

3rd Joint Workshop on Extending the RED Sustainability Requirements to Solid Bioenergy

held from June 28-29, 2012 at Clarion Hotel Gillet, Uppsala, Sweden

A joint initiative by



JOINT RESEARCH CENTRE

Informal Workshop Notes

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Day 1: June 28, 2012

Introduction

Johnny de Jong (Swedish Biodiversity Center) and **Uwe Fritsche (IINAS)** welcomed the participants and acknowledged the support from SLU to organize the 3rd Workshop.

They briefly explained background and introduced the structure of the workshop, highlighting that the aim was to continue the earlier discussions and stimulate deeper and greater understanding of the sustainability issues for bioenergy from forests. The GHG issue will be addressed separately on June 29.

Presentations¹ of Day 1

Giulio Volpi (EC DG ENER) gave an update on EU policy for biomass sustainability. He highlighted the crucial role of bioenergy for decarbonisation that is considered in the Energy Roadmap 2050. He also gave a clear message about the need of developing a sustainability framework.

Regarding the sustainability criteria for biofuels/bioliquids, he stressed the impact of ILUC on reducing the GHG savings of biofuels and the uncertainties/limitations of modelling. The best policy options to address this issue are currently discussed. How the implementation of EU criteria for biofuels/bioliquids is performed was reviewed.

Following-up on the 2010 EC report on biomass sustainability, he underlined:

- national sustainability criteria for biomass should be similar to those applying to biofuels,
- land use criteria do not apply to waste,
- GHG accounting to include end-use conversion, use of simplified methodology with default values,
- Member States (MS) should exempt small bioenergy generation (<1 MW) from compliance, and
- MS should monitor origin and quality of biomass used in small scale applications.

Currently, only Belgium and the UK have followed the EC recommendations. However, many MS have introduced regimes promoting end-use efficiency.

The sustainability of biomass production is addressed at best through general environmental regulations for all. Several MS are waiting for EU proposal for binding criteria.

The risk of non-coordinated/conflicting national regimes was emphasized. In addition, various stakeholders are concerned about issues of forest bioenergy promotion.

In order to maximize the benefits of biomass the following issues are proposed:

- prevention of worst-case scenarios, e.g. clearing of areas with high carbon stocks and high biodiversity value (forests/peatlands),
- avoidance of transport or processing practices that result in low or non-optimal GHG savings compared to fossil fuels,

¹ Presentations will be available at: <http://www.iinas.org/Work/Projects/REDEX/redex.html>

- assurance that forests are regenerated and carbon stocks are maintained in reasonable timescales, and
- management of broader sustainability issues including resource competition.

Aiming at minimizing the costs of sustainability proofing, four issues were suggested:

- ensure that criteria are relevant, objective, measurable and manageable,
- build on ongoing experience with biofuels criteria, with necessary adaptations to solid biomass characteristics,
- build on as much as possible on national and international voluntary forest management schemes,
- exempt small scale forest owners for cost-effectiveness, as well as small-scale consumers (eg above 1 MW capacity), share compliance efforts along the supply chain (e.g. between energy users and biomass suppliers).

Leire Iriarte (IINAS) presented the key issues of the updated input paper. The scope of the work was to define a feasible set of criteria and indicators to ensure that additional forest biomass harvesting for bioenergy is sustainable. Additional thinnings and residues from fellings are the raw material considered in this report.

Previous considerations about the site-dependant effects of biomass harvesting and hence, the difficulty this implies when making universal generalizations were mentioned. Also, the lack of knowledge of some potential long-term effects and the need of precautionary considerations was stated.

Finally, she pointed out that Sustainable Forest Management (SFM) processes and certification schemes don't specifically consider some of the potential impacts from forest biomass harvesting.

The additional risks that forest biomass harvesting show in comparison with traditional forestry were addressed in three groups:

- pre-harvesting phase (lack of compliance with legislation, lack of planning, effects on high biodiverse forests and other areas),
- harvesting phase (impacts on biodiversity, soils and water), and
- post-harvesting phase (impacts derived from management intensification, simplification and homogenization of forests).

The effect of additional extraction of residues is a central concern. The proposed set of criteria, indicators and thresholds was shown to stimulate further discussion (except for GHG issues that were not addressed in this presentation):

Criterion 1: Raw material legitimacy, composed by two indicators:

- I1.1. Compliance with EU Timber Regulation (EU No 995/2010). It applies to all wood products. They have to show a "due diligence" in order to demonstrate that they have been supplied legally (both in Europe and elsewhere).
- I1.2. Existence of a Forest Management Plan aiming to prevent long-term productivity losses and to maintain ecosystem services of the stand. This tool allows definition of very specific issues at stand level.

Criterion 2: Potential harvestable areas. In this respect, it was proposed that “High Biodiverse Forests” be considered no-go areas, except when biomass is harvested for management purposes. High risk of natural hazards and biomass from salvage logging were proposed to be allowed as long as it is ecologically sound and other indicators are respected. An open question was in relation to primary forests. The definition of these areas is highly controversial, so further discussion is needed.

Criterion 3: Sustainable extraction rates and retention of deadwood.

- Below-ground biomass. Only selected extraction of stumps and roots, and avoiding complete removal were proposed. The definition of further thresholds at national/local level was suggested.
- “Singular dead or alive trees” such as live cavity trees, den trees, other live decaying trees and snags should be left in the forest and protected. The definition of further threshold at national/local level was also suggested.
- Residues extraction rates in order to avoid nutrient depletion. At this regard the development of a map of soils risks to define a traffic light system (areas to go without restrictions, areas in which some precautionary measures should be considered and no-go areas) was recommended. When lacking such a risk map, 1/3 of residues should be left. The possible need for a differentiation of coarse/fine wood was raised.
- The protection or enhancement of Soil Organic Carbon should be assured.

Criterion 4: Soil compaction and erosion. In order to prevent these risks, the compliance with no harvesting in areas having steep slope (>35°) and extraction only from soils with low-to-medium compaction risk (exceptions when soil is frozen) were proposed.

Criterion 5: Use of agrochemicals and intensification of natural products uses. The main certification schemes (FSC and PEFC) indicate that inappropriate use of chemicals or other harmful substances shall be avoided in forestry but wood ash recycling is allowed. However, fertilisation or liming is allowed to correct specific problems in both schemes. Considering that, three indicators were proposed in this regard:

- I5.1. No fertilizer use to compensate for residue extraction
- I5.2. Wood ash recycling assuring no heavy metal loads above current levels in forest soils. The opened threshold proposed was to allow it only in “yellow” areas.
- I5.3. Avoidance of manufactured pesticides

Criterion 6: Water quality and quantity. It was recognized that some features of water quantity are addressed by the amount of woody residuals removal and the use of agrochemicals and intensification. Hence, the indicator proposed for this criterion was the protection of riparian ecosystems and wetlands and the establishment of adequate buffer zones. The need of definition at a local level was questioned.

Criterion 7: Invasive/Exotic Species and GMOs. Regarding this issue was reminded that both PEFC and FSC prefer regeneration with native species but allow the introduction of exotic species as long as negative impacts can be avoided or minimized. The use of GMOs is generally prohibited by FSC and not well indicated by PEFC (some national standards allow their use). Therefore, the indicator proposed for further debate was that the reforestation of harvested stands should not be performed with invasive/exotic species and GMOs.

Jan Iepsma (NL Agency) presented his thoughts regarding products and residues.

First, he asked for a plenary “vote” on which forest products could be a residue and/or a product. Then, he offered various definitions from different certification schemes, i.e. RED specifies that residues are directly produced by agriculture, aquaculture, fisheries and forestry; they do not include residues from related industries or downstream processing.

The importance of a policy to stimulate re-using residues but assuring there is no incentive for creating residues from useful materials is needed. It is necessary to make clear definitions, univocal and practically applicable, as well.

For solid biomass residues it is advisable to look at definitions and sustainability aspects associated with those laid down in the RED. Harmonization within the EU and the European Committee of Standardization (CEN) is suggested.

Finally, a monitoring of the “residue-policy” was proposed.

Charlotte Sluka (Lund University) presented the Results of IIIIEE Study of Sustainability Schemes addressing stakeholder opinions and risk mitigation options for European energy companies. The study aims to define if the application of sustainability schemes could help utilities address European stakeholder concerns over the use of forest biomass in large-scale energy generation.

Opinions from public, private institutions (utilities, bioenergy producers, etc.) and research institutes/NGOs for the main forest biomass consumer and supplier countries were collected. In parallel, legislative requirements, utility company schemes and voluntary certification schemes (forest certification schemes, stepwise programmes, legality verification schemes and RED Biofuel schemes) were examined.

Regarding the environmental criteria, the main concern for all interviewed groups was GHG balances. The question of forest biomass carbon neutrality was identified as a main issue of concern. Biodiversity protection was recognized as an important criterion by all groups. Water management and the use of chemicals, pest control and fertilizer were of special relevance for governmental bodies.

However, the net energy balance was considered particularly important by research institutes and NGOs.

In relation to social and economic criteria, the competition for raw material and food, labour conditions and land use rights were recognized by all sectors. Land grabbing has been identified as a risk. The private sector manifested its concern regarding economic stability.

Considering standard setting, monitoring and governance mechanisms, stakeholders showed their preoccupation with verification due to concern over corruption. 3rd party certification and accreditation was of special concern.

Also, the certification and accreditation processes as well as regular 3rd party assessments were issues of high relevance.

Stakeholder perception is that there is no any scheme covering all or even the most important stakeholder concerns. Forest certification schemes (FSC and PEFC) are

recognized as the most comprehensive ones but they don't account for GHG balances and some preoccupations raised in relation with the wood left in forests, which may be not sufficient. IWPB was recognized as the most comprehensive scheme from the utilities side. Stepwise programmes were acknowledged as acceptable solution in the short-term but not enough to cover stakeholders concerns. Legality verification schemes are not sufficient once the sustainability criteria are laid down. The advantage of ISCC is that cover RED criteria but it would have to be adapted for forest biomass. Stakeholders have more trust in long-experienced schemes and in those they are familiar with.

There is not any doubt about the need of forest biomass certification, but many different views on forest biomass were found among all groups. In order to mitigate risks it is proposed to source wood from less controversial origins, i.e. European wood and wood waste and residues. To avoid corruption, the establishment of "risk countries" and suppliers profiles was proposed.

Results from group discussions about criteria and indicators

Three parallel breakout groups discussed further the definitions, criteria and indicators for sustainability of forest bioenergy. Various concerns and proposals came from the group discussions. All opinions are collected in the following, even though they are may not represent consensus views, and may not express the opinion of the majority.

Comments on current indicators as drafted in the input paper

C1. Raw material legitimacy

Some participant argued that the establishment of a Forest Management Plan (FMP) is not the solution to control activities at stand-level. The reason is that the plan may be not addressed. Others defended that specific requirements for FMP are needed.

C 2. Protect Highly Biodiverse Forests

Some concerns were how to define High Conservation Value Forest (HCVF). It seemed more appropriate to use this term than Highly Biodiverse Forests. Solutions proposed by FSC could be checked. A global system can better protect biodiversity.

The definition of Primary Forest seemed to be of no crucial importance even though some sensitive areas should be protected. Instead, the definition of HCVF, and its declaration as no-go areas revealed of importance.

C 3. Sustainable Extraction Rates and Retention of Deadwood

Controversy about stump extraction and its potential negative impacts were raised. In line with the precautionary principle it might be appropriate to wait for further environmental research or be allowed if no negative impacts on biodiversity, soil erosion and degradation, and SOM.

A complete ban of deadwood extraction would be appropriate unless it is proven that it is harmless. A precautionary approach is proposed due to the lack of scientific consensus.

Extraction rates and rating zones are of relevance. Nutrient depletion from soils should be avoided but to do that a suggestion of including ash recycling as part of the indicator is proposed. That means that after harvesting and ash recycling nutrient depletion should be avoided. Stronger requirements to prevent nutrient depletion / maintenance of balance were also proposed.

The respect to allowable annual cut might be included somehow.

C4. Soil compaction and erosion.

I.4.1. Slope is included in SFM

I 4.2 Delete “residue” in current formulation (I 4.2 Bioenergy from forests residues is extracted only from soils with low-to-medium compaction risk (exceptions when soil is frozen). Instead, a suggestion is to add: technological mitigation measures as lighter weights of machinery used.

C 5. Use of Agrochemicals and intensification of natural products uses

- Ash recycling could be allowed to ensure long-term nutrient balance and to compensate for woody biomass extraction (not only residues).
- Long-term productivity should be maintained and fertilization could be applied if needed. Fertilization is a controversial issue: some people defend it in order to assure long-term productivity maintenance but other people are against it because of environmental impacts (eutrophication or harm to soil ecosystem/ organic carbon pool).
- In relation to pesticides the concept of “manufactured” is proposed to be removed.
- Avoidance of pesticides with adverse effects on ecosystems or in other targeted species is proposed. Also it is noted that pesticides are addressed by SFM so they may be considered there.

Additional suggestions for the set of C&I

- Economic & social criteria should be included
- Prevention of conversion of forest systems into plantation/safeguard against transformation may be considered.
- Some participants argued that international Forest Management Processes (Montreal Protocol, Forest Europe or ITTO) covers most of the issues that arise from additional woody biomass harvesting. Others were in favor of grouping key topics directly affected by SFM into one “big criterion”.
- The fractions that should be addressed were discussed. They are: residues from logging operations, commercial thinning, complementary fellings and roundwood (firewood). Currently, stemwood has higher prices than residues.
- Assurance of maintenance of ecosystem services (if not covered by current indicators)
- Trash collection/management (due to forestry operations)
- Deal with some areas covered by RED (i.e., peat).
- Include avoidance mechanism for the use of forest products for energy purposes which could be used for other applications. Incentive for (and not against) cascade use is suggested.

Overarching comments/ recommendations

- Different rules/requirements according to specific conditions would be desirable (e.g. primary forests - semi natural/ extensive used forest systems – plantations).
- Cut-off dates are essential to prevent perverse incentives.
- From DG ENER to focus on operationally issues and challenges that forest bioenergy face is recommended to elaborate the “outcome paper” from this workshop.

Overall discussion

Lack of forest regulations at the European level is acknowledged. Preoccupations about illegal resources provisions as well as the lack of respect to CITES in wood markets are put in place.

From a biodiversity point of view the division between production/protection areas would not seem to be the most sustainable management response; an integral approach at landscape level was suggested.

The use of improved genetic organisms for some forestry practices (i.e. willow or poplars cultivation) was reminded.

EU Timber Regulation may create a loophole in woody biomass for bioenergy.

The management of broader sustainability issues concerning forest biomass, i.e. including resource competition, is suggested. In this regard, the difference in the feedstock amount needed for 1 MW power/heat plant is recognized.

A proposal to establish bin obligations exclusively for large imports was proposed.

Day 2: June 29, 2012

Additional Presentations on soil issues

Sofie Hellsten (IVL) contributed the sustainability issues of forest soils. The study was based in the research performed with Norway spruce, Scots pine and silver birch in Sweden, Finland and Denmark.

Firstly, the nutrient concentrations seem to be species dependant. As expected, smaller roots and bark showed higher nutrient concentration. The concentration of nutrient increment from stems (lowest), stumps (medium) and foliage (highest). Both in nutrient concentrations and nutrient status of the soil seemed to be a geographical gradient. The stump biomass may constitute an important amount of the extracted stem volume (about 35 %, depending on the species). From a nutrient perspective some recommendations for stump removal are: (i) avoid small roots, (ii) control the tree species to be removed, some should be avoided, (iii) avoid small young tree species (birch) and (iv) consider the location.

The mass balance calculation considers inflow (from deposition and weathering/N-fixation) and outflow (harvest and leaching). At harvesting, three scenarios may be identified: stem only harvesting; whole tree harvesting (WTH) and whole tree harvesting plus stump removal.

It was concluded that biomass removal (WTH + stumps) affects losses of base cations, reducing buffer capacity against acidification. However, the risk of phosphorous and nitrogen depletion is site-dependant.

Difference in nutrient losses between stem and WTH is higher than between WTH and WTH+stumps. However, losses at stump removal are still important (particularly in combination with WTH). Ash recycling may be necessary to compensate for losses to ensure a sustainable extraction of biomass from forestry (also recommended by the Swedish Forestry Agency).

GHG Issues

Presentations on GHG Balances for Solid Bioenergy

John Neeft (NL Agency) presented the project BioGrace II. BioGrace I released a user friendly tool for biofuels with harmonized GHG calculations during 2010-2012. Since April 2012 BioGrace II was launched aiming to provide (mainly) GHG calculations for electricity and heat from solid, gaseous and liquid biomass.

BioGrace II follows Commission and JRC decisions so it includes only agreements and not current scientific discussions. It aims to provide transparent the default values from COM(2010)11 and make decisions implementable for stakeholders. Some of the activities performed are: explain the methodology and add calculations rules, discuss with policy makers on harmonization both calculations rules and conversion factors and train verifiers to verify actual GHG calculations. Also, if there are other tools there will be cooperation with them to ensure the results alignment.

The project website is <http://www.BioGrace.net> (freely accessible).

Aikaterini Boulamanti (JRC) gave a presentation about Biogenic CO₂ accounting of bioenergy from forests. The bioenergy carbon intensity of wood (102 g CO₂/MJ) is higher than that from hard coal (96 g CO₂/MJ) or natural gas (56.4 g CO₂/MJ). On the other hand, efficiencies of biomass are around 25-35 % and for advanced fossil it is around 45-50 %.

According to UNFCCC annual crops LULUCF emissions are neutral. However the situation for slow-growth biomass differs. Punctual emissions after harvesting are not compensated by immediate years of plant re-growth generating a payback time.

A sensitivity analysis shows that payback time changes with the fossil system substituted, residues size and effects Soil-C and nutrients. Forest management techniques, natural disturbances and albedo effect also play a role. Different scientific studies have obtained a wide range of payback time for forest biomass depending on the factors considered.

It is concluded that the assumption of carbon neutrality is not appropriate for forest biomass. Bioenergy may cause more emissions than fossil energy in the short term even though in the long term is a low carbon energy source. It is recommended to factor these emissions into EU policy.

Alessandro Agostini (JRC) offered a presentation about questions in GHG accounting. In the RED a LCA methodology for GHG calculation and fossil fuel comparator is provided. The upstream emissions are accounted for in other sectors so the emissions from the fuel in use are set to 0.

GHG savings from wood pellets or briquettes are higher for Heat&Cooling applications than for electricity and strongly dependant on the transport distance. Up to 90 % of GHG savings may be recorded.

He reminded that the bioenergy carbon intensity of wood is higher than that from Hard Coal or Natural Gas and the implications it presents in order to consider biomass as carbon neutral resource. Regarding the reference system for comparison is important: the choice of emissions per functional unit, the payback time, the marginal reference system (fossil or renewable sources) or the average per MJ.

The timeframe of comparison plays a relevant role. If it is short the current emissions from the reference systems can be considered suitable. In case it is long the changes in the reference systems have to be accounted for. When forest carbon stock changes are accounted for different results in global warming mitigation efficiency will be obtained depending on biomass sources.

An increase in the pressure on natural forests may be a consequence of increasing the use of biomass for bioenergy. It is acknowledged that the wood is already used somehow so replacement with other sources should be needed in the system.

A cascade use of wood approach is discussed. UNECE and FAO recommend to sequester carbon in forests, then a "cascaded" use of wood. The inclusion of a factor for indirect effects (ILUC or displacement) is proposed for the total emissions accounting.

Hillevi Eriksson (Swedish Forest Agency) presented the GHG accounting for forest biomass-results from Sweden. The net effect of GHG emissions on climate depends on: GHG emissions at production and transportation and the effects on carbon stocks in soils and biomass. The concept of optimized bio-refinery was highlighted as a pathway for the future.

When ex forest is converted to salix coppice a 8-15 years payback time results. In the case of ex roundwood for energy, the coal substitution in 50 years is 80 t C ha^{-1} and a carbon stock after 50 years amounts to minus 20 t C ha^{-1} . Hence a criterion for initial C stock losses is proposed: "land conversion should not result in losses larger than 30 % of substitution gain in 50 years time".

In Swedish forestry, it is typical to apply 150 kg N ha^{-1} that provides an increase in volume of 15 m^3 , which means 10 kg/m^3 . Therefore, a suggestion in relation to N fertilization is: "Unless research shows risks are minor, only compensatory doses of N should be applied".

In case that larger demand of wood occurs, it is likely that: (i) afforestation/reforestation ambitions are improved, (ii) silviculture for high biomass production is improved and (iii) biomass is harvested before natural disasters happen.

Overall discussion on GHG issues

The GHG issue - especially the "carbon debt" - is of utmost importance for the vast majority of participants. It is necessary to define the accounting system with regard to the typically long rotation times of woody biomass.

In addition, black carbon must be considered in the LCA, as it implies relevant short-term effects for biomass systems.

Furthermore, accounting of GHG for biorefineries are a concern, as allocation rules cannot be easily based on a multi-output system which has both energy and non-energy products.

Quantifications of ILUC factors remain uncertain (it is estimated that ILUC may eliminate around 70 % of the direct savings).

More appropriate uses of biomass may be stimulated using higher thresholds for GHG accounting. This is in relation with the "cascade use" that aims to assure sustainability in the long term but may be of difficult implementation in the short term.

Efficiency of the biomass at the conversion state should be promoted.

Some relevant export countries (Canada and the USA) are not (longer) signatories to the Kyoto Protocol so that worries about how LULUCF emissions are accounted for were voiced.

The complexity of the topic implies that a more appropriate approach may be to distinguish among different circumstances, especially regarding GHG balances issues.

Closing Remarks and Way Forward (Uwe Fritsche, IINAS and Johnny de Jong, SLU)

Both expressed gratitude to the participants for sharing their points of view and their valuable inputs.

In July/August, a draft version of the output paper will be sent to all the participants to collect their opinions. Modifications in track change mode will be welcome until end of August/September. The “outcome” paper will be distributed to a broader public.

A summary of the outcome paper will be presented at the CA-EU workshop in October 2012 in Quebec (Canada). This workshop is a joint initiative organized by IEA Bioenergy Tasks 40 and 43, the Faculty of Forestry, Geomatics and Geography of Laval University and Natural Resources Canada in cooperation with the GBEP.

In November 2012, the outcome paper could also be presented at a GBEP meeting.

The organization of another workshop and the invitation to partners from other export countries (Argentina, Brazil, Russia) will be explored.