

Industrial biomass: How electricity from wood threatens climate, forests and people and why sustainability standards cannot work

Rapid demand expansion for wood for industrial bioenergy

Industrial wood-based bioenergy is expanding rapidly, particularly in Europe and North America. Developments can be compared to those in biofuel markets in 2005: Rapid demand expansion is foreseen, fuelled by public subsidies and targets, yet the time-lag in building the infrastructure (power stations, pellet plants, new shipping facilities, etc) means that impacts on forests, land-use and communities have not yet been realised except on a small scale.

In the EU, a 20% renewable energy target by 2020 represents a keystone of the EU's 'greenhouse gas reduction' target. Most of that target will be met from burning biomass. When EU member states put forward their renewable energy plans in 2010, they envisioned 54.5% of it to come from bioenergy – including biofuels, but with the majority to come from burning wood for heat and electricity¹. This would require an additional 100-200 m³ of wood for bioenergy per year by 2020², which converts to around 80-154 million green tonnes. However, industry plans announced so far far exceed member states' ambitions: In the UK alone, plans for burning more than 80 million green tonnes of wood in power stations (not including projected expansion of biomass for heat) have been announced³.

In the US, bioenergy currently accounts for 48% of energy classed as renewable, but that figure rises to 75% if hydro power is removed from the total⁴. Solid biomass, mainly wood, accounts for the largest proportion of bioenergy in the US, too, due to the poor energy balance for corn ethanol and other biofuels. The US Energy Information Agency foresees a fourfold increase in bioenergy use by 2035, most of it from burning wood in power stations⁵.

In Canada, too, biomass is by far the most important type of energy classed as renewable, except for hydro power⁶ and its use is expanding rapidly. According to a 2011 Greenpeace report⁷: *"With volumes allocated to biomass almost equivalent or even higher than "traditional" wood harvested in 2008-2009, new biomass harvesting policies could double the industrial footprint in forest ecosystems [in Canada]."*

As a result, the previously very limited global trade in wood pellets and wood chips is growing rapidly. Global wood pellet production has increased from 9 to nearly 16 million tonnes over just two years⁸. 80% of wood pellets produced worldwide are burnt in Europe⁹. At present, around 19.4 million dry tonnes of woodchips are traded globally every year, the vast majority for paper production, but woodchip trade for bioenergy is expected to increase drastically.

1 www.ieep.eu/assets/753/bioenergy_in_NREAPs.pdf

2 www.fern.org/sites/fern.org/files/Biomass%20imports%20to%20the%20EU%20final_0.pdf

3 UK figure based on http://www.biofuelwatch.org.uk/biomass_map/

4 http://205.254.135.7/totalenergy/data/monthly/pdf/sec10_3.pdf

5 www.eia.gov/todayinenergy/detail.cfm?id=5170

6 www.nrcan.gc.ca/energy/renewable/1297

7 www.greenpeace.org/canada/Global/canada/report/2011/10/ForestBiomess_Eng.pdf

8 www.woodmarkets.com/PDF/wmm/Dec11-Jan12%202-pager.pdf

9

www.europarl.europa.eu/committees/fr/studiesdownload.html?languageDocument=EN&file=72731

Where will all the wood come from?

While the US and Canada rely primarily on burning domestic wood, the EU is increasingly reliant on biomass imports. Most of the biomass imported by the EU currently come from Canada, the southern US, Eastern Europe and Russia, however both the European biomass industry and the European Parliament's Directorate General for External Policies of the Union expect that future growth in imports will primarily come from South America (especially Brazil), west and central Africa¹⁰. Countries in South America, central and west Africa, Mozambique and Indonesia are regarded as having the greatest potential for increased 'wood harvesting' for biomass¹¹.

This means that most EU imports are coming from, and will in future come from regions with high rates of forest destruction and degradation. According to a scientific study published in 2010, Brazil lost the largest total area of forest between 2000 and 2005, closely followed by Canada. However the US, followed by Canada, Brazil, Indonesia and Russia lost the greatest percentage of forests during that period. The study looked at actual forest loss without applying the FAO's flawed methodology under which forest destruction is considered to be 'offset' by new industrial tree plantations¹².

While there is much talk about using 'residues', traditional residues from sawmills, pulp mills, etc tend to be fully utilised in Europe and probably elsewhere¹³. Additional 'residues' are generally ones that come from more harmful logging methods, such as stump, brash and deadwood removal¹⁴, with serious consequences for soil fertility, soil carbon, biodiversity and future tree growth. However, across Europe and North America, bioenergy is increasingly reliant on burning wood from whole trees cut for this purpose. This results in more intensive and destructive logging, and in further expansion of monoculture tree plantations at the expense of forests and other biodiverse ecosystems, for example in the southern US.

According to Greenpeace Canada: *"New biomass policies in provinces like Québec and Ontario encourage whole-tree harvesting (WTH), a technique that has been criticized by the scientific community for decades because of the ecological damage it causes through impacts on nutrient cycling. Because it is cheaper, faster and more convenient to cut an entire tree, remove its branches at the roadside, use the stem for lumber and the rest (top, branches) for bioenergy, the biomass boom encourages this destructive technique."* and *"Logging operations are moving rapidly northward, and the last remaining intact forests are vanishing at an increasing rate. The biomass boom, driven by dangerously lenient extraction policies and subsidies, will increase pressure on these forests"*. Similar impacts of the growing bioenergy demand have been documented for example in Massachusetts¹⁵ and in Germany, where the government aims to increase logging rates by 60% by 2020 to counter 'wood shortages', making serious biodiversity losses inevitable¹⁶.

10 Impact of EU Bioenergy Policies on Developing Countries, European Parliament Directorate- General for External Affairs, 2012, www.europarl.europa.eu/committees/fr/studiesdownload.html?languageDocument=EN&file=72731

11 www.environmental-finance.com/file/113/peter-rechberger and www.europarl.europa.eu/committees/fr/studiesdownload.html?languageDocument=EN&file=72731

12 Hansen, Matthew C.; Stehman, Stephen V.; and Potapov, Peter V. Quantification of global gross forest cover loss. PNAS. www.pnas.org/cgi/doi/10.1073/pnas.0912668107

13 www.europeanclimate.org/documents/Biomass_report_-_Final.pdf

14 www.fern.org/sites/fern.org/files/NGO%20Report%20on%20Biomass%2011%20April%20011.pdf

15 www.maforests.org/

16 www.biodiversity.de/index.php/de/fuer-presse-medien/top-themen-biodiversitaet/wissenschaftsjahr-2012/2747-exportprodukt-deutscher-wald

However, European industry analysis forecasts most of the global increase in bioenergy to come from new and expanded industrial plantations¹⁷, increasingly in Southern countries. Plantation expansion will be partly indirect: In the southern US, for example, wood from monoculture pine plantations which have traditionally met much of North America's demand for paper is increasingly being diverted to bioenergy, resulting in tree plantation expansion for pulp and paper in Southern countries, especially South America.

What does the biomass boom mean for the climate?

A growing number of scientific studies shows that burning wood for energy generally results in a carbon debt of decades or even centuries compared to fossil fuels which might otherwise have been burnt¹⁸. This is hardly surprising: Biomass is considerably less energy dense than fossil fuels, hence a power station burning wood emits around 50% more CO₂ than one burning coal to generate the same amount of energy. Trees cut down to be burnt will generally take decades to be replaced by fully-grown new ones – especially long in temperate and boreal regions. Carbon lost from undergrowth and soils can take far longer still to be rebuilt after logging, especially if stump or brash removal is used. And the ever-growing demand for biomass means that forests will not be allowed to recover and that they will increasingly be replaced with industrial tree plantations, leading to irreversible losses of carbon as well as biodiversity and ecosystems' ability to regulate the climate (including through carbon sequestration and regulating rainfall cycles). The Scientific Committee of the European Environment Agency has warned of the consequences of the mistaken assumption that bioenergy is carbon neutral: *"Based on the assumption that all burning of biomass would not add carbon to the air, several reports have suggested that 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. Such an increase in harvested material would compete with other needs, such as providing food for a growing population, and would place enormous pressures on the Earth's land-based ecosystems. Indeed, current harvests, while immensely valuable for human well-being, have already caused enormous loss of habitat by affecting perhaps 75% of the world's ice- and desert-free land, depleting water supplies, and releasing large quantities of carbon into the air."*¹⁹ And a study published in Science shows that policies which seek to reduce carbon emissions but class biomass as 'carbon neutral' could result in the near-complete loss of all natural forests, grasslands and other ecosystems worldwide by 2065²⁰.

What are the consequences of bioenergy for communities and access to land, food and water?

Forest-dependent peoples, including Indigenous Peoples, will likely be affected particularly severely as forest destruction and conversion to plantations accelerates. In West Papua, for example, the conversion of rainforests to tree plantations for biomass exports forms part of the larger "Merauke Integrated Food and Energy Estate Project " (MIFEE)²¹. In September 2011, the UN High Commissioner for Human Rights issued a notice to the Indonesian government under its early warning and urgent action procedure *"on allegations on the threatening and imminent irreparable harm for the Malind and other indigenous people of the district of Marueke, Papua Province, due to the reportedly massive and non-consensual alienation of their traditional lands by the Marueke Integrated Food and Energy Estate*

17 www.bioenergytrade.org/downloads/junginger---bio-equity-trade-workshop---final.pdf

18 See for example: Biomass Supply and Carbon Accounting for Southeastern Forests, Southern Environmental Law Center in partnership with Biomass Energy Resource Center, Forest Guild and National Wildlife Federation, February 2012 The upfront carbon debt of bioenergy, Joanneum Research, July 2010 AND Biomass Sustainability and Carbon Policy, Manomet Center for Conservation Sciences, June 2010

19 Opinion of the European Environment Agency Scientific Committee on Greenhouse Gas Accounting in Relation to Bioenergy, September 2011.

20 Implications of limiting CO₂ concentrations for land an energy, Marshall Wise et al, Science, 29th May 2009

21 https://awasmiffee.potager.org/uploads/2012/03/miffee_en.pdf

*Project.*²² Long-term concessions for biomass plantations for export have been acquired by companies including in Guyana, Ghana, Republic of Congo and Brazil²³. Industrial tree plantations are being expanded at the expense of grasslands and farmlands as well as forests, leading to land grabs at the expense of pastoralists, small farmers and other communities, as well as forest-dependent peoples. The European Parliament's report referred to above (reference 10) warns that many of the countries regarded by industry as future wood pellet suppliers to Europe are ones with high levels of foreign private sector investment in land and little legal/state protection of communities from land-grabbing, such as Cameroon, Ghana or Mozambique. The report further warns of increased competition for water and 'water rights grabs' by plantation companies, loss of land used to grow food for local communities and loss of forests and other lands used by communities to meet a wide range of needs, including their need for woodfuel for cooking.

Brazil aims to become a major exporter of wood pellets to Europe and plantation expansion for this purpose is well underway. In 2011, the Brazilian government announced a new policy to more than double the tree plantation area to 15 million hectares, including for biomass exports. Brazilian plantation company Suzano Papel e Celulose has announced plans to invest \$1.3 billion in biomass plantations and five pellet plants and has entered into a Memorandum of Understanding to supply wood pellets to UK energy company MGT Power. Suzano's existing plantations in the Northeast of Brazil are linked to serious land conflicts with traditional quilombola communities²⁴. Suzano is further planning large-scale cultivation of Genetically Engineered trees for bioenergy and recently obtained government approval for a GE tree 'trial'. GE trees pose serious and unpredictable risks to forest ecosystems and to the communities which depend on them.

The 'sustainability standards' myth

Greenhouse gas and/or sustainability standards for biomass are being considered by the EU and by different US states, as well as being debated by international organisations such as the FAO and UNEP. Yet there are serious shortcomings of such an approach, which seeks to distinguish between individual supplies of biomass rather than looking at the impacts and sustainability of biomass subsidies and targets as a whole. Problems include:

- The fact that biofuel greenhouse gas sustainability standards, debated since 2005 and partly introduced by the EU, have proven ineffective and unenforceable. Similarly, no forest certification scheme exists which has been able to guarantee compliance with its own principles and criteria, however weak;
- EU biomass standards will likely be modelled on EU biofuel standards and thus ignore human and land rights abuses, increased hunger, water and soil depletion and pollution, air pollution as well as all other impacts on people;
- Indirect impacts: No certification scheme or standard has even sought to address indirect impacts. If future biomass standards were strict and enforceable (which is highly questionable), the demand for biomass would nonetheless result in 'displacement'. Wood from destructive and illegal logging or from plantations which directly result in forest destruction would be used for other markets if wood classed as 'sustainable' was diverted to bioenergy;
- A long-term carbon debt is inherent in large-scale industrial biomass use. It does not stem from specific choices over biomass sourcing, but from the fact that increased wood removals will inevitably reduce the amount of carbon stored in and sequestered by forests and that land conversion to plantations will directly or indirectly lead to the conversion of natural ecosystems. As a recent scientific article concludes: "*Owing to the peculiarities of forest net primary production humans would appropriate ca. 60% of*

22 www.forestpeoples.org/sites/fpp/files/publication/2011/09/cerduaindonesia02092011fm.pdf

23 www.forestpeoples.org/sites/fpp/files/publication/2011/09/cerduaindonesia02092011fm.pdf

24 www.corporatewatch.org.uk/?lid=4108

the global increment of woody biomass if forest biomass were to produce 20% of current global primary energy supply. We argue that such an increase in biomass harvest would result in younger forests, lower biomass pools, depleted soil nutrient stocks and a loss of other ecosystem functions. The proposed strategy is likely to miss its main objective, i.e. to reduce greenhouse gas (GHG) emissions, because it would result in a reduction of biomass pools that may take decades to centuries to be paid back by fossil fuel substitution, if paid back at all."²⁵

25 Large-scale bioenergy from additional harvest of forest biomass is neither sustainable nor greenhouse gas neutral, Ernst-Detlef Schulze et al, GCB Bioenergy, 2nd April 2012