

## Bioenergy and LULUCF: the need to account for bioenergy emissions

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**Under international accounting rules significant emissions from bioenergy are not being accounted for, meaning that bioenergy is not fulfilling its potential as a climate mitigation tool and in some cases emits more carbon than fossil fuels. This briefing explores the reasons for this accounting failure and what must be done to resolve this issue.**

### *Background*

According to existing IPCC guidance<sup>1</sup>, greenhouse gas emissions from bioenergy are not counted as emissions in the energy sector. Rather, the guidance assumes that bioenergy emissions will be reflected in accounting in the Land Use, Land Use Change and Forestry (LULUCF) sector.

The guidance therefore relies on the assumption that emissions associated with the production of biomass energy feedstocks are accurately accounted for by the country of origin in its sector of origin i.e. the LULUCF sector. However, in the first commitment period of the Kyoto Protocol, accounting for emissions and removals from land management activities in the LULUCF sector is voluntary for Annex I countries. These activities are: forest management, cropland management, grassland management, and revegetation. Of these, forest management and cropland management activities lead to the production of bioenergy feedstocks.

As a result, in the first commitment period, emissions attributable to biomass energy production and use in developed countries are not necessarily accounted for in either the energy or the LULUCF sector.<sup>2</sup> New LULUCF accounting rules for forest management being considered under the AWG-KP for the second commitment period would see accounting for emissions from forest management become mandatory. However, these rules have been designed in such a way as to still allow Annex I countries to avoid responsibility for the impacts of bioenergy production and use on the atmosphere.

Misinterpretation of this IPCC accounting convention has led to a widely held but scientifically inaccurate assumption that all bioenergy emissions should be treated as “carbon neutral.” This assumption underlies a wide range of current policies subsidising and otherwise favouring bioenergy. In reality, greenhouse gas emissions from biomass cultivation, harvest, processing, and combustion *do* have a net impact on climate. The failure to account for bioenergy emissions (in whole or in part) thus creates a perverse incentive for expansion of bioenergy production and utilisation when it may create as many or more emissions than fossil fuels.

**Parties must account for emissions resulting from bioenergy production and use. This accounting should be done in the sector of origin (i.e. the LULUCF sector) or, if they fail to do so, in the end-use sector (such as the energy sector). In some circumstances it may be necessary to account for different aspects of the carbon life cycle of bioenergy in different sectors<sup>3</sup>.**

### *Why is this important?*

- Many biomass and biofuel products have an unaccounted carbon footprint<sup>4</sup> that can be larger than the emissions from the conventional energy sources they are supposed to displace. It takes about two decades using bioenergy to displace conventional fuels to balance out the emissions

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1 Jim Penman, Michael Gytarsky, Taka Hiraishi, William Irving, and Thelma Krug. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

2 Searchinger, Timothy, et al. October 2009. Fixing a Critical Climate Accounting Error. *Science* / vol. 326 / Page 527/10.1126/science.1178797

3 The energy inputs (e.g., in biomass cultivation, conversion and distribution) must be adequately captured in the energy sector accounting and commitments.

4 Gibbs et al. 2008. Carbon payback times for crop-based biofuel expansion in the tropics: the effects of changing yield and technology. *Environmental research letters*.

from converting wooded savannah areas such as the Cerrado of Brazil to sugar cane, and almost a century to repay the emissions debt from conversion of a rainforest for palm oil.

- For a palm oil plantation developed in a rainforest on peat, it takes several centuries to repay the loss of carbon from vegetation and peat soil.<sup>5</sup>
- These are just the emissions from direct land-use change. If we include indirect land use impacts (ILUC), the net carbon impact of bioenergy may increase even further. Indirect emissions result from changes in land use and management in both Annex I and Non-Annex I countries driven by demand for bioenergy. Tens of millions of tonnes of CO<sub>2</sub> have already been emitted from ILUC as a result of the EU's biofuel use, making its carbon impact 81-165% greater than fossil fuels<sup>6</sup>.
- Where bioenergy is sourced from Non-Annex I countries, its emissions, when utilized in AI countries, are currently not included in the accounts of Annex 1 countries.
- In Australia, burning native forest for stationary electricity generation will not be accounted for but may release more than 250 t/ha C<sup>7</sup>.
- Emission estimates for growing maize for biofuel on peat soil in Germany are 40t/C02/ha/yr.<sup>8</sup>

Thus the net impact of biomass energy depends in part on the circumstance under which it is produced and the particular characteristics of the feedstock. There is also a wide range of potential conversion technologies and end uses for bioenergy.

#### *What must be done?*

It is therefore critical that carbon impacts be accurately reflected in accounting to avoid creating incentives for bioenergy use that may ultimately result in perverse consequences for the atmosphere.

- Accounting for forest management must be mandatory.
- Accounting for all existing 3.4 activities, particularly cropland management as well as the new activity "rewetting and drainage", should be made mandatory understanding that data quality issues need to be resolved. Parties must move to improve data quality as soon as practically possible in order to achieve comprehensive accounting for emissions and removals from land.
- Emissions should be accounted for against an historical reference period.
- Net emissions resulting from policies promoting forest-based biomass energy use should not be included in the forest management reference levels of Annex I countries. Including these emissions effectively factors them out of accounting and removes the carbon signal of forest-based biomass energy. The information submitted in accordance with Decision 2/CMP.6 indicated that 19 countries have explicitly included policies promoting the use of bioenergy in their forest management reference levels.
- If bioenergy-related emissions are reported in the land sector, soil and biomass carbon losses associated with bioenergy crop production must be fully and accurately accounted for.
- Until full accounting for all bioenergy-related emissions in either the end-use or the land sectors of Annex I and Non-Annex I countries is accomplished, measures such as supply chain certification and limitations on sourcing biomass from carbon rich ecosystems should be utilized. Even when carbon accounting is complete and robust, Annex I countries should have safeguards to avoid degradation and clearing of high conservation value landscapes.
- Pursuant to the REDD+ decision, all Parties - developed and developing - must address drivers of deforestation and forest degradation. Bioenergy use and substitution is such a driver.
- In the future, if biomass energy feedstocks are produced in a REDD+ country and exported to an Annex I country, the land-use emissions must be accounted for.

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5 Fargione, Joseph. February 2008. Land Clearing and Biofuel Carbon Debt. Science express / Page 1 / 10.1126/science.1152747

6 Institute for European Environmental Policy, November 2010. Indirect Land Use Change Associated with Expanded Use of Biofuels in the EU.

7 Keith et al. 2010. Estimating carbon carrying capacity in natural forest ecosystems across heterogeneous landscapes: addressing sources of error, Global Change Biology

8 IMCG newsletter. 2007/3. Biomass energy crops on peatlands: on emissions and perversions