NGO briefing
Sustainability issues for solid biomass in electricity, heating and cooling.

SUMMARY

Europe plans to produce over half of its renewable energy from bioenergy by 2020, which is over 10% of the total energy consumption. Although we fully support the need to move away from fossil energy sources, there are significant risks associated with this increased use in bioenergy:

- **Biomass can contribute to increased carbon emissions and thus exacerbate climate change.** Using biomass for energy creates a "carbon debt" because there is a time gap between the instant release of carbon when the biomass is extracted, transported and combusted and the time it will take to rebuild the store of carbon to an amount equal to that released. Until the moment at which this time gap, also referred to as "payback time period", is closed, burning biomass *increases* atmospheric carbon; it can take many decades or even centuries before living biomass can absorb an equivalent amount of carbon to that released during the biomass energy lifecycle, that is biomass extraction, storage, processing, transport and combustion. Current regulations fail to guarantee this balance is achieved within a timeframe consistent with the objective of keeping global warming below 2°celsius.

- **The international GHG accounting system does not account for emissions from biomass for energy, but just assumes they are zero in the energy sector.** The part where emissions from biomass use for energy could be considered, namely the rules for land use, land-use change and forestry (LULUCF) linked to the UN climate negotiations, is flawed and thus LULUCF accounting does not ensure that all emissions are captured. At EU level, there are currently no sustainability criteria attached to the legislation that stimulate biomass use for energy (Renewable Energy Directive, Directive establishing the European Trading Scheme) so that Member States do not have to prove that the biomass they use to replace fossil fuels, is actually saving emissions.

- **Forest ecosystems could be destroyed and degraded and biodiversity reduced in Europe and globally because of the expansion and intensification of logging activities in forests**. Increased bioenergy production could also have other negative environmental impacts on water and soil and air quality as well as negative social impacts on land rights and livelihoods of local communities and indigenous peoples. Pristine habitats must be protected from biomass extraction and demand in various industry sectors (energy, fuels, pulp/paper, construction, etc.) balanced with what can be sustainably supplied from forests.

- **Sustainable biomass is a limited resource** – it cannot be expected to fulfill indefinitely increasing, competing demands. Sustainable biomass, therefore, must be used as efficiently as possible through cascading use i.e. when *biomass* is *used* for material products first and the energy content is recovered from the end-of-life products. At each stage of the cascading, sustainable biomass should be dedicated in priority to sectors where there is no other sustainable alternative to achieve emissions reduction.

1. Political background

The Renewable Energy Directive (RED) sets a mandatory target for 20% of the EU's energy consumption to be renewable by 2020. The National Renewable Energy Action Plans (NREAPs) produced by each member state indicate that more than 50% of this renewable energy will come from biomass, while leaving the potential of other – more sustainable renewables – largely untapped. Therefore, more than 10% of the EUs final energy consumption will come from biomass by 2020. Biomass from woody sources, agriculture, fisheries and waste are all expected to increase, but woody biomass will remain the most important biomass source.

2. Growing demand for biomass and impacts on trade

This increased use of biomass places a significant pressure on forests within Europe and around the world, on top of an already high demand for forest products such as paper, pulp, and timber for furniture and construction, and increased demand for land for vegetable oil, feed, food, and biofuel. The NREAPs of EU member states show that *indirect* sources of biomass from forestry (forest industry by-products such as sawdust) are, to a great extent, already being utilized. The biggest increase of solid biomass is therefore expected to come from *direct* forest sources (logging, residues from logging, landscape management residues and other).[1] This means that under the NREAPs, direct pressure on forests in the EU and globally will increase.

Several NREAPs explicitly anticipate a heavy dependence on imports. Biomass imports are expected to grow significantly from regions such as Russia, North America, Central and Southern America, and to a lesser extent Africa. According to the International Energy Agency (IEA), the total annual import of wood pellets into the EU under the business as usual scenario is expected to increase drastically from about 2.3 million tons in 2010 to over 16 million tons in 2020.[2]

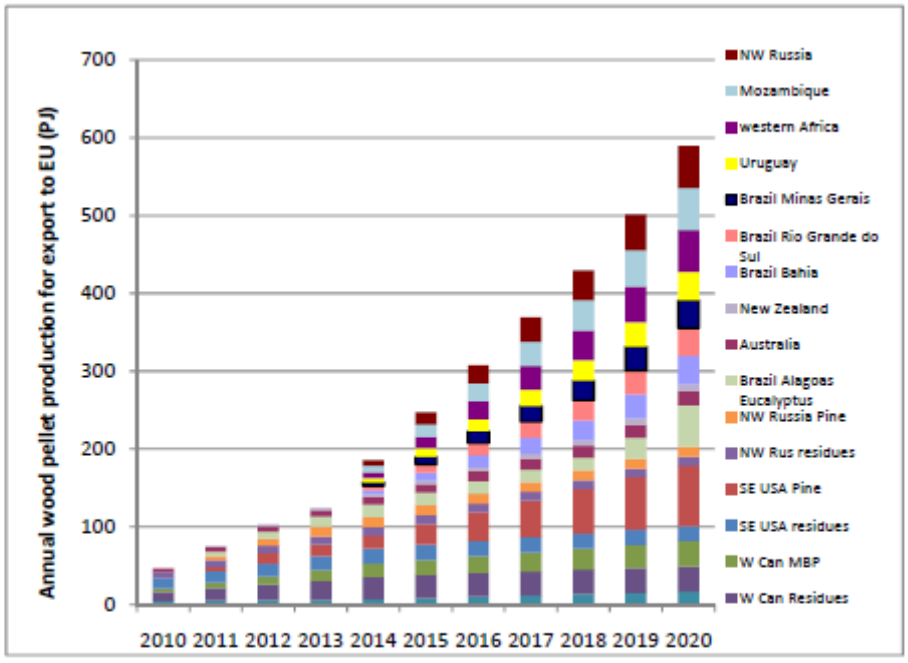

Fig. 1.10 - Anticipated growth in available solid biomass supply from the various sourcing regions in the high import scenario from 2010 (1) to 2020 (11)

[1] 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.

[2] IEA Bioenergy, "Global wood Pellet Industry – Market and Trade Study", December 2011, page 12: http://www.bioenergytrade.org/downloads/t40-global-wood-pellet-market-study_final.pdf

A “high import” scenario was also developed by the International Environment Agency, based on the assumptions that the rapid growth of biomass demand in EU would trigger investments in additional pellet plants and a strong development of short rotation crops and energy plantations (i.e. Eucalyptus) in some areas of the world such as Brazil, Uruguay, West Africa, Mozambique and Russia. These assumptions lead to an additional amount of 17 million tons of wood pellets in 2020 compared to the business as usual scenario, bringing the total to almost 33 million tons by 2020[3].

This increased EU demand for biomass in 2020 threatens to further accelerate deforestation and forest degradation globally, resulting in more CO2 emissions, biodiversity loss and social conflicts.

3. Climate impacts of biomass use

- Carbon Debt

The combustion phase of biomass can release as much greenhouse gases as fossil fuel combustion. Moreover, extracting, transporting and transforming biomass leads to significant additional carbon release to the atmosphere. In order for bioenergy to deliver emissions reductions, it is crucial to ensure that the total volumes of emissions are balanced out by increased carbon sequestration and storage in living forest biomass and the total ecosystem. But there is currently no guarantee that this will happen, or that it will occur within a reasonable timeframe consistent with the objective to maintain global warming below 2°celsius.

As underlined by the IPCC in its report on renewable energy sources and climate change mitigation (2011), it can take many decades, even centuries, before ecosystems; in particular forests, recapture the CO2 that is released immediately upon biomass combustion[4]. A study for BirdLife, the European Environmental Bureau (EEB) and Transport & Environment (T&E) by Joanneum Research[5] on the upfront carbon debt of biomass energy found that the carbon neutrality depends on the timeframe considered as well as on the biomass source. Additional fellings from forests can increase emissions over a 20-50 year timeframe compared to fossil fuels and only produce savings after two or three centuries. Harvested residues can increase emissions over a 20-year timeframe. Land conversion from forest to plantation could only produce a climate benefit after 150-200 years, while conversion of cropland to forest can be carbon neutral, but may have knock on effects on crop production leading to indirect-land use change effects elsewhere.

With the science pointing to a need for global emissions to peak and decline by 2016, just four years away, and with the further risk of reaching atmospheric tipping points, we cannot afford to invest in renewable energy sources which create an enormous “carbon debt” which cannot be repaid in time to stabilise global warming and avoid dangerous climate change. Furthermore, in a climate-stressed world there is no guarantee that forests will be able to continue to absorb anthropogenic emissions at the scale they currently do over the long term. Worse, adding additional pressures on already vulnerable forest ecosystems could lessen their resilience to climate change.This issue must be addressed urgently if we are serious about achieving emission reductions and addressing climate change.

[3] IEA Bioenergy, “Global wood Pellet Industry – Market and Trade Study”, December 2011, page 13: http://www.bioenergytrade.org/downloads/t40-global-wood-pellet-market-study_final.pdf

[4] Chum, H., A. Faaij, J. Moreira, G. Berndes, p. dhamija, H. dong, B. Gabrielle, A. Goss Eng, W. Lucht, M. Mapako, O. Masera Cerutti, T. McIntyre, T. Minowa, K. pingoud,. Bioenergy. In IpCC Special Report on Renewable Energy Sources and Climate Change Mitigation. 2011. press, University. Cambridge. IpCC. http://srren.ipcc-wg3.de/report/IPCC_SRREN_Ch02.pdf/view

[5] The upfront carbon debt of bioenergy, Joanneum Research, May 2010; paper now published Zanchi et al in GCB Bioenergy 2011.

- Shortcomings in the Greenhouse Gas Accounting Method

The international accounting rules for emissions from Land Use, Land Use Change and Forestry (LULUCF) reflects a political outcome agreed under the UNFCCC negotiations rather than an accurate accounting system. The negotiated rules enable countries to only account for emissions seen as additional to a business as usual baseline. Therefore emissions from harvesting trees for bioenergy that are projected by a country as "business as usual", could be included in the baseline and would thus not appear as additional emissions in a country's accounts. A number of countries have inflated their baselines compared to historical levels. For example, Finland has included much higher levels of harvesting than past levels or indeed than appear to represent a genuine business as usual scenario.

The current EU proposal on LULUCF states an intention to close loopholes on biomass carbon accounting, but it does not address this issue of dishonest baselines which hide increased emissions from biomass under a business as usual projection. Nor does the proposal address how emissions from countries not party to the Kyoto Protocol will be accounted for, so emissions from US and Canadian imports for example, will still be ignored.

Currently biomass energy production is considered as carbon neutral in EU laws. This flawed assumption is exacerbated by the fact that the EU does not have mandatory criteria ensuring sustainability in the use of biomass for energy production. Consequently member states are not required to check whether the biomass they stimulate actually is sustainable and saves emissions. This is a huge problem, as it means that currently all kinds of biomass can be stimulated without being sure that it actually will deliver carbon savings and while – in certain – cases even exacerbating other environmental problems.

An opinion published by the Scientific Committee of the European Environment Agency (EEA)[6] in September 2011 stated that there is a "serious accounting error" in the baseline definition in European bioenergy policy. According to the Committee, a major accounting flaw exists in EU legislation whereby counting biomass used for power generation as 'zero emissions' is incorrect and will have "immense" negative consequences for the environment. They state that the re-absorption of atmospheric carbon by living vegetation should not be ascribed to bioenergy as it would have occurred anyway due to natural growth; bioenergy policy should ensure that only biomass which *adds* to the natural growth of carbon stocks, or which at least does not *reduce this growth*, is incentivised.

4. Availability of sustainable biomass

Studies on the future potential wood supply in the EU indicate an imbalance between supply and demand to meet the existing material use and extrapolated renewable energy needs in the EU, if the importance of wood in the biomass component of the total renewable energy supply remains constant and overall energy use is not reduced.[7]. Moreover at global level, we will see an increasing deficit in wood supply through many regions in the coming years[8]. For rational planning it is necessary that a comprehensive assessment of the availability of sustainable biomass supply and the competing uses of the materials be completed, and be offered for public comment. Biomass resources are limited and already heavily utilized. Tapping additional sources of biomass, either regionally or internationally, can be expected to have ecological, social and climatic repercussions.

[6] Scientific Committee of the European Environment Agency, Opinion on Greenhouse Gas Accounting in relation to Bioenergy, September 2011, http://www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues/sc-opinion-on-greenhouse-gas

[7] Mantau U. et al, *Real potential for changes in growth and use of EU forests*, EU Wood final report, June 2010.

[8] Global Wood Supply, presentation by Sten Nilsson, CEO of Forest Sector Insights, at the European Parliament, November 2011, http://www.fern.org/sites/fern.org/files/Nilsson_Brussels_Europ-Parlia-reduced-1.pdf

The EEA scientific opinion says that *"if bioenergy could or should provide 20% to 50% of the world's energy needs in coming decades […] doing so would require doubling or tripling the total amount of plant material currently harvested from the planet's land."* The notion that forest biomass is infinitely available in quantities sufficient to meet an ever increasing demand is plainly wrong and following it will lead to bad policy decisions.

5. Biodiversity loss and vulnerability of forest ecosystems in Europe

In its recent 'State and Outlook 2010 Report,[9]'the EEA already warned about the poor environmental conditions of European forests. Most of the European forests are heavily exploited. Exploited forests lack sufficient levels of deadwood as well as older trees which function as a habitat for numerous species[10]. In 2009 a Commission report focusing on the conservation status of Europe's most vulnerable habitats and species (protected under the Habitats Directive) identified nearly two thirds of forest habitats as having unfavorable conservation status[11i]. If member states authorize to intensify the extraction of biomass from forests already under stress, biodiversity decline and other forest ecosystems impacts in Europe are likely to worsen.

6. Biomass sustainability criteria in Europe

Currently biomass is identified by Member States as an important tool to help them achieve their renewable energy targets under the Renewable Energy Directive. Despite attempts by a few Member States to develop biomass sustainability criteria, so that only biomass complying with these criteria could be accounted towards those targets, there is still no EU wide vision for how biomass can positively contribute to a low carbon energy mix in a sustainable and efficient way. In the meantime, large-scale developments are being planned and implemented, increasing the risk that we become 'locked in' to an unsustainable industry. The longer we wait, the harder it will be to develop a meaningful sustainability scheme for energy uses of biomass; therefore an ambitious legislative proposal is urgently needed.

CONCLUSIONS - ESSENTIAL ACTIONS TO ENSURE A SUSTAINABLE BIOENERGY POLICY

❶ To succeed, EU bioenergy policy must be developed within an overall framework that reduces overall energy demand, increases energy efficiency and which seeks to minimize energy production from combustion sources, favouring non-combustion forms of renewable energy.

❷ Even with the demand for energy reduced as in the principle above, the supply of biomass for energy production needs to be constrained to that, which:

- Is consistent, according to comprehensive accounting of GHG emissions as the atmosphere sees them in the short- and long-term, with keeping the average global temperature rise below 2°celsius; and

- Can sustainably be supplied from the forests and other ecosystems. EU bioenergy policy should be based on a comprehensive assessment of the availability of sustainable biomass, and considering other competing demands and needs that also rely on limited biomass resources.

[9] EEA, Martin J. et al, The European environment: State and outlook 2010: Synthesis, 2010.
[10] 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
[11] Report from the Commission to the Council and the European Parliament. Composite Report on the Conservation Status of Habitat Types and Species as required under Article 17 of the Habitats Directive. COM(2009)358 - http://ec.europa.eu/environment/nature/

❸ It is also crucial to use sustainable biomass efficiently through "cascading use" i.e. when *biomass* is *used* for material products first and the energy content is recovered from the end-of-life products. At each stage of the cascading, sustainable biomass should be dedicated in priority to sectors where there is no other sustainable alternative to achieve emissions reduction.

❹ Finally, with the climatic and environmental crises facing Europe and the rest of the world today, it is highly important that a mandatory sustainability scheme be developed to regulate the production and use of biomass for energy. This sustainability scheme should:

- Prevent extraction of energy biomass from pristine forests, lands with high carbon stocks and high-biodiversity value, wetlands and peat lands ("no-go areas"), including from plantations made by the conversion of such areas, natural forests or food producing lands. In other areas, the legislator should ensure the application of the highest environmental, land-use and sustainable forest management standards.

- Set ambitious GHG emission reduction for bio-energy based on an honest accounting of all GHG emissions produced from biomass, taking into account among other factors all aspects of biomass production, processing, transport and combustion, and including emissions contributions from the land use and land use change and the treatment of the land over time, as well as the ability of the land and its vegetation to store carbon.

- More particularly, the upfront carbon debt of wood-based bioenergy and the length of time required for the emissions to become carbon neutral should be taken into account, when performing carbon lifecycle assessments of wood-based energy. The carbon payback time for wood-based energy should be consistent with the objective of keeping global warming below 2°celsius, and bear in mind the short term tipping points affecting this.

❺ Small-scale bioenergy operations which favour locally available waste biomass and by-products, are the most appropriate bioenergy operations in that they (i) make use of waste, thus contributing to waste reduction and management, (ii) substitute other more damaging energy sources, (iii) contribute to the decentralisation of the energy network and are more likely to be located close to heat demand areas, (iv) contribute to rural development, (v) result in supply chains whose sustainability can be more easily monitored and verified by regulators.

END

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