AS YOU SOW

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BUILDING A SAFE, JUST, AND SUSTAINABLE WORLD SINCE 1992

March 13, 2019

Dear Green-Impact Investor,

On Wednesday, February 27, 2019, *As You Sow* and a group of 27 SRI institutions, investors, and advisors filed a petition with the Securities and Exchange Commission (SEC) requesting the SEC to issue guidance under regulation S-K regarding how companies should disclose information about emissions of greenhouse gases from manufacturing and use of biomass-based fuels and products. A copy of the SEC petition can be found here. On Monday, March 4, 2019, a coalition of plaintiffs composed of individuals and non-governmental organizations (NGOs) from different countries filed suit with the European General Court challenging the European Union (EU)'s treatment of forest biomass as a renewable fuel in the EU's 2018 revised Renewable Energy Directive (RED II).

As Green-Impact investors, we would strongly benefit from accurate and comparable disclosures in which any claims of emission reductions, and by extension climate benefits, are adequately substantiated by biomass companies. For your reference, we have attached a summary memo and 2 other documents that *As You Sow* submitted to the SEC as supporting materials to the above-mentioned petition. These documents are provided to help you with your due diligence when evaluating biomass investments for your portfolio and for companies held within green-impact mutual and hedge funds.

The issue of biomass is complex due to a range of factors including Paris compliant carbon definitions. It is important that you understand the context for some claims that companies in the biomass industry make regarding the carbon impact of burning their wood-pellet products.

If you have questions or would like to discuss any of the materials in this memo please be in touch.

Best

Andrew Behar
CEO,
As You Sow

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EXHIBIT A

AS YOU SOW

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 CO_2 per megawatt-hour than fossil-fired plants, burning biomass is often treated in regulations as having zero CO_2 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 resequester 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 CO_2 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.

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[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

Power plants that burn biomass generally emit more CO_2 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 CO_2 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 CO_2 stack emissions but also the net emissions impact over time, taking into consideration "foregone carbon sequestration" due to forest harvesting – that is, the CO_2 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 CO_2 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 CO_2 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 CO_2 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

occur over years to decades while burning those residues creates immediate CO_2 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 Integrity[14] 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 CO_2 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, CO_2 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 CO_2 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]

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[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

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

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, Dogwood[31] 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 Southestern 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

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/

EXHIBIT B

Clear Cut

Wood Pellet Production, the Destruction of Forests, and the Case for Environmental Justice

RACHEL CARSON COUNCIL

Clear Cut

Wood Pellet Production, the Destruction of Forests, and the Case for Environmental Justice

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RACHEL CARSON COUNCIL

The Rachel Carson Council, founded in 1965, is the national environmental organization envisioned by Rachel Carson to carry on her work. We promote Carson's ecological ethic that combines scientific concern for the environment and human health with a sense of wonder to build a more sustainable, just, and peaceful future.

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We thank Mary Booth, Tavares Bostic, Stefan Koester, Robert Parr, Cary Rodgers, Jack Spruill, Heather Hillaker and the Southern Environmental Law Center, and Rachel Weber, Emily Zucchino and The Dogwood Alliance for sharing their wisdom and advice about wood pellets, justice, and a true clean energy future.

EXECUTIVE SUMMARY

Clear Cut: Wood Pellet Production, the Destruction of Forests, and the Case for Environmental Justice

The industrial-scale production of wood pellets arrived in the Southeastern United States in the early 2000s bolstered by growing European and global need for alternative, sustainable fuel sources. The Rachel Carson Council's new report, ***Clear Cut***, highlights the fallacies and economic and political injustices surrounding the industry, focusing on Enviva, the largest producer of wood pellets globally, and its operations within North Carolina.

Though touted as a clean, environmentally safe alternative to fossil fuels, wood pellets are a carbon-intense, destructive and polluting industry based in flawed carbon accounting in international agreements. Wood pellet material sourcing leads to massive deforestation of critical habitats, and Enviva alone is responsible for 50 acres a day of clear-cut land. Pellet production facilities release dangerous air pollutants including particulate matter and volatile organic compounds putting surrounding communities at higher risk for health complications. Finally, burning wood pellets releases 65% more CO2 than coal per megawatt hour. In order to keep global climate change below 1.5 degrees Celsius, wood pellets must not be used as an energy alternative.

Enviva is a privately-owned corporation operating seven, soon to be eight, processing plants in the southeastern United States which produce three and a half million metric tons of wood pellets each year. Half of these plants are in North Carolina, each of which are sited in environmental justice communities. These communities directly suffer three-fold from wood pellet production. First, as wood pellet plants source within a 70 mile radius, the communities experience higher rates of tree loss leading to lower air and water quality and increased risk of flooding. Second, wood pellet production plants in North Carolina until recently have skirted Clean Air Act requirements, freely emitting dangerous pollutants into the communities. Third, and finally, these communities sit on the coastal plain of North Carolina and are under direct threat from climate change which wood pellet production and consumption contribute to.

Many North Carolina residents understand these dangers and have been fighting back to protect their communities and ensure their environment is not being wasted on this misleading industry. Enviva, however, has continued to expand operations even in the face of community mobilization. It has used North Carolina's favorable political environment and long history of industrial logging operations to ingratiate itself with key decision makers and landowners. From these alignments, it has mislead North Carolinians to believe it is a sustainable industry which bolsters local economies. This has garnered it over $6 million in state and local subsidies and allowed it to skirt critical regulations. The reality is that it has only brought around 250 jobs to the state of North Carolina, lining the pockets of a few, at the direct risk to the health and environment of the many.

Industrial-scale production of wood pellets is entirely unnecessary to combat climate change. It pushes us further away from our climate goals which, according to the 2018 IPCC report, we have even less time to meet, and takes critical subsidies and resources away from real renewable energies like wind and solar. However, this industry has managed to entrench itself in global and local political and economic systems. Taking action against the wood pellet industry requires a coordinated approach from community members, nonprofits and political actors alike. We must work at all levels to bring about systemic change for a more just and sustainable world without wood pellets.

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INTRODUCTION

Clear Cut is the fourth comprehensive report from the Rachel Carson Council. These reports, ***Pork and Pollution***, ***Fowl Matters***, ***Blast Zone***, and now ***Clear Cut***, constitute a series around a common theme central to the work of the Rachel Carson Council and to the ecological ethic of Rachel Carson — environmental justice. Carson is best known for the exposé in her 1962 classic, ***Silent Spring***, of the harmful effects of pesticides like DDT on wildlife and on human beings alike. But Carson's larger, more enduring contribution — in her writing and in her environmental and political advocacy — is the combination of reverence, awe, and wonder for all living things, their interdependence, and their beauty, along with stark warnings of the destructive nature of human arrogance in attempting to control and dominate nature in the interests of efficiency, profit and greed. Faced with environmental degradation and harm to animals or humans, Carson consistently reminds us, action must be taken, something must be done.

In addition to toxic chemicals, Rachel Carson also wrote about the inhumanity and health risks of factory farms in her "Introduction" to Ruth Harrison's ***Animal Machines*** (1964) and about the dangers of nuclear weapons testing and radioactive wastes in the "Preface" to her revised edition of ***The Sea Around Us*** in 1961. Here Carson spoke eloquently about how radioactive fallout, carried through bioaccumulation and the food chain, endangers a nursing Inuit mother and her child in the seemingly remote Arctic. Carson felt keenly the injustice of harming those who bore no responsibility for their own degraded environment and who had limited financial and political resources to fight back. Carson understood environmental justice long before the term and a sustained movement to combat it arose in North Carolina in the 1980s.

In each of our previous reports, and, as we document in ***Clear Cut***, the environmental harms described also cause global climate change — from the methane from animal wastes, the methane from natural gas, and the CO2 produced from fossil fuels used during the industrial processes involved. In ***Clear Cut***, the damage to the environment and to humans comes from a relatively new, rapidly growing and little-known form of energy production that incinerates huge amounts of industrially produced wood pellets to create electricity.

As you will see, these wood pellets are increasingly manufactured out of woods and forests that are clear cut throughout the Southeast, and especially in North Carolina on which we focus. The pellets are then shipped from the U.S. to the European Union and Great Britain to produce electricity and heat. Ironically, these nations are then given credit toward climate change goals under the Paris Accords, since such "biomass" production is counted as renewable and carbon neutral. As we report in ***Clear Cut***, it is neither. What is left behind is a growing area of ugly, devastated woodlands which will not become forests again, if ever, for about a half century. All of the benefits of forests — wildlife, biodiversity, clean air, clean water, the absorption of CO2 — and the aesthetic, psychological, and recreational benefits that come with them, are lost for at least two generations. And, once again, the pollution, noise, and adverse environmental health effects are concentrated in predominantly low-income, people of color and indigenous communities. Worse, the communities we focus on, such as Northampton and Richmond Counties in North Carolina, are the very ones already suffering heavily from factory farms and natural gas infrastructure.

Rachel Carson had just learned about the newly-emerging science of global climate change when she died in 1964. But she had already observed, written and speculated about the causes of our warming climate in the United States. And, she had described the beauty of forests and fought actively to protect and preserve a coastal forest in Maine near her summer cottage in Southport.

Her description of what she called "The Lost Woods" captures some of what would have been lost there; it also captures the beauty of what has been lost, and increasingly will be lost, in North Carolina unless wood pellet production is finally halted:

Photo: Rachel Carson at microscope, 1951 Brooks Studio

> Behind this [the shoreline] is the wonderful, deep, dark woodland — a cathedral of stillness and peace. Spruce and fir, some hemlock, some pine, and hardwoods along the edges where a fire once destroyed what was there and set in action the restorative forces of nature. It is a living museum of mosses and lichens, which in some places form a carpet many inches deep. Rocks jut out here and there, as a flat floor where only lichens may grow, or rising in shadowed walls. For the most part the woods are dark and silent, but here and there one comes out into open areas of sunshine filled with the wood's smells. It is a treasure of a place to which I have lost my heart, completely.…I have had many precious moments in these woods, and this past fall as I walked there the feeling became overwhelming that something must be done.

Something must be done. The urgency of taking action to prevent clear cutting forests to produce electricity in Europe is greater than ever as a result of the devastating flooding and destruction caused by Hurricane Florence in September 2018. Cutting down forests is a contributor to global climate change, fueling fiercer hurricanes like Florence. So is burning wood pellets on a huge, industrial scale. An end to wood pellet production and the preservation of forests, as ***Clear Cut*** makes evident, would help mitigate climate change; it would provide natural buffers against what, unfortunately, will be further flooding and damage unless we act now. And it would begin to restore some measure of health, well-being, and justice for those Americans, often poor and of color, whose families and homes suffer, through no fault of their own, from their proximity to clear cutting and wood pellet facilities.

These Americans have already begun to take action. But it will take even a broader movement of people and organizations — in North Carolina and throughout the United States – to support them and save our forests and ourselves. We hope that ***Clear Cut*** will give you the information, resources, and resolve to take action along with us and the growing resistance to clear cutting that has inspired us.

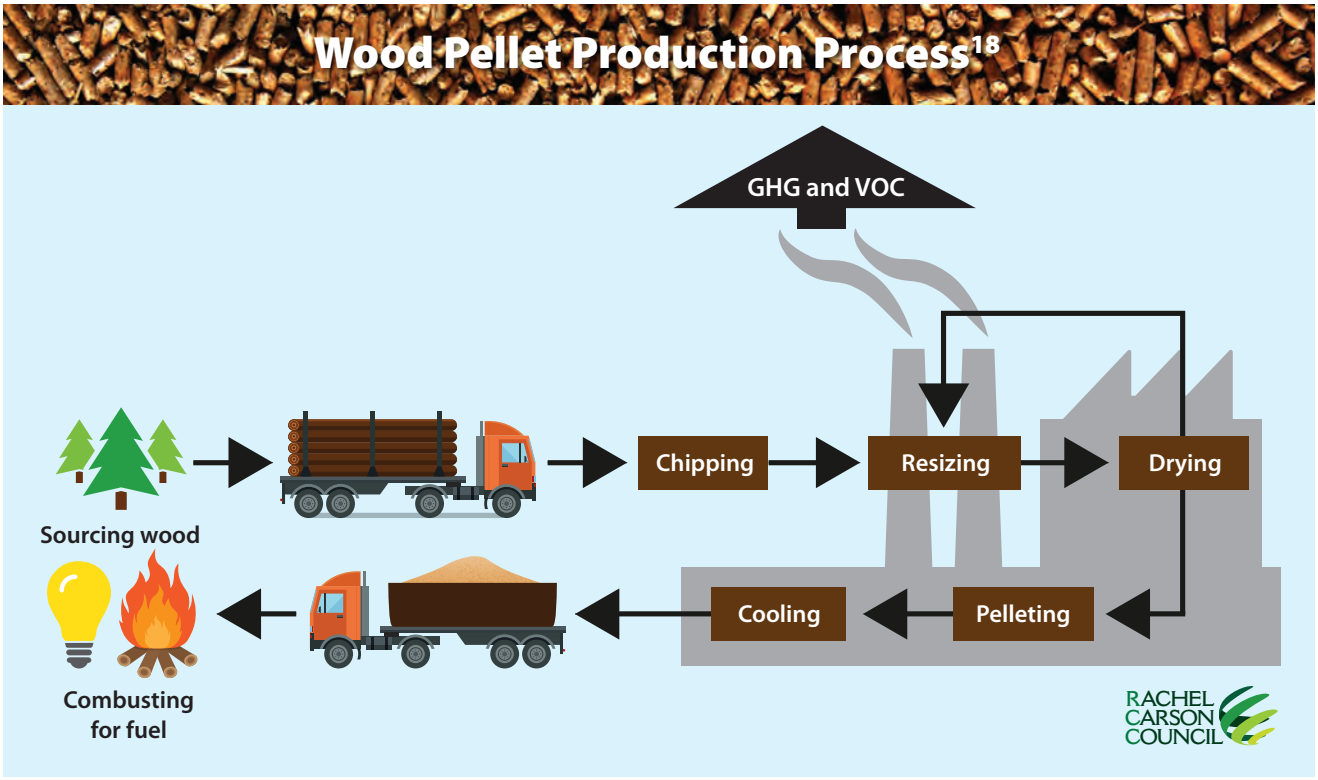
Clear Cut is designed to provide the evidence you need, not only to understand why wood pellet production has burgeoned in just over a decade, but also how you and the communities and organizations we describe can, together, act to stop it.

Robert K. Musil, Ph.D., M.P.H., President & CEO
Alexandra Wisner, Assistant Director, Policy and Programs

THE WOOD PELLET INDUSTRY: CURRENT AND FUTURE TRENDS

The wood pellet industry is a growing global industrial enterprise, but its effects, in addition to causing global climate change, are felt in particular places and communities. How and why the industry and corporations like Enviva are thriving in the United States, especially the Southeast and North Carolina the site of its largest concentration for clear cutting and wood pellet production, are critical to understanding current and future trends and how ultimately they can be slowed and stopped.

In the early 2000s, industrial-scale wood pellet production moved to the southeastern United States prompted by growing demand from the European Union. The exponential increase in production and demand rose out of heightened international pressure to implement renewable alternatives to carbon-intensive fossil fuels. Fossil fuels are major causes of climate change and domestic energy insecurity that take millions of years to renew themselves.[1] Trees, on the other hand, take in and **sequester** carbon dioxide as they grow and have the potential to renew themselves in a relatively short amount of time to consistently satisfy large demands for energy.[2]



Wood, in its raw form, contains water and is inconsistent in size and shape, making it inefficient to process and transport in the energy sector.[1] Wood pellets do not have these drawbacks because they are created through a process of drying, chopping and compressing wood into a small, dehydrated cylinder. Further, wood pellets can be created from waste byproducts from other timber industries such as misshapen trees, tree tops and saw mill chips, making them an even more attractive option for a renewable fuel.[3]

Another key selling feature of wood pellets is that they can be used in pre-existing coal-fired power plants without requiring significant short-term economic investment, creation of new infrastructure, or job loss and re-training costs associated with switching to wind and solar. For countries and environmentalists around the world looking to make a switch to more renewable sources of fuel, wood pellets can seem to be the most economically and structurally sustainable option that would not require a drastic change in the status quo.

Photo: Wood pellets; D-Kuru, Wikimedia Commons[1]

The "Green" Myth Behind Wood Pellets:

These hopes are misguided. In recent years, devastating carbon accounting errors have been discovered and new science has been brought to light that destroys the idea that wood pellets are a "green" fuel source. Now, however, a thriving industry has grown around these mistakes, and countries in the EU have become dependent on wood pellets to meet their climate goals. So, how did green myth start and why does the industry continue to grow?

1. Bad Accounting in International Agreements:

Wood pellets were originally used in personal-use wood stoves in the 1980s after the unstable oil prices of the 70s.[4] As prices leveled, they fell into a steady decline until the early 2000s when EU climate mitigation policies and a carbon accounting error made them incredibly attractive to European countries attempting to meet their climate goals.

In the 1990 International Panel on Climate Change (IPCC) climate assessment, two of the categories for counting **greenhouse gas** (GHG) emissions were energy use and land use.[5] To avoid double counting the carbon emitted from using forests for energy, these numbers were only counted in the land-use section of the report.[6] The intent was not to suggest that these emissions were **carbon neutral**, but this oversight opened the way for the thriving wood pellet industry we see today.

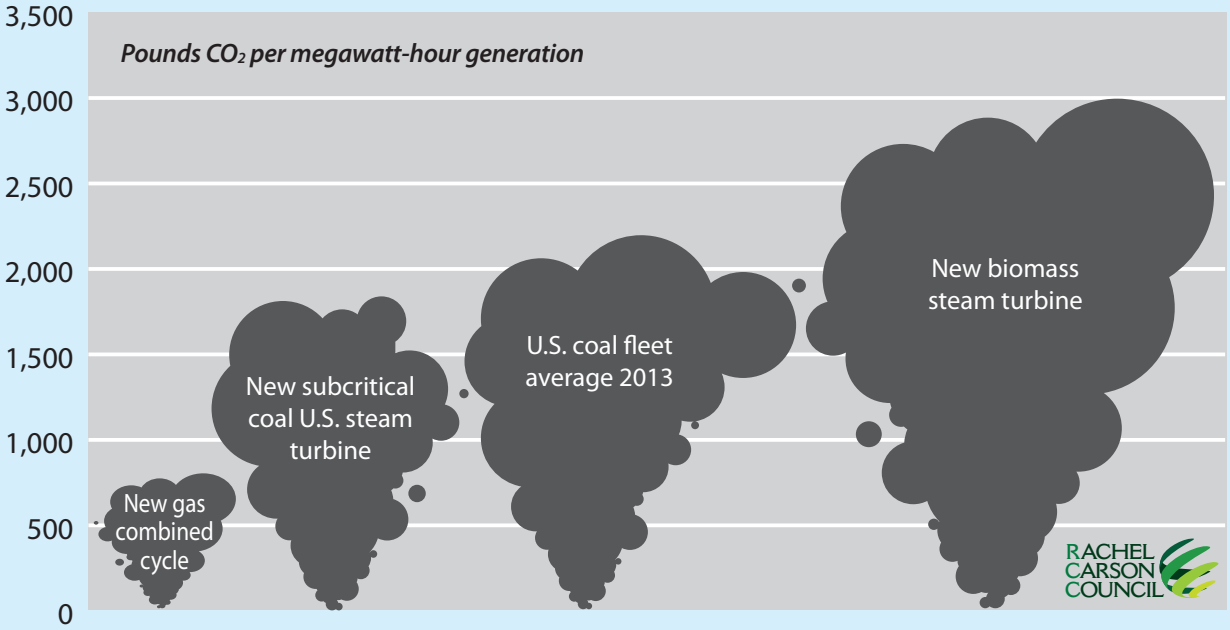
The 1992 United Nations Framework Convention on Climate Change (UNFCCC) further entrenched this problematic approach to carbon accounting.[7] This international policy required countries to report their greenhouse gas emissions in different categories. When industries **clear cut** forests for fuel, the carbon lost from the forest was recorded solely under land-use emissions.

The 1997 Kyoto Protocol and E.U. Renewable Energy Directives from 2005 to present have since followed this model.[7] These later international policies treat wood as carbon-neutral without recognizing the emissions from deforestation.[7] This omission wrongly allows nations to claim their wood-derived energy is a carbon-neutral tool for combating climate change.[7]

With the way clear, the small and dwindling wood pellet industry seized upon its new 'carbon neutral' status and found a niche in European markets which had large carbon reduction goals but lower access to other renewable sources like solar and wind energy. Wood pellets are further attractive in European countries with large coal infrastructure because they can be combusted to generate energy with coal in coal power plants or without coal in converted coal power plants.[8] The United Kingdom, for example, with massive coal infrastructure where annual available sunlight is only half of that of Los Angeles, California [9, 10], relies on wood pellets to achieve its carbon reduction commitments.

As the market for wood pellets grew, so did the concern over this climate accounting error. Now, there is a well-respected and growing body of research demonstrating that wood pellets are neither carbon-neutral nor sustainable.[11] **Many of these studies, like one done by the NRDC in 2015, have found that burning wood pellets for fuel releases as much as, or even more, carbon dioxide per unit of energy than coal.[12, 13]**

Comparison of Power Plant Emissions[1]



If you have ever sat downwind from a campfire, you know wood doesn't burn cleanly. Even without the particulates released from combustion that threaten European health, biomass emits more carbon to get the same amount of heat than most fossil fuels. Biomass energy is excessively inefficient and bioenergy power plants emit approximately 65 percent more CO2, per MWH than modern coal plants, and approximately 285 percent more than natural gas combined cycle plants.

2. Source Materials: Waste Products?

Various factors affect the science behind total carbon emissions of wood pellets and thus their claim as a green energy source. These include the source material for pellet production, the time frame studied, and forest management practices after harvest.

Many believe that the wood pellet industry only consumes waste material from other wood-based industries which have no use for misshapen trees, saw mill waste and the top limbs and roots of processed trees. If the industry did not use these products, they would be thrown away and decompose. Wood pellets are carbon-neutral **if and only if** pellets exclusively consist of forest by-products and residues.[14] This practice ensures that carbon emissions from sourcing are less than those of an unharvested forest.[15]

The problem is that international demand for wood pellets, due to misguided designs in renewable energy policies, is so high that the industry cannot rely on residues alone. As of now, it is difficult to ascertain the precise amount of whole forest products which are used in wood pellet operations, but environmental groups have done investigations following clear cut trees directly to wood pellet production facilities.[16, 17]

Photo: Dogwood Alliance, Wetland Logging Investigation of Enviva2

3. Natural regeneration of trees:

The natural regeneration of trees underpins many assumptions that wood pellets are carbon-neutral. Theoretically, trees that regrow after being harvested for wood pellet production can act as **carbon sinks** to offset the increase in atmospheric carbon coming from the production, transportation and combustion of wood pellets.[2, 14] In truth, much of the wood sourced for the wood pellet industry, both waste products and whole trees, comes from plots with no proper plan for reforestation.[18]

If plots do have plans for reforestation, it is key to understand that their ability to sequester carbon is dependent on *how* they are reforested. A recently published scientific study conducted over eight years demonstrated that plots of land with greater forest species diversity absorb more carbon than those with only one species.[19] However, in areas of the southeastern United States, because of inadequate forest oversight, reforestation plans often allow for owners to replant using just a singular species.[20, 21] Most often, these are pine plantations valued for their commercial need and fast growth rate. Between the 1950s and the early 2000s, pine plantations in the Southeast grew by 30 million acres, drastically decreasing the forest diversity of the region.[22]

Even if biodiverse forests are fostered in areas of clearcutting, we have run out of time to wait for the trees to regrow. Given that climate change impacts are already disrupting the planet, committing to net zero emissions and decreasing atmospheric carbon is essential. It is necessary to contain global temperature rise to 1.5°C or less within the century before we face a human-induced, irreversible environmental catastrophe.[23] However, it takes a half-century for new trees to remove carbon dioxide from the wood pellet process.[24] The time lag for trees to regrow and pay off their **carbon debt** undermines the very efforts the renewable portfolio standard, Paris Agreement, and E.U. climate targets were initially designed for: immediate climate change mitigation. The best strategy to lower atmospheric CO_2 levels is to preserve and expand forests, rather than destroy them and use trees as fuel.[25]

4. Misnomers for the industry:

To better understand how wood pellet production based on mistaken notions is perpetuated, it is critical to understand the misuse of language to describe the industry, specifically the difference in meaning between carbon-neutral, 'green', renewable and sustainable since these terms should not be interchangeably used. **Renewable** energy only relates to the ability of any energy source, like trees, to regenerate over time, often when referring to a timespan relevant to human life. However, this does not inherently mean that the process of using trees as a fuel is carbon-neutral. A **carbon-neutral** fuel source indicates that whatever carbon is released during the production and consumption of a fuel is, in the end, absorbed, stored, or 'sequestered.' Finally, **sustainable** fuel is a resource that is renewable, carbon-neutral and has limited negative effects on the environment.

Carbon-Neutral vs. Renewable vs. Sustainable

Carbon-Neutral: an energy resource that produces a net zero change in atmospheric carbon dioxide levels; the life-cycle emissions from producing the energy are offset by the source's carbon sequestration efforts

Renewable: an energy resource that naturally replenishes with time, such as the growth of new organisms or the natural recycling of materials

Sustainable: an energy resource that can be produced for the foreseeable future without significantly damaging the environment

'Green': a colloquial term used to describe any energy source or technology that is environmentally friendly

Note: Renewable resources can be used unsustainably! If an energy resource is used faster than it recreates itself, it will eventually run out despite its renewability.

Under these definitions, the science is unmistakable: wood pellets can, under certain scenarios, be a renewable source of energy, but they are far from a sustainable, carbon neutral fossil fuel substitute.

Unfortunately, on November 1, 2018, the heads of the U.S. Environmental Protection Agency, the U.S. Department of Agriculture and the U.S. Department of Energy sent a letter to the Senate Appropriations Committee in which they stated their agencies would,

"work to ensure consistent federal policy on forest **biomass** energy and promote clear policies that encourage the treatment of forest biomass as a *carbon-neutral renewable* energy solution"[26]

According to the best science available however, this comment is incorrect in its description of forest biomass. It more accurately reflects the current political penchant in favor of U.S. industrial expansion regardless of the environmental impacts both locally and globally.

Wood pellets can only be a clean alternative if their total GHG emissions are less than those of the fossil fuels they displace and if the forests they come from are replaced.[14] Science has moved on. Why hasn't the world?

Current Status & Growth

In 2009, the European Union created their 2020 Renewable Energy Directive. This policy sets a collective target for 20% of total energy generation from renewable sources by 2020; it includes all forms of biomass as carbon-neutral and sustainable sources. As a result, it has driven some of the world's largest energy consumers to turn to wood pellets to meet this goal without heavy investment in new infrastructure. Wood pellets now account for nearly half of the E.U.'s "renewable" energy production.[27]

As the European Union is quickly approaching the 2020 deadline for its commitments, it is becoming ever more crucial to maintain the myth behind wood pellets. For example, the U.K. is struggling to meet its target of 15% total generation and 30% electricity coming from renewables.[28] Falling short on renewability goals would result in geopolitical consequences for the U.K. and climate penalties for the planet. Rather than increase investment in sustainable, carbon-neutral energy sources to address climate change, the U.K. has simply increased its dependency on wood pellets. In 2014, an international lawyer at the Department of Energy and Climate Change in London told Tufts University professor and biomass energy expert, Dr. William

Moomaw, that if the U.K. does not count bioenergy as carbon neutral, it will fail to meet its obligations to the European Union.[29] Although wood pellets will allow the British government to appease geopolitical demands, they will do so without truly addressing the growing climate crisis.[A]

The economic and political power of the wood pellet industry and its allies solidifies their dominance in countries' **energy mixes**. A key financial incentive for wood pellet consumption is that wood pellets can be integrated into existing fossil fuel infrastructure thus retaining jobs. The decades-long dominance of the fossil fuel industry established significant economic activity around a vast network of power plants. Fossil fuel power plants can burn wood pellets alongside coal or use wood pellets as the main feedstock.[8] Converting coal plants to biomass energy plants is cheaper in the short-run compared to investing in new infrastructure for more sustainable renewables such as solar and wind.

In order for the wood pellet industry to operate in the U.K., which remains the largest importer, the government must provide large subsidies and avoid high infrastructure costs. The U.K. accesses different subsidy regimes by framing wood pellets as a green tool for combating climate change.[8] Without this financial support for biomass, the industry would struggle to be economically sustainable.[8] In 2015, The U.K. Energy Minister announced that the nation's coal fired power generation would end within a decade.[30] As coal still plays an important part in the U.K.'s electricity generation, wood pellets are an important tool to allow the U.K. to phase out fossil fuels without financing new infrastructure.

Photo:Chris Allen, 2013, Drax Biomass Storage [3]

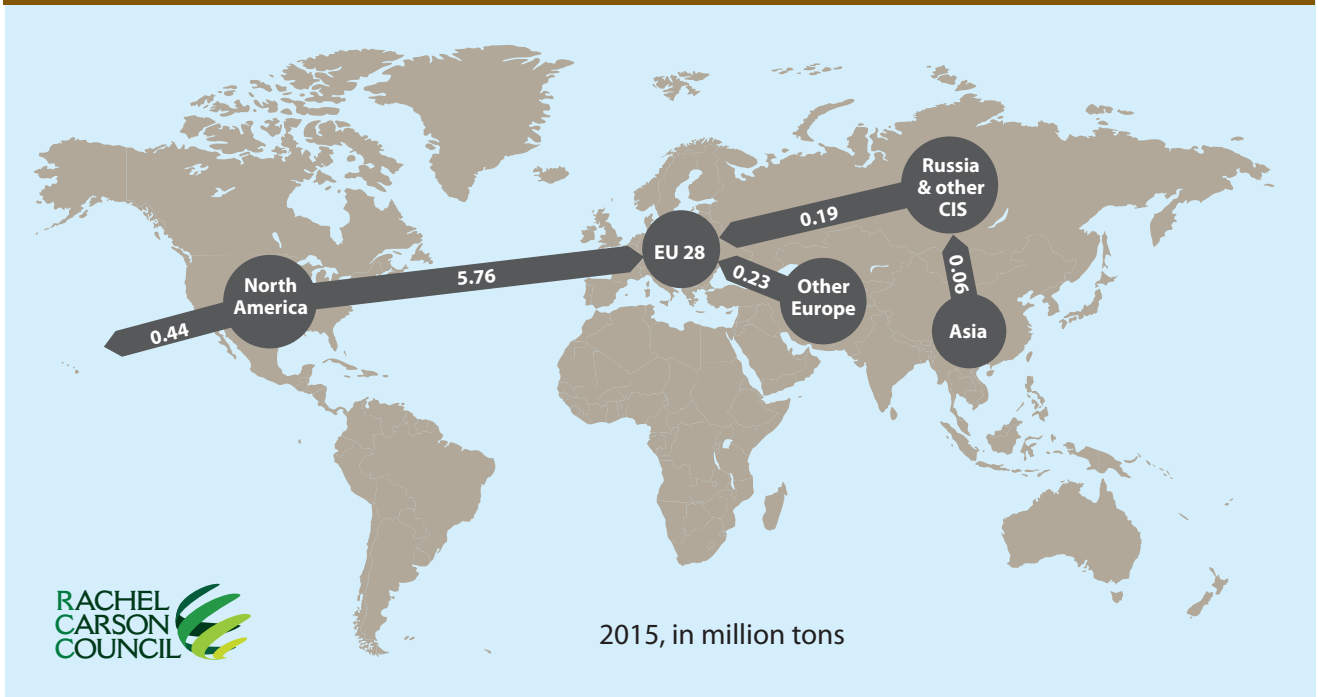
Photo: Andrew Whale, 2011, Drax Power Station [4]

The UK's Drax Power Station is phasing out coal to burn wood for "cleaner" operations. This transition, however, will ultimately increase CO2 emissions.[6] Nevertheless, due to the accounting errors in the EU Energy Directive, the plant is able to avoid tens of millions of dollars in fees for pollution, while receiving hundreds of millions in subsidies.[6] Fuel costs from Drax are sixty-two dollars per megawatt-hour.[6] With the renewable subsidies, the cost goes down to thirty-six dollars, which is nearly half of the actual cost.[6] A report from the Natural Resources Defense Council (NRDC) highlights that such investment in biomass makes poor economic sense.[31] Without the subsidies for biomass, solar and wind power offer greater investment opportunities for a cheaper and more reliable source of electricity.[31] In effect, the UK, as well as the broader European Union, are now victims of a market that was accidentally created to achieve greater carbon neutrality.

Currently, the European continent accounts for more than 75 percent of global wood pellet demand, of which a third goes to power plants to be burned for electricity generation.[8] Now, countries such as Japan and South Korea are increasingly incorporating wood pellets into their renewable energy mix as well.[8] This trend is growing, as on October 31, 2018, Enviva, the world's largest producer of wood pellets, announced it is committed to supply Mitsubishi, a Japanese power supplier, with 630,000 metric tons/year of wood pellets.[32]

[A] As of December 18, 2018, the UK lowered the imported biomass greenhouse gas threshold which means it will no longer be creating new biomass burning power stations. This critically slows the growth of its dependence on wood pellets.

Global Demand for Wood Pellets by Geographic Region[2]



These major consumers of woody biomass primarily import wood pellets from the United States, allowing them to externalize the environmental and human costs of their electricity supply to rural regions in the Southeastern United States.[8]

NORTH CAROLINA & ENVIVA

In the past 15 years, the Southeastern United States has emerged as a major supplier and net exporter of wood pellets. The proximity from the Southeast to Europe and the rich forest resources presented industries a geographical advantage to access European wood pellet markets.[1] This is critical, because in 2015, nearly all of the 4.6 million tons of wood pellets exported from the U.S. were shipped to Europe.[1]

The industry has continued to thrive on the abundant timber resources in the Southeast. The region contains more than 24 million acres of **bottomland hardwood forests** that account for 65% of the total

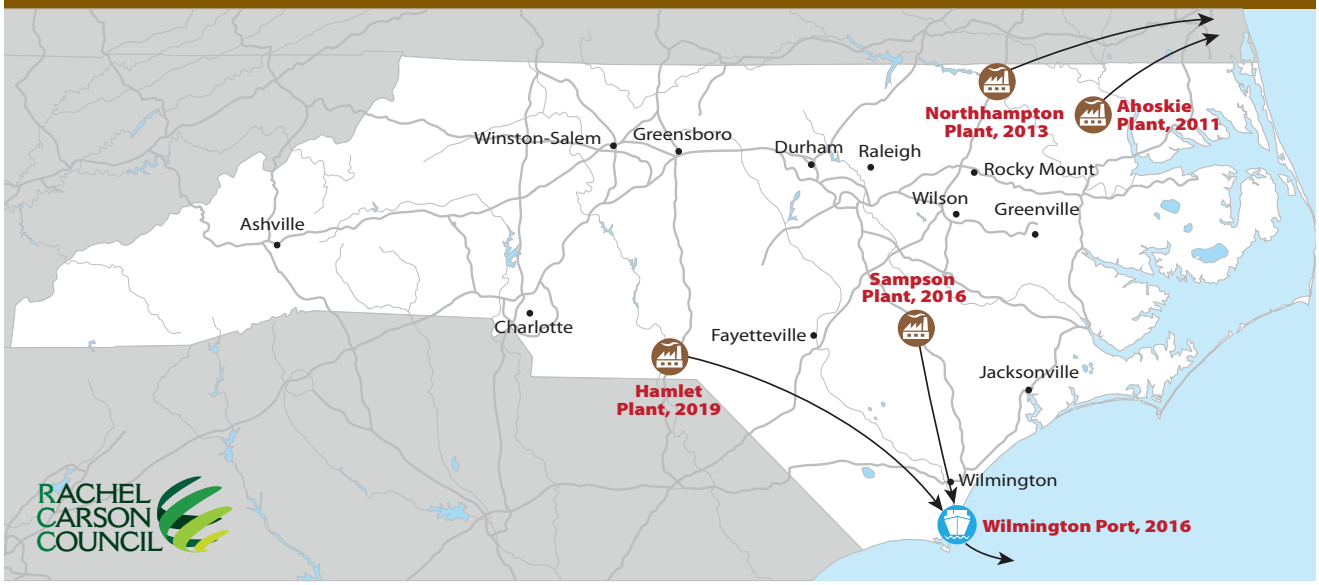
Enviva in the Southeast[18]

amount found in the nation.[2] Large-scale wood pellet plant operations extend throughout Southeastern states including Louisiana, Georgia, Florida, Virginia, Alabama, Mississippi, and North Carolina.[1]

Enviva, the world's largest wood pellet producer, is a key industrial player in the Southeast.[3] Founded and headquartered in Maryland in 2004, the company now owns plants and ports across North Carolina, South Carolina, Virginia, Florida, Alabama, and Mississippi. As of 2018, Enviva's seven processing plants have a combined annual production capacity of nearly three and a half million metric tons of wood pellets.[4] This is the same mass as more than half a million African elephants.[5] Projected growth in global wood pellet demand drives Enviva's operations. The company tells its investors that Denmark, Germany, France, Japan, South Korea, and several other nations will soon need millions of metric tons of wood pellets.[6] Flawed renewable energy portfolios and misguided notions of sustainability underpin this demand.

Acknowledging the rising demand, Enviva plans to increase supply from the Southeastern U.S.[6] Government support has already created an artificially cost-competitive market in the region. Enviva is set to invest hundreds of millions of dollars in new facilities to meet global demand.[6] The company is examining over a dozen new production plants and two seaports as it prepares for expansion, and an eighth plant in Hamlet, North Carolina is under construction to open in 2019.[6]

Enviva in North Carolina[18]



North Carolina is unique because it houses more Enviva facilities than any other part of the country. It is home to three, soon to be four, wood pellet plants that are among the largest in the world — all owned and operated by Enviva. The North Carolina wood pellet plants have an annual production capacity of about 2 million tons, which are more than 15% of the total U.S. annual production capacity.[1] This level of production, though, has put a severe strain on the environment and communities in North Carolina.

INDUSTRIAL EFFECTS: THE ENVIRONMENT, CLIMATE CHANGE & HEALTH

Our environment is not only a "source of livelihood," but it is also where we live.[1, 2] It is where our identity is created: the air we breathe, the water we drink, and the world we see are all intrinsically tied to who we are.[2] Therefore, the "fights for human rights and environment are inseparable."[1]

Environmental health encompasses the idea that people live *along with* nature, which is vulnerable to industrial processes and practices. It aims to maintain an environment that promotes a necessary standard of mental and physical health for humans and other living beings.[3]

As an **extractive industry**, Enviva threatens rural North Carolina communities' environmental health. Its extractive economy depletes natural resources and harms human health in order to create a falsely "green" product.[4] The wood pellet industry harvests forests and never makes independent efforts to regenerate them.

The wood pellet life cycle can be categorized into three key stages: sourcing, processing, and burning. While interconnected, these stages create unique impacts for local and global communities. The following sections closely examine the consequences of sourcing timber and timber products, processing trees into pellets, and combusting pellets for energy.

Sourcing: Clear Cutting & Deforestation

Less than five hundred years ago, the land that is now North Carolina was covered with vast, diverse forests.[5] Native Americans who lived on this land used controlled forest fires and subsistence agriculture to support their communities.[5] These practices worked within natural systems and merely created localized, short-term impacts.[5]

With European colonization, an extractive plantation economy took over, assaulting North Carolina's forests.[5] By the early twentieth century, the overwhelming majority of old-growth forests in North Carolina were decimated.[5]

While their numbers have fallen drastically since pre-colonial times, the state's 18.8 million acres of forests support climate control, biodiversity, clean air, clean water, and other essentials for a healthy ecosystem.[5] Yet with nearly 85% of forests privately owned and up to the discretion of their owners whether or not to be used for timber production, extractive industries like Enviva can easily disrupt these important forests.[6]

Enviva has three key source materials it relies on for wood pellet production – saw mill by-products, forestry waste, and whole trees.[7] Each of these sources is at one point dependent on the practice of clear cutting forests or cutting down all of the trees in a given area of land.

Nevertheless, many still consider the industry as "green" since it claims that it predominantly uses sources that would otherwise be thrown away. The reality can be seen in the photo below taken of clear cut logs at an Enviva plant in North Carolina.

By 2015, it was clear that residual wood waste would be insufficient to supply the wood pellet market.[8] So, Enviva had to turn to whole wood sources. The corporation primarily consumes pine trees found in softwood forests as well as a mixture of bottomland and upland hardwood trees.[9] The softwood tree supply is often sourced primarily from pine plantations that are abundant in North Carolina, but the bottomland and upland hardwood trees generally come from older growth, biodiverse regions critical to the environmental health of North Carolina. Unfortunately, nearly **half of all bottomland hardwoods lie within the sourcing perimeters of Enviva's three operational plants in North Carolina.**[10]

Given the escalating demand across European and Asian markets, Enviva will need to clear cut forests at even faster rates. The adverse effects of deforestation are already apparent. The practice threatens the state's people, plants, animals, insects, and other organisms alike.

Photo: Dogwood Alliance, Enviva Harvest Site, May 2015[5]

Forests and Water

Forests simultaneously depend upon and support the Earth's **hydrologic systems**. They promote groundwater renewal and maintain the proper movement of the water cycle.[10] Forests support strong riverbanks to capture sediment and control water temperature fluctuations. They further provide buffers that promote the health of rivers and of the many different species living in their waters.[11] Healthy forests contain productive soils and vegetation.[10] In addition to acting as carbon sinks, soils are incredibly important for supporting life within and outside of a forest. Within forests, trees guide the formation of soils that are healthy in terms of their depth, structure, and ability to cycle nutrients.[12] Stable soils control water pollution by capturing potential runoff such as sediments and nutrients.[13] River quality is deeply intertwined with the quality of coastal wetland systems that rely on forests to facilitate a clean and flowing water supply. Forests both upstream and close to the coast, therefore, influence river health.[10]

Just as forests support the water cycle, they are critically important for humans as well. North Carolina forests filter, store, and deliver fresh drinking water.[12] More than half the state's population directly depends on groundwater for their water supply.[14] About 98 percent of all public supply systems also rely on groundwater.[14] This means that North Carolina residents have directly benefited from the natural filtration system that forests provide. As North Carolina's population continues to grow, forest support for local freshwater will become increasingly important.[14]

Importantly, forested areas also control flooding by soaking up water, reducing its speed, and creating areas for it to pool.[14] Strong forests protect North Carolinians from extreme weather events such as costly hurricanes.[12] In 2016, Hurricane Matthew caused $4.8 billion in damage, affected 98,000 homes and nearly 20,000 businesses across North Carolina. While the federal government initially committed $1.2 billion toward the recovery, this was still insufficient to properly address housing and infrastructure needs.[15] Cutting down trees for wood pellets further weakens North Carolina's natural defense against such severe weather events.

Hurricane Florence

On September 14th, 2018 Hurricane Florence collided into North Carolina's coast and continued to dump rain inland for three days, flooding homes, towns, roads and multiple coal ash and animal waste pits.

One of the clearest and most devastating impacts of climate change has been the dramatic amplification of damage done to coastlines by hurricanes/tropical cyclones. Hurricanes have increased in frequency, intensity and duration since the early 1980s.[2] According to NOAA, these "observed records of Atlantic hurricane activity show some correlation, on multi-year time-scales, between local tropical Atlantic sea surface temperatures."[3] Sea level rise to date has elevated storm surge, increasing the reach of coastal flooding driven by hurricanes, especially along low-lying areas and coastal plains.[4] Warming seas and a wetter atmosphere are supercharging the deluge delivered by tropical cyclones, increasing flood risk.

By the Numbers

Approximately 2,200 primary and secondary roads closed due to flooding[5]

Damage reached an estimated $12.7 billion[6]

36 lives lost[7]

83% in tier 1 & tier 2 counties[8]

Power outages peaked at 814,351[9]

In countries around the world, governments plant trees to protect their coastlines from climate change. Forests are critical in mitigating the threats of climate change, and it is more urgent than ever to invest in nature to protect our country against the damage that Hurricane Florence and storms like it pile onto our most vulnerable communities in years to come.

Carelessly dismantling these protective resources for short term profit directly undermines the safety of North Carolinians.

Photo: NASA/USGS; Hurricane Florence pollution[1]

Forests and Biodiversity

Beyond fostering healthy hydrological systems, North Carolina's forests support an immense amount of biodiversity. The World Wildlife Fund labeled southeastern forests as "some of the most biologically important habitats in North America."[10] Unique and threatened carnivorous plants like the Venus flytrap and pitcher plants are now only found in limited areas of North Carolina forests. What were once abundant species in the region, like some songbirds, black bears, bats, and butterflies, are now endangered.[10] For example, birds like the Swainson's warbler rely upon North Carolina's tree canopies for migration.[10] These forests also contain the highest diversity of amphibians in North America.[10] Expanding their homes is critical to restoring the populations of these valuable yet vulnerable organisms. Protection of the forests, the rivers, and the species within them is all interconnected.

Species Under Pressure in Bottomland Hardwoods[3, 4, 5, 6, 7]

Swainson's warbler	**Saint Francis' Satyr butterfly**	**Mountain Sweet Pitcher Plant**	**Black bear**
Migrates through bottomland hardwood canopies	*Endangered*	*Endangered*	*Found in hardwoods of North Carolina mountains and coast*
U.S. Fish and Wildlife Service Northeast Region	Wikimedia	U.S. Fish and Wildlife Service Southeast Region	Creative Commons

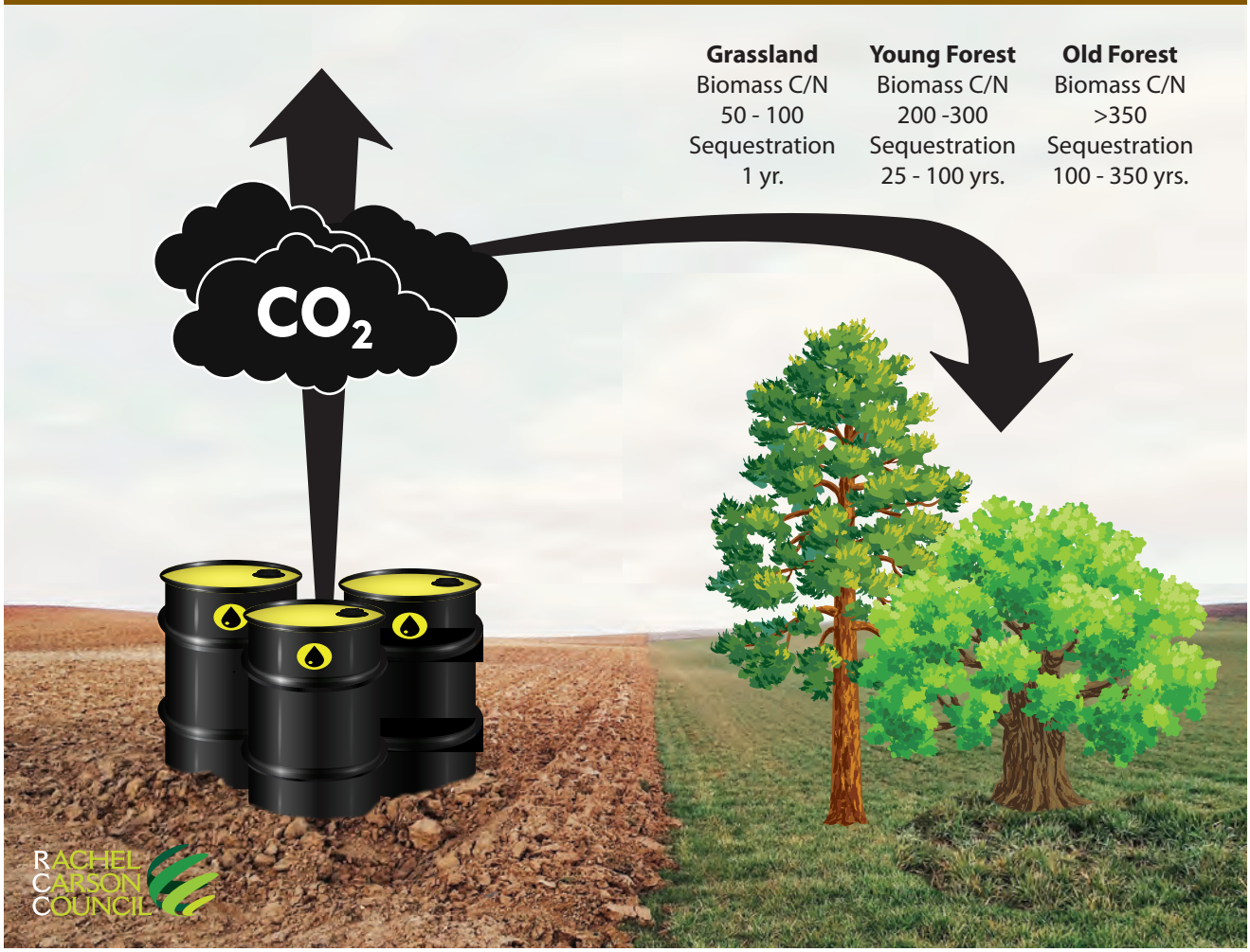
A number of beautiful and necessary species depend on North Carolina's bottomland hardwood forests. Many are already under significant pressure from the instability and destruction of their traditional ecosystems. Turning these forests into industrial sites will deny these species access to the complex forests they depend on, even if individual trees grow back.

Monoculture pine plantations threaten the biodiversity in natural forests. Enviva actively contributes to this issue by sourcing from pine plantations.[16] Further, a lack of government regulation allows North Carolina industries to easily convert natural forest ecosystems to plantations for industry gain.[17] To exclusively produce one tree species, pine plantations use harmful herbicides and pesticides such as Triclopyr, glyphosate and Imazapyr.[18, 19, 20] By preventing other vegetation or organisms from existing, pine plantations diminish the rich biodiversity naturally found in the state's forests. In contrast, natural forests protect clean water and air, enhance climate regulation, and conserve wildlife habitats.[21]

Forests: Air and Climate

Severe weather events such as Hurricane Florence are only expected to worsen as carbon dioxide levels in the atmosphere rise. Forests play a critical defensive role in minimizing these impacts because they remove, filter, and sequester pollutants and greenhouse gases from the atmosphere. Greenhouse gases raise global temperatures and worsen the effects of climate change. Forests address this problem by acting as sinks for carbon dioxide, one of the primary greenhouse gases contributing to our current climate crisis. Through photosynthesis and other biological processes, forests absorb atmospheric carbon dioxide which is then stored in their cellular bonds. If you recently drove down one of North Carolina's many tree-lined highways,

Carbon Sequestration by Vegetation[8]



Globally, vegetation stores the same amount of carbon dioxide that would be emitted from burning over 6 billion barrels of oil.

those trees cleaned up some of your car's exhaust gas.

Forests and other communities of vegetation around the world remove about 2.6 billion metric tons of carbon (BMtC) from the atmosphere.[22] That is the same amount of carbon dioxide emitted from burning over 6 billion barrels of oil.[23] Forests are the only proven system for taking out enough carbon from the atmosphere to prevent a 1.5 degrees Celsius increase in the global temperature by the end of the 21st century, making them ever more critical to protect from industries like Enviva.[22]

In 2015, 195 countries adopted the landmark Paris Agreement to set targets for greenhouse gas mitigation and climate change adaptation. Article 5 of the agreement notes the important role of sustainable forest management in these efforts.[24] Such approaches should be used to protect communities and forests in all regions of the world. However, most efforts focus almost exclusively on tropical forests, leaving the hardwoods and softwoods of North Carolina at risk.[22] While tropical forests are important, forests in the U.S. South need protection as well. In fact, **Southern forests are logged at a rate four times higher than that of South American rainforests.**[25] Such rapid logging has been shown to reduce the potential of the U.S. forest carbon sink by about 35 percent.[26]

STAND4FORESTS Campaign

STAND4FORESTS

- 120 Organizations
- 60+ Elected Officials
- 30+ Scientists
- Over 25,000 signatures

If you care about the protection of our nation's forests, please follow the link below for more information and consider signing on to the pledge.

https://stand4forests.org/

In the Fall of 2018, Dogwood Alliance laid out a bold and necessary vision for the future of North Carolina's forests threatened by the wood pellet industry.

TheStand4Forests Platform urges decision-makers to put forest protection at the forefront of the national climate agenda by investing in forests as a resiliency strategy for communities; end the destruction of our most important carbon sinks; and recognize the inherent links between forest destruction, climate impacts, and environmental injustices.

The week of action featured a variety of coordinated events, actions and media across the country culminating in a press event in Raleigh, where Senator Erica Smith and other leaders placed the destruction of North Carolina's forests at the feet of the wood pellet industry and called for increased forest protection.

A heightened sense of gravity accompanied the campaign amid the dire warnings and pleas for action in the latest IPCC report, as well as the visible and hard-felt devastation from Hurricane Florence.

Dogwood Alliance, an organization protecting Southern forests and communities from industrial logging, has championed the cause against industrial wood pellets from the front line. Often integral to community organization and information efforts, Dogwood has the trusted record and the passion to fight for environmental and community health required to organize the many voices of the Stand4Forests campaign. https://www.dogwoodalliance.org/

DOGWOOD ALLIANCE

Production & Burning

The production and burning processes that are involved in the creation of wood pellets heavily influence climate change as well as the human health of surrounding communities.

Photo: Dogwood Alliance, Enviva Production Facility [6]

Human Health Effects:

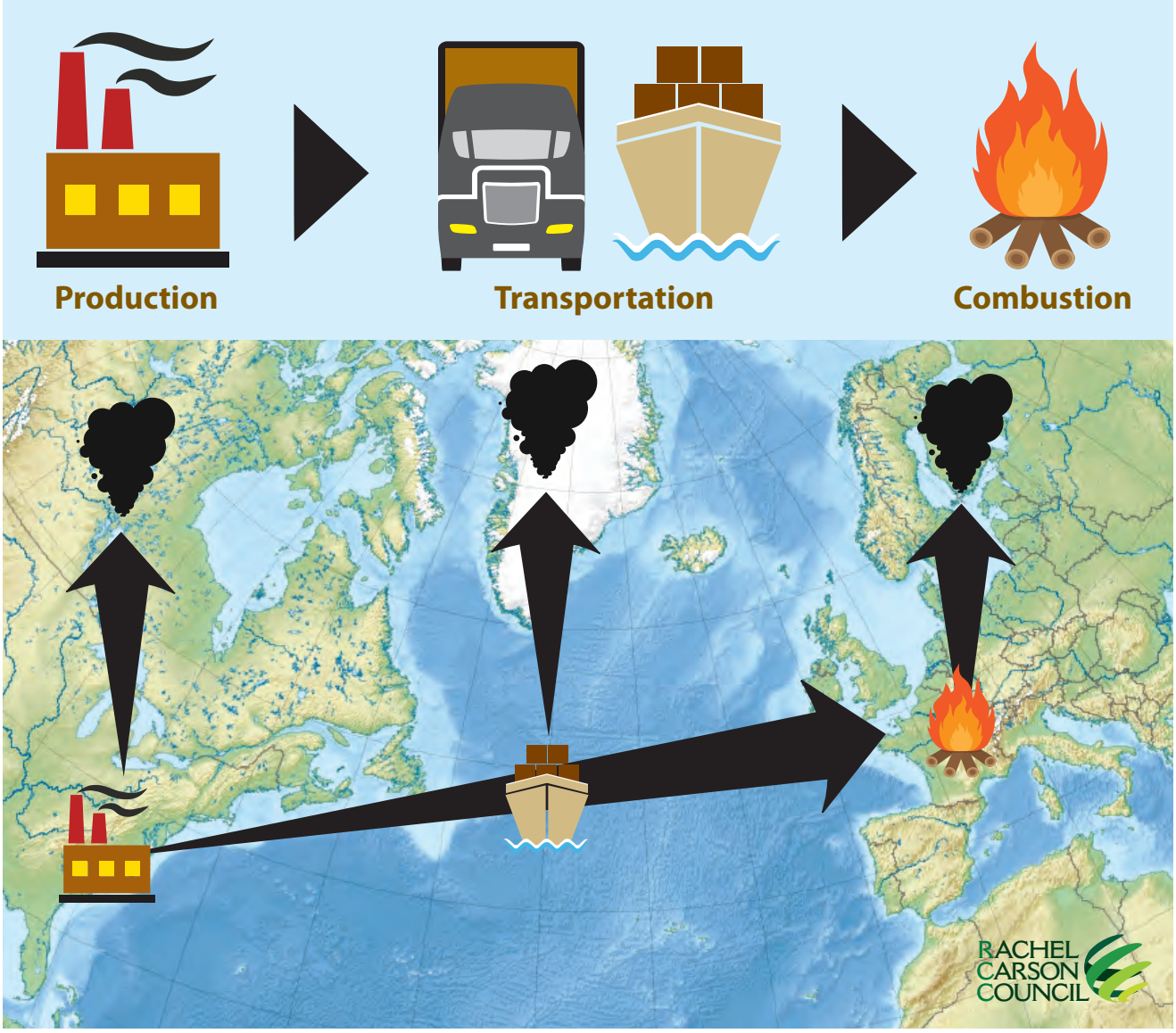
When wood pellets are first processed or chipped in mills, they release heavy amounts of carbon dioxide and harmful pollutants. These chipped wood materials are decreased to a size no larger than a paperclip, parched in drum dryers that heat up to 6000 degrees, and compressed to form the end product.[27] The processing and burning of wood pellets creates, Volatile Organic Compounds (VOCs), particulate matter (PM), nitrogen oxides (NO), and carbon monoxide, all of which are detrimental to human health.

In a recent study, the Environmental Integrity Project found that all 21 U.S. wood pellet mills combined emit 16 thousand tons of detrimental air pollutants annually.[28] North Carolinians are particularly at risk because up until 2018, the government has allowed Enviva facilities to operate without any VOC or hazardous air pollutant controls. This has left community members at risk from air-borne pollutants which can cause or worsen cardiovascular and respiratory issues and cancers. Long-term exposure to many of these pollutants, especially acetaldehyde, formaldehyde and methanol can also cause chronic symptoms and harm early child development.[28]

Climate Effects:

The burning and processing of wood pellets are also massive sources of greenhouse gases. The process to produce wood pellets requires high inputs of energy that emit over three million tons of greenhouse gases, like CO_2, further contributing to global climate change.

Carbon Life Cycle of Industrial Wood Pellets[9, 10]



Traditional fossil fuels like coal, gas and oil billow out from every stage of the production of wood pellets. Trees are cut down, ground up into pellets, shipped across the Atlantic Ocean, unloaded and combusted - all using fossil fuels. Even the carbon stored within the pellets won't necessarily be "neutralized" by other trees as their old wood and deep roots held more carbon than young trees can take up. At regional scales, a permanent increase in annual wood harvest results in a permanent reduction in the amount of carbon stored in forests and the deterioration of current biomass pools requires decades to centuries to reaccumulate.

Much of Enviva' s pellet production ends up in the U.K.'s Drax Power station, the world's largest woody biomass power plant. The facility burns 13 million tons of wood pellets to generate electricity each year, emitting up to 23 million tons of carbon dioxide, making it the heaviest carbon emission source in the life cycle of a wood pellet.[29] Such a huge amount could only be sequestered if 60 million tree seedlings were planted and allowed to grow for a full decade. Instead, each year these emissions are compounded by additional burning, pushing carbon neutrality further out of reach for the industry.[23]

These massive carbon emissions go on to affect global climate and weather patterns. In North Carolina in the last century the average temperature rose by 1.2 degrees Fahrenheit.[30] Even conservative estimates show that these hotter conditions will continue to amplify in the near future as CO_2 levels rise.[14] It is predicted that across the southeastern United States, the total number of days above 90 degrees Fahrenheit will nearly triple in the next 100 years.[31]

Rainfall now occurs in more intense, shorter-lived episodes, with longer dry spells in between.[31] Severe conditions, like the state's 2007 drought resulting in water restrictions for five million North Carolinians, will become more frequent and intense as companies like Enviva continue unsustainable, carbon intensive practices.[30]

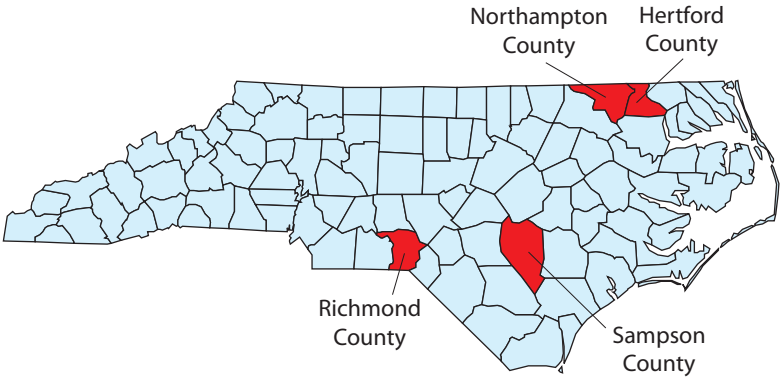
The changing climate will also intensify sea-level rise. When the U.S. Geological Survey evaluated the state's shoreline, it rated more than half of North Carolina's coast at "very high risk" from sea-level rise.[30] The rest of the shoreline is at high or moderate risk. As intense hurricanes, like Hurricane Florence batter the coast and push flooding further inland more areas will begin to fall under the "very high risk" category, affecting North Carolina communities, agriculture, public infrastructure, and ecosystems.[32]

The impacts across North Carolina's varied regions will significantly hinder the state economy and low-income, rural communities across the state will bear the biggest burdens.[33]

NORTH CAROLINA ENVIRONMENTAL JUSTICE COMMUNITIES

As North Carolina remains a net exporter of wood pellets, certain communities in the state are suffering disproportionately from the associated adverse health and environmental effects.

The Enviva facilities within North Carolina are located in Hertford, Sampson, Northampton and Richmond Counties.. Each of these counties lies on the coastal plain of the state in largely rural areas with easy access to rich forests, pine plantations, and ports, making them ideal for Enviva's operations.



The facilities also fall in counties that suffer some of the highest environmental degradation from industrial operations in the state. These operations are disproportionately clustered around poor communities of color. **In an important study done this past year by Dogwood Alliance, it was found that wood pellet facilities are 50% more likely to be cited in *environmental justice communities*. Worse, the study also found that every single facility in North Carolina lies within an environmental justice community.**[1]

Hertford County

Enviva began its operations in North Carolina with its Ahoskie plant in Hertford County in 2011 when it converted an old Georgia Pacific sawmill.[2] Hertford County sits directly in the northern coastal plain region of North Carolina with direct access to rich wetland forests and pine plantations. This ecologically rich area was also once home to the Meherrin Native American tribe that had been in the area for hundreds of years before English colonization. During the 1800s this group was pushed onto a small reservation in the area. But, later on, even this land was taken from them. Nevertheless, a few hundred Meherrin remain in the area today.[3]

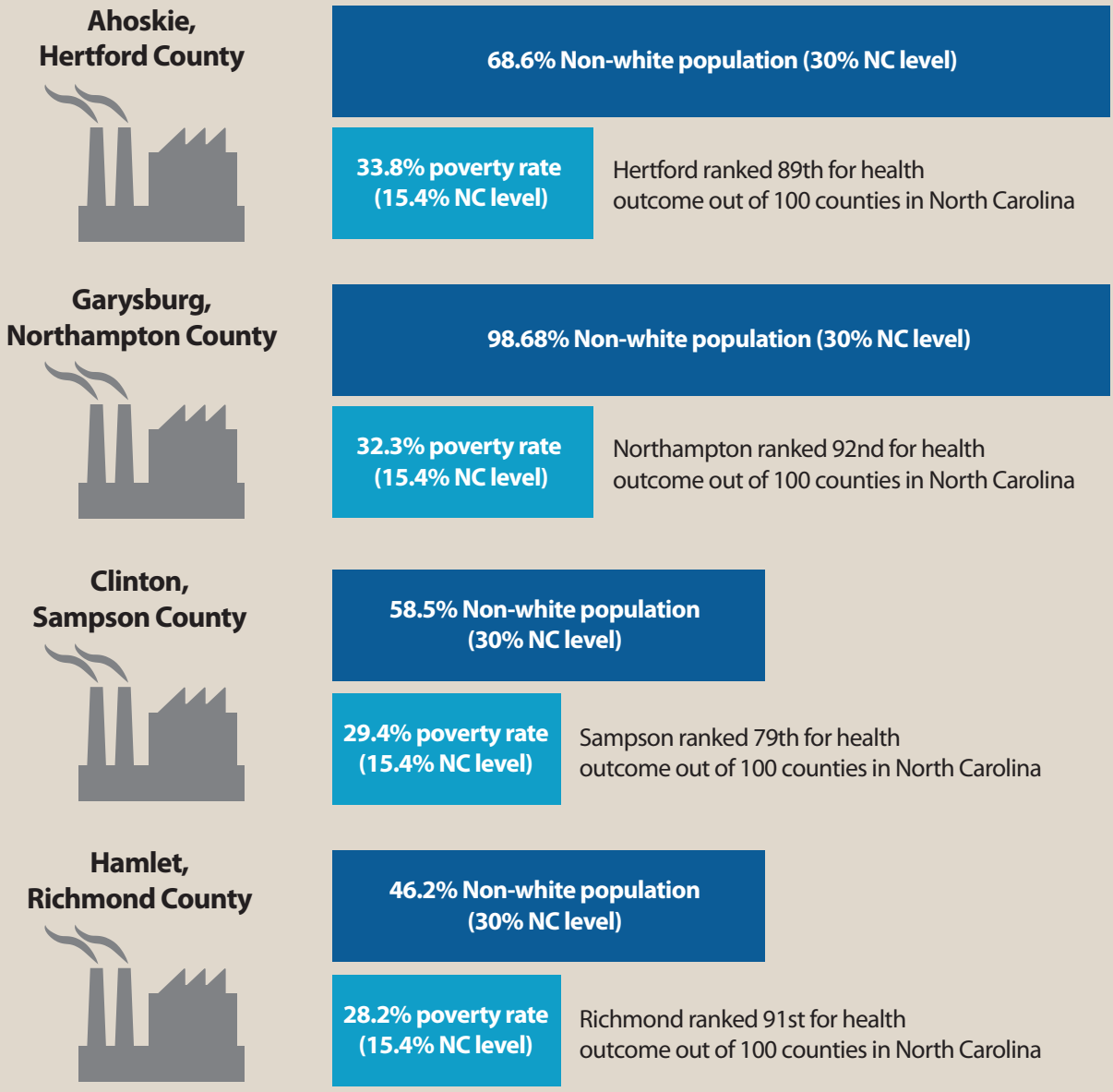
This history of injustice has continued into the present. Hertford County is currently listed as a tier 1 county, meaning it is one of the 40 most economically distressed counties in North Carolina. It has a poverty rate of 24.9%. In 2013 nearly half of the county's population was low-income.[4] The county is composed of 65% people of color and over 72% of those in poverty identify as Black.[5] Nevertheless, Enviva operations in the county have continued unabated since 2011, degrading its rich forest diversity and harming the health of its residents.

Northampton County

"I call this area a dumping ground."
—President of Concerned Citizens of Northampton County [6]

Various environmental injustices surround towns in Northampton County, where a majority (60%) of residents are people of color.[7] In 2002, local community members were constantly exposed to noxious smells of sulfuric acid and negative health effects from a paper mill,[8] and just a few years later, plans were In addition to the paper mill, just a few years later, plans were announced for establishing the highly pollutive and controversial Atlantic Coast Pipeline through the county.[9] Most recently, a proposal for rezoning areas to locate two coal ash landfills was drafted by local county officials.[10]

Enviva in North Carolina's Environmental Justice Communities[11, 12, 13]



Data USA (https://datausa.io/profile/geo/garysburg-nc/?compare=hamlet-nc), the US Census (https://www.census.gov/quickfacts/nc), and County Health Rankings (http://www.countyhealthrankings.org/app/north-carolina/2018/compare/snapshot?counties=37_153%2B37_131)

RACHEL CARSON COUNCIL

And there's the Enviva plant. The wood pellet mill, operating since April 2013, is a significant source of dangerous air pollutants exacerbated by lacking air quality control technology.[11, 12]

Such pollution is especially troubling for a community where many citizens already suffer from chronic diseases.[13] The county is ranked 92nd for health outcomes of all 100 counties in North Carolina and hospitalizations for asthma in Northampton County are higher than the state average.[14, 15] A public comment by the Southern Environmental Law Center reveals that 22% of residents in their survey reported that they have been diagnosed with asthma, and 64% with high blood pressure.[13]

"The three leading causes of death in Northampton County are cancer, diseases of the heart, and chronic lower respiratory disease, all conditions that are aggravated by air pollution."

—Southern Environmental Law Center [13]

The cumulative environmental issues surrounding the Atlantic Coast Pipeline, paper mill, coal ash landfill rezoning, and wood pellet plant location highlight extractive economies that perpetuate environmental racism.

In the future, Northampton County faces heavy forest loss and climate change with an estimated 8% drop in gross domestic product over the next 100 years. This percentage loss will grow if wood pellets continue to be used as a 'green' source of energy.[16]

Stories of Resistance

Northampton Communities Fighting Back

In light of the realities they experienced every day as neighbors to these polluting industries, residents mobilized their communities to create awareness of how their "air, water, and soil are subject to institutional racial discrimination."[10] While Enviva can produce a series of quotes from paid spokespeople, the people of North Carolina can speak too: In 2014, over 300 residents in the town of Garysburg signed petitions to county commissioners against Enviva. These petitions detailed how the smells, noises and vibrations from the plant disrupt their health and quality of life.

Thanks to their unified defense, the decision to rezone the Enviva area from 'light' to 'heavy' industrial status was successfully postponed.[11]

The Concerned Citizens of Northampton County works with external environmental organizations to call for environmental justice. The Natural Resources Defense Council, Dogwood Alliance, Clean Air Carolina, Southern Environmental Law Center, the Environmental Integrity Project, and the Rachel Carson Council are just a few of many national and regional organizations that support local community mobilization for environmental health against the extractive wood pellet industry.

Sampson County

Sampson County, which sits in the southeastern coastal plain of the state, is one of the largest counties in North Carolina, about the size of Rhode Island. Its population is composed of 26% African Americans and 19% Hispanics, with over 25% of the population living in poverty.[17] Yet, this is not a county lacking economic opportunity. Industrial operations, especially industrial-scale animal production, crisscross the region because of its proximity to the Port of Wilmington and easy access to two major interstate highways.

Such established industrial operations, as well as its access to forest products, led Enviva in 2016 to open a production facility in Sampson County. This plant currently produces around 500,000 tons of wood pellets a year and is expected to ramp up to its full 600,000-ton-per-year capacity during 2019.[18] Much like the Northampton and Ahoskie plants, production of wood pellets at the Enviva facility in Sampson County leads to heavy air pollution including 110,000 pounds of acetaldehyde, methanol and formaldehyde, and 628 tons of VOCs per year, well above federal safety requirements.[19]

This pollution, combined with the air and water pollution from industrial animal production, has contributed to drastic adverse health effects for community members. Sampson County's average life expectancy (75.74 years old) is four years less than the United States' average.[17] Leading causes of death among all ages include cancer, heart disease, diabetes, and chronic respiratory diseases, all of which are higher in Sampson County than the state average.[17] Many of these, especially cancer and respiratory illnesses, can be caused or worsened by the pollutants pumped into the environment from industrial operations.

The Enviva Sampson plant is positioned on land surrounded by CAFOs, compounding the degradation of local communities' air quality. Google Maps[7]

Richmond County

Two hours west of Sampson County, Enviva is constructing yet another wood pellet processing plant in Hamlet, Richmond County to open in early 2019. Nearly half of Hamlet's six thousand residents are Black (38.4%), Hispanic (7.1%), and Native American (1.7%), and about three in ten residents live below the federal poverty level.[20] Within Hamlet, Enviva has sited its plant next to Dobbins Heights, where four out of five residents are Black and more than a third live below the federal poverty line.[21]

"… my children play at the park as well as play in their grandmother's yard… The health issues from this industry can cause big concerns for me, not only for my kids and family but for anyone who has to breathe in this pollution." ~Dobbins Heights Resident [22]

Communities in Richmond County already face the cumulative effects of polluting and extractive industries. As one concerned resident stated, "Adding a wood pellet mill that harms our forests, health and quality of life to **CAFOs**, a dirty coal plant, and a potential terminal for the Atlantic Coastal [sic] Pipeline would be an injustice."[23] Enviva's processing plant will only exacerbate the problem by adding more toxic emissions.

Even larger than the Northampton plant, the Hamlet facility will emit at least three hundred tons of volatile organic compounds (VOC).[11] The plant is legally required to install the best available emissions control technologies based on what similar facilities use. Such controls can reduce VOCs and hazardous air pollutant emissions by 95% or more.[11] But, North Carolina decided that Enviva does not need to install any VOC controls. This decision happened for no discernable reason as neither Enviva nor North Carolina showed that it would be infeasible to install the controls on either plant. Instead, Enviva claimed the technology would be too expensive, even though all comparable companies utilized such technology for their wood drying operations.

By not requiring Enviva to install proper pollutant control devices, the Hamlet facility will soon emit more than double the legal threshold of hazardous air pollutants. One local resident wrote, "I have a lot of family here in Dobbins Heights, my children play at the park as well as play in their grandmother's yard." She continues, "The health issues from this industry can cause big concerns for me, not only for my kids and family but for anyone who has to breathe in this pollution."[22]

Instead of listening to community concern, Enviva is already requesting an increase in production at the facility before it has even opened. To guise this as a benefit to the community, it has coupled this repermitting with one to increase its air pollution control technology.

Stories of Resistance

"Adding a wood pellet mill that harms our forests, health and quality of life to CAFOs, a dirty coal plant, and a potential terminal for the Atlantic Coastal [sic] Pipeline would be an injustice." ~Debra David, Secretary of Concerned Citizens of Richmond County [12]

Photo: Dogwood Alliance, Richmond County [13]

While working against Enviva in Northampton County, Dogwood Alliance learned that the company would soon expand their operations to Richmond County. The environmental group then informed Concerned Citizens of Richmond County (CCRC) because of the new threat to their community's health and well-being.[14] The two groups were able to combine their efforts and fight against Enviva's disinformation.

Facing the power of an organized and informed community, local politicians attempted to discredit both these groups. When CCRC and Dogwood Alliance campaigned against Enviva's unjust impacts County Commission Chairperson Kenneth Robinette dismissed their claims as "smoke and mirrors."[15] Rather than addressing the environmental injustices his constituents face, Robinette described Dogwood as "corrupt" and using minorities.[15]

In a blatant and unconvincing attempt to discredit CCRC, Richmond County officials created a map allegedly showing that some county officials live closer to the plant than the residents of Dobbins Heights.[15] However, in the map officials used, the location of the Dobbins Heights town hall is shown as a representative of all residents, ignoring the many people spread across the county including those that live just minutes away from the plant.

Concerned Citizens of Richmond County has worked with other environmental organizations including the Blue Ridge Environmental Defense League (BREDL) and the Southern Environmental Law Center (SELC). With CCRC members within just one mile of the plant, the group has been an active and integral part of opposition to Enviva. https://www.facebook.com/Concern-Citizens-of-Richmond-County-706398899415725/

RCC Public Testimony Nov. 08, 2018

Nearly 200 people attended a public hearing on November 8, 2018 in Richmond County for the chance to hear how and why Enviva planned to expand production at their Hamlet facility. [16]

At the hearing, The Rachel Carson Council joined local concerned residents and environmental justice advocates from across the state to voice support for clean air and increased forest protection.

Photo: Dogwood Alliance, Richmond County Public Hearing, 2018[16]

The comments given at the hearing were accompanied by a letter signed by 40 organizations representing well over 1.5 million North Carolinians, calling on DEQ to deny Enviva's expansion and halt any future permitting until they complete a study of the cumulative impacts of the wood pellet industry.

Shockingly, this single hearing was the first time North Carolinians had any meaningful involvement in the permitting process, as the community had previously been denied an opportunity to have a public hearing on the initial permitting decision.

WHAT DRIVES ENVIVA IN NORTH CAROLINA? *THE CONVERGENCE OF INJUSTICE*

North Carolina, especially its poor rural communities like those above, has become an attractive destination for many industrial operations because of its geographical location and its political alignments that currently favor economic growth over policies to protect people and the environment. These factors, as well as pre-existing forestry industries, created the perfect milieu in which Enviva's operations have developed. Once established in the state, Enviva has continued to drive its growth and expansion with close political relationships and by dominating the public narrative surrounding wood pellets.

Such corporate opportunism creates cycles of industrial development that get increasingly difficult to break as they become more heavily entrenched in the politics and economics of North Carolina. They also represent interconnected injustices to the poor communities of color in Hertford, Northampton, Sampson and Richmond Counties that undermine their ability to protect themselves and their environment. In order to create change and make progress against the wood pellet industry, it is key to understand the systems at play that allow a falsely "green" industry not only to grow, but also to thrive in the United States at the expense of people and the environment.

Pre-Existing Industries

The already established logging industries and transportation services in North Carolina have made it a strategic location for the wood pellet industry and have facilitated Enviva's development in the state.

In North Carolina, CSX freight rail lines and a well-developed highway system crisscross the state, connecting wood pellet plants to ports, like the Port of Wilmington.[1] These industries and infrastructure are critical to Enviva's operations, and help to dictate where new facilities are cited, as in Richmond County.

Photo: Morven, Wikimedia Commons, CSX Diesel Train 2005[8]

Photo: RCC, Alexandra Wisner, 2018, Enviva Wilmington, NC Port storage facility [9]

Unfortunately, these industries also take a heavy toll on surrounding communities. CSX is known among local residents in Richmond County for its threats to the community's health and environment. In the past it has been sued for failing to warn workers about asbestos exposure, and several of the company's rail workers in Richmond County have died from cancer.[3] Further, the trucks needed to transport pellet materials substantially increase air and noise pollution levels in the communities close to pellet plants and the sourcing areas for wood. The trucks needed to transport pellet materials also create substantial noise pollution and increase the air pollution levels in communities near the roads they traverse.

Finally, the Port of Wilmington, where Enviva purchased two massive domes for storage of their pellets before being loaded, has been a large source of complaint for community members because of its round the clock operations, noise and air pollution.

RCC at the Port of Wilmington

The Rachel Carson Council joined other environmental advocacy groups on a fact-finding boat tour along the Cape Fear River in Wilmington, NC. Dr. Kyle Horton, a Democratic candidate for the U.S. House of Representatives at the time, was also in attendance.

The boat travelled past wood pellet dome silos maintained by Enviva, as advocates discussed the impact of the wood pellet industry on climate and public health.

While the pellets themselves wait to be shipped across an ocean, many of the industry's environmental and communal burdens are left behind in North Carolina and along the Cape Fear River.

RCC's Alexandra Wisner on boat tour with concerned parties. Photo: Sherry O'Daniell, 2018 [17]

"The wood pellet processing plants themselves are emitting really terrible particulate matter." said Alexandra Wisner, Assistant Director for the Rachel Carson Council. "That's little particulates in the air when you breathe them in (that) can cause different things like asthma or aggravate asthma." [18]

The Rachel Carson Council, founded in 1965, is a nationwide membership organization that engages and empowers their supporters to take effective action in communities, campuses, and at the local, state and national level.

Carolina Wetlands Association works to promote the importance and value of Wetlands through science-based programs, education, and advocacy. http://carolinawetlands.org/

Alliance for Cape Fear Trees' mission is to preserve, protect, and plant trees to enhance the quality of life for present and future generations in the greater Wilmington area. They work to educate the community as a whole on how their region can support growth while still maintain its forest. https://www.renaissancewilmingtonfoundation.org/alliance-for-cape-fear-trees1

Cape Fear Sierra Club serves over 1500 members in Bladen, Brunswick, Columbus, Duplin, New Hanover, Pender, and Robeson counties.The club is focused towards opposition to industrial wood pellets as a priority for their work in 2018. https://www.capefearsierraclub.com

Clean Air Carolina was founded in 2003 by a group of passionate volunteers determined to improve the quality of Mecklenburg County's air. They now champion a statewide initiative to raise North Carolina's air quality to exceed that of scientific recommendations. CAC has led and joined multiple community efforts to oppose Enviva. https://cleanaircarolina.org/

Forestry industries in North Carolina are also key to Enviva's operations. These industries, including those of pulp, paper and sawmills, are sources of waste byproducts Enviva uses to supply its wood pellet production. In North Carolina, these businesses contribute up to $29 billion to the state economy.[4] The existing labor, infrastructure, and expertise in these systems allow the wood pellet business to have lower startup and operation costs within North Carolina.[5] These industries also help set the stage politically for the wood pellet industry. The International Paper Company and Weyerhaeuser Company, multinational wood product companies with operations in North Carolina, frame all biomass as carbon-neutral and have a heavy political influence in North Carolina.[6, 7]

These industrial connections continue to benefit and deepen Enviva's operations in the state as well as worsen the environmental destruction in certain areas of North Carolina.

Private Land Ownership

In North Carolina, 82% of **timberland**, which accounts for 96% of forest land in North Carolina, is owned by private individuals and corporations according to the 2017 NC Forest Service Biennial Report.

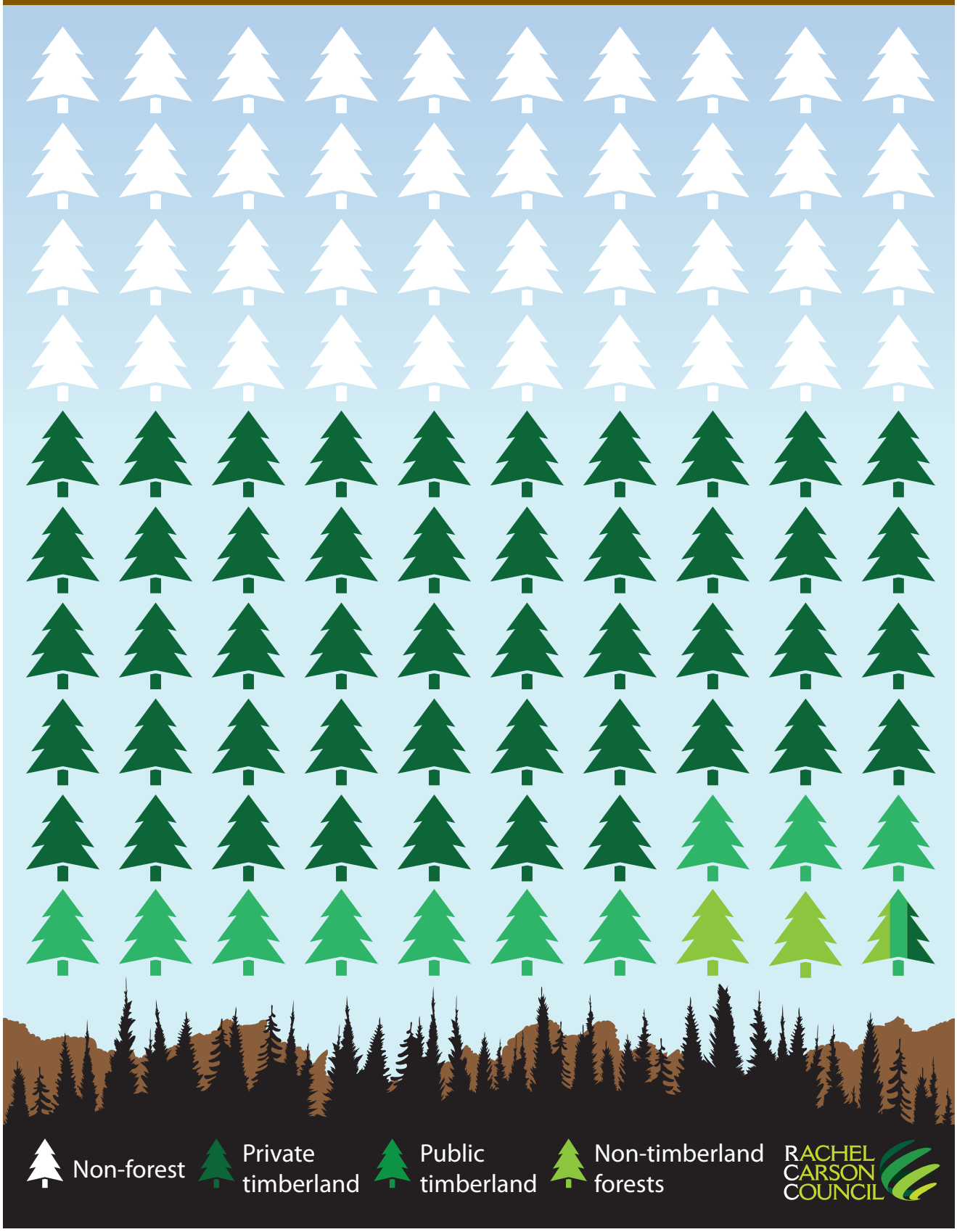
Private land ownership by large corporate entities has its roots in the dispossession of land fostered by **systemic racism** in the 20th century. U.S. governmental agencies, including the USDA, have aggressively discriminated against people of color, preventing them from benefiting from loans, technical assistance, and extension programs for the land they own.[8] **Today, African Americans comprise less than 1% of rural landowners, whereas almost 95% of forest land is owned by whites.**[9, 10] These imbalances lead to disproportionate decision making power over forest resources.

Current private forestry regulations in North Carolina make it easy for Enviva to source wood from private owners without requiring either party to replant the original forest. Privately owned forests can be self-managed by industries and individual landowners without reporting any large-scale clear cutting activities. In fact, the North Carolina Forest Service (NCFS) encourages landowners to clear cut trees when harvesting timber and other wood products.[11] Worse, landowners have no required responsibilities for the resources they own.[12] Many of these laws, or lack thereof, stem from the long history of logging in North Carolina's forests and a desire to promote economic activity in rural regions by lessening restrictions on business.

The dominant presence of private land ownership in North Carolina poses challenges for public input for land management. Unlike public lands, private forest regulations are limited to zoning decisions and federally mandated environmental protection laws, largely to protect landowners' property rights.[13] However, even these weak laws and regulations are enforced independently by individual states. For example, while the Federal Water Pollution Control Act prohibits any development of wetlands, North Carolina allows wetland clearcutting so long as "the forestry work will not adversely impact the wetland area or water quality."[14] In addition, private property laws prevent public input in their land management decisions. Private ownership of land divides and precludes ordinary citizens from engaging effectively in the management of nearly 85% of North Carolina's forests.

Although forest landowners must submit woodland management plans to the NCFS, sustainable forest management largely depends upon statewide **stewardship** programs and individual voluntary activities.[15, 16] In particular, there are no "state-sponsored best management practices prescribed specifically for harvesting and utilizing forest/woody material for biomass energy."[11] Under this insufficient legal framework, landowners easily implement forest management plans driven by Enviva, which primarily purchases its wood materials from private timberland.[17]

North Carolina Forests[14]



In Northampton County, Enviva is aware of the vital position landowners have in their business model as they purchase and source wood for wood pellet production from forests owned by private landowners.[17] In order to foster these relationships, Enviva funds various forestry projects that develop management plans for privately owned land use.[18] In particular, Enviva collaborates with the North Carolina Forest Landowners Association, the American Forest Foundation, and regional forestry management programs.[19] These programs influence 56% of the area in Northampton County alone.[20, 21] Private landowners there who want to generate income from their land receive resources to sell their harvested whole woods to forestry industries like Enviva. Enviva is able to effectively control public discussion surrounding their operations and to promote their interests while community members are left with little recourse to limit clear cutting operations.

North Carolina landowners are a part of a system that incentivizes timber production. The Present-use Value Program administered by North Carolina Department of Revenue can greatly lower property taxes for forest landowners.[22] The program recognizes and qualifies a management plan as "sound" if the forest actively engages in "the commercial production and sale of forest products."[14] Such a system commodifies nature and ignores the inherent benefits a protected forest brings. With the opportunity to generate income by selling whole woods while lowering property taxes, landowners are left to choose between making a profit or losing money on higher taxes.

Not all landowners are happy with their decision to cut their trees, however. In an interview, a forest landowner in North Carolina testified that his neighbors regretted harvesting forests and selling timber to Enviva after seeing their barren land.[23] It is a practice that ends the legacy of family forests which have grown along with them, their children, parents and grandparents.

Democracy and **environmental justice** need local people to "have a voice in decision making processes that directly affect their lives and livelihoods."[24] Therefore, it is important to facilitate collaborative efforts between landowners and local residents to protect the environmental health of the region.

County Commissioners & Community Representation

Many barriers prevent local residents from influencing decision-making processes. County commissioners and various boards set agendas, zoning laws, and budgets for communities. Sadly, in the four counties where Enviva plants are located, officials are quick to overlook the qualitative impacts of the industry on human lives and the environment. Instead, the focus has been on presumed local economic growth, ignoring the true cost of this growth for the well-being of their constituents.[25]

In Sampson County for example, the uncontested 2018-2019 budget was created to lay, "the groundwork for Sampson County to move forward to attract industry… The people that served before us took a bold move on the Enviva property ... and in the last budget we saw those fruits and how impactful that could be for this county and its citizens," said Clark Wooten, a Sampson County commissioner. [26]

The case of Enviva in North Carolina follows this narrative of economic growth at the expense of surrounding communities. Reverend Cary Rodgers, a member of Concerned Citizens of Richmond County (CCRC), said that the placement of Enviva's plants near poor, rural and minority communities is "not just happenstance." He explains that they want to "create a dumping ground in a place where people are already suppressed from speaking up."[27]

Richmond Board of County Commissioners Photo: Richmond County Government, Richmond County Board of Commissioners 2016

Such suppression of community voices is the cornerstone of Richmond County politics. For any new development or economic activity to enter the county, it must first receive approval from the board.[28] However, all seven board members are at-large representatives.[29] This means that the diverse mix of communities within the county are not guaranteed representation on the board. Instead, commissioners represent all voters across the county. The National Association of the Advancement of Colored People explains that this system enables a majority of white voters to drown out voters of color.[30] At-large districts often have been struck down for their discriminatory effects, but the system remains in place in Richmond.[30] As a result, Dobbins Heights, until November 2018, had no direct representation on the board, thus eliminating the voices, concerns and needs of the affected community.[31]

At the Table

Tavares Bostic —a resident of Dobbins Heights— won the 2018 Democratic primary for the county board of commissioners.[19] Now that he has won the November 2018 general election, Bostic is the first representative from his community to bring a voice to this board. While his election will not necessarily stop Enviva's operations, it is an important first step toward better controlling industries that exploit the low-income communities of color within Richmond County.

The youngest candidate for Richmond County commissioner in 2018, in some cases by over 40 years, Tavares Bostic earned a Masters of Social Work with certification in clinical mental health from the University of Pittsburgh and a Bachelor of Social Work from N.C. A&T State University.[20] Bostic also serves as the CEO of Bostic Counseling & Consulting and is the founder Brothers Leaning on Another Creating Kings, a youth mentorship group.[20]

County commissioner boards do allow for public forums and public comments, but these avenues in North Carolina have been highly regulated to the point that they violate the First Amendment.[32] For a community member to be allowed to make a public comment at a board meeting, they may not discuss any issue on the approved agenda.[33] For example, if there is a meeting discussing Enviva's operations, no citizen can comment on Enviva. The process to provide comment is unnecessarily complicated, overly regulated, and out-of-touch.[34]

CCRC members explain that neither Enviva nor the county commissioners ever spoke with Dobbins Heights leaders or residents about the pellet plant plans.[31] In fact, the community was unaware of the issue until Dogwood Alliance notified them.[31] Richmond County officials reacted poorly to Dogwood's efforts, portraying them as an outsider group stirring up trouble in an otherwise transparent and responsibly handled matter of economic development.[27, 35, 36]

The current composition and structuring of county politics in Hertford, Northampton, and Sampson counties, like Richmond County, prevents those most affected by Enviva's operations from voicing their needs.

Permitting Process: Loopholes & Injustices

These boards also host critical permitting processes for pollution, siting and expansion of Enviva's many plants. Unfortunately, time after time, these processes have been manipulated to benefit the industry and allow it to avoid penalties and the implementation of pollution reduction technologies, specifically under the Clean Air Act (CAA).

The 1990 CAA amendments establish a permitting process to strengthen pollution control standards for different facilities.[37] This Title V permit is administered at the state level. The Department of Air Quality (DAQ) oversees Title V permitting for the North Carolina Department of Environmental Quality (NCDEQ). In

2017, the Environmental Integrity Project documented the many ways in which the wood pellet industry avoids CAA regulations. While Title V requires public engagement in the permitting process, DAQ fails to make information publicly accessible in a timely manner. This practice silences voices from the communities that would suffer from the pollution. Of all the southeastern states studied, the report finds that North Carolina "has been the most egregious in terms of allowing unnecessary and unlawful pollution from the industry."[38] The unjust silencing of community voices connects to the policy of underenforcement, thereby exposing the same communities to toxic air pollutants. The pattern across industries and counties has largely been the same.

In Northampton, there was no opportunity for public input on the Enviva plant's development.[39] This is because the facility, now emitting more than most major sources of pollution, was originally listed as a minor source of pollution under permitting standards.[38] Minor sources of pollution, which are facilities that emit less than 250 tons of volatile organic compounds (VOCs), are not required to give public notice or undergo commenting periods for their construction.[38] Such lack of transparency, distortion of emissions, and disengagement of community members were made possible by the political injustices brought on by an already existing lack of information and understanding, policy loopholes resulting from top-down approaches, and representation systems manipulated by industrial interests.

As a result, the facility is authorized to emit up to 456 tons per year without being legally mandated to install the best existing VOC control technology as is required in the federal Clean Air Act.[38] A report by the Environmental Integrity Project (2018) concludes that Enviva purposefully exploited loopholes in current air pollution policies to avoid emission regulations.[38]

Initially, Enviva agreed to limit the use of softwood products, a primary source of VOC emissions. But two years after its construction, Enviva requested that the restrictions be nullified. Surprisingly, North Carolina agreed to lift restrictions without any penalties. This change now allows a major polluter to operate without any technological regulations whatsoever. Because of the state's lack of industrial pollution monitoring and the industry's exploitation of policy loopholes, the Northampton plant is now the largest wood pellet facility in the United States without any appropriate VOC control technology. In 2014, residents were appalled to hear that county commissioners were considering rezoning Enviva's area from 'light industrial' to 'heavy industrial.'[40] Confused about why the enormous Northampton facility was placed in an area for light industrial uses, **nearly three hundred residents petitioned against a proposal** that makes their land an official 'sacrifice zone' for the industry. **Their mobilization successfully held the local officials accountable for this environmental justice as the rezoning case was tabled indefinitely.[40]**

Unlike Northampton, the Enviva Sampson plant was originally permitted as a major source of hazardous air pollutants thus requiring it, "to perform a case-by-case analysis to determine maximum achievable control technology." However, it avoided installing controls "by convincing North Carolina to treat its so-called "low emitting" dryers as a separate category," which allowed them to claim that they did not need to install any additional controls.[41] Recent emissions testing at the plant has revealed the fallacy behind this, as the pollutant-heavy wood dryer emits 50 times more total hazardous air pollution and 70 to 300 times more formaldehyde and acetaldehyde than similar wood pellet plants that do use controls.[41]

After this first round of tests showed a blatant violation of VOC emission limits, Enviva Sampson decided to clean up its emission reductions. The test conducted after this modification showed that the plant's emissions were indeed lower. However, because the emissions were found to be exactly at the permitting limit, the compliance was deemed "Inconclusive."[41] The Hamlet plant, which is still under construction, also has gone through a permitting process similar to those for Northampton and Sampson. Again, NCDEQ failed to enforce the Clean Air Act, allowing Enviva to operate without the legally mandated emissions control technologies.[38]

Beyond this lack of regulation, a variety of issues complicated the Hamlet plant's permitting process. According to the CAA, the NCDEQ should have offered public hearings for Dobbins Heights.[42] However, Enviva changed the physical location of the facility multiple times without allowing for public input from residents.

Once Enviva finally listed the true address of the plant, it gave no public notice and no opportunity for public hearing from community members that the plant would affect.[42]

On behalf of CCRC, the Southern Environmental Law Center entered a legal battle with both Enviva and the NCDEQ for ignoring public input and violating the Clean Air Act.[42] However, the judge sided with the wood pellet industry and community members still were unable to voice their concerns on the matter.

New Permitting Threat

Enviva has applied to the DEQ for a permit modification so that it can "meet new consumer softwood percentage and production rate demands, and to incorporate significant emission-reduction efforts to minimize emissions impacts associated with the project," Michael Carbon, an air-quality consultant with Ramboll, said in a letter.[21]

Enviva's proposed modifications include installing air pollution control devices that will lower their emission rates. But, "Enviva has shown at its other North Carolina facilities that it cannot keep its emissions below limits laid out in the federal Clean Air Act despite its attempts to reduce them," said Rachel Weber, grassroots political organizer for Dogwood Alliance, at the November 8th DEQ hearing.[21]

For this reason, community members and environmentalists alike gathered to demand the permit be modified to increase emission reduction efforts and decrease production levels, at a permit hearing in November 2018. Many also demanded that the DEQ complete a FULL environmental justice impact study as opposed to the one page snapshot it currently has posted on its website. This snapshot is limited in breadth and depth, looking at a limited geographical area surrounding the plant and leaving out cumulative impacts of other industries in the area.

Southern Environmental Law Center

Southern Environmental Law Center calls for clear standards that protect native forests and air quality as well as insure sustainable practices. This protections include keeping national forests off-limits to biomass extraction while conserving old growth forests, streams and wetlands, wildlife habitat, and other natural treasures. https://www.southernenvironment.org/

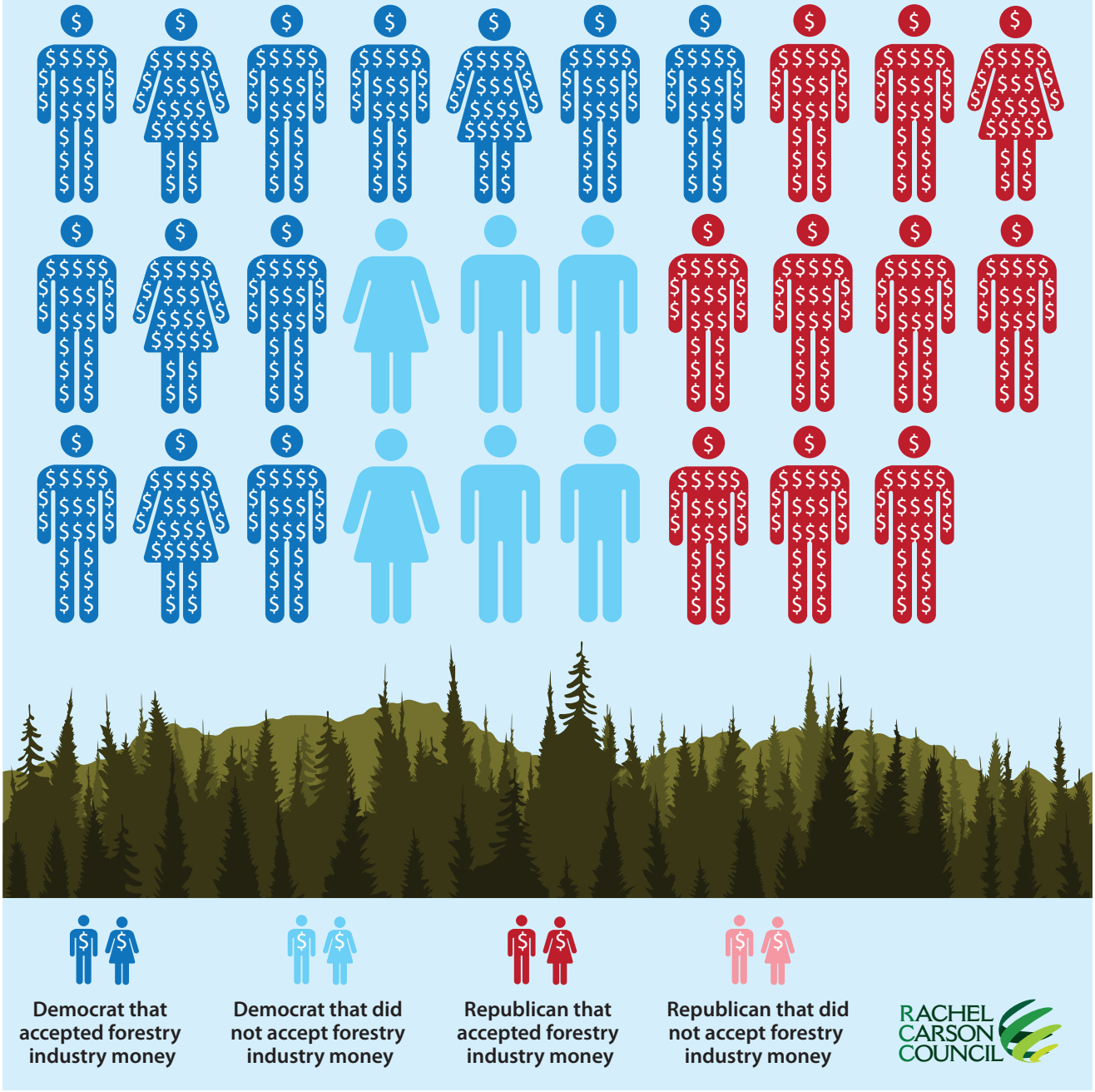
EIP ENVIRONMENTAL INTEGRITY PROJECT

Environmental Integrity Project works to to limit the growth of the wood bioenergy industry in the United States and the associated climate change driven by deforestation and air pollution, research, political action and strategy development. https://www.environmentalintegrity.org/

Campaign Financing

Despite the increasingly apparent problems with industrial wood pellets, North Carolina largely supports this product and the forestry industry overall. Many North Carolina politicians accept financial contributions from the forestry industry. Enviva and its industrial wood pellet allies are no different. Since its initial plans to enter the state in 2009, twenty-nine different officials — governors, senators, representatives, and state legislators — have represented the communities surrounding Enviva's four processing plants within North Carolina.[43] Twenty-three of these politicians—Republicans and Democrats alike—have accepted nearly $400,000 from the forestry industry throughout their careers.

North Carolina Politicians Who Accepted Money from the Forestry Industry[15]



Two key donors from the industry are the International Paper Company and the Weyerhaeuser Company. These multinational wood product companies frame all biomass as carbon-neutral.[6, 7] With pockets filled with industry money, North Carolina officials have written and upheld policies that treat all wood-based biomass as renewable. By distorting the facts about industrial wood pellets, companies and the politicians enable Enviva to exploit North Carolinians.[44, 45]

Governor Roy Cooper

While Campaigning in 2016- Governor Cooper highlighted his support for environmental issues.[22]

Governor Roy Cooper [31]

As Governor- His administration has created an Environmental Justice & Equity Advisory Board, spoken out against offshore drilling, and continuously vetoed devastating environmental legislation coming from a Republican-dominated General Assembly.[23]

In October 2018, Governor Cooper also signed Executive Order 80 that reaffirms his administration's commitment to the Paris Agreement and aims to reduce greenhouse gas emissions across all sectors of the state's economy by 40% by 2025.[24]

BUT

Governor Cooper has remained silent about the forest pellet industry even as more than 50 organizations, 100 scientists, and 10,000 individuals petitioned Governor Cooper to stop Enviva from expanding its operations in 2017. [25, 26, 27, 28, 29]

Dogwood Alliance has called on Governor Cooper to give North Carolinians the power to protect themselves from Enviva.[30] They need:

A North Carolina study to assess the cumulative impact of the industrial-scale wood pellet industry on forests, the climate, and communities.

Until this study is completed:

- **NO NEW** industrial-scale wood pellet facilities.
- **STOP** expansions of existing wood pellet facilities.
- **NO MORE** taxpayer dollars to subsidize industrial-scale bioenergy.
- **ENFORCE** full compliance of existing facilities with state and federal air quality standards.

A **Commission on Climate Action** that includes a focus on forests and resiliency.

This commission should:

- **ENSURE** that frontline communities and environmental advocacy groups have a seat at the table.
- **IDENTIFY & PRIORITIZE** conservation and economic development projects in our state's most vulnerable communities and valuable forest ecosystems using resilience mapping.
- **INTEGRATE** rural economic development centered around forest protection into existing economic development and workforce readiness initiatives.

Such industry financing also leads to heavy promotion of the industry by politicians. North Carolina's past Democratic and Republican governors alike have shown unrelenting support for the major corporation.

"Our terrific business climate, skilled workforce and diverse natural resources make North Carolina an excellent location for the growing biomass industry and other alternative energy producers. Enviva will be a great addition for Northampton County."[46]

—Former Governor Bev Perdue (D), 2011

"This is a great example of how we can use natural resources to grow business... And if we continue to take advantage of and unleash these great resources we'll continue to help the existing businesses grow."[43]

—Former Governor Pat McCrory (R), 2013*

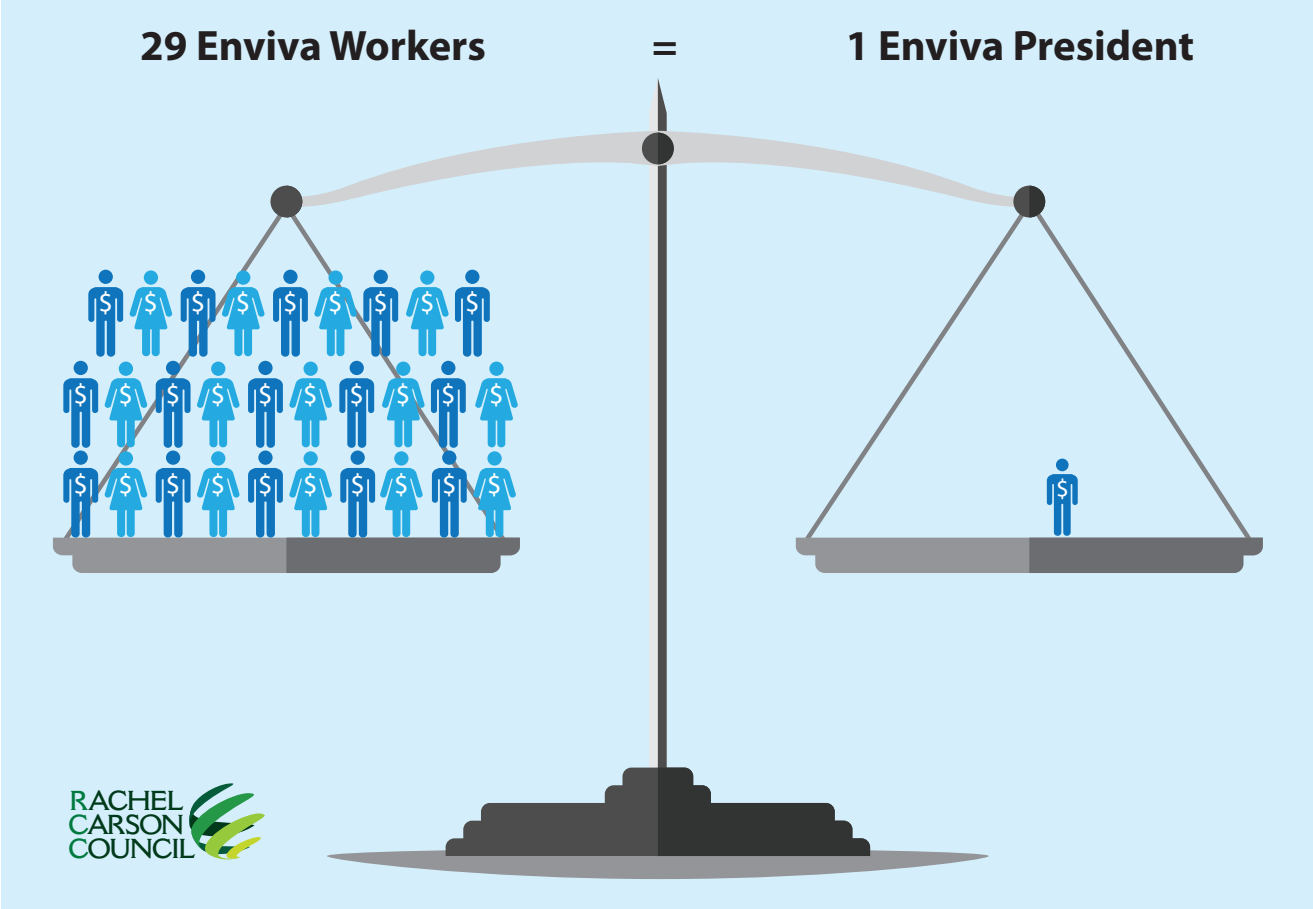
"The Obama administration is committed to job growth and business development and this grant will fund vital infrastructure needed in Northampton County."[47]

—U.S. Commerce Secretary Rebecca Blank, 2011

Industrial Subsidies

The campaign financing, rural development, and misconceptions about the wood pellet industry discussed above have set up the industry to be first in line to receive financial benefits from its operations. Both the local (NC) and federal (U.S.) government have misallocated millions of dollars from taxpayers to fund Enviva's development.

Income Disparity Between Enviva's President and Enviva Plant Workers[16, 17]



One of Enviva's claims is that its processing plants strengthen rural economies.[48] This is false. While these facilities bring a few new jobs, they do not necessarily hire from the communities they pollute. These jobs require technical skills and education that are not easily accessible to environmental justice community residents. Further, jobs at pellet processing plants pay just a fraction of what Enviva's executives receive. **An Enviva plant worker must work for nearly thirty years to earn what the company president receives in just one year.**[46, 49]

Nevertheless, the false premise of supporting local economies grants Enviva large government subsidies. Under the guise of a sustainable business model that benefits rural communities, **Enviva's North Carolina facilities have received over six million dollars in state and local subsidies**.[50, 51, 52, 53] These are funds that could have gone towards economic development that better supports communities, their environmental health, and their futures.

In Northampton County, Enviva received subsidies and grants from The Economic Development Agency (EDA) ($2 million), The Community Development Block Grant (CDBG) Program administered by the Department of Housing and Urban Development ($930 thousand), North Carolina Rural Center ($220 thousand), and from the local county (more than $31 thousand).[54] Ultimately, the money paid for suitable living environments went to funding environmental degradation and injustice to low income people of color.

Enviva has congratulated itself for its contribution to local economic development, bringing approximately 90 jobs to Sampson County, 70 jobs to Northampton County, 50 jobs to Ahoskie County and 80 jobs promised to Hamlet County.[50, 54, 55, 56] However, the limited jobs they provide are not sustainable. Wood pellet industries can only operate with the immense subsidies and tax from renewable energy of international and national agencies. With increasing awareness of the unsustainability of wood pellets, these subsidy allocations are at risk.

"It creates jobs, but as we move toward extractive industries, the quality of life and communities declines. They're low-paying jobs, basically liquidating the resources that communities are relying on, for short-term industries."

—-Scot Quaranda, Dogwood Alliance [57]

Although the grant Enviva received from the CDBG program requires the facility to employ local people, to whom these jobs actually go is in question. There is a lack of information on the status of Enviva's employment of local residents.[25] The jobs Enviva provides are technical. Hence, it is possible that they do not hire people from environmental justice communities that are directly affected by plant operations.[25] To better assess economic justice implications of the environmental justice communities, full disclosure of Enviva's current employment status is necessary.

In Richmond County, despite its assault on the local community, Enviva has received millions of dollars in local and state level subsidies for the Hamlet plant.[51, 53] The company claims that they promote economic stimulation and job creation to support Richmond County. Specifically, Enviva officials state that the Hamlet facility will employ 80 workers.[58] Yet, when repeatedly asked by community members, "Who will these jobs go to? Will you actually hire local residents?", Enviva has not answered.[35]

Nevertheless, the promise of a small number of technical jobs can be enough to foster support from some community members.[58] Given that the average annual wage in the county is just over $30,000, some residents are willing to accept the risks for a job paying $38,000.[29]

Alternative Industry: Solar Power

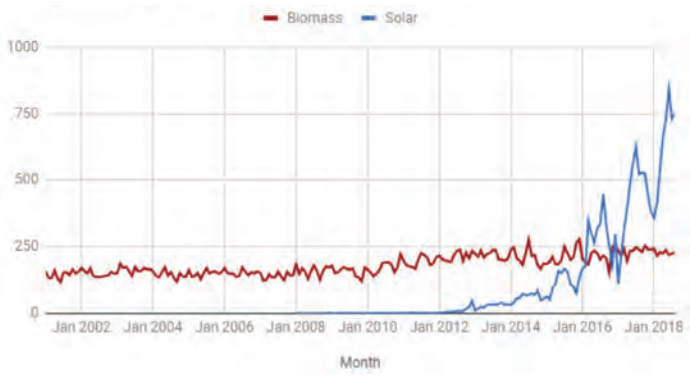
When solar panels are installed in a given neighborhood, residents benefit directly and save money on their electricity bill, unlike with wood pellet production plants where the products are exported and lead to heavy environmental degradation and pollution. Solar farms are already appearing across Richmond County. among other Tier 1 and Tier 2 counties in North Carolina. In order for these sustainable and beneficial energy sources to grow, private and public investment in renewable energy needs to stop being diverted to wood pellets, and rather go to technologies that mitigate climate change, maintain healthy communities and do not harm the environment around them. [33]

Photo: Solar Array Wikimedia Commons [32]

Total Number of Solar Panels[37]

STATE	RANK
California	1
North Carolina	2
Utah	3
New Jersey	4
Nevada	5

Net generation, monthly[35, 36]



Enviva built off the forestry industry's established influence over North Carolina politics to support its own practices. By working extensively with state and local officials, Enviva has received government support and funding. This industry, however, depletes North Carolina's resources, pollutes its environment, and threatens the lives of residents. As seen in the U.K., **greenwashing** the wood pellet industry to receive subsidies is the only way that this industry can operate. [50, 51, 52, 53] Without such strong support for its operations, Enviva would not be able to expand rapidly across the across the state, and other, sustainable energies like wind and solar could prosper.

Federal Failings: Affordable Clean Energy Rule

Enviva benefits from the public endorsements and regulatory leniency of state and federal agencies. These agencies should protect forests, the environment, and the communities around them. Instead, they actively promote Enviva's damaging practices.

In 2015, USDA Chief Economist Robert Johansson wrote, "An industry that can reduce greenhouse gas emissions, increase forest growth, and create jobs sounds too good to be true. But that is the reality of the emerging wood pellets market in the Southern U.S."[59] Johansson's inaccurate declaration ignores the reality of wood pellets. This source of energy emits more greenhouse gases than coal, destroys critical forest ecosystems, and exploit communities to profit private companies. But Enviva cites Johansson to convince investors that their practices are responsible.[60]

This situation has grown worse with the current administration that has reiterated its support for wood-based biomass and reaffirmed its belief that these are carbon-neutral, sustainable energy sources.

Recently, the Trump administration released its Affordable Clean Energy (ACE) rule, or as it is known by environmentalists, the Coal Power Plan. ACE is supposed to be a replacement for the Obama administration's Clean Power Plan that promoted divestment from coal in favor of renewables and natural gas. Instead, the ACE rule promotes investments to make coal plants cleaner and more efficient which marks a turn away from renewable commitments.

According to the EPA, the ACE rule defines the best system of emission reduction (BSER) for existing power plants as "on-site, efficiency improvements and provides a list of candidate technologies that can be used in state plans.[61] It is within these recommendations that the EPA proposes burning biomass with coal to serve as an option for states to meat compliance goals. If this strategy is pursued, the United States would become both a consumer and producer of wood pellets, drastically increasing demand.

The Biomass Power Association issued a statement following release of the ACE rule, stressing the benefits of bioenergy.

"The members of the biomass industry look forward to contributing to any carbon reducing plans put forth by the EPA, including the Affordable Clean Energy rule unveiled today," said Carrie Annand, vice president of external affairs at BPA. "Biomass power facilities generate renewable baseload power from mostly unusable organic materials like forestry residue and agricultural byproducts. Our members offer rural jobs and support the economic development of other industries like logging and farming. As our economy and transportation sector become increasingly electrified, biomass power will play a growing role in providing essential renewable baseload power. We look forward to working with EPA on its Affordable Clean Energy rule, and we urge the EPA to allow biomass power to participate in the Renewable Fuel Standard as soon as possible."[61] - Carry Annand, VP of External Affairs at BPA

Issue Reframing

The Biomass Power Association statement demonstrates the industry's misleading reframing of wood pellets as green and beneficial. Moreover, the industry also oversimplifies protests and community outcry as merely a **Not In My Backyard (NIMBY)** phenomenon.[62, 63] The premise of the NIMBY effect is that people in a community "will raise no objections to similar developments elsewhere," because they recognize its general benefits.[64, 65] Such industrial attitudes toward community mobilization incorrectly categorizes concerned citizens as acting stubbornly because of self-interest, completely dismissing the role of race and class.[66] To regard community opposition as a NIMBY effect ignores the heavy environmental and health burdens they face.

The wood pellet industry should Not be in Anyone's Backyard (NIABY), and especially not in areas that already have poor health outcomes, pre-existing industrial pollution, and deep-rooted institutional, political and economic discrimination.[67]

Dialogue and action surrounding the environmental injustices of the wood pellet industry are critical to reshape the narrative as an issue of social and human rights.[66]

TAKE ACTION TO OPPOSE WOOD PELLETS

Clear Cut demonstrates the far reaching influence, at the Federal, state, and local level, of the wood pellet industry and its severely adverse effects on the communities, politics and economies of North Carolina. Its many successful operations in the state have been falsely bolstered by international carbon accounting errors and have been allowed to continue because of political imbalances, legal loopholes and a disregard for environmental justice communities that continue to bear the brunt of environmental degradation. This report makes clear that the wood pellet industry can only continue if those in power continue to ignore the truth – that wood pellets are not a sustainable or carbon neutral substitute for fossil fuels.

The Rachel Carson Council believes that such problems also need a solution that involves and combines the power of citizens and their organizations throughout North Carolina and nationwide. The RCC focuses on uplifting environmental justice communities through a combination of education, advocacy, grassroots organizing, and political involvement at schools and college campuses. To find more information about us or get involved, visit https://rachelcarsoncouncil.org/ or contact us at office@rachelcarsoncouncil.org.

On Campus? Get Involved

The Rachel Carson Campus Network promotes education, research, and civic engagement around environmental health, social justice and climate change. The RCCN builds alliances between campuses across the country and other stakeholders, including communities, organizers, and advocacy organizations. The RCCN's mechanisms for action include curricular development, coordinating research partnerships, conducting advocacy trainings, and creating calls-to-action for sustainable and equitable policy.

RCCN currently coordinates initiatives across campuses, sharing resources, setting up trainings, and orchestrating interdisciplinary research for environmental justice and social action.The RCC also routinely convenes panels and presentations at national conferences in Washington, DC and elsewhere, raising the profile of specific issues and bringing leaders together across different backgrounds.

The RCC Campus Dispatch keeps you up to date on environmental endeavors on campuses nationwide along with the latest RCC reports, fact sheets, and presentations.

For more information, contact the RCC Campus Coordinator, Mackay Pierce, at mackay@rachelcarsoncouncil.org.

The work we do could not be done without key alliances with the other environmental and justice-based organizations that are highlighted throughout this report. Their consistent advocacy and lobbying over the past decade of Enviva's presence in North Carolina have helped to fight the false rhetoric and injustices which surround wood pellets.

But in order to continue to create a sufficiently powerful movement and successful fight against the industry, the inspiring community and local efforts we have highlighted here must be bolstered by the involvement of environmentalists, justice advocates, and concerned citizens across the country. These efforts can then be brought together in coalitions and collaborative efforts in order to push policy makers at the local, state and Federal level to recognize the unsustainability of wood pellets and remove them from renewable energy goals within the U.S. and globally. Wood pellets are an extractive industry that should be considered

as bad as fossil fuels and eliminated from climate solutions. Forests, meanwhile, should be protected and expanded as one of the best hopes to mitigate and alleviate worsening climate change.

Political Engagement: What can you do?

Whether or not you live in North Carolina, one of the best ways to take action and amplify your voice against the wood pellet industry and systems that perpetuate it, is by joining national and state organizations such as the Rachel Carson Council, Dogwood Alliance, and others listed below.

Get Involved

The National Resources Defense Council is an international environmental advocacy group that has published multiple reports on, and helped organize actions against, the wood pellet industry in the southern United States. Find NRDC's policy solutions, fact sheets and reports on biomass at their Support Renewable Energy that Protects the Wild webpage.(https://www.nrdc.org/)

The National Audubon Society is a non-profit environmental organization that uses science, education and grassroots advocacy to advance its conservation mission. They have published articles like, Why U.S. Forests Are Fueling Europe and Let's Say It Again: Wood Pellets Are Not a Sustainable Fuel Source, to bring attention and action to the wood pellet industry and the threat it poses to the natural environment. (https://www.audubon.org/)

The Environmental Integrity Project, founded in 2002 by former U.S. Environmental Protection Agency attorneys Eric V. Schaeffer and Michele Merkel, advocates for more effective enforcement of environmental laws. Their 2018 report, Dirty Deception: How the Wood Biomass Industry Skirts the Clean Air Act, and webpage on their Wood Bioenergy work, are a great place to learn more. (https://www.environmentalintegrity.org/)

The Rachel Carson Council, founded in 1965, is a nationwide membership organization that engages and empowers their supporters to take effective action in communities, campuses, and at the local, state and national level. By signing up for the (Link) or (Link) you can keep up to date on pressing environmental news as well as the work of The Rachel Carson Council and its allies.

Regional

Dogwood Alliance, based out of Asheville, NC, Dogwood is unmatched in their organizational focus and efforts against forest destruction from the wood pellet industry. It mobilizes diverse voices to protect forests and communities, has published a number of reports, organized the Stand4Forests day of action and is the first-stop resource to learn more own how to engage on wood pellet issues. (https://www.dogwoodalliance.org/)

Get Involved *(continued)*

The North Carolina Coastal Federation is a nonprofit organization that works with coastal residents and visitors to protect the beautiful and productive N.C. coast. (https://www.nccoast.org/)

Carolina Wetlands Association works to promote the importance and value of Wetlands through science-based programs, education, and advocacy. (http://carolinawetlands.org/)

Clean Air Carolina was founded in 2003 by a group of passionate volunteers determined to improve the quality of Mecklenburg County's air. They now champion a statewide initiative to raise North Carolina's air quality to exceed that of scientific recommendations. CAC has led and joined multiple community efforts to oppose Enviva's industrial pollution and destruction of forestland. (https://cleanaircarolina.org/)

Southern Environmental Law Center calls for clear standards that protect native forests and air quality as well as ensure sustainable practices. For insight into their work to conserve the South's forests, check out their .Biomass Energy in the South webpage. (https://www.southernenvironment.org/)

The North Carolina Audubon Society works to protect North Carolina's unique environment for birds by advocating for land conservation, coastal protection and clean energy. They have published a number of op-eds warning against the damages of wood pellet biomass harvesting and feature a robust webpage on the subject that includes their policy goals, strategies and networks for you to join. (http://nc.audubon.org/)

Local

Coastal Plain Conservation Group works to "protect rare and imperiled plants and wildlife and the habitats that benefit them and us." Their efforts support habitat monitoring, management, protection and endangered species advocacy.

Alliance for Cape Fear Trees' mission is to preserve, protect, and plant trees to enhance the quality of life for present and future generations in the greater Wilmington area. They work to educate the community as a whole on how their region can support growth while still maintaining its forest. https://www.renaissancewilmingtonfoundation.org/alliance-for-cape-fear-trees1

Cape Fear Sierra Club serves over 1500 members in Bladen, Brunswick, Columbus, Duplin, New Hanover, Pender, and Robeson counties.The club is focused towards opposition to industrial wood pellets as a priority for their work in 2018. https://www.capefearsierraclub.com

The Blue Ridge Environmental Defense League is a network of grassroot community groups that work to maintain the dignity of human and natural environments. Their expertise and advocacy center around toxic chemicals, industrial expansion, public health and intensive agriculture. (http://www.bredl.org/)

These organizations track the industry and provide alerts and avenues for action through political engagement. Local action in North Carolina is critical to change the political and economic structures within which Enviva and its allies thrive.

Depending on your time and resources, this can include voting at the polls, providing public comment during permit hearings, running for office or applying to be on an advisory board in your community. Each of these are crucial aspects of decision making processes especially in local communities where zoning and regulatory decisions lie with local governments and can reshape what areas bear the burden of industry and what areas are spared.

Provide Public Comment

Every time any new industry wishes to enter a county, site its facility, expand operations, or install new technologies, a permit along with a period for public comment is required. Although this process has been abused in North Carolina, specifically in Richmond County, public comment periods are key opportunities for communities and allies to voice their opinions and provide critical research on the approval, dismissal or restructuring of permits and facilities in their area. Public comments can be submitted online, in writing or at public hearings that grant each speaker 3-5 minutes to make their remarks. While all are beneficial, in-person hearings garner awareness and put a face on the issue at hand.

It is important to note that these hearings are not just for experts or those with research to present, but also for people to tell their own stories, a critical and important piece of comment periods that cannot be seen by purely looking at studies or science. ***Your voice matters***. *Providing public comment can change minds, stall decisions, push further research and even make decision-makers rethink their support of an industry.*

If you are interested in getting more involved by providing public comment, keep an eye on your local paper as well as the zoning and permitting authorities in your area who are mandated to put out a public notice on these proceedings. Remember, all you need to do is show up, speak out, and tell your story.

Vote

Many know and understand that voting is a critical and important civic duty. In local elections, this is even more the case. Unlike federal elections which are separated by hundreds of thousands or millions of votes, local elections can be determined by a matter of tens to hundreds of votes. In North Carolina, they also determine your most direct form of elected representation, a board of county commissioners which crucially determines industrial zones and the budget for the county.

In Northampton, Richmond and Hertford Counties, commissioners are elected at-large, meaning there are not guaranteed seats based on districts within the county nor guaranteed representation for each part of the county. This has dangers as it can mean certain areas are left under-represented and thus at higher risk for unfair decision making. In Sampson County, commissioners are elected by district. While this guarantees representation of certain areas, it does also have the risk of gerrymandering votes and minimizing possible total representation of certain regions.

Although both types have flaws, each is dependent upon voter turnout which can easily swing who gets the ultimate decision making power for the county. In the 2016 elections shown below, especially in Richmond County, you can see how only a few hundred votes separated candidates. Tavares Bostik, who has since won a seat in 2018 and is openly outspoken against the wood pellet industry, only needed 314 more votes to win in 2016.

Hertford County [1]

HERTFORD COUNTY BOARD OF COMMISSIONERS DISTRICT 1

John D. Horton DEM	7,524	100.00%

HERTFORD COUNTY BOARD OF COMMISSIONERS DISTRICT 2

Ronald J. Gatling DEM	7,079	90.5%
Donald Kim Kirkland (Write-In)	440	5.60%
Write-In (Miscellaneous)	342	4.35%

2018 Presidential Election Results, Hertford County

Sampson County [2]

SAMPSON COUNTY BOARD OF COMMISSIONERS DISTRICT 2

Robert (Jerol) Kivett REP	4,226	100.00%

SAMPSON COUNTY BOARD OF COMMISSIONERS DISTRICT 4

Harry Parker DEM	3,635	100.00%

2018 Presidential Election Results, Sampson County

Northampton County [3]

Officials elected at-large with residency requirements

NORTHAMPTON COUNTY BOARD OF COMMISSIONERS DISTRICT 1

Charles R. Tyner, Sr. DEM	6,945	100.00%

NORTHAMPTON COUNTY BOARD OF COMMISSIONERS DISTRICT 2

Geneva N. Riddick DEM	6,952	100.00%

2018 Presidential Election Results, Northampton County

Richmond County [4]

RICHMOND COUNTY BOARD OF COMMISSIONERS (Vote for 3)

Jimmy Capps DEM	9,244	22.48%
John Garner DEM	8,333	20.26%
Kenneth R. Robinette UNA	8,117	19.74%
Tavares Bostic DEM	7,803	18.98%
Donnie Richardson REP	7,625	18.54%

2018 Presidential Election Results, Richmond County

Run for Office

The above statistics also demonstrate that many of these positions are uncontested, especially those in Sampson and Northampton. When a candidate runs uncontested, they will get the seat, even if you abstain. This effectively neutralizes people's ability to choose their representative and does not give an opportunity to push critical issues during pre-election debates and campaigning.

However, uncontested positions also reveal the opportunity for others to run. County commissioner positions are elected at the same time as members of the General Assembly and other state officers in elections

held in the month of November in even-numbered years. Because boards have staggered four-year terms and two-year terms, about half of the state's county commissioners are elected at each general election.

But, who can run? The qualifications to be elected to county office are as listed below:

1. One must reside in the electoral district
2. One must be a registered voter in the electoral district *
3. One must be at least 21 years of age

The voting requirement also means that those with felony charges cannot run unless they have been restored to full voting citizenship.

And who is running?

Statewide county commissioners [5]

	2010	2012	2014	2016	2018
Total Seats	578	580	583	583	587
Democrats	295	271	275	256	242
Republicans	277	303	304	322	334
Independents	6	6	3	5	7
New Commissioners	145	121	131	107	97
Vacancies	0	0	1		4
Females	93	93	93	91	98
African-Americans	108	112	111	109	116
American Indians	7	7	6	5	5
Asian	0	0	0	0	0
Hispanic	0	0	0	0	0
Democratic Boards	50	45	47	45	41
Republican Boards	49	53	52	55	56

As you can see, of the 583 seats up for re-election in 2016, less than $^1/_5$ were filled by females, less than $^1/_5$ were filled by African-Americans, none were filled by Asians or Hispanics and only $^1/_5$ of the open seats were filled by new commissioners. Current Boards of Commissioners across the state of North Carolina clearly do not reflect the actual diversity of the people they represent. There is a huge opportunity for community members to make real and drastic change by running for office to better represent their communities.

According to the North Carolina Government & Heritage Library, Boards of Commissioners can pass:[6]

1. **An order:** Usually a directive to a county administrative officer to take or refrain from taking a specified action. For example, a board of commissioners may enter an order directing the county manager to advertise for bids for a new office building. An order may also declare the existence of a given fact, such as an order declaring the results of an election. Finally, an order may sometimes be used to decide a question before the board, such as an order awarding a construction contract to the lowest responsible bidder.
2. **A resolution:** Expresses the sense of the board on a question before it. For example, the board may resolve to petition the State Department of Transportation to pave a rural road.
3. **An ordinance:** An action of the board taken in its capacity as the county's legislative body. As such, an ordinance is analogous to an act of the General Assembly. The board of commissioners may adopt ordinances relating to such varied matters as zoning of industry, or use of the county landfill.

Credit: NC Government & Heritage Library

All of these give power to decide the direction of the community, its economic development, and, sometimes, in what areas of the county harmful industries are sited.

If you are a member of one of the counties where there is a wood-pellet production facility, are unhappy with the actions or inactions of your Board of Commissioners, and are interested in running, in 2020 the following seats are up for re-election:

Richmond County: 3 of 7 Commissioners [7]
Kenneth Robinette, Chairman (First elected 1996)
John Garner, Vice-Chairman (First elected 1996)
Jimmy Capps, Commissioner (First Elected 2012)

Northampton County: 2 of 5 Commissioners [8]
Charles Tyner, Commissioner (First Elected 2016)
Geneva Riddick, Commissioner (First Elected 2016)

Hertford County: 3 of 5 Commissioners [9]
William F. Mitchell Jr, Vice-Chairman (First Elected 2008)
Ronald J. Gatling, Commissioner (First Elected 2012)
John D. Horton, Commissioner (First Elected 2016)

Sampson County: 2 of 5 Commissioners [10]
Jerol Kivett, District 2 (First Elected 2016)
Harry L. Parker, District 4 (First Elected 2012)

Each of the above political engagement strategies are critical if equitable action is to be taken against wood pellets and other polluting industries. However, they are particularly crucial for the wood pellet industry as it has had relative success avoiding scrutiny by hiding behind its so-called economic and environmental benefits. Many voters and politicians alike are unaware of its existence, and even more are unaware of its dangers. Further, the politicians who are aware of the industry and generally support environmental protections are careful to not take a side in this seemingly murky issue, much like North Carolina's Governor Cooper. But, this issue is not murky, it is clear. The wood pellet industry harms our ability to meet critical climate goals while harming the health and environment of communities it is near. Education, conservation and action need to combine to push citizens and politicians to take a stand against this industry in North Carolina.

Looking Forward: The Green Amendment

"The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and aesthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people."

Article1, Section27, Commonwealth of Pennsylvania Declaration of Rights, 1971[11]

Photo: Nicholas A. Tonelli, Wikimedia Commons; NE Pennsylvania [11]

In the early 1970s during a peak in environmental movements and protections across the United States, Pennsylvanians voted to make an amendment to their Constitution that gave the people, as well as future generations, an inherent right to a clean and healthy environment.

Nevertheless, in recent years, Pennsylvania has been defined by its hefty environmental destruction caused by the fracking industry and lax regulations placed on its operations by a heavily Republican legislature. In 2012, this legislature passed a devastating piece of legislation, later known as Act 13, which gave the shale gas industry the right to seize land for gas storage, opened all residencies, schools, and protected areas to fracking permits, and put a gag on medical professionals treating patients exposed to fracked gas drilling chemicals.[11]

In response, environmentalists and community members fought back against the legality of this action. In 2013 in the Pennsylvania Supreme Court, a heavily conservative panel of judges ruled that Act 13 was unconstitutional. Pennsylvania's Article 1, Section 27 played a critical role in the Supreme Court's landmark decision, made even more pivotal as it took place in a state where environmental degradation was rampant.

Pursuing a Green Amendment for North Carolina, and eventually the United States, could be a key strategy for environmental justice communities; environmental rights would become the rights of everyone, not just those who have the time, money and resources to protect their health and surroundings. Instead of consistently placing unsavory industries into low-income communities of color, polluting industries would not be allowed anywhere without proper environmental and community protections.

Since Pennsylvania incorporated an environmental amendment and finally upheld its enactment, could North Carolina and the United States follow a similar path?

In the 1970s, North Carolina also incorporated environmental protections into its Constitution in Article 14, Section 5.

> "It shall be the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry, and to this end it shall be a proper function of the State of North Carolina and its political subdivisions to acquire and preserve park, recreational, and scenic areas, to control and limit the pollution of our air and water, to control excessive noise, and in every other appropriate way to preserve as a part of the common heritage of this State its forests, wetlands, estuaries, beaches, historical sites, open lands, and places of beauty."[12]

This article, though, is far less specific and protective than that found in Pennsylvania's Constitution and it lacks legal precedent unlike Pennsylvania's Article 1. North Carolina citizens' rights to clean air, clean water and a healthy environment are thus left less protected.

In order to get a true Green Amendment included in the North Carolina Constitution, citizens must first convince their legislators to change the constitution and then, in statewide elections, to vote to amend the constitution to include a Green Amendment. Although this seems difficult given North Carolina's rampant gerrymandering and heavy Republican presence, every day it is becoming more possible.

2018 and Our Reasons for Hope

The events and midterm elections which have taken place in 2018 have brought us even closer to a future where *all people* enjoy the rights to a healthy environment and just political and economic system.

The Supreme Court is still hearing the case for district voting maps in the 2020 election, but in mid-2018 recognized that the original and redrawn maps unconstitutionally favored the Republican party.[13] Even with gerrymandered maps, in the November 2018 election North Carolina was able to break the veto power of the anti-environmental supermajority in the General Assembly by electing more Democrats who support environmental and community protections. These elections also created a liberal majority in the North Carolina Supreme Court of 5-2, which will be critical in maintaining just litigation.

This mirrored a national trend as many pro-environment Democrats were elected, wresting control of the U.S. House of Representatives from anti-environmental, Republicans. The new House also will contain an historically diverse set of representatives — from women to Native Americans to Muslims to openly LGBTQ+ people – who pledged to fight for justice and against discrimination.

As these new members of Congress both in state and federal positions, it is critical they are educated to the dangers and fallacies of large scale wood pellet production and burning. The United States cannot continue to support this industry as a sustainable way forward. It worsens global climate change while harming the health and environment of southeastern communities. If it is allowed to continue expanding, it will place even more forests and communities across the United States and world at risk.

Rather, the U.S. needs to set an example for the world to cut ties with this misleading energy source. Wood pellet production at an industrial scale is relatively young and is not yet critical to the global supply of energy as are fossil fuels. If society is already transitioning away from fossil fuels which have been in use for hundreds of years, then it can move away from the clear cutting of forests to produce wood pellets – an industry based on poor science and policy loopholes that is only a couple of decades old.

APPENDIX

Definitions

Biomass is any organic material that can be used as a source of energy and is generally renewable within a time-scale relevant to humans.

Bottomland Hardwood Forests are seasonally flooded forests located along waterways that contain many plant plant species and support structurally complex ecosystems.

Carbon Debts are the measurable imbalance between the carbon footprint of a particular activity, country, group or person and any carbon offsetting measures they pursue.

Carbon Neutral energy resources produces a net zero change in atmospheric carbon dioxide levels; the life-cycle emissions from producing the energy are offset by the source's carbon sequestration efforts.

Carbon Sequestration is the process, natural or artificial, of capturing and storing atmospheric carbon dioxide.

Carbon Sinks are reservoirs that accumulate and store more carbon dioxide than they release. like grasslands, trees and the ocean.

Clear Cutting is a logging practice in which most or all marketable trees in a designated area are cut down.

Concentrated Animal Feeding Operations (CAFOs) are industrialized animal storage, feeding and butchering factories.

Energy Mixes are a group of different energy or fuel sources from which electricity is primarily produced.

Environmental Health is a key part of any comprehensive health system as it relates to all aspects of the natural and built environment impacting human health.

Environmental Justice Communities disproportionately bear the burden of environmental degradation where the poverty level is above the state median and 25% or more of the population is nonwhite.

Environmental Justice is a movement and framework that "seeks to reduce harm for everyone as opposed to distributing harms equally throughout society."[1] The 17 Principles of Environmental Justice were written in 1991 and are rooted in "the need for a healthy and safe work environment, and the importance of economic and political alternatives to develop environmentally safe production methods and livelihoods."[1] The movement traces its roots to the resistance to an illegal siting of a landfill in Warren County, North Carolina.

Extractive Industries operate "through the depletion and degradation of natural resources, the exploitation of human labor and the accumulation of wealth by interests outside the community."2 Work in the extractive economy is divorced from values, and exploiting humans in this way enables ecological erosion.

Greenhouse Gasses are compounds in the atmosphere that are capable of absorbing infrared radiation and trapping heat in Earth's atmosphere.

Greenwashing is a deceptive corporate strategy in which particular products and practices are promoted to be environmentally responsible or beneficial.

Hydrologic Systems are the respective interactions and pathways of interrelated components including but not limited to the processes of precipitation, evaporation and groundwater flow. All together, these systems make up what is commonly called the water cycle.

Monoculture is the agricultural or aesthetic practice of growing and producing a single crop, plant or species on land at a time. These systems have and support very little biological diversity.

Renewable energy solely relates to the ability of any energy source, like trees, to regenerate over time, often when referring to a timespan relevant to human life. However, this does not inherently mean that the process of using trees as a fuel is carbon-neutral.

Sacrifice Zones are geographic regions, often occupied by low-income and minority communities, that have been permanently impaired and relegated to environmental degradation by the inputs and outputs of an extractive industry.

Stewardship is the careful and responsible management of natural resources as systems entrusted into one's care from previous generations to be maintained and passed down to future generations, educated to do the same.

S**ustainable** fuel is a resource that is renewable, carbon-neutral and has limited negative effects on the environment.

Systemic Racism: Discrimination based on race which shows up in institutions and society.

Timberland: Forested land that is managed or can be used for human purposes like industry, building or carpentry.

Volatile Organic Compounds (VOCs) are gasses emitted into the air that are typically not acutely toxic but have compounding long-term negative health impacts. While some VOCs occur naturally, anthropogenic VOCs are regulated by law.

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The Rachel Carson Council is the national environmental organization envisioned by Rachel Carson and founded in 1965 to carry on her work after her death. We promote Carson's ecological ethic that combines scientific concern for the environment and human health with a sense of wonder and reverence for all forms of life in order to build a sustainable, just, and peaceful future.

The Rachel Carson Campus Network (RCCN) links students, faculty, staff, and administrators at campuses nationwide to the Rachel Carson Council to provide and share information and resources, recruit environmental leaders, and work on and off campus to create lasting changes in policy and practice for a sustainable future.

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EXHIBIT C

DIRTY DECEPTION:

How the Wood Biomass Industry Skirts the Clean Air Act

ENVIRONMENTAL INTEGRITY PROJECT

April 26, 2018

ACKNOWLEDGEMENTS

This report was researched and written by Patrick Anderson and Keri Powell of Powell Environmental Law on behalf of Environmental Integrity Project. Rachel Weber of Dogwood Alliance provided edits and suggestions.

THE ENVIRONMENTAL INTEGRITY PROJECT

The Environmental Integrity Project (http://www.environmentalintegrity.org) is a nonpartisan, nonprofit organization established in March of 2002 by former EPA enforcement attorneys to advocate for effective enforcement of environmental laws. EIP has three goals: 1) to provide objective analyses of how the failure to enforce or implement environmental laws increases pollution and affects public health; 2) to hold federal and state agencies, as well as individual corporations, accountable for failing to enforce or comply with environmental laws; and 3) to help local communities obtain the protection of environmental laws.

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PHOTO CREDITS

Cover photo: Enviva Ahoskie wood pellet mill in North Carolina, courtesy of Dogwood Alliance.

DIRTY DECEPTION:

How the Wood Biomass Industry Skirts the Clean Air Act

Executive Summary

Across the U.S. South, industrial-scale "wood pellet" facilities are converting trees into pellets and shipping them to Europe to be burned for electricity. The industry has grown almost 10-fold since 2009, converting millions of tons of trees into pellet fuel for power plants under the mistaken notion that this is carbon neutral and therefore good for the climate. In the midst of this fast growth, relatively little attention has been paid to the high levels of air pollution—such as soot and volatile organic compounds—generated by wood pellet manufacturing, pollution which can lead to a wide array of health and environmental problems. The Environmental Integrity Project (EIP) examined air permits and emissions information in federal and state records for 21 wood pellet mills in the U.S. that are exporting to Europe and found numerous schemes to skirt federal Clean Air Act regulations. EIP's survey also revealed a troubling record of dangerous fires and explosions, which cause serious episodes of heightened air pollution. EIP focused particular attention on the 15 "new generation" mills constructed since 2008 specifically to supply the international demand for wood pellets. These mills operate on a much larger scale and emit substantially more air pollution than traditional pellet mills that supply a domestic heating market.

Key Findings:

- In 2017, at least a third of the wood pellet plants (7 out of 21) violated their permit limits by releasing illegal amounts of pollution, while another four plants had faulty permits issued by state governments that failed to require pollution control equipment required by the federal Clean Air Act. Overall, more than half of the plants (11 out of 21) either failed to keep emissions below legal limits or failed to install required pollution controls.
- The 21 wood pellet mills exporting to Europe emit a total of 16,000 tons of health-threatening air pollutants per year, including more than 2,500 tons of particulate matter (soot), 3,200 tons of nitrogen oxides, 2,100 tons of carbon monoxide, and 7,000 tons of volatile organic compounds. These plants also emit 3.1 million tons of greenhouse gases annually.
- A factory northeast of Houston owned by German Pellets has emitted nearly ten times its permitted limits of volatile organic compound pollution since it began operation in 2013, releasing 580 tons per year. Rather than require the facility to comply with legal limits, Texas officials are proposing to simply raise the limits to let the facility continue to emit dangerous levels of pollution.
- At the Enviva Biomass wood pellet plant in Southampton County, Virginia, plant operators actually removed the pollution control equipment to evade upgrade requirements and switched from processing softwood to hardwood, which results in more carbon dioxide pollution and other harmful environmental impacts.

- Of the 15 largest operating facilities, at least eight have had fires or explosions since 2014, including at factories in North Carolina, Georgia, Arkansas, Alabama, and Texas that released vast amounts of air pollution and/or injured employees. A blaze at the German Pellets storage silo in Port Arthur, Texas, burned for two months in 2017, releasing smoke that forced dozens of local residents to seek medical attention and killed a worker during cleanup.

One of the most troubling trends in the wood pellet industry is that facilities that should face the most rigorous air permitting standards are actually the least controlled and dirtiest. Under a Clean Air Act program called "new source review," new or modified major sources of air pollution are required to reduce emissions to the level achievable by using the best available control technology. Contrary to that legal requirement, states allow construction of the country's largest wood pellet manufacturing plants without controls, or with inadequate controls, for volatile organic compounds (VOCs), an air pollutant that causes smog and respiratory problems. This is despite the fact that extremely effective VOC controls capable of reducing emissions by 90 to 95 percent are in widespread use at similar wood pellet manufacturing plants. These same controls are also very effective at reducing hazardous air pollutants, which can cause a variety of health effects including cancer. For instance, in North Carolina, wood dryers at two recently permitted major source facilities owned by Enviva Biomass emit nearly six times more VOCs and 50 to 60 times more hazardous air pollutants than comparable facilities with appropriate pollution control systems.

In other instances, states allow facilities to emit well beyond legal limits for years at a time. In Mississippi, Florida, and North Carolina, state permitting authorities continue to allow wood pellet manufacturing plants to emit well above a 250 ton per year threshold for major sources without installing legally required air pollution controls. For example, the Drax plant in Amite County, Mississippi, near McComb, emits more than 900 tons per year of VOCs – more than three times the amount that normally triggers a requirement for the installation of best available pollution control equipment. An Enviva plant in Jackson County, Florida, north of Panama City, emits more than 500 tons per year, and an Enviva plant in Northampton County, North Carolina near Roanoke Rapids emits 377 tons per year. In each of these cases, the Clean Air Act mandates that state permitting authorities require the facility to either reduce its VOC emissions to below 250 tons per year or undergo major source permitting and install the best available control technology. But these states have largely failed to follow the law.[1]

Finally, in addition to the air pollution emitted during the manufacturing process directly, pellet mills and storage facilities have experienced a rash of fires and explosions, injuring workers and releasing large amounts of uncontrolled air pollution. Because wood pellets are stored in massive and concentrated piles, these fires can burn for days or weeks. In fact, in the summer of 2017, a fire at a German Pellets in storage facility in Port Arthur, Texas, burned for 52 days, emitting vast amounts of air pollution and sickening nearby residents.

This report calls on state permitting authorities to take these pollution problems seriously and require full compliance with the federal Clean Air Act. In particular, EIP requests that states take the following steps to ensure wood pellet facilities operate legally:

1. **Reexamine existing air permits in light of new testing that shows much higher emissions of volatile organic compounds and hazardous air pollutants.** If a facility is polluting above legal limits, states must take immediate action to ensure facilities cease violating pollution limits, either by accepting enforceable production limits or by installing adequate pollution controls.

2. **Require major sources of air pollution to install the best available control technology.** Many pellet mills with major source permits evade using the best available control technology, or any control technology at all, while facilities with minor source permits, often the same size or larger, do use controls. States must not reward companies for refusing to install controls that would reduce emissions to minor levels. Rather, states must require new or modified major sources utilize controls that are at least as effective as those used by the best-controlled minor sources.

3. **Institute pellet production limits at facilities that claim to be too minor for the best available pollution controls.** If pollution controls will not keep emissions below legal limits when a facility is operated at full capacity, the facility's permit must restrict maximum production to a level that ensures the facility will not exceed the major source threshold. Although a few permits EIP surveyed do incorporate production limits, most minor source permits do not and are therefore legally deficient.

4. **Ensure Communities are Notified of and Able to Participate in Permitting Decisions.** Many of the air permits EIP surveyed were issued without any public notice or the ability to comment, including permits for the initial construction of facilities, in contravention of the Clean Air Act. This means communities were not informed of the decision to allow sources of air pollution to locate in their backyard. States should revise their regulations and procedures to include public notice and opportunity for meaningful input from those closest to proposed facilities.

5. **Require annual emissions testing for volatile organic compounds and hazardous air pollutants from all of the major emission points at pellet mills.** Many permits rely on emissions estimates—frequently outdated and inaccurate—rather than source-specific emissions testing to determine the level of emissions. While continuous emissions monitoring is the best method to determine actual levels of pollution emitted, where states do not require this they must at least require annual testing of each of the major units at pellet mills for volatile organic compounds and hazardous air pollutants.

6. **Reduce the risk of fires and explosions by requiring facilities to comply with their general duty under the Clean Air Act to design and maintain a safe facility.** Fires and explosions from wood dust plague the industry, and states should utilize a section of the Clean Air Act, called the "general duty clause," to develop site-specific management plans that will lower the risk of dangerous fires and explosions.

Introduction

The wood pellet manufacturing industry exploded in the U.S. South beginning in the late 2000s, when the European Union began subsidizing burning wood for electricity under the false presumption that doing so would be carbon neutral. Under a loophole in the EU carbon accounting system, neither the loss of carbon-absorbing trees in U.S. South, nor the emissions from burning trees in EU are accounted for in assessing greenhouse gas emissions from wood biomass. Many climate scientists have refuted the EU's premise that cutting whole trees to burn for electricity is carbon neutral, especially in a time scale relevant to fighting the worst impacts of climate change. While the industry frequently claims to process mostly forest residuals, multiple investigations have shown this to be false.[2] Ecologists have also pointed out that the industry is having a major impact on forests in the South, especially ecologically valuable hardwood forests which are being cut and replanted with faster-growing softwood plantations to feed expected demand.

Although the EU has provided substantial subsidies to enable the growth of the wood pellet industry, narrow profit margins have caused European power plants to look beyond the EU for cheap sources of wood. The U.S. South, with its vast forests growing on mostly unprotected private lands, along with state and local governments eager to provide their own industry subsidies, provide the EU plants with just such a source. In the span of only a few years, the U.S. South became the world's largest wood pellet supplier. At present, EU power companies import over 4.7 million metric tons of U.S. wood pellets each year, up from just 500,000 tons in 2009 – a nearly tenfold growth over a decade.[3] Projections show this growth rate continuing, and possibly accelerating if Asian nations begin importing comparable amounts of wood pellets, as many in the industry predict.[4]

As the industry has grown, so too have concerns over just how clean and sustainable it is to burn trees for electricity. Recent reports document the wood bioenergy industry's adverse impacts on southern forests as well as its role in causing global climate change.[5] This report is the first to focus on air pollution generated by wood pellet manufacturing plants and the industry's unlawful evasion of air pollution control requirements intended to protect human health and the environment in the communities where these plants are located.

To ascertain the local and regional impacts of air pollution from wood pellet plants, EIP analyzed air permits, emissions information, and other documents related to the 21 plants exporting wood pellets, as well as 10 facilities under construction or proposed which have air permits. EIP also estimated emissions from nine proposed facilities which do not yet have air permits. This survey placed particular attention on the 15 new-generation mills built specifically to supply the international biomass demand, all of which have production rates above 300,000 tons per year, and all but one of which were built after 2010. The vast majority of pellets produced at these plants are exported to Europe, while a limited but growing portion is exported to Japan and other Asian nations.

EIP's survey reveals that these facilities emit dangerous amounts of air pollution, and further finds that state agencies consistently fall well short of their duty to ensure that these facilities control their pollution to the levels required by law, frequently due to misleading information supplied by the industry. As a result, many large pellet mills have been allowed

to emit air pollution, especially volatile organic compounds (VOCs) and hazardous air pollutants at levels well above legal limits for years at a time. When states do address these issues, they frequently fail to require actual compliance with Clean Air Act requirements. For instance, those states that have issued major new source review permits to large wood pellet plants concluded that the "best available control technology" for reducing VOCs is no controls, despite the fact that controls are in use at similar (and sometimes nearly identical) facilities. EIP's findings are particularly concerning when viewed in conjunction with another recent report showing that wood pellet mills are substantially more likely to be located in communities living below the median income level and with large minority populations, communities frequently burdened with excess pollution from multiple industrial sources.[6] This report provides a state-by-state analysis of the state failures and industry deceptions that riddle this emerging industry. Additionally, this report details the lengthy history of fires and explosions at pellet mills, which emit dangerous levels of air pollution.

How Pellet Mills Pollute

Before 2010, typical U.S. wood pellet mills were relatively small, producing between 10,000 and 100,000 tons of pellets per year for domestic consumption in home heating stoves. While these mills still had the potential to emit considerable amounts of air pollution, especially particulate matter, they weren't generally large enough to trigger significant attention from permitting agencies or watchdog groups. The newer generation of mills built to feed Europe's demand, on the other hand, are massive, producing up to 800,000 tons of wood pellets per year. While the large increase in scale came with an equally large increase in pollution, the full magnitude of emissions has not been well understood by permitting authorities. Consequently, states issued construction permits to many recent facilities under the assumption they would emit relatively low levels of air pollution (making them "minor" air pollution sources that are exempt from many control requirements), only to subsequently find that these facilities actually emit five or six times more pollution than legally allowed (making them "major" air pollution sources that should be subject to much more stringent pollution control requirements).

To understand the air pollution issues in the wood pellet industry, it is useful to understand the basics of how the facilities operate. A wood pellet manufacturing plant has two main tasks: to dry the wood to a point where it is efficient to burn in power plants, and to turn the wood into pellets for easy transport. To begin the process, wood arrives by truck (frequently whole trees from clear-cutting operations), often a half-dozen or more trucks per hour.[7] Once at the facility, the trees are debarked and then chipped in shredding machines called hammermills. The wood is then conveyed to the dryer, usually a large rotary dryer heated by burning wood and bark, where the moisture in the wood is reduced from about 50% by weight to around 10%. After the dryer, the wood is again processed by hammermills to reduce its size to a point where it can be formed into pellets. The next unit is the pellet press, which presses the wood through holes in a die to create pellets, a process that requires large amounts of pressure and heat. The pellets are then deposited into a pellet cooler to reduce their temperature back to safe levels. A typical facility produces between 50 and 70 tons of wood pellets per hour, or between 450,000 and 650,000 tons per year. The pellets are then

ready for transport to a port, where they are usually stored for some time before being shipped to Europe.

Each step in the process has the potential to emit large amounts of air pollution. The most obvious source is the drying process, as burning wood emits substantial amounts of fine particulate matter, carbon monoxide, nitrogen oxides, and greenhouse gases. While each of these pollutants has serious health or environmental impacts, fine particular matter ($PM_{2.5}$) is particularly harmful to human health. $PM_{2.5}$ consists of airborne particles less than 2.5 micrometers which can pass deep into a person's lungs and even into the bloodstream, causing heart attacks, decreased lung function, worsening asthma symptoms, and premature death. Recent research published in the New England Journal of Medicine found that reducing $PM_{2.5}$ by just 1 microgram per cubic meter throughout the United States could save 12,000 lives each year.[8] Many wood pellet mills frequently emit 60 to 80 tons per year of $PM_{2.5}$, even after installing controls.[9]

In addition to the particulate matter emitted from burning wood, drying wood actually emits the largest share of air pollution. Green wood (that is, wood before it has been dried), contains significant amounts of volatile organic compounds (VOCs), and applying heat or mechanical energy to the wood releases the VOCs into the air. Once in the atmosphere, VOCs combine with sunlight to produce ground-level ozone, a major constituent of smog. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. In addition to the ozone risk, VOC emissions from wood pellet mills also contain numerous individual pollutants which are classified by the EPA as hazardous air pollutants, such as acetaldehyde, formaldehyde, and methanol. Hazardous air pollutants are those pollutants which EPA has identified as especially toxic or carcinogenic even in small amounts and are the most tightly regulated pollutants under the Clean Air Act.

The industry and permitting agencies have long understood that drying wood emits large amounts of VOCs and hazardous air pollutants, in large part because the drying process at pellet plants is similar to the drying process in more traditional industries like particle board manufacturing. Because of this knowledge, even the earliest of the large wood pellet plants generally utilized control technology to reduce emissions from the dryers. The most common form of control is known as a regenerative thermal oxidizer, which uses very high temperatures to destroy 95 to 99 percent of the VOCs and organic hazardous air pollutants.

What the industry and permitting agencies did not understand at the outset is that units other than the dryer also emit substantial amounts of VOCs. Until recently, many permitting authorities simply assumed the hammermills, pellet presses, and pellet coolers did not emit any VOCs at all. That assumption began to fall apart in 2012, when a large facility, Georgia Biomass in Waycross, Georgia, decided to test all of the facility's units for VOC emissions. The results showed that not only did these units emit VOCs after all, they emitted a lot of them. Georgia Biomass found that their hammermills, pellet presses, and pellet coolers emitted more than 1,000 tons per year of VOCs, whereas the facility and the state previously believed the entire facility emitted less than 250 tons per year. This meant the facility had been operating in violation of its permit limits and the Clean Air Act's major source requirements for several years, leading Georgia to levy heavy fines and issue a

consent order requiring the facility to reduce its facility-wide VOC emissions to below 250 tons per year.

Testing at a Florida facility in 2013 and an Alabama facility in 2014 soon confirmed Georgia's findings. Both tests showed that the facilities had likewise been emitting VOCs well beyond legal limits. Unfortunately, though by 2014 three sets of testing showed that large pellet mills emitted substantially more VOCs than most permits allowed, most states have yet to take meaningful action to address the problem.

Clean Air Act Permitting 101

In order to understand the systematic issues identified by EIP, this section provides a brief primer on the basic framework of Clean Air Act permitting and how it applies to the wood pellet industry (Appendix A contains a lengthier explanation). The basic scheme of Clean Air Act permitting is that facilities which either actually emit or have the potential to emit various pollutants above certain thresholds must apply for corresponding permits before beginning construction and/or operating, which contain certain requirements such as using pollution controls or limiting emissions. The key permits at issue in the wood pellet industry are "major source" permits and hazardous air pollutant permits. Major source permitting is a rigorous set of requirements meant to reduce emissions from the largest sources of air pollutants. For the wood pellet industry, facilities must go through major source permitting and install the best available control technology if they have the *potential* to emit more than 250 tons per year of any pollutant. Permitting for hazardous air pollutants, meanwhile, requires the use of the maximum achievable control technology, an even more stringent standard, for facilities which emit or have the potential to emit more than 10 tons per year of any hazardous pollutant, or more than 25 tons per year of all hazardous air pollutants. Note that both permitting requirements are triggered not only by actual emissions, but by potential emissions (which are usually the level of emissions when a facility operates at full capacity). Finally, one key thing to recognize is that these permitting programs are primarily administered by state environmental agencies, and while the federal EPA has some oversight, the vast majority of decision-making and enforcement occurs at the state level. This means permits and enforcement vary considerably from state to state.

Part One: State-by-State Analysis of Permits Reveals a Troubling Pattern

After the initial revelations that wood pellet mills emit substantially more VOCs than initially believed, states reacted in many different ways. A few states took the violations seriously and required some facilities to install controls and/or reduce their pollution levels. This includes Georgia, where the VOC discovery was first made, and Alabama, which required the installation of a second pollution control system at a facility after it discovered the violation. Most other states failed to address the problem in an adequate manner. This section details those issues and other permitting deficiencies which have allowed the industry to pollute above legal limits for years.

North Carolina

North Carolina is home to three wood pellet manufacturing plants owned by a company called Enviva Biomass in Sampson, Northampton, and Hertford Counties, and a fourth Enviva facility is under construction in Richmond County. The state has been the most egregious in terms of allowing unnecessary and unlawful pollution from the industry. While most wood pellet plants utilize at least some VOC and hazardous air pollutant controls, North Carolina illegally allows all three Enviva plants to operate without any VOC or hazardous air pollutant controls whatsoever and will do the same for the fourth when it begins operations. In fact, out of all of the large pellet mills in the country, only one other facility operates without VOC or hazardous air pollutant controls of any kind: the Enviva Southampton plant just across the border in southern Virginia, near Chesapeake. Due to North Carolina's lax oversight and Enviva's reluctance to install controls, the Enviva plants are the largest emitters of VOCs and hazardous air pollutants in the industry, emitting five to six times the level of VOCs and 50 times the level of hazardous air pollutants as comparable facilities.

Table A. Annual Air Pollution from Exporting Pellet Mills in North Carolina (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (3)	366	337	529	1,396	552,655
Existing (3) and Under-Construction (1)	511	568	749	2,024	782,483

Many North Carolina Plants Avoid Installing Best Available Control Technology

Typically, industrial facilities seek to avoid the most stringent Clean Air Act control requirements by voluntarily limiting their air pollution levels that qualify them as "synthetic minor" sources (synthetic in the sense that they could be major sources but have limited themselves to minor source levels of emissions). Ironically, the current situation in the wood pellet manufacturing industry is that the "synthetic minor" air pollution sources usually utilize VOC controls while the "major" sources that are subject to more stringent control requirements do virtually nothing to control VOC pollution. Enviva's existing Sampson plant, located 35 miles east of Fayetteville, NC, and Enviva's proposed Hamlet plant (40 miles west of Fayetteville) are prime examples of this phenomenon. Enviva conceded at the outset that both plants qualified as "major" sources due to their VOC emissions.[10] Accordingly, major source permitting requirements applied to both plants, including the requirement to control air pollution to the level that can be achieved using "best available control technology." The decision of what constitutes the best available control technology for controlling VOC emissions should be straightforward: what is the best type of pollution control technology utilized at similar facilities? As discussed above, every other non-Enviva facility of similar size operates with a regenerative thermal oxidizer controlling the facility's dryer. Many also reduce VOC emissions from other units by using additional pollution controls. These controls can reduce VOC and hazardous air pollutant emissions by 95% or more.[11] Accordingly, North Carolina plainly should have selected these same controls as "best available control technology" for the Enviva Hamlet and Enviva Sampson plants. It

did not. Rather, North Carolina concluded that Enviva need not install any VOC controls whatsoever. The problem is clear when Enviva's plants are compared to similar facilities. For example, an older facility in Georgia, Georgia Biomass, actually produces more wood pellets than Enviva Sampson, yet the Georgia plant emits just 130 tons of VOC per year compared to Enviva Sampson's 628 tons per year. This is because Georgia Biomass utilizes VOC control technology, despite being a synthetic minor source, while Enviva Sampson, a major source that should use the best available control technology, uses no controls at all.

Neither Enviva nor North Carolina indicated it was infeasible to install the VOC controls—regenerative thermal oxidizers—on the Sampson and Hamlet plants.[12] Rather, Enviva argued that a regenerative thermal oxidizer would be cost prohibitive, despite the fact that every other comparable company in the industry is able to afford the technology at least for the wood drying operations.[13] Enviva further argued that adequate VOC reductions could be achieved at both facilities by restricting the wood processed to 25% hardwood and 75% softwood, rather than 100% softwood. This is because softwood emits more VOCs than hardwood.[14] While this reduction in softwood does result in a small reduction of VOCs, perhaps 20%, it pales in comparison to the reduction achievable by the use of regenerative thermal oxidizers, which reduce VOC and organic hazardous air pollutant emissions by at least 95%.[15] With the use of regenerative thermal oxidizers, Enviva would lower VOC emissions from 628 tons per year to less than 50 tons per year.

In addition to not being an effective control technology to reduce VOC and hazardous air pollutant emissions, processing hardwood presents other significant environmental impacts. The use of slow-growing hardwood forests as feedstock, forests which sequester more carbon than softwood pine forests, results in more carbon in the atmosphere, even decades after the wood pellets have been burned.[16] The harvesting of bottomland hardwood forests is also concerning because of the critical ecosystem services that will be lost if these wetland habitats are decimated. Wetland forests buffer communities from storms and floods, and remove nutrients and other pollutants from water to maintain the quality of streams, rivers, and estuaries.[17] Destruction of hardwood forests also depletes habitats of endangered and imperiled species.[18]

Violations of Air Pollution Regulations at Plants in Richmond and Sampson Counties Means Massive Emissions of Hazardous Air Pollutants.

In addition to allowing dangerously high VOCs, North Carolina's failure to require Enviva to install control devices at Enviva Hamlet and Enviva Sampson also means these facilities emit hazardous air pollutants at more than twice the legal threshold. In fact, emissions testing at Enviva Sampson recently revealed the facility's dryer emits up to 50 times more hazardous air pollution than comparable facilities, simply because North Carolina has not required pollution controls at the facility, and Enviva has refused to install the controls voluntarily.

Manufacturing wood pellets emits significant levels of hazardous air pollutants, especially acetaldehyde, formaldehyde, and methanol. EPA lists acetaldehyde and formaldehyde as probable human carcinogens, and both cause additional short term respiratory problems and chronic symptoms occur from long term exposure.[19] The health risks of methanol emissions, meanwhile, include "a decrease in gestation time, an increase in the number of required

Caesarian-section births, and, in prenatally exposed children, instances of a severe wasting syndrome, concentration-related delay in sensorimotor development and lower performance on an infant intelligence test."[20]

The Clean Air Act requires that major sources of hazardous air pollutants like Enviva Hamlet and Enviva Sampson utilize the maximum achievable control technology, which is meant to be even more stringent than the "best available control technology" standard for other pollutants. Unfortunately, North Carolina has not required any control technology at all to reduce hazardous air pollutants at Enviva Sampson and Enviva Hamlet. This is extremely problematic, as control technology which can massively reduce these hazardous air pollutant emissions is standard in the wood pellet industry.[21] The hazardous air pollutants emitted at wood pellet facilities are largely emitted from the burning and drying of wood, and because these hazardous air pollutants are also VOCs, control technologies that reduce VOCs also reduce these particular hazardous air pollutant emissions.[22] This means installing a regenerative thermal oxidizer on the dryers at Enviva Sampson and Enviva Hamlet would reduce hazardous air pollutant emissions by 95% or more. Every other non-Enviva facility that EIP surveyed has installed a regenerative thermal oxidizer on their dryer, vastly lowering their hazardous air pollutant emissions.

Without this technology, the Enviva plants emit 300 times more formaldehyde and 71 times more acetaldehyde than Hazlehurst Wood Pellets, a Georgia facility with a similar process rate but that uses a regenerative thermal oxidizer. The Enviva facilities' hazardous air pollutant emissions are substantially higher even than Georgia Biomass, the largest pellet mill in the country, because Georgia Biomass has installed regenerative thermal oxidizers while the Enviva plants have not. Although testing for hazardous air pollutant emissions is unfortunately rather rare, Table B below compares the available testing at similar facilities to the Enviva Sampson and Enviva Hamlet plants.

Table B. Enviva Sampson and Enviva Hamlet Emit Much More Hazardous Air Pollutants Than Comparable Facilities That Utilize Regenerative Thermal Oxidizers

Facility	State	Production Rate (tons per year)	Acetaldehyde Emissions (tons per year)	Formaldehyde Emissions (tons per year)	Methanol Emissions (tons per year)	Total HAP Emissions (tons per year)
Georgia Biomass	GA	826,000	1.7	7.6	5.0	15.4
Drax Amite	MS	578,000	No Data	0.4	No Data	No Data
Hazlehurst	GA	525,000	0.16	0.08	0.87	1.1
Enviva Sampson/Enviva Hamlet[A] (Initial Test)	NC	535,000	19.9	23.7	13.4	70.1
Enviva Sampson/Enviva Hamlet[A] (Second Test)[B]	NC	535,000	11.4	24.4	8.14	55.5

A. Although Enviva Hamlet is not yet operating, it is very similar to the Sampson facility.

B. After the first round of testing showed the facility was exceeding its VOC limits, Enviva tweaked their dryer, which somewhat reduced VOC emissions and some HAP emissions. It is unclear whether Enviva will continue to operate in this manner, but even if they do, emissions are still much higher than other facilities.

If Enviva Sampson and Enviva Hamlet installed regenerative thermal oxidizers on their dryers, hazardous air pollutant emissions would be cut by at least 95%.[23] Total hazardous air pollutants would be reduced from 55.5 tons per year to just 2.7 tons per year, and formaldehyde emissions would be lowered from around 24 tons per year to 1.2 tons. Acetaldehyde and methanol would both be reduced to less than one ton per year.

Enviva's Illegal Scheme to Avoid Major Source Permitting in Northampton County

North Carolina impermissibly removed limits intended to reduce VOCs from Enviva's mill in Northampton County, allowing the facility to emit 200 tons more VOCs than similar facilities. Like the other Enviva facilities, Enviva Northampton's VOC emissions are uncontrolled, despite the fact that it emits well over the 250 ton per year major source threshold that should require the use of the best available control technology. Initially, North Carolina allowed Enviva to construct without VOC controls based on Enviva's agreement to accept enforceable limits designed to ensure that the facility's emissions qualified as "minor" (and therefore exempt from control requirements).[24] Specifically, Enviva agreed to reduce VOC emissions by processing no more than 10% softwood and to not dry the wood to lower than 13% moisture content.[25] But only two years later, Enviva apparently decided those restrictions no longer fit within its business plan and asked North Carolina to remove them from the Northampton facility's air permit.[26] North Carolina obliged, but still did not require Enviva to comply with the permitting and pollution control requirements applicable to major air pollution sources.[27] The law is clear that North Carolina acted illegally: when a facility takes a limit to avoid stringent Clean Air Act requirements applicable to "major" sources, as Enviva Northampton did, any subsequent relaxation of that limit that allows the source to emit more than the major source threshold (here, 250 tons per year of VOCs) triggers the requirement to obtain a major source construction permit and install required pollution controls.[28] North Carolina disregarded that requirement and allowed Enviva to continue operating the Northampton plant without VOC controls. The facility now emits 377 tons per year of VOCs, and is authorized to emit up to 456 tons per year—despite being constructed as a "minor" air pollution source.[29]

Table C on the following page shows that Enviva Northampton is the largest wood pellet mill in the country that does not utilize VOC control technology. To further illustrate the high emissions, other facilities which process various rates of softwood are adjusted to operating at 30% softwood, the same rate the Enviva Northampton currently processes. Once this adjustment is made, it is clear that Enviva Northampton's VOC emissions are substantially higher than they could be if Enviva utilized a regenerative thermal oxidizer on their dryer. Further, had the facility gone through legitimate major source permitting, VOC emissions from the hammermills and pellet coolers would also be reduced because major source permitting's best available control technology requirement applies to each emission unit with significant emissions.

Table C. VOC Controls on Dryers at Pellet Mills Above 300,000 Tons Per Year Production Rate; Enviva Northampton Highlighted

Facility	State	Production Rate	VOC Controls On Dryer	Softwood Content	Actual VOC Emissions (tons per year)	VOC Emissions at 30% Softwood[A] (tons per year)
Georgia Biomass	GA	826,000	Yes (RTO and RCO)	100%	120	36
Enviva Cottondale	FL	821,000	Yes (RTO)	100%	517	155
Zilkha Monticello[B]	AR	661,000	Yes (RTO)	100%	249	74
Enviva Northampton	NC	628,000	No	30%	377	377
Drax Amite	MS	578,000	Yes (RTO)	100%	249[C]	63
German Pellets	TX	578,000	Yes (RTO)	100%	580	174
Enviva Southampton	VA	535,000	No	10%	245	321
Enviva Sampson	NC	535,000	No	75%	628	251
Enviva Hamlet[B]	NC	535,000	No	75%	628	251
Colombo (Now Enviva Greenwood)	SC	175,000[D]	Yes (RTO)	100%	249[D]	74
Hazlehurst	GA	525,600	Yes (Sent to burner, 90% reduction)	100%	216	64
Highland Pellets	AR	500,000	Yes (Sent to burner, 90% reduction)	100%	245	73
Drax Morehouse	LA	500,000	Yes (RTO)	98%	249[E]	76
Drax LaSalle	LA	500,000	Yes (RTO)	100%	611	183
Enviva Ahoskie	NC	420,000	No	30%	280	280
Westervelt	AL	320,000	Yes (Two RTOs)	100%	28	8
Zilkha	AL	300,000	Yes (RTO)	50-100%	246	73

A. Facilities utilize a range of softwood content, however, for comparison purposes, we assume in this column that all facilities are utilizing 30% softwood, which is what the Enviva Northampton plant currently utilizes.
B. Facility is permitted but not yet operating.
C. This facility's permit limit is 249 tons per year, but research by EIP shows it likely emits much higher levels, up 1,000 tons per year; see the section on Mississippi below.
D. Colombo Energy has the capacity to produce 669,000 tons per year, but without VOC controls on its post-dryer emissions, the facility must limit operations to avoid exceeding the 250 ton per year major source threshold. See the discussion on this facility below in the South Carolina section.
E. This facility's permit limit is 249 tons per year, but research by EIP shows it likely emits much higher levels, potentially more than 700 tons per year, see the section on Louisiana below.

Complete Lack of Public Input at Enviva's Northampton and Hamlet Plants When It Mattered.

The most troubling aspect of Enviva Northampton's permitting history is that it was completely opaque; the public never had notice or the opportunity to comment on the facility's construction or subsequent modification to emit more than 250 tons per year of VOCs.[30] This is because North Carolina's regulations do not require public notice or

comment for minor source permits such as the one obtained by Enviva for Northampton, likely in contravention of the Clean Air Act.[31] This is in contrast to the major source permit process, for which North Carolina does require public notice and comment. In other words, residents who live near the Northampton facility—now emitting at major source levels—never knew about the levels of pollution emitted, or the decision to allow the facility to increase its emission above the major source threshold. Had the facility initially proposed to emit 377 tons per year of VOCs, the permits would have been subject to public notice and comment, but Enviva craftily avoided these requirements by taking initial limits and then eliminating those limits just two years later.

The public also lacked an adequate opportunity to provide input for the permit for Enviva Hamlet in Richmond County. As noted above, this permit allows the highest level of air pollution in the industry. In issuing this permit, the state failed to follow clear regulations which serve to inform the public about the proposed facility near the predominantly African American community of Dobbins Heights. North Carolina never held a public hearing on the permit, notwithstanding the Clean Air Act's clear mandate to do so and despite requests by the community.[32] North Carolina also issued public notice and draft permits for the facility with incorrect addresses, making it difficult for citizens to learn whether the facility would be built in their backyard or elsewhere.[33] While North Carolina dismisses these issues as minor typos, the failure to give the proper address meant that those who were most impacted could not reasonably discover the true location of the plant until after the opportunity to file comments or request a hearing.

Texas

Texas only has one exporting pellet plant, German Pellets northeast of Houston, but the facility has had a serious history of failing to comply with the Clean Air Act, as well as the worst record of fires in the industry, with at least five fires or explosions since 2014. One fire at a German Pellet's storage facility in Port Arthur burned for more than 50 days, sickening residents and leading to multiple lawsuits.

Table D. Annual Air Pollution from Exporting Pellet Mills in Texas (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing plants (1)	72	98	175	580	190,923

Pellet Plant in Woodville Has Violated Clean Air Law for Years, but Texas Proposes no New Controls

The German Pellets facility in the community of Woodville, Texas, 90 miles northeast of Houston, has emitted VOCs at nearly double its permitted limits and the major source threshold since it began operation in 2013, with VOC emissions approaching 600 tons per year. Despite the testing at multiple facilities dating to 2012 that proved large facilities like German Pellets could not remain below the major source threshold without additional controls, German Pellets apparently did not discover that it was itself violating its permit

limit of 64 ton per year (as well as the 250 ton per year major source threshold) until late 2014. It turns out the facility actually emits 580 tons of VOCs per year.[34] Instead of punishing the facility for violating the terms of its permit and exceeding the Clean Air Act's major source threshold for nearly five years, Texas has allowed the facility to continue to operate at full capacity, emitting the same level of illegal VOC emissions. In fact, Texas is now proposing to issue a major source permit to the facility that simply raises the emissions limits to levels with which German Pellets can comply while requiring no additional VOC control measures.

While German Pellets does utilize a regenerative thermal oxidizer on its dryer, the hammermills and pelletizing lines are uncontrolled and emit substantial amounts of VOCs. The two pellet coolers emit 446 tons per year of VOCs, and the total post-dryer emissions are 514 tons per year. As discussed above, the major source permitting process must limit emissions to the level that can be achieved by using best available control technology. A regenerative thermal oxidizer or a regenerative catalytic oxidizer—controls which have been installed on hammermills and pelletizing units at several other facilities—should have been chosen as the best available control technology.

German Pellets submitted misleading information to the Texas permitting authority to justify not installing control technology. In particular, German Pellets dismissed from consideration all facilities which utilize control technology for the hammermills and pellet coolers on the grounds they were permitted as minor sources, and only submitted information on facilities that do not use controls.[35] German Pellets further stated that it was "consistent with other similar operations" not to install VOC controls on the post dryer units.[36] The fact of the matter is that many wood pellet mills do utilize these controls, as Table E below shows. The Clean Air Act's best available control technology mandate therefore requires the same level of controls at German Pellets, regardless of the type of permit in place at similar facilities (in fact a proper analysis must even evaluate international facilities if they achieve greater emission reductions).[37] Yet based on German Pellets' application, Texas authorities may not have even been aware that such controls were in use in the industry because the facility only submitted information on plants that do not use controls on their post-dryer units.

A regenerative thermal oxidizer, in use at several other facilities, would reduce the total post-dryer emissions from 514 tons per year to just 25 tons per year. Another alternative, in use at several facilities, is to route the post-dryer emissions to the dryer and its regenerative thermal oxidizer, a technique that achieves at least 95% VOC reduction. These are not extreme options; as Table E below shows, most similar facilities (i.e. facilities processing mostly softwood) utilize some form of technological control to reduce VOCs. Yet Texas is proposing a permit which would not require any technological controls on the relevant units, despite the best available technology requirement.

Table E. Despite German Pellets' Claim, Many Facilities Utilize Controls to Reduce Post-Dryer VOC Emissions

Post-Dryer Controls at Synthetic Minor Pellet Mills Processing More than 50% Softwood							
Facility Name	State	Production Rate	Softwood Content	Major Source	VOC Controls on Hammermills	VOC Controls on Pellet Presses and/or Coolers	Facility-wide VOC Emissions
Georgia Biomass	GA	826,000	100%	No	RTO (95% control)	RTO (95% control)	130
Enviva Cottondale	FL	821,000	100%	No	Sent to Burner-RTO (95% control)	Sent to Burner-RTO (95% control)	517
Zilkha Monticello (proposed and permitted)	AR	661,912	100%	No	Sent to Burner-RTO (95% control)	Sent to Burner-RTO (95% control)	249
Drax Amite	MS	578,000	100%	No	None	None	900+[A]
Colombo Energy (Now Enviva Greenwood)	SC	168,000[B]	100%	No	Limited Operating Hours	Limited Operating Hours	249
Hazlehurst	GA	525,600	100%	No	Sent to Burner-RTO (95% control)	Sent to Burner-RTO (95% control)	216
Highland Pellets	AR	500,000	100%	No	Sent to Burner (90% control)	Sent to burner (90% control)	208
Highland Pellets South (proposed)	AR	500,000	100%	No	Sent to Burner (90% control)	Sent to burner (90% control)	208
Drax Morehouse	LA	500,000	100%	No	None	None	465[C]
Bord na Mona (proposed and permitted)	GA	330,000	50-100%	No	Sent to Burner-RTO (95% control)	None	192
Westervelt	AL	320,000	100%	No	RTO (95% Control)	RTO (95% Control)	139
Post-Dryer Controls at PSD Major Source Pellet Mills							
German Pellets	TX	578,000	100%	Yes	None	None	580
Enviva Sampson	NC	535,000	75%	Yes	None	None	628
Enviva Hamlet (proposed and permitted)	NC	535,000	75%	Yes	None	None	628
Drax LaSalle	LA	500,000	100%	Yes	None	None	611

A. This facility has never tested its post-dryer units; emissions based on Georgia Biomass emission factors. See the Mississippi section below.
B. Facility has the capacity to operate at up to 669,000 tons per year but is limiting operating hours to avoid exceeding permit limits.
C. This facility has never tested its pellet coolers. Pellet cooler emissions estimated based on average emission factor for pellet coolers derived from stack testing (see Louisiana section below). Actual emissions could be as high as 745 tons per year.

Mississippi

Mississippi is home to three pellet mills exporting to Europe: two relatively small Enviva plants, Enviva Amory ear Tupelo and Enviva Wiggins near Gulfport (Enviva is in the process of selling the Wiggins plant), and one large facility in Amite County owned by Drax Biomass. Drax also owns and operates the Drax power plant in the UK, which is the largest consumer of wood pellets in the world, and the single largest emitter of CO_2 in the UK. The Drax power plant is almost exclusively supplied by pellet plants in the U.S. South, including Drax's own mills, Enviva's mills, and others. In addition to the existing mills, a fourth facility is proposed in the state, Enviva Lucedale, north of Biloxi.

Table F. Annual Air Pollution from Exporting Pellet Mills in Mississippi (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (3)	462	309	325	1,400	270,617
Existing (3) and proposed (1)	607	540	545	2,028	500,445

Note: Particulate, CO, and Nitrogen Oxide emissions from Enviva Wiggins and Amory estimated based on similar facilities as this data was not available. Emissions from the proposed Enviva Lucedale are the same as Enviva Sampson, Enviva's most recently-constructed plant.

Drax Plant in Gloster Misleads Mississippi on VOC Emissions

Drax Biomass appeared to mislead Mississippi officials in order to avoid major source permitting requirements at its Drax Amite facility in Gloster. Drax submitted extremely low emissions estimates for certain units based on testing that Drax should have known was invalid. By doing so, Drax was able to convince Mississippi that the Amite facility's VOC emissions were below the 250 ton per year major source threshold, when more reliable testing data showed the facility's emissions were likely to be around 1,000 tons per year. Troublingly, Mississippi has never required that the facility conduct emissions testing on the relevant units, and instead has accepted Drax's estimates.

As with other large facilities initially permitted before 2013, Drax initially assumed that only Amite's dryer would emit VOCs. It took until 2016 for Drax to acknowledge that other units emit any VOCs at all.[38] Drax then asserted that these emissions were minor, and that emissions from these units would be just "0.704 lb/ton [pounds of VOCs per ton of wood pellet produced], based on testing performed at Green Circle Bio Energy with 10% additional margin included."[39] Drax did not provide the cited test data with its application, and supplied no further information on the test. It turns out that Drax was referring to 2010 tests performed at Green Circle Bio Energy in Florida.[40] Subsequent testing performed at that facility in 2013 showed that the 2010 tests were completely invalid, and that the Green Circle facility actually emitted more than 1,000 tons of VOCs per year.[41] The true emissions rate at Green Circle (now Enviva Cottondale) for all post-dryer units was 3.25 lb/ton, almost five times higher than the .704 lb/ton proposed by Drax.[42] Further, the 3.25 lb/ton rate is completely consistent with other wood pellet plant manufacturing plant tests such as the Georgia Biomass testing (showing 3 lb/ton).[43] This means Drax Amite's true facility-wide emissions are likely above 900 tons per year, vastly exceeding the major source threshold of 250 tons per year.

While it is hard to prove that Drax intentionally misled Mississippi, it is difficult to fathom that Drax, one of the most prominent companies in the industry, was not aware of the elevated VOC issue when it submitted its Title V permit application in August 2016, or likewise was unaware that Green Circle had conducted subsequent testing in 2013 disproving the 2010 tests. Regardless, it may have worked: Mississippi proposed to issue the operating permit without questioning the assumed .706 lb/ton emission rate Drax provided. Mississippi states that testing at Drax Amite showed a "large margin of compliance" with the 249 ton per year VOC limit.[44] The problem is that these tests only tested the facility's dryer and not the other significant sources of VOCs like hammermills and pellet coolers. In other words, Mississippi is still apparently operating under the impression that post-dryer units do not emit any VOCs, a completely incorrect assumption given the numerous tests conducted in the industry since 2013.

Mississippi's proposed permit continues to treat Drax Amite as a minor source, despite likely VOC emissions of nearly 1,000 tons per year, four times higher than the 250 ton-per-year major source threshold. Further, Mississippi did not even propose to require Drax to test the Amite facility's post-dryer units, so Drax can continue avoiding major source control requirements with impunity. EIP and a coalition of other concerned public interest groups recently filed comments with Mississippi during the public comment period on the draft permit that raised the above concerns regarding VOC emissions. Mississippi is currently reviewing the comments.

Mississippi Allows Unlawful Hazardous Air Pollutant Emissions from Enviva Mills in Stone and Monroe Counties

Enviva Wiggins in Stone County, north of Gulfport, and Enviva Amory in Monroe County southeast of Tupelo, are two relatively small pellet mills which Enviva purchased in 2010. Despite being smaller than Enviva's newer mills, both facilities have troublingly high hazardous air pollutant emissions because, as with the other Enviva mills, Enviva does not utilize any hazardous air pollutant controls, in contravention of the Clean Air Act. As explained below, potential hazardous air pollutant emissions from each of these facilities easily exceeds the level that triggers major source maximum achievable control technology requirements under the Clean Air Act, yet both sources claim to be minor sources that are exempt from these requirements. A compounding problem is that Mississippi issued utterly deficient permits to the two facilities authorizing wood pellet production rates that clearly lead to hazardous air pollutant emissions in excess of the major source threshold.

At Enviva Wiggins, emissions testing revealed that the facility, when operating at the permitted production rate of 185,550 tons per year, emitted 31 tons per year of hazardous air pollutants, including 10.3 tons of methanol.[45] The rates meant the facility was exceeding the threshold that triggers maximum achievable control technology for hazardous air pollutant emissions. Rather than install these controls, the facility decided to lower its emissions by restricting production. Based on the testing, Enviva's own consultant calculated that the facility would need to limit production to 140,000 tons per year to remain below the hazardous air pollutant limit, yet Mississippi inexplicably authorized wood pellet production of up to 165,000 tons per year, which only reduced total hazardous air pollutant emissions to 28 tons per year.[46] This means the facility is still a major source of hazardous air pollutants, but is not complying with the major source requirement to install

maximum achievable control technology. Notably, if the facility installed a regenerative thermal oxidizer, total emissions would be less than two tons per year.

The hazardous air pollutant situation at Enviva Amory is also troublesome. Emissions testing there purportedly showed that the facility's hazardous air pollutant emissions were either zero or essentially zero, which is simply not plausible given that it has no hazardous air pollutant controls and operates at similar rates to Enviva Wiggins.[47] The testing found no acetaldehyde at all and just .64 tons per year of formaldehyde. These rates are highly inconsistent with stack tests at similar facilities, which generally show that wood drying emits considerable amounts of formaldehyde and acetaldehyde.[48] Although Mississippi apparently accepted Enviva's Amory test results, North Carolina rejected them when Enviva offered them as justification for not installing hazardous air pollutant control devices at its North Carolina facilities.[49] North Carolina's Stationary Source Compliance Branch found that the consultant that performed the testing for both Enviva facilities had used incorrect values for several significant pollutants, including acetaldehyde and formaldehyde, meaning the testing for both facilities underrepresented the facilities' hazardous air pollutant emissions.[50]

Enviva Facility Near Tupelo is Violating Major Source Permitting Requirements and Avoiding the Use of Pollution Controls

Enviva Amory, the Enviva facility southeast of Tupelo, also has major issues with its VOC emissions, with several past and continuing violations. Most concerning is that the facility is currently operating in violation of the Clean Air Act's major source requirements. Facilities that have the potential to emit 250 tons per year or more of pollutants like VOCs must go through major source permitting (which requires the use of the best available control technology) or take legally enforceable limits to ensure that actual emissions stay below the major source applicability threshold. As shown below, Enviva Amory has the potential to emit VOCs well above 250 tons per year but has neither obtained a major source permit nor agreed to an enforceable emissions limit that would enable it to avoid major source permitting. Further, the facility is operating without any VOC controls whatsoever, meaning it is not complying with major source permitting's best available control technology requirement.

When initially constructed, Enviva claimed that the Amory facility's VOC emissions would not only be below the 250 ton-per-year major source applicability threshold, but also below the 100 ton-per-year required to apply for a federal operating permit known as a Title V permit.[51] Accordingly, Enviva accepted a VOC emissions limit of 99 tons per year and a production limit of 99,000 tons of wood pellets per year to keep its actual emissions below the Title V threshold.[52] Subsequent emission testing at Enviva Amory in 2013 showed that VOC emissions were 185 tons per year when producing 99,000 tons per year of pellets, far exceeding its 99 tons-per-year permit limit and the Title V threshold.[53] In light of the test results, Enviva applied for a Title V operating permit, but when Mississippi issued the new permit, it altogether eliminated the limits on the facility's VOC emissions and production rate.[54] The new permit also does not limit the kind of wood the facility can process.[55] This is highly problematic, because the facility could easily emit more VOCs than the major source threshold of 250 tons even without increasing capacity beyond its current rate. Because softwood emits much higher levels of VOCs than hardwood, any increase in the softwood

processed in the mix increases VOCs. Troublingly, the testing did not report what ratio the facility processed during the testing. This is basic information that is almost always included in testing reports. For instance, the Enviva Wiggins test states that it was conducted at 60% softwood.[56] If the testing at Amory occurred when the facility was processing relatively low levels of softwood, which is likely based on the results compared to similar facilities, then the resulting rate of 185 tons per year would not be representative of what the facility is capable of emitting. Since the permit contains no limit on the amount of softwood processed, Enviva Amory can process whatever it wants, including 100% softwood like many other wood pellet plants. At 100% softwood, the facility would emit 562 tons per year of VOCs at the current production rate.[57] This means the facility is currently violating major source rules, which require compliance with major source permitting and best available control requirements based on a facility's *potential* to emit pollution. Enviva Wiggins clearly has the potential to emit above 250 tons per year of VOCs and its permit has zero limits preventing it from doing so.

To illustrate how easy it would be for the facility to have emissions above the 250 ton per year major source threshold—assuming that during testing the facility was processing the same rate of softwood as Enviva Wiggins, 60% softwood—then an increase to just 65% softwood would place the facility's actual emissions beyond 250 tons per year (this is in part because Enviva Amory's testing occurred at a production rate of 99,000 tons per year, but now operates at 121,000 tons per year).[58]

Louisiana

Louisiana hosts two large pellet mills; both are currently owned by Drax Biomass. The Drax Morehouse facility is located about 30 miles north of Monroe, Louisiana, while Drax Lasalle is located 35 miles north of Alexandria.

Table G. Annual Air Pollution from Exporting Pellet Mills in Louisiana (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (2)	223	271	590	911	367,810

Drax Plant North of Monroe, Louisiana Likely Exceeds Major Source Limits, Yet Louisiana has Never Required Testing

Drax's plant in Morehouse County does not control VOC emissions from its post-dryer units, and likely emits well above the 250 ton per year major source threshold. Unfortunately, although Louisiana did require VOC emissions testing from the facility's dryers and hammermills, for reasons that are not clear the state did not require emissions testing on Drax Morehouse's pellet coolers. Pellet coolers can be massive sources of VOC emissions, with testing at several similar facilities finding VOC emissions above 400 tons per year.[59] Drax, however, claims the Morehouse facility's pellet coolers emit just 20 tons per year of VOCs based on their own in-house testing.[60] Such in-house testing is not subject to the rigorous regulations and review procedures meant to ensure testing is an accurate reflection of true emissions. For instance, unlike legitimate testing, Drax did not need to

comply with any EPA-approved methodology, did not need to submit data and records from the test for review, did not need to test at full capacity (in fact the testing occurred at 35% capacity, which is well below the 80% or 90% minimum required by most states), nor did Drax need to notify the state that they were conducting the testing in order to allow state oversight. Nonetheless, Louisiana accepted Drax's proposed emissions rate without even reviewing Drax's testing protocols or the actual test results.[61]

Without adequate testing, it is hard to believe that Drax's self-reported emission rate, which is 20 to 30 times lower than similar facilities, is trustworthy. Table H below shows how Drax's emission factor compares to similar facilities:

Table H. Drax Morehouse's Self-Reported Emission Factor is an Extreme Outlier

Facility	State	Facility Production Rate at the Time of Testing (tons per year)	Uncontrolled Pellet Cooler VOC Emissions (tons per year)	Uncontrolled Pellet Cooler VOC Emission Factor (lb/ton)	Comparison to Drax Morehouse's Self-Reported Emission factor of .065 lb/ton
Drax Morehouse "engineering testing data"	LA	578,000	20	.065	-
Enviva Amory	MS	99,000	101	2.04	31 times higher
German Pellets	TX	578,000	446	1.54	23 times higher
Enviva Cottondale	FL	610,000	460	1.5	23 times higher
Georgia Biomass (with steam injection)	GA	820,000	533	1.3	20 times higher
Hazlehurst Wood Pellets	GA	525,000	166	.62	9.5 times higher
			Average Emission Factor:	1.07	16.4 times higher

Sources: Stack testing reports from plants other than Drax; Drax's emission factor from permit applications.

The issue of Drax Morehouse's pellet cooler emissions is not trivial. At the emission factors Louisiana accepted from Drax, Louisiana states that the facility is currently emitting 249.21 tons per year.[62] This means even a minute error in the pellet cooler emission rate would push the facility above the 250 ton per year major source threshold. In fact, applying any of the above test-derived emission rates to Drax Morehouse's pellet cooler results in a facility-wide VOC emission rate of at least 300 tons per year, and could be as high as 745 tons per year. Applying the average mission factor from the table above places the facility's total VOC emissions at 465 tons per year.

Notably, if Drax Morehouse installed a regenerative thermal oxidizer or other VOC control technology to its post dryer units, whether to remain below the major source threshold or to comply with major source permitting's best available control technology mandate, Drax could reduce VOC emissions to less than 50 tons per year.[63]

Virginia

One pellet plant, owned by Enviva, is currently operating in Virginia, and Enviva has proposed a second facility in the state. The existing facility, Enviva Southampton, is located about 40 miles west of Norfolk, and the proposed facility will be just outside of Danville.

Table I. Annual Air Pollution from Exporting Pellet Mills in Virginia (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (1)	88	56	163	245	160,535
Existing (1) and Proposed (1)*	223	287	383	873	390,363

* Emissions from the proposed Enviva Danville facility assume the new plant will have the same emissions as Enviva Sampson, the most recently-constructed Enviva plant.

After Discovering They Were Violating Limits, Enviva Southampton Actually Removed Pollution Control Technology

Enviva's Virginia facility, located in Southampton County, was originally permitted as a synthetic minor source processing 90% softwood in 2012.[64] Predictably, after the Georgia Biomass testing showed facilities like this could not comply with their synthetic minor limits without additional controls, Enviva found that the Southampton facility was indeed emitting well above 250 tons per year.[65] Rather than installing additional control technology or reduce production like other companies have done, Enviva actually *removed* their VOC and hazardous air pollutant control technology (a regenerative thermal oxidizer) and switched to processing hardwoods.[66] While this did allow Enviva Southampton to begin complying with the VOC limit, it is far from environmentally sound given the larger ecological footprint of harvesting hardwood trees. Furthermore—and of particular importance to nearby residents—the removal of the regenerative thermal oxidizer means Enviva Southampton is no longer controlling its hazardous air pollutant emissions in any way, and the facility almost certainly emits major levels of hazardous air pollutants, triggering the Clean Air Act's hazardous air pollutant requirements to install the maximum achievable control technology. Despite this, Virginia has not required any technology to reduce hazardous air pollutants. Worse yet, Virginia has not even required that Enviva test for hazardous air pollutants, so the true rates are impossible to know.

Rather than requiring emissions testing for hazardous air pollutants, a requirement found in almost every other state, Virginia has apparently relied on Enviva's in-house estimates of the total amount of hazardous air pollutants emitted by the facility, estimates which are based on unsupported assumptions.[67] Enviva assumes that the difference in emissions for each individual hazardous air pollutant is uniform between hardwood and softwood, such that decreasing the amount of softwood processed will uniformly reduce each hazardous air pollutant by an identical rate.[68] This is simply not true. Research and recent testing at other facilities indicates that drying hardwood actually emits certain hazardous air pollutants at higher levels than drying softwood.[69] At the very least, Enviva's assumption that reducing softwood content will reduce each hazardous air pollutant at the same rate is not scientifically sound. Instead, EIP estimated emissions of hazardous air pollutants

individually, based on how each pollutant is emitted at 100% softwood and at 50% softwood, because these are known emission rates available in EPA databases.[70] From there, EIP can make a reasonable extrapolation to 10% softwood (the rate the Enviva Southampton currently processes). For formaldehyde, this produced an emission rate of 16.2 tons per year from the dryer alone, well above the 10 tons per year threshold for utilizing maximum achievable control technology, and three times higher than Enviva's own estimate for its dryer emissions of 5.87 tons per year.[71] The increase in formaldehyde emissions also means the facility is exceeding the 25 ton per year threshold for total hazardous air pollutant emissions, at 31 tons per year.[72]

Further, applying actual test results from a Georgia pellet mill that processes a similar ratio of hardwood shows that Enviva Southampton is almost certainly exceeding both its permit limits and the Clean Air Act's maximum achievable control technology threshold.[73] Based on those tests, Enviva Southampton emits 21.2 tons per year of methanol and 16.5 tons of formaldehyde, and emissions of total hazardous air pollutants are at least 46 tons per year. These rates are substantially higher than the 10 ton per year threshold for individual hazardous air pollutants and 25 tons per year for total hazardous air pollutants, meaning the facility should be required to install maximum available control technology—a regenerative thermal oxidizer. Had Enviva retained the regenerative thermal oxidizer to control hazardous air pollutants, these emissions would be less than one ton per year of formaldehyde, and total hazardous air pollutant emissions would be less than three tons per year.

Florida

Florida only has only one wood pellet plant exporting to Europe, Enviva Cottondale located near Panama City, but the plant is the second largest pellet mill in the nation, producing more than 800,000 tons of pellets per year. The facility has correspondingly high emissions of air pollutants, as detailed below. A second facility, Cornerstone Biomass, is proposed in Florida, which would be located between Tallahassee and Gainesville.

Table J. Annual Air Pollution from Exporting Pellet Mills in Florida (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (1)	411	22	245	517	229,336
Existing (1) and proposed (1)*	511	85	370	767	293,546

* Emissions from the proposed Cornerstone Biomass facility estimated based on similar-sized facilities.

Enviva Plant Near Panama City Emits More than 500 Tons Per Year of VOCs Without a Required Permit or Sufficient Controls

Enviva Cottondale, formerly Green Circle Bio Energy, was one of the first facilities to test and find higher than expected VOC emissions after learning of the original Georgia Biomass testing in 2013. As with Georgia Biomass, the facility-wide VOC emissions were well over 1,000 tons per year, violating that facility's 250 ton per year permit limit and exceeding the major source threshold. While Florida did require the facility to take some action to reduce

VOC emissions, the facility still emits more than 500 tons per year of VOCs because the facility's pellet coolers remain uncontrolled.[74]

Despite Florida's acknowledgement in 2013 that Enviva Cottondale emits VOCs at more than twice the major source threshold, Florida did not require the facility to go through major source permitting until EIP and a coalition of concerned public interest organizations submitted comments on the facility's permit renewal in August of 2017.[75] In 2013, Florida had excused the facility from complying with major source requirements, including the use of best available control technology, in part because the original owners acted in "good faith" when they originally represented that hammermills and pellet coolers do not emit VOCs.[76] While Green Circle, the owners at the time, may have indeed acted in good faith when they operated the facility prior to knowing about the VOC emissions, the Clean Air Act does not contain an exception for pollution emitted in good faith. While EIP is glad to see that Florida is now requiring the facility to go through major source permitting, it is imperative that Florida require the use of the best available control technology for the facility's pellet coolers. Major source permitting requires an analysis of the best available control technology for each unit which emits a significant amount of a pollutant, and the pellet coolers currently have no controls at all. Given that the similar-sized Georgia Biomass has been able to reduce facility-wide VOC emissions to 130 tons per year by installing a regenerative catalytic oxidizer that controls pellet cooler emissions, Florida must require Enviva to utilize this control technology, or other technology that is equally effective.

South Carolina

South Carolina has two pellet plants which export to Europe, and up to four more are proposed in the state. The largest facility, Colombo Energy, is located just outside of Greenwood and has the capacity to produce 669,000 ton of pellets per year. The facility was built in 2016 by the Portuguese paper company Portucel Soporcel, but was acquired by Enviva Biomass in February of 2018. A smaller facility, Thunderbolt Biomass, is located in Allendale County. The four proposed plants include an Enviva plant in Laurens County and a Drax Biomass plant in Abbeville County, each with a production capacity of 550,000 tons per year.

Table K. Annual Air Pollution from Exporting Pellet Mills in South Carolina (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (2)	94	244	243	786	218,347
Existing (2) and Proposed (4)*	665	876	1,094	2,742	984,822

* Emissions from proposed plants based on recently constructed Drax and Enviva facilities.

Greenwood Facility Fails to Meet Testing Requirements, Fast-Tracks Inadequate Permit Behind Closed Doors

In February 2018, Enviva Biomass acquired the Colombo wood pellet manufacturing facility in Greenwood, South Carolina, with plans to more than triple production. The plant is permitted as a synthetic minor source, meaning that it is exempt from the Clean Air Act's

requirement that it reduce air pollution using best available control technology. However, the Colombo plant discovered recently that it generates far more VOC emissions than it previously thought, and that it was capable of emitting more than 600 tons of VOCs per year. At that time, plant operators started limiting the plant's production to less than a third of its designed capacity to keep emissions to legal levels (the facility is designed to produce 669,000 tons per year, and Colombo has been operating at less than 200,000 tons per year). Now, Enviva has publicly stated that it wants to increase actual production to 660,000 tons per year, and to do that, the plant must install controls to reduce its VOC emissions.[77] While Enviva plans to install controls on some of the plant's VOC-emitting sources, it does not plan to install controls on its hammermills. As a result, the facility would still emit more than 300 tons per year of VOCs when operating at the capacity Enviva desires.[78] Based on its potential emissions, even with the new controls the plant plainly qualifies as a major source which must utilize the best available control technology on all of its sources. Instead, South Carolina issued a permit with no public notice or opportunity to comment which did not contain a production limit necessary to restrict the facility's emissions to legal levels.[79] In response to pressure from EIP and other groups, the facility agreed to amend their permit to include an enforceable production limit of 500,000 metric tons.

Another troubling issue with the Colombo facility is that it failed to conduct legally adequate emission testing, with one set of tests the facility submitted to South Carolina wildly inaccurate. After first failing to meet the permit deadline to submit testing within 180 days of start-up, Colombo eventually sent South Carolina test results that anyone familiar with emissions from wood pellet manufacturing plants could tell were wildly inaccurate. That testing underrepresented VOC emissions from the facility's pellet coolers by at least 259 tons per year, conveniently showing that the facility could operate at full production rates without exceeding the major source threshold.[80] Eventually, even Colombo acknowledged these tests were flawed, and arranged for a different consultant to perform a new round of testing in October 2017. The new testing showed significantly higher VOC emissions from the facility's pellet coolers: 370 tons per year compared to the original test's result of 111 tons per year.[81] However, this subsequent testing also failed to fulfill Colombo's testing obligation because Colombo did not follow proper procedures regarding planning and notification. Colombo's permit and South Carolina regulations set out numerous requirements for emission testing, including prior approval of a site-specific test plan and notification to South Carolina officials of the test date. Notification of the test date is crucial, because it allows South Carolina officials the ability to observe the testing. Despite these legal requirements, Colombo conducted its tests without notifying South Carolina and without an approved site-specific test plan.[82] This means the tests were conducted without approval and without any outside observers. While the facility may conduct proper testing in the future, the fact remains that South Carolina has allowed the facility to operate for 18 months without satisfying its requirement to conduct legitimate emissions testing.

Georgia

Georgia is home to five pellet mills exporting to Europe, and four more proposed facilities have either received permits or are under construction. The two largest mills, Georgia Biomass in Waycross, and Hazlehurst Wood Pellets in Jeff Davis County, produce more

than 1.3 million tons of wood pellets per year. While Georgia was the first state to recognize the VOC issue from pellet mills and has generally done the best of any state to address the issue, permits in the state still allow for facilities to emit more VOCs and hazardous air pollutants than the Clean Air Act allows without installing pollution controls.

Table L. Annual Air Pollution from Exporting Pellet Mills in Georgia (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (5)	499	510	584	999	649,836
Existing (5) and Proposed (4)*	1,138	1,259	1,357	1,932	1,233,545

* Emissions from proposed plants based on permitting materials and similar facilities.

Georgia Permits Lack Enforceable Pollution Limits.

Permits for at least two facilities, Appling County Wood Pellets near Brunswick and Varn Wood Pellets near Waycross, fail to require best available control technology, or alternatively, fail to adequately limit emissions. At Appling County Pellets, which does not utilize any pollution controls for VOCs, the permit lacks any facility-wide VOC limit. While the latest draft permit does contain a production limit, which is a step in the right direction, the production limit fails to ensure the facility will not emit more than 250 tons per year of VOCs. This is because the facility could exceed 250 tons per year of VOCs even while producing less than the production limit. Georgia relied on emission factors—rates of pollution emitted per ton of product produced—to show that the production limit contained in the permit would keep emissions below 250 tons per year. The problem is, those emission factors are based on stack testing which does not adequately represent the maximum emissions. The facility processed mostly hardwood during the testing, but could process up to 100% softwood if it desired, because the permit does not restrict the softwood processed at the facility. Softwood emits substantially more VOCs than hardwood, and at the current production limit the facility would emit 540 tons per year of VOCs if it processed 100% softwood. Georgia must therefore implement facility-wide VOC limit. The problem with Varn Wood Pellets' permit is basically the opposite of that at Appling County: the permit contains a facility-wide limit on VOCs, but no production limit. For facilities like Varn Wood Pellets, which do not utilize adequate pollution controls to reduce VOC emissions below the major source threshold when operating at full capacity, permits must restrict production to a point where emissions are below the major source threshold. In response to comments submitted by EIP on behalf of other environmental groups, Georgia has proposed to issue a new permit that will contain a production limit.

Pellet Mill Near Valdosta Begins Construction Without Permit.

Under the Clean Air Act and Georgia law, it is illegal to commence construction of a source of air pollution without obtaining a permit. Blue Sky Biomass, however, ignored the law and began constructing a 400,000 ton per year pellet mill north of Valdosta, Georgia. The company's website shows considerable concrete work, and the installation of at least four pellet presses. Georgia officials have apparently not taken action to halt construction or require the facility to apply for a permit. Because the facility has not applied for a permit, it is impossible to know exactly how the facility will be designed and whether it will

adequately control for VOC and hazardous air pollutants.

Alabama

Alabama hosts three pellet mills exporting to Europe, including Zilkha Biomass, near Selma, and Mohegan Renewable Energy (formerly Lee Energy Solutions) near Birmingham. Three new mills are proposed in the state, including two large Enviva plants—Enviva Childersburg outside of Birmingham, and Enviva Abbeville, north of Dothan.

Table M. Annual Air Pollution from Exporting Pellet Mills in Alabama (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (3)	499	510	584	999	649,836
Existing (3) and Proposed (3)*	1,138	1,259	1,357	1,932	1,233,545

* Emissions from proposed plants based on permitting materials and similar facilities.

Pellet Mill in Selma Vastly Exceeds Limits on Carbon Monoxide and VOC Emissions.

The Zilkha Biomass mill just east of Selma is regulated as a minor air pollution source based on permit restrictions that serve to limit facility-wide emissions of pollutants like VOCs and carbon monoxide to below the major source threshold of 250 tons per year. When Zilkha Biomass first conducted emissions testing in 2017, however, the tests revealed that the facility emits 456 tons of CO per year when operating at the plant's design capacity—nearly twice the major source threshold. This means the facility has triggered the Clean Air Act's New Source Review requirements for major sources, including the obligation to install the best available control technology. This technology would likely be a regenerative catalytic oxidizer.

The facility is also almost certainly a major source of VOCs. The permit improperly exempts units known as hammermills and pellet coolers from emissions testing requirements, so the true rate is not known. However, emissions testing from every comparable wood pellet mill shows these units emit hundreds of tons more VOCs than Alabama believes. Emission factors from tests at a pellet mill in Georgia show Zilkha's hammermills and pellet coolers emit between 450 and 570 tons per year; emission factors from tests at a mill in Florida show these units emit 487 tons per year, and emission factors from tests at a mill in South Carolina show these units emitting 316 tons per year. Given that the wood dryer and the facility's unique and proprietary "black pellet" system also emit substantial amounts of VOCs, it is simply not plausible that Zilkha's facility-wide VOC emissions are below the 250 ton per year major source threshold.

Alabama Facility Emitted Twice as Much Particulate Matter Pollution than Permitted and Exceeded the Title V Threshold Without Obtaining a Title V Permit.

Until late 2017, Lee Energy Solutions was a wood pellet manufacturer northeast of Birmingham (the facility is now owned and operated by Mohegan Renewable Energy). The facility has a capacity of 225,000 tons per year, although operations are limited to 150,000

tons per year in an attempt to avoid Title V permitting.[83] Unfortunately, even at this lower rate, the facility has violated both its permit limits and the Title V threshold for particulate emissions. In fact, the facility emitted more than double its hourly permit limits of particulates, and emitted 189 tons of particulates per year, well above the Title V threshold of 100 tons per year.[84] The facility claimed that the issue was a poorly functioning multicyclone control device on the dryer. Multicyclones are relatively low-tech devices which can be efficient at removing large particulates but remove 10% or less of the smallest particulates, which are the deadliest.[85] While a faulty multicyclone may have contributed somewhat, the larger issue is that the facility was utilizing only a multicyclone rather than control technology with much better removal capacity. All of the large facilities EIP surveyed utilize a particulate matter control device known as a wet electrostatic precipitator, which removes 99% of all particulate matter, and at least 90% of fine particulates ($PM_{2.5}$).[86] Many smaller facilities like Lee Energy do not utilize this technology, and consequently have higher than necessary particulate matter emissions.

Arkansas

Arkansas is home to one wood pellet facility currently operating, the Highland Pellets mill in Pine Bluff, and two proposed mills which have applied for or received initial construction permits (Zilkha Biomass in Monticello, and Highland Pellets South, in Ouachita County).

Table N. Annual Air Pollution from Exporting Pellet Mills in Arkansas (Tons)

	Particulates	CO	NOx	VOCs	CO_2
Existing Plants (1)*	174	191	201	245	238,510
Existing (1) and Proposed (2)*	631	631	651	739	655,902

* All emissions are estimates from permit reviews or applications, Highland Pellets has not submitted stack testing.

Arkansas Fails to Require Crucial Emissions Testing at Pine Bluff Mill

The Highland Pellets mill is one of the newer and larger mills constructed, and it controls VOC and hazardous air pollutants from most of its units by routing emissions to the wood dryer's furnace. This process generally achieves 90% destruction of VOCs and hazardous air pollutants. The problem is, Highland Pellets does not do this for its pellet cooler emissions.[87] As noted above, pellet coolers can be massive sources of VOC emissions, with uncontrolled pellet coolers at some facilities emitting around 500 tons of VOCs per year (see the Table H above). These rates would mean Highland Pellets is greatly exceeding the 250 ton per year major source threshold as well as its permit limits. Despite this fact, Arkansas has not required emissions testing for VOCs from the pellet coolers—in fact the pellet coolers are the only major unit that is not required to test for VOCs. Given that the total VOC emissions for the plant are estimated to be up to 245 tons per year, the facility only has a 5 ton per year margin of error to avoid exceeding the major source threshold.[88] Therefore, the true rate of VOC emissions from the pellet coolers is crucial to ensuring the facility does not exceed the major source threshold; yet Arkansas has inexplicably exempted these particular units from testing requirements.

Piles of Wood Smolder Endlessly at Pine Bluff Pellet Mill

In addition to the potential VOC issue identified above, the Highland Pellets mill in Pine Bluff has had major issues with smoke emissions. When nearby residents complained, stating that "smoke was leaving the site and blanketing the surrounding community," Arkansas officials inspected the site but apparently did not take any corrective action.[89] According to the inspection, wood piles at the facility smolder and emit smoke continuously. The inspector's report states: "As you drive by the property you will see several large piles of material . . . This morning, both of these kinds of piles were smoking, or more accurately, smoldering. Normal rainfall amounts do a good job of keeping the temperature inside the pile down and the wood wet enough to keep the smoldering in check. With the severe lack of rain this fall, that was evidently not the case and the smoke was worse than normal."[90]

Improperly stored wood chips will frequently spontaneously combust, as large piles of decomposing wood produce heat. The smoke from this combustion is particularly harmful, as the low heat and incomplete combustion produces substantially higher levels of particulate matter, carbon monoxide, and VOCs than other forms of burning wood.[91] Studies have shown that smoldering pine emits 75 times more particulate matter pollution and 7 times more carbon monoxide than flaming fires.[92] In addition to the smoke, smoldering wood chips present an obvious risk of larger fires. As discussed in Part Three below, fires are a common problem at wood pellet industries. Highland Pellets has already had one fire since commencing operations in 2017.

Part Two: Enviva is a Clear Outlier, Failing to Utilize Pollution-Reducing Controls Which are Standard in the Industry

As discussed above, most large pellet mills utilize at least a regenerative thermal oxidizer or other control device on their dryer. The only exceptions are facilities owned and operated by Enviva Biomass. Most of these are located in North Carolina, where the state has repeatedly allowed Enviva to avoid reducing pollution. EIP's survey of new-generation pellet mills in the nation reveals that regenerative thermal oxidizers or other control technology are fundamental control devices which greatly reduce VOCs, yet Enviva has consistently claimed such controls are too expensive to install.[93] The fact is, however, that Enviva's competitors are able to utilize controls not only on their dryers, but frequently on additional units as well.

Two of Enviva's mills, Enviva Sampson (constructed in 2017) and Enviva Hamlet (under construction), both of which are near Fayetteville, North Carolina, are subject to the Clean Air Act's "best available control technology" and "maximum available control technology" requirements. Under both requirements, the facility is required to reduce emissions to the level achieved by the best-controlled pellet mill in operation. Despite these requirements and the fact that other facilities do use very effective pollution controls, the two Enviva facilities

utilize no control devices whatsoever for VOCs or hazardous air pollutants. Each facility will emit more than 600 tons of VOCs and more than 50 tons of hazardous air pollutants once they reach full operation. Had the facilities actually complied with the Clean Air Act's control technology requirements and installed controls used by other pellet mills, each plant would emit less than 100 tons of VOCs and less than three tons of hazardous air pollution per year.

Table O on the following page shows VOC controls on wood dryers at the largest wood pellet mills in the country. Notably, the only Enviva plants which do utilize controls, Enviva Cottondale and the Colombo plant, were built by previous owners. Enviva acquired both plants after states had required the facilities to utilize controls.

Table O. Enviva's Failure to Control Dryer VOC Emissions Makes Them the Dirtiest in the Industry

VOC Controls on Dryers at Pellet Mills Above 300,000 Tons Per Year Production Rate					
Facility	State	Production Capacity	VOC Controls on Dryer?	Current Softwood Percent	Dryer VOC Emissions (in tons per year)
Enviva Sampson	NC	535,000	No	75%	306
Enviva Hamlet (proposed and permitted)	NC	535,000	No	75%	306
Enviva Ahoskie	NC	420,000	No	30%	164
Enviva Cottondale	FL	821,000	Yes (RTO)	100%	136
Enviva Northampton	NC	628,179	No	30%	135
Drax LaSalle	LA	500,000	Yes (RTO)	100%	128
Enviva Southampton	VA	535,000	No	10%	122
Georgia Biomass	GA	826,000	Yes (RTO)	100%	55
Zilkha Monticello (proposed and permitted)	AR	661,000	Yes (RTO)	100%	51
Hazlehurst	GA	525,600	Yes (Sent to burner)[A]	100%	32
Highland Pellets	AR	500,000	Yes (Sent to burner)[A]	100%	22
Highland Pellets South (proposed, permit application submitted)	AR	500,000	Yes (Sent to burner)[A]	100%	22
German Pellets	TX	578,000	Yes (RTO)	100%	21
Westervelt	AL	320,000	Yes (RTO)	100%	20
Colombo (Now Enviva Greenwood)	SC	669,000	Yes (RTO)	100%	13
Zilkha	AL	300,000	Yes (RTO)	50-100%[B]	9
Drax Amite	MS	578,000	Yes (RTO)	100%	7
Drax Morehouse	LA	500,000	Yes (RTO)	98%	6

A. Emissions are routed to the furnace for VOC and HAP destruction, achieving 90% reduction
B. Facility processes a range of softwood, but is permitted as if it processed 100% softwood

Part Three: Fires and Explosions

Wood pellets are designed to burn as efficiently as possible, so it shouldn't be surprising that the facilities manufacturing and storing wood pellets face a substantial risk of fires and explosions. What is surprising, however, is just how common and severe these fires and explosions are.[94] Of the 15 new generation pellet mills EIP surveyed, at least eight have had fires or explosions since 2010, including several resulting in injuries.[95] A "flash fire" at the Hazlehurst pellet mill in Hazlehurst, Georgia—the facility's second fire since commencing operations in 2014—seriously injured four employees.[96] The Westervelt wood pellet mill in Tuscaloosa, Alabama had an explosion in 2016 which injured an employee.[97] Enviva has had news-worthy fires at its Florida facility (Enviva Cottondale near Panama City), two fires at its Virginia facilities (Enviva Southampton and its port storage facilities, both in or near Chesapeake), and a North Carolina facility (Enviva Ahoskie north of Greenville).[98] German Pellets Texas alone had fires or explosions in April 2014, April 2015, May 2015, and February 2017, culminating in a two-month long fire in 2017 at German Pellets storage's silo in Port Arthur, Texas.[99] The silo ultimately collapsed, and smoke from the smoldering pellets caused dozens of Port Arthur residents to seek medical attention. The city of Port Arthur and residents have filed multiple lawsuits over the fire, and a court has ordered German Pellets to empty all of its silos and install proper fire-fighting technology. During the process of removing the pellets, a worker was killed when a pile of wood pellets collapsed.

Fires in silos can be particularly difficult to fight, as the German Pellets silo fire demonstrated. Fires can start deep in the silo under many tons of wood pellets thanks to spontaneous combustion, a common phenomenon when a large amount of wood is not properly stored, due to the heat generated from decomposing wood and lack of ventilation. Once a silo fire begins, it may burn for days, weeks, or months. Water is usually ineffective in fighting these fires, as water causes the top layer of pellets to expand, creating an impenetrable crust, preventing water from reaching the fire itself. In the case of the German Pellets fire, even after the silo collapsed more than a month after the fire began, fire fighters still struggled for weeks to stop the fire.[100] In another instance, after a fire burned for four days at a small pellet mill in in West Monroe, Louisiana and injured a firefighter, the local fire chief reported that the fire was very difficult to extinguish, and that "there was really no safe way to do it quickly with a lot of wood chips smoldering and smoking."[101] The uncontrolled burning of so much wood biomass accounts for huge amounts of harmful air pollution.

Beyond fires, explosions also occur. The primary culprit of explosions at wood pellet facilities is airborne wood dust, which is generated at all stages of manufacturing, storage, and transporting of wood pellets. Once this fine dust is suspended in the air it is extremely combustible. For instance, a 2011 blast at Georgia Biomass in Waycross, Georgia, rattled windows up to five miles from the facility.[102] While mills in the U.S. South have thus far escaped fatal explosions, an employee was killed by a dust explosion at a mill in British Colombia in 2012.[103]

The Clean Air Act addresses the risk of fires and explosions, yet many states are not fully implementing the Act's provisions in order to best reduce the risk. The Clean Air Act

contains a General Duty Clause which requires facilities producing or handling extremely hazardous substances to design, maintain, and operate their facilities in a safe manner.[104] As the long list of fires and explosions at wood pellet facilities show, wood dust qualifies as an extremely hazardous substance.[105] Unfortunately, permits issued to wood pellet manufacturing plants either fail even to mention the General Duty Clause, or provide only brief, non-specific references to it which do not discuss measures the facility needs to take to properly manage combustible dust. This is insufficient to prevent fires and explosions, and instead EIP believes permits must state that the General Duty Clause applies to the facility's handling of explosive dust and require the facility to perform specific steps that are sufficient to ensure that workers and others who live, work, recreate, or simply commute in the facility's vicinity are protected from the dangers posed by combustible dust. At a minimum, the permits should:

1. Identify the Clean Air Act's General Duty Clause as an applicable requirement with respect to the facility's handling of combustible dust.

2. Specifically require the facility to prepare a hazard analysis identifying the hazards associated with explosive dust and the facility's processes, potential fire and explosion scenarios, and the consequences of a fire or explosion.

3. Establish specific design and operation standards that the facility must meet to prevent a dust-related fire or explosion.

4. Establish recordkeeping and reporting requirements sufficient to demonstrate that the facility is meeting its General Duty Clause obligations.

Implementing these more specific requirements will not only aid in preventing releases of air pollution, but will serve to protect workers and neighbors from harm. Plant managers will benefit too, as EPA has brought enforcement actions against plants for failure to comply with the General Duty clause after accidents, and plant managers have responded that they were not aware of the Clause or its full requirements.

Conclusion and Recommendations

The Clean Air Act only works to protect health and the environment when state agencies are fully implementing all of the Act's requirements. EIP calls on state agencies across the U.S. South to address the errors and omissions identified in this report, and to further make proactive moves to better understand and control emissions from this emerging industry in the future. EIP makes the following recommendations as initial steps to remedy the numerous deficiencies identified in this survey:

1. **Reexamine existing air permits and reissue stronger permits where needed.** Many of the air permits for wood pellet mills were issued before permitting agencies fully understood the scope of VOC and hazardous air pollutant emissions from the industry. These permits allow facilities to exceed the Clean Air Act's major source threshold and are legally deficient. States should take a careful look at permits for

wood pellet mills and assess whether the existing permits account for VOC and hazardous air pollutant emissions from each of the major units at the facility. Where exceedances exist, states should take immediate action to ensure facilities cease violating pollution limits.

2. **Require "major" sources of air pollution to install the best available control technology.** As this report reveals, many pellet mills with major source permits evade using the best available control technology, or any control technology at all, while facilities with minor source permits, often the same size or larger, do utilize controls. This is an unacceptable perversion of the Clean Air Act. States must require facilities with major source permits to reduce emissions to at least the level achieved by the best-controlled minor source facility.

3. **Institute production limits at minor source facilities.** Court decisions and EPA guidance dictate that production limits are necessary aspects of ensuring that facilities do not exceed the major source threshold. This is especially vital at minor source facilities which do not utilize sufficient controls to keep their emissions below legal limits when operating at full capacity. If a facility can exceed legal limits when operating at or near maximum production rates, states must require production limits that ensure the facility does not emit more pollution than legally allowed. Further, production limits allow state agencies and the public a reasonable method to determine whether a facility is exceeding Clean Air Act thresholds. Although a few permits EIP surveyed do incorporate production limits, the overwhelming majority of permits which should have production limits do not and are therefore legally deficient.

4. **Ensure Communities are Notified of and Able to Participate in Permitting Decisions.** As noted above, several permits allowing the construction or modification of wood pellet plants were issued without public notice. Communities near the proposed facilities were not adequately informed of the decision to allow sources of air pollution to locate in their backyard. States should revise their regulations and procedures to include public notice and opportunity for meaningful input from those most affected by a plant's air pollution.

5. **Require annual emissions testing.** Many permits rely on emissions estimates—frequently outdated and inaccurate—rather than source-specific emissions testing to determine the level of air pollution emitted from wood pellet mills. This is especially true for VOC and hazardous air pollution, and from units other than the wood dryer such as pellet coolers and hammermills. While continuous emissions monitoring is the best method to determine actual levels of pollution emitted, where states do not require this they must at least require annual testing of each of the major units at pellet mills for volatile organic compounds and hazardous air pollutants.

6. **Reduce the risk of fires and explosions.** Fires and explosions from wood dust plague the wood pellet industry, and the Clean Air Act gives states a powerful tool to address the problem in the General Duty Clause. States must begin utilizing the

Genera Duty Clause effectively and require facilities to comply with their general duty under the Clean Air Act to design and maintain a safe facility.

Appendix A: Clean Air Act Permitting in the Context of Wood Pellet Manufacturing

This Appendix provides a brief primer on the basic framework of the Clean Air Act and how it applies to the wood pellet industry. The Clean Air Act requires sources of air pollution to obtain various types of permits based on the amount and type of pollution emitted, as well as the nature and location of the source. These permits generally contain emission limits, operating standards, or other requirements to protect air quality. One key thing to remember is that these permitting programs are primarily administered by state environmental agencies, and while the federal EPA has some oversight, the vast majority of decision-making and enforcement occurs at the state level. This means that permits and enforcement can vary considerably from state to state.

State Construction Permits

In general, sources of air pollution must obtain at least a state permit to construct and operate a new source of air pollution. These permits may or may not be open to public notice and comment, and states are relatively free to issue these permits on their own terms. Unless a facility triggers one of the other types of permits, this may be the only permit a facility needs. Wood pellet plants, especially large export-based plants, need additional permits due to their high emission rates.

Title V Permits

Title V of the Clean Air Act establishes a federal operating permit program. Title V permits incorporate all legal requirements for air pollution that apply to a facility into a single permit. Most importantly, Title V permits require facilities to demonstrate how they will comply with each of the legal requirements, with conditions for monitoring, record keeping, and reporting. Facilities which emit or have the potential to emit more than 100 tons per year of any regulated pollutant, 25 tons per year of HAPs, or 10 tons per year of any single HAP must apply for a Title V permit within a year after they begin operation. Large wood pellet facilities all emit VOCs, and frequently other regulated pollutants or HAPs, above the Title V threshold, so every facility in this report has at least a Title V permit. Finally, although Title V is a federal operating permit in that the requirement are specified by the Clean Air Act, responsibility for the issuance and enforcement of these permits rests mostly with state agencies.

New Source Review and Prevention of Significant Deterioration Permits

New Source Review is the Clean Air Act's permitting program designed to limit emissions from large sources of air pollution by requiring a permit before a "major source" begins construction or undertakes a modification. Although EPA has created a stricter definition of "major source" for many industries (a facility with the potential to emit 100 tons per year of a regulated pollutant), for wood pellet mills, "major source" means a facility with the potential to emit more than 250 tons per year of a regulated pollutant. It is worth pointing out that that the threshold is based on potential emissions rather than actual emissions, so

even if a facility usually operates at 75% capacity, the relevant emissions are those produced while operating at 100% capacity.

New Source Review consists of several types of permits, but the permit at issue in the wood pellet industry is known as a Prevention of Significant Deterioration (PSD) permit. PSD permitting requires facilities to conduct impact analyses, air dispersion modelling, and other protective steps, but the heart of PSD permitting is the "best available control technology" requirement. On a technical level, PSD does not actually require a facility to install the best available control technology, but it does require a facility to limit emissions to the level achievable by using the best available control technology. In practice, however, PSD is synonymous with utilizing the best available control technology, and permitting agencies are supposed to select the best available control technology on a case-by-case basis and implement corresponding emission limits.

PSD permitting is meant to be rigorous, and most of the wood pellet industry has attempted to remain below the 250 ton per year threshold to avoid it (see the section on synthetic minor limits below). Only three facilities have gone through New Source Review and PSD permitting before construction: Enviva Hamlet, Enviva Sampson, and Drax LaSalle. Two other facilities, German Pellets and Enviva Cottondale, are currently going through PSD permitting after discovering they were exceeding 250 tons per year of VOCs. Many of the issues revealed in EIP's survey involve facilities either exceeding the 250 ton per year threshold and not going through PSD, or states failing to select controls which are widely used in the industry as the best available control technology.

Hazardous Air Pollutants and Permitting

Hazardous air pollutants (HAPs) are those pollutants which EPA considers especially toxic or carcinogenic, and are more strictly regulated under the Clean Air Act. Unlike the permits discussed above, there is no unique permit needed to emit HAPs; instead, facilities which have the potential to emit more than 10 tons per year of any single HAP, or more than 25 tons per year of all HAPs combined, must apply for a Title V permit and utilize the maximum achievable control technology, which is meant to be stricter than other requirements such as PSD's best available control technology. For most industries, EPA has promulgated national standards and limits which represent the maximum achievable control technology. The wood pellet industry, however, is so new that EPA has not established any standards. This means it is up to the states to develop, on a case-by-case basis, maximum achievable control technology standards and emissions limits for wood pellet facilities. Unfortunately, for facilities which qualify, states have frequently failed to require any control technology at all, and several facilities emit substantially more HAPs than they would if states actually required maximum achievable control technology.

Synthetic Minor Sources

Each of the above permitting realms has a triggering pollution threshold, e.g. 250 tons per year of any PSD pollutant. The key to these thresholds is that they are triggered by the *potential* to emit that pollutant, rather than whether a facility actually emits more than the threshold in a given 12-month period. Facilities with such a potential are known as "major sources," for example a facility which has the potential to emit more than 100 tons per year

of a regulated pollutant is a major source in terms of Title V permitting. Facilities which have a potential to emit above a given threshold but wish to avoid the stricter permitting can opt to take limits to remain a minor source. These are known as "synthetic minor limits" because the facility is not truly a minor source, but will be treated as such if it complies with the limit. To be valid synthetic minor limit, the limit must be enforceable, ideally in terms of a production or operating limit. A good example would be a facility which would emit 275 tons per year of VOCs when operating at a production rate of 400,000 tons per year (and would therefore be a major source for PSD), but takes a legal limit which restricts operations to just 350,000 tons per year, which lowers VOC emissions to below 250 tons per year. Most wood pellet facilities are permitted as synthetic minor sources for PSD, but only have a blanket emission limit in their permits, such as "the facility shall emit less than 249 tons per year of VOCs," rather than an actual production limit. Unfortunately, such blanket limits are difficult to enforce in the real world if a facility does not accurately understand its rate of emissions. This is why many large pellet mills were in fact exceeding their 249 ton per year limits, because states and the industry did not realize that many units emitted much more VOCs than they believed.

Notes

[1] Florida has agreed to require Enviva Cottondale wood pellet plant to go through major source permitting in response to recent comments submitted by EIP. It remains to be seen whether Florida will require the best available control technology, despite the fact that the Clean Air Act requires it.
[2] Dogwood Alliance, Natural Resources Defense Council, Southern Environmental Law Center, "European Imports of Wood Pellets for "Green Energy" are Devastating US Forests," https://www.dogwoodalliance.org/wp-content/uploads/2017/05/NRDC_2014-2017Booklet_DigitalVersion-resize.pdf; Drouin, Roger, "Wood Pellets: Green Energy or New Source of CO2 Emissions," Yale Environment 360 (Jan. 22, 2015), http://e360.yale.edu/features/wood_pellets_green_energy_or_new_source_of_co2_emissions.
[3] Copley, Andrew. "Wood Bioenergy Update and Wood Pellet Exports: Q1 2017," Forisk Consulting (Feb. 17, 2017), http://forisk.com/blog/2017/02/17/wood-bioenergy-update-wood-pellet-exports-q1-2017/ ; National Renewable Energy Laboratory, Energy Analysis, International Trade of Wood Pellets,(DATE), *available at* https://www.nrel.gov/docs/fy13osti/56791.pdf.
[4] Campilho, Pedro. "The Asian Biomass Market: Challenges and Opportunities Ahead." *Biomass Magazine,* November 30, 2017. http://biomassmagazine.com/articles/14854/the-asian-biomass-market-challenges-and-opportunities-ahead.
[5] Science Advisory Board Review of EPA's Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources 7 (Sept. 28, 2012); "Letter from Over 100 Scientists to North Carolina Governor Roy Cooper," November 14, 2017; Mitchell, S.R. et al., Carbon debt and carbon sequestration parity in forest bioenergy production. Global Change Biology Bioenergy 4: 818-827 (2012); Schulze, E.-D. et al., Large-scale bioenergy from additional harvest of forest biomass is neither sustainable nor greenhouse gas neutral. Global Change Biology Bioenergy 4: 611-616 (Apr. 2, 2012); McKechnie, J. et al., Forest bioenergy or forest carbon? Assessing trade-offs in greenhouse gas mitigation with wood-based fuels. Environ. Sci. Technol. 45: 789-795 (2011); Repo, A. et al., Indirect carbon dioxide emissions from producing bioenergy from forest harvest residues. Global Change Biology Bioenergy 3: 107-115 (2010); Gunn, J., et al., Manomet Center for Conservation Sciences, Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources (2010).
[6] Koester, Stefan and Davis, Sam, Siting of Wood Pellet Production Facilities in Environmental Justice Communities in the Southeastern United States. Environmental Justice (ahead of print) (Jan. 2018).
[7] Dogwood Alliance, Wetland Logging Investigation Southampton, VA & Ahoskie, NC: May 13/14th, 2015, https://www.dogwoodalliance.org/wp-content/uploads/2015/06/Wetlands-Logging-Investigation-Flyer.pdf.
[8] Qian Di, M.S. et al., Air Pollution and Mortality in the Medicare Population. *New England Journal of Medicine* 377:15, 1497-1499. (2017), http://www.nejm.org/doi/full/10.1056/NEJMoa1702747.
[9] For instance, German Pellets Texas reports 63 tons per year in its PSD application, Enviva Northampton reports 75 tons per year in their Title V Permit application, and Enviva Southampton reports 77 tons per year in their Title V Permit Application. *See* German Pellets Texas Permit Amendment Application, Permit No. 98014, (Sep. 2016); North Carolina DAQ Application Review for Enviva Pellets Northampton, Permit No. 10203T06; Enviva Pellets Southampton Title V Permit Application, Permit No. 61653 (Jan. 4, 2016).
[10] Revised PSD Air Quality Construction and Operating Permit Application for Enviva Pellets Sampson, August, 2014; PSD Air Quality Construction and Operating Permit Application for Enviva Hamlet, January, 2014.
[11] EPA, Air Pollution Control Technology Fact Sheet for Regenerative Incinerator. EPA-452/F-03-021.
[12] *See supra,* note 10; *see also* North Carolina DEQ Application Review Including Final Determination for Enviva Pellets Sampson (Nov. 17, 2014); North Carolina DEQ Application Review Including Final Determination for Enviva Pellets Hamlet (Mar. 29, 2016).
[13] Revised PSD Air Quality Construction and Operating Permit Application, Enviva Pellets Sampson, Prepared by Trinity Consulting (Aug. 2014), § 4.4.3.5. ("RTO abatement technology is deemed to be cost prohibitive"); *see also* PSD Air Quality Construction and Operating Permit Application, Enviva Pellets Hamlet, Prepared by Trinity Consulting (Jan. 2015), § 4.4.3.5 ("RTO abatement technology is deemed to be cost prohibitive").

[14] Compare, for instance, AP-42 emission factors for particle board dryers at 100% softwood of 4.9 lb/ODT to 100% hardwood at .24 lb/ODT. (AP-42 § 10.6.2, Table 10.6.2-3).
[15] EPA Air Pollution Control Technology Fact Sheet, Regenerative Incinerator, EPA-452/F-03-021.
[16] Sterman, John et al., Does Replacing Coal with Wood Lower CO2 Emissions? Dynamic Lifecycle Analysis of Wood Bioenergy. Environ. Res. Lett. 13 (2013); UK Department of Energy and Climate Change, Life Cycle Impacts of Biomass Electricity in 2020 at 12-13 (July 2014).
[17] Forest Stewards Guild, Ecological Forestry Practices for Bottomland Hardwood Forests of the Southeastern U.S., May 2016, http://www.forestguild.org/publications/research/2016/FSG_Bottomland_Hardwoods.pdf.
[18] *Id.*
[19] U.S. EPA, Integrated Risk Information System.
[20] *Ass'n of Irritated Residents v. Fred Schakel Dairy*, 634 F.Supp.2d 1081 (E.D. Cal., 2008), *see also American Forest and Paper Association v. EPA,* 294 F.3d 113, 118-119 (D.C. Cir. 2002).
[21] *See* Table O, showing control devices on dryers at the facilities surveyed by EIP. Only Enviva facilities operate without an RTO or similar device.
[22] Memorandum from Manny Patel, Georgia EPD, to Eric Cornwell, Georgia EPD, entitled "Emission Factors for Wood Pellet Manufacturing" (Jan. 29, 2013), containing stack testing results from Georgia Biomass showing 95% reduction of formaldehyde, acetaldehyde, and methanol with the use of an RTO.
[23] *See supra,* note 15.
[24] North Carolina DEQ Air Quality Permit for Enviva Northampton, Permit No. 10203R00 (Mar. 9, 2012).
[25] *Id.* at 11.
[26] Application to Modify Air Permit No. 10203R03 for Enviva Pellets Northampton (May 2015).
[27] North Carolina DEQ Air Quality Permit for Enviva Northampton, Permit No. 10203R04 (Oct. 12, 2015).
[28] North Carolina State Implementation 15A NCAC 2D .0530(i) ("[w]hen a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980 on the capacity of the source or modification to emit a pollutant … then the provisions of [North Carolina's PSD regulations] shall apply to the source or modification as though construction had not yet begun on the source or modification."). The most recent version of North Carolina's PSD regulations includes the same language but in a different place: 15A NCAC 2D. 0530(k). Nearly identical language appears in EPA's federal PSD regulations at 40 C.F.R. 52.21(r)(4).
[29] *See supra,* note 15.
[30] The permit review document for both the original construction permit and the permit to increase VOC emissions contain the following statement: "Public notice is not required for this state-only construction permit under 15A NCAC 02Q .0300." North Carolina DEQ Air Permit Reviews for Air Permits No. 10203R00 and 10203R04.
[31] 40 CFR Part 51, Subpart I (Requirements for Preparation, Adoption, and Submittal of Implementation Plans—Review of New Sources and Modifications) requires 30 days public notice and opportunity to comment for both minor and major new sources of air pollution. 40 CFR §51.161.
[32] The Clean Air Act is clear that before a permit can be issued to a major facility like Enviva Hamlet, the state must hold a public hearing. North Carolina, however, believes it is their prerogative whether to hold a hearing, based on whether North Carolina regulators determine that there is sufficient public interest in the proposed permit. Even if this were a valid interpretation, North Carolina still failed to hold a hearing under the state's own guidelines. North Carolina ignored repeated requests for a hearing, and approximately 300 public comments, showing there was indeed substantial public interest.
[33] *See, e.g.* North Carolina DEQ Air Quality Permit for Enviva Hamlet, Permit No. 10365R00 (Mar. 29, 2016) (listing the facility's address with an incorrect zip code placing the facility some 90 miles east of its intended location). Other errors include public notice documents with no street address or an incorrect street address.
[34] German Pellets Draft Permit No. 98014, Maximum Allowable Emission Rates table (showing maximum emissions at 579 tons per year based on stack testing at the facility).
[35] Permit Amendment Application for German Pellets, Prepared by Trinity Consulting (Sep. 2016), § 10.2.2.
[36] *Id.,* § 11.1.2.
[37] EPA New Source Review Workshop Manual, Chapter B, § IV.A, at B.11, *available at* https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf.

[38] Title V Issuance Application, Drax Amite, prepared by FC&E Engineering (Aug. 2016), Appendix B: Emissions Calculations.
[39] *Id.*
[40] *See* Florida DEP Technical Evaluation & Preliminary Determination for Green Circle Bio Energy Permit No. 0630058-014, August 6. 2013, at 5 (referencing the 2010 testing and giving an emission rate of .639 lb/ODT. When a 10% margin is added to this rate the resulting emission rate is .703 lb/ODT, almost exactly the .704 lb/ODT Drax cited.).
[41] *Id.*
[42] *Id.* The emission factor of 3.25 lb/ton is back calculated from the reported post-dryer annual VOC emissions (1,344 tons per year) and a production rate of 827,000 tons per year.
[43] *See supra,* note 15.
[44] Mississippi DEQ Statement of Basis for Drax Amite's Draft Title V Permit (Jun. 20, 2017), at 4.
[45] Air Emission Test Report for Enviva Wiggins, Prepared by Air Control Techniques (Oct. 31, 2013), at 1.
[46] *Id.*; State of Mississippi Air Pollution Control Title V Permit No. 2540-00025 (Nov. 30, 2015), at 15.
[47] Air Emission Test Report for Enviva Amory, Prepared by Air Control Techniques (Oct. 31, 2013), at 1.
[48] *See, e.g.*, emissions in Table B, note that the emission rates for facilities like Hazlehurst and Drax Amite are after an RTO has removed 95% of HAP emission, which is not the case at Enviva Amory, meaning emissions at Enviva Amory should be much higher.
[49] Memorandum from Shannon Vogel, NC DEQ Stationary Source Compliance Branch to Robert Fisher, NC DEQ Washington Regional Office and Yuki Puram, Air Quality Permitting Section, Re: Emissions Testing Performed in Amory and Wiggins Mississippi (Oct. 9, 2015).
[50] *Id.*
[51] State of Mississippi and Federally Enforceable Air Pollution Control Permit for Enviva Amory, Permit No. 1840-00082, Issued May 2, 2007 and Modified April 16, 2008, October 19, 2010, and March 4, 2011.
[52] *Id.* at 16.
[53] Memorandum from Manny Patel, Georgia EPD, to Eric Cornwell, Georgia EPD, entitled "Emission Factors for Wood Pellet Manufacturing" (Jan. 29, 2013).
[54] State of Mississippi Air Pollution Control Title V Permit No. 1840-00082 for Enviva Amory (Aug. 4, 2015).
[55] *Id.*
[56] *See supra*, note 54.
[57] Because the stack testing report did not include the rate of softwood processed, it is impossible to develop a source-specific emission factor for Enviva Amory. Instead, EIP applied the emission factors from Georgia Biomass, which are widely considered to be the best emission factors for 100% softwood facilities, and applied those emission factors to Enviva Amory's capacity of 125,000 tons per year. *See supra* note 15. Notably, even if the Georgia Biomass factors give relatively higher-than-actual emission estimates, the facility would still be well above the 250 ton per year threshold.
[58] 185 tons per year of VOC emissions at 60% softwood and 99,000 tons per year production rate gives an emission factor of 3.73 lb/ODT. Scaling this emission factor to 65% softwood gives an emission factor of 4.04 lb/ODT, which applied to the facility's current production rate of 121,000 tons per year results in 253 tons per year of VOCs.
[59] Drax Morehouse operates at 620,000 tons per year and claims to emit 20 tons per year of VOCs, for comparison testing at Enviva Cottondale found 460 tons per year of VOCs when operating at 610,000 tons per year, testing at Georgia Biomass found up to 533 tons per year of VOCs while operating at 820,000 tons per year, and testing at German Pellets Texas reports up to 446 tons per year of VOC emissions when operating at 578,000 tons per year.
[60] Drax Title V Air Permit Modification Application for Drax Morehouse (Aug. 2016), Section 5.0 Emissions Calculations. Note that when Drax submitted this same testing to Mississippi to support its claims of low VOCs at Drax Amite, they added an asterisk to the pellet cooler testing, labelling it "engineering testing data." No other portion of Drax's testing contained such an asterisk, and EIP assumes this is to denote that the pellet cooler testing was not conducted pursuant to any requirement or EPA-methodology.
[61] Louisiana's Air Permit Briefing Sheet for the November 17, 2017 Title V Air Permit Modification gives 20.95 tons per year of VOCs from the pellet coolers, an identical rate to Drax's emission factor from their permit application, showing that Louisiana accepted Drax's emission factor. A December 22, 2017 phone conversation with Steven Schwartz, Louisiana DEQ's Waste Permits Division (the Division's officer responsible for reviewing Drax Morehouse's stack tests), confirmed that the department never received any

stack testing data concerning the pellet coolers. Further, Drax Morehouse's stack testing report only shows PM testing from the pellet coolers, and Louisiana DEQ's review of these tests also only show PM testing from the pellet coolers. *See* Letter from James Meyers, Engineering Manager, Waste Permits Division, LDEQ to Michael Bellow, Drax Environmental Health & Safety Monitor, RE: Compliance Tests Conducted February 10-24, 2016.

[62] Louisiana's Air Permit Briefing Sheet for the November 17, 2017 Title V Air Permit Modification.

[63] Assuming the worst-case scenario that the facility-wide emissions are 708 tons per year, and a VOC destruction rate for an RTO of 95%, total emissions from the dryer, hammermills, and pelletizing lines would be 35.4 tons per year.

[64] Virginia DEQ Stationary Source Permit to Construct and Operate, Registration No. 61653 for Enviva Pellets Southampton (Sep. 5, 2012).

[65] The exact rate is not available, but applying Georgia Biomass emission factors approximately 900 to 1,000 tons per year of VOCs.

[66] Letter from Joe Sullivan, Trinity Consultants to Troy Breathwaite, Virginia DEQ, Re: Air Quality Permit Application (May 9, 2013). *See also* Virginia DEQ Stationary Source Permit to Construct and Operate, Registration No. 61653 for Enviva Pellets Southampton (Aug. 15, 2013).

[67] A thorough review of Virginia DEQ permitting documents related to Enviva Southampton provided by the state in response to an EIP Freedom of Information Act request reveals no discussion of HAP emissions after the switch to hardwoods. The only reference to HAP emissions are found in Enviva's applications.

[68] Enviva developed a weighted emission factor by scaling HAP emissions based on VOC emissions, as such: "To account for hardwood HAP & TAP [toxic air pollutants] emissions, factors were conservatively calculated by taking the AP-42 HAP factors for 100% softwood (green) and multiplying by the ratio of the total listed VOC emission factors for hardwood and softwood (0.24 / 4.7)." Enviva Pellets Southampton Title V Air Permit Application (Jan. 4, 2016), Table 5 ("Rotary Dryer -HAP and TAP Wood Combustion Emissions"). Under this method, Enviva assumes each HAP is therefore reduced at the same rate total VOCs are reduced. Rather than base all the HAP emission factors for a given hardwood content on the sliding VOC scale, EIP used the ratio between a given HAP in in the 100% softwood AP-42 source category and the emission factor for the same HAP in the 40 to 60% source category to create a HAP-specific rate of decrease (AP-42 Table 10.6.2-3 SCC 3-07-006-25 and SCC 3-07-006-26 respectively). This method does not assume that all HAPs are reduced at the same rate, but instead accounts for the unique emission rates of each HAP. For formaldehyde the emission factor at 100% softwood is .14 lb/ODT, and at 50% softwood (e.g. the middle point of the 40 to 60% AP-42 category), the emission factor is .096 lb/ODT. This amounts to a reduction in formaldehyde emissions of 31.43%, whereas total VOCs between the same two source categories are reduced from 4.7 lb/ODT to 1.6 lb/ODT, for a reduction of 65.96%. This shows that formaldehyde emissions do not decrease at the same rate as total VOCs, and instead decrease much more slowly.

[69] Appling County Wood Pellets, a facility in Georgia, conducted three sets of HAP testing in 2017. In each set of testing, Appling tested at 70% hardwood, 80% hardwood, and 100% hardwood. In two out of three tests, acetaldehyde and formaldehyde increased as hardwood increased. Averages of all three tests revealed emissions of formaldehyde at .85 lb/hour at 70% hardwood and 1.11 lb/hour at 100% hardwood; acetaldehyde at .52 lb/hour at 70% hardwood and .61 lb/hour at 100% hardwood; methanol was emitted at 1.33 lb/hour at both 70% and 100% hardwood. Further, studies of lumber and engineered wood dryers show that during the wood drying process, hardwood emits significantly more methanol than softwood. For instance, one study assessing HAP emissions from oriented strandboard drying showed hardwood emitting nearly three times as much methanol as softwood southern pine, at .33 lb/ODT and .12 lb/ODT respectively. *See* Milota, Michael, "Emissions from Wood Drying: the Science and the Issues," Forest Products Journal, 2000, Issue 50(6). Another study of wood drying, conducted at lumber kilns, tested five species of softwood and one species hardwood for HAP emissions, including methanol. The results again showed that the hardwood species emitted much higher rates of methanol than any of the softwoods. *See* Milota, Mike and Mosher, Paul, "Emissions of Hazardous Air Pollutants from Lumber Drying," Forest Products Journal, July 2008 Issue 7/8, at 50-55. Notably, the raw data which Enviva relies upon for its methanol emission rate (known as AP-42 emission factors) is based on just three particle board dryers, and EPA gave the data one of the lowest reliability ratings. Enviva relies on the methanol emission factor at AP-42 § 10.6.2, Table 10.6.2-3 SCC 3-07-006-26. Out of the wood-fired rotary dryers tested to develop the methanol AP-42 emission factors,

there are only five sources processing any significant amount of hardwood (all of which processed 55% hardwood and 45% softwood pine). Of these five, two are noted to be pre-dryers and have substantially lower emissions than the other dryers, and therefore should not be used to estimate emissions from a full-scale rotary dryer. AP-42's emission factor, however, does not exclude the pre-dryer tests from the average for the emission factor, which means the final emission factor is biased low by these pre-dryer tests. *See* AP-42 § 10.6.2 Data Sets, Rotary Dryer category, Excel spreadsheet available at https://www3.epa.gov/ttn/chief/ap42/ch10/index.html.

[70] AP-42 § 10.6, *see* note 77.

[71] *See* note 77. At 10% softwood the emission factor is .0608 lb/ton. This rate applied to Enviva Southampton's production rate is 16.2 tons per year.

[72] Enviva estimated the dryer formaldehyde emissions at 5.87 tpy and facility wide HAP emissions at 21.8, while EIP estimates formaldehyde dryer emissions at 16.2 tpy, which pushes facility wide emissions to 31.4 tpy. See Title V Permit Application for Enviva Southampton.

[73] Appling County Wood Pellets, a facility in Georgia, conducted three sets of HAP testing in 2017. In each set of testing, Appling tested at 70% hardwood, 80% hardwood, and 100% hardwood. EIP averaged all three sets of testing at each softwood ratio, then averaged the emission factor for 80% hardwood and 100% hardwood to estimate emissions at 90% hardwood, which is what Enviva Southampton processes. These emission factors are .08 lb/odt for methanol, .033 lb/odt for acetaldehyde, and .061 lb/odt for formaldehyde.

[74] Florida DEP Draft Statement of Basis for Title V Air Operation Permit Renewal, Permit No. 0630058-020-AV.

[75] Florida DEP Consent Order OCG File No. 17-1134 (Nov. 15, 2017).

[76] Florida DEP Technical Evaluation & Preliminary Determination for Green Circle Bio Energy, Project No. 0630058-014-AC, Aug. 6, 2013 at 4.

[77] South Carolina DHEC, Bureau of Air Quality Construction Permit No. 1240-0133-CB (Jan. 12, 2018); Statement of Basis for Air Permit No. 1240-0133-CB (Jan. 12, 2018).

[78] *Id.*

[79] *Id.*

[80] Custom Stack Analysis, LLC Report on Stack Tests at Colombo Energy, June 19 through July 8, 2017. Colombo submitted this testing to SC DHEC, with the caveat that they were not submitting the June testing in order to meet its source testing obligation.

[81] Air Emission Test Report for Colombo Energy, Prepared by John Richards, Ph.D., P.E., Air Control Techniques (Dec. 4, 2017).

[82] Phone conversation between Patrick Anderson, EIP, and Michael Shroup, Manager, SC DHEC Source Evaluation Section (Jan. 25, 2018).

[83] Alabama DEM Synthetic Minor Operating Permit Nos. 703-0041-X001 through X003 for Lee Energy Solutions, August 12, 2009 (restricting operations to 5,840 hours per year).

[84] *In re: Lee Energy Solutions, LLC,* Alabama Department of Environmental Managements, Consent Order No. 16-023-CAP (Dec. 29, 2015).

[85] Biomass Energy Resource Center, Particulate Matter Emissions-Control Options, 2011, table at 9. Link: http://www.biomasscenter.org/images/stories/FSE_PM_Emissions.pdf

[86] *Id.*

[87] ADEQ Operating Air Permit No. 2341-AOP-R1 for Highland Pellets, LLC (Sep. 15, 2015), at 26.

[88] *Id.*

[89] Arkansas Department of Environmental Quality Air Division Complaint Report, PDS # 23234, Dec. 14, 2017.

[90] *Id.*

[91] Ho Kim, Yong et al., "Mutagenicity and Lung Toxicity of Smoldering vs. Flaming Emissions from Various Biomass Fuels: Implications for Health Effects from Wildland Fires," Environ Health Perpect. 126(1):017011 (Jan. 2018); Holder, Amara, at al, EPA Office of Research and Development, PM and VOC Speciation by Combustion Phase (2017).

[92] *Id.*

[93] For instance, in each case of each of Enviva's two most recent facilities in North Carolina, Enviva Sampson and Enviva Hamlet, as well as at the Virginia Enviva Southampton plant, Enviva dismissed regenerative

thermal oxidizers as "clearly cost prohibitive." Air Quality Permit Application, Enviva Pellets Southampton, Prepared by Trinity Consultants (May 9, 2013); *see also* Revised PSD Air Quality Construction and Operating Permit Application, Enviva Pellets Sampson, Prepared by Trinity Consulting (Aug. 2014), § 4.4.3.5. ("RTO abatement technology is deemed to be cost prohibitive"); PSD Air Quality Construction and Operating Permit Application, Enviva Pellets Hamlet, Prepared by Trinity Consulting (Jan. 2015), § 4.4.3.5 ("RTO abatement technology is deemed to be cost prohibitive").

[94] Melin, Staffan, Wood Pellet Association of Canada, Determination of Explosibility of Dust Layers in Pellet Manufacturing Plants (Aug. 30, 2012)("Dust explosions and fires has become a major issue in the pellets industry as well as in other woodworking industries with devastating consequences in many cases.); Biomass Handling, *Biomass Dust Fire and Explosion Control* (Apr. 24, 2013), at 2 ("Historically, wood pellet production was a small industry with more than its share of fires and explosions. However with the emphasis on green energy, wood pellet production has skyrocketed and very large plants are being constructed. There have been several recent major fires and explosions within the wood pellet manufacturing, shipping, receiving, storage and power plant facilities. These new facilities are learning that they have to employ safe handling practices for dry wood materials.").

[95] "2 Burn Victims Remain Hospitalized after Hazlehurst Flash Fire," WALB (June 4, 2015), http://www.walb.com/story/28983516/4-seriously-burned-after-fire-at-hazlehurst-wood-pellets; "Fire Reported at Highland Pellets Plant," *The Pine Bluff Commercial* (Aug. 16, 2017), http://www.pbcommercial.com/news/20170816/fire-reported-at-highland-pellets-plant; "Enviva's Cottondale Facility Damaged by Fire," *mypanhandle.com*, (June 11, 2017), http://www.mypanhandle.com/news/envivas'cottondale-facility-damaged-by-fire/737627383; Voegele, Erin. "Fire at Enviva Facility Not Expected to Result in Major Downtime." *Biomass Magazine* (Jan. 9, 2014), http://biomassmagazine.com/articles/9882/fire-at-enviva-facility-not-expected-to-result-in-major-downtime; Bryant, Cal. "Enviva Fire Quickly Contained." *Roanoke-Chowan News-Herald* (Jan. 24, 2013), http://www.roanoke-chowannewsherald.com/2013/01/24/enviva-fire-quickly-contained/; Taylor, Stephanie. "Aliceville Plant Closed After Explosion." *Tuscaloosa News* (Oct. 24, 2016), http://www.tuscaloosanews.com/news/20161024/aliceville-plant-closed-after-explosion Taylor, Stephanie. "Aliceville Plant Closed After Explosion." *Tuscaloosa News* (Oct. 24, 2016), http://www.tuscaloosanews.com/news/20161024/aliceville-plant-closed-after-explosion; "German Pellet Plant in Woodville has Fire in Silo." *Beaumont Enterprise* (Apr. 30, 2014), http://www.beaumontenterprise.com/jasper/news/article/German-pellet-Plant-in-Woodville-has-fire-in-Silo-5442052.php; Waldrep, Emily. "Firefighters Respond to Second Fire at Woodville German Pellet Plant." *Tyler County Booster* (May 07, 2015), https://www.tylercountybooster.com/index.php/news/1848-firefighters-respond-to-second-fire-at-woodville-german-pellet-plant; Langford, Cameron. "Residents Go to Court Over Months-Long Texas Plant Fire." *Courthouse News* (Oct. 27, 2017), https://www.courthousenews.com/residents-go-court-months-long-texas-plant-fire/

[96] "2 Burn Victims Remain Hospitalized after Hazlehurst Flash Fire," WALB, (June 4, 2015), http://www.walb.com/story/28983516/4-seriously-burned-after-fire-at-hazlehurst-wood-pellets.

[97] Taylor, Stephanie. "Aliceville Plant Closed After Explosion." *Tuscaloosa News* (Oct, 2016), http://www.tuscaloosanews.com/news/20161024/aliceville-plant-closed-after-explosion

[98] "Enviva's Cottondale Facility Damaged by Fire," *mypanhandle.com* (June 11, 2017), http://www.mypanhandle.com/news/envivas'cottondale-facility-damaged-by-fire/737627383; Voegele, Erin. "Fire at Enviva Facility Not Expected to Result in Major Downtime." *Biomass Magazine* (Jan. 9, 2014), http://biomassmagazine.com/articles/9882/fire-at-enviva-facility-not-expected-to-result-in-major-downtime; Bryant, Cal. "Enviva Fire Quickly Contained." *Roanoke-Chowan News-Herald* (Jan. 24, 2013), http://www.roanoke-chowannewsherald.com/2013/01/24/enviva-fire-quickly-contained/; Hill, Brian. "Firefighters Battle Fire at Port of Chesapeake." *WKTR.com* (Feb. 28, 2018), http://wtkr.com/2018/02/28/firefighters-battle-blaze-at-port-of-chesapeake/.

[99] "German Pellet Plant in Woodville has Fire in Silo." *Beaumont Enterprise* (Apr. 30, 2014), http://www.beaumontenterprise.com/jasper/news/article/German-pellet-Plant-in-Woodville-has-fire-in-Silo-5442052.php; Waldrep, Emily. "Firefighters Respond to Second Fire at Woodville German Pellet Plant." *Tyler County Booster* (May 07, 2015), https://www.tylercountybooster.com/index.php/news/1848-firefighters-respond-to-second-fire-at-woodville-german-pellet-plant; Langford, Cameron. "Residents Go to Court Over

Months-Long Texas Plant Fire." *Courthouse News* (Oct. 27, 2017), https://www.courthousenews.com/residents-go-court-months-long-texas-plant-fire/.

[100] *Id.*

[101] Rogers, Scott, "OPFD Continues Investigation of Bayou Wood Product Fire," *The News Star* (June 8, 2015), http://www.thenewsstar.com/story/news/local/2015/06/08/opfd-continues-investigation-bayou-wood-products-fire/28683263/.

[102] Stepzinski, Teresa, "Explosion Damages Waycrosss Plant; No Injuries Reported," jacksonville.com (June 21, 2011), http://www.jacksonville.com/news/crime/2011-06-21/story/explosion-damages-waycross-plant-no-injuries-reported.

[103] "Fatal Sawdust Blast in B.C. Comes After Five Explosions at Similar Plants Since 2009," National Post (Apr. 28, 2012), http://nationalpost.com/news/canada/fatal-sawdust-blast-in-b-c-comes-after-five-explsions-at-similar-plants-since-2009

[104] Clean Air Act section 112(r)(1).

[105] Although the Clean Air Act does not define "extremely hazardous substances," the legislative history provides criteria which EPA may use to determine if a substance is extremely hazardous. Specifically, the Senate Report states that "extremely hazardous substance" would include any agent "which may or may not be listed or otherwise identified by any Government agency which may as the result of short-term exposures associated with releases to the air cause death, injury or property damage due to its toxicity, reactivity, flammability, volatility, or corrosivity." Senate Committee on Environment and Public Works, Clean Air Act Amendments of 1989, Senate Report No. 228, 101st Congress, 1st Session 211 (1989), at 211.