Woody Biomass for Energy

NGO Concerns and Recommendations

April 2011

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Executive summary

Under the EU Renewable Energy Directive, 20 per cent of overall EU final energy consumption should be fulfilled by renewable sources by 2020. According to Member States' National Renewable Energy Action Plans (NREAPs), a significant share of renewable energy is expected to come from bioenergy (bioliquids, biofuels, solid and gaseous biomass for transport, electricity, heating and cooling). The rapid expansion of energy production from biomass derives from the Member States' planning a staggering increase in feedstock exploitation.

While the NREAPs indicate that woody biomass will be heavily relied on to meet Member States' renewable energy targets, reliable data regarding how much woody biomass can be sustainably supplied is hard to come by. However, we do know that, even without the increased demands placed on forest resources by policies encouraging the use of biomass for energy, there are already many other competing demands—both industrial uses and ecosystem functions or services—on limited forest resources.

The majority of forests in the world are not well managed. It is essential that we manage global forest resources sustainably. Forests are a strong ally against climate change, as well as home to 90 per cent of terrestrial biodiversity, and a resource upon which more than one billion people depend for their livelihoods.

Studies show that claims that we can increase the harvesting of wood for biomass use without serious negative environmental or social impacts are unfounded. EU consumption of biomass should not further increase the already-too-large EU ecological footprint and should not have long-term negative environmental or social impacts. Therefore, the EU should base its biomass use on what forests can sustainably supply, applying the precautionary principle. This report shows that the opposite is happening. The EU and Member States use the demand for biomass as starting point, rather than aligning biomass policies with limited supply.

At the beginning of 2011, the European Commission started a public consultation in preparation of a report on additional sustainability measures at EU level for solid and gaseous biomass used in electricity, heating and cooling. The consultation is intended to analyse whether the EU needs to take further action to ensure that biomass used for energy is sustainable, in particular in light of the developments in the bioenergy sector and considering the impacts of the developments of national and regional (solid/gaseous) biomass sustainability schemes. Existing international, EU, and Member State policy frameworks are wholly inadequate for ensuring that the production and use of biomass for energy will be sustainable. There is no overall framework that a biomass policy could fit into. The biomass consultation refers to various policies that are either under development or may never be developed, clearly indicating the lack of such a framework. The national schemes that have been developed so far also fail to convince

us that they will sufficiently address key aspects necessary to ensure biomass sustainability. There is therefore at the moment no choice other than to ensure that an EU biomass policy should be standard-setting in itself. This requires a strict policy that sets clear limits for where and how biomass can be used, as well as how and to what extent woody biomass can be harvested and forests managed.

In addition, current legislation considers biomass a 'carbon neutral' source of energy. This is based on an assumption that the carbon released by the combustion of biomass is recaptured during its re-growth, so that the cycle closes with zero greenhouse gas impacts. Recent studies, however, have demonstrated that this assumption is erroneous because it overlooks at least two important issues: (i) emissions from biomass extraction and from land-use change (both direct and indirect), and (ii) the time difference between emissions from combustion and re-absorption through re-growth. But the other measures recommended here—including the reduction of overall energy demand, improved energy efficiency, the need for policy coherence, and the need for biomass policy to be aligned with a limited sustainable supply—are equally, if not more, important. If this whole package of measures is not taken up in its entirety, then the EU's targets for renewable energy—if allowed to be met by unsustainable biomass—will act as a major destructive force for EU and global forests.

There is great risk that EU biomass policy will become yet another example of moving forward policy frameworks that cross-reference other inadequate, incomplete, or yet-to-be-developed frameworks rather than filling identified gaps in policy, particularly when it comes to sustainability measures. This practice has become a recipe for adopting policy incentives without simultaneously ensuring that the incentivised activities will be pursued in an environmentally sustainable manner, in clear violation of the precautionary principle.

The mandate in the RED requires the Commission to address biomass sustainability concerns. This mandate provides an opportunity to reinforce and reform related frameworks for the sustainable management of forests, both within and outside the EU. It furthermore provides the opportunity to take other necessary measures to ensure that the production and use of biomass for energy is aligned with what can be sustainably supplied rather than driven by unregulated demand. Omitting to do so would be a major policy failure.

As woody biomass is expected to remain the most important biomass source by 2020, the report is focuses mainly on woody biomass. This report will not deal with other forms of biomass.

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List of abbreviations

RED: Renewable Energy Directive[1]
NREAP: National Renewable Energy Action Plan
EU: European Union
CAP: Common Agricultural Policy
LULUCF: land use, land-use change and forestry
REDD: reducing emissions from deforestation and forest degradation
GHGs: greenhouse gases
LUC: land-use change
ILUC: indirect land use change
Mtoe: Million Tonnes of Oil Equivalent
ROO: Renewable Obligation Order
NPS: National Policy Statement
DECC: Department of Energy and Climate Change
CBD: Convention on Biological Diversity
EEA: European Environment Agency

Explanation of terms

Biomass: the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.[2]

Bioliquid: liquid fuel for energy purposes other than for transport, including electricity and heating and cooling produced from biomass.[3]

Biofuel: liquid or gaseous fuel for transport produced from biomass.[4]

Woody biomass: biomass originating from forestry, wood processing industries or recycled wood products. Short rotation coppice often qualifies as an agricultural practice and hence wood originating from short rotation coppice is often excluded from the term 'woody biomass'. Nonetheless some studies include wood from short rotation coppice in their woody biomass potential. These terms should therefore be treated with care. It should be noted that the same problems related to lack of arable land, mismatch of supply and demand, sustainability and energy efficient use of woody biomass, apply as much to wood originating from short rotation coppice as wood from forestry practices.

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[1] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directive 2001/77/EC and 2003/30/EC, OJ L 140, 05.06.2009, pp. 16 – 62.
[2] RED, Art. 2(e).
[3] RED, Art. 2(h)
[4] RED, Art. 2(i).

Primary biomass: biomass directly from forestry or agriculture.[5]

Direct supply of woody biomass: biomass directly from the forest including from fellings, residues from fellings, landscape management residues.[6]

Indirect supply of woody biomass: biomass from residues from wood working industry, by-products of the pulp and paper industry, processed wood fuels, post consumer recycled wood and other.[7]

Carbon debt: the net GHG emissions in the atmosphere where carbon is emitted upfront by harvesting biomass in forests and associated management changes, but it takes many years or decades to recapture the carbon in soils and vegetation.

Gross final energy consumption: the energy commodities delivered for energy purposes to industry, transport, households, services including public services, agriculture, forestry and fisheries, including the consumption, of electricity and heat by the energy branch for electricity and heat production and including losses of electricity and heat in distribution and transmission.[8]

Black liquor: lignin residue left by the chemical pulping process when extracting cellulose from wood.

[5] Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling, COM(2010) 11 final (hereinafter Biomass Report).
[6] Commission Decision 2009/548/EC of 30 June 2009 establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC of the European Parliament and of the Council, OJ L 182, 15.07.2009, pp. 33 – 62.
[7] Commission Decision 2009/548/EC.
[8] RED, Art. 2(f).

1. Introduction

> *The control of European energy consumption and the increased use of energy from renewable sources, together with energy savings and increased energy efficiency, constitute important parts of the package of measures needed to reduce greenhouse gas emissions.*[9]

With these opening words, the Renewable Energy Directive (RED) justifies the adoption of mandatory renewable energy targets for the Member States in their total energy consumption.[10] Under the RED, 20 per cent of overall EU final energy consumption should be fulfilled by renewable sources by 2020. In particular, a significant share of renewable energy is expected to come from biomass.

Biomass is

> *the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.*[11]

In practice, biomass for energy generation can be divided into three categories: forest biomass, agricultural biomass, and waste biomass.[12]

RED requires each Member State to adopt and publish a National Renewable Energy Action Plan (NREAP) setting out the roadmap for achieving the targets.[13] Analysis of the NREAPs shows that aggregate EU renewable energy production is expected to grow from 99 Mtoe in 2005 to 245 Mtoe in 2020. At the same time, however, energy consumption is also projected to grow from 1166 Mtoe to 1317 Mtoe.[14] Energy from solid biomass, in particular, is anticipated to rise from 53 Mtoe in 2005 to 90 Mtoe in 2020, of which 13

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[9] RED, Recital 1.
[10] RED, Art. 1.
[11] RED, Art. 2(e).
[12] Forest biomass includes: direct and indirect supply of wood biomass from forests and other wooded land, such as logs, stumps, leaves, branches, bark, cut-offs, woodchips, and sawdust. Agricultural biomass includes: crops and fishery products, by-products, and residues, such as straw and animal manure. Waste biomass includes: organic waste, including landfill gas, sewage sludge, industrial waste (paper, cardboard, pallets), and municipal solid waste (garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants). IEEP, Atanasiu B., *The role of bioenergy in the National Renewable Energy Action Plans: A first identification of issues and uncertainties*, November 2010, p. 11.
[13] RED, Art. 4.
[14] Energy Research Centre of the Netherlands (ECN), Beurskens L. W. M. and Hekkenberg M., *Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States*, February 2011, p. 239.

Mtoe in the electricity sector (a 160 per cent increase over 2005 levels) and 77 Mtoe in the heat and power sector (up 60 per cent from 2005).[15]

The rapid expansion of energy production (for transport, electricity, heating and cooling) from biomass derives from the Member States' planning a staggering increase in feedstock exploitation. For example, feedstock exploitation will rise by over 3000 per cent in Portugal, by 1379 per cent in the Netherlands and by 636 per cent in Ireland. Supply of woody biomass[16] is expected to grow by 354 per cent in Italy, 201 per cent in Slovenia and 111 per cent in Ireland. Use of agricultural crops and fishery products for energy generation will increase by half over 2006 levels (from 19.6 per cent to 31 per cent), while by-products from the same sources are expected to more than triple in all Member States.[17] While several NREAPs estimate large domestic potentials for woody biomass, they usually do not provide details on how forestry resources will be collected or the forests managed to ensure sustainability.[18]

The following graph compares biomass feedstock exploitation in 2006 with estimated use by 2020 according to 23 NREAPs and highlights the relative contribution of different feedstock:

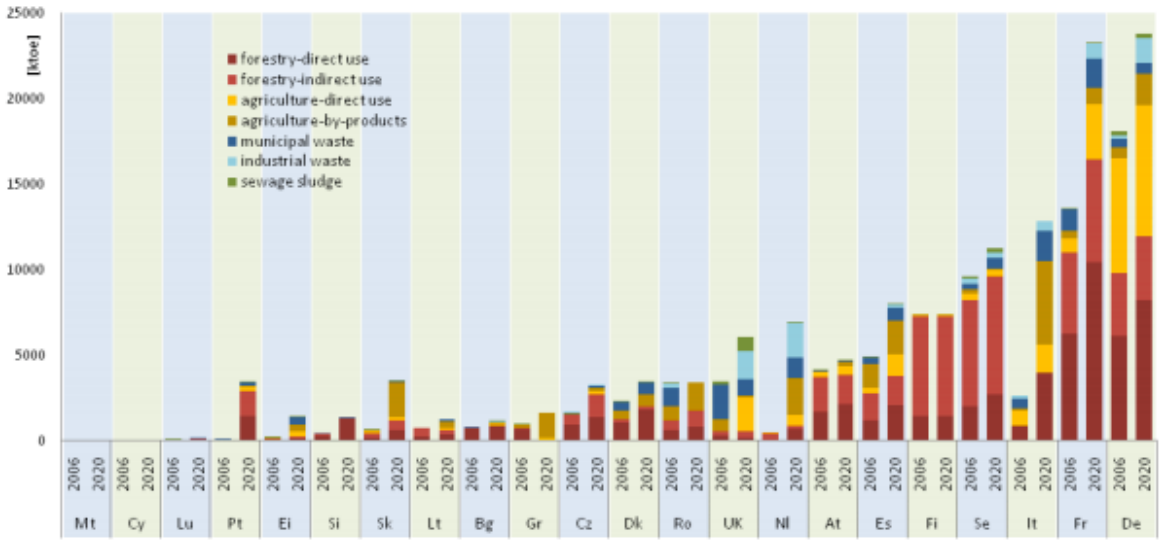

Figure 1 - Biomass feedstock in 2006 and the NREAPs estimations by 2020.[19]

In addition, estimates show that 48 per cent of biomass potential from domestic feedstock is already exploited,[20] thus raising serious concern over whether European

[15] ECN (2011), p. 239.
[16] Including the indirect supply of woody biomass
[17] IEEP (2010), p. 11.
[18] IEEP (2010), p. 10.
[19] IEEP (2010), p. 12.
[20] EUBIONET3, Junginger M. et al., *Solutions to overcome barriers in bioenergy markets in Europe*, February 2011, p. 11. Data refer to the year 2006.

biomass demand can be met from domestic sources. The alternative—relying upon imports—would exacerbate the Union's footprint on global natural resources and be at cross-purposes with its ambition to lead the world's efforts towards climate change mitigation.

In fact, while a market for biomass feedstock has already developed within the EU, trade is increasingly becoming international. Especially the trade in refined products such as wood pellets has been growing strongly and is expected to increase further in the coming years. This is because wood pellets couple high energy content with low moisture and size, so that they can be handled easily and shipped over long distances relatively inexpensively. Other forms of solid biomass (e.g. wood chips, waste wood, firewood and agricultural residues) are also traded in sometimes significant quantities. Indeed, several NREAPs explicitly anticipate a heavy dependence on imports.[21]

It is essential that we manage global forest resources sustainably. Forests are a strong ally against climate change, as well as home to 90 per cent of terrestrial biodiversity, and a resource upon which more than one billion people depend for their livelihoods.[22] In light of the multiple demands made on forest resources, including increased demand for bioenergy from other countries as well as EU Member States, the figures presented above strongly suggest that the increased demand for forest biomass expected under the current provisions of the RED and Member States NREAPs will be difficult to meet from sustainably managed forests.

In addition to the impact of increased EU demand for biomass on sustainable forest management and related biodiversity concerns, in the current policy framework the use of biomass for energy is wrongly considered 'carbon neutral' and thus encouraged. In fact, biomass for energy poses sustainability concerns for forests that can reduce any GHG-emission benefits or even run against the objectives of EU environmental policy in general and the climate objectives of the RED in particular.

As woody biomass is expected to remain the most important biomass source by 2020, the report is focuses mainly on woody biomass. This report will not deal with other forms of biomass

The present paper seeks, in its first part, to clarify these problems. In doing so, it discusses the greenhouse gas (GHG) performance of biomass as a source of energy as well as the detrimental effects of increased demand for biomass on forests. The second part focuses on the legal framework for biomass exploitation, producing evidence that current legislation is not capable of satisfactorily addressing environmental and social concerns and that the law places an obligation upon the Commission to take action. We

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[21] IEEP (2010), p. 17.
[22] World Bank, *Biodiversity and forests at a glance*, p. 2, available at: http://siteresources.worldbank.org/ESSDNETWORK/64158610-1111583197441/20488129/BiodiversityAndForestsAtAGlance.pdf (accessed 07.04.2011).

conclude that, in a world of finite resources, demand cannot grow indefinitely but has to come to terms with limited supply. This means that the extent to which biomass can help meet our energy needs must be limited to that which can be sustainably supplied, rather than driven by unregulated demand. This question, moreover, must be considered in light of the multiple demands made on forest resources and careful assessment of how limited forest resources can *best* be mobilized to address a broad range of development and environmental objectives, including climate. The EU should therefore first introduce more stringent and binding energy reduction and saving targets. A limited use of biomass can only be justified in the context of ever-increasing energy savings targets. Unfortunately, the recent Energy Efficiency Plan released by the European Commission[23] is insufficient.[24] Second, a supply-led biomass policy would only permit biomass to be used for energy where it can be used most efficiently. Currently, however, there seem to be no clear plans, either at EU or Member State level, to limit biomass use to where it is most efficient. If the Commission would start working from a supply-led approach, this would help significantly to bring some policy coherence in all the different pieces of regulation and legislation that are currently influencing the biomass debate. This policy coherence is urgently needed. Finally, we propose GHG criteria for biomass, to ensure that EU biomass policies are consistent with, and not counterproductive towards, EU climate mitigation objectives.

2. EU Biomass Policy in relation to Sustainable Supplies of, and Demand for, Forest Resources

It is apparent that current EU biomass policy is demand-led. That is, it suggests that biomass can provide a 'renewable' source of energy for the EU without any regard for the plain fact that supplies of sustainable forest resources—and also, of course, supplies of unsustainable forest resources—are limited. Accordingly, we argue that a sustainable biomass policy should be supply- rather than demand-led.

2.1 Biomass: a sustainable source of energy?

While National Renewable Energy Action Plans indicate that woody biomass will be heavily relied on to meet Member States' renewable energy targets, reliable data regarding how much woody biomass can be sustainably supplied is hard to come by. However, we do know that, even without the increased demands placed on forest resources by policies encouraging the use of biomass for energy, there are already many other competing demands, in terms of both industrial uses and ecosystem services, on limited forest resources. A biomass policy developed in accordance with the

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[23] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions *Energy Efficiency Plan 2011*, COM(2011) 109 final.

[24] European Environmental Bureau, Press release, *Little direction and no action on energy efficiency*, 08.03.2011.

precautionary principle would not introduce additional significant demands on forests without first ascertaining whether and how existing and additional demands can be sustainably supplied.

2.1.1 NREAPs are an unreliable reference for estimating biomass supply, use, and impacts

By mid 2010, Member States had to submit their NREAPs, to provide clarity regarding expected supply and use of renewable energy, including bioenergy, by 2020. Member States also had to highlight how they would 'develop existing biomass resources and mobilise new biomass resources for different uses.'[25]

It should be questioned, however, whether these plans provide reliable data to assess the anticipated consequences associated with meeting the EU renewable energy targets. First, the plans are based on statistics of varying quality concerning the quantity of solid biomass. Second, there seem to be problems with the conversion factors Member States have used when converting between different units. Third, it is unclear how the NREAPs would be affected by policy changes (such as changes in subsidies or taxation) or by fluctuations in the prices of alternative fuels, competition for raw material, or other factors that could impact demand for energy or supplies of various fuels and their feedstock.

Box 1: The lack of clear data on woody biomass

There are currently several data deficiencies which are interfering with the collection of useful forest data at EU level. In addition, the collection, interpretation, and reporting of data still lack harmonisation in the EU, due to inconsistency in definitions, scope, and focus in current forest monitoring.[26]

Clear, up-to-date and reliable statistics on the production and use of wood in the EU are also difficult to come by. It is worth pointing out that the volumes of wood and co-products (residues) used for energy are much larger than previously believed, or regularly recorded, due to the limitations of information systems based purely on trade statistics.[27] Not all removals from forests are reported in these statistics. Trade statistics are not able to cover informal trade (for example, wood use by private households) or wood residues and waste recovery streams (for example, black liquor).[28] However, these volumes can add up to significant numbers.

[25] RED, Art. 4(1).
[26] Winkel G. et al., *EU policy options for the protection of European forests against harmful impacts*, September 2009.
[27] Steier F., *Wood energy in Europe and North America: a new estimate of volumes and flows*, January 2007.
[28] Mantau U. et al., *Wood resources availability and demands – Part I: National and regional wood resources balances 2005*, Background paper to the UN-ECE/FAO workshop on wood balances, March 2008.

In terms of mobilisation measures for woody biomass, several plans are weak and there is not enough evidence to evaluate the potential impacts of increased use of forestry products for energy generation.[29] It is also very difficult to estimate how much biomass will be imported, and from which regions, as several of the NREAPs lack detailed information on these points. For further discussion of imports, see section 2.1.4.

All this makes it impossible to draw firm conclusions from the NREAPs regarding the supply, use and impacts of woody biomass.

Box 2: Mobilisation measures in Sweden

The Swedish NREAP emphasises increased wood production throughout the whole forest landscape. But the NREAP doesn't mention any concrete plans for how the state will stimulate this production, nor what the expected environmental impact will be, nor how expected biodiversity losses will be compensated. The NREAP mentions forest management operations that are already in use today (including stump uprooting, fertilisation, re-ditching) and do not require any changes in the law, as well as other operations that do require changes in the law (such as large-scale planting of fast growing exotic species). The NREAP also mentions additional proposals for forest management methods which, if considered eligible, would require changes to existing laws. This could mean anything from introduction of GMOs to large-scale ditching projects.

2.1.2 What NREAPs tell us about woody biomass supply

The NREAPs indicate that bioenergy (for transport, electricity, heating and cooling) will remain the most important renewable energy source. It will contribute to more than 50 per cent of renewable energy consumption in 2020 and to more than 10 per cent of total final energy consumption in 2020.[30] Although biomass from woody sources, agriculture and fishery and waste are all expected to increase, woody biomass will remain the most important biomass source. In relative terms, however, the biggest increase will come from the agricultural and fishery sector.

Studies show that indirect supply (forest industry by-products such as sawdust and black liquor) is, to a great extent, already being utilised.[31] The largest potential increase in supply of woody biomass can be found in (1) harvesting more stemwood in forests available for wood supply, (2) harvesting a greater part of forest biomass, such as stumps, branches, and tops of trees already harvested, and (3) mobilising more post-consumer wood.[32]

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[29] IEEP (2010).
[30] European Commission Directorate-General for Energy, *State of play of EU biomass policy and update on biofuels policy.* Presentation to Forestry & Cork Advisory Group, February 2011.
[31] Södra, Sveaskog and Vattenfall (McKinsey), *Biomass for heat and power: Opportunity and economics* (Report commissioned by European Climate Foundation), 2010.
[32] UNECE/FAO Timber Section, Hetsch S., *Potential sustainable wood supply in Europe*, October 2008.

The NREAPs confirm that the biggest increase of (domestic) woody biomass is expected to come from *direct supply* (fellings, residues from fellings, landscape management residues and other). This means that direct pressure on forests in the EU and globally will increase.

Box 3: Intensification of the use of felling residues in Finland, without consequences?

In 2006, 24 per cent of the energy used in Finland was from renewable sources, mostly from woody biomass.[33] More than half of the woody biomass used for energy consisted of black liquor and other by-products as well as waste products from the forestry industry.

Finland's goal is to produce 38 per cent of the energy it uses from renewable energy sources by 2020. It intends to reach this target mainly by increasing the use of wood chips (logging residues such as branches and tree tops, stumps and roots, and small diameter stems especially from thinning of young stands and of timber) in heating and power plants. The use of wood chips in heating and power plants would increase from about 5 million m^3 annually in 2009 to 13.5 million m^3 annually by 2020[34]. On top of this, Finland wants to increase the use of wood chips and industry residues in transport fuel.

Research[35] suggests that the lack of dead wood is the single most important reason for forest-dependent species to become endangered in Finland. If the amount of dead wood in managed forests decreases as a result of energy wood harvesting, this increases the risk to these forest species.

Removal of logging residues affects the temperature and moisture conditions in the soil, the amount of biomass available as nutrients, and the soil acidity. As a consequence soil fauna is likely to be reduced. Harvesting of logging residues can lead to a sevenfold increase in nutrient loss compared to conventional harvesting.[36]

In heavily harvested forests where stumps have not been uprooted, stumps provide a significant resource of coarse dead wood that is especially scarce in Finnish forests and might have buffered more dramatic losses in saproxylic[37] beetle diversity.[38]

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[33] Energian kokonaiskulutus nousi selvästi, Suomen virallinen tilasto 2006, Tilastokeskus. Available at: http://www.tilastokeskus.fi/til/ekul/2006/ekul_2006_2007-12-12_kat_001.html (accessed 3.2.2011)

[34] Uusiutuvan energian velvoitepaketti , työ- ja elinkeinoministeriön esitys20.4.2010. Available at: http://www.tem.fi/index.phtml?101881_m=98836&s=4265 (accessed 3.2.2011)

[35] Laitila J. et al., *Energiapuun korjuun ympäristövaikutukset, tutkimusraportti*, February 2008. Available at: http://www.metsavastaa.net/files/metsavastaa/Energiaseminaari%2020112007/Energiapuun_korjuun_ymparistovaikutukset.pdf (accessed 07.04.2011).

[36] Stupak, I.; Kukkola, M.; Varnagiryte-Kabasinskiene, I. (2007). Biomass and nutrients removals, in Norway Spruce, Scots Pine and Birch over one rotation – the influence of harvesting intensity, site productivity, target diameter and nutrient concentration in leaves.

[37] Saproxylic organisms are animal, plant or fungi species that use dead wood as their habitat. They use rotten wood for reproducing, foraging or shelter and cannot substitute it for other habitats. It is estimated that in Central Europe, 40 per cent of all forest fauna is dependent on this type of woodland organic system.

Moreover, stump uprooting causes major disturbances to the soil, which could lead to changes in plant composition.[39]

Recent research has shown that the targeted increase of use of wood chips will decrease the carbon sink capacity of the forests in Finland by 6 million tonnes of CO_2/year by 2020, compared to a situation where harvesting would be carried out without logging residue and stump removal.[40]

2.1.3 Availability of biomass in the EU to achieve the 2020 target

Because of the expected growth in demand for wood, both for the timber processing industry and for energy purposes, a number of studies have been commissioned, estimating the wood production potential within the EU. These studies suffer from a lack of data and start from different assumptions. Therefore, comparisons between them need to be made with care. Some studies are overoptimistic about how much wood could be harvested for the bioenergy sector. They tend to overestimate the potential for further wood mobilisation and underestimate the effects that removing dead wood would have on soil and biodiversity. They also underestimate the level of competition between different users of forest products. Other studies indicate that wood used for energy generation (such as firewood use by households, which can be substantial[41]) is sometimes not captured by official trade and statistics.[42]

Several studies have indicated that projected wood demand risks exceeding supply. Reports by the United Nations Economic Commission for Europe (UN-ECE) and the Food and Agriculture Organisation (FAO) suggest an imbalance between supply and demand to meet existing material use and extrapolated renewable energy needs, if the importance of wood in the biomass component of the total renewable energy supply remains constant.[43] It has been estimated that, due to steadily growing demand, the ratio of fellings to net annual increment could temporarily increase in some European countries to over 1, causing a decline in growing stock after 2020.[44]

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[38] WWF Sweden, *Stubbarnas biologiska betydelse underskattas. Potentiella konsekvenser av storskalig stubbskörd för den vedberoende biologiska mangfalden*, available at: http://www.wwf.se/source.php/1241203/Stubbarnas%20biologiska%20betydelse%20underskattas.pdf (accessed 07.04.2011).

[39] Jonsell M., *The effects of forest biomass harvesting on biodiversity*, in Röser et al. (eds.), *Sustainable Use of Forest Biomass for Energy: A Synthesis with Focus on the Baltic and Nordic Region*, Springer, Dordrecht, 2008.

[40] Finnish Environment Institute, Press release, *Weaker carbon sink capacity of forests undermines the majority of climate benefits from forest energy*, 02.01.2011, available at: http://www.environment.fi/default.asp?contentid=375282&lan=en (accessed 07.04.2011).

[41] Mantau U. et al. (2008).

[42] Steier F. (2007).

[43] www.unece.org/timber/docs/dp/dp-441.pdf

[44] Hetsch S. et al., *Wood resources availability and demands II – Future flows in the forest and energy sector*, March 2008.

The recent EU wood study[45] offered an estimate of the future potential wood supply in Europe. The study concluded that even under a medium mobilisation scenario[46], the expected wood demand is likely to exceed the potential before 2020. Even if all measures for increased wood mobilisation are implemented, wood demand—from both industry and to meet the renewable energy targets—can barely be satisfied from domestic sources in 2020. Under a high mobilisation scenario, it would be difficult but not impossible in 2020, but certainly impossible in 2030, to supply enough wood to satisfy the needs of industry as well as to meet the targets for renewable energy.[47] Moreover, the management intensification necessary for the medium and high mobilisation scenarios would hinder any increase in biodiversity.[48]

Sixty to 70 per cent of the annual growth in EU forests is being harvested. This, combined with extra demand from the energy sector, has led interested parties to plan to exploit the remaining stock.

The share of private ownership in relation to the total forest area is very diverse among the EU Member States. While the number of private forests is rather high, their share of forest land is comparably small. Studies indicate that there is a growing group of small forest owners that are not participating in wood markets[49]. Wood mobilisation from forest land of these small forest owners is therefore challenging.

2.1.4 Imports of biomass from outside the EU[50]

It is difficult to give a good overview of how much woody biomass is being and will be imported in the EU for energy production. Furthermore, the end-use of these products is not apparent from national import statistics. A lot of the increase in woody biomass is likely to be for electricity-only generation—probably in the form of wood pellets supplied to a small number of large power stations. Wood chips, mill residues, and logs might also be used as raw material for making other products, for instance pulp or wood panels.

For wood pellets, however, the trends are somewhat clearer. The EU is said to consume the large majority of global wood pellets. In 2010, the EU imported 2.5 million tonnes of pellets, roughly one third of which was supplied to the Netherlands. The UK accounted for a further 20 per cent. Belgium, Denmark, Italy and Sweden also accounted for a

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[45] Mantau U. et al., *Real potential for changes in growth and use of EU forests*, EUwood final report, June 2010.
[46] The medium mobilisation scenario represents the maximum amount of biomass that can be extracted from forests according to current management guidelines.
[47] Mantau U. et al. (2010).
[48] Prins K., *Policy options for more wood*. Presentation, EUwood stakeholder workshop. 4 June 2010, Brussels.
[49] BOKU, Schwarzbauer P. et al., *Prospects for the market supply of wood and other forest products from areas with fragmented forest-ownership structures*, Final Study Report, October 2010.
[50] Hewitt, J., *Biomass flows to and from the EU – a report analysing data and trends* (unpublished report produced for FERN, Morton-on-Marsh, United Kingdom) March 2011.

substantial share of those imports. The total increased 40 per cent during 2010. In contrast, Finland, Italy and Sweden import most of the other residues, wood chips and fire wood. Canada, and to a lesser extent Russia and the USA, currently produce the large majority of the wood pellets imported into the EU.

For a number of different reasons, however, the question remains how long these regions will remain important sources. Although there is considerable diversity concerning supplies from North America, competition for suitable wood is also likely to increase there. The availability of wood pellets for export in the USA will tend to reduce as a consequence of legislation requiring 25 per cent of the USA's energy to be supplied from renewable sources by 2025. In Canada, a number of provinces also plan to reduce their use of fossil fuel for heating. If these plans are implemented, then local demand will tend to divert supplies away from export markets. British Columbia currently supplies most of the pellets which are exported from Canada to the EU, but the proportion of the EU's imports supplied by British Columbia has reduced in recent years, transport costs becoming prohibitive (and volatile). Meanwhile, Russia revised its Forest Code in 2006. It seems the revised code is unclear and dysfunctional. Consequently, it will be difficult for those who first place wood-based products from Russia on the EU market to carry out the due diligence that will be required for compliance with the EU's Timber Regulation from March 2013.

Brazil is considered by some to be the EU's most promising potential source of wood-based fuel in the Southern hemisphere, due particularly to its good infrastructure and relative proximity. However, there are many concerns about the sustainability, or lack thereof, of many of the wood plantations in Brazil which account for most of Brazil's exports of wood-based products. The EU imported a negligible quantity of pellets from Brazil in 2010.

Finally, some imports of woody biomass which might be used directly for energy are also sometimes directed towards other uses within the EU. For example, Belarus, Croatia, Norway, Switzerland and Ukraine each supply a substantial proportion of the wood which is imported into the EU in forms which might be used directly as energy (i.e. fire wood, chips, mill residues, pellets and logs), whereas the EU's paper industry accounts for most of the exports of wood chips from Uruguay and, in smaller quantity, the Republic of Congo. Australia, Chile, South Africa and Vietnam currently export large quantities of wood chips—mainly to Japan and increasingly China. The cost of transportation from Australia, Chile and Vietnam might make supplies from these countries uncompetitive in the EU market.

Box 4: Power plant plans give clear indication of skyrocketing imports in some EU Member States

Even though it is difficult to come up with clear figures about how much biomass for energy production is currently imported and will be imported in the future, the planning of large power plants or the conversion of coal power plants to biomass in

some EU Member States give a clear indication of how imports will increase in the near future.

An April 2010 study estimated that Britain could start importing wood chips and pellets for new energy plants in the UK from 2012. If all the planned wood energy plants are built, the quantity of imports could rapidly rise to about 27 million tonnes per annum. The sourcing of large long-term supply contracts overseas will therefore present a major challenge for wood energy plants.[51] Other plans have been announced since the April 2010 study was produced, suggesting that total imports could exceed the 27 million tonnes estimated.

Recently, RWE Npower has been granted planning permission to convert a coal power station at Tilbury (UK) into a biomass-only plant. This would translate into over 7 million tonnes of wood pellets per year. RWE say that most of the wood is to come from North America[52].

Already, one UK energy company, MGT Power, has signed a non-binding memorandum of understanding with a Brazilian plantation company, Suzano Papel e Celulose, which has invested $800 million in three projects in Northeast Brazil for the production of 3 million metric tons of eucalyptus pellets per year.[53]

In April 2010, Swedish utility company Vattenfall agreed a €50 million deal with Canadian Baron MacBain to buy 1 million tonnes of wood chips (from rubber trees) from Liberia over the next five years (first delivery in the summer of 2010). Vattenfall will need annual supplies of about 7–8 million tonnes of biomass by 2020 to meet its target of reducing hard coal usage by 40 per cent (for its plants in Germany, Poland, Denmark and The Netherlands). They will get the biomass from different supplies but Liberia can play an important role. Vattenfall has so far bought wood chips from Russia and the Baltic States.[54]

Between 2008 and 2010, import to Denmark in firewood and pellets has almost doubled every year (from approximately 0.56 million tonnes in 2008 to 1.04 and 1.87 million tonnes in 2009 and 2010).[55] This growth is implemented through imported wood pellets and is expected to continue, as the large central heat and power plants are planning to increase the use of biomass relative to coal. For instance, DONG Energy CHP plant near Copenhagen—delivering heat and power to part of the

[51] John Clegg Consulting Ltd., *Wood fibre availability and demand in Britain: 2007 to 2025*, available at: http://www.confor.org.uk/Upload/Documents/37_WoodFibreAvailabilityDemandReportfinal.pdf (accessed 07.04.2011).
[52] http://climate-connections.org/2011/03/31/worlds-largest-wood-power-station-approved-in-the-uk-will-threatens-climate-and-forests/
[53] Gibson L., *MGT signs MOU with Suzano for biomass supply*, 07.10.2010, available at: http://biomassmagazine.com/articles/5023/mgt-signs-mou-with-suzano-for-biomass-supply (accessed 07.04.2011).
[54] Power-Gen Worldwide,*Vattenfall invests in Liberian biomass project*, available at: http://www.powergenworldwide.com/index/display/articledisplay/1287796881/articles/powergenworldwide/renewables/biomass/2010/04/vattenfall-invests.html (accessed 07.04.2011).
[55] Data collected from Danmarks Statistik, Statistikbanken: http://www.dst.dk

capital—used 0.5 million tonnes of pellets in 2010 and is planning to use 0.65 million tonnes in 2012[56]. This is in line both with the government's renewable energy plans and the plans of the municipalities in Denmark's big cities. The larger part of the ambitions will be fulfilled through imported biomass. The main exporting countries (for all wood products) to Denmark are Latvia, Estonia, Poland, Lithuania, Germany, Portugal, Finland, Sweden, USA and Switzerland.[57]

2.2 Under Current Policies, Demand for Forest Resources Will Exceed Supply

2.2.1 The mistaken assumption that forests supplying EU demand are managed sustainably

At present no one knows how much of industrial timber consumption worldwide is actually sustainable. Demand for paper, plywood and other wood products is expected to continue to rise, driven by growing and increasingly affluent populations around the world. While this demand will be met in part through sustainable sources and industrial efficiency, the pressure on natural forests worldwide will also continue to rise.[58]

Europe's consumption of natural resources is already too high, including consumption of products coming from forest land. The EEA estimated that the EU has an ecological footprint of 4.7 hectares per person; this is 2.2 times as large as its own biological capacity.[59] This shows that the continent cannot sustainably meet its consumption demands from within its own borders. The increasing ecological footprint results in an ever larger deficit, with negative consequences for the environment within and outside Europe.[60] From this perspective, it is hard to see how increased import of biomass for energy production can be considered sustainable.

Generalised statements that existing or projected imports are coming from sustainable sources are dangerous. Statements about annual increment and volume of removals do not indicate whether the forest is being sustainably managed.

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[56] Sørensen H. D., *Avedøre unit 2 - the world's largest biomassfuelled CHP plant: Co-firing biomass with coal workshop, 25-26 January 2011, Drax Power Station*, available at: http://www.iea-coal.org.uk/publishor/system/component_view.asp?LogDocId=82495&PhyDocId=7702 (accessed 07.04.2011).

[57] Data collected from Danmarks Statistik, Statistikbanken: http://www.dst.dk

[58] Forest Footprint Disclosure, Mardas N. et al., *Global Forest Footprints: How businesses around the world contribute to deforestation – the risks of inaction and the opportunity for change*, 2nd ed., July 2009, available at: http://www.forestdisclosure.com/docs/FFD-Global-Forest-Footprints-Report.pdf (accessed 07.04.2011).

[59] http://www.eea.europa.eu/themes/biodiversity/multimedia/ecological-footprints-worldwide/view

[60] http://www.eea.europa.eu/data-and-maps/indicators/ecological-footprint-of-european-countries/ecological-footprint-of-european-countries#toc-0

Box 5: British Columbia's dead pine forests not so dead after all

The area in British Columbia (BC) which has been affected by an exceptionally severe epidemic of mountain pine beetle is very large. Since then, many people have looked at this area as an important source of woody biomass for energy production. The export of wood-pellet fuel from this province to the EU reflects efforts to maximise the commercial value of the affected trees.[61]

A group of federal and provincial forest scientists reported in 2008 that the widespread tree mortality caused by this epic mountain pine beetle infestation had turned BC's interior pine forests to a large net source of carbon emissions both during and immediately after the insect attack. But the early results of an ongoing study suggest things might not be so dire. The beetle attack killed four out of every five older pine trees. But many such forests turn out to have lots of living trees, which are just smaller and growing beneath the crowns of their dead counter-parts. Two stands being studied were found to be net carbon sinks, despite the fact that on one site, 80 per cent of the older pine trees were dead while at the other site 95 per cent were dead. The study concluded that the large number of living trees and shrubs below the dead trees stored increasing amounts of carbon. Why? Because more light reached the forest floor as the older dead trees lost their needles and branches and boosted the growth of the remaining healthy trees, allowing them to store more carbon. The same study also concluded that areas of adjacent logged forests were still net sources of carbon emissions, in one case 10 years after logging.[62] So logging all the forests attacked by pine beetles may be unwise for British Columbia's carbon balance if all trees—living and dead—are cut down.

The majority of forests in the world are not well managed. The area of certified forests could give an indication of the area of forests under 'sustainable management'. Currently, only 9 per cent of the world's forests is certified under PEFC or FSC,[63] and there is now a wealth of studies indicating that even these forests are not all well managed, including in countries which are key suppliers of woody biomass to the EU, such as Canada, the US, Brazil and Russia. Certified forests do not, in our opinion, automatically qualify as sustainable.

2.2.2 Increasing biomass demand increases threat to forest biodiversity

As shown above, increasing demand for wood—boosted by the RED, amongst others drivers—will put more pressure on forests in the EU and will lead to intensification of forest production. This will have, in all likelihood, negative implications for forest biodiversity.

[61] Hewitt J. (2011).
[62] Parfitt B., *Managing BC's Forests for a Cooler Planet: Carbon Storage, Sustainable Jobs and Conservation*, January 2010
[63] UNECE/FAO, *Forest products Annual Market Review 2009-2010: Innovation for structural change recovery*, 2010.

Forests in the EU are steadily losing their biodiversity. Over the last decades the composition and structure of forests in the EU have been altered greatly by human economic activities—mostly to enable more efficient production of timber and other wood-based products. The growing demand for timber has also led to the replacement of indigenous species with newly introduced ones that promised greater output. The replanting of selected breeds stops natural regeneration, simplifies the genetic resource base, and reduces forests' resilience and adaptive capacity.

In its recent 'State and Outlook 2010 Report,'[64] the European Environment Agency (EEA) stated that only five per cent of the European forest area is currently considered to be undisturbed by humans and the loss of old-growth forest in combination with increased fragmentation for the remaining stands partially explains the continuing poor conservation status of many forest species of European concern. Even though there are few old-growth forests left, the remaining forests are still being felled. The Swedish forestry model, often touted as an outstanding example of sustainable management, fails to ensure effective protection of these last pristine areas. In February 2011, Swedish NGOs alerted the press to planned logging in a pristine subalpine forest in Sweden's Änok river delta, an area recognised by environmental protection authorities and NGOs as being of high conservation value.[65]

EEA also stated that most of the European forest area is heavily exploited. Exploited forests lack sufficient levels of deadwood as well as older trees which function as a habitat for numerous species. Quantities of deadwood[66] in forests across Europe have markedly decreased since the middle of the nineteenth century due to intensive forest exploitation and widespread burning of small wood and other debris. Even though the amount of deadwood slightly increased during the period 1990-2005, in most European countries it remains well below optimal levels from a biodiversity perspective.[67] The deadwood stock in forests might decline again as wood demand increases, for example for energy production.

Projections for increased biomass production are based on increased removal of forest residues that have previously been left on the forest floor or in the soil, and of stumps

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[64] EEA, Martin J. et al., *The European environment: State and outlook 2010: Synthesis*, 2010.
[65] Protect the Forest & Friends of the Earth Sweden, Press release, *Controversial Logging Exposes Sweden's Hollow Forest Policy*, 23.02.2011, available at: http://protecttheforest.se/en/pressmeddelanden/26-pressmeddelanden/860-kontroversiell-urskogsavverkning-blottlaegger-ihalig-skogspolitik (accessed 07.04.2011).
[66] EEA defined dead wood as coarse woody debris, in form of snags (dead standing trees) and logs (dead lying trees). EEA, Schutyser F. et al., *Progress towards the European 2010 biodiversity target*, EEA Report No 4/2009, May 2009.
[67] Commission staff working document, accompanying document to the Communication from the Commission to the Council, European Parliament, the European Economic and Social Committee and the Committee of the Regions: *A mid-term assessment of implementing the EC Biodiversity Action Plan – SEBI 2010 Biodiversity Indicators*, SEC(2008) 3045.

and coarse roots of trees, as well as on complementary fellings.[68] An analysis of the NREAPs confirms this. But increasing the removal of forest residues and stumps for energy production will negatively affect soil properties and biodiversity. Unrestrained extraction of these resources could have dramatic consequences for soil fertility and soil organic matter, leading to an increase in carbon dioxide (CO_2) emissions and a decrease in the carbon storage capacity of forest ecosystems.

2.2.3 The exception for biomass installations under one MW excludes a significant cumulative amount of forest biomass from sustainability criteria

From the NREAPs, it is clear that the use of biomass in individual households will remain significant in 2020. IEEP estimated that the use of biomass in individual households will represent around 31 per cent of the heating and cooling renewable energy target (based on 23 NREAPs).[69] In 2010, the European Commission recommended in its Biomass Report only to apply sustainability schemes to energy producers of 1 MW or above.[70] The fact that individual households will remain important by 2020 shows already that this 1 MW cut-off will have significant implications in terms of overall bioenergy volumes that will not be covered by sustainability schemes (if this 1 MW cut-off remains in place in future policy). In addition, household use of woody biomass also poses significant efficiency, air pollution, and climate concerns if proper measures particularly directed at these households are not put in place. These concerns include the unfiltered release into the atmosphere of particulate matter. These particulates can have significant health impacts[71] and also include 'black carbon' which is known to exert a strong influence on both regional and global warming.[72]

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[68] EEA, *How much bioenergy can Europe produce without harming the environment?*, EEA Report No 7/2006, 08.06.2006, available at: http://www.eea.europa.eu/publications/eea_report_2006_7/at_download/file (accessed 07.04.2011).
[69] IEEP (2010).
[70] Biomass Report.
[71] Environmental Protection UK, *Biomass and Air Quality Guidance for Local Authorities: England and Wales*, June 2009, available at: http://www.environmental-protection.org.uk/assets/library/documents/Biomass_and_Air_Quality_Guidance.pdf (accessed 07.04.2011).
[72] IPCC estimates that the direct radiative forcing of black carbon lies at 0.34 Wm^{-2} (±0.25). This compares with the value of CO_2 which the IPCC sets at +1.66 [±0.17] W m–2. IPCC, Foster P. et al., *2007: Changes in Atmospheric Constituents and in Radiative Forcing*, in IPCC, Solomon S. et al. (eds.), *Climate Change 2007: The Physical Science Basis, Contribution Of Working Group I To The Fourth Assessment Report Of The Intergovernmental Panel On Climate Change*. However, many studies suggest that this estimate is rather conservative as it does not take into account the interaction of BC particles with other particles; for instance it has been demonstrated that BC warming effects may even be magnified when BC particles mix with particles that normally scatter light energy such as sulphates. See Jacobson M. Z., *Strong radiative heating due to the mixing state of black carbon in atmospheric aerosols*, Nature 409, pp. 695-697, February 2001.

2.2.4 The need to reduce overall energy demand

The EU has committed itself to limit global warming of no more than 2ºC above the pre-industrial temperature.[73] NGOs are however convinced that global average surface temperature should be limited to 1.5°C above pre-industrial levels which is based on recent scientific studies and knowledge.[74] To remain within a 2ºC temperature increase, the IPCC recommends that GHG concentrations peak by 2015 and are then reduced by up to 85 per cent by 2050. Even then there is only a small chance to stay within the 2ºC target.[75] To stay within this ceiling, the EU has committed itself to halve global emissions by the middle of this century and continue cutting them thereafter.[76] The use of biomass therefore has to be framed within comprehensive plans to set the EU on a path to reduce its emissions by at least 80 per cent in the next 40 years. Biomass cannot be used as a fig leave to keep or even increase current energy consumption levels.

It is important to employ efficiency measures not only in regard to how we use energy, but also how we produce it. Thus, to the extent that biomass is used for energy, it should be directed towards those uses where it can be converted most efficiently into usable energy, in other words, where there is higher energy conversion efficiency.

2.3 Current Biomass Policies are not Aligned with Sustainable Forest Management Objectives

Based on the information available, it is clear that the current biomass policy will have damaging implications as it will raise demand in a sector where no clear information on supply capacities exist.

There are currently several deficiencies interfering with the collection of useful forest data at the European level. Clear, up-to-date, and reliable statistics on the production and use of wood in the EU are difficult to come by. The NREAPs do not provide reliable data, nor do they offer reassuring information on how forest data will be collected or forest resources mobilized. So it is very difficult to make firm conclusions about the increased biomass supply and demand. And, due to the lack of clarity on mobilisation measures, it is also difficult to evaluate the potential impacts of increased harvesting of biomass for biodiversity.

The fact that the use of biomass in individual households (for heating) will remain significant in 2020 indicates that the overall bioenergy volumes that might not be

[73] Even then, many small island states will be submerged and therefore some argue that temperature increases should be no more than 1.5ºC.
[74] CAN International, Cancun Building Blocks: Essential Steps on the Road to a Fair, Ambitious and Binding Deal, October 2010, available at: http://www.climatenetwork.org/sites/default/files/CAN_cancun_building_blocks_october2010_1.pdf (accessed 07.04.2011).
[75] IPCC *Climate Change 2007, Synthesis Report,* p 45, November 2007.
[76] European Commission website: DG Climate Action, http://ec.europa.eu/clima/policies/brief/eu/index_en.htm (accessed on 14.02.2011)

covered by sustainability schemes—if the 1 MW cut-off remains in place in future bioenergy policy—will be very significant. But an overall analysis of what this 1 MW cut-off means in terms of bioenergy volume is still lacking.

Comparing annual increment and volume of removals do not indicate whether the forest is being sustainably managed. Studies indicate that in Europe, the projected wood demand risks exceeding supply. And the intensification of forest management will put more pressure on forest biodiversity. This is important for its own sake, for the EU's biodiversity targets, and to keep our forests resilient to climate change.

Many factors make it difficult to come up with clear figures for how much biomass for energy production is already and will be imported and from which regions this will come in the near future. But planned power plant projects give enough indication of the volumes and the likely implications of future imports. Considering that the EU's ecological footprint is too large already, including the demand for wood products, increased imports can hardly be seen as sustainable.

3. Climatic Impacts of Biomass

Energy from biomass is considered 'carbon neutral' under the RED because the assumption at the time of adopting this legislation was that emissions related to harvesting biomass for energy production would be accurately accounted for under the Kyoto Protocol. This, however, is not the case.

3.1 Is biomass a 'carbon neutral' source of energy?

Current legislation considers biomass a 'carbon neutral' source of energy. This is based on an assumption that the carbon released by the combustion of biomass is recaptured during its re-growth, so that the cycle closes with zero greenhouse gas impacts. Recent studies, however, have demonstrated that this assumption is erroneous because it overlooks at least two important issues:

i) Emissions from biomass extraction and from land-use change (both direct and indirect), and

ii) The time difference between emissions from combustion and re-absorption through re-growth.

The combination of these two aspects contradicts the carbon neutrality assumption. Indeed, in the short- to medium-term a shift to biomass for energy will result in increased GHG emissions, thus running against the very objective of the RED.

Regarding the displacement of natural lands, the RED itself explains why this type of land-use change should be avoided:

> *If land with high stocks of carbon in its soil or vegetation is converted for the cultivation of raw materials for biofuels or bioliquids, some of the stored carbon will generally be released into the atmosphere, leading to the formation of carbon dioxide. The resulting negative greenhouse gas impact can offset the positive greenhouse gas impact of the biofuels or bioliquids, in some cases by a wide margin. The full carbon effects of such conversion should therefore be accounted for in calculating the greenhouse gas emission saving of particular biofuels and bioliquids. This is necessary to ensure that the greenhouse gas emission saving calculation takes into account the totality of the carbon effects of the use of biofuels and bioliquids.*[77]

On this premise, RED lays down rules forbidding that biofuel and bioliquid feedstock be produced on lands with high carbon stock such as forests, wetlands, peatlands and other natural areas.[78] However, this safeguard only applies to biofuels and bioliquids—not to biomass—despite the fact that analogous concerns attach to the latter.

Harvesting or extraction of biomass in fact determines an immediate, one-off release of the carbon stored in the vegetation and soils which can be likened to incurring a carbon debt with the atmosphere. The size of such debt very much depends on the type of land affected and on the type of biomass extracted. Different scenarios can be considered

- If only residues from managed forests are used for energy production, then emissions are limited to the carbon stock changes in the dead wood, litter, and soil pools. When this biomass is burnt, the carbon that would have oxidised over a longer time and the carbon that would have been stored in the soil is released immediately to the atmosphere, impairing the GHG performance of the biomass energy system

- If increased demand for biomass results in additional fellings, then the effect described above would be much greater. The carbon losses would not in fact be limited to the soil and litter pools, but would include losses to the above-ground live biomass pool

- If new plantations are used as a biomass source, then there will be an increase in the trees being grown as compared to a no-policy baseline scenario. However, carbon stock changes due to the conversion of the land from the previous land-use to the new plantation should be accounted for. These changes can be positive (carbon sequestration) or negative (carbon loss) depending on the previous land-use. In addition to this *direct* land-use change, *indirect* land-use changes may occur when crops previously grown on the converted land are shifted elsewhere. For example, new plantations could replace food crops without directly affecting forests. Nevertheless, all else being equal, agricultural crops will need to find new lands. This, in turn, places additional pressure on a scarce resource. The resulting indirect

[77] RED, Recital 70.
[78] RED, Art. 17(4)-(5).

land-use change may well affect forests if these are cut to make space for food production.

Whether biomass remains an advisable source of energy in terms of GHG emissions depends therefore on the time necessary to settle the carbon debt and on the emissions avoided by replacing current energy systems based on fossil fuels. An intuitive way of expressing the interaction of these factors and the relevance of time is the 'carbon neutrality factor'.[79]

The following graph shows the evolution of the GHG performance of biomass-for-energy when wood is used to replace coal:

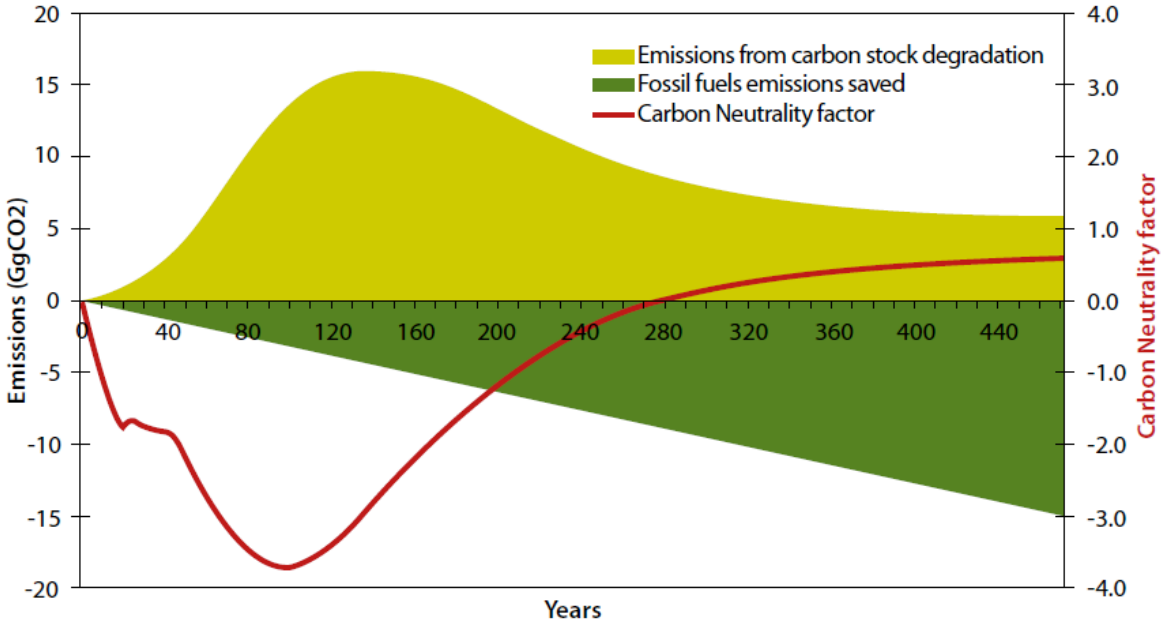

Figure 2 - Graph showing the interplay of emissions from harvesting and burning biomass versus savings from fossil fuel replacement in the case of additional felling in a typical European managed forest, with wood used to replace coal in power generation. The red line shows the evolution of the carbon neutrality factor: biomass use in this case leads to increased emissions for the first two and a half centuries. Note that in the emissions ('green') graph, positive values mean emissions while negative mean emission savings. Conversely, in the case of the carbon neutrality factor ('red graph'), negative values mean net emissions while positive values mean net savings.[80]

An analysis of different types of biomass feedstock and management practices shows that

[79] Joanneum Research, Zanchi G. et al., *The upfront carbon debt of bioenergy*, May 2010.
[80] Joanneum Research (2010).

- Additional logging in managed forests could emit more carbon than a fossil-fuel system in the short-medium term (20-50 years) and is estimated to produce benefits only after 2-3 centuries

- Harvested residues extracted for bioenergy result in a loss of above- and below-ground carbon. In a 20-year timeframe, it is estimated that the GHGs are reduced by such bioenergy material by 60-90 per cent

- Conversion from a mature forest into new, fast growing plantations is estimated to produce climatic benefit only after 150-200 years.

Biomass policy should differentiate among different types of biomass in order to ensure that only the most environmentally beneficial are allowed and promoted. Broadly speaking, a line should be drawn between biomass that does not add pressure on natural resources and biomass that does. Therefore, GHG emissions criteria for biomass that appropriately reflect the GHG emissions resulting from added pressure on natural resources and which are set at a high GHG emissions savings threshold should, in effect, eliminate such biomass from the acceptable biomass feedstock pool.

Reference to biomass in the EU Emission Trading System (ETS)[81] also reflects the mistaken assumption that using biomass for energy is 'climate neutral.' The ETS is intended to reduce GHG emissions by encouraging energy suppliers to favour less carbon-intensive energy fuel sources.[82] Currently Annex I of the ETS excludes from the Directive installations exclusively using biomass,[83] and Annex IV currently rates use of any bioenergy as having zero emissions.[84] This does not reflect reality and provides a perverse incentive for energy suppliers to favour biomass even where doing so would not reduce GHG levels, not to speak of the biodiversity impacts of further intensifying already unsustainable forest management. Therefore, a sustainable biomass policy must also require revisions to these provisions of the ETS Directive.

[81] The ETS was established by Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for green house gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L 275, 25.10.2003, pp. 32 – 46 (hereinafter ETS Directive).
[82] ETS Directive, Recital 20.
[83] ETS Directive, Annex I, § 1.
[84] ETS Directive, Annex IV, Part B.

Box 6: Weaker carbon storage capacity of forest undermines the majority of climate benefits from forest energy

In February 2011, the Finnish Environment Institute published a study examining the climate impacts of emissions attributable to a rapidly increasing forest energy production.[85] Woody biomass harvested from Finnish forests for energy production—about 5 million m^3 in the 2000s—is predicted to reach 13.5 million m^3 by 2020**.**

Wood can replace and reduce emissions from fossil fuels, but harvesting woody biomass from forests ultimately weakens their carbon storage capacity. If forest energy production increases as planned by the Finnish Government, the reduced carbon storage in forests will cut actual reductions in greenhouse gas emissions achievable through forest energy in Finland by 60 to 80 per cent by 2020.

The RED promotes biomass use to reduce greenhouse gas emissions. But as the Finnish example indicates, carbon changes are insufficiently addressed in many climate policy calculations. Accordingly, climate benefits achieved through wood energy will likely be overstated.

3.2 International carbon accounting rules (LULUCF) are not adequate to ensure emissions from land use are accounted for

The underlying lack of adequate precision and large natural variations in emissions and uptake of carbon dioxide in the land-use sector are compounded by flaws in the international accounting system for emissions from land use, land-use change, and forestry (LULUCF). Under both current and proposed UNFCCC rules, a significant proportion of emissions from harvesting trees or biomass crops for energy will not be accounted for.

Currently countries can opt not to include emissions from 'forest management' in their accounts and therefore any emissions from bioenergy production will be ignored where the biomass feedstock is produced in a country that has decided not to include emissions from forest management in its accounts. New rules under discussion at UNFCCC level may include a move to mandatory accounting for forest management, but favoured proposals allow countries to ignore business-as-usual forest management emissions. This means that it is even possible for countries to decide that their business as usual emissions in the future will *increase* but these emissions will not be counted if they are included in their accounting baselines. The result is that megatonnes of carbon emissions from managing forests, including for bioenergy production, will be ignored.

Furthermore, accounting for 'cropland management' in the international system is likely to remain voluntary, meaning that countries can choose not to account for emissions

[85] Finnish Environment Institute (2011).

from crops grown for bioenergy such as *Miscanthus.* This has significant implications for bioenergy, which is counted as carbon neutral under the Renewable Energy Directive.

In addition, some countries expected to supply the EU with forest products for bioenergy may be outside of the accounting system altogether, as only countries signed up to the Kyoto Protocol (so-called 'Annex 1 countries', excluding the USA) account for emissions from deforestation, reforestation, or afforestation. This means that, when developing countries export biomass to the EU, not only are the emissions from harvesting not accounted for, but neither are the emissions that occur when the biomass is burned. If the emissions from the carbon in trees are ignored—both at the point that the trees are cut down and when they are burnt in a power plant—this ignores substantial quantities of emissions released into the atmosphere.

The net result of ignoring these emissions from forest extraction/harvesting is that, under both the current and proposed LULUCF rules, bioenergy could play a negative role in the fight against climate change as well as becoming a major additional driver of deforestation and forest degradation.

4. The Legal Framework for Biomass

4.1 The Renewable Energy Directive and the February 2010 Biomass Report

In April 2009, the EU legislature adopted the RED to promote renewable energy and reduce GHG emissions. RED requires Member States to ensure that 20 per cent of their cumulative gross final energy consumption in 2020 comes from renewable energy sources.[86] Member State targets will be met, in large part, by increasing reliance on bioenergy. The RED distinguishes between three categories of fuels to produce bioenergy: solid and gaseous biomass for electricity, heating and cooling, biofuels, and bioliquids.[87]

In recognition of the potentially detrimental effect of bioenergy policies on climate, biodiversity and the world's forests, Article 17 of the RED lays down sustainability criteria for biofuels and bioliquids. These criteria require that (1) biofuels and bioliquids must have a GHG performance which ensures their deployment results in emissions savings vis-à-vis fossil fuels of at least 35 per cent and rising to 50 per cent in 2017 and 60 per cent in 2018 for new installations;[88] (2) biofuels and bioliquids cannot be produced from lands with high biodiversity value such as primary forest or other wooded land, natural protected areas and highly biodiverse grassland;[89] and (3) the Directive prevents the conversion of lands with high carbon stock (for example, continuously forested areas

[86] RED, Art. 3(1).
[87] RED, Art. 2(h).
[88] RED, Art. 17(2). The GHG profile of biofuels and bioliquids is calculated in accordance with Art. 19.
[89] RED, Art. 17(3).

with canopy cover of more than 30 per cent, wetlands and other natural areas) for the sole purpose of producing biofuels on the converted land.[90]

Despite involving similar environmental concerns, the sustainability criteria set out in the RED only apply to biofuels and bioliquids, not to solid and gaseous biomass for electricity, heating and cooling. In the current legislative framework, biomass is considered to be a 'carbon neutral', sustainable form of energy. However, the RED mandates the Commission to produce a report in 2009 'taking into account the need for biomass resources to be managed in a sustainable manner'[91] and to put forward proposals as appropriate. The mandate is contained in Article 17(9), which reads:

> *The Commission shall report on requirements for a sustainability scheme for energy uses of biomass . . . by 31 December 2009. That report shall be accompanied, where appropriate, by proposals for a sustainability scheme for other energy uses of biomass, to the European Parliament and the Council. That report and any proposals contained therein shall be based on the best available scientific evidence, taking into account new developments in innovative processes. If the analysis done for that purpose demonstrates that it would be appropriate to introduce amendments, in relation to forest biomass, in the calculation methodology in Annex V or in the sustainability criteria relating to carbon stocks applied to biofuels and bioliquids, the Commission shall, where appropriate, make proposals to the European Parliament and Council at the same time in this regard.*[92]

In February 2010, albeit belatedly, the Commission released a report on requirements for a sustainability scheme for energy uses of biomass.[93] The report, to which we will refer as 'the Biomass Report', also included an impact assessment.[94] The Biomass Report did not lay down any binding criteria at the EU level to encourage Member States to develop schemes of their own.[95] As a result, EU law does not at present ensure any coherence in or soundness of the sustainability rules Member States may choose to introduce.

The recommendations included in the Biomass Report include four primary elements: (1) a methodology for calculating GHG emissions and savings for biomass,[96] including default values for certain feedstock;[97] (2) the recommendation that Member States

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[90] RED, Art. 17(4).
[91] RED, Recital 75; see also Art. 17(9).
[92] RED, Art. 17(9).
[93] Biomass Report.
[94] European Commission staff working document, Impact Assessment Accompanying document to the Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling (COM(2010) 11).
[95] Biomass Report, pp. 8-10.
[96] Biomass Report, Annex I.
[97] Biomass Report, Annex II.

should encourage higher energy conversion efficiency in their support schemes for electricity, heating, and cooling installations;[98] (3) an exception excluding from the application of the criteria generators up to 1 MW thermal or electrical capacity;[99] (4) requirements for monitoring and reporting on the origins of primary biomass, to assist the Commission in filling knowledge gaps concerning the amount of biomass used for energy purposes.[100] All of these recommendations are just that: recommendations which are, as such, non-binding.

In the Biomass Report, the Commission committed to further reporting by 31 December 2011 after Member States produced their NREAPs in order to analyse (1) whether national schemes have sufficiently and appropriately addressed sustainability concerns related to the use of biomass from inside and outside the EU and (2) whether additional measures, such as common sustainability criteria at the Union level, would be appropriate.[101] In addition to this, the Commission also committed to report on how international climate change negotiations including international policies for LULUCF and REDD relate to the sustainable production of biomass, whether used for energy, food, feed, or fibre.

This commitment was made, in part, to fulfil the Commission's obligations under the RED's mandate pertaining to biomass after sufficient information became available on projected biomass usage and Member State adoption of sustainability schemes.[102] Now, Member State NREAPs as well as policies in adjacent areas can be analysed in order to determine whether it is appropriate for the Commission to put forward common sustainability criteria at EU level in its forthcoming report. The RED clarifies the criterion to evaluate the appropriateness of sustainability criteria: 'the best available scientific evidence.'[103]

In the following sections, we assess whether Member States have put into place measures to ensure that their use of biomass for energy anticipated by their respective NREAPs will ensure that biomass is used sustainably. To this end, we provide a general assessment of forest policy at both the EU and Member State level. We also analyse the NREAPs of selected Member States including whether policies are in place to ensure that the use of biomass anticipated by the NREAPs will be sustainable. In addition, we assess the relevance of REDD and LULUCF, as well as other potentially relevant policy frameworks, to these questions.

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[98] Biomass Report, p. 9.
[99] Biomass Report, p. 9.
[100] Biomass Report, pp. 9-10.
[101] Biomass Report, p. 10.
[102] Biomass Report, p. 10.
[103] RED, Recital 85.

4.2 Lack of coherence and perverse incentives in current policies impacting forests

4.2.1 EU forest policy

The Treaties[104] establishing the EU make no provision for a common forest policy. Instead, there are various forest-related policies and laws impacting on forests in the EU, spinning a confusing policy web. These include currently the Rural Development Regulation of the Common Agricultural Policy, EU Biodiversity Policy, the EU Water Framework Directive and, now, the RED, as well as some forestry specific policies and action plans described below. There is a clear lack of coherence between these laws and policies both at EU level and between the EU and Member States. National action plans for different policies such as rural development and biodiversity are not in line with each other and can even be contradictory. The forecasted sharp increase in demand for biomass as a result of the RED is likely to aggravate this incoherence. Yet one thing is becoming clear: there are not adequate safeguards provided by existing policies to ensure that EU use of biomass for energy will proceed sustainably.

The concern about a lack of coherence and coordination between national forest policies and different forest-related EU policies was voiced in the 1990s. To address these concerns, a non-legally binding EU Forestry Strategy was adopted in 1998 but its implementation has left much to be desired. A review of the implementation in 2005 revealed that there was a need to strengthen coherence between EU policies, as well as coordination between the European Commission and Member States. This review led to the EU Forest Action Plan in 2006. However, the 2009 mid-term evaluation[105] of the EU Forest Action Plan concluded that its activities have been ineffective on most counts.

In 2010, the European Commission launched a 'Green paper on Forest Protection and Information in the EU,'[106] to initiate a public debate about how to address the impact of climate change on forests in the EU. In the Council Conclusions,[107] the Council stated that '*further efforts and options for cooperation and coordination at the EU level within the framework of the Forestry Strategy and EU Forest Action Plan, with due regard to the subsidiarity principle, should be pursued.*' This clearly demonstrates that, even though Member States say they want more policy coherence and cooperation, they keep on pushing policy instruments that have not yielded results. This reveals a clear lack of political will to come to greater coherence. National policy-makers have preferred so far

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[104] Treaty on the Functioning of the European Union (TFEU), Treaty on the European Union (TEU).
[105] Pelli P. et al., *Mid-term evaluation of the implementation of the EU Forest Action Plan: A study for DG Agriculture and Rural Development*, November 2009.
[106] Green Paper on Forest Protection and Information in the EU: preparing forests for climate change, COM(2010) 66 final.
[107] Council Conclusions on preparing forests for climate change: forest protection and information in the EU, 3021st Environment Council meeting, Luxemburg, 11 June 2010.

to push their own national agendas instead of ensuring there is an EU framework in place that will guarantee sustainable use and greater protection of forests in the EU.

4.2.2 Do other policies contribute to sustainable biomass production and use?

In addition to the fact that there is an urgent need for coherent policy to ensure that forests in the EU are sufficiently protected and sustainably managed, there is also a need for a coherent and strong framework to ensure sustainable biomass production and use. But with regard to the need for a biomass framework, the European Commission has so far tried to transfer responsibility to others. They clearly did this when releasing the Biomass Report in 2010 by choosing to only give recommendations for Member States that wished to elaborate biomass schemes.

The European Commission stated in the Biomass Report that, in its assessment due by the end of 2011, it would also report '*on how international climate change negotiations and other policy developments including LULUCF accounting and REDD relate to the sustainable production of biomass, whether used for energy, food, feed or fibre.*' In the public consultation on the preparation of a report on additional sustainability measures at EU level for solid and gaseous biomass, the European Commission listed a number of policies and requested consideration of which of these would contribute to ensuring the sustainability of biomass used in the EU for energy purposes.

Some of the policies listed in the consultation are not developed yet and thus cannot be relied upon to ensure that supplies of biomass are sustainable, as shown below in table 1. Other policies listed refer back to the RED for sustainability measures for bioenergy. As noted above, the consultation is on whether additional measures are needed under the RED to ensure the sustainable production and use of biomass for energy. Accordingly, any policies that, in turn, refer back to the RED to provide such measures can hardly be relied on to provide answers for sustainable biomass production and use.

Table 1: Evaluation of policies listed in the European Commission biomass consultation

Policies	Current status	Contributing to sustainable biomass production and use?
EU Biodiversity Strategy.	Not yet adopted yet.	The strategy is likely to refer to the Renewable Energy Directive for provisions on sustainable bioenergy production.
Flagship initiative for a resource efficient Europe and upcoming resource efficiency roadmap.	Under development.	The policy lacks clear targets.
Green Paper on Forest		The Green Paper was undermined by the Biomass

Protection and Information in the EU.		Report as this report didn't come up with binding biomass criteria even though the Renewable Energy Directive will boost biomass production which will lead to increased harvesting. This will likely have a negative impact on biodiversity and the carbon storage capacity of forests making forests less resilient against climate change.
Guidance on the sustainable mobilisation of wood in Europe.	This is not a policy, but a report of an external expert group.	Demonstrates the biased nature of the consultation.
Timber Regulation.	Will only come into force in March 2013.	Important elements still need to be further developed.
EU Green Public Procurement Criteria on Combined Heat and Power.	Not mandatory.	Green Public Procurement Criteria can stimulate green growth. However, one of the major concerns with regard to the use of biomass is the use in inefficient technologies such as co-firing. Policies or laws to exclude or discourage inefficient processes are currently lacking.
EU Green public procurement criteria related to wood and wood-based products.	Not mandatory.	Green public procurement can stimulate positive development. The criteria for wood and wood-based products however, are insufficient and lagging behind criteria adopted by at least six EU Member States in national level timber procurement policies[108].
Possible inclusion of LULUCF activities in the EU GHG emissions reduction commitment.	Under development. There is considerable reason to believe that the accounting loopholes in the international LULUCF system will be carried into EU legislation which would be very damaging.	This development is unlikely to deal with emissions from imported biomass. Countries like Canada and Russia—important biomass exporters to the EU—have not included forest management emissions in their accounting under the Kyoto Protocol. The US, another important exporter, has not ratified the Kyoto Protocol. Under future rules, under negotiation, countries are likely still to be able to avoid accounting for a substantial proportion of these emissions. Therefore substantial emissions that should be captured in this sector will be ignored. See chapter 3.2.

[108] FERN, *Towards buying a sustainable future*, 2010, available at www.fern.org.

Possible legally binding agreement on forests at pan-European level.	No decision has yet been made to even start negotiations for such an agreement.	NGOs have expressed serious concerns about the development of such a legally binding agreement.[109] Current—voluntary—instruments for sustainable forest management developed by Forest Europe have not been properly implemented. The current process to come to a possible legally binding agreement doesn't show that past failures would not be repeated. In fact, current problems may become further entrenched.
Possible EU Green Public Procurement for Heating Systems.	Under development and will not be mandatory.	
10-year strategic plan of the Convention on Biological Diversity.	Not yet decided how the CBD strategic plan will be implemented in EU and Member States.	
Reform of Common Agricultural Policy.	Under development.	The current CAP is referring to the RED for sustainability criteria for bioenergy production. In the CAP Communication that was published in November 2010, there was hardly any reference to forests.[110]
Reducing Emissions from Deforestation and Forest Degradation (REDD).	Under development.	It is unclear if or to what extent forest carbon will be accounted for and what long term finance will be. In any case, REDD will be purely voluntary; it is envisioned as an incentive system for, not a regulation to ensure, the sustainable management of forests.

The Commission should work towards a broader framework that clearly looks at what forests can sustainably supply and how resources can be used in the most environmentally friendly and efficient way. The Resource Efficiency Initiative could and should offer an appropriate framework for this debate. In the short term, however, the European Commission should develop criteria that prevent negative climate, environmental, and social impacts from the use and production of biomass for energy, as

[109] *The big unanswered question: what is the added value of Forest Europe creating a legally binding agreement on forests in Europe?*, NGO open letter to Forest Europe, September 2010, available at: http://www.fern.org/sites/fern.org/files/NGO_open_letter_LBA_MCPFE_final-logos_all.pdf (accessed 07.04.2011).

[110] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future*, COM(2010) 672 final.

it is clear that these sustainability concerns are *not* sufficiently dealt with by other policies. After all, it is the RED that is pushing for an enormous increase in the production and use of biomass for energy. This policy should only be allowed to go forward if and when there is a strong framework in place to ensure the *sustainable* production and use of biomass for energy.

4.3 Member State legal frameworks for biomass

There are clear indications that Member State legal frameworks are not currently positioned to fill existing policy gaps in order to ensure that the increased production and use of biomass for energy that is anticipated in NREAPs is sustainable.

4.3.1 Case study: The UK

Current biomass usage in the UK is approximately 42 TWh (14 per cent of which is imported). Generation of energy from biomass is mostly through direct combustion either in dedicated plants or through co-firing with coal. The latter represents the largest of the two. Growing capacity of biomass-fuelled power plants will require additional feedstock imports in the future.[111]

The 2007 UK Biomass Strategy[112] seeks to further expand the domestic supply of biomass through various measures, including the Woodfuel Strategy for England 2007 aiming to bring 2 million green tonnes and 1 million dried tonnes of wood onto the market annually by 2020.[113] Biomass is thus expected to occupy a central role in the future renewable energy mix of the UK.

In the UK, the Renewables Obligation (RO) is the main financial support mechanism incentivising investment in renewable energy. It covers the use of biomass for electricity as well as heat and power.[114] With regard to the sustainable production and use of biomass feedstock, the introduction of sustainability criteria for biomass use within the RO framework is envisaged, as detailed in the UK NREAP.[115] At present, however, the RO only imposes reporting obligations on generators.[116] Sustainability reporting, introduced in 2009, was aimed to develop knowledge ahead of the introduction of European sustainability standards, which have so far failed to materialise.

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[111] EUBIONET3, Diaz-Chavez R. A., *Country report of different criteria for sustainability and certification of biomass and solid, liquid and gaseous biofuels*, February 2010, § 1.2.
[112] Department for Environment, Food and Rural Affairs (DEFRA), *UK Biomass Strategy*, May 2007, available at: http://www.biomassenergycentre.org.uk/pls/portal/docs/PAGE/RESOURCES/REF_LIB_RES/PUBLICATIONS/UKBIOMASSSTRATEGY.PDF (accessed 07.04.2011).
[113] See http://www.forestry.gov.uk/england-woodfuel.
[114] CHP generating stations need to be accredited under the Combined Heat and Power Quality Assurance (CHPQA) programme before they can receive incentives.
[115] See National Renewable Energy Action Plan for the United Kingdom, p. 100.
[116] S. 54(4), Renewables Obligation Order 2009.

Following a recent consultation on the Renewables Obligation Order 2011, the UK Government declared its intention to introduce the following criterion for biomass for energy: Biomass qualifying for support must have a carbon intensity of 285.12 kgCO2/MWh at most (that is, 60 per cent GHG emissions savings over the current EU fossil fuel comparator).[117] Generators of 1 MW or above will need to meet this criterion in order to receive support; generators below this level but over 50 kW will only be required to report against the criterion. Also, waste, biomass wholly derived from waste, landfill and sewage gas will be exempted from the criterion.

The entry into force of the described criterion is delayed to April 2013.[118] Moreover, the proposed criterion places no regard on the management of forests and other natural areas from which biomass is extracted.[119] Indeed, while the Government acknowledged the existence of 'important issues raised [by respondents to the consultation] concerning the imports of wood fuel resulting in deforestation in developing countries,' it took the view that the detail of forest management 'needs to be developed further in close conjunction with the Forestry Commission…based on our established risk-based approach, build on existing standards whenever feasible, and balance the burden for managers of small woodlands with adequate protection for the environment.'[120] Clearly, this response represents yet another case in which a measure intended to incentivise activities fails to simultaneously incorporate measures to ensure that those activities are sustainable. Instead, it relies on parallel measures to attend to sustainability concerns—without providing any evidence that the parallel measures sought to be relied on are currently delivering sustainability or are likely to be adequate in the face of increasing demands for biomass. Indeed, the parallel policy frameworks sought to be relied on are, in some cases, yet to be developed.

It is important to point out how the RO correlates with the planning legislation applicable to biomass-fuelled energy plants. A recently proposed National Policy Statement (NPS) on Renewable Energy put forward by the UK Government[121] to facilitate the construction of renewable energy installations seeks to slim down the procedure for planning permissions. To do so, it prevents the possibility for proposed biomass plants to be called into question in the context of consenting individual projects.[122] In the course of

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[117] Department for Energy and Climate Change (DECC), *Government Response to the Statutory Consultation on the Renewables Obligation Order 2011*, December 2010, available at: http://www.decc.gov.uk/assets/decc/Consultations/Renewables per cent20Obligation/1059-gov-response-ro-order-2011-cons.pdf.

[118] DECC (2010).

[119] For biofuels and bioliquids, the RED criteria will be applicable.

[120] DECC (2010).

[121] Consultation documents are available at https://www.energynpsconsultation.decc.gov.uk/ (link checked on 29 Mar 2011).

[122] Under s. 106(1)(b) of the Planning Act 2008, 'In deciding an application for an order granting development consent, the decision-maker may disregard representations if the decision-maker considers that the representations…relate to the merits of policy set out in a national policy statement'. Because the NPS declares that there is an urgent need for biomass plants development,

the consultation on the NPS, the need for sustainability criteria for biomass was set aside on the obsolete and scientifically wrong basis that biomass is 'carbon neutral,' as well as on the assumption that sustainability would be ensured by RO rules.[123]

As noted above, however, the proposed RO Order 2011 fails to ensure that the use of biomass for energy in the UK will be sustainable. First, the proposed criteria do not include any criteria concerning the management of forests and other natural areas from which biomass is extracted. Second, the proposed criteria fail to the carbon debt factor discussed in section 3.1, above. Finally, making RO financial support dependent on the fulfilment of GHG sustainability criteria does not in itself prevent plants from failing to fulfil these criteria.

Box 8: UK failure to ensure sustainability in the face of increased demand for biomass

In addition to the RO, the UK has just introduced yet another package of incentives for the use of biomass: the Renewable Heat Incentive.[124] This provides a strong signal to industry and domestic users to install biomass heating, yet this comes at a time when there are still major uncertainties about the impacts of boosting biomass demand at every level and the possibility of regulation to ensure the sustainable production and use of biomass for energy.

In the UK NREAP, agricultural crops and fishery products *directly provided* for energy generation represent the largest increase in biomass projected, yet there is no means of assessing the level provided by either in the total. Energy consultants E4Tech assumes that the 8,000 ha currently planted for energy crops will increase by 1000 ha

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the consenting authority cannot assess the need for biomass plants developments on a case-to-case basis.

[123] The Appraisal of Sustainability for the proposed biomass policy reads: 'The case for biomass as a renewable alternative to fossil fuels powering combustion plants is based on the proposition that the CO2 released when it is used to create energy can be offset by the CO2 it consumes when growing. Biomass fuel may be said to be 'sustainable' when it comes as close as possible to achieving this. It has been argued by some that biomass generating stations should only be consented subject to a condition requiring them to use only sustainable fuel. Government has not adopted this approach, proposing instead (subject to the outcome of an ongoing consultation) to incentivise the use of sustainable biomass through the Renewables Obligation on which all biomass plants rely to a greater or lesser extent'. See *Appraisal of Sustainability for the revised draft National Policy Statement for Renewable Energy Infrastructure (EN-3)*, § 1.3.1. Further on (§§ 2.2.8 and 3.1.5), the conclusion is drawn that 'Biomass combustion is considered to be a 'zero carbon' technology'. The policy alternative of setting more stringent criteria based on biomass sustainability considerations is discarded because 'This would be likely to result in biomass fuel becoming more expensive, and fewer facilities being considered economically viable and worth developing, at least in the short term...The impacts of individual facilities would remain largely unchanged [because biomass is assumed to be carbon neutral], but impacts associated with a reduction of facilities proposed relative to the adoption of EN-3 are outlined' (§ 2.2.7).

[124] See the webpage of the Department of Energy & Climate Change (DECC), *Renewable Heat Incentive (RHI) Scheme*, available at: http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/incentive/incentive.aspx (accessed 07.04.2011).

in 2010, with the annual rate of increase doubling each year until it reaches a maximum of 150,000 ha/year in 2017.[125]

4.3.2 Case study: Finland

In 2006, 24 per cent of the energy used in Finland was from renewable sources and 87 per cent of this was from woody biomass.[126] More than half of the woody biomass used for energy consisted of waste liquors and other by-products and waste products from forest industries.

Finland's goal is to ensure 38 per cent of its energy use is renewable by 2020, an increase of 14 per cent. It wants to reach this mostly by increasing the use of wood fuel, especially the use of wood chips in heating and power plants. This would mean that the use of wood chips in heating and power plants would increase from about five million m^3 in 2009 to 13.5 million m^3 annually by 2020.[127]

On top of the increase of the use of wood chips for heating and power plants, Finland aims to increase the use of biofuel in transport from practically 0 TWh to 7 TWh annually by 2020. The main domestic raw material for this increase is expected to be wood chips (from forests) and residues from the forestry industry. In Finland's NREAP,[128] an overall target of 15 million m^3 of wood chips is mentioned, but it is rather clear that this target would likely not be enough to cover the amount needed for heat and power *and* biofuels production.

A 2010 report from the Finnish Forest Research Institute and Technical Research Centre of Finland,[129] estimates wood chips availability to be in the range of 14 to 20 million m^3 per year, suggesting that the Government's target of 15 million m^3 per year by 2020 is feasible, at least technically. All projections point out that, for the technical potential to be reached, government subsidies will be needed. Some kind of ecological limitations for wood chips are only considered in one[130] of the five projections set out in the report, but even then it is estimated that the availability would be high enough. Even though there has been less research on the biodiversity impacts of energy wood harvesting, there is enough data available to demonstrate the likely negative impacts on soil, water, and biodiversity. Negative impacts pose an even bigger risk if energy wood harvesting leads

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[125] E4Tech, *Biomass supply curves for the UK*, March 2009.
[126] Energian kokonaiskulutus nousi selvästi, Suomen virallinen tilasto 2006, Tilastokeskus. Available at: http://www.tilastokeskus.fi/til/ekul/2006/ekul_2006_2007-12-12_kat_001.html (accessed 3.2.2011)
[127] Uusiutuvan energian velvoitepaketti , työ- ja elinkeinoministeriön esitys20.4.2010. Available at: http://www.tem.fi/index.phtml?101881_m=98836&s=4265 (accessed 3.2.2011)
[128] Uusiutuvan energian velvoitepaketti , työ- ja elinkeinoministeriön esitys20.4.2010. Available at: http://www.tem.fi/index.phtml?101881_m=98836&s=4265 (accessed 3.2.2011)
[129] Laitila J. et al., Metsähakkeen hankinta- ja toimituslogistiikan haasteet ja kehittämistarpeet, VTT 2010. Available at: http://www.vtt.fi/inf/pdf/tiedotteet/2010/T2564.pdf (accessed 07.04.2011).
[130] Laitila J. et al., Metsähakkeen hankinta- ja toimituslogistiikan haasteet ja kehittämistarpeet, VTT 2010. Available at: http://www.vtt.fi/inf/pdf/tiedotteet/2010/T2564.pdf (accessed 07.04.2011).

to intensification of forestry and use of currently unexploited areas (see box 3 in section 2.1.2).

But it is hard to get a realistic overview of biomass availability in Finland. Availability and mobilisation of biomass, as well as political measures to promote biomass, are largely tied to the forestry industry in Finland. Availability of logging residues and stumps is directly linked with the annual area that is harvested and industry demands. The overall share of renewable energy used by Finland also depends on the by-products and waste products of the industry.[131] The year 2009 is a good example of how changes in the industry can affect biomass use, as it was a very hard year for the forest industry. Even though the use of wood chips hit an all-time high record, the use of by-products and waste products from the forest were at the lowest level since 2000 and the share of wood-based energy was below average.

Finland has no national biomass or biofuel sustainability scheme yet. The law[132] through which the requirements of RED for transport fuels and sustainability of biofuels is currently implemented does not include national-level regulations to guarantee sustainable production of biofuels and stipulates that more detailed regulations are being planned. A multilateral research project that started in 2009 is looking into how to advance sustainable biofuel production and use, and how to support the implementation of the RED. It is also looking at how to prepare for possible changes or extensions of the RED[133] which could be seen as a reference to sustainability criteria for biomass. But the discussions and analyses of sustainability criteria for biomass and biofuels currently focus on how to interpret the requirements of the current directive, to ensure they are least restrictive, rather than on designing a national initiative that would guarantee sustainability.

The only regulations that are currently widely used and accepted for wood energy harvesting are the 'Recommendations for Energy Wood Harvesting'[134] made by the Forestry Development Centre Tapio. They were first made in 2005 and last updated in

[131] Metsätilastollinen vuosikirja 2010 (Finnish Statistical Yearbook of Forestry 2010). Available at: http://www.metla.fi/julkaisut/metsatilastollinenvsk/index-en.htm (accessed 02.03.2011)
[132] Hallituksen esitys Eduskunnalle laiksi biopolttoaineiden käytön edistämisestä liikenteessä annetun lain muuttamisesta (HE 197/2010). Available at: http://www.finlex.fi/fi/esitykset/he/2010/20100197 (accessed 02.03.2011)
[133] Antikainen, R. Kohti kestävämpää biomassan hyödyntämistä - SUBICHOE -projekti. BioRefinen vuosiseminaari 1.12.2010. Available at: http://www.tekes.fi/fi/gateway/PTARGS_0_201_403_994_2095_43/http%3B/tekes-ali1%3B7087/publishedcontent/publish/programmes/biorefine/documents/seminaariaineistot/vuosiseminaari2010/antikainen011210.pdf (accessed 02.03.2011)
[134] Äijälä O. et a., *Hyvän metsänhoidon suositukset energiapuun korjuuseen ja kasvatukseen*, 2010, available at: http://www.tapio.fi/files/tapio/Aineistopankki/Energiapuusuositukset_verkkoon.pdf (accessed 07.04.2011).

2009. Despite the increased knowledge on environmental impacts and a special report[135] issued by Tapio and the Finnish Forest Research Institute Metla in 2008 with suggestions from an environmental perspective, the environmental considerations were not improved in the 2009 update. Moreover, the recommendations are voluntary and no verification system is proposed.

Despite the growing amount of research results, it is commonly stated that there is not enough knowledge and understanding yet of the environmental consequences of energy wood harvesting. Wider assessments of environmental impacts like the 2008 report from Tapio and Metla are moreover based on lower targets for energy wood harvesting that were set in 2008 and not the current target of 15 million m^3 per year.

When releasing the NREAP for Finland, the government promised that an environmental impact assessment would be carried out concerning the target for energy wood. So far the assessment has not started, even though all the measures to promote energy wood harvesting are practically already almost in place. Possible assessments will thus likely just record the consequences afterwards rather than influence any policies made.

Clearly, the claimed lack of knowledge of the environmental impacts of energy wood harvesting has thus not lead to limitations in energy wood harvesting targets but rather to lax regulations and guidelines while energy wood harvesting is strongly growing.

Having no strong sustainability criteria for biomass, and hence no strong ecological limitation to the amount of biomass assumed to be available and also no binding targets for energy saving in Finland, has lead to energy policies of which the main priority is just to fulfil the renewable energy goals, not to mitigate climate change in a sustainable way. None of the national strategies, law proposals, or papers promoting the use of renewable energy provide an estimate of the emission reductions that would be achieved, even though new research demonstrates that the climate benefits of energy wood need to be more carefully analysed.

And what will happen after 2020? The scenarios described in the 2010 report from the Finnish Forest Research Institute and the Technical Research Centre of Finland[136] show that the 15 million m^3 per year target set by the government is close to the maximum amount that can be 'sustainably' harvested. The impact of biomass policy in Finland strongly depends on the development of the forestry industry in Finland. In addition, since most of the investments and incentives are now designed to support biomass production and use, there is insufficient support for other renewable energy sources.

4.3.3 Case study: Bulgaria

[135] Kuusinen, M., Ilvesniemi, H. (toim.). Energiapuun korjuun ympäristövaikutukset, tutkimusraportti. Tapion ja Metlan julkaisuja 2008. Available at: www.metsavastaa.net/energiapuu/raportti (accessed 02.03.2011)

[136] Laitila J. et al., Metsähakkeen hankinta- ja toimituslogistiikan haasteet ja kehittämistarpeet, VTT 2010. Available at: http://www.vtt.fi/inf/pdf/tiedotteet/2010/T2564.pdf (accessed 07.04.2011).

In recent years Bulgaria has gone through a considerable change in the components of its energy mix, with an increase in the use of renewable energy which reached 10.4 per cent of energy production in 2005.[137] Of this, biomass comprised 63 per cent.[138]

Biomass is the most widely used renewable energy resource in Bulgaria—predominantly provided by firewood combined with coal. Currently 86 per cent of the biomass energy utilisation in the country is attributed to households. In the last 10 years, households increased their biomass use up to four times, while at the same time the use of most other fuels has declined. According to data from the 2002 census, the number of households using wood for heating is 1.9 million which equals 65 per cent of the total number of households in the country. Due to negligible investments in biomass stoves and the increasing prices charged by fossil-based energy suppliers (electricity and district heating), it is not likely that the number of households using wood will decrease. It should be noted that most of the heating appliances used—stoves and fireplaces—are inefficient, with heat losses amounting to 60-70 per cent. Heating with wood by using high-efficiency boilers is underdeveloped.

Biomass is also expected to play a central role in the future renewable energy mix of Bulgaria. Projections for harvested wood[139] show that in 2015 the quantity of harvested wood is expected to reach 7 million m^3 and will increase to 8.5 million m^3 by 2020. This represents a growth of 24 per cent and 50 per cent for 2015 and 2020 respectively, compared to 2005. There are no comprehensive data showing how much wood is available from domestic forests for different uses (energy purposes, timber industry, etc.). Moreover, current estimates are focused on the technical potential of biomass and do not consider the location from which this biomass will be harvested or what impacts its extraction would have on natural ecosystems, biodiversity, carbon storage, water, soil and other components of the environment. Nor do they estimate relevant economic factors or the feasibility of meeting such demands, which would play a crucial role in determining further national strategies.

At present the political aims for increased production and use of biomass for energy are therefore very high. To achieve Bulgaria's 20/20/20 targets by 2020 the contribution of biomass will have to increase significantly. This will not only require mobilisation of woody biomass, as explained above, but also increasing resource to agricultural biomass in Bulgaria on a very large scale. This will have significant impacts on land use and biodiversity. Mobilisation of biomass will lead to conversion of natural/semi-natural lands into either agricultural commodities or fast-growing tree stands, as well as intensification of forest management, with new wood resources being targeted that are

[137] Ministry of Economy and Energy (MEE), National long-term programme to encourage the use of biomass for the period 2008 – 2020, January 2008, available at: http://www.mee.government.bg/energy/energy_doc/Biomass_Programme_EN.pdf (accessed 07.04.2011).
[138] MEE (2008).
[139] National Strategy for Sustainable Development of the Forestry Sector in Bulgaria 2006 – 2015.

currently important for biodiversity such as deadwood and increased pressure on protected territories.

None of the national strategies[140] include any safeguards to ensure that the planned increased production and use of biomass won't cause irreversible damage to forests, won't have negative impacts on forest biodiversity, soil, water, or forest health and that no additional pressure will be put on protected and protective forests. There is a need for careful planning and sufficient safeguards to ensure that the planned increase in biomass production does not conflict with existing nature conservation legislation at national, EU, and international level.

There is no clear vision for how wood will be mobilised. The measures proposed so far are very unclear. They highlight the need to increase the productivity of existing forest management, build new forest roads to currently inaccessible forests, increase extraction of forest by-products and low quality wood, and use certification schemes to improve forest management. Increasing the productivity of existing forest management to use more forestry residues may have a negative impact on the sustainability of forest resources. The 'inaccessible forests' are, in most cases, very old and with high conservation values. Construction of new forest roads will lead to forest fragmentation, as well as better accessibility and therefore a higher risk of logging, with negative impacts on biodiversity.

There is no definition of 'low quality wood,' but one can expect that deadwood falls into this category. Its removal could harm the functioning and productivity of forest ecosystems and cause forest-dependent species to become endangered. Negative impacts of increased removal of forest residues and stumps on the soil organic matter and the soil carbon stocks are largely ignored.[141]

Of most concern is the fact that there are currently no sustainability standards for biomass production, neither at national nor EU level. Neither has the introduction of sustainability criteria for biomass use been envisaged so far. Meanwhile the interest in Bulgaria in new biomass plants, boilers, and combined heat and power (CHP) plants is growing.

Increased use, combined with a lack of sustainability standards at sufficiently high level will lead to irreversible damage to forests, in particular in countries such as Bulgaria with a large biomass production potential and problems with forest law enforcement.

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[140] National Strategy for Sustainable Development of the Forest Sector in Bulgaria 2006-2015; Strategic Plan for Forest Sector Development 2007-2011; National Biological Diversity Conservation Strategy and National plan for biodiversity conservation 2005-2010.

[141] During a session of the Council of Ministers in February 2011 the Bulgarian Prime Minister stated that Bulgaria has a huge woody biomass potential including 'deadwood that should be removed in order to keep our forests healthy'.

4.4 Public consultation on several NREAPs was inadequate

The issues taken up by NREAPs impact on numerous matters of significant public concern. These include the composition of the country's energy mix and consequent impacts for climate change and biodiversity protection.

The Aarhus Convention[142] secures the rights of EU citizens and NGOs to environmental information and to participate in environmental decision-making.

Nevertheless, in the case of several NREAPs, very little information was shared with the public during their development and few or no opportunities for stakeholder consultation in the formulation of the NREAPs were provided. For example, NGOs were not invited to participate in the development of the Czech NREAP. Although member organisations of the Green Circle in Czech Republic took the initiative to submit proposals for amendments to the text negotiated among ministers the NGOs' proposals were not officially recorded or discussed with the NGOs. In Belgium, there was no stakeholder consultation on the NREAP. While there were some conferences and round-tables concerning specific topics (including biomass) before the NREAP itself was developed, there was no involvement of stakeholders concerning the Action Plan itself. In Finland, even though there has been consultation on some actions included in the NREAP, there has been no consultation on what elements the NREAP should include or how actions should be prioritised.

Although question 5.4(a) of the NREAP template provided by the European Commission to Member States enquires about stakeholder consultation,[143] this was not always answered in accordance with what happened in reality. In Bulgaria, for example, the NREAP was prepared by three consultancy companies and no public hearings took place. Although the NREAP states that a questionnaire was prepared and distributed to different stakeholders and that meetings with interested parties had been arranged, conservation NGOs in Bulgaria were not, in fact, consulted.

Member States' failure to provide stakeholders with information and opportunities to participate in the development of the NREAPs is not only a violation of the Aarhus Convention,[144] it is also a missed opportunity for Member State policy-makers to benefit from stakeholders' knowledge and insight concerning the climate and biodiversity impacts of heavy reliance on biomass to meet Member State targets under the RED.

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[142] Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus, Denmark, 25 June 1998); Council Decision 2005/370/EC (OJ L 124, 17.5.2005).
[143] Commission Decision 2009/548/EC.
[144] Article 7, Aarhus Convention (providing a right to public participation concerning plans, programmes, and policies relating to the environment).

5. Conclusions and Recommendations

The foregoing analysis plainly illustrates that existing international, EU, and Member State policy frameworks are wholly inadequate for ensuring that the production and use of biomass for energy will be sustainable. Moreover, there is great risk that EU biomass policy will become yet another example of moving forward policy frameworks that cross-reference other inadequate, incomplete, or yet-to-be-developed frameworks rather than filling identified gaps in policy, particularly when it comes to sustainability measures. This practice has become a recipe for moving forward policy incentives without simultaneously ensuring that the incentivised activities will be pursued in an environmentally sustainable manner, in clear violation of the precautionary principle. This practice must cease.

The mandate in the RED requires the Commission to address biomass sustainability concerns. Thus, the evaluation being undertaken in line with this mandate provides an opportunity to reinforce and reform related frameworks for the sustainable management of forests, both within and outside the EU and to take other necessary measures to ensure that the production and use of biomass for energy is only allowed within sustainable limits. To fail to do so would be a major policy failure. Giving a boost to bioenergy production, without having the necessary safeguards in place, will lead to biomass production and use that doesn't pass the test of the best use of our scarce resources. At the same time, it will undermine EU policies on deforestation and halting biodiversity loss. It is also likely to have a significantly destructive impact on producer countries outside the EU. Moreover, it would be counterproductive to the climate change objectives which the RED is intended to serve.

5.1 The Commission must take action to fulfil the RED's legislative mandate on sustainability measures for biomass

In the Biomass Report, the Commission committed to further reporting by 31 December 2011. The upcoming report should evaluate whether, in the light of 'the best available scientific evidence', 'additional measures such as common sustainability criteria at EU level would be appropriate.'[145] The appropriateness of measures depends on whether the safeguards currently contained in the NREAPs have 'sufficiently and appropriately addressed the sustainability related to the use of biomass from inside and outside the EU.' In addition, any barriers to trade or the development of the bioenergy sector also warrant an intervention by the Commission to harmonise the rules applicable to biomass across the EU.[146]

[145] Biomass Report, p. 10.
[146] Biomass Report, p. 10.

The analysis of NREAPs as well as relevant policy frameworks at Member State, EU, and international level plainly shows that the sustainability of biomass for energy use is not sufficiently nor appropriately guaranteed in Europe. Because the legislation in force does not satisfactorily address these concerns, the Commission should act on the basis of Article 17(9) and the commitment in the Biomass Report.

5.2 Sustainability measures for biomass must be pursued in the context of a coherent energy strategy

A lack of binding sustainability criteria for biomass is only one of the problems concerning increased bioenergy use. A much bigger problem is the lack of policies and regulations to ensure an overall reduction in energy consumption and an increase in energy efficiency. Such measures are urgently required for the EU to meet its policy objective of limiting climate temperature increase to 2°C. In addition, there is no framework for ensuring that scarce resources are being used in the most environmental and efficient way. The EU Resource Efficiency Initiative, which could potentially deal with this, currently lacks ambition and clear targets.

Even if the potential of the Resource Efficiency Initiative is realised and other specific measures addressing the sustainability of biomass are put in place, these policies will achieve only limited results unless broader policies determining the shape and content of Member State energy sectors—such as the planning of large-scale power plants or co-firing biomass in existing coal-fuelled power plants—are squarely addressed. There is a great need for policy coherence. If we develop an energy infrastructure designed to consume unsustainable supplies of biomass, then even relatively strong measures for ensuring the sustainable production and use of biomass for energy will be hard-pressed to succeed. Rather, we must ensure first that overall energy demands are reduced and that, where biomass is used for energy, it is applied to only those uses where it can meet energy needs most efficiently.

Therefore, the recommendations below for specific measures for the sustainable production and use of biomass for energy must be seen within a framework that ensures the EU meets its emission reduction requirements of 80 to 95 per cent in the next 40 years to restrict temperature increase to 2°C. Furthermore, the use of woody biomass for energy should be seen within the wider context of land-use, in the EU as well as globally.

5.3 Recommendations

5.3.1 Reduce overall energy demand

EU policies on biomass need to be developed within an overall framework to reduce overall energy demand.

The recent Energy Efficiency Plan[147] released by the European Commission in March 2011, aiming at saving 20 per cent of its primary energy consumption by 2020, has been dismissed as flimsy and weak by NGOs who feel the Commission leadership should be doing much more to put the EU on track towards meeting its energy targets.[148]

The 2050 Roadmap for moving to a low carbon economy[149], also released in March 2011, is setting out a plan to meet the long-term target of reducing domestic emissions by 80 per cent by 2050, but has not included the scenario of reducing emissions internally by 95 per cent. The plan shows the need for enhanced climate action by 2020. But the roadmap falls short on the policy proposals to execute that. The long term vision of the roadmap requires the implementation of short term actions and NGOs have warned that attention could not slip from ambitious action in the short term[150].

From the NREAPs it is clear that Member States intend to rely heavily upon biomass and are not coming forward with sufficient measures promoting other renewable sources.

Therefore the EU should

- Ensure that the proposed directive on energy efficiency and savings comes with binding targets and comprehensive measures to deliver the required savings as set out in the Low Carbon Roadmap 2050
- Prioritise research and financing of energy reduction and energy efficiency programmes. Truly renewable sources like solar, wind and wave should be prioritised.

Biomass used for energy should be seen as a 'last resort' and only used in the most efficient way. As to the role of biomass within an efficiency-oriented energy framework, an efficient biomass policy would direct that biomass can only be used for energy where it can be used most efficiently.

To this effect, the EU should

- Develop measures that discourage or exclude the use of biomass in inefficient energy-generation processes.

[147] COM(2011) 109 final.
[148] European Environment Bureau (2011).
[149] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A Roadmap to a competitive low carbon economy in 2050, COM(2011) 112 final.
[150] European Environment Bureau (2011).

5.3.2 Restrict the use of biomass for energy to levels that can be sustainably supplied, not driven by unregulated demand

Studies show that claims that we can increase the harvesting of wood for biomass use without serious negative environmental or social impacts are unfounded. EU consumption of biomass should not further increase the already too-large EU ecological footprint and should not have long-term negative environmental or social impacts. To this effect, the EU should base its biomass use on what forests can sustainably supply, applying the precautionary principle. This report shows that the opposite is happening. The EU and Member States use the demand for biomass as starting point, rather than aligning biomass policies with limited supply. To reverse this trend, the EU should

- In order to ensure that the EU's use of biomass does not expand its global ecological footprint, the EU should match its expansion of the use of biomass for energy to a level which could be sustainably supplied from domestic sources. Furthermore, the EU should ensure that biomass feedstock is limited to well-defined supply chains where sustainability and GHG balance can be guaranteed.
- Demonstrate it is serious about using the Resource Efficiency Initiative as a way to use the Earth's limited resources in a sustainable manner
- Use the RED's legislative mandate to address sustainability concerns for biomass as framework to discuss what forests in the EU can sustainably supply.

5.3.3 Ensure consistency with other frameworks

As pointed out above, there is no overall framework that a biomass policy could fit into. The biomass consultation refers to various policies that are either under development or may never be developed, clearly indicating the lack of such a framework. The national schemes that have been developed so far also fail to convince us that they will sufficiently address key aspects necessary to ensure biomass sustainability. There is therefore at the moment no choice other than to ensure that a EU biomass policy should be standard-setting in itself. This requires a strict policy that sets clear limits for where and how biomass can be used, as well as how and to what extent woody biomass can be harvested and forests managed. As the drive for biomass has been launched, binding GHG sustainability criteria are needed, but these will not have a positive impact unless the other measures recommended herein—addressing the overarching energy framework and restricting biomass use to that which can be sustainably supplied—are also effectively implemented.

Sustainability criteria for biomass should be different from the criteria that have been developed for biofuels or the recommendations that have been taken up in the Biomass Report. These criteria do not only lack ambition; the current formulation also has serious shortcomings such as the lack of a proper instrument to ensure that emissions from forest management are taken into account or criteria that guarantee sound forest

management. The argument that the biomass criteria should be the same as the biofuels criteria for consistency reasons is moreover dubious. The question is: 'Consistent with what policy framework?'

Moreover, in the current biomass report, the European Commission excludes small energy producers below 1 MW from sustainability criteria, even though it is very clear from statistics and now also from the NREAPs that the use of biomass by individual households (for heating) will remain significant.

To address these concerns, the EU should

- Develop an own-standing EU biomass policy that sets clear limits for where and how biomass can be used. Biomass criteria formulated under this framework should ensure that key aspects relating to carbon debt and forest management are integrated
- Make an analysis quantifying how much biomass will be used by small biomass producers up to 2020, in order to be able to estimate the potential environmental and other impacts that these producers might create and to establish appropriate measures that should be taken to ensure that their contribution to biomass production and use is sustainable.

5.3.4 Ensure meaningful stakeholder participation in the development of NREAPs and the actions they call for

The issues taken up by Member States' NREAPs impact on numerous matters of significant public concern, including the composition of the country's energy mix and consequent impacts for climate change and biodiversity protection.

Accordingly, is it vital that Member States and the Commission

- Ensure that NREAPs, as well as the actions they call for, are developed and undertaken in a transparent manner and provide for meaningful stakeholder participation, in compliance with the Aarhus Convention.

5.3.5 Reject the myth that all biomass for energy is 'climate neutral'

The RED was adopted as a part of a package of measures intended to reduce EU GHG emissions. However, the evidence reviewed above clearly shows that the cultivation and harvest of many of the feedstock likely to supply increased demand for biomass under the existing legal framework will not provide climate benefits within the short or even medium term. Under some likely scenarios, the GHG emissions caused by harvesting and

burning biomass will not be recouped through re-growth of new carbon stocks for decades.[151]

Therefore, the EU should take measures to ensure that EU biomass policy is not based on false assumptions that biomass is in most cases 'climate neutral'. More specifically, the EU should

- Change Annex IV to the ETS Directive so that emissions caused by using biomass for energy production are adequately considered
- Ensure sustainability criteria that effectively safeguard against negative biodiversity and social impacts and ensure emissions that are caused by the biomass used are applied to all fuels used in installations covered by the EU ETS
- Introduce amendments in the calculation methodology in Annex V to the RED to ensure that GHG emissions arising from both direct and indirect land-use change are factored into the calculation of the climate impact of replacing fossil fuels with biomass for energy
- Introduce further amendments to Annex V to the RED that would factor in the 'carbon debt' incurred when various biomass feedstock are used for energy
- Introduce amendments to the RED to restrict the use of biomass for energy to those situations where the calculation of the estimated climate impacts of shifting from fossil fuel energy systems to biomass indicates that the shift in fuels will result in significant climate benefits. In practice, such a measure should shift the biomass-for-energy market away from most woody and agricultural biomass feedstock and towards feedstock generated from wastes and residues that do not place direct or indirect pressures on land and resource use.

As emphasised throughout the foregoing analysis, conclusions, and recommendations, however, GHG sustainability criteria are but one aspect of sustainability measures for biomass. It is equally, if not much more, important that the other measures recommended herein—to reduce overall energy demand, improve energy efficiency including restricting the use of biomass for energy to its most efficient uses, strengthen frameworks for sustainable forest management, ensure that demand for biomass to meet EU energy demands does not expand the EU's ecological footprint, and ensure that biomass policies are aligned with what can be sustainably supplied rather than driven by unregulated demand—are effectively implemented as a package of comprehensive measures to ensure that the production and use of biomass for energy is sustainable. Adopting GHG sustainability criteria for biomass while continuing to ignore these other components of a sustainable biomass policy would only create perverse incentives to

[151] Joanneum Research (2010).

expand the EU's ecological footprint and place unsustainable pressure on limited forest and land resources.

6.Conclusion

In light of the fact that the Renewable Energy Directive aims to increase the use of energy from renewable sources and NREAPs confirm that biomass will play a major role in this, it is worrying that policy makers at both national and EU level seem to lack any clear vision on how to ensure that the increased use of this biomass will not have negative climate, environmental, or social impacts.

In this report, we have outlined weaknesses in existing policy frameworks and provided recommendations to guide the development of a sustainable EU biomass policy.