JRC Report on Sustainability of biomass from forests

– Analysis by Svebio, Swedish Bioenergy Association

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The report[1] contains both positive and negative points about the sustainability of biomass from forests for energy. We welcome that it has a humble attitude and the authors express a wish that the debate on bioenergy should be "de-toxified", also from scientists (p.12). Sadly, reactions after the publication of the report have not followed that advice, as many comments from e.g. environmental NGOs have given a very one-sided picture of the report. We comment this aspect at the end of this paper.
Our aim with this analysis is to identify both what we think is positive in the report and what we are critical of. We also have some suggestions on factual matters. Above all, we want to relate the report to the conditions in Sweden, the country in Europe with the biggest deployment of bioenergy, currently 38 percent of all energy used.

Positive messages in the report

Carbon reporting

The report clearly states that the climate impact of bioenergy is covered by the internationally agreed accounting and reporting rules, in the climate convention UNFCCC and IPCC, and that EU follows these rules. The emissions from combustion of biomass must be recorded as zero, while the changes in carbon content in forests and wood products are recorded in the LULUCF sector. JRC points out that the LULUCF regulation in EU has been strengthened and there are no carbon losses from bioenergy that are not recorded, when LULUCF accounting is applied. JRC explicitly argues against those actors in the debate who still advocate that there are flaws in the accounting, that emissions from bioenergy are not recorded, and that they should be counted the same way as fossil fuels. JRC specifically mentions the paper from EASAC (Norton et al 2019), where the authors argue against "the simplistic assumptions of carbon neutrality and treating biomass as renewable". JRC says that these authors clearly overlook the importance of LULUCF regulation (p 85).

Our conclusion:

It is obvious that JRC does not question bioenergy as a renewable energy source as it is defined in the renewable energy directive, which of course doesn't mean that all bioenergy can be considered sustainable.

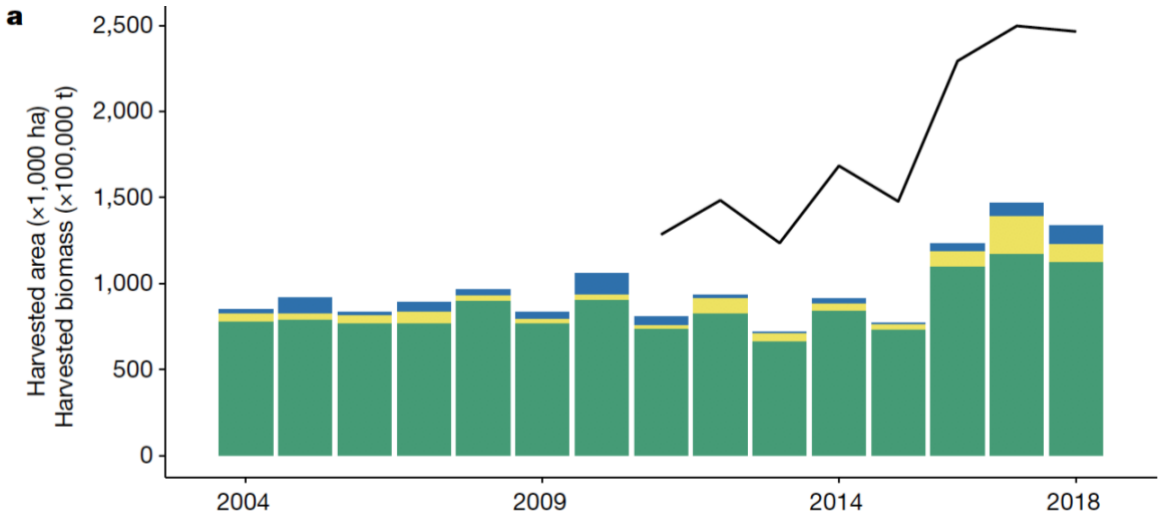
The report can be seen as a strong rebuke to EASAC on the issue of carbon reporting, and gives clear messages to a number of NGOs who are campaigning against biomass for energy. If bioenergy is used right there are win-win pathways where bioenergy from forests can be used with benefits for the climate and without risk for biodiversity.

[1] *The use of woody biomass for energy production in the EU, JRC Science for policy report, 2021, https://publications.jrc.ec.europa.eu/repository/bitstream/JRC122719/jrc-forest-bioenergy-study-2021-final_online.pdf*

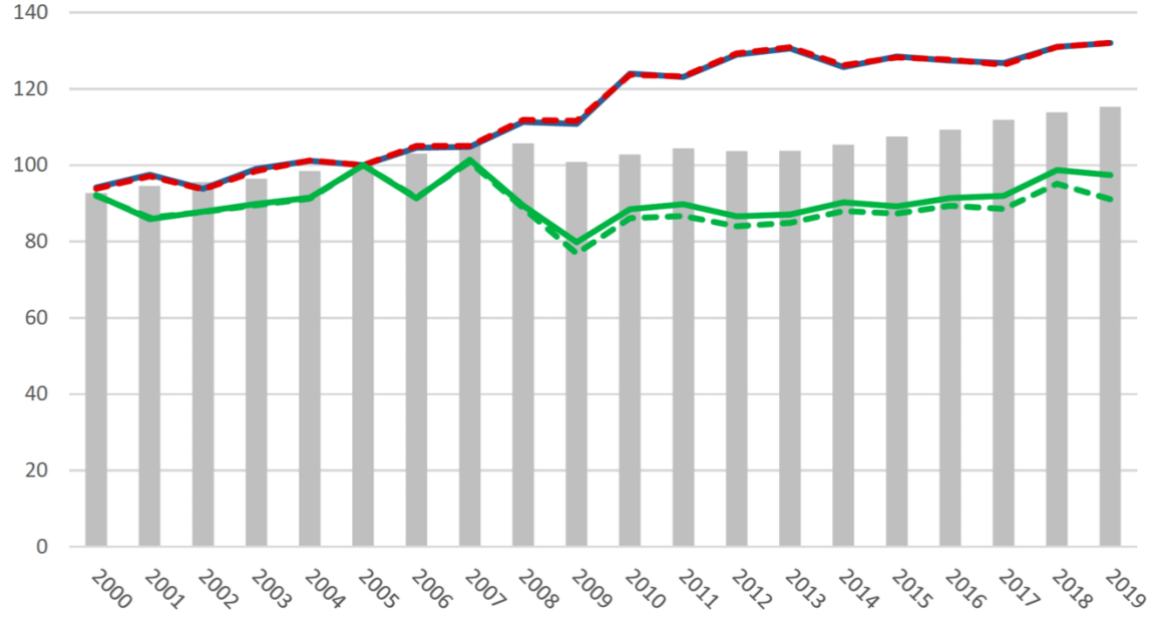
Sourcing in Europe

Contrary to the paper published in Nature last summer by JRC researchers, this actual report now concludes that harvesting in EU forests have been relatively steady in the last years. In the paper from last summer the JRC researchers, of which some are co-authors of the new report, concluded that biomass removals had increased by 69 %, and that clearcutting had increased by 49 % in recent years (between 2011-2015 and 2016-2018). This was based on remote sensing. The result was immediately contested by forest inventory researchers who showed that according to proven established inventory methods no such drastic change in European forestry had taken place.

In the Nature article, bioenergy use was mentioned as one factor behind the supposed increased harvests. The new actual report shows that both the harvest of industrial stemwood and of fuel wood has stagnated after 2013.



This chart is from the article in Nature (Guido Ceccherini et al: Abrupt increase in harvested forest area over Europe after 2015, Nature July 2020). Green = harvested area, yellow = fire damage area, blue = wind damage area, black line = harvested biomass volume.



This chart is from the JRC report Jan 2021. Green line = harvested industrial stemwood, red line = harvested fuelwood, grey bars = GDP (index 2005 = 100).

The report notes that statistics on biomass for energy are uncertain. The numbers presented show that 37 % are primary fuels, directly from forests, of which about half is stemwood and the rest is harvesting residues. Of the stemwood, half is coppice wood in forests in southern Europe where coppice forestry for fuelwood is common (this was news to us!). 49 % of the forest biomass fuels are secondary fuels like by-products and residues from forest industries and woodworking industries, and recovered post-consumer wood. 14 % is not accounted for. The report also includes an analysis of salvage wood, e.g. damaged wood from bark beetle infestations.

Our conclusion:

The report shows that bioenergy use has not caused increased harvests in EU forests in recent years when RED has been in place, and the use of fuelwood has even been at a steady level in recent years.

The "problem" more seems to be too little use rather than too much use. The report does not show that there is any use of high-quality stemwood for energy in EU. The 14 % fuelwood not accounted for could be from categories that are not readily included in the forestry statistics, like landscaping wood, wood from urban areas, salvage wood, wood from areas of natural conservation, small-scale use of firewood, etc.

Based on these statistics, we are critical of the limited choice of "archetypes" in the sustainability analysis in the report. A large majority of the biomass fuels used in EU are not included in the analysis. Most of the excluded categories are clearly sustainable as they are different kinds of wastes and residues and marginal biomasses that have no alternative use and would decompose if they couldn't be used for energy. In our opinion, these types of forest biomass have potential to increase considerably.

The sustainability analysis (chapter 5)

The sustainability of biomass from forests is assessed on two grounds: climate performance and effect on biodiversity.

Carbon performance

On carbon performance, the report on the one hand states that this issue has already been assessed in the impact assessment for the revision of RED in 2016 and therefore is not questioned. Also, the report insists that LULUCF regulation guarantees that biomass removal doesn't result in net carbon emissions. Long-term carbon storage in the forests is also a requirement in the sustainability criteria. On the other hand the analysis includes evaluation of each alternative fuel according to "payback time".
This is not logical, in our view. If the whole forestry system shows net sequestration of carbon, different sub-groups of biomass fuels from that same forest system should not be considered more or less carbon neutral, and none should be disqualified as contributing to climate mitigation.
The carbon emissions mitigation for the different pathways are evaluated with reference to an earlier JRC report (Agostini et al 2014), from which the following chart is presented in the report:

Biomass source	CO_2 emission reduction efficiency					
	Short term (10 years)		Medium term (50 years)		Long term (centuries)	
	coal	natural gas	coal	natural gas	coal	natural gas
Temperate stemwood energy dedicated harvest	---	---	+/-	-	++	+
Boreal stemwood energy dedicated harvest	---	---	-	- -	+	+
Harvest residues*	+/-	+/-	+	+	++	++
Thinning wood*	+/-	+/-	+	+	++	++
Landscape care wood*	+/-	+/-	+	+	++	++
Salvage logging wood*	+/-	+/-	+	+	++	++
New plantation on marginal agricultural land (if not causing iLUC)	+++	+++	+++	+++	+++	+++
Forest substitution with fast growth plantation	-	-	++	+	+++	+++
Indirect wood (industrial residues, waste wood etc)	+++	+++	+++	+++	+++	+++

+/-: the GHG emissions of bioenergy and fossil are comparable; which one is lower depends on specific pathways,

-; --; ---: the bioenergy system emits more CO_2eq than the reference fossil system

+; ++; +++-: the bioenergy system emits less CO_2eq than the reference fossil system

**For residues, thinning & salvage logging it depends on alternative use (roadside combustion) and decay rate*

Very few of the pathways are present in this chart. All pathways in the chart have potentially positive climate performance even in a short-term (10 year) perspective, except stemwood use and plantations on former forest. Thinning wood, landscape care wood, salvage logging wood and “indirect wood” are all listed in the chart, but not considered in the JRC report, despite being major existing biomass fuel paths in EU today, and not least in Sweden. Many of the assumptions in the Agostini report and shown in the chart above can also be questioned, like conversion and efficiency factors, supply chain emissions, etc. Changes in these assumptions both for biomass and fossil fuel can easily change a minus to a plus.

Biodiversity

On biodiversity, the report shows that it is difficult to show the effects with certainty. In many cases there are diverging conclusions from different researcher. Often it is possible to harvest residues up to a certain threshold, but to exactly determin the “safe” threshold can be difficult, and depends on many factors. Swedish and Finnish research results, which are abundant as our countries have practiced bioenergy use from forestry for decades, are relatively well presented. Conclusions are in general overly cautious. “The precautionary principle” is applied which often leads to very conservative assumptions concerning perceived risks for negative impacts on biodiversity.

Choice of pathways

We are critical against the choice of the 24 fuel pathways that are analyzed.
Only one of these groups of pathways is commonly applied in European biomass for energy: harvesting residues. The others – fuel from afforestation and from plantations – are not common, and not even mentioned in the chapter about current use of biomass fuels in EU. But also among the pathways for residues many of the alternatives are not relevant. Using harvesting residues "above thresholds" will not be possible, as this would be against the sustainability criteria in REDII; the implementation of forestry legislation as well as certification would not permit this.

When the results of these 24 pathways are presented, the picture is that "18 of the 24 pathways risk biodiversity" (which will be interpreted as: most bioenergy is harmful to biodiversity). But this is misleading, as many of these pathways are irrelevant in the foreseeable future.

A large number of other and often more relevant pathways are not included:

- Residues from sawmills, pulpmills and woodworking industry. This is the most common fuel in EU – according to the report at least 49 %.
- Salvage wood and discarded wood (rotten, splinted, crooked, etc). Wood from species that are not in demand from industry. This is a major part of the stemwood.
- Coppice wood.
- Wood from increased productivity on managed forestland. This is a major potential for the future.
- Landscaping wood and wood from urban areas. Other marginal wood sources from areas that are not considered forest land.

Comments on some of the 24 pathways and their relevance to the Swedish biomass fuels market

Removals

1. Coarse Woody Debris removal
2. Fine Woody Debris (Slash + foliage/needles) removal above landscape threshold
3. Fine Woody Debris (Slash + foliage/needles) removal below landscape threshold
4. Fine Woody Debris (Slash Coniferous) removal above landscape threshold
5. Fine Woody Debris (Slash Coniferous) removal below landscape threshold
6. Fine Woody Debris (Slash Deciduous) removal above landscape threshold
7. Fine Woody Debris (Slash Deciduous) removal below landscape threshold
8. Low stumps removal above landscape threshold
9. Low stumps removal below landscape threshold

All 9 alternatives are relevant for the Swedish situation. Three categories have been accepted as "green" in the report (3,5,7). Harvesting "above threshold" means harvest at an unsustainable level, and this would be unlawful and not in compliance with the sustainability criteria in RED. These alternatives (2,4,6,8) should therefore not be considered. The Swedish forestry law requires a certain retention of coarse woody debris at harvest, and harvest of coarse woody debris above this level should be allowed. This can be salvage wood and damaged wood (rotten, fire damaged, insect damaged etc). Low stumps below landscape threshold are excluded based on payback time. This conclusion is contested in Swedish

research on stump removal. According to Svebio pathway 9 should be accepted and pathway 1 partly accepted.

Afforestation

10. Natural grassland afforestation with monoculture plantation
11. Natural grassland afforestation with polyculture plantation
12. Natural grassland afforestation with other planted forest
13. Anthropogenic heathland afforestation with monoculture plantation
14. Anthropogenic heathland afforestation with polyculture plantation
15. Anthropogenic heathland afforestation with other planted forest
16. Natural forest expansion on anthropogenic heathland
17. Former agricultural land afforestation with monoculture plantation
18. Former agricultural land afforestation with polyculture plantation
19. Former agricultural land afforestation with other planted land managed with low intensity
20. Natural forest expansion on former agricultural land

Only 17 – 20 have relevance for Sweden. 0.5 – 1 Mha agricultural land may be afforested in the coming decades unless the policies on energy crops are changed to make these lands available for energy crops for biofuels production. All of these pathways are considered favorable in the analysis, with less positive evaluation of 17 (on biodiversity) and 20 (on climate). Afforestation on abandoned farmland can be made with single species, like Norway spruce, hybrid aspen, poplars or short rotation coppice willows. These trees would clearly have much higher carbon up-take than expansion of “natural forest” or “management with low intensity”.

Conversion to plantation

21. Conversion of primary, old-growth forest, to plantation
22. Conversion of native naturally regenerating forest to monoculture plantation
23. Conversion of native naturally regenerating forest to polyculture plantation
24. Conversion of native naturally regenerating forest to other planted forest managed with low intensity

21 – 24 are not relevant for Swedish conditions, as we have no plantations. Swedish regeneration is done with planting or other silviccultural methods in our semi-natural managed forest, almost entirely with indigenous species (two coniferous species, Norway spruce and Scots Pine make up more than 80 % of the forests, also in a natural state), and our forests cannot be classified as plantations. We note that there is no definition of the term plantation in the report (p 167-169).

Reactions from WWF and EASAC

When the report was published, some critics of the use of bioenergy in EU quickly made comment with the obvious purpose to give a one-sided picture of the results of the report. By doing so, they hijacked the debate and managed to spread their interpretation to media and the public. Two of these actors were WWF Europe and EASAC. Their pictures of the report had widespread influence.

WWF

Under the headline “Most forest biomass harms climate, biodiversity, or both - EU Commission” WWF posted a press release on 26 January.

Here are some quotes:

“A European Commission report concludes that most forest biomass produces more greenhouse gas emissions than coal, oil and gas.”

“In 23 out of the 24 scenarios the Commission’s Joint Research Centre (JRC) examined, biomass had a negative impact on climate, biodiversity, or both.”

“Indeed the report, published yesterday, finds that most of the forest biomass currently being burnt for energy in the EU not only increases emissions compared to fossil fuels, but does so for decades…”

“It basically admits in this report that EU bioenergy policies are accelerating climate change”.

Beside the misleading information that this is a report from the European Commission, implying that the commission has taken a stand on the text, most of the summary of the report in this press release is false or misleading.

The report does not conclude that most forest biomass produces more greenhouse gas emissions than coal, oil and gas. It doesn’t say anything about the total carbon balance for the forest fuels.

It is not correct that 23 out of 24 scenarios have negative impact on climate, biodiversity, or both. 5 of the pathways are placed in the green area with good climate performance and low impact on biodiversity. These cases are the most relevant for EU biomass fuels, as we have shown. Most of the lose-lose cases are not relevant and are not applied in practice.
The report does not say that “most of the forest biomass currently being burnt for energy in the EU increases emissions” or that EU policy accelerates climate change. In fact, the report says that 49% of the woodfuels used in EU are industrial by-products and waste or post-consumer wood, and that most of the primary fuels are either coppice wood in southern Europe or harvesting residues with short-term climate benefits.

Sadly, the picture given by WWF has been widely spread as “truth” despite being largely fake.

EASAC

EASAC, the European Academies of Science Advisory Council, published a commentary on 27 January. The headline was more restrained than the one from WWF: “Climate impact of woody biomass - EASAC welcomes JRC report strengthening the case for shorter payback periods.”
The main theme of EASACs comment is that much of the bioenergy use has too long payback times to contribute to reaching the Paris agreement and EU targets in the near decades.

Some quotes from the EASAC text:
"With average warming already over 1°C, it appears to EASAC's scientists that a 'renewable' energy that actually increases atmospheric CO_2 for decades merely contributes to overshooting the 1.5° C – 2° C targets. Such technology is not effective in mitigating climate change and may even increase the risk of dangerous climate change."

"The JRC report allows us to assess different sources of biomass from a climate perspective. Unfortunately, this confirms our worst fears that most of the current biomass in coal conversions is in the worst categories. As EASAC has repeatedly pointed out, accounting rules and public subsidies have led to an industry that is reducing even further our chances of meeting Paris Agreement targets, comments EASAC president Christina Moberg."

"EASAC finds it highly significant that the only scenario with neutral or positive biodiversity impact that has short-term carbon impacts is burning fine woody debris from coniferous forests (typically twigs and low-diameter branches). And even then, JRC state that enough of this material should be left onsite to maintain soil carbon and fertility."

"The JRC shows how the billions in public subsidy for biomass conversions are worsening carbon emissions for many decades. We must pay more attention to the science and ensure public subsidies focus on low carbon energy technologies that actually mitigate climate change, concludes Michael Norton, EASAC's Environment Programme Director."

It is a practice by EASAC to put the term renewable in brackets when writing about bioenergy. The statement by Christina Moberg that the JRC report confirms that "most of the current biomass in coal conversions is in the worst categories" has no foundation in the report. The report does not look into how pellets are sourced, and mainly writes about the biomass fuels sourced in EU. Most of these fuels are not covered in the pathways that are studied in the sustainability part of the report. Christina Moberg's statement is just free phantasy. Her reference to the "accounting rules" is also odd, as the report clearly rebukes EASACs environmental committee for its misunderstanding of the accounting rules in its"scientific" paper (p 85). She also says that the use of biomass fuels reduces our chances to reach the Paris Agreement targets. This also has no foundation in the report.
EASAC, just like WWF, spreads the wrongful picture that only one of the pathways is beneficial to climate and biodiversity.

Michael Norton's statement that JRC shows that billions in public subsidies for biomass conversion are worsening carbon emissions for many decades also is a grave misinterpretation of the report.

EASAC uses the publication of the report to continue its negative campaign against bioenergy and gives an untruthful picture of the results of the report.

In summary

- JRC shows that most of the biomass used for energy are secondary biomass like industrial by-products and post-consumer wood waste, or harvesting residues. A smaller part is stemwood, of which half is traditionally harvested coppice wood. There is no evidence that larger use of forest bioenergy has caused higher harvesting levels.
- JRC clearly states that the existing accounting rules for bioenergy are safe, and that combustion of biomass shall count as zero emissions. LULUCF regulation guarantees the total balance of biogenic carbon.
- JRC recommends stringent implementation of the adopted sustainability criteria in REDII, which in general cover the issues raised on carbon performance and biodiversity. JRC have few suggestions for changing the criteria but mention criteria already in place for biofuel, like sourcing from forests with high biodiversity values.
- JRC does not mention the issue of limiting or minimizing the use of “whole trees”, which was mentioned by the Commission in the Biodiversity strategy.
- JRC shows a number of pathways, both win-win cases and lose-lose cases and many in between. Most of the currently used pathways are not analyzed.
- JRC makes an appeal to scientists and others to de-toxify the debate on sustainability for bioenergy. Instead of following this advice some actors used the report as a stepstone for renewed attacks on bioenergy, based on a biased interpretation of the report.