



EASAC Secretariat
c/o German National Academy of Sciences Leopoldina
Jägerberg 1; D-06108 Halle(Saale)
Email: secretariat@easac.eu
Tel: +49 345 4723 9833; **Fax:** +49 345 4723 9839

Brussels Office
c/o Royal Academies for Science and the Arts of Belgium
Hertogsstraat 1 Rue Ducale, B-1000 Brussels
Email: brusselsoffice@easac.eu

www.easac.eu

To Pearse Buckley
Secretary of IEA Bioenergy
pbuckley@odbtbioenergy.com

cc: Luc Pelkmans, Technical Coordinator
luc.pelkmans@caprea.be

--- *by email only* ---

13 May 2020

IEA Bioenergy critique of EASAC publications on forest bioenergy

Dear Pearse Buckley

We are writing to you in your capacity as Secretary of IEA Bioenergy. We are representing the views of the European Academies Science Advisory Council. As you will know, EASAC is a consortium of 28 of Europe's science academies tasked with bringing science into public policy, drawing on the combined expertise of its member academies. This letter is our reply to the concerns expressed in your document released in 2019 criticising recent EASAC work related to the overall climate impacts of converting large coal-fired power stations to burn forest biomass.

As you are aware, EASAC has issued three reports (1,2,3) analysing the effects of increasing harvesting of forest biomass for bioenergy, culminating in a paper (authored by most of EASAC Environment Steering Panel members) in the peer-reviewed journal GCB Bioenergy (4). This paper (entitled 'Serious mismatches continue between science and policy in forest bioenergy') attracted your strong critique (5). While we understand that your group is just one of 40 programs organised under the IEA's framework for technology collaboration, is not funded by the IEA, and does not represent the views of IEA, your use of the title 'IEA Bioenergy' could convey the impression that your views reflect those of the IEA. Moreover, your criticisms have been taken up by others (e.g. <https://futureforestsandjobs.com/iea-bioenergy-responds-to-errors-and-half-truths-made-by-easac/>) and thus, regretfully, we are obliged to respond to your critique in the form of this open letter. We believe that at least part of your criticism is due to a misunderstanding of the intended scope of EASAC's comments, and thus will attempt to make this even clearer, as well as emphasising the many areas of science in which there is general agreement.

The key point in EASAC's analyses- the focus on coal conversions to forest biomass

Within the range of the many possible forest bioenergy configurations, there is a huge range of scale and efficiencies ranging from forest biomass for residential heating, through local biomass utilised for CHP facilities, to importing pellets for use in former coal-fired power

stations. While there remains considerable debate on the impacts of each possible use on forests, climate change and related issues such as biodiversity, EASAC's work has focused very much on the use of forest biomass to replace fossil fuels in electricity generation. Our conclusions and implied recommendations are thus aimed at this specific use- generally involving large scale international movement of biomass pellets.

In that context, currently some billions of euros of subsidies are being spent to convert coal-fired power stations to burning biomass pellets as a substantial part of climate change strategy. Millions of tonnes of biomass pellets are being transported around the world- between countries in Europe, between North America and Europe, between Asian countries and between North America and Asia (see <https://www.maprovision.com/viewer/Viewer.html?&dclid=40uje69w#view>) all on the assumption that this is a major tool to tackle global warming and avoid dangerous climate change. Yet the science shows this to be a false assumption, because in the short term there is no significant carbon compensation provided by any tree regrowth and, furthermore, the actual emissions of carbon dioxide (CO₂) is increased. This, as you group recognises, is because when a power station switches from coal to wood pellets, a significant amount of EXTRA CO₂ is released, so there follows a period (carbon payback period) during which switching from coal to forest biomass INCREASES atmospheric levels of CO₂. This is often a long period- much beyond the time we have available to meet Paris Agreement targets of limiting warming to 1.5-2°C.

Despite this, the accounting rules allow power station emissions from biomass to be excluded from emissions reporting, giving the superficial impression of progress in reducing emissions. As we point out in our papers, bioenergy accounts for a large proportion of Europe's 'renewable energy' capacity and is also increasingly being deployed around the world as a means of addressing climate change. Doubt over its effectiveness in actually reducing atmospheric levels CO₂ and of the time scales involved, thus call into question the effectiveness of the public subsidies given to biomass. Our argument has thus been that this requires much greater transparency on the extent to which these substantial subsidies are contributing to climate change mitigation within the current legal framework under the Paris Agreement. It is also relevant to ask whether the large subsidies for biomass conversions risk reducing support and budgets for other key climate mitigation measures (whether energy saving, solar, wind, ocean waves, tidal, carbon capture and storage etc.).

We believe many of these overarching objectives may be shared by your group and would thus hope for a greater level of consensus than might appear from the published documents. Indeed, we point to several areas of agreement and suggest that some of the remaining differences reflect different priorities in policymaking rather than fundamental disagreements in the underlying science. For example, the length and significance of the carbon payback period and the acceptability of overshooting Paris Agreement targets. In addition, replacing the artificial reporting of emissions as zero with a reporting regime which better reflects net effects on atmospheric concentrations of CO₂ would allow decisions on the role of biomass to be made on a more objective basis.

In the meantime however, we would like to provide a more detailed explanation of the debate between us for non-specialist readers through a commentary on your specific points, and this is attached and endorsed by the members of the Environment Steering Panel listed.

Should you wish to move away from the current emphasis on challenging the science described in our analyses to focus on the differences on which there are legitimate grounds for policy debate, we would be happy to continue a dialogue on these points.

Yours sincerely



Dr Christiane Diehl
EASAC Executive Director



Professor Lars Walloe
Chair, EASAC Environment
Steering Panel



Professor Mike Norton
Director, EASAC
Environment Programme

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/PDF_s/reports_statements/Carbon_Neutrality/EASAC_commentary_on_Carbon_Neutrality_15_June_2018.pdf),
3. An update on forests bioenergy
https://easac.eu/fileadmin/PDF_s/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. IEA Bioenergy group. https://www.ieabioenergy.com/wp-content/uploads/2019/12/WoodyBiomass-Climate_EASACresponse_Nov2019.pdf

EASAC's COMMENTARY ON THE MAIN ARGUMENTS IN IEA BIOENERGY CRITIQUE

Background

EASAC (with its focus on European Union policies) explains why current policy under the Renewable Energy Directive (RED) and the accounting rules under the UN Framework Convention on Climate Change (UNFCCC) have led to governments seeing conversion of coal power stations to burn biomass as a cost-effective means of meeting part of their renewable energy targets. However, failure to properly account for the net effects of this on carbon flows has triggered an industry which is at best, very inefficient in reducing atmospheric levels of CO₂ (compared with available low-carbon energy alternatives), or at worst unable to deliver any benefits to climate in a timescale compatible with meeting Paris Agreement targets and reducing the risk of dangerous climate change.

The key point (which is not in dispute) is that increasing harvesting of woody biomass (and the energy needs of drying, pelleting and transport) leads to higher emissions of CO₂ than the coal replaced. There is thus an inevitable increase in emissions when converting a coal-fired power station to forest biomass pellets. The justification for this retrograde step is that trees regrow after harvesting thus taking out CO₂ from the atmosphere. Regulations however do not recognise the slowness of this process and that a significant time lag exists before even the extra emissions are removed, let alone achieving a net reduction in emissions to the atmosphere. This 'carbon payback period' is the critical issue and for large-scale electricity generation using imported wood pellets, it is likely to be long (decades). EASAC has argued that this is incompatible with commitments under the Paris Agreement to limit warming to 1.5-2°C, which requires urgent reductions in atmospheric CO₂ levels. This oversight in the regulations is compounded by an unintended consequence of UNFCCC accounting rules which allow emissions at the power station to be treated as zero for the purpose of national accounting. This allows a power station converting from coal to biomass to reduce its reported emissions when in reality they are increasing.

The IEA Bioenergy group critique appears to address uses of forest bioenergy in a wider context than coal to biomass conversions, but even within that, EASAC welcomes the group's agreement on some key basic points in the debate; namely that:

- The concept of carbon neutrality underpinning public debate on the issue is an oversimplification and unhelpful.
- Assessing the overall climate impact of a bioenergy scheme should be based on comparing scenarios with and without the bioenergy activity (counterfactual scenario).
- It is inevitable that converting a fossil-fuel power station to biomass will increase emissions per kilowatt of electricity generated.

Nevertheless, the IEA Bioenergy group disagrees with EASAC's policy conclusions summarised above- particularly on the length and importance of the carbon payback period and the acceptability of overshooting Paris Agreement temperature targets. Specifically, the critique is structured as 10 points of criticism on which we comment below. In general, we consider that IEA Bioenergy's counter-arguments may reflect a misunderstanding of our focus since many are either irrelevant to the core issue of net effects on atmospheric levels of CO₂ of switching from coal to biomass, or fail to recognise realities in the supply chain and

its governance across the many countries involved. The reader is referred to the original papers for the detail of the arguments and supporting references.

IEA Bioenergy topic 1. The term “carbon neutral” is ambiguous; emissions in the supply chain and impacts on forest carbon stock must be included.

This is a point of agreement between EASAC and IEA Bioenergy. We welcome this agreement but point out that the principle remains the foundation stone for many countries’ bioenergy policies. Moreover, the IEA group uses this concept in their own arguments supporting bioenergy (e.g. see https://www.ieabioenergy.com/wp-content/uploads/2016/04/iea-poster_V2.pdf). As we say in our GCB Bioenergy paper *“The ‘carbon neutrality’ concept is.. a gross misrepresentation of the atmosphere’s CO₂ balance since it ignores the slowness of the photosynthesis process which takes several decades for trees to reach maturity”*.

IEA Bioenergy topic 2. Forest biomass is not treated as carbon neutral in national greenhouse gas inventories.

This is not actually claimed in the EASAC papers. The key point here refers to the preparation of national greenhouse gas (GHG) inventories, where countries report harvest of forests as CO₂ emissions in the land use sector to UNFCCC. This means that CO₂ emissions from combustion of biomass for energy are excluded in the energy sector to avoid double counting. While this, in theory, accounts for all carbon, land use reporting cannot distinguish biomass harvesting from overall forestry activities, making it impossible to assess the overall carbon balance of scenarios with and without forest bioenergy (this weakness is recognised by IPCC¹). In particular, large scale use in power generation may rely on imports of biomass pellets from several countries, further complicating any attempt to compare the emissions at the stack with carbon stock losses in the forests of the supplying country. This is why EASAC pointed out that the current accounting rules effectively give the importing country a free ride (by being able to treat their biomass emissions as zero at the point of use), leaving it to the exporting country (whether Russia, USA, Canada or even Brazil) to declare the changes in their carbon stocks in forests, agriculture and related categories.

The IEA Bioenergy response also claims that management and governance systems exist in all locations providing feedstock for biomass pellets that will ensure forest stocks are maintained. It also invokes the ‘landscape’ argument (see next topic 3).

IEA Bioenergy topic 3. Climate effects of woody biomass should be considered at the landscape rather than plot level. If annual harvest does not exceed the annual growth of the forest, there is no net reduction in forest carbon.

This landscape argument has been challenged many times in the peer reviewed literature as cited in (4). Assessing the climate impact of a project on bioenergy requires that the carbon flows be compared between the case with and without extraction of biomass for energy- the ‘counter-factual’ comparison. It is also common sense that trends in the forest entirely unrelated to the decisions to harvest for biomass should not be counted to ‘offset’ additional harvesting for bioenergy. Trends in areas of forest unaffected by the specific

¹ IPCC SRCCL Chapter 6-50. “One of the complications in assessing the total GHG flux associated with bioenergy under UNFCCC reporting protocols is that fluxes from different aspects of bioenergy life cycle are reported in different sectors and are not linked....**Thus, the whole life cycle GHG effects of bioenergy systems are not readily observed in national GHG inventories...**”

https://www.ipcc.ch/site/assets/uploads/2019/08/2h.-Chapter-6_FINAL.pdf

project are irrelevant to the effects of a specific project on the carbon inputs to the atmosphere. Moreover, as pointed out in (4), whether a landscape is increasing or decreasing carbon stock depends on the boundaries of the 'landscape' and is thus an arbitrary choice. Globally carbon stocks in forests continue to be in decline, while even in some European countries, forest carbon stocks are no longer increasing; further weakening this argument.

IEA Bioenergy topic 4. Woody biomass is a renewable energy source if forest productivity is maintained.

EASAC (4) questioned whether the automatic classification of any biomass as 'renewable' was consistent with the implicit condition in the RED that 'renewable' meant contributing to climate change mitigation. Scientific analyses show how biomass substitution for coal either failed to meet this condition at all, or does so much less effectively than solar or wind. While clearly a re-growing tree is renewable (given time) in the context of the tree, the argument here is whether classifying a specific bioenergy project as 'renewable' should be linked to that project's contribution to climate change mitigation (i.e. to reducing atmospheric levels of CO₂).

IEA Bioenergy topic 5. The climate change effect of using biomass for energy cannot be determined by comparing GHG emissions at the point of combustion.

This is a point of agreement. Both IEA Bioenergy and EASAC agree that the biomass carbon flows and fossil GHG emissions associated with the complete life cycle of the bioenergy system need to be compared with the GHG emissions in the absence of bioenergy- the counterfactual approach. The IEA Bioenergy paper also accepts that it is inevitable that switching to biomass increases emissions at first- although the IEA Bioenergy estimate of this initial increase is lower than those referenced in EASAC papers.

IEA Bioenergy topic 6. Long-distance transport does not negate the climate benefits of woody biomass as a renewable energy source.

The IEA Bioenergy paper claims that emissions from long-distance transport are small (a figure of 5g CO₂/MJ is given). However, when full supply chain emissions including harvesting, drying and pelleting stages are included, these are very much higher – from 30-45 gCO₂/MJ (<https://www.drax.com/wp-content/uploads/2020/03/32-A-Drax-supply-chain-greenhouse-gas-emission@4x.png>).

IEA Bioenergy topic 7. Switching from coal to woody biomass reduces atmospheric CO₂ over time scales relevant to climate stabilisation

This is the key point underlying EASAC's scientific critique of current renewable energy policy. Both EASAC and IEA Bioenergy agree that there is an initial increase in atmospheric CO₂ levels as a consequence of switching from fossil fuels to forest biomass. The question of whether such a negative effect is justified by a beneficial effect later depends entirely on the timescales involved. EASAC has emphasised that, whatever the assumptions made at the time of the original RED (before 2009), the urgency of avoiding overshoot of the Paris Agreement targets now places new conditions on biomass energy- that they should deliver a NET reduction in atmospheric CO₂ levels within a decade or so.

EASAC regards overshoot of Paris targets as increasing the risk of dangerous climate change and therefore to be avoided and certainly not subsidised. IEA Bioenergy considers that such

overshoots are acceptable but do not offer a suggestion for how long a payback period would be acceptable; nor that operators should be required to calculate the payback period that applies to their operation and feedstock choices. This remains a point of disagreement in which a more transparent debate is required in society to allow a conscious decision to be taken on the trade-off between short term support of biomass conversions and longer-term risks of dangerous climate change.

IEA Bioenergy topic 8. Sustainability governance is required to ensure that woody biomass used for energy makes a positive contribution to addressing climate change and other societal goals

Governance is essential for complying with current sustainability rules, but the claim that this is sufficient to protect carbon stocks in all the countries and continents providing wood for biomass pellets is highly simplistic. Forest governance to maintain or increase carbon stocks is simply lacking in many countries, and even in European countries there are serious cases of unauthorised felling and illegal harvesting of timber. Independent reviews have labeled existing governance as seriously inadequate (<https://www.theccc.org.uk/publication/biomass-in-a-low-carbon-economy/>).

Moreover, the atmosphere does not differentiate between carbon entering from burning legal, sustainable, unsustainable or illegal forest biomass, and thus this issue is not relevant to the central issue discussed here. In any case, sustainability systems cited by the IEA Bioenergy paper (e.g. FSC, PEFC) do not include requirements to ensure that harvesting and use make a positive contribution to mitigating climate change.

IEA Bioenergy topic 9. Managed forests can provide greater climate benefits than conservation forests.

This implies a choice between managed and conservation forests which is not the issue—mostly the debate is about the use of managed forests. Conservation forests may already be excluded from biomass provision under the sustainability/biodiversity criteria in existing regulations. There is also debate in the literature over the accuracy of this assertion since carbon stocks are higher (and continue to grow) in conservation forests (e.g. see <https://www.nature.com/articles/nature12914>). This is however, not central to the question addressed by EASAC on the timescale of effects on atmospheric concentrations of CO₂ of a biomass conversion project.

IEA Bioenergy topic 10. Managed forests produce wood for multiple products, not just bioenergy.

This is clearly a point of agreement and the message in EASAC's reports is that forest harvesting should prioritise uses where the carbon is captured in the products. The key policy issue is that the large subsidies providing incentives to increase harvesting for energy, increase the removal of carbon from the forest stock and into the atmosphere. The presence of such subsidies and the lack of equivalent financial rewards for maintaining or increasing carbon stock in the forests themselves risk creating market distortions which exacerbate rather than mitigate climate change. Indeed, some market models (Favero et al., 2020: "Forests: Carbon Sequestration, Biomass Energy, or Both?" *Science Advances* 6 (13): eaay6792) suggest that pricing mechanisms resulting from high bioenergy demand may lead to diversion of biomass from traditional timber use to bioenergy as well as more conversion of natural forests to high-growth plantation forests.

In conclusion, EASAC welcomes several areas described above where IEA Bioenergy and EASAC agree on the science underpinning the climate impacts of forest bioenergy. We believe that it would be wrong to assign remaining differences in policy conclusions to disagreement on the science, and we should all welcome greater transparency when debating between policy options in the use of forest biomass for energy- especially in the case of conversion of existing coal-fired power stations. Critical policy questions include; what is the length and significance of the carbon payback period, whether public funds should subsidise technologies that increase the risk of overshooting Paris Agreement targets, whether the current artificial reporting of emissions as zero can be replaced by a reporting regime which better reflects the real effects on atmospheric concentrations of CO₂. EASAC remains ready to engage in dialogue on such critical issues.

Endorsed by members of the Environment Steering Panel

- The Czech Academy of Sciences; Professor Pavel Cudlin
- The Estonian Academy of Sciences; Professor Tarmo Soomere
- The Council of Finnish Academies; Professor Maija Heikkilä
- The German National Academy of Sciences Leopoldina; Professor Bernhard Schink
- The Academy of Athens; Professor Christos Zerefos
- The Hungarian Academy of Sciences; Professor András Báldi
- The Royal Irish Academy; Professor Mike Jones
- The Accademia Nazionale dei Lincei; Professor Bruno Carli
- The Lithuanian Academy of Sciences; Professor Vincas Buda
- Royal Netherlands Academy of Arts and Sciences; Professor Louise Vet
- The Norwegian Academy of Science and Letters; Professor Lars Walløe
- The Polish Academy of Sciences; Professor Rajmund Michalski
- The Academy of Sciences of Lisbon; Professor Filipe Duarte Santos
- The Slovak Academy of Sciences; Professor Karol Marhold
- The Slovenian Academy of Sciences and Arts; Professor Andrej Kranjc
- The Spanish Royal Academy of Sciences; Professor Francisco Novo
- The Royal Swedish Academy of Sciences; Anders Wijkman
- The Royal Society; Professor John Shepherd