February 26, 2024

Douglas W. O'Donnell
Deputy Commissioner for Services and Enforcement
U.S. Department of the Treasury, Internal Revenue Service
Office of Tax Policy
Ben Franklin Station
P.O. Box 7604, Room 5203
Washington, DC 20044

Submitted via www.regulations.gov, IRS REG–117631–23

Re: Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election To Treat Clean Hydrogen Production Facilities as Energy Property (REG–117631–23)

Dear Mr. O'Donnell,

The Partnership for Policy Integrity (PFPI) respectfully submits the following comments to the Treasury and the Internal Revenue Service (IRS) on the proposed rule implementing the 45V clean hydrogen tax credit.

PFPI is focusing its comments on two aspects of the proposed rule: the eligibility of woody biomass as a feedstock in hydrogen production and the potential eligibility of biomass-powered electricity generation in the production process. PFPI appreciates the interest of the Treasury Department and IRS in soliciting information about biomass-powered electricity generation, and responded to several of the specific requests for information.

Our key comments, described in more detail below, are the following:

1) The 45VH2-GREET 2023 model is incapable of assessing whether hydrogen made from biomass feedstocks and/or produced with biomass powered electricity can meet the GHG emissions threshold to qualify for the 45V tax credit

2) The 45VH2-GREET 2023 model erroneously treats biomass electricity as carbon neutral *(Response to comment solicited on lifecycle greenhouse gas emissions)*

3) The 45VH2-GREET 2023 model undercounts the lifecycle greenhouse gas emissions of hydrogen produced from woody biomass by treating them as carbon neutral

4) The 45VH2-GREET 2023 model's assumption that woody feedstocks used to produce hydrogen or electricity will all be forestry "residues" is not justified (*Response to comment solicited on verification of the origin of the feedstock*)

5) Accurate lifecycle analysis must count both fossil and biogenic fuel emissions, and include the use of a counterfactual, multi-year analysis, and a climate relevant timeframe *(Response to comment solicited on other parameters that are relevant to accurate lifecycle analysis*)

We conclude that based on the carbon intensity of woody biomass fuels, hydrogen made from woody biomass feedstocks and/or produced with woody biomass-generated electricity should be determined ineligible for the 45V clean hydrogen tax credit. Furthermore, due to the obvious deficiencies of the 45VH2-GREET model, the IRS and Treasury should not allow tax credits for hydrogen produced with any biomass feedstocks until the 45VH2-GREET model is corrected.

1) The 45VH2-GREET 2023 model is incapable of assessing whether hydrogen made from biomass feedstocks and/or produced with biomass powered electricity can meet the GHG emissions threshold to qualify for the 45V tax credit

The Inflation Reduction Act specifies that only hydrogen produced through a process that results in a lifecycle greenhouse gas emissions rate of no greater than 4 kilograms of CO_2 equivalent per kilogram of hydrogen can qualify for the 45V tax credit. The proposed regulations rely on a model developed by the Argonne National Laboratory (45VH2-GREET 2023) to determine the "well-to-gate" lifecycle greenhouse gas emissions rates resulting from hydrogen production processes.[1]

The 45VH2-GREET 2023 model, like its predecessors, arbitrarily assumes that the net CO_2 emissions released from biogenic fuels are zero, under the assumption that organic matter would otherwise have decayed and released its stored CO_2 anyway.[2] The GREET model only counts CO_2 emissions from fossil fuels utilized in the lifecycle process (e.g. harvesting, transport, and processing). It also counts non-CO_2 GHG emissions from both fossil and biogenic fuels (i.e. methane (CH_4) and nitrous oxides (N_2O).

Initially developed for transportation biofuels, the GREET model provided a simplified approach to calculating lifecycle emissions from biogenic sources such as energy crops and agricultural wastes. Carrying the assumption of carbon neutrality into a model that also includes woody biomass, however, dramatically increases the inaccuracy of this model, as discussed below.[3]

[1] U.S. Department of Energy, Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2-GREET 2023, ("DOE Guidelines"), December 2023.

[2] Argonne National Laboratory released the first GREET model in 1995, see https://www.energy.gov/eere/greet. "GREET" used to stand for "Greenhouse gases, Regulated Emissions, and Energy use in Transportation" but has been expanded to include other technologies.

[3] "Carbon neutrality," as used in these comments, refers to CO_2 emissions.

This is evidenced by the fact that under the 45VH2-GREET 2023 lifecycle analysis, corn stover and wood are both treated as instantaneously carbon neutral. This is absurd on its face, since corn stover (leaves, stalks, and cobs) will decay in a year or two, while forestry residues (branches, tops, and thinnings) will store their carbon for decades. If the 45VH2-GREET 2023 isn't capable of distinguishing between these two *very different* feedstocks, with very different carbon intensities, it needs to be corrected before it can be used to assess the lifecycle emissions of hydrogen produced from *any* biogenic feedstocks.

As we discuss below, the net lifecycle emissions of woody biomass energy are so high that hydrogen made from forest biomass feedstocks or created with woody biomass electricity should not be allowed to qualify at all.

2) The 45VH2-GREET 2023 model erroneously treats biomass electricity as carbon neutral

Wood-burning power plants emit roughly 50% more carbon dioxide per megawatt hour at the stack than coal-fired power plants.[4] The IPCC gives wood/wood waste an emission factor for CO_2 ranging from 95,000-132,000 kg/TJ, greater than coal and almost all of the other fuels burned at stationary sources.[5] Yet according to the GREET guidelines, combustion of logging residue *has an emissions factor lower than geothermal energy*.[6] This again points to the serious defects of the 45VH2-GREET 2023 model.

The GREET model minimizes the emissions of biomass electricity because the largest source of CO_2 emissions, combustion of the biomass fuel itself, is treated as "zero" under the erroneous and unsupported assumption that biomass energy is carbon neutral.[7] The assumption that all biogenic fuels are categorically carbon neutral has been rejected by climate scientists and has long been discredited in the scientific literature.

The IPCC has stated unequivocally that its "guidelines do not automatically consider or assume biomass used for energy as 'carbon neutral,' *even in cases where the biomass is thought to be produced sustainably*" (emphasis added). "The approach of not including these emissions in the

[4] Mary S. Booth, *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal* Partnership for Policy Integrity, (Apr. 2014), p. 16. *Available at:* https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf.

[5] IPCC Guidelines for National Greenhouse Gas Inventories (2006); Chapter 2, Stationary Combustion. TABLE 2.2 Default Emission Factors For Stationary Combustion In The Energy Industries (kg of greenhouse gas per TJ on a Net Calorific Basis), p. 2.17. The default CO_2 emission factor for wood/wood waste is 112,000.

[6] DOE Guidelines, Table 3., Emissions Factors of Electricity Generation from Various Primary Energy Sources in 45VH2-GREET, at p. 16.

[7] Hui Xu, *et al*., Regionalized Life Cycle Greenhouse Gas Emissions of Forest Biomass Use for Electricity Generation in the United States, *Environ. Sci. Technol*. 2021, 55, p. 14807. "For the biomass combustion stage, this study assumes carbon neutrality, meaning that the CO_2 emitted during forest biomass combustion is offset by the CO_2 uptake from the atmosphere by trees. Changes in soil carbon pool due to logging and inputs for establishing infrastructure and facilities are out of the scope of this analysis."

Energy Sector total should not be interpreted as a conclusion about the sustainability, or carbon neutrality of bioenergy."[8] Elsewhere, the IPCC states that "the neutrality perception is linked to a misunderstanding of the guidelines for GHG inventories."[9]

EPA's Science Advisory Board has stated, "Not all biogenic emissions are carbon neutral nor net additional to the atmosphere, and assuming so is inconsistent with the underlying science." [10] The European Academies' Science Advisory Council wrote, "The concept of all bioenergy being carbon-neutral is too simplistic and does not offer any general context-independent justification to increase forest utilisation."[11]

The science has long established that net CO_2 emissions from burning wood fuels exceed that of fossil fuels for decades to centuries, depending on various factors, including the feedstock, the fossil fuel that is replaced, and the efficiency with which is it burned.[12] The landmark Manomet study, commissioned in 2010 by the State of Massachusetts, found that it would take more than 45 years for carbon uptake from new tree growth to offset the emissions from a boiler that burns "mixed" wood (i.e., a mixture of wood residues and whole trees) to the point of equivalency with emissions from a coal-fired power plant, and more than 90 years to "pay off" the carbon debt relative to a natural gas plant.[13] A more recent analysis by PFPI found that *even if only true logging residues are burned*, such as treetops, limbs, and slash, the carbon emissions are still net additive to the atmosphere for decades, and thus cannot be construed as "carbon neutral" within

[8] International Panel on Climate Change (IPCC), Taskforce on National Greenhouse Gas Inventories, Frequently Asked Questions, Q2-10 at: https://www.ipcc-nggip.iges.or.jp/faq/faq.html

[9] IPCC, Agriculture, Forestry and Other Land Use (AFOLU), 2014, https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter11.pdf, Note14 at 879.
[10] EPA Science Advisory Board (SAB). (28 September 2012). *SAB Review of EPA's Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources* (September 2011). https://sab.epa.gov/ords/sab/f?p=114:1::::::

[11] European Academies' Science Advisory Council *Commentary by the European Academies' Science Advisory Council on Forest Bioenergy and Carbon Neutrality*, June 2018; https://easac.eu/publications/details/commentary-on-forest-bioenergy-and-carbon-neutrality/

[12] Thomas Buchholz, *et al.*, A global meta-analysis of forest bioenergy greenhouse gas emission accounting studies, *GCB Bioenergy*, (Mar 2016), https://onlinelibrary.wiley.com/doi/abs/10.1111/gcbb.12245; Niclas Bentsen, *et al.*, Carbon debt and payback time – Lost in the forest?, *Renew. Sustain. Energy Rev*, (Jun 2017), https://www.sciencedirect.com/science/article/pii/S1364032117302034. John D. Sterman, *et al.*, Does replacing coal with wood lower CO_2 emissions? Dynamic lifecycle analysis of wood bioenergy, *Environmental Research Letters*, Jan 18, 2018, at https://iopscience.iop.org/article/10.1088/1748-9326/aaa512/meta; Jerome Laganiere, *et al.*, Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests, *GCB Bioenergy* (2017)9, 358–369, https://onlinelibrary.wiley.com/doi/epdf/10.1111/gcbb.12327

[13] Thomas Walker, *et al.*, 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*, (2012) 32(1-2): 130-158, at https://www.researchgate.net/publication/241746647_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

climate relevant timeframes.[14]

Because biomass energy is still erroneously touted by industry advocates as "carbon neutral," biomass energy with carbon capture and storage (BECCS) has been heralded as a "carbon negative" technology. This is fundamentally untrue. Whether burning woody biomass alone to produce electricity, or whether paired with CCS, woody biomass energy is harmful to the climate and must be excluded from the rule by the Treasury and IRS.[15]

3) The 2023 GREET model undercounts the lifecycle greenhouse gas emissions of hydrogen produced from woody biomass by treating them as carbon neutral

The 45VH2-GREET 2023 model evaluates the "well-to-gate" GHG emissions associated with various production pathways, including biomass gasification with potential carbon capture and storage (CCS) using two specific feedstocks, "corn stover and logging residue, which are assumed to have no significant market value."[16]

The Guidelines explain in different ways why the model treats these feedstocks as carbon neutral, saying in one place that the model "assumes that biogenic CO_2 emissions that result from gasification equal CO_2 emissions that were captured during growth of the feedstock"[17] and elsewhere that, "In the case of forest logging residues, as these materials otherwise would have likely decayed over time or been pile-burned, the resulting emissions associated with using the materials to produce hydrogen are expected to be negligible or about the same as if the material were not collected and used."[18] The Guidelines present no scientific justification for this.

In fact, gasification of woody biomass is highly polluting. A proposed biomass gasification plant in New York designed to burn a mixture of wood, C&D debris and municipal solid waste, would have released more than twice the CO_2 emissions per megawatt-hour (lb/MWh) of a combined cycle natural gas plant, in addition to significant emissions of criteria and hazardous air pollutants.[19] As with biomass electricity, in addition to CO_2 emissions from the plant, there are significant upstream emissions from the harvest, transportation, and processing of the biomass feedstock.

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[14] Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. *Environmental Research Letters*, Feb. 21, 2018, at https://iopscience.iop.org/article/10.1088/1748-9326/aaac88

[15] Forest Litigation Collaborative, The Case Against Negative Emissions, November 27, 2023, at https://forestlitigation.org/wp-content/uploads/2023/11/The-Case-Against-Negative-Emissions-Nov-20-2023-1.pdf

[16] DOE Guidelines, fn 11 at p 10.
[17] DOE Guidelines, p. 13.
[18] DOE Guidelines, fn 15 at p 13.

[19] Mary S. Booth, *Burning Money: Biomass Gasification and the DOE Loan Guarantee Program*, Partnership for Policy Integrity (May 2013). *Available at:* https://www.pfpi.net/wp-content/uploads/2013/05/PFPI-Gasification-and-DOE-loan-guarantees.pdf.

4) The 2023 GREET model's assumption that woody feedstocks used to produce hydrogen or electricity will all be forestry "residues" is not justified

45VH2-GREET 2023 currently evaluates the "well-to-gate" greenhouse gas emissions of biomass gasification from two specific feedstocks, corn stover and "forest logging residue with no significant market value, such as bark, branches, cutter shavings, leaves, needles, and pre-commercial thinnings (i.e., not milling residues from industrial processing or whole trees)."[20] However, the assumption that only "true wastes" will be used is not justified, and in practice, is almost impossible to verify.

A. Bioenergy plants are permitted to burn a wide range of feedstocks

In reality, bioenergy facilities utilize more than logging residues. PFPI reviewed air permits for 88 biomass power plants in the US and found that these facilities burn more than residues – including logs and whole trees. [21] The majority of the permits also allowed burning waste wood, including construction and demolition debris, which adds to their harmful air pollution. While resequestration of the CO_2 emitted by burning wood will require multiple decades, carbon offsets are never actually required to be obtained or demonstrated by these plants.

The sheer amount of wood required by these facilities suggests that it would be impractical, if not impossible, to find enough wood residues to supply the fuel they need. A typical 50-MW biomass power plant, for instance, burns more than a ton of wood chips a minute, the equivalent of clearcutting more than 20 acres of forests a day.[22] Although woody biomass material is often transported to biomass plants as wood chips where chipping is done near the logging site or at wood processing facilities, log piles are commonly seen at biomass plants, evidence that whole trees are being chipped, not just "residues."[23]

B. Industry claims that they only use logging residues or other wood wastes have been repeatedly debunked

Multiple investigations of the wood pellet industry in the United States have demonstrated that the industry routinely lies when it claims to only use mill residues or forest residues as pellet feedstock.

U.S.-based Enviva, the world's largest wood pellet company, has long claimed that it doesn't use big, whole trees, but only uses wood waste, such as tops, limbs, and thinnings, and "low-value" smaller trees in the production of woody pellets it exports to be burned as "clean" "renewable" energy in Europe and Asia. Numerous investigations by journalists and activists into Enviva's

[20] DOE Guidelines, p. 13.

[21] Booth, *Trees, Trash, and Toxics*, *supra,* p. 6.

[22] PFPI, Biomass Basics, at https://www.pfpi.net/biomass-basics/

[23] There is ample visual evidence to support this, as documented in numerous investigations of the biomass industry by journalists and activists, or simply by using Google map satellite images.

feedstock sourcing have revealed that in fact much of the wood used in Enviva's pellet mills in the US Southeast comes from whole trees logged for that purpose, including clearcutting ecologically sensitive bottomland hardwood forests.[24]
A former maintenance manager at Enviva has publicly corroborated what eye witnesses have repeatedly documented. "The company says that we use mostly waste like branches, treetops and debris to make pellets," the whistleblower told an investigative reporter at *Mongabay*. "What a joke. We use 100% whole trees in our pellets. We hardly use any waste." [25]

Drax, the world's second biggest producer of wood pellets, also claims to only use materials left over from sawmill waste or logging residues that would have been left to decay. Contrary to these claims, an in-depth investigation by *BBC Panorama* found that Drax uses whole trees clearcut from old growth, primary forests in British Columbia to produce wood pellets.[26]

C. The GREET model should not assume that bioenergy demand does not drive logging

The GREET model assumes that only logging residues "with no significant market value" will be utilized.[27] By assuming that woody feedstocks are residual material that represent "true waste" – meaning that they are not a driver of logging but a by-product – the woody feedstocks used are not allocated any of the upstream emissions associated with cutting them.

However, the existence of a market for such materials will increase the market value and thus drive demand for more logging, including of trees that would otherwise have been left to grow. Subsidies for using woody biomass in hydrogen production through the 45V program will necessarily create an intrinsic value in those materials, and numerous renewable energy incentives are already available for producers of biomass electricity.

Biomass subsidies in the UK and EU have triggered a rapid expansion of logging for biomass wood pellets in the US Southeast, British Columbia, and eastern Canada. Wood-pellet manufacturing companies are all known to be harvesting trees specifically for biomass production, even wood that could have been used as sawtimber.[28] Logging to meet the demand

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[24] Southern Environmental Law Center, Satellite images show link between wood pellet demand and increased hardwood forest harvesting, (2022), at https://www.southernenvironment.org/wp-content/uploads/2022/03/Biomass-White-Page.pdf; https://www.nrdc.org/sites/default/files/global-markets-biomass-energy-devastating-us-forests-202209.pdf; https://www.politico.com/news/magazine/2021/03/26/biomass-carbon-climate-politics-477620; https://dogwoodalliance.org/2022/11/does-enviva-clearcut-forests-the-surprising-truth/.

[25] Justin Catanoso, "Whistleblower: Enviva claim of 'being good for the planet… all nonsense'" *Mongabay*, Dec. 5, 2022 at https://news.mongabay.com/2022/12/envivas-biomass-lies-whistleblower-account/. "We take giant, whole trees. We don't care where they come from. The notion of sustainably managed forests is nonsense. We can't get wood into the mills fast enough."

[26] Joe Crowley, "The Green Energy Scandal Exposed," *BBC Panorama*, Premiered Oct 3, 2022, available at https://www.youtube.com/watch?v=qadWRkPkKus

[27] DOE Guidelines, fn 11 at p 10.

[28] SELC, *supra* note 24, BBC Panorama, *supra* note 26.

for wood fuels has scaled up dramatically in Europe as well.[29] The consequences for both the extent and the intensity of cutting have been far-reaching.[30] The European Union is losing its forest and land carbon sinks at an alarming rate, and there is clear evidence that increased biomass harvesting to meet renewable energy targets is responsible for much of this loss.[31]

EU bioenergy subsidies are also driving illegal and destructive logging. An investigation by the *New York Times* showed biomass companies are illegally logging the EU's last ancient forests, grinding up ancient trees in protected areas for wood pellets.[32] An investigation by *The Guardian* showed how logging for pellets is destroying Estonia's protected forests.[33]

D. The GREET model's definition of "forest logging residues" is vague and unenforceable

While the GREET guidelines imply that logging residue with "no significant market value" would mean "not whole trees," this is not necessarily the case.[34] As discussed above, whole trees are routinely logged for bioenergy production. Sometimes they are claimed to be "low value" because they are not suitable for sawtimber, or sometimes they are claimed to be "thinnings," but for lifecycle accounting purposes, the counterfactual is important, especially if their alternative fate would have been to continue to grow and sequester carbon.

Correctly defining the feedstocks – and accounting for more than just foliage, treetops, and branches – matters because it affects the model inputs, parameters, and outputs for the emissions associated with projects, as well as whether the feedstocks can be defined as "true waste."

To our knowledge, there are no successful models in use that verify feedstock sourcing. Some programs rely on foresters to comply with industry certification programs, such as the Sustainable Forestry Initiative (SFI) or Forest Stewardship Council (FSC). While it is common

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[29] Mary S. Booth, *Burning up the carbon sink: How the EU's forest biomass policy undermines climate mitigation, and how it can be reformed*, (PFPI) November 4, 2022 at https://forestdefenders.eu/wp-content/uploads/2022/11/PFPI-Burning-up-the-carbon-sink-Nov-7-2022.pdf

[30] See Buchholz, T., et al. (2021). When Biomass Electricity Demand Prompts Thinnings in Southern US Pine Plantations: A Forest Sector Greenhouse Gas Emissions Case Study. *Frontiers in Forests and Global Change* 4(42). At https://www.frontiersin.org/article/10.3389/ffgc.2021.642569

[31] Booth, *Burning up the carbon sink, supra* note 29.

[32] Sarah Hurtes and Weiyi Cai, "Europe Is Sacrificing Its Ancient Forests for Energy," *The New York Times*, Sept. 7, 2022 https://www.nytimes.com/interactive/2022/09/07/world/europe/eu-logging-wood-pellets.html

[33] Hazel Sheffield, "'Carbon neutrality is a fairy tale': how the race for renewables is burning Europe's forests," *The Guardian*, Jan. 14, 2021, at https://www.theguardian.com/world/2021/jan/14/carbon-neutrality-is-a-fairy-tale-how-the-race-for-renewables-is-burning-europes-forests.

[34] DOE Guidelines, p. 13. "45VH2-GREET 2023 currently allows for biomass gasification to be modeled using two feedstocks- corn stover and forest logging residue with no significant market value, such as bark, branches, cutter shavings, leaves, needles, and pre-commercial thinnings (i.e., not milling residues from industrial processing or whole trees)."

for the timber lobby to claim that "sustainable forest management" protects forest carbon sinks and enhances carbon sequestration, voluntary certification programs provide no such guarantees. The SFI guidance states that it "is not a carbon quantification protocol, nor does it require Certified Organizations to additionally sequester carbon in managed forests."[35] As noted above, the IPCC does not assume biomass used for energy is carbon neutral "even in cases where the biomass is thought to be produced sustainably." Furthermore, voluntary forestry certification programs are notoriously lax in monitoring and enforcement.[36]

Few models with the force of law exist. Prior to 2022, Massachusetts had regulations requiring a fuel certification and tracking program to verify compliance with detailed sourcing guidelines for woody biomass to be eligible for Massachusetts' Renewable Energy Portfolio Standard (RPS).[37]

In practice, once the wood is chipped it's virtually impossible to distinguish whether the wood came from a tree that was felled for energy, or whether it is truly "logging residue." Attestations would not prevent misuse of the model's assumptions. There would need to be a strong regulatory system coupled with adequate monitoring and enforcement – something that does not exist in the US or elsewhere.

5) Accurate lifecycle analysis must count both fossil and biogenic fuel emissions, and include the use of a counterfactual, multi-year analysis, and a climate relevant timeframe

Because different biogenic feedstocks will have different carbon impacts, lifecycle analysis can be an appropriate tool for estimating the net greenhouse gas emissions of various biogenic fuels, provided it is conducted properly and includes emissions from both fossil and biogenic fuels.

A. In a scientifically sound accounting model, a counterfactual is required

Accordingly, any model utilized by the IRS and Treasury should not *de facto* assume that all forest feedstocks are "true waste," and should have the capabilities to both (1) model the upstream emissions coming from cutting feedstock materials, and (2) calculate net GHG emissions where the counterfactual scenario for biomass includes either continued forest growth, allowing a forest to continue growing and sequestering CO_2 out of the atmosphere, or forest harvesting with the utilization of that biomass material for products other than biomass fuel. This alternative fate scenario generally includes the emissions from generating energy from a source other than biomass (this could include solar or wind, it doesn't have to be fossil fuels). The *difference* between the bioenergy scenario and the counterfactual represents the net carbon impact of the bioenergy scenario.

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[35] SFI 2022 Standards and Rules, at https://forests.org/wp-content/uploads/2022_SFI_Standards.pdf

[36] Richard Conniff, Greenwashed Timber: How Sustainable Forest Certification has Failed, Yale Environment 360 (Feb. 20, 2018) at https://e360.yale.edu/features/greenwashed-timber-how-sustainable-forest-certification-has-failed

[37] 225 CMR 14.05(8)(a)(2)), adopted in 2012 and amended in 2022. The amended rules gutted the fuel certification and tracking procedure. At the same time, however, the Massachusetts State Legislature removed woody biomass from eligibility in the MA RPS statute.

One important factor for whether bioenergy emissions can eventually be offset is whether forests actually regrow. In fact, the assumption that forests fully regrow after harvest is usually not met. Changes in species composition, soil carbon loss from harvesting, other disturbances, shortened rotation periods, climate change, and a host of other factors conspire to ensure that forests regenerating after cutting hold less carbon than previously. These uncertainties are meaningful for the ability of models to predict actual bioenergy carbon impacts. In all cases, such uncertainties, if realized, worsen the carbon impact.

Burning biomass for energy always emits CO_2. A net lifecycle analysis using counterfactual modeling may show that emissions can be compensated over time, but "net" emissions are never instantaneously zero except in cases where the counterfactual involves burning the biomass without energy recovery. [38]

B. A multi-year analysis is necessary to determine the total net lifecycle emissions from a biomass facility

To determine the net impacts from a biomass facility that will be operated for longer than one year, it is necessary to utilize a multi-year lifecycle analysis that assesses cumulative emissions and cumulative counterfactual emissions over a timeframe of interest. The multi-year approach is standard practice in bioenergy carbon accounting, utilized in multiple published carbon accounting models.[39]

C. Models must provide outputs over policy-relevant, near-term timeframes

The GREET model is currently set up to evaluate the global warming potential of greenhouse gases on a 100-year timeframe.[40] This is not an acceptable time frame. Policymakers and citizens need to be able to determine how various technologies and approaches will help achieve legislative and aspirational greenhouse gas reduction targets in the coming decades.

Preventing the worst harms from the climate crisis requires deep, immediate emissions cuts during this decade. As highlighted by the IPCC's landmark 2018 Special Report on Global Warming of 1.5°C, global GHG emissions must be cut in half by 2030 to avoid catastrophic

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[38] *See* Booth, Not carbon neutral, *supra* note 14.

[39] See, e.g., Buchholz, T., et al. (2021). When Biomass Electricity Demand Prompts Thinnings in Southern US Pine Plantations: A Forest Sector Greenhouse Gas Emissions Case Study. Frontiers in Forests and Global Change 4(42). At https://www.frontiersin.org/article/10.3389/ffgc.2021.642569; Laganiere, et al. Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests. Bioenergy (2017). Available at: https://onlinelibrary.wiley.com/doi/10.1111/gcbb.12327; Mary S. Booth, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. Environmental Research Letters (2018). Available at: https://iopscience.iop.org/article/10.1088/1748-9326/aaac88; Walker, et al. 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 (2013). Available at: https://www.tandfonline.com/doi/abs/10.1080/10549811.2011.652019#.VRl6pfnF8m8

[40] Guidelines, p. 9.

harms from the climate crisis, with much larger reductions required in the United States due to our dominant role in driving climate change and greater financial and technical resources to implement emissions cuts.

Recognizing the urgency of the climate crisis, President Biden has set a national goal of achieving 100% carbon-pollution free electricity by 2035 and net zero economywide emissions by 2050. At a time when emissions must be drastically reduced, it is imperative that lifecycle GHG models used by the IRS and Treasury Department provide the capacity to quantify GHG pollution from energy sources over policy-relevant, near-term time frames.

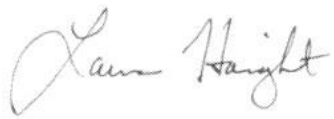
6) Conclusion: Hydrogen made from woody biomass feedstocks and/or produced with woody biomass-generated electricity should be ineligible for the 45V clean hydrogen tax credit

Based on the carbon intensity of woody biomass fuels, hydrogen made from woody biomass feedstocks and/or produced with woody biomass-generated electricity should be determined ineligible for the 45V clean hydrogen tax credit. Furthermore, due to the obvious deficiencies of the 45VH2-GREET model, the IRS and Treasury should not allow tax credits for hydrogen produced with any biomass feedstocks until the 45VH2-GREET model is corrected.

A tree can only be cut and burned once, but support for genuine clean energy is a long-term and truly sustainable investment that saves forests, the climate, biodiversity, human health, and the economy. Allowing hydrogen produced with woody biomass to qualify for the clean hydrogen tax credit would undermine the intent of the Inflation Reduction Act (IRA) to reduce greenhouse gas emissions.

Thank you for this opportunity to comment.

Sincerely,



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