



The consequences of RED III amendments on the use of primary v secondary biomass

Prepared for the US Industrial Pellet Association
April 2022



HAWKINS WRIGHT

Introduction

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John Bingham, Senior Advisor
john.bingham@hawkinswright.com

Hawkins Wright Limited
21/22 Station Point
121 Sandycombe Road
Richmond, Surrey, TW9 2AD,
United Kingdom

T: +44 (0)20 8747 5840
E: post@hawkinswright.com
W: www.hawkinswright.com



Background

Amongst the many amendments to the EU's Renewable Energy Directive (RED III) that have been proposed by the Rapporteur and by members of the ENVI committee, there are three amendments, or groups of amendments, which are of particular interest to the biomass sector and which are the focus of this study.

1. **Amendment #9** establishes a definition of 'primary' v 'secondary' forest biomass':
 - i. **Primary forest biomass** is defined here as "*comprising all wood obtained from removals, i.e., the quantities removed from forests, including wood recovered due to natural mortality and from felling and logging. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form, e.g., branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed*".
 - ii. **Secondary biomass** from forests comprises all other woody material, including: "*residues from forest-based industry, including bark, sawdust and wood shavings that result from sawmilling or wood milling, and recovered post consumer wood*".
2. **Amendment #13** proposes to add a line to the RED III Directive that forbids Member States from granting State Aid support [i.e., subsidies] for renewable energy produced from "primary biomass from forests". Other amendments proposed by ENVI committee members will have a similar effect. For example, **Amendment #649 (Pascal Canfin et al)** would have the effect of making the consumption of primary forest biomass ineligible for financial support.
3. Other proposed amendments go further. For example, **Amendment #650 (Idoia Villanueva Ruiz)** proposes that energy from primary woody biomass fuels shall not be taken into account when: a) calculating progress towards EU or Member States' renewable energy targets or; b) measuring compliance with renewable energy obligations or ; c) assessing eligibility for financial support. **Amendment #653 (Mihal Wiezik et al)** has a similar effect as Amendment #650 by disqualifying primary forest biomass from the definition of renewable energy and also making it ineligible for state aid.

This short paper describes how these amendments are likely to affect the markets for biomass and biomass products, and considers whether the proposals are likely to have the environmental effects that their sponsors anticipate. Our paper explores the implications for the EU's energy policy and the achievement of the region's Net Zero ambition. We begin with a brief summary of the role of biomass within the European Union's energy system.



The role biomass in EU energy supply

Biomass is the EU's largest source of renewable energy by a considerable distance. In 2020, solid biomass – essentially woodchips, pellets and renewable waste materials – accounted for 7% of the EU's gross inland energy consumption and 41% of all renewable energy, more than any other source. In addition, liquid biofuels and biogases contributed a further 3% of the EU's energy consumption.

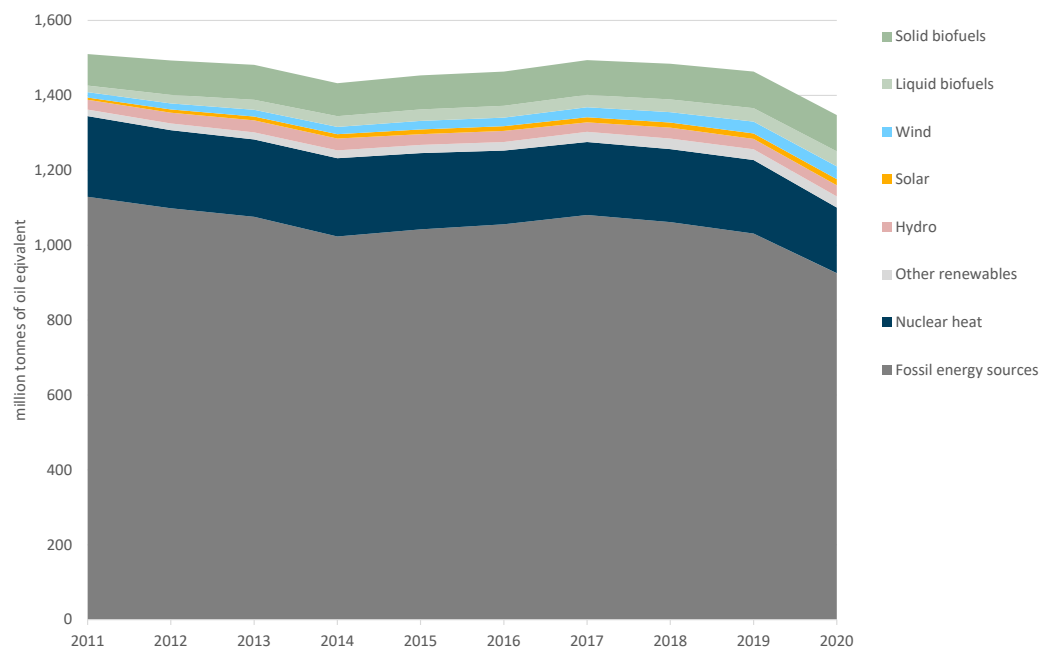
Together, solid biofuels and liquid and gaseous biofuels accounted for over half the region's gross inland consumption of renewable energy in 2020, as shown in the right-hand chart below.

The role and future opportunities for bioenergy differ between the three principal market sectors in which it is used: electricity, heat and transport fuels.

Of these, **bioelectricity** generation receives arguably the most media and political attention, though bioheat is much the bigger sector in terms of resource use, as discussed overleaf. Bioelectricity is generated in a relatively small number of dedicated or cofiring power-only plants in the EU. These generated 21.2TWh_e from solid biomass in 2020. (Source: Eurostat) However, almost three-times more bioelectricity, 61.8TWh_e, was generated in the many biomass CHP plants that are present in every EU member state except Cyprus. In addition, the renewable heat from these CHP plants is used in district heating networks or for industrial processes.

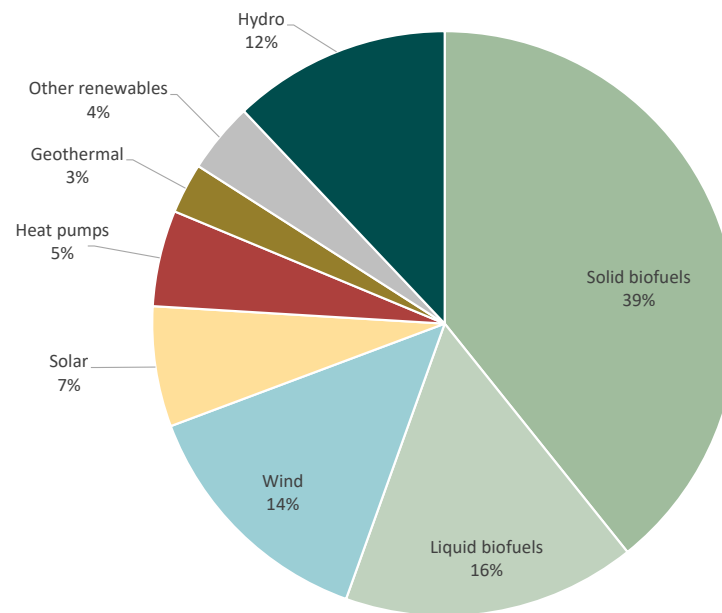
The use of solid biomass to make transport fuels is not yet significant, though the development of, for example, biojet fuel projects are making progress.

EU27: Gross inland consumption of energy by fuel source, 2011-2020



Source: Eurostat

EU27: Gross inland consumption of renewable energy by fuel, 2020



Source: Eurostat



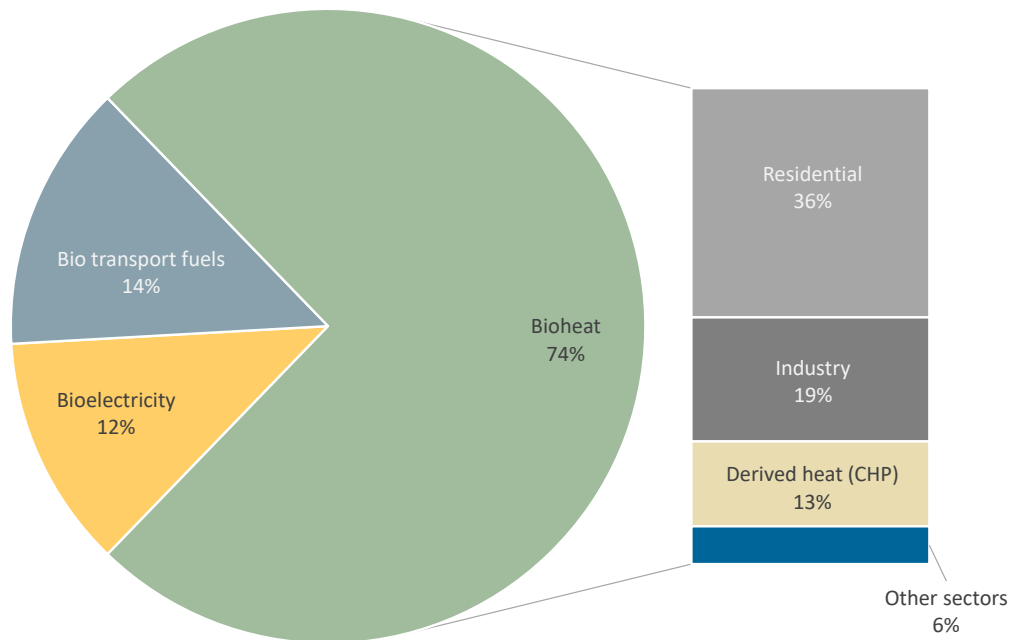
The role bioenergy in EU energy supply *continued*

Bioelectricity accounted for 12% of final bioenergy consumption in the EU27 in 2019. In that year, the use of biomass for heating and cooling was six times greater, accounting for three quarters of total final consumption of biomass energy in the EU27. Over 90% of the bioheat came from the combustion of solid biomass.

As such, bioenergy (and solid biomass) currently dwarfs the use of all other renewable heating fuels and technologies. For example, bioheat accounted for 19% of all heating and cooling in the EU27 in 2019 (both renewable and non-renewable). In comparison, heat pumps contributed 2.4%, solar thermal 0.5% and geothermal 0.3%.

Bioheat finds uses in many different markets. The direct use of biomass provides heat to hundreds of thousands of homes across Europe, particularly

The final consumption of biomass energy by end-use in the EU27, in 2019



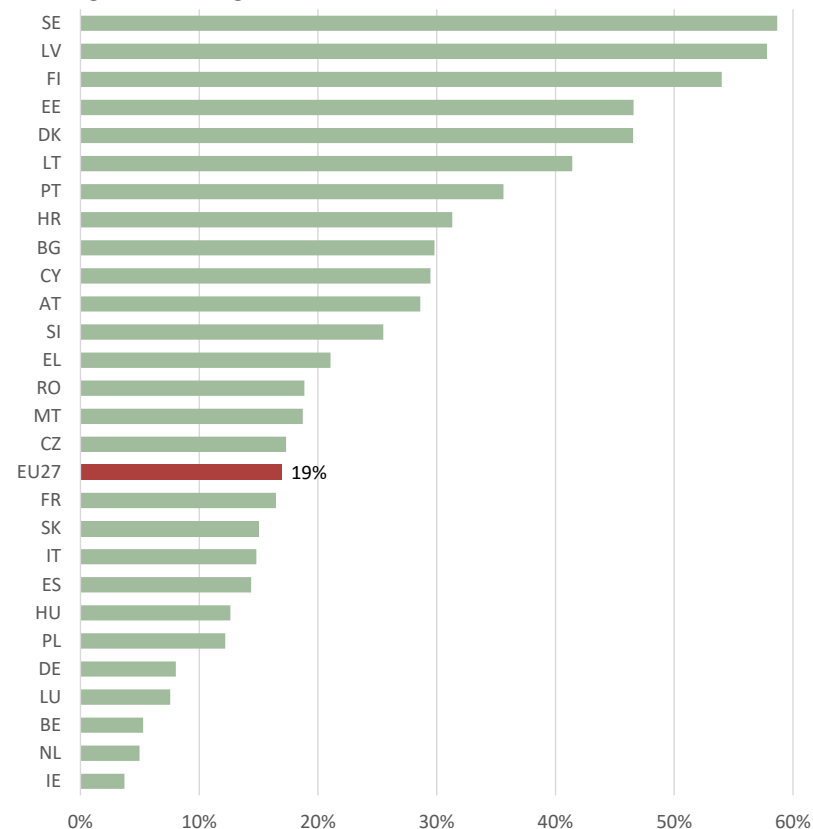
Source: Bioenergy Europe and Eurostat

in rural areas as a substitute to heating oil. In addition, homes and commercial buildings in many cities are warmed by district heat networks fired by biomass.

The use of solid biomass to generate industrial process heat is also growing and is seen as having an important role in the future decarbonisation of industries such as steel, cement and chemicals.

The importance of bioheat varies across the region, particularly in Scandinavian and Nordic countries. In Sweden, Latvia and Finland over 50% of all heating is provided by bioenergy, much of it from wood chips.

Bioenergy as a proportion of all final consumption of renewable heating and cooling in EU27 member states in 2019



Source: Bioenergy Europe and Eurostat, SHARES



Sources of solid biomass

The wood that is used for energy is derived from three principal sources: directly from forests (primary biomass), as a residue from sawmills and other wood processing industries (secondary biomass), and as a post-consumer waste material (tertiary biomass¹).

Note that the term "primary biomass" is not synonymous with high-value sawlogs. True, primary biomass includes sawlogs, but the definition also includes lower-value feedstocks used for bioenergy, such as are pictured on the cover of this report.

Removals of roundwood from the EU27's forests in 2020 totalled 375Mm³ underbark. Most of these removals will have been sawlogs that were processed into sawnwood (lumber) for construction and furniture manufacture, for example.

A relatively small portion of the removals will comprise low quality roundwood logs. These may be either too small for sawing, or they will be twisted, damaged or diseased. Such logs, together with forestry residues (e.g. tree tops and branches), are suitable only for pulp or, for the lowest quality materials, for bioenergy (including domestic firewood).

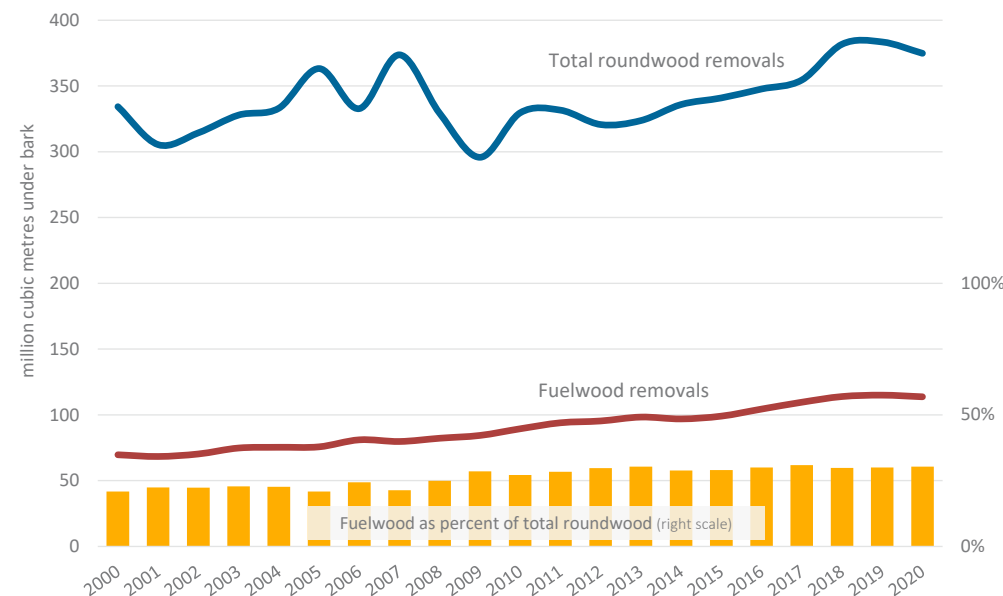
According to Eurostat data, 114Mm³ of wood that is subsequently used as fuel (fuelwood) was removed from EU27 forests in 2020. Statistically fuelwood removal is an imputed figure, back-calculated by statisticians using surveys and data on bioenergy generation. It is the use which defines the commodity as a fuel. No attempt is made to assess the production of fuelwood at the forest level.

The production of wood chips, particles and sawmill residues (i.e. secondary biomass) in the EU27 in 2020 totalled 111Mm³. This too is an imputed figure, based largely on the production of sawnwood (109Mm³ in 2020), of which wood chips and residues are the by-products. The yield of sawnwood from a sawlog is roughly 50%. This is a figure which can vary from year to year, but which ultimately constrains the supply of sawmill by-products.

The various flows of wood fibre move through complex and dynamic supply chains from multiple sources to numerous end-uses. Every forest basin is different but interactions between supply sources (pulpwood, residues and recovered wood) and end uses (pulp, panel board and bioenergy) are much the same everywhere.

Yet, beyond this general understanding of wood raw material flows, the origin of the wood used to generate energy, much of which occurs without the involvement of a commercial transaction, is more difficult to calculate and even more difficult to police, at a granular level.

EU27: Removals from forests of roundwood and fuelwood, 2000-2020



Source: Eurostat


1. In the proposed EU Parliament definition, Tertiary biomass is included with Secondary biomass



Sources of biomass feedstock used by members of the Sustainable Biomass Program (SBP)

The Sustainable Biomass Program (<https://sbp-cert.org>) is a non-profit certification system designed to certify the woody biomass – mostly wood pellets and wood chips – that is used for industrial-scale energy generation. In 2021, SBP certified 16.7Mt of biomass.

In Europe, almost all utility-scale users of wood chips or industrial wood pellets require their feedstock suppliers to be certified by SBP. With certification, utilities can demonstrate their compliance with EU and national regulations. Certification also aids trade. Mutual recognition of sustainability criteria allows sellers, buyers and traders to optimise their supply chains.

Independent bodies audit and certify the companies that supply biomass to utilities in Europe and elsewhere. The current list of certificate holders includes 220 producers and traders, excluding producers in Belarus and Russia whose certifications have been suspended as a consequence of the war in Ukraine 

As part of the process of accrediting an SBP supplier, the applicant's feedstock supply is audited annually. This includes identifying all sources of the raw biomass feedstock, broken down by primary, secondary and tertiary sources. The SBP data for 2021 is summarised in the tables. The main points to note are:

- Primary feedstock accounted for **51%** of the woody biomass used by SBP-certified suppliers in Europe and **57%** of the feedstock used by US suppliers.
- Certified European wood chip suppliers are more dependent on primary biomass than are pellet producers, with **89%** of the wood chip feedstock coming from primary sources. Certified wood chips are most likely to be used by utility-scale CHP/DH plants such as those operated by Ørsted and Høfor in Denmark and by Fortum and Stockholm Exergi in Sweden. It is plausible to assume that primary feedstock is also predominant in the supply of wood chips to the hundreds of smaller biomass CHP/DH plants and to the thousands of chip-fired commercial and residential boilers across Europe.
- Primary biomass comprises **42%** of the feedstock used by SBP-certified pellet producers in Europe. Note that these producers are mostly supplying industrial grade pellets to utilities. Heating grade pellets will contain less primary and more secondary feedstocks.
- In the US, primary biomass accounts for **57%** of the feedstock used by SBP-certified industrial pellet producers, those exporting pellets to the European market. This feedstock includes thinnings and residues from working forests which cannot be manufactured into solid wood products.

The sources of biomass feedstock used by European and US members of the Sustainable Biomass Program (SBP), 2021

<u>Europe</u>	<i>thou. dry tonnes</i>	
Primary feedstock	4,785	51.1%
Secondary feedstock	4,434	47.4%
Tertiary feedstock	141	1.5%
TOTAL	9,361	100.0%

<u>United States</u>	<i>thou. dry tonnes</i>	
Primary feedstock	5,455	57.4%
Secondary feedstock	2,924	30.8%
Tertiary feedstock	1,127	11.9%
TOTAL	9,506	100.0%

<u>Europe</u>	<i>thou. dry tonnes</i>	
Chip producer		
Primary feedstock	1,661	88.6%
Secondary feedstock	214	11.4%
TOTAL	1,875	100.0%
Pellet producer		
Primary feedstock	3,124	41.7%
Secondary feedstock	4,220	56.4%
Tertiary feedstock	141	1.9%
TOTAL	7,486	100.0%

<u>United States</u>	<i>thou. dry tonnes</i>	
Pellet producer		
Primary feedstock	5,455	57.2%
Secondary feedstock	2,924	30.7%
Tertiary feedstock	1,157	12.1%
TOTAL	9,536	100.0%

Note: Europe includes SBP members in the EU27, the UK, Norway and Belarus (but not Russia). The data includes all the biomass production by each member, including production that is not certified. US production of wood chips is not shown as the production of chips by US members is not significant.

Source: SBP (personal correspondence)



Conclusions

There is no information on how – should the amendments to RED III be accepted – new regulations would be framed and implemented, but the clear intention of the amendments is to proscribe the use of primary biomass by some end-users. This would have negative implications for forest owners, forest industries, homeowners and businesses and for the EU's climate ambitions.

Absent from the amendments is an explanation of the fundamental beliefs that underlie them. Other than a desire to promote the cascading principle that governs resource use, what is the concern that the amendments' proposers seek to address? The cascading principle is already assured by a biomass market that efficiently allocates different qualities of biomass to their highest and best end-use, primary biomass included. Also, the well-regarded SBP collects verifiable data on the origins of all the biomass that it certifies as being sustainably managed.

The lack of timely and detailed data on the split between primary and secondary biomass across Europe makes it difficult for us – and also for the Commission, presumably – to assess the implications of the proposals. However, given the size of the EU market for solid biomass, one that contributes 7% of the EU's gross inland energy consumption and 41% of all renewable energy, the potential effects will be profound. These effects will be felt not just in the EU but in North America and elsewhere too.

Forest management and environmental consequences

- There is no scientific evidence that the removal of low quality fuel grade primary biomass is environmentally damaging to a working forest. Quite the reverse; the management of working forests, including thinning and the removal of fuel grade log and forestry residues, is essential to the long term health of a forest, encouraging the efficient cultivation of high quality sawlogs, minimising the risks of diseases and forest fires, and maximising carbon sequestration.
- Forest thinning is vital to maintaining biodiversity. For example, many endemic plant and animal species in the US Southeast thrive in open pine forests. Forest thinning is a tool which can be used to help create a desired habitat for many declining and imperiled species.
- For thinning and maintenance to be commercially viable, there needs to be a market for the low-quality wood that is extracted. Absent such a market, and the income that it generates, it is more difficult for forest owners to justify the cost of the treatments. If thinning and maintenance are therefore reduced because a primary biomass market no longer exists, growth rates will suffer, sawlog quality will decline and the health of the forest will be impaired. Alternatively, thinnings and harvest residues will be left to rot or will be burned on site. A forest will then sequester less carbon during sequential forestry cycles than otherwise would be the case.
- Removing markets for forest products reduces the incentive to perform these sustainable forest management activities, or even to retain land as forest? Forest cover in SE US continues to grow, but is under pressure from deforestation and land conversion in areas where markets do not exist.

Socio-economic and climatic consequences of prohibiting the removal of primary biomass materials

- Any ban on the use of primary biomass will have an immediate effect on all utility-scale biomass power/CHP or district heating plants that have received, or may in the future receive, state aid. These plants would, in turn, need to require their suppliers of feedstock (mainly wood chips and pellets) to eliminate primary wood from their mix of feedstocks.

Continued...



Conclusions *continued*

- Most suppliers are already using as much secondary fibre as they can (as it is almost always cheaper than primary wood) but total reliance on secondary biomass would often be impossible without creating damaging market distortions. Remember that the supply of secondary biomass is limited by the output of sawmills and that, depending on local factors, there are often other industries that use secondary fibre too.
- Pellet and wood chip producers would have two choices; closedown or increase purchases of secondary fibre in competition with other off takers. With supply limited, increased competition would raise secondary feedstock prices, not just for industrial pellet/chip producers but for the many EU producers of heating pellets that rely exclusively on secondary fibre. As a result, individual households will pay more to heat their homes.
- Implementing bans on the use of primary biomass will be complex and costly, and would likely require the creation of national and sub-national monitoring systems operating on a more granular level than the existing (and effective) risk-based regional assessments and certifications.
- In the US South, wood pellet suppliers' business models will not support a switch to 100% secondary biomass as its availability in the South is inadequate. The supply of sawmill residues can also be uncertain given that it is heavily dependent on sawnwood (lumber) production which is, in turn, dependent on the sometimes erratic US house-building cycle. If the use of primary biomass in industrial pellets is banned, US producers would likely withdraw from the European market, directing their production to Asia instead.

There are long-term policy implications of proscribing primary biomass.

- Bioenergy has an important role to play in the future decarbonisation of the European economy, one that would be curtailed if the use of primary biomass disqualified innovative projects from state aid. Biomass is an essential component in the decarbonisation of hard-to-abate sectors such as aviation fuel and the production of bio-materials.
- One example is *Bioenergy with Carbon Capture and Storage (BECCS)* a technology being developed in several European countries which offers the prospect of negative carbon emissions. According to the EU's own analysis, up to 50GW of BECCS power generation will be necessary. To minimise the cost of carbon capture to consumers and taxpayers, BECCS power stations will need low cost feedstock, a need that would be jeopardised if primary biomass is proscribed.
- Higher biomass prices will slow the adoption of renewable heating, resulting in greater consumption of fossil fuels and consequently higher emissions of greenhouse gases, hindering the EU from reaching its climate goals.
- If the more extreme RED III amendments are accepted (i.e. Amendments #650 & #653 that remove primary biomass from the definition of renewable energy for the purposes of EU and national targets) it is difficult to see how the EU's 2050 Net Zero ambition could be achieved. According to a report by the Joint Research Centre in 2021, the use of primary biomass in the EU28 in 2015 totalled 166Mm³, roughly equivalent to 45Mtoe. As a point of comparison, the EU27's output of wind energy (both onshore and offshore) in 2019 totalled 32Mtoe.



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21/22 Station Point
121 Sandycombe Road
Richmond, Surrey TW9 2AD
United Kingdom

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