Why the IEA Bioenergy Group got it wrong concerning the Chatham House report
March 15, 2017

The IEA recently published a letter authored by Cowie, Berndes, Junginger, and Ximenes, criticizing the Chatham House report on the climate and forest impacts of bioenergy. The IEA letter is quite vague, but the key arguments, to the extent they can be discerned, are factually and logically inaccurate.

It is not surprising for authors associated with the IEA bioenergy initiative to be supporting bioenergy because the IEA has long made the mistake of treating bioenergy as carbon neutral. For example, in Bauen et al. 2009[i] and other publications, the IEA has identified as carbon-neutral biomass any "surplus forest growth," meaning any amount of wood up to the level of annual forest growth. The well-recognized problem with this argument is that many of the world's forests, and the world's forests overall, are gaining wood and carbon. This is known as the forest carbon sink and it plays a critical role in holding down climate change. It is a double-counting error to count this wood as providing carbon-free fuel while assuming that it simultaneously continues to stand in the forest and contribute to the forest carbon sink. Burning any ton of carbon in wood that would otherwise be added to forests emits a ton of additional carbon to the air precisely because it would otherwise be added to forests.

The authors in effect repeat this double-counting error while using vaguer language that the impacts of harvesting wood for bioenergy are not observed at the "landscape level due to staggered harvest." This is essentially the same argument that the effects of harvesting one stand for biomass are somehow cancelled out by the growth of other parts of the forest. But those parts of the forest would continue to grow anyway. Unless the harvest of harvest of trees causes trees elsewhere to grow faster, the net effect of the harvest is to reduce wood and carbon in the forest. This argument is similar to the idea that a money-losing company is profitable so long as companies in a country are profitable overall. The "landscape" level analysis advocated by these authors is just one way of camouflaging the impact of the bioenergy harvest itself. The authors make the same mistake when they argue that "sustainability" criteria make it acceptable to harvest wood for bioenergy. As this discussion shows, "sustainable" harvest does not make wood carbon neutral.

In fact, added to existing demand for traditional forest products, wood pellet demand is helping clear forests in the U.S. South. In the creeping areas of pink, Figure 1 shows the reduction in forest cover around Ahoskie, North Carolina, home to a large wood pellet facility, captured through satellite photographs incorporated on the World Resource Institute's Global Forest Watch. This area of depleted forests is now representative of many areas of the U.S. South.

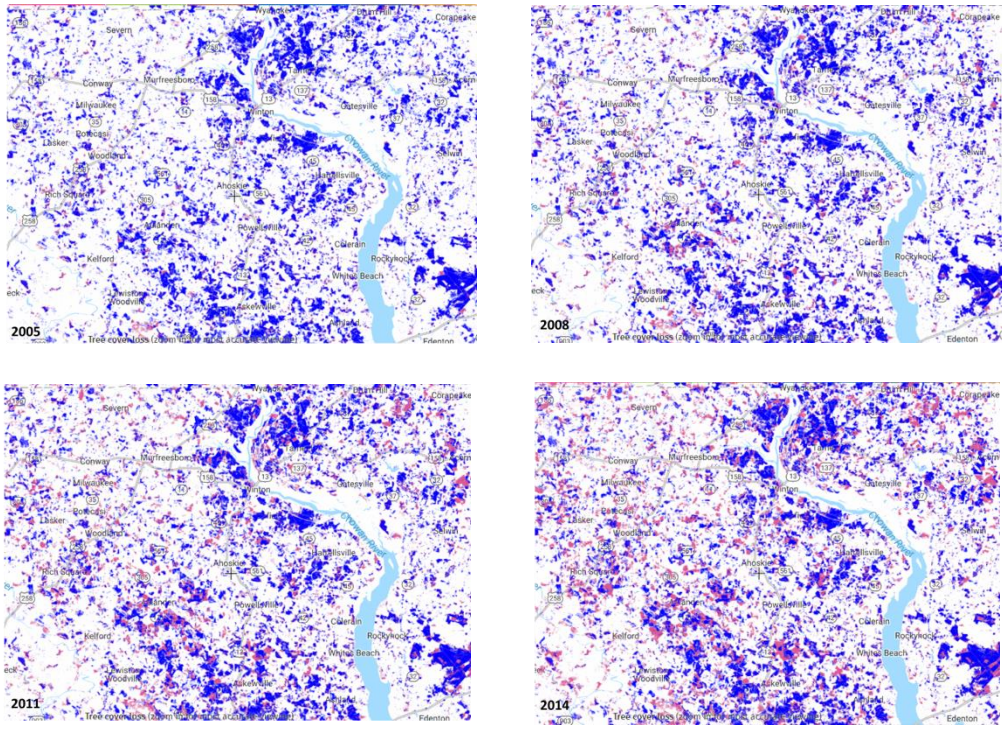


Figure 2. Global Forest Watch images centered at Ahoskie, North Carolina, home to one of the biggest pellet plants in the U.S.. Forest loss (pink) is increasing relative to forest gain (blue). The animation can be viewed at http://www.globalforestwatch.org/map/10/36.27/-76.98/USA/grayscale/loss,forestgain?tab=analysis-tab&begin=2001-01-01&end=2015-01-01&threshold=30&dont_analyze=true.

Unfortunately, as Figure 2 shows, bioenergy production in the Southeastern U.S. is growing so fast that it could seriously degrade the region's forest carbon sink, which the U.S. cites as a major factor in holding down its emissions.

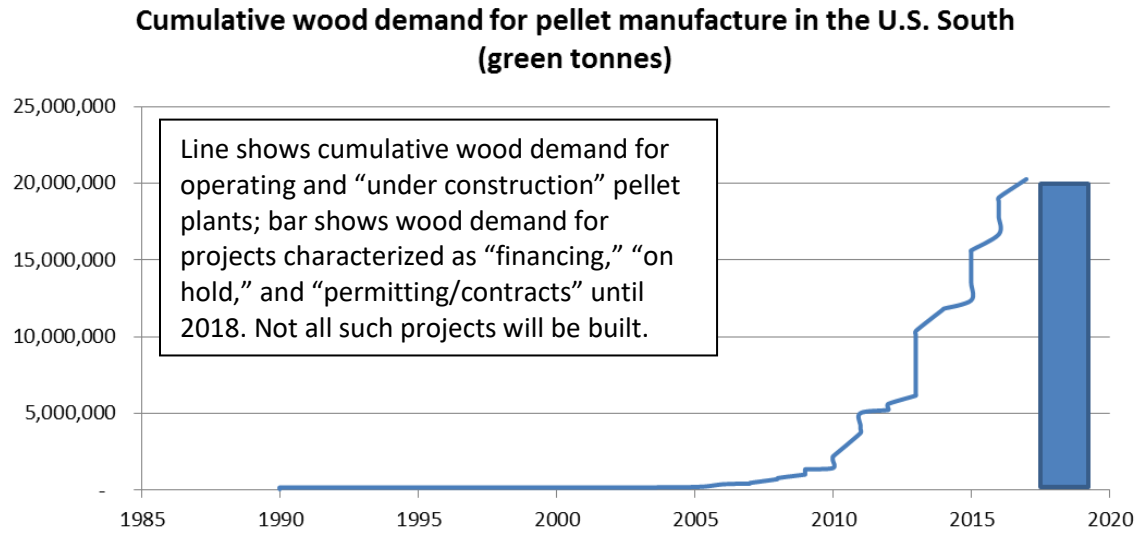
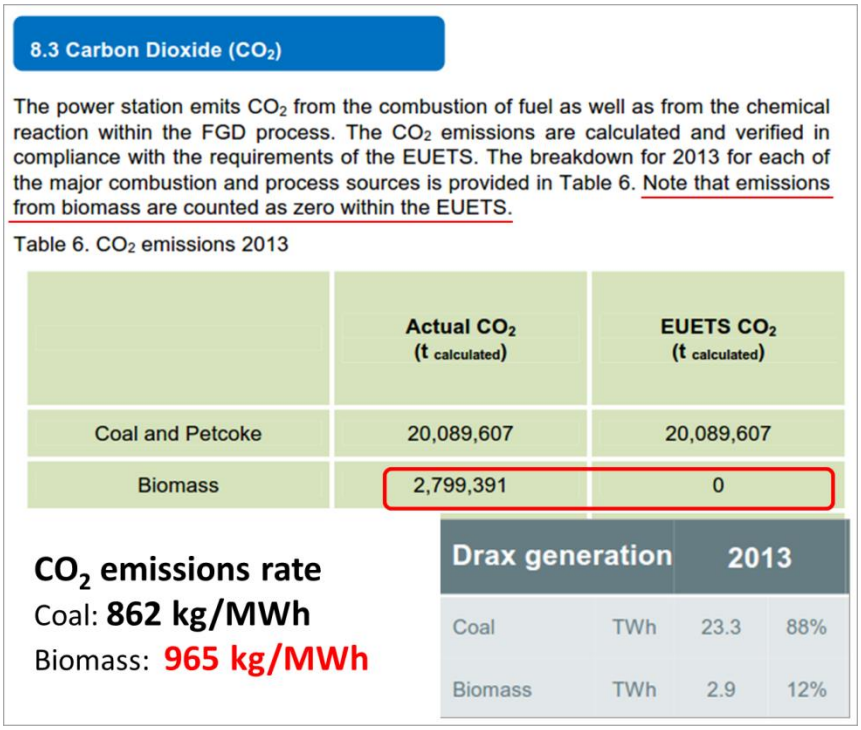


Figure 2. Cumulative wood demand for pellet plants in the Southern U.S. Forisk Wood Energy Database, Q4, 2016.

The fact that forests are losing carbon by itself means that biomass is not carbon-neutral. Just as burning fossil fuels takes carbon that would be stored underground and puts it in the air, so burning forests takes carbon that would be stored above and in the ground, and puts it in the air. But as countless studies have now shown, burning stemwood that would otherwise remain standing in the forest is worse even than burning coal, first because it is less efficient, and also because of the "forgone sequestration" that trees left growing in the forest would provide (long-lived forest products also provide sequestration). Data from Drax, a UK power station, show that stack emissions per megawatt hour (MWh) are higher from burning wood pellets than coal. This calculation of actual emissions up smokestacks seriously underestimates the increase in emissions because it does not account for the portion of wood that is killed and decomposes without being turned into wood pellets, such as roots. It also fails to account for the very large emissions required to harvest and transport the wood, and dry, manufacture and transport the wood pellets. About one fifth of the wood harvested is needed only for drying the biomass – emissions that are ignored under European rules, again because the energy is provided by biomass.



8.3 Carbon Dioxide (CO_2)

The power station emits CO_2 from the combustion of fuel as well as from the chemical reaction within the FGD process. The CO_2 emissions are calculated and verified in compliance with the requirements of the EUETS. The breakdown for 2013 for each of the major combustion and process sources is provided in Table 6. Note that emissions from biomass are counted as zero within the EUETS.

Table 6. CO_2 emissions 2013

	Actual CO_2 (t calculated)	EUETS CO_2 (t calculated)
Coal and Petcoke	20,089,607	20,089,607
Biomass	2,799,391	0

CO_2 emissions rate
Coal: **862 kg/MWh**
Biomass: **965 kg/MWh**

Drax generation		2013	
Coal	TWh	23.3	88%
Biomass	TWh	2.9	12%

Figure 3. Data from Drax on emissions and generation allow estimation of CO_2 emission rates for biomass and coal.

The IEA authors in effect argue that these emissions do not matter, stating the Chatham House report has a "misguided focus on short-term carbon balances," and that it is the "cumulative emissions of CO2 that largely determine global warming by the late 21st century and beyond." But the rate of warming in the interim matters as well, because it has effects that persist, such as melting ice sheets and releasing methane and carbon dioxide from thawing permafrost, as well as effects on biodiversity as species have less time to adapt or migrate. It is important to reduce emissions to avoid crossing tipping points, and to maintain the option of enacting more vigorous reductions in the future. That is precisely why European climate policy in all other respects focuses on immediate emissions reductions, and in the case of land use change, counts emissions within twenty-years. By arguing that bioenergy can be upscaled, and treated as carbon neutral, the IEA authors are essentially arguing that power plants in

Europe should be able to take greenhouse gas reduction credit for strategies that actually increase carbon in the atmosphere for decades, based on the unenforceable promise that they will eventually reduce emissions. Obviously, this is not compatible with country commitments to reduce carbon in the atmosphere by 2050.

The authors also confuse this point by contending that forests will lose their mitigation value if not harvested. It is true that eventually, if forests mature, their carbon sequestration rates may slow. But old forests store huge amounts of carbon, which provides climate mitigation because it keeps carbon out of the atmosphere. (As the Chatham House reports, there is also evidence that even very old forests continue to sequester carbon, adding to this value.) Cutting down these forests and burning them for energy adds carbon to the atmosphere at a higher rate than fossil fuels, as shown above. Even if re-growing trees absorb carbon faster, the result is large increases in carbon in the atmosphere for decades.

Finally, the authors argue that it is incorrect to assume that bioenergy from harvested roundwood would otherwise remain unharvested - thus implicitly arguing that diverting that wood to bioenergy will not have carbon consequences. The basic argument implicit here is that bioenergy can reduce emissions if its main result is to divert wood from other uses, such as paper or particle board for furniture. This argument can also be seen in papers by the IEA letter authors which argue that in the Southeastern United States, wood used for wood pellets will mainly come at the expense of supplies of wood for other purposes. In fact, the likely result is that the vast majority of wood needed for traditional products will be replaced from other sources because the world demands these other products, and that demand is growing. Some of these other wood products also displace plastics or metal products, which have their own emissions A similar problem arises from the argument that people will plant more trees to meet bioenergy demand. Not only is there very little evidence for that, but doing so displaces agricultural land, which also has carbon costs as food is replaced elsewhere, putting forest or grassland newly into agricultural management.

The language in the IEA letter is mostly vague, but most of these arguments are rehashed efforts to treat biomass as carbon neutral. This assumption of carbon neutrality is based on accounting errors long explained, as in the UK government-commissioned BEAC report[ii] and the EEA Scientific Committee position on bioenergy.[iii] A recent letter to the UK government, signed by over 50 international scientists working in the fields of bioenergy, climate, and ecology, also contains detailed information that rebuts the IEA arguments.[iv] Chatham House has made a valuable contribution by carefully exploring the consequences of this dangerous assumption.

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[i] Bauen, A., Berndes, G, Junginger, M., Londo, J. Vuille, F. 2009. Bioenergy – A sustainable and reliable energy source: A review of status and prospects. IEA Bioenergy ExCO 200906.

[ii] At https://www.gov.uk/government/publications/life-cycle-impacts-of-biomass-electricity-in-2020

[iii] http://www.eea.europa.eu/about-us/governance/scientific-committee/sc-opinions/opinions-on-scientific-issues/sc-opinion-on-greenhouse-gas/view

[iv] At http://www.pfpi.net/wp-content/uploads/2017/03/Scientists-bioenergy-letter-March-15-2017.pdf