

EXHIBIT A



CLIMATE CONSEQUENCES OF CURRENT CARBON ACCOUNTING PRACTICES FOR BIOENERGY

Case Study on Wood-Pellet Manufacturer Enviva

In response to climate change, many countries, especially in Europe, have turned to biomass as a source of renewable energy. Even though biomass power plants emit more CO₂ per megawatt-hour than fossil-fired plants, burning biomass is often treated in regulations as having zero CO₂ emissions due to assumptions about its origin – that it is ‘waste’ that would decompose anyway, or that it is derived from trees or plants that will grow back and re-sequester carbon.

While many biomass plants worldwide burn residues from sawmills and black liquor from the paper industry, lucrative renewable energy subsidies have driven an increase in new wood-burning power plants. Forest harvesting to meet this new fuel demand presents a direct threat to both forests and international climate goals, contravening the directive of a [recent report](#) by the Intergovernmental Panel on Climate Change (IPCC)¹ that stresses we must significantly increase carbon “sinks” in order to limit dangerous climate change, in addition to dramatically reducing emissions. Restoring and expanding forests is the best and [most viable way](#) to increase carbon uptake,² as long as forests are fully functioning ecosystems, rather than monoculture plantations. The importance of forests for climate mitigation is recognized in Article 5 of the Paris Agreement, which states, “1. Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases as referred to in Article 4, paragraph 1 (d), of the Convention, including forests.” Cutting down forests and burning them for fuel runs counter to these goals.

A significant new development in biomass energy is the use of wood pellets as a replacement for coal, with a large portion of pellet biomass manufactured in the US and Canada for shipment to the EU and Asia. As demand has grown, more trees are being cut as pellet feedstock, a trend with devastating impacts on forests, particularly in the US South. Biomass harvesting tends to remove the majority of wood from a site, and harvesting of eastern bottomland hardwood forests for wood pellets, including some of the most carbon-rich and biodiverse forests in America, has been [especially controversial](#).³

Background on Biomass CO₂ Emissions

A growing number of scientists and policymakers understand that biomass is not an instantaneously carbon-neutral source of renewable energy, and in many cases may never achieve true carbon neutrality.

¹ IPCC Special Report: Global Warming of 1.5 C. Summary for Policymakers. At http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

² PFPI. The IPCC's recipe for a livable planet: grow trees, don't burn them. October, 2018. At <http://www.pfpi.net/the-ipccs-recipe-for-a-livable-planet-grow-trees-dont-burn-them>

³ Dogwood Alliance, Southern Environmental Law Center, and Natural Resources Defense Council. 2017. European Imports of Wood Pellets for “Green Energy” Devastating US Forests. At https://www.dogwoodalliance.org/wp-content/uploads/2017/05/NRDC_2014-2017Booklet_DigitalVersion-resize.pdf

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Power plants that burn biomass generally emit [more CO₂ per megawatt-hour](#) (MWh) than fossil fueled plants, due to differences in fuel energy content per unit of carbon and higher fuel moisture content, which degrades power plant efficiency.⁴ In the case of wood pellets, significant energy (with associated emissions) is invested up front to prepare and dry fuels so that, while smokestack CO₂ emissions of wood pellets are only somewhat higher than emissions from coal, the total [greenhouse gas footprint of wood pellets](#) is significantly higher than the stack emissions.⁵

Replacing coal with wood pellets not only increases CO₂ stack emissions but also the net emissions impact over time, taking into consideration “foregone carbon sequestration” due to forest harvesting – that is, the CO₂ that trees would have continued removing from the atmosphere, if they had not been harvested and burned for fuel. It does not matter whether all the trees from a harvest site are used for pellets, or some of the wood is used for sawtimber – it is the regrowth of forests following cutting that “offsets” carbon emissions, and regrowth takes decades whatever the ultimate fate of the wood. Bioenergy proponents have a [number of arguments](#) for why bioenergy should be considered carbon neutral, such as the idea that forest growth elsewhere can instantaneously offset the CO₂ emitted by burning wood for energy.⁶ However, counting *ongoing* forest growth as “offsetting” bioenergy emissions essentially double-counts forest carbon uptake that is happening anyway. It is akin to spending down one’s bank balance, then claiming the interest accruing in someone else’s account should be seized to instantaneously replenish your funds.

A number of studies have demonstrated that harvesting trees for energy leads to a net increase in CO₂ emissions that persists for decades to more than a century.⁷ Particular to the wood pellets burned in the UK and elsewhere, a [UK government study](#)⁸ found that when biomass is sourced from whole trees rather than forestry and mill residues, bioenergy net emissions exceed those from coal over a period of several decades. Wood waste and forestry residues are assumed to have a lower net carbon impact as this material eventually decomposes and emits CO₂ if not burned for energy. However, such emissions

⁴ Booth, M. S. (2014). *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal*. Pelham, Massachusetts, Partnership for Policy Integrity. At <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

⁵ 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/meta>

⁶ Ter-Mikaelian, M. T., S. J. Colombo and J. Chen (2015). "The Burning Question: Does Forest Bioenergy Reduce Carbon Emissions? A Review of Common Misconceptions about Forest Carbon Accounting." *Journal of Forestry* 113(1): 57-68. At <https://ucanr.edu/sites/forestry/files/212529.pdf>

⁷ See, for example, 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; 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; Mitchell, S. R., et al (2012). "Carbon debt and carbon sequestration parity in forest bioenergy production." *GCB Bioenergy* 4(6): 818-827.

⁸ 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. At <https://www.gov.uk/government/publications/life-cycle-impacts-of-biomass-electricity-in-2020>

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occur over years to decades while burning those residues creates immediate CO₂ emissions, increasing emissions just within the short timeframe that climate scientists say is left for reducing emissions. A [recent study](#) published in *Environmental Research Letters*⁹ examined the Net Emissions Impact (NEI) of burning pellets made from forestry residues, calculating the additional carbon impact of burning biomass compared to emissions if the wood were simply allowed to decompose. Even assuming rapid decomposition, the cumulative 10-year NEI of wood pellets is about 55% of cumulative direct emissions, highlighting the large error in assuming this fuel is “carbon neutral.” It is important to note that this study did not account for soil carbon loss from biomass harvesting, which can be significant.¹⁰

In addition to the carbon released when wood pellets are burned, there are significant fossil fuel “life-cycle” emissions from planting, tending, and harvesting trees; grinding, drying, and extruding wood into pellets; then shipping pellets to the EU and Asia. Such emissions can constitute an additional 10 – 30% of the carbon released by burning the fuel itself.¹¹ In the UK, the government has recognized that even these lifecycle emissions will soon exceed the average emissions from the grid, and so has enacted a [new policy](#)¹² that will eliminate subsidies for biomass ([including wood pellets](#)¹³) with fossil fuel lifecycle emissions exceeding a new, lower threshold than before. Unfortunately, this policy will not affect plants that have been grandfathered under the old, more lenient standard.

Finally, pellet manufacturing facilities and domestic wood-burning power plants can also be large sources of harmful air pollution. [Research](#) by the Partnership for Policy Integrity¹⁴ found that U.S. biomass power plants can emit more particulate matter and volatile organic compounds than coal plants per unit energy. Many biomass power plants circumvent Clean Air Act regulations and produce dangerous levels of pollution with little to no oversight or consequences; as an example, the Environmental Integrity Project [reports](#) that wood pellet manufacturers skirt the Clean Air Act, and is taking legal action against air permits at some of the largest pellet plants in the world. Recently,

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/meta>

¹⁰ Achat, D. L., M. Fortin, G. Landmann, B. Ringeval and L. Augusto (2015). "Forest soil carbon is threatened by intensive biomass harvesting." *Scientific Reports* 5: 15991.

¹¹ Booth, 2018

¹² UK Government. Contracts for difference scheme for renewable electricity generation – Government response to consultation on proposed amendments to the scheme – Part B. August, 2018. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/736640/Consultation_document.pdf

¹³ PFPI. New UK biomass policy removes subsidies for high-carbon wood pellets. Sept. 3, 2018. At <http://www.pfpi.net/new-uk-biomass-policy-removes-subsidies-for-high-carbon-wood-pellets>

¹⁴ Booth, M. S. (2014). *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal*. Pelham, Massachusetts, Partnership for Policy Integrity. At <http://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

regulators in Louisiana announced they will [require additional pollution controls](#) at a pellet plant owned by Drax.¹⁵

European Rules for Biogenic Carbon Accounting

The IPCC system of country-level CO₂ accounting deducts wood harvested for bioenergy from a country's forest stocks as part of land-use emissions reporting; to avoid double-counting of the carbon loss, CO₂ emissions from biomass combustion are not included in a country's energy sector emissions reporting.¹⁶ The convention of not counting bioenergy emissions in the energy sector has unfortunately been mischaracterized as implying the IPCC treats biomass as "carbon neutral," when in fact the IPCC is careful to explain that that *"The IPCC Guidelines do not automatically consider biomass used for energy as "carbon neutral," even if the biomass is thought to be produced sustainably, because . . . in any time period there may be CO₂ emissions and removals due to the harvesting and regrowth of bioenergy crops."*¹⁷

The IPCC accounting principles were enshrined in the Kyoto Protocol (KP). However, when countries not covered by the KP (such as the US and Canada) ship pellets to Protocol Signatory countries (such as the UK), the [carbon is not accounted for](#) because the US does not directly measure the carbon released by forest harvesting for wood pellets, and the EU does not count biomass emissions in the energy sector, nor require companies to purchase carbon allowances for bioenergy under its carbon trading program.¹⁸ This loophole will be carried forward in new carbon accounting rules for the EU that come into effect in 2021. At the same time, the EU's renewable energy rules allow countries in Europe to provide lucrative subsidies to wood-burning power plants, which has served as a powerful incentive for the wood pellet industry. The combination of inadequate accounting and ongoing subsidies for forest biomass has led to a [lawsuit being filed](#) to annul the biomass provisions of the European Union's Renewable Energy Directive.¹⁹ Environmentalists and citizens are not the only ones that object to subsidies for bioenergy; the main lobbying group of the US pulp and paper industry, the American Forest and Paper Association, has taken a strong stand against these subsidies, [stating](#) that "Foreign governments should eliminate or minimize subsidies that distort the U.S. market for biomass."²⁰

¹⁵ Environmental Integrity Project. Louisiana orders wood pellet plant to install air pollution controls. Feb 5, 2019. At <http://www.environmentalintegrity.org/news/louisiana-orders-wood-pellet-plant-to-install-air-pollution-controls/>

¹⁶ Haberl, H., et al. "Correcting a fundamental error in greenhouse gas accounting related to bioenergy." *Energy Policy* 45: 18-23.

¹⁷ Intergovernmental Panel on Climate Change. Frequently Asked Questions. At <https://www.ipcc-nggip.iges.or.jp/faq/faq.html>

¹⁸ Brack, D. (2017). *Wood Biomass for Power and Heat: Impacts on the Global Climate*. London, UK, Chatham House. At <https://www.chathamhouse.org/sites/default/files/publications/research/2017-02-23-woody-biomass-global-climate-brack-final2.pdf>

¹⁹ A description of the lawsuit is at www.eubiomasscase.org.

²⁰ AFPA. July, 2018. *Biomass, Renewable Energy Mandates Distort Markets*. At <https://afandpa.org/docs/default-source/1pgrs/2018-summer-update/biomass-and-renewable-energy-july-2018.pdf>

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Many European NGOs, including Transport and Environment, BirdLife Europe, and the European Environmental Bureau, [have called](#) for an end to treating biomass as a zero-emission form of energy due to the rise in biomass use across the continent.²¹ The use of biomass in Europe is currently heavily subsidized and the demand is quickly outpacing the amount of local biomass available, making countries highly dependent on imports for new bioenergy facilities.

Case Study on Enviva

As demand in Europe has grown, U.S. companies are scaling up to meet this demand using Southern forests. Enviva is the largest producer of wood pellets for biomass energy in the United States, and will be producing between 3 and 4 million metric tons of pellets as of mid-2019. This amount of pellets requires 8 – 9 million tons of green ‘roundwood.’²² Any claims for benefits associated with wood pellet based biomass energy must be tempered with an understanding of the controversial issues surrounding its production and use.

In 2016, the Partnership for Policy Integrity (PFPI) filed [a report with the SEC](#),²³ claiming, among other things, that Enviva’s claims that biomass ‘reduces’ emissions relative to fossil fuels are misleading. As of early 2019, Enviva’s website is still claiming that “switching from coal to biomass reduces emissions of carbon dioxide by between 74 and 90% on a lifecycle basis,”²⁴ without disclosing that this estimate does not include the carbon dioxide emitted by burning the pellets.

Enviva’s use of hardwood trees is also of concern. As of early 2019, Enviva is [reporting](#) that 55% of the wood it uses is from hardwood,²⁵ meaning this wood is likely sourced from natural forests, rather than pine plantations.²⁶ Enviva’s advertising [downplays](#)²⁷ its use of whole trees in manufacturing and

²¹ Transport and Environment (2015). Reasons to change the zero-rated criteria for biomass in the EU ETS, BirdLife, European Environmental Bureau, and Transport & Environment. At https://www.transportenvironment.org/sites/te/files/publications/2015%2001%20biomass%20ets_rating_FINAL.pdf

²² Roundwood refers to tree trunks and high-diameter branches. See Forisk Blog. Revisiting wood-use conversions and projections for bioenergy projects. August 12, 2014. at <http://forisk.com/blog/2014/08/12/revisiting-wood-use-conversions-projections-bioenergy-projects/>.

²³ Booth, M. S. (2016). Carbon emissions and climate change disclosure by the wood pellet industry- a report to the SEC on Enviva Partners LP. Pelham, MA, Partnership for Policy Integrity. at <http://www.pfpi.net/wp-content/uploads/2016/03/Report-to-SEC-on-Enviva-March-14-2016.pdf>

²⁴ Enviva Biomass website. FAQ: Most Frequently Asked. At <http://www.envivabiomass.com/faq-most-frequently-asked/>. Accessed January 10, 2019

²⁵ Enviva “Track & Trace” website, at <http://www.envivabiomass.com/sustainability/track-and-trace/>.

²⁶ Plantations typically contain pines, not hardwoods, which grow in natural forests that are generally not replanted after cutting unless converted to pine.

²⁷ Enviva Biomass website. FAQ: Most Frequently Asked. At <http://www.envivabiomass.com/faq-most-frequently-asked/>. Accessed January 10, 2019

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emphasizes its use of forest residues and unusable ‘waste’ material. In reality, Enviva harvests from [tens of thousands of acres](#)²⁸ and is responsible for the significant release of forest carbon each year.

The Southern Environmental Law Center (SELC) [has stated](#) that the increased logging of hardwood forests threatens vulnerable species and biodiversity hotspots, as pine plantations and already-depleted bottomland hardwood forests are clear-cut to supply wood pellet production.²⁹

[The Dogwood Alliance](#), a nonprofit based in North Carolina (a state with three Enviva plants) has exposed evidence of Enviva using whole trees to produce wood pellets, publishing [photos and reports](#) that track trees from clear-cuts to Enviva processing plants.³⁰ Based on Enviva’s own data, Dogwood³¹ that 49% of Enviva’s feedstock comes from natural or semi-natural forests, some of which are fragile wetlands, and the balance comes from plantations. Dogwood has been fighting Enviva’s continued expansion in the South, especially in low-income environmental justice communities, [which are](#) 50% more likely to have a biomass facility than higher income communities.³²

Enviva’s pellet manufacturing plants also emit conventional air pollution. The Environmental Integrity Project’s [report](#) on pollutants from wood pellet manufacturing accuses Enviva of being among “the dirtiest in the industry.”³³ Their investigation found several documented cases of high pollution and highlighted a general trend of air quality violations and a lack of oversight. According to their investigation, for several years, the company routinely refused to install appropriate abatement technology, leading to two North Carolina Enviva plants having volatile organic compound (VOC) emissions levels that are six times higher than other local wood pellet manufacturers. While Enviva has received a permit and applied for another one to add some VOC controls at these two plants, at one of the plants, Enviva Sampson, Enviva continues to reject controls that are common in the industry as being too expensive. As a result, the Sampson mill would be authorized to emit 840 tons of VOCs per

²⁸ Dogwood Alliance. 2018. Destroying Southern Forest for International Export. At <https://www.dogwoodalliance.org/wp-content/uploads/2017/08/Acres-of-Pellets-Fact-Sheet.pdf>

²⁹ Southern Environmental Law Center (2018). Burning trees for power: the truth about woody biomass, energy and wildlife. Chapel Hill, NC. At https://www.southernenvironment.org/uploads/publications/Biomass_Biodiversity_white_paper.pdf

³⁰ Dogwood Alliance, Southern Environmental Law Center, and Natural Resources Defense Council. 2017. European Imports of Wood Pellets for “Green Energy” Devastating US Forests. At https://www.dogwoodalliance.org/wp-content/uploads/2017/05/NRDC_2014-2017Booklet_DigitalVersion-resize.pdf

³¹ Dogwood Alliance. Destruction in Disguise. March 15, 2018. At <https://www.dogwoodalliance.org/2018/03/destruction-in-disguise/>

³² Koester, S. and S. Davis (2018). "Siting of wood pellet production facilities in environmental justice communities in the Southeastern United States." *Environmental Justice* 11(2). At <https://www.liebertpub.com/doi/pdfplus/10.1089/env.2017.0025>

³³ Anderson, P. and K. Powell (2018). Dirty Deception: How the Wood Biomass Industry Skirts the Clean Air Act, Environmental Integrity Project. At <http://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

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year, more than any other pellet plant in the nation.³⁴ Similarly, the Environmental Integrity Project reports that Enviva's Cottondale plant in Florida emits nearly 500 tons of VOCs but is still not required to equip the industry-standard of technology. When the State of Florida proposed requiring those controls at that facility, Enviva rejected the controls as not "cost effective" despite the fact that a similar pellet mill across the state line in Georgia uses those same controls and emits just 130 tons of VOCs per year as a result.³⁵ At Enviva Southampton, the company decided not to install control technology required by that plant's initial air permit and switched to utilizing less-VOC-heavy hardwoods as 90% of their feedstock, increasing the threat to endangered forests. The Southampton plant has finally opted to install VOC controls, under an imposed deadline from the Virginia permitting authority due to concerns over excess emissions.³⁶

Enviva [shareholder reports](#) indicate the company is growing rapidly, opening new plants and ramping up production.³⁷ The bioenergy tracking company Forisk indicates business is booming for Enviva, stating recently that "*Enviva Hamlet's (NC) 600 thousand metric ton facility is scheduled to be online by the first half of 2019. The company recently announced plans to build a new facility in Lucedale, MS, which is expected to be 600 thousand metric tons. Enviva has also announced numerous capacity increases at existing facilities: Enviva Greenwood is expected to reach 600 thousand metric tons by 2019; Enviva Sampson is increasing capacity by 100 thousand metric tons in 2019; Enviva's Northampton and Southampton mills are expanding capacity by a combined 400 thousand metric tons in 2020.*"³⁸

Conclusion

If nothing is done to stop the proliferation of wood-fired power plants, we may look back in 15 years and wonder what the impact on climate might have been if forests had been restored, instead of liquidated for energy. Collectively, there is a very brief time horizon to get this right. Investors have an important role to play in ending over-exploitation of forests for biomass fuel.

³⁴ Enviva, Application for PSD Permit Modification for Softwood Expansion Project at Enviva Pellets Sampson (Mar. 30, 2018) at 30; *see also id.*, at Table 2, Appendix C.

³⁵ Letter from Michael Carbon, Ramboll (consultant for Enviva), to David Read, Environmental Administrator, Florida Department of Environmental Protection (Dec. 14, 2018); *see also supra*, note 23.

³⁶ Letter from Michael Dowd, Director, Virginia DEQ Air and Renewable Energy Division, to Royal Smith, Executive Vice President, Enviva Pellets Southampton (Aug. 1, 2018).

³⁷ Enviva Biomass. EVA Investor Presentation, June 2018. at https://ir.envivabiomass.com/sites/envivabiomass.investorhq.businesswire.com/files/doc_library/file/EVA_Investor_Presentation_June_2018_vFinal.pdf

³⁸ Forisk Blog. Wood pellet capacity continues to increase in the U.S. South. Feb 26, 2019. At <http://forisk.com/blog/2019/02/26/wood-pellet-capacity-continues-increase-u-s-south/>