Guidelines on greenhouse gas emissions trading

March 10, 2020. Please accept this feedback from the Partnership for Policy Integrity (PFPI), a US based NGO working with allies across Europe for the protection and restoration of natural forests.[1]

The Commission seeks input on the new ETS proposal "and its possible impact on the risk of carbon leakage, on the effectiveness of the ETS system, and on possible distortions of competition." As the explanatory note for this rulemaking states, "there is a need to rethink policies" on clean energy and a host of other things, particularly since the Commission intends to increase GHG emissions reduction targets to 50% or even 55% relative to 1990 levels.

The emissions trading guidelines were originally adopted in 2003 under Directive 2003/87/EC. The goal was to reduce greenhouse gas emissions by establishing a system to cap emissions, require companies to purchase allowances to emit greenhouse gases and allow trading of allowances.[2] The revision is being proposed to prevent so-called "carbon leakage," in which economic actors avoid the need to buy allowances by transferring production from the EU to other countries that are not as committed to reducing emissions, or by replacing products made in the EU with more carbon-intensive imports. "If this risk materialises," the guidelines state, "there will be no reduction in global emissions, and this will frustrate the efforts of the Union and its industries to meet the global climate objectives of the Paris Agreement."[3] The revision would allow member states to provide aid designed to prevent leakage to actors in certain industries likely to be subject to economic pressure to shift production to, or import products from, outside the EU. The aid would be designed specifically to offset "greenhouse gas emission costs passed on in electricity prices."[4]

From this description, it appears that the EU is proposing to pour even more aid into polluting industries while there is a glaringly obvious source of leakage sitting in plain sight, one that is not only robbing the EU of ETS revenue, but also costing EU ratepayers literally billions of euros each year in subsidies. We speak, of course, of biomass energy.

Biomass emissions are increasing

The EU has been aggressively promoting heat and power from burning biomass as "zero carbon" renewable energy (Figure 1). The majority of "solid" biomass burned in the EU is forest wood (Figure 2). Residential heating, which qualifies toward renewable energy targets, is still the largest consumer of wood (Figure 3). (Data in all three figures is from Eurostat).

[1] Partnership for Policy Integrity website: https://www.pfpi.net/.

[2] Directive 2003/87/EC of the European Parliament and of the Council, as amended (OJ L 275, 25.10.2003, p. 32). Accessed online Feb. 26, 2020 at https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2003L0087:20090625:EN:PDF.

[3] European Commission. Communication from the Commission: Guidelines on certain state aid measures in the context of the system for greenhouse gas emission allowance trading post 2021, at § Introduction (5). Accessed online Feb. 26, 2020 at https://ec.europa.eu/competition/consultations/2020_ets_stateaid_guidelines/draft_ets_guidelines_en.pdf.

[4] See id. at § 3.

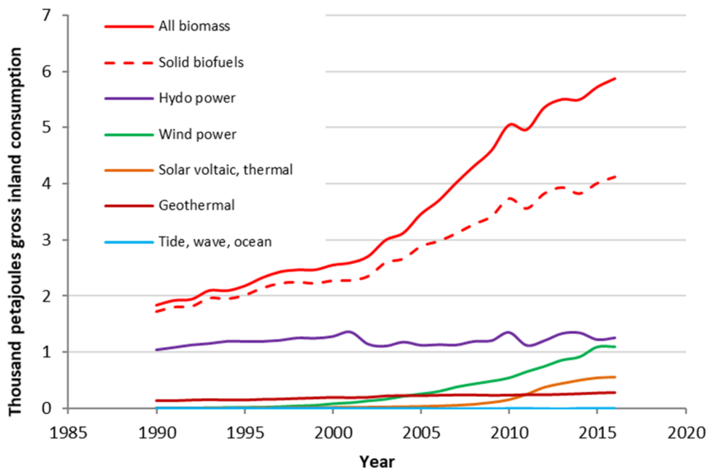

Figure 1. Growth of all biomass use, and solid biomass use (mostly wood) in the EU since 1990.

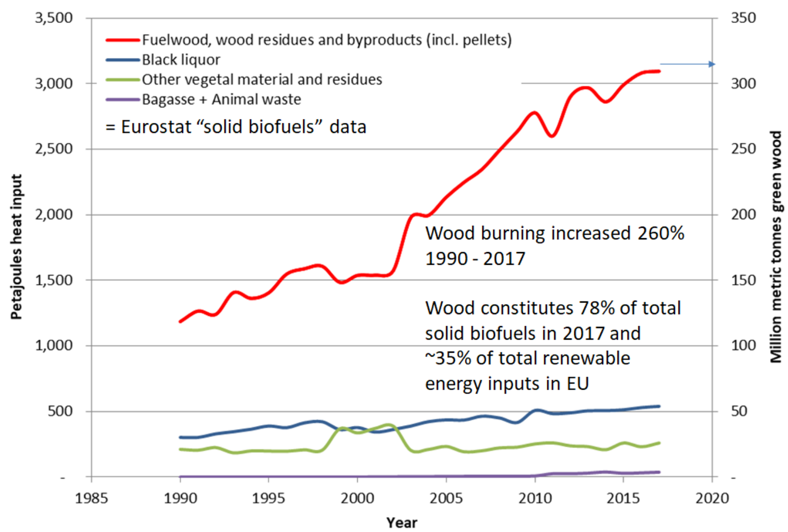

Figure 2. Composition of "solid biomass" in the EU.

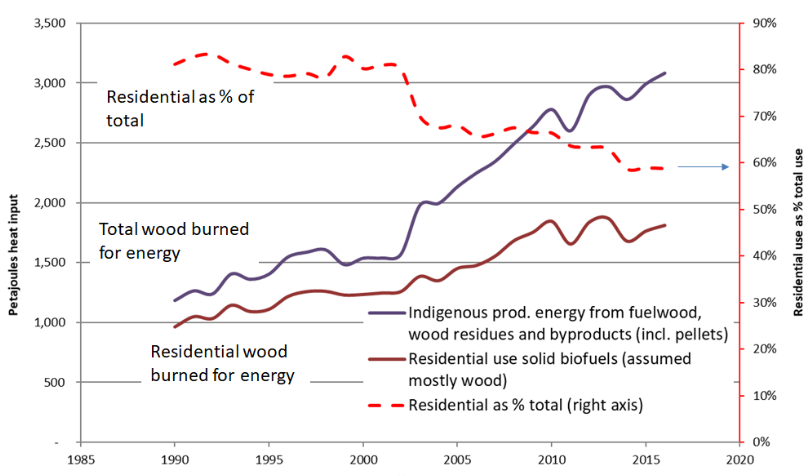

Figure 3. All wood use for energy, and amount and percent of wood for residential heating in the EU.

Bioenergy emissions are undermining climate change mitigation

Burning both green wood (Figure 4) and wood pellets (Figure 5) emit more CO_2 per unit energy than burning fossil fuels.

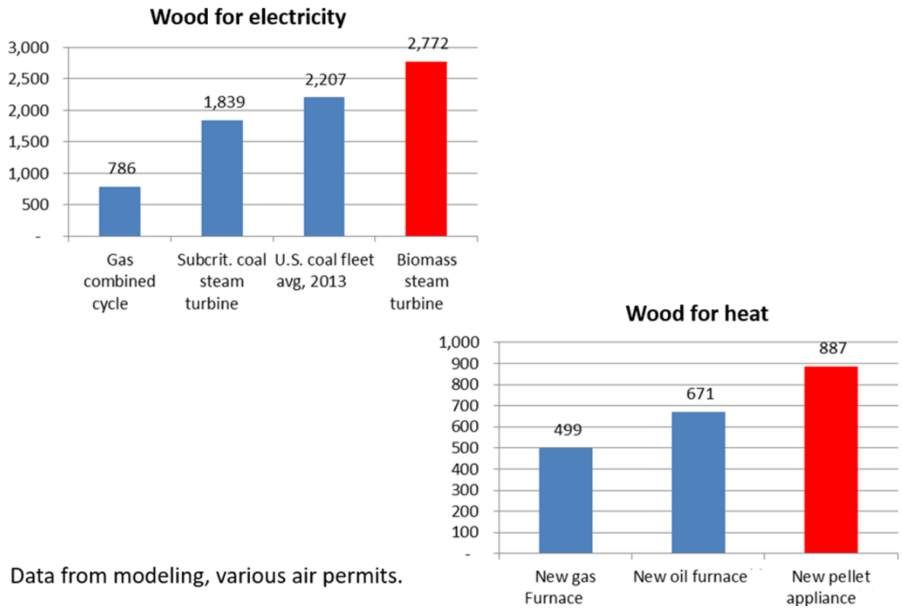

Figure 4. All data in lb CO_2 per MWh (pardon the US units). These are data from actual air permits and environmental impact assessments showing that burning green woodchips emits more CO_2 per unit energy than burning fossil fuels.

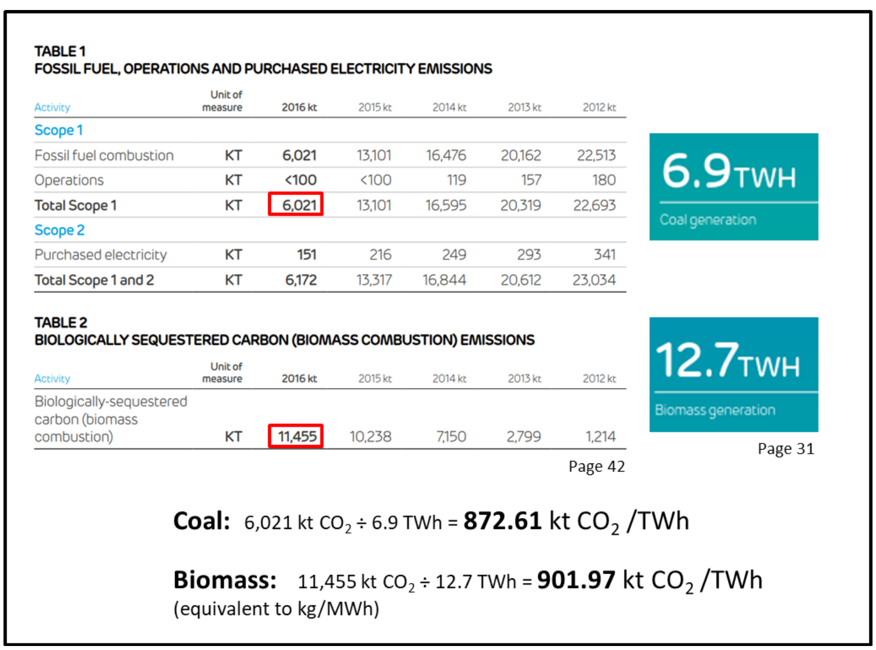

TABLE 1
FOSSIL FUEL, OPERATIONS AND PURCHASED ELECTRICITY EMISSIONS

Activity	Unit of measure	2016 kt	2015 kt	2014 kt	2013 kt	2012 kt
Scope 1						
Fossil fuel combustion	KT	6,021	13,101	16,476	20,162	22,513
Operations	KT	<100	<100	119	157	180
Total Scope 1	KT	6,021	13,101	16,595	20,319	22,693
Scope 2						
Purchased electricity	KT	151	216	249	293	341
Total Scope 1 and 2	KT	6,172	13,317	16,844	20,612	23,034

6.9TWH
Coal generation

TABLE 2
BIOLOGICALLY SEQUESTERED CARBON (BIOMASS COMBUSTION) EMISSIONS

Activity	Unit of measure	2016 kt	2015 kt	2014 kt	2013 kt	2012 kt
Biologically-sequestered carbon (biomass combustion)	KT	11,455	10,238	7,150	2,799	1,214

Page 42

12.7TWH
Biomass generation

Page 31

Coal: 6,021 kt CO_2 ÷ 6.9 TWh = **872.61** kt CO_2 /TWh

Biomass: 11,455 kt CO_2 ÷ 12.7 TWh = **901.97** kt CO_2 /TWh
(equivalent to kg/MWh)

Figure 5. Data from Drax, a 4 GW wood pellet/coal power plant in the UK.Wood pellet CO2 exceeds coal CO_2 but by a smaller margin than for green woodchips in Figure 4, because wood pellets contain less moisture and accordingly the efficiency penalty is smaller. However, a great deal of biogenic and fossil carbon is emitted "upstream" in manufacturing, drying, and transporting the wood pellets.

An abundance of carbon modeling studies[5] show that harvesting trees to be burned in power plants has a greater net emissions impact than continuing to burn fossil fuels and allowing forests to continue growing and sequestering carbon (for an interactive online model, see https://apps-scf-cfs.rncan.gc.ca/calc/en/bioenergy-calculator). There is wide consensus among scientists that model bioenergy carbon dynamics that burning forest wood for energy is undermining the EU's climate goal to reach ambitious GHG reduction targets (see for instance a recent paper by the EU's own science advisory body, EASAC, plus colleagues[6]).

Graphing emissions versus sequestration in the land sector shows how far the EU has to go to achieve climate neutrality by 2050. Leaving aside the fact that climate science demonstrates that the 2050 target is not ambitious enough, and will likely cook the planet, currently, sequestration in the land sector is just a fraction of emissions (Figure 6).

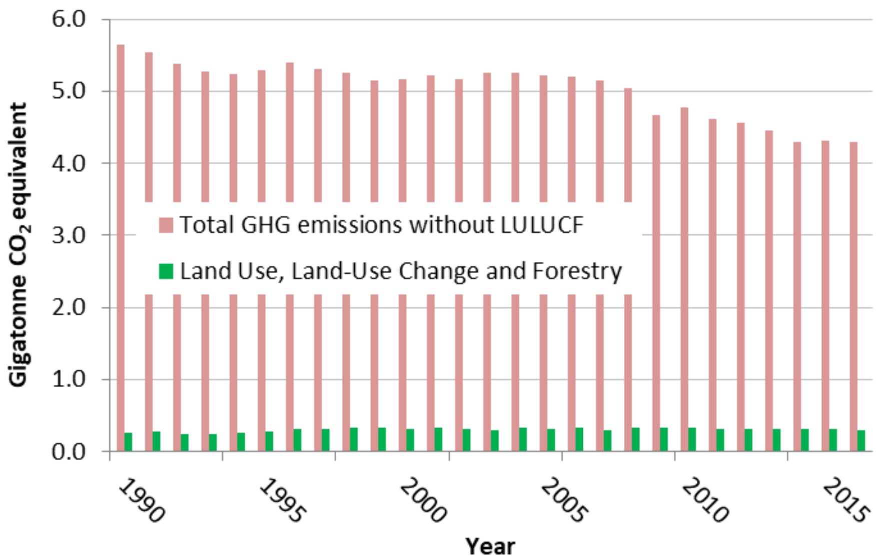

Figure 6. UNFCCC data on emissions and the forest carbon sink (graphed here as a positive number for comparison) in the EU.

Increasing carbon sequestration in the land sector will require an unprecedented effort – a "moon shot" – to restore and expand natural forests. That is the only real option, because technologies that will ostensibly achieve "negative" emissions, such as bioenergy with carbon capture and storage (BECCS) are in early testing stages and are certainly un-scalable even if they actually deliver carbon benefits (which have yet to be demonstrated).

[5] Domke, G. M., et al. (2012). "Carbon emissions associated with the procurement and utilization of forest harvest residues for energy, northern Minnesota, USA." Biomass and Bioenergy 36: 141-150; Stephenson, A. L. and D. J. C. MacKay (2014). Life Cycle Impacts of Biomass Electricity in 2020 London, UK, UK Department of Energy and Climate Change: 154; Walker, T., et al. (2013). "Carbon Accounting for Woody Biomass from Massachusetts (USA) Managed Forests: A Framework for Determining the Temporal Impacts of Wood Biomass Energy on Atmospheric Greenhouse Gas Levels." Journal of Sustainable Forestry 32(1-2): 130-158; Laganière, J., et al. (2017). "Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests." GCB Bioenergy 9(2): 358-369.

[6] Norton, M., et al (2019). "Serious mismatches continue between science and policy in forest bioenergy." GCB Bioenergy 0(0).

As for the emissions side, "reducing" emissions on paper is easy if you simply replace coal with biomass and then claim the emissions are zero as the EU does. However, this does not fool the atmosphere. As shown in Figures 4 and 5, burning biomass emits more CO_2 per unit energy than burning fossil fuels. The atmosphere registers the surge and increase in emissions when biomass replaces fossil fuels. Since trees do not grow back instantaneously to sequester an equivalent amount of CO_2 as released by biomass combustion, the net increase of CO_2 persists in the atmosphere and continues to warm the planet.

The data are clear that the EU's forest carbon sink is growing weaker in recent years (Figure 7) – the opposite of what needs to happen to help offset emissions.

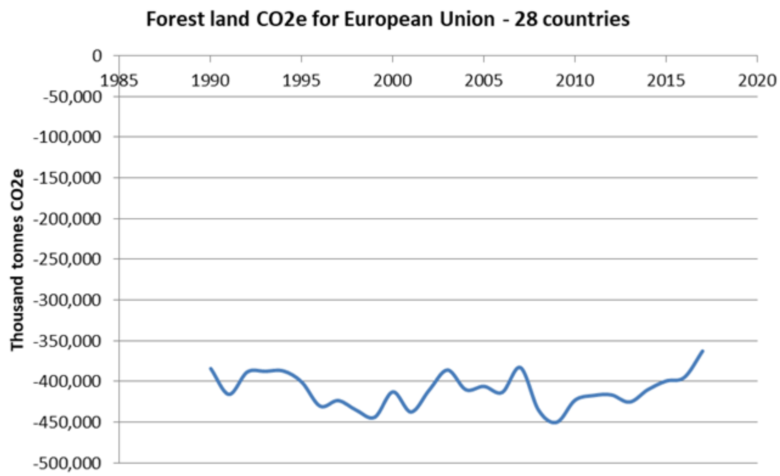

Figure 7. The EU's forest carbon sink (data from UNFCCC).

Country-level data offers compelling correlational evidence that biomass harvesting is at least partially responsible for degrading the carbon sink in some regions. For instance, Latvia has seen a massive loss in the forest carbon sink since 1990, which co-varies strongly with the amount of wood being burned for energy and being manufactured into pellets (Figure 8).

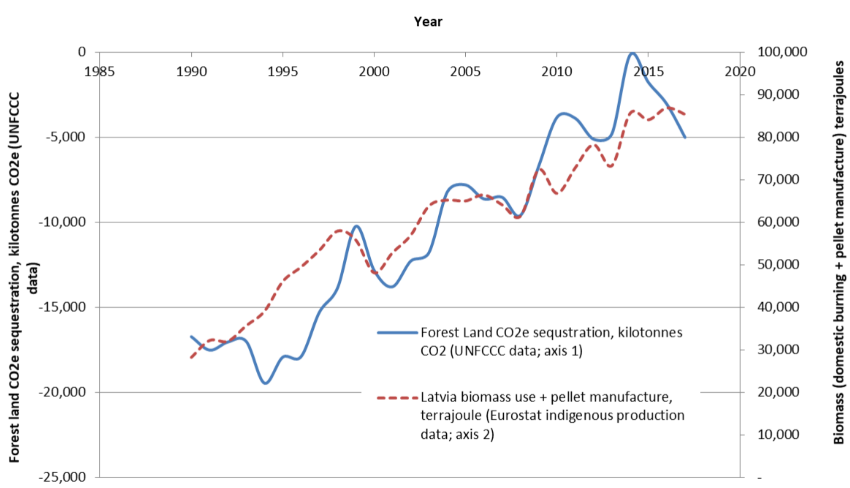

Figure 8. Covariance between biomass harvesting and loss of forest carbon sink, Latvia (data from UNFCCC and Eurostat)

Slovakia is another country where a steep reduction in the forest carbon sink has co-varied with increased harvesting for biomass (Figure 9).

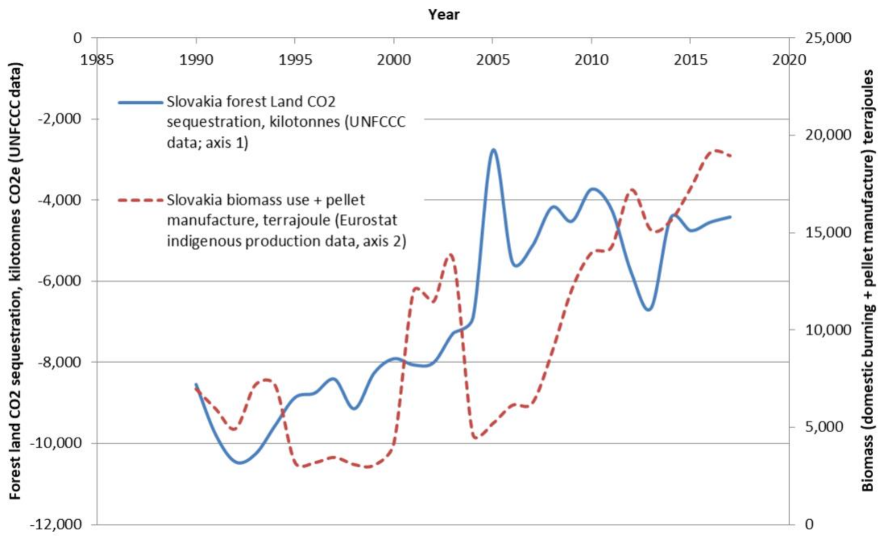

Figure 9. Covariance between biomass harvesting and loss of forest carbon sink, Slovakia

The EU policy of incentivizing wood-burning as renewable energy, and making it eligible for subsidies, is not only liquidating EU forests, but forests in other countries and regions. The wood pellet industry, which has sunk its teeth into forests of the US southeast and increasingly Canada, is responsible for destroying tens of thousands of hectares of forests per year in these places. Europeans should not look to the North American forest carbon sink to mitigate emissions – it is faltering as well (Figure 10).

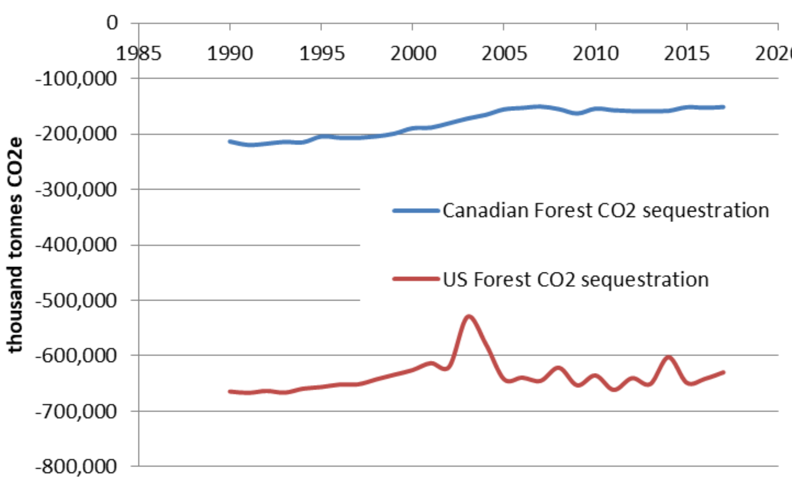

Figure 10. UNFCC data for the US and Canadian forest carbon sinks.

The ETS should regulate bioenergy emissions

Directive 2003/87/EC states that polluters do not have to purchase allowances for biogenic CO_2 under the ETS, stating that "installations or parts of installations used for research, development and testing of new products and processes and installations exclusively using biomass are not covered by this Directive."[7] We believe that the treatment of bioenergy as "zero carbon" in the RED and the ETS directly contravenes the provisions of Section 191 of the Treaty of the Functioning of the EU (TFEU), which lays out the objectives to which EU environmental policy shall contribute. The details of our argument are laid out in the case we filed against the EU on bioenergy, at http://eubiomasscase.org/wp-content/uploads/2019/08/EU-Biomass-Case-Main-Arguments.pdf. One provision of the TFEU in particular stands out – "that the Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and **that the polluter should pay**."

The treatment of bioenergy as "zero carbon" in the energy sector, which unquestionably exempts the polluter from paying, has in part arisen because of the IPCC carbon reporting protocols count loss of carbon out of forests in the land use sector, not the energy sector. Mindlessly translated into EU policy, and juiced with subsidies as if bioenergy *actually really has* zero emissions, this accounting convention is flooding private companies with billions in cash as they convert forests into fuel, while providing for essentially non-existent penalties to countries for degrading the forest carbon sink (under the incoming LULUCF Regulation). The subsidies for logging and burning biomass are well in excess of €6.5 billion each year.[8] The EU taxpayers and ratepayers propping all this up would be dismayed if they knew the truth.

If the EU increases the GHG reduction target to 50% or 55% of 1990 levels, this will further increase biomass harvesting pressure on forests worldwide. **Therefore the EU absolutely must remove subsidies for bioenergy before it moves forward with increasing the target.**

Fortunately, the revisions to the ETS, and the stated objective of decreasing leakage, provide an opportunity.

Failing to count emissions from bioenergy under the ETS has the same effect as "leakage": it encourages companies and countries to rely on a polluting source of bioenergy outside the regulated system that does not require the purchase of allowances.

Clearly, a better accounting system is required under the ETS, one that accurately counts and caps emissions from bioenergy. (In related comments filed last week with the EU, PFPI separately recommended changes to the IPCCC/UNFCCC protocol to better account for bioenergy emissions in the land sector – these comments are posted here: http://www.pfpi.net/wp-content/uploads/2020/03/PFPI-EU-GHG-ReportingComments.pdf)

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[7] Directive 2003/87/EC of the European Parliament and of the Council, as amended (OJ L 275, 25.10.2003, p. 32), Annex I (1). Accessed online Feb. 26, 2020 at https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2003L0087:20090625:EN:PDF.

[8] See https://www.nrdc.org/sites/default/files/burnout-eu-clean-energy-policies-forest-destruction-ip.pdf

One way to count emissions from bioenergy under the ETS is to simply count CO_2 emissions at the smokestack, as is done with fossil fuels. As a number of carbon modeling studies have shown, counting stack CO_2 emissions is a closer approximation of the net atmospheric impact of bioenergy than the current convention of treating emissions as zero. Stack emissions are in fact an *underestimate* of the actual net carbon impact of cutting and burning whole trees that would have otherwise continued growing and removing CO_2 from the atmosphere.

However, an alternative method for counting bioenergy emissions under the ETS may be align more closely with the goals of this revision: the Net Emissions Impact or NEI methodology. [9]

Net emissions are a cumulative measure assessed over some time period (for example, ten years), and are calculated as the difference between stack emissions and emissions if the biomass underwent some alternative fate. In other words, net emissions represent the **additional emissions to the atmosphere** (emissions worthy of regulation) that occur when the choice is made to burn biomass, rather than letting it undergo some other fate.

There are four basic categories of wood-derived biomass that are defined by the alternative fate if the material is not burned in a power plant:

1. Trees that if not used for fuel would continue growing, or be harvested for some other purpose;
2. Forestry residues that would otherwise remain onsite to decompose, or in limited cases would be burned for disposal;
3. Mill residues that would be incinerated for disposal even if not burned for energy (black liquor, some sawdust and other wood);
4. Mill residues that can be used for other purposes like mulch, animal bedding, and particle board.

Net emissions from burning forestry residues for energy are much greater than those from decomposition over decades, contributing to atmospheric CO_2 loading. From this outcome, it can be seen that net emissions – even from "residues that would decompose anyway" – are significant enough to be worth regulating under the ETS.

Figure 11 shows the mechanism for calculating "alternative fate" decomposition emissions. In this example, wood cut in each year is assumed to follow a course of decomposition determined by an averaged decomposition rate for residues in the US Southeast, the source of some of the wood pellets burned in the EU. The cumulative proportion of potential emissions at any point (in this example year 10, corresponding to a 2030 target date) can be calculated as the averaged emissions up to that point.

[9] Booth, M. S. 2018. Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. Environmental Research Letters 13(3): 035001. At http://iopscience.iop.org/article/10.1088/1748-9326/aaac88

Model mechanism for determining cumulative alternative fate emissions (decomposition)

$$=1-e^{-k*yr}$$

k-constant = 0.0695 (average of EPA values for softwood and hardwood in the Southeast)

Counterfactual: Proportion CO2 emitted from decomposition

YEAR	Fuel collected in Year 1	Fuel collected in Year 2	Fuel collected in Year 3	Fuel collected in Year 4	Fuel collected in Year 5	Fuel collected in Year 6	Fuel collected in Year 7	Fuel collected in Year 8	Fuel collected in Year 9	Fuel collected in Year 10
1	0.067									
2	0.130	0.067								
3	0.188	0.130	0.067							
4	0.243	0.188	0.130	0.067						
5	0.294	0.243	0.188	0.130	0.067					
6	0.341	0.294	0.243	0.188	0.130	0.067				
7	0.385	0.341	0.294	0.243	0.188	0.130	0.067			
8	0.427	0.385	0.341	0.294	0.243	0.188	0.130	0.067		
9	0.465	0.427	0.385	0.341	0.294	0.243	0.188	0.130	0.067	
10	0.501	0.465	0.427	0.385	0.341	0.294	0.243	0.188	0.130	0.067
11	0.534	0.501	0.465	0.427	0.385	0.341	0.294	0.243	0.188	0.130
12	0.566	0.534	0.501	0.465	0.427	0.385	0.341	0.294	0.243	0.188
13	0.595	0.566	0.534	0.501	0.465	0.427	0.385	0.341	0.294	0.243
14	0.622	0.595	0.566	0.534	0.501	0.465	0.427	0.385	0.341	0.294
15	0.647	0.622	0.595	0.566	0.534	0.501	0.465	0.427	0.385	0.341
16	0.671	0.647	0.622	0.595	0.566	0.534	0.501	0.465	0.427	0.385
17	0.693	0.671	0.647	0.622	0.595	0.566	0.534	0.501	0.465	0.427
18	0.714	0.693	0.671	0.647	0.622	0.595	0.566	0.534	0.501	0.465
19	0.733	0.714	0.693	0.671	0.647	0.622	0.595	0.566	0.534	0.501
20	0.751	0.733	0.714	0.693	0.671	0.647	0.622	0.595	0.566	0.534
21	0.768	0.751	0.733	0.714	0.693	0.671	0.647	0.622	0.595	0.566
22	0.783	0.768	0.751	0.733	0.714	0.693	0.671	0.647	0.622	0.595
23	0.798	0.783	0.768	0.751	0.733	0.714	0.693	0.671	0.647	0.622
24	0.811	0.798	0.783	0.768	0.751	0.733	0.714	0.693	0.671	0.647
25	0.824	0.811	0.798	0.783	0.768	0.751	0.733	0.714	0.693	0.671

Averaged emissions year 10 = 30.4%

Figure 11. A section of the excel model that calculates emissions for forestry residues and other biomass fuels where the alternative fate is decomposition.

Visually, this looks like a slice through a series of curves (Figure 12):

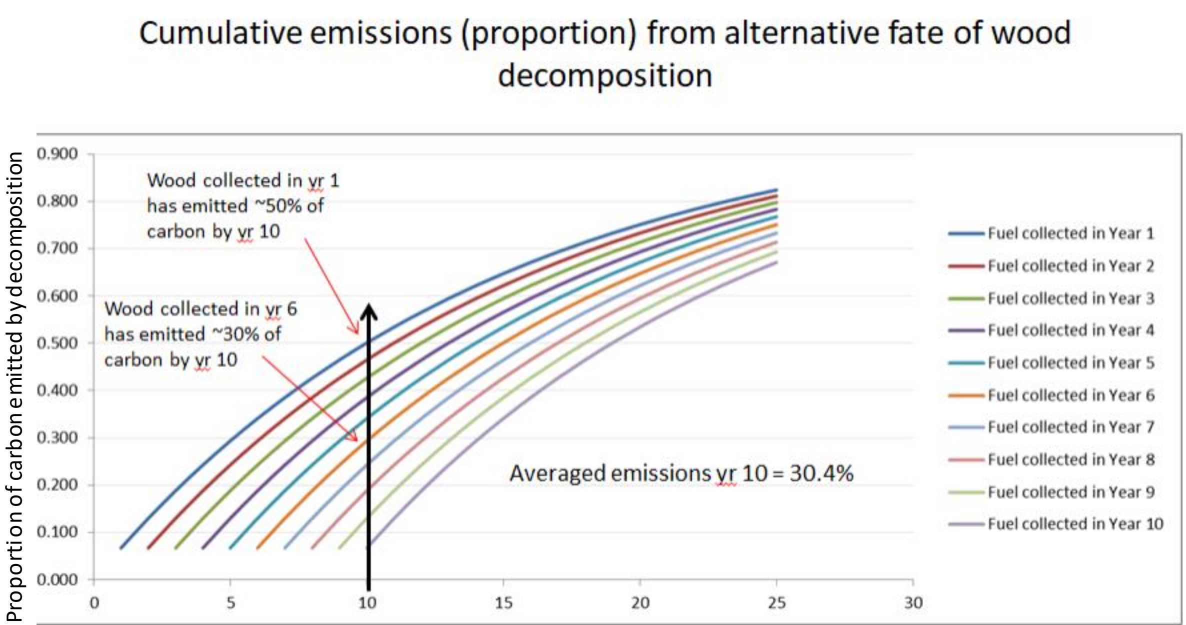

Figure 12. Graphical representation of the emissions shown in Figure 10.

The cumulative emissions from decomposition over the timeframe are subtracted from the "direct" emissions of biomass combustion to calculate the net additional CO_2 that was emitted by burning the wood rather than letting it decompose.

Figure 13 calculates net emissions assuming one tonne of wood is burned each year for ten years; the alternative fate decomposition emissions are also calculated over ten years. (Burning one tonne of wood at typical moisture content of 45 percent emits just over one tonne of CO_2, so wood burned and CO_2 are functionally equivalent).

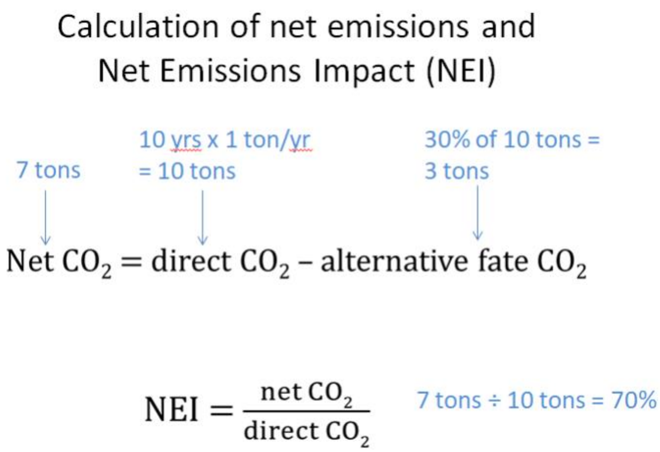

Figure 13. Worked example of net emissions and the net emissions impact (NEI) for a case where one tonne of wood is burned for energy each year, versus being allowed to decompose. The alternative fate emissions taken from Figure 12 are subtracted from the direct combustion emissions to calculate net emissions. The NEI at year 10 is 70%, meaning that 70% of the direct stack emissions represent a net increase of CO_2 loading to the atmosphere over that time period.

Applying this figure to the carbon trading situation would mean that facilities burning forestry residues would be obligated to purchase 0.7 allowances for every tonne of CO_2 they emitted. However, for facilities such as pulp and paper mills that have historically burned black liquor or other materials where the alternative fate was unquestionably incineration without energy recovery, the net difference between direct emissions (combustion) and alternative fate emissions (also combustion) is zero, meaning the facility would be obligated to purchase zero allowances for the carbon it emitted. Since many industrial facilities burn black liquor and other mill residues that may arguably be incinerated if not burned for energy, the NEI methodology would provide an "intelligent" industrial exemption in the ETS that is likely to be consistent with efforts to prevent companies from relocating outside the EU and creating the type of leakage that the revision seeks to avoid. At the same time, this exemption would be based on a scientific and explainable rationale rather than a blanket exemption under which emissions from facilities that burn exclusively bioenergy would not be counted at all.

This example and the NEI framework is currently configured for biomass that is derived from forestry residues that would otherwise decompose. To configure it for biomass sourced from trees that would otherwise continue growing, or from other sources with other alternative fates, would require additional modeling, but would require no new approach, as such models already exist.

Either directly counting bioenergy stack emissions or using an NEI approach to weight and appropriately regulate emissions under the ETS would be an improvement over the current wholesale treatment of bioenergy emissions as "zero." Counting bioenergy emissions would discourage continued use of forests as fuel, which is unquestionably a large source of leakage in the ETS that violates the principle that the "polluter should pay." It would generate ETS revenue, reduce the money being sucked out of ratepayers' wallets to pay for bioenergy subsidies, help save forests worldwide and incentivize greater deployment of true zero-emissions energy, such as wind and solar. Now is the time: the EU must regulate bioenergy CO_2.

Thank you for the opportunity to comment.

Mary S. Booth
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