind and solar, ensuring the UK has a continuous, secure energy supply from a mix of technologies.

5. Does harvesting woody biomass cause a carbon debt?

Working forests are generally managed on a landscape level, with hundreds of trees of different ages, harvested at different times, to produce a constant supply of wood products. As such, when a small number of trees are removed, others continue to grow and sequester carbon, rendering the carbon debt argument less relevant. Moreover, in the forests where the UK sources biomass, and as per requirements set out in UK land criteria, annual growth always remains level or exceeds harvest rate.

Indeed, in the US Southeast, where a significant amount of UK pellet imports come from, the harvesting of wood products and managed forest activity is shown to have steadily increased forested areas since the mid-1950s, with carbon stocks having nearly doubled.⁹ Therefore, there is no net reduction in forest carbon.¹⁰ This is also confirmed and monitored by the US Forest Service.

That is why the climate effects of harvesting woody biomass need to be assessed at the landscape level, and not by looking at the growth of an individual tree.

6. Is sourcing biomass bad for biodiversity?

Working forests, following sustainable management practices, can support good biodiversity and nature-related outcomes.¹¹ Forests need light to create a diverse habitat on the ground and in the canopy. Harvesting trees sustainably can encourage regrowth and regeneration, providing a range of food sources and shelter, with areas for nesting, roosting, and hibernating. This is a factor considered and audited by independent certification schemes that monitor the biomass supply chain. For example, the Sustainable Biomass Program (SBP) requires that biodiversity is maintained or enhanced through protecting key species, habitats and ecosystems,¹²

⁹ US Forest Service (2020) Forestry Inventory and Analysis, <https://www.fia.fs.fed.us/> and Sustainability guidelines and forest market response: an assessment of EU pellet demand in the south-eastern United States, Galik, CS and ABT RC 2016. Available here: <https://onlinelibrary.wiley.com/doi/epdf/10.1111/gcbb.12273>

¹⁰ IEA Bioenergy (2019) "The use of forest biomass for climate change mitigation: response to statements of EASAC", https://www.ieabioenergy.com/wp-content/uploads/2019/12/WoodyBiomass-Climate_EASACresponse_Nov2019.pdf

¹¹ REA (2022), "Over 550 Scientists Back Bioenergy as Part of "Climate Smart" Forest Management", <https://www.r-e-a.net/over-550-scientists-back-bioenergy-as-part-of-climate-smart-forest-management/>

¹² Sustainable Biomass Programme <https://sbp-cert.org/>

Forest management also plays a crucial role in wildfire prevention - in 2023 alone, wildfires destroyed more than 2.6 million acres of US forest.¹³

7. Does biomass cause deforestation?

Sourcing biomass sustainably does not cause deforestation. According to the UN Food and Agriculture Organization (FAO), deforestation is the single most important driver of forest biodiversity loss with 10 million hectares of forest converted every year to other land uses, primarily agriculture.¹⁴ In Europe, conversion into cropland is the main cause of deforestation.¹⁵

Working forests, like those from where the UK sources biomass, create new growth and provide a constant cycle of forest regeneration. By providing a market for the lowest value product, bioenergy provides an economic incentive to landowners to preserve and maintain forests, rather than giving them over to agriculture or other industry.

8. Does growing crops for biomass compete with food supply?

Much of the UK's imported biomass supply is woody biomass, sourced from large, working forests in the US Southeast, British Columbia, and the Baltics, posing no competition to food production.

Small and medium biomass sites use a range of feedstocks, predominantly sourced domestically, including waste wood, agricultural residues, and energy crops. The use of waste wood for biomass power sees more than 2.7 million tonnes diverted from landfill annually, providing both low carbon energy and essential waste management capacity.

The use of energy crops (short rotation coppice, willow or miscanthus) can provide additional revenue streams to the agricultural sector, enabling farmers to use less economically productive land, unsuitable for food crops, that can instead be used to produce low carbon energy.

9. Why do we need to import wood?

While small-medium generators tend to use waste wood or energy crops, larger generators need access to a significant supply of woody biomass to keep generating at the levels needed to help the UK get to Net Zero and help us transition away from fossil fuels. The UK simply doesn't have enough managed forested land to provide this - as of

¹³ National Interagency Fire Center, "Wildfires and acres", <https://www.nifc.gov/fire-information/statistics/wildfires>

¹⁴ Food and Agriculture Organization of the United Nations, (2024) "Mainstreaming biodiversity in forestry", <https://openknowledge.fao.org/items/4e95ea97-2166-43c6-8569-8bc7f677fa9b>

¹⁵ European Parliament, (2023) "Deforestation: causes and how the EU is tackling it", <https://www.europarl.europa.eu/topics/en/article/20221019STO44561/deforestation-causes-and-how-the-eu-is-tackling-it>

31 March 2023, the area of woodland in the UK is around 3.25 million hectares, representing 13% of the total land area in the UK.¹⁶ By contrast, forests in the USA cover over 800 million acres, equivalent to about a third of their total land area.¹⁷

10. Is shipping wood overseas sustainable?

The UK's bioenergy sustainability governance arrangements include Greenhouse Gas (GHG) emissions savings criteria, requiring that life-cycle emissions savings associated with biomass meet certain thresholds to ensure they're delivering significant savings compared to fossil fuels. As part of this, the UK's large-scale generators track and report their supply chain emissions every year and are constantly working to make further reductions.

Biomass pellets are shipped and when on land, are usually transported via trains. Some businesses are undertaking partnerships to decarbonise these supply chain elements further. For example, in 2022, Drax announced it was partnering with MOL Drybulk to develop wind power technology which is set to reduce its shipping emissions by a fifth.¹⁸

11. What role will Bioenergy Carbon Capture and Storage (BECCS) play in helping the UK get to Net Zero?

BECCS is the most scalable Negative Emissions Technology (NET) today, and it's also unique in delivering critical negative emissions while also generating electricity. This is particularly important for hard-to-decarbonise sectors, where carbon removals are the only viable option for meeting net zero.

In the UK alone, it's expected that 60-170 MtCO₂ of engineered removals will be needed per year by 2050 to meet net zero. Even by 2035, we will need around 15-25 MtCO₂ of removals to meet the Sixth Carbon Budget, according to analysis from the Climate Change Committee.¹⁹ BECCS can help deliver these critical removals.

The last government's own Task and Finish Group did not identify *"any insurmountable scientific barriers to the net removal of CO₂ from the atmosphere and subsequent permanent geological storage via BECCS when carried out in accordance with existing biomass*

¹⁶ Forest Research, (2023) "Woodland Statistics", <https://www.forestresearch.gov.uk/tools-and-resources/statistics/statistics-by-topic/woodland-statistics/>

¹⁷ National Association of State Foresters, "Who owns America's Forests?", <https://www.stateforesters.org/timber-assurance/legality/forest-ownership-statistics/>

¹⁸ Drax (2022), "MOL Drybulk and Drax launch green shipping initiative", https://www.drax.com/press_release/mol-drybulk-and-drax-launch-green-shipping-initiative/

¹⁹ Climate Change Committee, (2020) "Sixth Carbon Budget", <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

sustainability criteria and via sustainable supply chains” in their report into BECCS’ ability to generate negative emissions.²⁰

The main barrier to deployment in the UK has been the slow progress on developing the policy and regulatory environment that will adequately reward the value of negative emissions. Once this work is complete, commercial deployment of the technology will quickly follow suit.

²⁰ DESNZ, (2023), “Ability of bioenergy with carbon capture and storage (BECCS) to generate negative emissions” , <https://www.gov.uk/government/publications/ability-of-bioenergy-with-carbon-capture-and-storage-beccs-to-generate-negative-emissions>