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22 October 2020

Recent issues and scientific debate in the EU concerning forest bioenergy

Dear Biomass Working group members,

We understand that the New and Renewable Energy Division of the Japan Ministry of Economy, Trade and Industry (METI) is aiming to increase the share of renewable energy (RE) in Japan's energy mix, in line with trends in Europe. Included in this is reconsideration of the sustainability criteria for woody biomass feedstock and the priority to be afforded to bioenergy in comparison with renewable sources such as wind, solar and geothermal. This is a very active area of debate in Europe – particularly following the commitment in the 2030 Biodiversity Strategy that "*The use of* whole trees *and food and feed crops for energy production – whether produced in the EU or imported – should be minimised*". As a result, existing sustainability criteria as well as the Renewable Energy Directive are currently being reconsidered. I have been asked to provide a short summary of the key scientific aspects currently under debate- particularly the evidence and conclusions drawn by the European Academies Science Advisory Council (EASAC).

Biomass supplies a significant proportion of Europe's renewable energy and the criteria for considering forest biomass to be a source of 'renewable' energy is being questioned. EASAC has carried out much work on the use of forest biomass – especially as a substitute for coal in electricity generation (see reference list) and the conclusions summarised here reflect the consensus of all Europe's 28 Academies of Science.

The basic objective of renewable energy is generally assumed to be to reduce overall greenhouse gas emission levels. This is achieved swiftly by solar and wind since their operating emissions are very low. In the case of bioenergy however, CO_2 continues to be emitted at a large scale and a careful consideration of the carbon flows involved is required in order to assess the net effects on atmospheric levels of CO_2 and on climate.

The extensive scientific research reviewed by EASAC has shown that current practice and regulations fail to properly assess climate impacts. In particular, we have found that the large-scale use of forest biomass provided through international trade in wood pellets actually increases emissions for long periods- the opposite of the aim of renewable energy. The belief that forest biomass can contribute to climate change mitigation has historically been based on the assumption that biomass can be regarded as 'carbon neutral' because harvested trees will regrow. However, it is now accepted that this is a gross oversimplification of the carbon cycle and ignores the substantial time lags involved. **Carbon neutrality is thus a false and misleading** concept and should not be assumed.

Much research shows that the combination of the lower energy content of wood, and the emissions in the supply chain (harvesting, transport, drying, pelleting and shipping over long distances) means that for each kWh of electricity generated, biomass emits significantly MORE CO_2 than the coal it is replacing. The initial effect of switching from fossil fuels to biomass in power stations is thus **to INCREASE net emissions to the atmosphere**. A significant 'time lag' exists before any assumed regrowth in biomass after harvesting can offset this initial increase (**the carbon payback period**). The initial effect on the climate is thus the reverse of that expected for a renewable energy.

The reason this perverse effect is not apparent to many regulators is due to the accounting rules. These allow biomass emissions at the point of combustion to be zero rated- because they are assumed to have been recorded in forestry sector emissions. As recognized by the IPCC, current climate emission accounting rules thus present a false picture. To properly assess climate impacts, **full life cycle assessment t**hat records all emissions along the supply chain and any changes in the forest carbon stock are essential.

A critical component of assessing the climate impact of biomass is thus proper carbon accounting. With this, the initial carbon debt and carbon payback period can be calculated. This should be a fundamental component of any 'sustainability' criteria. Active debate in Europe is over the length of payback periods that are compatible with commitments under the Paris Agreement to limit warning to 1.5-2 degrees. EASAC's argument is that the proximity of current global temperatures to the 1.5 target means that only short payback periods (less than 10 years) can be considered compatible with nation's Paris Agreement commitments. Therefore, biomass uses with longer payback periods should not be subsidized or regarded as 'renewable'.

You will find these arguments in our paper in the peer reviewed Global Change Biology-Bioenergy, where scientists from fifteen EU countries argued that *"excess emissions are incompatible with the urgency of reducing emissions to comply with the objectives enshrined in the Paris Agreement.*" Since Japan's policy goal is also to meet Paris Agreement goals, we note the critical importance of using science-based, lifecycle $CO2_2$ accounting as the best basis for policy.

A final point I would emphasize is that EU regulations (as well as elsewhere) have developed rules on the nature of the feedstock and whether it is **legal, illegal or 'sustainable'. From a climate perspective, however this is irrelevant.** The atmospheric impact of increased CO_2 is the same wherever the carbon came from, and thus such criteria cannot be a substitute for proper accounting of emissions. If a country wishes its biomass to make a real contribution to climate change mitigation it must require full life cycle accounting and limit subsidies to situations where payback periods are short. The literature suggests strongly that if this were applied, climate-compatible forest biomass would be limited to local supplies of residues from existing forestry management.

While the above discussion has described the EU debate, national bioenergy policies are also under examination. The UK substantially reduced allowable emissions from the supply chain in its sustainability criteria (see *Renewables obligation: Sustainability criteria*. https ://www.ofgem.gov.uk/syste m/files/ docs/2018/04/ro_sustainability_criteria.pdf). The Netherlands Socio-economic Council have concluded that burning biomass is not sustainable and should be minimized (https://www.euractiv.com/section/energy/news/the-dutch-have-decided-burning-biomass-is-n

ot-sustainable/). In Slovenia, use for bioenergy is strictly limited to forest residues, while active debate is also underway in Denmark and Sweden.

I hope the above summary of key issues in Europe are helpful and remain ready to provide any further information.

Yours sincerely

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Source documents

1. Multi-functionality and sustainability in Europe's forests https://easac.eu/publications/details/multi-functionality-and-sustainability-in-the-european-unions-forests/)
2. Statement on carbon neutrality https://easac.eu/fileadmin/PDFs/reports_statements/Carbon_Neutrality/EASAC_commentary_on_Carbon_Neutrality_15_June_2018.pdf),
3. An update on forests bioenergy https://easac.eu/fileadmin/PDFs/reports_statements/Negative_Carbon/EASAC_Commentary_Forest_Bioenergy_Feb_2019_FINAL.pdf
4. Serious mismatches continue between science and policy in forest bioenergy https://doi.org/10.1111/gcbb.12643.
5. Letter to Commission Vice-President Timmermans, January 2020. https://easac.eu/news/details/easac-reaches-out-to-the-new-european-commission-on-energy-from-forest-biomass/