



# Study

Reasons to change the zero-rated criteria for biomass in the EU ETS

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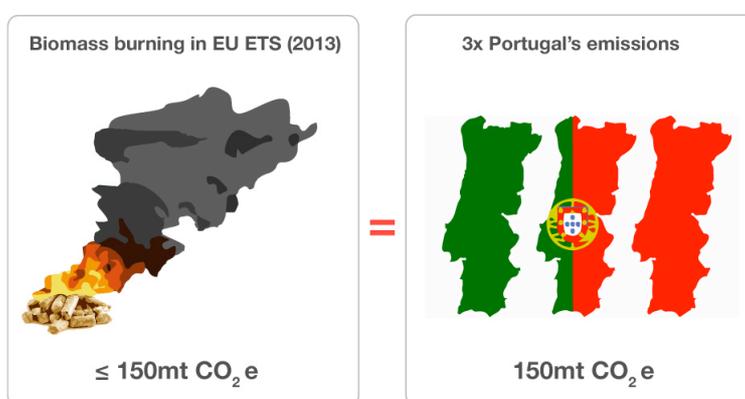
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## Summary

The European Commission is currently consulting on the EU emissions trading system (ETS) with a view to revising it for the period 2021-2030. The current EU ETS only accounts for smokestack emissions but erroneously rates the carbon emissions of biomass burning at zero. This is based on the assumption that the biomass emissions have been saved during the growth phase and accounted for in the land-use sector. Yet, as most biomass production lacks any kind of sustainability criteria and as land-use accounting is incomplete, this assumption is wrong and biomass usage can actually increase greenhouse gas (GHG) emissions. This briefing reviews the current use of biomass under the EU ETS and proposes steps to ensure that biomass use is only incentivised when it delivers real GHG emissions reductions. Biomass emissions in the EU ETS are in the range of 90 to 150 million tonnes of CO<sub>2</sub> equivalent, which represents between 4 and 7% of the overall emissions allowances. The ETS already has serious problems and fixing the biomass accounting error can be another step towards a stronger EU ETS and a more consistent EU climate policy.



## Introduction

The EU emissions trading system (EU ETS) is currently under review. As stated by the Commission communication on Energy Union<sup>1</sup>, the ETS is being held up as the cornerstone of EU climate policy, and therefore it is important to ensure that it works properly. Until 16 March 2015 there is an open consultation<sup>2</sup> on the directive for all citizens and organisations. It represents a political opportunity to solve some of the loopholes that the system has. This paper focuses mainly on the accounting criteria that biomass usage has under the emissions trading legislation. Even if this problem is reflected in other pieces of European legislation, the EU ETS will enable the spearheading of reform of this accounting problem overall.

The main arguments used to promote the use of biomass in the EU are that it is a renewable energy source, that it can increase the energy independency of the EU and its potential to reduce GHG emissions. Several EU energy directives promote the uptake of biomass for different energy purposes, including electricity and heat generation and biofuel production. The two main directives driving the uptake of bioenergy are the Renewable Energy Directive (RED) and the ETS. The RED is the main driver behind bioenergy uptake, as it obliges countries to increase the share of renewables in their energy sector. However, this paper focuses on biomass use in the ETS, which represents an additional incentive for the use of bioenergy.

<sup>1</sup> [http://ec.europa.eu/priorities/energy-union/docs/energyunion\\_en.pdf](http://ec.europa.eu/priorities/energy-union/docs/energyunion_en.pdf)

<sup>2</sup> [http://ec.europa.eu/clima/consultations/articles/0024\\_en.htm](http://ec.europa.eu/clima/consultations/articles/0024_en.htm)

## The gap between the science and policy

All legislation is based on the assumption that biomass combustion only releases carbon absorbed from the atmosphere during plant growth. It is therefore considered 'carbon neutral' in EU legislation.

The loophole lies in the failure to recognise that while plants do absorb carbon, land would also typically grow plants in the absence of human bioenergy use. It is therefore flawed to fully credit bioenergy for reducing carbon in the atmosphere through plant growth as the extant plants would grow and absorb that carbon anyway.

In addition we have to consider whether we cause a substitution or displacement of production as the land used to grow biomass for energy fails to produce biomass for other purposes (causing emissions from indirect land-use change, or ILUC). We must also consider the potential time delay between release of carbon from biomass burning and its recapturing by plant growth (also known as carbon debt). The payback times range from zero (short rotation plantation in Austria on marginal agricultural land with low-carbon stocks) to almost 500 years (forest biomass removed for fire prevention on old growth forest in Western Cascades in US)<sup>3</sup>.

The carbon neutrality assumption also derives from the partial misapplication of the Intergovernmental Panel on Climate Change (IPCC) system<sup>4</sup> that looks at emissions directly connected to activities in the ETS. Under IPCC guidelines CO<sub>2</sub> emissions and removals from the atmosphere through the use of biomass for energy are included in the Agriculture, Forestry and Other Land-Use (AFOLU) sector (previously the LULUCF sector). This would be true only if all countries would report and account for their emissions, including AFOLU, while at the same time having binding targets for emissions reductions across the planet, something which currently isn't true even for the signatory countries of the Kyoto Protocol / more developed countries.

However, the situation with biomass carbon neutrality and sustainability is in reality much more complex. Depending on how the biomass is produced and used, the resulting emissions and impacts to our climate can be better or worse when compared to fossil fuels<sup>5</sup>. Switching from fossil fuels to bioenergy does not necessarily reduce CO<sub>2</sub> emissions overall<sup>6</sup>. The IPCC itself recognises now that "the IPCC approach of not including these emissions in the Energy Sector total should not be interpreted as a conclusion about the sustainability or carbon neutrality of bioenergy"<sup>7</sup>. The JRC, the European Commission's in-house science service, states that "the assumption of biogenic carbon neutrality is not valid under policy relevant time horizons"<sup>8</sup>. Also the US Environmental Protection Agency recognises that "carbon neutrality cannot be assumed for all biomass energy a priori"<sup>9</sup>.

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<sup>3</sup> JRC, 2013. Carbon accounting of forest bioenergy.

<sup>4</sup> <http://www.ipcc-nggip.iges.or.jp/faq/faq.html>, question Q2.10.

<sup>5</sup> EEA, 2011. Opinion of the EEA Scientific Committee on Greenhouse Gas Accounting in Relation to Bioenergy.

<sup>6</sup> Searchinger et al, 2009. Science magazine. Vol. 326 no. 5952 pp. 527-528. Fixing a Critical Climate Accounting Error.

<sup>7</sup> <http://www.ipcc-nggip.iges.or.jp/faq/faq.html>, question Q2.10.

<sup>8</sup> JRC, 2013. Carbon accounting of forest bioenergy.

<sup>9</sup> EPA, 2014. Framework for Assessing Biogenic CO<sub>2</sub> Emissions from Stationary Sources

A clear example of biomass not being either sustainable or carbon neutral are the wood pellets being supplied to the EU power sector from south-eastern United States forests<sup>10</sup>. According to NRDC, “forestry on private land in the region is conducted with few restrictions and little oversight. Practices such as large-scale clearcutting, old-growth logging, wetland logging, and the conversion of natural forests to plantations are mostly unregulated and are often practiced in sensitive habitats with little protection for species”. Demand for wood pellets is increasing loggings in the southern US forests and increasing amounts of pulp wood (ie. whole trees) are used in their manufacturing. In the absence of any kind of carbon accounting or sustainability standards, the emission reductions – not even considering other environmental impacts – attained by using these wood pellets is highly questionable. According to the US Energy Information Administration<sup>11</sup>, wood pellet exports doubled in 2013 in response to growing European demand. More than 98% was exported to the EU.

In Europe altogether the use of wood has increased from 798 million m<sup>3</sup> in 2000 to 942 million m<sup>3</sup> in 2011, leading to increased extraction of roundwood and residues from forest. This increased biomass demand constitutes a pressure on forests’ carbon stocks compared to a situation where there had not been additional wood demand for energy. The energy sector is the main driver behind the increase<sup>12</sup>.

In 2012, bioenergy (bioelectricity, bioheat and biofuels) was the main contributor towards the renewable energy targets in the EU. In 2012, the consumed bioenergy amounted to 99 Mtoe, representing 62% of renewable energy consumption and 8.7% of total EU final energy consumption<sup>13</sup>. Figure 1 below shows the final energy demand of bioenergy by member state and type.

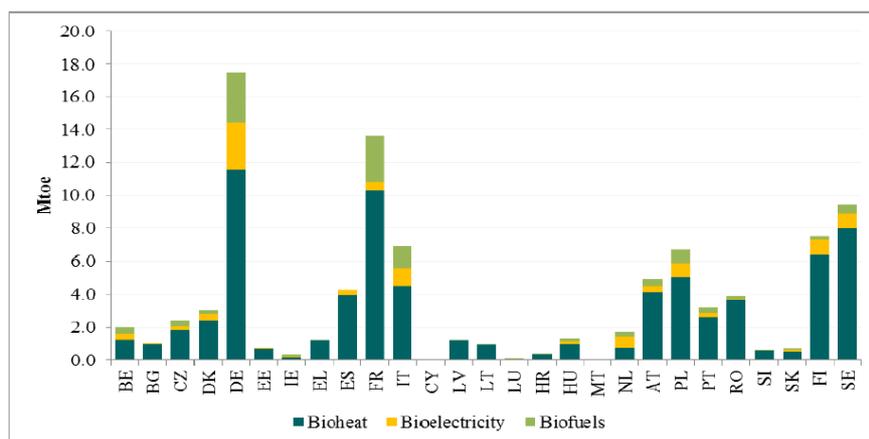


Figure 1: Final bioenergy demand by Member State (2012, Mtoe)

<sup>10</sup> NRDC, 2014. The Truth About the Biomass Industry: How Wood Pellet Exports Pollute Our Climate and Damage Our Forests. NRDC fact sheet. <http://www.nrdc.org/energy/files/wood-pellet-biomass-pollution-FS.pdf>

<sup>11</sup> EIA, 2014. U.S. wood pellet exports double in 2013 in response to growing European demand.

<sup>12</sup> [http://ec.europa.eu/enterprise/sectors/wood-paper-printing/files/indufor-report-part2\\_en.pdf](http://ec.europa.eu/enterprise/sectors/wood-paper-printing/files/indufor-report-part2_en.pdf)

<sup>13</sup> European Commission, 2014. Commission Staff Working Document. State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU.

<sup>14</sup> European Commission, 2014. Commission Staff Working Document. State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU.

Bioenergy demand is expected to increase in the following years, as can be seen in Figure 2 below. For 2020, bioenergy is expected to be contributing 57% of all renewables, growing from 99 Mtoe to 139.5 Mtoe. It seems bioenergy is the main way chosen by EU member states to reach the 2020 renewable target. Bioenergy consumption is expected to increase by 41% between 2012 and 2020.

Around three-quarters of EU biomass supply for electricity and heating come from forestry. Roughly one-third of the wood is roundwood (whole tree trunks) and another third woody, industrial residues. Of the remaining third, about half are different kinds of residues from forest harvesting operations. The volumes of roundwood and harvesting residue used for energy which pose the biggest threats in terms of negative climate and biodiversity impacts are expected to increase more than other sources<sup>15</sup>. The rest comes from agriculture and waste, which are assumed to have lower sustainability risks (apart from crops used for biofuel and biogas production). Although there is no specific data for EU ETS-regulated installations, it can be extrapolated that the ETS keeps a similar proportion as the overall use of biomass. This briefing only focuses on biomass use in the ETS although RED, with its lack of biomass sustainability criteria, is a major driver.

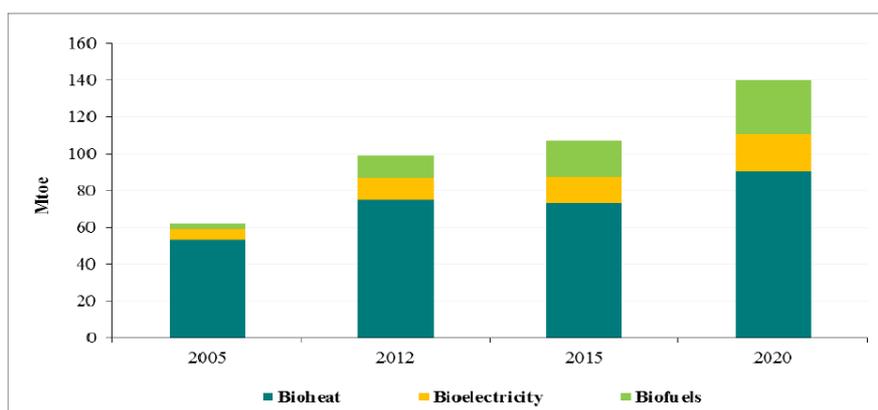


Figure 2: Outlook for EU final bioenergy demand (Mtoe, 2012-2020)<sup>16</sup>

## 1. Biomass usage in the EU ETS

Not all bioenergy that is supplied to meet the EU's renewable energy targets falls under the EU ETS. Biofuels, by definition, are used in transport, a sector excluded from the EU ETS, with the exception of aviation, where use of biofuels is still experimental. Bioelectricity is normally produced in large power plants that are within the scope of the EU ETS. Around 35% of bioelectricity is produced in facilities (mostly in coal-biomass co-firing plants) that only produce electricity, which means that an incredible amount of energy is wasted in the form of heat<sup>17</sup> due to very low power generation efficiency (between 35 and 39%)<sup>18</sup>. Regarding bioheat, it will depend on the installation where it is produced. Small-scale stoves for households, larger-scale boilers for farms or commercial buildings are excluded, while large heating plants for district

<sup>15</sup> [http://ec.europa.eu/enterprise/sectors/wood-paper-printing/files/indufor-report-part2\\_en.pdf](http://ec.europa.eu/enterprise/sectors/wood-paper-printing/files/indufor-report-part2_en.pdf)

<sup>16</sup> European Commission, 2014. Commission Staff Working Document. State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU.

<sup>17</sup> Eurobserv'er, 2015. Solid Biomass Barometer.

<sup>18</sup> IEA, 2012. Technology Roadmap. Bioenergy for Heat and Power.

heating or industrial use are included as long as their total thermal output is beyond 20MW.

Under the EU ETS, the emissions factor is zero for all solid and gaseous biomass used in electricity, heating and cooling<sup>19</sup>. For biofuels in aviation, the emissions factor is zero as long as it complies with the sustainability criteria set out in the Renewable Energy Directive (RED). The Commission<sup>20</sup> has defined the zero-rating of bioenergy under the ETS as financial support within the meaning of the RED<sup>21</sup>. Only biofuels and bioliquids that comply with the sustainability criteria set out in RED can receive financial support or count towards renewable energy targets. This means that only sustainable biofuels could get a zero-rating under the ETS. However, biofuels are currently used mostly in road transport, which is outside of EU ETS, and there is no EU-wide sustainability criteria for biomass used in heat and power. Although this might change after 2020, as the Commission has proposed a sustainability policy for bioenergy in its Energy Union communication<sup>22</sup>, for the moment solid and gaseous biomass can be used in the EU ETS without restriction and is, by default, zero-rated. Also, bioenergy-only installations, no matter their size, are not included in the EU ETS<sup>23</sup>.

## Methodology

To gather information on the amount and source of biomass use and the resulting GHG emissions in the ETS, the authors looked at 2013 reports sent by member states to comply with the obligations of article 21 of the EU ETS directive, which obliges them to report on the application of the directive. Question 5.17<sup>24</sup> refers to biomass usage in the EU ETS and associated smokestack emissions of CO<sub>2</sub>. The results presented below are given in a range. The lower end of the range is underestimated because it is based on the existing information included in article 21 reports. For some member states, such as France and Sweden, this information was missing, although the two of them are heavy users of biomass. Denmark and Norway didn't report it either. Some other member states (Ireland, Latvia, Lithuania, Romania and Slovenia) decided not to report this information under article 21 reports and only included energy content of the biomass used. According to the monitoring and reporting regulation, it is not mandatory to report CO<sub>2</sub> associated emissions at an installation level<sup>25</sup>. Therefore, the scale of biomass use in the EU ETS is not totally clear. Meanwhile, the upper part of the range

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<sup>19</sup> European Commission, 2012.Guidance document. Biomass Issues in the EU ETS. The legal basis is the EU ETS Directive, Annex IV.

<sup>20</sup> Pursuant to recital 2 of the Monitoring and Reporting Regulation.

<sup>21</sup> European Commission, 2012.Guidance document. Biomass Issues in the EU ETS.

<sup>22</sup> [http://ec.europa.eu/priorities/energy-union/docs/energyunion-annex\\_en.pdf](http://ec.europa.eu/priorities/energy-union/docs/energyunion-annex_en.pdf)

<sup>23</sup> Annex I. EU ETS Directive.

<sup>24</sup> Reports were consulted during the week of January 12th, 2015. The question reads as follows:

- the number of category A, B and C installations using biomass;
- the total emissions from biomass which are considered zero rated, i.e. where no sustainability criteria apply or where the sustainability criteria are complied with;
- the total emissions from biomass which are not considered zero rated, i.e. where sustainability criteria apply but the sustainability criteria are not complied with;
- the energy content of the biomass which is considered zero rated; and
- the energy content of the biomass which is not considered zero rated.

<sup>25</sup> Commission Regulation (EU) 601/2012, Annex X. In its subparagraph 8, CO<sub>2</sub> emissions from biomass only need to be included when a measurement-based methodology is used. However, the Annual Emissions Report Template provides this information so it could be easily made mandatory.

is based on estimations for member states with missing information<sup>26</sup>. An average emission factor<sup>27</sup> was used for member states that reported energy data but not emissions data. For those which didn't report anything, reports submitted to UNFCCC were used<sup>28</sup>.

## Key results

Under the EU ETS, most biomass is used for heat and electricity generation. In 2012, the EU consumed 86.5 million tonnes of oil equivalent (Mtoe) of biomass for heating and electricity<sup>29</sup>. At least 50% of the biomass was consumed in EU ETS-regulated installations<sup>30</sup>. More than 10% of installations were reported as having used biomass during 2013. The amount of GHG emissions zero-rated in the EU ETS are in a range between 90 and 150 million tonnes of CO<sub>2</sub> equivalent, as explained in the methodology section. This refers to smokestack emissions, not including lifecycle emissions.

The EU ETS cap for 2013 was 2,084,301,856 allowances. This means that biomass emissions from smokestack within EU ETS-regulated installations are equivalent to 4 to 7% of overall annual emission allowances. Biomass usage is expected to increase in the following years, while the cap is tightened. If biomass is not delivering carbon reductions, any substitution of fossil fuel use might be neutralised by the increase of biomass usage. Besides, given the current surplus of around 2 billion allowances, changing the zero-rating criteria could help to increase demand for allowances in the EU, complementing other measures such as the Market Stability Reserve.

The biomass zero-rating in the EU ETS also represents an additional subsidy for the industry. At a current ETS price of €7 per tonne of CO<sub>2</sub><sup>31</sup>, this equals an annual amount between €630 million and €1 billion approximately, depending on the range of actual biomass smokestack emissions.

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<sup>26</sup> In the case of Denmark, Norway and France, half of their UNFCCC reported biomass emissions were considered to fall under the EU ETS, following trends identified in other member states. In the case of Sweden, specific bioenergy emissions were available, and typical sectors under the EU ETS were included, such as the power and paper sector. In the case of Ireland, Latvia, Lithuania, Romania and Slovenia, no emission data was provided, although they provided energy info which allowed to estimate emissions. UK and Spain reported inconsistent data, although the first one corrected it after being contacted. Denmark, Norway and Sweden were also contacted although no response was obtained.

<sup>27</sup> Based on member states that reported both energy and emissions data. A value of 90 t CO<sub>2</sub> eq / TJ was used.

<sup>28</sup> It was assumed that for the case of France, Norway and Denmark half of biomass emissions came from EU ETS regulated installations. In the case of Sweden, more specific information was available per sector, so those sectors generally under the EU ETS were included.

<sup>29</sup> European Commission, 2014. Commission Staff Working Document. State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU.

<sup>30</sup> Based on the authors study of reports sent by Member States to comply with the obligations of article 21 of Directive 2003/87 for year 2013. The number must be under estimated because some major users of biomass for electricity and heat such as France, Sweden and Denmark didn't report this information.

<sup>31</sup> Approximate price in January-February 2015.

## 2. Reasons to halt the zero-rated support for biomass in the EU ETS

There are several reasons that justify halting as soon as possible the zero-rating of biomass in the EU ETS. First of all, we have no certainty that there are any **GHG reductions** due to the accounting loophole arising from the only partial application of IPCC guidelines. Secondly, even if the accounting was robust, we would still need sustainability safeguards for bioenergy to prevent negative knock-on impacts, such as carbon debt and ILUC as well as for biodiversity. These sustainability criteria should include ILUC factors for all bioenergy grown on agricultural land, carbon accounting for woody biomass that takes into account changes in the carbon stocks of forests, and waste hierarchy and cascading use principles for biomass based on wastes and residues. This is even more relevant considering that biomass consumption is expected to increase by more than 40% by 2020, and an increasing part of it will come from outside the EU. The lack of sustainability criteria may result in increased carbon emissions, accelerating global warming.

These criteria should also encourage the most efficient uses of bioenergy. Supporting co-firing of biomass in low-efficient coal power plants through the EU ETS is leading to a waste of **limited sustainable biomass resources**. Biomass is a scarce, valuable renewable resource that should be used only in the most efficient installations.

From an **energy independence** point of view, supporting biomass uptake in the EU ETS contains additional risks. Although currently most of the biomass for electricity and heat is supplied domestically, conservative estimates consider that by 2020 a gap of 21.4 Mtoe will have to be imported, equivalent to 15% of all EU primary bioenergy supply<sup>32</sup>, in the most optimistic studies<sup>33</sup>.

When looking at the functioning of the EU ETS, including biomass emissions would help to increase demand for allowances. Taking a conservative value of 100 million tonnes per year, it would partially **help to solve the existing surplus** of allowances in the system<sup>34</sup> leading to an increased carbon price that is badly needed to drive investments in better technologies. Considering that biomass usage already receives more than €8 billion in support schemes per year – most of it through feed-in premiums and feed-in tariffs<sup>35</sup> – having a support system on top through the EU ETS might create unfair competition with other forms of energy. Besides, it is foregone revenues for EU governments' budgets that could otherwise be effectively channelled towards more effective climate policies.

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<sup>32</sup> European Commission, 2014. Commission Staff Working Document. State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU.

<sup>33</sup> The biomass supply gap could reach 38 Mtoe according to Pöyry Energy Consulting (2011), compared to 21.4 Mtoe used to calculate the 15% stated in the text. Biomass imports to Europe and global availability, research for Euroelectric/VGB.

<sup>34</sup> Some sectors using biomass would receive free allowances because they are covered by the carbon leakage provisions. Others such as electricity and district heating providers would add to the EUA demand. Besides, if biomass would stop being zero-rated, the total cap could be changed. Therefore, it is difficult to estimate what would be the real increase in demand if biomass is not zero-rated.

<sup>35</sup> More than 8 billion each year. Ecofys, 2014. Subsidies and costs of EU energy.

### 3. Policy Recommendations

**3.1.** The Commission should reassess the zero-rating policy of biomass in the EU ETS directive, taking into account the uncertainty with regards to CO<sub>2</sub> savings. Scientists have suggested that accounting standards for GHGs should count all the carbon and other GHG releases by the combustion of carbon as emissions, and should include additional plant growth or reduced decomposition of biomass as an offset, which together make up additional carbon sequestration<sup>36</sup>. One option could be to fully account for the smokestack emissions of biomass. Another option could be to develop sustainability criteria with a minimum emissions savings threshold for bioenergy – similar to the GHG savings threshold that is currently part of the biofuels sustainability criteria. Then only the savings part would be allowed to count as zero in the ETS, which would be closer to reality but still relatively simple, as it would avoid full lifecycle accounting for each pathway. These two options would be a simple way to improve the accounting, while the European Commission further looks into how the EU ETS could better reflect the balance of the net effect of the production and use of bioenergy and get rid of perverse incentives that might increase GHG emissions.

**3.2.** Improve reporting and transparency under the EU ETS by including the bioenergy-only installations if they are above the 20MW threshold established for all other installations as an informative item only while the zero-rating criteria is reassessed. Otherwise it is hard to know the scale of the problem within the EU ETS. It should also be made mandatory to report CO<sub>2</sub> emissions from biomass both at an installation and member state level under the monitoring and reporting regulation to increase transparency.

**3.3.** Include ambitious environmental safeguards guiding the use of bioenergy in the renewable energy policy for 2030, as set out in the Energy Union communication. These safeguards should include full carbon accounting (including ILUC for biofuels and carbon debt for woody biomass), the efficiency standards that would guide the use of biomass only in the most efficient installations, and sustainable management criteria covering the use of residues and wastes (including waste hierarchy and cascading use principles). It should also recognise that the amount of sustainable biomass is limited and place a cap on the maximum amount of biomass contribution to the EU renewable energy targets.

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<sup>36</sup> Haberl, H., et al., Correcting a fundamental error in greenhouse gas accounting related to bioenergy. *Energy Policy* (2012), doi:10.1016/j.enpol.2012.02.051