Wood Pellet Production in the U.S. South and Exportation for 'Renewable' Energy in Europe: The New Green Sacrifice Zone

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In recent years, European demand for wood pellets has surged due to a misconception of carbon neutrality. The current legal frameworks posit that simply replacing a harvested tree renders the burning of wood pellets for energy use renewable energy. This oversimplification does not consider a number of factors, including the difference in carbon sequestration capabilities between original, natural forests and replacement monoculture plantations, the cumulative impact of CO_2 emissions in the atmosphere, and the years required for a replacement tree to sequester as much carbon as the harvested tree. The EU and U.K. can currently utilize emissions "reductions" due to burning wood pellets to reach domestic renewable energy goals along with commitments under the Paris Agreement. The corresponding increase in demand for wood pellets in Europe has resulted in a hotspot of wood pellet production in the U.S. South with several significant consequences. This Note presents the environmental justice and climate change impacts of the growing wood pellet industry in historically marginalized communities in the U.S. South, with a close look at the Enviva wood pellet plant in Hamlet, North Carolina. It provides an overview of the inadequacies of U.S., EU, U.K., and international environmental law in protecting both the global climate and local communities from the impacts of wood pellet production and combustion. This Note then builds on calls to change IPCC and EU carbon accounting rules for wood harvested for energy use to propose a solution to the environmental justice side of the wood pellet dilemma in international environmental law: namely, adding environmental justice safeguards to the UNFCCC Paris Agreement.

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I. THE 'RENEWABLE' WOOD PELLET DILEMMA

As the renewable energy transition accelerates, policymakers and industry have turned to the promise of carbon-neutral biomass. Burning biomass for energy use is an appealing alternative to burning fossil fuels, because trees already emit carbon dioxide (CO_2) during the natural process of decomposition, and harvested trees can be replaced. In turn, the replacement trees will sequester a lifetime of carbon, in theory rendering the carbon debt of emissions in both the harvesting and combustion process repaid. In reality, however, this assumption overlooks the cumulative impact of CO_2 emissions, along with the time it takes for a newly planted tree to adequately sequester carbon and the difference in carbon sequestration capabilities between original forests and fast-growing replacement plantations.

Nonetheless, the repayable theory of carbon-neutral combustion of woody biomass as an energy source underlies the greenhouse gas (GHG) accounting[1] guidelines from the Intergovernmental Panel on Climate Change (IPCC), the international authority on climate change science and policy. To avoid double-counting, the IPCC guidelines advise countries to only account for harvested biomass emissions in the land-use sector, leaving the combustion emissions unaccounted for in the energy sector. Moreover, the proposed accounting framework allows for consideration of only the producing country's estimated changes in carbon stocks in the harvested wood products pool.[2]

The inadequacies of this accounting approach are twofold. Firstly, the assumption that the lifecycle of a wood pellet can be accounted for in forest and wood-product pool stock changes creates the impression of carbon neutrality, overlooking the significance of the harvesting technique, category of wood, and time required for carbon sequestration; while combustion leads to immediate CO_2 emissions,

1. "Carbon accounting is the process by which organizations quantify their GHG emissions, so that they may understand their climate impact and set goals to limit their emissions." *Carbon Accounting 101*, SUPPLY CHAIN SOL. CTR., https://supplychain.edf.org/resources/carbon-accounting/ [https://perma.cc/4KPN-P84D] (last visited Jan. 27, 2023).

2. The IPCC defines a carbon pool as a "system which has the capacity to accumulate or release carbon." ROBERT WATSON ET AL., IPCC SPECIAL REPORT ON LAND USE, LAND-USE CHANGE AND FORESTRY APP. III (2000). The Harvested Wood Project (HWP) pool includes CO_2 sequestered by the forest, CO_2 emitted during slash and harvest, CO_2 stored in HWP, and CO_2 released at the end of the HWP's life. The HWP pool significantly does not include CO_2 emissions derived from combustion of HWP. Sebastian Rüter et al., *Harvested Wood Products*, *in* VOL. 4 2019 REFINEMENT TO THE 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES: AGRICULTURE, FORESTRY, AND OTHER LAND USE 12.1, 12.42 (Eduardo Calvo Buendia et al. eds., 2019).

sequestering the same amount of carbon via newly planted trees can take up to a hundred years,[3] which is in direct conflict with the exceedingly time-sensitive nature of the climate crisis. Additionally, wood-fired power plants actually generate more CO_2 per kWh than coal.[4] Scientists estimate that it would take between 44 and 104 years for new trees to sequester enough carbon dioxide to make wood greener than coal.[5] Secondly, the IPCC land-use accounting approach poses a major problem when the country that harvests and exports biomass is not a Party to the accounting framework. This presents a significant loophole: The United States, Canada, and Russia did not ratify the Second Commitment of the Kyoto Protocol and thus were not subject to its reporting requirements, but they continued to export woody biomass to Parties.[6] As a result, emissions were not accounted for under the Kyoto Protocol, because the land-use emissions occurred in non-Parties and the energy sector emissions from combustion are not accounted for under the IPCC approach.

This loophole in international carbon accounting has increasingly engendered criticism from advocates and scientists alike.[7] In response to the pressure, the IPCC's latest guidance, the 2019 Refinement to the 2006 IPCC Guidelines on National Greenhouse Gas Inventories ("2019 Refinement"), included an acknowledgement that fugitive emissions guidelines for harvested wood products need to be developed.[8] However, the land-use reporting loopholes were not addressed, and the consequences of this carbon accounting oversight are not limited to climate change. The carbon-neutral label has led to increasing demand for woody biomass[9] and subsequent legal systems

3. Michael Ter-Mikaelian et al., *Carbon Debt Repayment or Carbon Sequestration Parity? Lessons from a Forest Bioenergy Case Study in Ontario, Canada*, 7 GCB BIOENERGY 704, 704 (2015); NAT. RES. DEF. COUNCIL (NRDC), THE SUSTAINABLE BIOMASS PROGRAM: SMOKESCREEN FOR FOREST DESTRUCTION AND CORPORATE NON-ACCOUNTABILITY 3 (2017).

4. John Sterman et al., *Does Replacing Coal with Wood Lower CO_2 Emissions? Dynamic Lifecycle Analysis of Wood Bioenergy,* 13 ENV'T RSCH. LETTERS 1, 2 (2018).

5. *Id.*

6. DUNCAN BRACK, WOODY BIOMASS FOR POWER AND HEAT: IMPACTS ON THE GLOBAL CLIMATE 5 (2017).

7. Majile de Puy Kamp, *How Marginalized Communities in the South Are Paying the Price for 'Green Energy' in Europe*, CNN (July 9, 2021), https://www.cnn.com/interactive/2021/07/us/american-south-biomass-energy-invs/ [https://perma.cc/3V7M-XYZH].

8. Christian Boettcher et al., *Fugitive Emissions*, *in* VOL. 2 2019 REFINEMENT TO THE 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES: ENERGY 4 APP 4A.2 (Eduardo Calvo Buendia et al. eds., 2019).

9. Jozsef Popp et al., *Bioeconomy: Biomass and Biomass-Based Energy Supply and Demand*, 60 NEW BIOTECHNOLOGY 76 (2021).

that serve to incentivize with limited regulatory oversight. United States (U.S.), United Kingdom (U.K.), and European Union (EU) laws all subsidize biomass as an energy source with varying levels of protection afforded to forests.[10]

The international biomass demand that has followed from the existing legal frameworks has led to the disproportionate impact of wood pellet production in the U.S. South on historically marginalized communities. While "sacrifice zones" are traditionally considered to be the geographic zones home to fence line communities living in proximity to dangerous pollution from dirty industries like oil and gas,[11] the wood pellet industry has created a new "green" sacrifice zone. The environmental justice (EJ) implications of this trend can be seen in the public health impacts of the Enviva wood pellet production plant in Hamlet, North Carolina, and will be discussed *infra* Part II(A)(1). The effect of biomass production on local communities is a vital consideration that is noticeably absent from both the respective biomass laws of the U.S., U.K., and EU, and the latest international UN Framework Convention on Climate Change (UNFCCC) treaty, the Paris Agreement.

Under the existing international framework, the EU and U.K. will be able to take credit for emissions reductions under the Paris Agreement without any accountability mechanism for either the CO_2 emissions resulting from combustion of wood pellets or the human cost on the ground of the exporting country. Given that existing domestic laws have proven inadequate and the inherent global nature of this problem, this Note argues that a solution lies in the realm of international environmental law: IPCC accounting guidelines should include combustion emissions, and the Paris Agreement must include an EJ safeguard that precludes emission reduction credit when specified EJ standards are not met in the producing country.

II. THE ENVIRONMENTAL JUSTICE AND CLIMATE CHANGE IMPLICATIONS OF INADEQUATE WOOD PELLET REGULATION IN THE U.S. AND ABROAD

The IPCC's carbon accounting methodology for harvested wood pellets for energy use has led to an oversimplified distillation of the 2006 and 2019 Guidelines on harvested wood products by forest

10. *See infra* Parts III(A)–(B).

11. *Let's Talk About Sacrifice Zones*, CLIMATE REALITY PROJECT (May 13, 2021), https://www.climaterealityproject.org/blog/lets-talk-about-sacrifice-zones [https://perma.cc/8CGU-WJ2P].

biomass industry proponents—that the IPCC deems wood pellets to be carbon neutral.[12] As a result, this perception has been integrated into the domestic policy of many countries as well as the carbon accounting and reporting requirements of the Paris Agreement. Given that Parties can make progress on their National Determined Contribution (NDC) emissions reductions goals under the Paris Agreement by replacing fossil fuels with biomass as an energy source, domestic laws have shifted to incentivize biomass, putting it on par with renewable energy sources like wind or solar and disregarding the costs of biomass as an energy source. The practical impacts of this lopsided cost-benefit analysis have serious EJ and climate change implications that highlight the need for a legal intervention in the current state of wood pellets as an energy source around the globe. The true carbon emissions of a wood pellet's lifecycle must be accounted for in the law, and an EJ framework must be established to prevent NDC emission reduction credits from being derived from exploitation of local communities by industry in another country. The impacts of widespread biomass incentivization are currently most starkly seen in the nation's "wood basket," the most industrially productive forest region in the world: the U.S. South.[13]

A. Impacts on Local Communities in the U.S. South

Wood pellet production in the U.S. South has exploded over the past decade, earning the region the title of the world's largest wood pellet supplier[14] and increasing exportation to the EU almost ten-fold, from 500,000 tons in 2009 to 4.7 million metric tons in 2018.[15] Industrial wood pellet plants in the U.S. convert trees into wood pellets, which in turn are utilized as biomass fuel to produce electricity via burning.[16]

12. *See infra* Part III(C)(1); Sasha Stashwick, *What the IPCC Really Says on Forest Biomass & Climate Change*, NRDC (Nov. 9, 2021), https://www.nrdc.org/experts/sasha-stashwick/what-ipcc-really-says-forest-biomass-climate-change [https://perma.cc/M8L6-YFB5]. This is, in fact, not the case. The IPCC explicitly states that it "do[es] not automatically consider or assume biomass used for energy as 'carbon neutral,' even in cases where the biomass is thought to be produced sustainably." *FAQs Q2-10*, IPCC: TASK FORCE ON NAT'L GREENHOUSE GAS INVENTORIES, https://www.ipcc-nggip.iges.or.jp/faq/faq.html [https://perma.cc/M2ZN-PAZ4] (last visited Mar. 4, 2023).

13. Apporva Joshi, *A Bleak Future for the U.S. 'Wood Basket'? Southern Forests Under Threat*, MONGABAY (Apr. 6, 2016), https://news.mongabay.com/2016/04/bleak-future-u-s-wood-basket-southern-forests-threat/ [https://perma.cc/F4WJ-4YHR].

14. PATRICK ANDERSON & KERI POWELL, ENV'T INTEGRITY PROJECT, DIRTY DECEPTION: HOW THE WOOD BIOMASS INDUSTRY SKIRTS THE CLEAN AIR ACT 4 (2018).

15. *Id.*

16. *Id.*

Demand for U.S. wood pellets is primarily driven by European renewable energy incentives,[17] with over 99% of U.S. wood pellet exports in 2017 going to the EU.[18] As this industry has rapidly grown under the guise of clean and renewable energy, an all too familiar problem has followed suit: the brunt of the consequences in the U.S. has been felt by low-income communities of color.

Wood pellet manufacturing operations pollute communities with particulate matter (soot) and volatile organic compounds (VOCs), which pose dangers to both the health of the public and the environment; fine particulate matter ($PM_{2.5}$) can cause heart attacks, decreased lung function, asthma, and premature death,[19] and VOC emissions produce ground-level ozone and also contain air pollutants classified as hazardous under the Clean Air Act (CAA) due to toxic or carcinogenic characteristics, including acetaldehyde, formaldehyde, and methanol.[20] In addition to pollution associated with day-to-day operations, wood pellet mills in the U.S. South have experienced frequent fires and explosions, endangering both employees and surrounding communities with episodes of more extreme air pollution on top of the traditional dangers of fire.[21] The storage of wood pellets in sizable piles creates conditions that are amenable for fires, which contribute to the sustained burning once a fire does in fact break out.[22]

In 2018, the Environmental Integrity Project (EIP) investigated the emissions and air permits of twenty-one American wood pellet mills exporting to Europe, fifteen of which were specifically constructed to meet international wood pellet demand, and calculated the total

17. *See infra* Part III(B).

18. U.S. INT'L TRADE COMM'N, INTERNATIONAL TRADE IN WOOD PELLETS: CURRENT TRENDS AND FUTURE PROSPECTS 1 (2018).

19. *See, e.g.,* ANDERSON & POWELL, *supra* note 14, at 6; Yu-Fei Xing et al., *The Impact of PM2.5 on the Human Respiratory System*, 8 J. THORACIC DISEASE 69 (2016); Yixing Du et al., *Air Particulate Matter and Cardiovascular Disease: The Epidemiological, Biomedical and Clinical Evidence*, 8 J. THORACIC DISEASE 8 (2016); *Health and Environmental Effects of Particulate Matter (PM)*, EPA (Aug. 30, 2022), https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm [https://perma.cc/J55M-ZJ6L].

20. ANDERSON & POWELL, *supra* note 14, at 6; *Volatile Organic Compounds' Impact on Indoor Air Quality*, EPA (Aug. 26, 2022), https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality [https://perma.cc/2MEV-8JZ6]; Regina Montero-Montoya et al., *Volatile Organic Compounds in Air: Sources, Distribution, Exposure and Associated Illnesses in Children*, 84 ANNALS GLOB. HEALTH 225 (2018); Jeffrey Wickliffe et al., *Increased Long-Term Health Risks Attributable to Select Volatile Organic Compounds in Residential Indoor Air in Southeast Louisiana*, 10 SCI. REPS. 21649 (2020).

21. ANDERSON & POWELL, *supra* note 14, at 2.

22. *Id.*

annual emissions of "health-threatening" pollutants to be 16,000 tons, with over 2,500 tons of particulate matter, 3,200 tons of nitrogen oxides, 2,100 tons of carbon monoxide, and 7,000 tons of VOCs.[23] The study further found that four plants had faulty permits under the CAA pollution control equipment requirements, and eleven out of twenty-one had either violated the law in failing to install the necessary pollution controls or in surpassing the legal limits of emissions.[24] For example, EIP found that the annual VOC emissions of the Drax plant in Amite County, Mississippi, surpassed 900 tons; the Enviva plant in Jackson County, Florida, surpassed 500 tons; and the Enviva plant in Northampton County, North Carolina, surpassed 377 tons—all well above the 250 ton limit required under the CAA.[25] These numbers are unsurprising, given that in both drying the wood and turning it into pellets, air pollution is an inherent element of the wood pellet production process.

After the trees are chopped down and transported to the facility, they are put into chipping machines, or "hammermills," and subsequently transferred to the dryer, which is typically heated by burning wood and bark.[26] This drying procedure emits the most air pollution because the application of heat to wood emits VOCs, but the corresponding burning is also an emitter, releasing fine particulate matter, carbon monoxide, nitrogen oxides, and greenhouse gases.[27] The wood then returns to the hammermills and is sent to the pellet press, which uses pressure and heat to press the wood through pellet-shaped holes.[28] Finally, the pellets are cooled and stored prior to being shipped.[29] Despite historically being understood by industry as emitting insignificant amounts of VOCs, in recent years the substantial VOC pollution of pressing and cooling has come to light.[30] This fundamental misunderstanding is in part to blame for violations of CAA permits by wood pellet facilities.[31] For example, the permitting

23. *Id.* at 1. As a point of comparison, based on the total emissions of U.S. coal power plants in 2014, twenty-one plants would on average emit 2,747 tons of particulate matter, 20,888 tons of nitrogen oxides, 8,024 tons of carbon monoxide, and 308 tons of VOCs. *Coal and Air Pollution*, UNION OF CONCERNED SCIENTISTS (Dec. 19, 2017), https://www.ucsusa.org/resources/coal-and-air-pollution [https://perma.cc/7HCP-UW6F].

24. ANDERSON & POWELL, *supra* note 14, at 1.

25. *Id.* at 2.

26. *Id.* at 5.

27. *Id.* at 6.

28. *Id.* at 5.

29. *Id*. at 5.

30. ANDERSON & POWELL, *supra* note 14, at 6.

31. *Id.* at 6–7.

limits for VOCs at Georgia Biomass were set under the assumption that the entire facility emitted fewer than 250 tons of VOCs per year, when in reality emissions reached over 1,000 tons.[32] In addition to the air pollution derived from routine production, the EIP study found that at least eight of the fifteen largest operations had fires or explosions after 2014, releasing pollution in large quantities and injuring workers, and in one case even killing a worker during cleanup following a fifty-two day fire.[33]

As is true for most environmental pollution in the United States, the localized negative impacts of wood pellet production are not evenly distributed. A peer-reviewed study published by authors from the Dogwood Alliance and Tufts University found that eighteen of thirty-two wood pellet operations in the U.S. South[34] were located in EJ-designated communities, meaning communities with poverty levels above the state median and a nonwhite population of at least 25% of the total community population.[35] Moreover, this study found that all biomass wood pellet mills in both North and South Carolina were located in EJ communities and that EJ communities were twice as likely as communities without the EJ designation to have wood pellet production facilities in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, and Virginia.[36] There is an imbalance in modern private land ownership: white people own approximately 95% of family-owned forest land,[37] and family forest ownerships control more forest land than any other ownership group in the United States.[38] But, the private landowners that lease land and sell timber to wood pellet companies are not the ones who are forced to live with the consequences.[39] This injustice continues a legacy of systemic racism in land ownership in the U.S. South. Historically, federal agencies have hindered private land ownership by people of

32. *Id.* at 6.

33. *Id.* at 2.

34. Stefan Koester & Sam Davis, *Siting of Wood Pellet Production Facilities in Environmental Justice Communities in the Southeastern United States*, 11 ENV'T JUST. 64, 67 (2018). The study included Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, and Virginia.

35. *Id.* at 64.

36. *Id.*

37. Brett Butlet et al., *Family Forest Ownerships of the United States, 2013: Findings from the USDA Forest Service's National Woodland Owner Survey*, 114 J. FORESTRY 638, 641 (2016).

38. *Id.*

39. ALEXANDRA WISNER ET AL., RACHEL CARLSON COUNCIL, CLEAR CUT: WOOD PELLET PRODUCTION, THE DESTRUCTION OF FORESTS, AND THE CASE FOR ENVIRONMENTAL JUSTICE 12 (2019).

color through discrimination in federally-administered loans, technical assistance, and land extension programs.[40]

Although industry and the local governing bodies that approve the construction of wood pellet plants tout economic benefits, including direct employment for over 1,000 people in the U.S. South and stimulation of local logging and trucking businesses,[41] the siting of wood pellet production plants is not without opposition from local communities. Multiple NAACP chapters in Southern communities have come out in opposition to the siting of wood pellet production operations, in part due to an NAACP finding that "African Americans who live near biomass power plants are more likely to suffer from increased exposure to a number of dangerous emissions, such as smog, asbestos, sulfur dioxide, and other toxins, than any other racial group in America."[42] In fact, one chapter deemed the siting of wood pellet production facilities to be "a clear cut example of environmental racism."[43] Both the American Lung Association and American Heart Association also oppose the expansion of wood pellet production due to the health risks to the surrounding communities.[44]

Moreover, wood pellet production plants burden the community with emissions from the on-site biomass and/or coal required to generate the electricity to fuel the plant itself,[45] and noise pollution, increased traffic, and degradation of water quality and ecosystem services resulting from production of wood pellets in rural

40. *See, e.g.*, Melissa Gordon, *"Revolution is Based on Land:" Wealth Denied via Black Farmland Ownership Loss,* TUFTS UNIV., https://sites.tufts.edu/gis/files/2019/05/Gordon-Melissa_UEP232_Fall2018.pdf [https://perma.cc/B29Q-9R6H] (last visited Mar. 4, 2023); John Schelhas et al., *Engaging African American Landowners in Sustainable Forest Management*, 115 J. FORESTRY 26, 27 (2017); Jess Gilbert et al, *The Loss and Persistence of Black-Owned Farms and Farmland: A Review of the Research Literature and Its Implications*, 18 J. RURAL SOC. SCI. 1, 9–12 (2002); William Nelson Jr., *Black Political Power and the Decline of Black Land Ownership*, 8 REV. BLACK POL. ECON. 253, 260 (1978).

41. Gabriel Popkin, *There's a Booming Business in America's Forests. Some Aren't Happy About It.*, N.Y. TIMES (Apr. 19, 2021), https://www.nytimes.com/2021/04/19/climate/wood-pellet-industry-climate.html [https://perma.cc/5DND-Y6U5]. *See also* CHMURA ECON. & ANALYTICS, ECONOMIC & FISCAL IMPACT: ENVIVA'S OPERATIONAL FOOTPRINT IN THE SOUTHEASTERN UNITED STATES (2021) (finding that Enviva is on track to create/support approximately 4,200 jobs within its operational footprint, and for every job created in the states housing Enviva facilities, 2.8 jobs are supported elsewhere in the U.S. South in other businesses).

42. Stefan Koester & Sam Davis, *Siting of Wood Pellet Production Facilities in Environmental Justice Communities in the Southeastern United States*, 11 ENV'T JUST. 64, 65 (2018).

43. *Id.*

44. *Id.* at 67. For more on the health impacts of burning biomass, *see* Torben Sisgaard et al., *Health Impacts of Anthropogenic Biomass Burning in the Developed World*, 46 EUR. RESPIRATORY J. 1577 (2015).

45. Koester & Davis, *supra* note 42, at 65.

communities.[46] The harvesting of trees for wood pellet operations produces even more disproportionate burdens on EJ communities. In addition to the global benefits, forests are critical to local regions in both absorbing water during storm events and removing pollution from the atmosphere.[47] Despite the localized impacts of wood pellet production, the opposition of the very communities in which wood pellet plants are sited often goes unheeded. The following case study illustrates this problem.

1. The Enviva Case Study

A close look at the presence of the Enviva biomass company in the state of North Carolina reveals the gravity of the wood pellet-induced EJ problems in the U.S. South. Enviva is the largest wood pellet producer in the world, with seven processing plants across North Carolina, South Carolina, Virginia, Florida, Alabama, and Mississippi, totaling an annual production capacity of almost 3.5 million metric tons of pellets[48] out of approximately 10.3 million total tons in the U.S. South and 13.3 million in the United States nationally.[49] North Carolina suffers disproportionately at the hands of Enviva. The state is deemed ground zero for the wood pellet industry by the executive director of environmental advocacy group, the Dogwood Alliance.[50] Every day, 164 acres of North Carolina's forests are lost to the biomass industry.[51] Moreover, the Dogwood Alliance study found every single North Carolina wood pellet facility to be situated in an EJ community.[52]

One recent Enviva project has been particularly controversial, garnering widespread critique and legal challenges. The Enviva Pellets Hamlet LLC biomass pellet manufacturing plant in Hamlet, North Carolina, became operational in 2019.[53] Identified as an EJ community, Hamlet is nearly half Black, Hispanic, and Native American, and approximately three in ten residents live below the

46. *Id.*
47. *Id*. at 67.
48. WISNER ET AL., *supra* note 39, at 12.
49. U.S. ENERGY INFO. ADMIN., MONTHLY DENSIFIED BIOMASS FUEL REPORT tbl.2, Form EIA-63C (Sept. 15, 2021).
50. de Puy Kamp, *supra* note 7.
51. *Id.*
52. Koester & Davis, *supra* note 41, at 64.
53. *Hamlet, NC*, ENVIVA, https://www.envivabiomass.com/facility/hamlet-nc/ [https://perma.cc/Y6E8-N65E] (last visited Feb. 19, 2022).

poverty level.[54] The plant is located in the neighborhood of Dobbins Heights, which is 80% Black and over a third of residents live below the federal poverty line.[55] In the greater Richmond County, the median poverty rate is 27.3% (compared to North Carolina's median poverty rate of 20.15%) and the county is 37.5% nonwhite.[56] According to EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN), Hamlet is ranked in the 90–95th percentile for air toxics respiratory hazard, air toxics cancer risk, and traffic proximity; the 80–90th percentile for superfund site proximity; and 70–80th percentile for ozone pollution.[57]

Although the Enviva project was approved by Richmond County commissioners and received $1.7 million in state and local tax credit subsidies, partly due to seventy-nine jobs created and $107 million in "planned investment,"[58] due to the existing pollution in Hamlet, community members opposed the project: a local grassroots nonprofit, the Concerned Citizens of Richmond County, organized the community to fight the plant's siting.[59] However, opportunities for community members to voice their opposition were few and far between—according to residents, Richmond County commissioners did not allow residents to speak before the commission on the issue before approving the siting of the project, and the Southern Environmental Law Center (SELC) subsequently filed a petition in May 2017, alleging that the North Carolina Department of Environmental Quality (NCDEQ) improperly issued the original Enviva air permit without the required opportunity for public comment.[60]

In 2018, community members were eventually given an opportunity to provide input at an NCDEQ public hearing concerning Enviva's application for a modified air quality permit due to the expansion of its Hamlet facility[61] in Richmond County, and over 100

54. WISNER ET AL., *supra* note 39, at 24.

55. *See id.*

56. Koester & Davis, *supra* note 42, at 69.

57. *EJScreen: EPA's Environmental Justice Screening and Mapping Tool (Version 2.1),* EPA, https://ejscreen.epa.gov/mapper/ (last visited Jan. 8, 2023).

58. Koester & Davis, *supra* note 42, at 68.

59. *Id.* at 69.

60. *See id.*

61. BRUCE INGLE, ENVIVA PELLETS HAMLET, HEARING OFFICER'S REPORT AND RECOMMENDATIONS 1–15 (2018) (public hearing pertaining to permit application no. 7700096.18A and draft air permit no. 10635R03; hearing officer's report and recommendation of Bruce Ingle, regional supervisor, 2019).

people attended.[62] Seventeen people spoke in favor of the project and twenty-six spoke against it.[63] Additionally, 581 emails and thirty-three comments were received, one accompanied by a letter with forty signatures from organizations purporting to represent over 1.5 million North Carolinians in a plea for NCDEQ to deny Enviva's expansion in the state until cumulative impacts of the wood pellet industry were studied.[64] The hearing report does not disclose the number of emails and comments that were in support and opposition, but 390 of the emails included language expressing concern for both the climate and health impacts of the Enviva plant.[65]

Despite the activism of community members, the project went forward, with plans to emit 300 tons of VOCs per year at a minimum.[66] Based on the technologies in place at similar facilities, a report penned by environmental advocates from the Rachel Carson Council and Duke University alleges that the Enviva facility was legally required to install the best available emissions control technologies (BACT) to prevent these emissions under Section 165 of the CAA, yet North Carolina chose not to require installation of any VOC controls due to cost.[67] EIP and SELC challenged the Enviva Hamlet air pollution permit in the North Carolina Office of Administrative Hearings in 2019, alleging that NCDEQ improperly classified the facility as a minor rather than a major air pollution source under the CAA in addition to failing to properly scrutinize Enviva's air pollution estimates.[68] Enviva ultimately settled, agreeing to install pollution control technologies that will achieve at least a 95% reduction in VOCs and hazardous air pollutants.[69]

Whether Enviva will effectively improve emissions remains to be seen, and its track record is not strong: NCDEQ fined the Hamlet facility for over $11,000 in 2020 due to air permit violations resulting from equipment malfunctions.[70] North Carolina Policy Watch also

62. WISNER ET AL., *supra* note 39, at 26.
63. INGLE, *supra* note 61, at 1–15.
64. WISNER ET AL., *supra* note 39, at 26.
65. INGLE, *supra* note 61, at 1–15.
66. WISNER ET AL., *supra* note 39, at 24.
67. *Id.* at 26.
68. *Legal Challenge Forces NC Wood Pellet Facility to Install Pollution Controls*, S. ENV'T L. CTR. (June 4, 2019), https://www.southernenvironment.org/news/legal-challenge-forces-n-c-wood-pellet-facility-to-install-pollution-controls/ [https://perma.cc/RY9W-EM6Q].
69. *Id.*
70. Lisa Sorg, *Fire Breaks Out at Enviva Wood Pellet Plant with History of Environmental Violations*, NC POL'Y WATCH: THE PULSE (May 1, 2021), https://pulse.ncpolicywatch.org/2021/05/01/fire-breaks-out-at-enviva-wood-pellet-plant-

reports that NCDEQ records indicate five air quality violations at Enviva's Sampson County plant since 2017, including excess emissions of VOCs, carbon monoxide, and particulate matter, and in 2021, NCDEQ fined Enviva $7,300 for permit violations due to Sampson County equipment failures.[71] There have also been at least six fires at Enviva plants in the U.S. South since 2014.[72] It is apparent that the designation of wood pellets as clean energy is a misnomer in more than one respect, and Hamlet community members continue to suffer from some of the worst health outcomes in the state.[73]

B. Climate Impacts

In addition to the immediate health-threatening impacts of industrial-scale wood pellet production, these operations also pose a threat to the global climate crisis, contrary to the impression created by the designation as carbon-neutral or renewable energy. A life-cycle analysis of wood pellet biomass casts doubt on this label. Proponents of biomass argue that replanting trees at the same rate at which they are harvested occasions carbon neutral energy given that decomposition of trees releases CO_2, but a Chatham House study in 2019 showed:

> Accounting for emissions from their combustion, their supply chain, forgone removals of carbon dioxide from the atmosphere due to the harvesting of live trees and emissions from the decay of roots and unused logging residues left in the forest after harvest . . . US-sourced wood pellets burnt in the UK were responsible for 13 million–16 million tonnes of CO_2 emissions in 2019, equivalent to the emissions from between 6 million and 7 million passenger vehicles.[74]

For reference, the total GHG emissions in CO_2 equivalent totaled at approximately 453 million metric tons in the U.K. in 2018 and 6 billion

with-history-of-environmental-violations/#sthash.K62qkOJG.i5eZkHlF.dpbs [https://perma.cc/HGF2-SLU6].

71. *Id.* Without more information, it is difficult to determine the precise severity of these violations.

72. *Id.*

73. *Legal Challenge Forces NC Wood Pellet Facility to Install Pollution Controls*, S. ENV'T L. CTR. (Jun. 4, 2019), https://www.southernenvironment.org/news/legal-challenge-forces-n-c-wood-pellet-facility-to-install-pollution-controls/ [https://perma.cc/RY9W-EM6Q]. *See also* RICHMOND COUNTY HEALTH DEP'T, STATE OF THE COUNTY HEALTH REPORT 2018 (2018); *Richmond, NC*, COUNTY HEALTH RANKINGS & ROADMAPS, https://www.countyhealthrankings.org/app/north-carolina/2022/rankings/richmond/county/outcomes/overall/snapshot [https://perma.cc/WW43-S876] (last visited Mar. 4, 2023).

74. DUNCAN BRACK ET AL., GREENHOUSE GAS EMISSIONS FROM BURNING US-SOURCED WOODY BIOMASS IN THE EU AND UK (2021).

metric tons in the U.S.[75] In the same year, North Carolina energy-related CO_2 emissions totaled at 124.2 million metric tons.[76]

1. CO_2 Emissions from Production and Transportation

The EIP Study found twenty-one wood pellet mills to emit 3.1 million tons of GHG annually, primarily through the wood pellet drying process.[77] Another source of emissions is associated with transport.[78] From the running of truck routes between forests and production plants in the U.S. South to the shipment of wood pellets across the Atlantic to Europe, the industry's life cycle emissions are substantial. The EU does purport to factor domestic transport and transatlantic shipment emissions into the carbon neutral calculation,[79] but the IPCC and UNFCCC only account for domestic transport emissions in national calculations.[80] Emissions from international shipment and aviation are the prerogative of the International Civil Aviation Organization (ICAO) and International Maritime Organization (IMO) and were consequently omitted from the Paris Agreement.[81] Estimates indicate that the making of the wood pellets and transport from the U.S. to Europe (i.e., supply chain emissions) totaled approximately 1.3 million metric tons in 2019, up from 695,000 metric tons in 2014.[82] Other life cycle emissions that are excluded from carbon accounting calculations include:

> The fuel used in replanting, fertilizing, tilling, trucking to and from the forests, the natural gas used in processing the wood pellets, [and] the diesel used to ship those pellets thousands of miles overseas.[83]

75. *Total Greenhouse Gas Emissions (kt of* CO_2 *Equivalent)*, WORLD BANK, https://data.worldbank.org/indicator/EN.ATM.GHGT.KT.CE?most_recent_value_desc=true [https://perma.cc/5D8Q-JY5P] (last visited Feb. 21, 2022).

76. *Energy-Related* CO_2 *Emission Data Tables, Table 1: State Energy-Related Carbon Dioxide Emissions by Year, Adjusted*, U.S. ENERGY INFO. ADMIN. (Mar. 2, 2021), https://www.eia.gov/environment/emissions/state/ [https://perma.cc/5FFT-NR38].

77. ANDERSON & POWELL, *supra* note 14, at 1.

78. BRACK ET AL., *supra* note 74, at 30.

79. Simon Bager, Unintended or Unanticipated Consequences? The Indirect Greenhouse Gas Effects of Wood Pellet Consumption for Energy Generation (Feb. 1, 2016) (M.Sc. thesis, University of Copenhagen).

80. Dario Gomez et al., *Mobile Combustion*, *in* 3 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Simon Eggleston et al. eds., 2006).

81. *Shipping Aviation and Paris,* U.N. CLIMATE CHANGE (May 18, 2016), https://unfccc.int/news/shipping-aviation-and-paris [https://perma.cc/QKH8-S7TL].

82. BRACK ET AL., *supra* note 74, at 35.

83. Carson Vaugh, *American Forests Fuel Europe's Appetite for "Green" Energy*, WEATHER CHANNEL: COLLATERAL (Apr. 27, 2019), https://features.weather.com/collateral/forest-biomass-carbon-neutral-energy-climate-change/ [https://perma.cc/AZ7Z-ENCG].

2. CO_2 Emissions from Deforestation

In addition to providing the vital ecological services of climate control, clean air and water, and biodiversity,[84] forests and other forms of plant communities around the globe are responsible for absorbing approximately 30% of the CO_2 emitted into the atmosphere.[85] Forests are thus an essential piece of the puzzle to avoid the catastrophic 1.5 degrees of warming before the close of the century.[86] Rainforests often lie at the forefront of the global discourse on preventing deforestation to preserve climate sinks and fight climate change, but the rate at which U.S. Southern forests are logged, over 31% loss between 2000 and 2012, is four times greater than the rainforests in South America.[87] This rate has the potential to reduce carbon sequestration capacity by approximately 35%.[88]

Wood pellets can be produced from a variety of forest sources with varying carbon footprints. Fast-growing softwood trees can be grown on managed plantations and swiftly replaced after each round of harvesting.[89] Although problematic for biodiversity,[90] harvesting softwood trees results in lower net emissions than harvesting

84. WISNER ET AL., *supra* note 39, at 12. North Carolina residents rely on forests for natural filtration of the groundwater supplying 98% of public water systems, along with the flooding control that is increasingly crucial as severe weather events become more frequent in the state. *Id.* at 13.

85. Alan Buis, *Examining the Viability of Planting Trees to Help Mitigate Climate Change*, GLOB. CLIMATE CHANGE: VITAL SIGNS OF THE PLANET (Nov. 7, 2019), https://climate.nasa.gov/news/2927/examining-the-viability-of-planting-trees-to-help-mitigate-climate-change/ [https://perma.cc/9TBM-4NQ5].

86. WISNER ET AL., *supra* note 39, at 17.

87. M.C. Hansen et al., *High-Resolution Global Maps of 21st-Century Forest Cover Change*, 342 SCI. 850, 850–852 (2013).

88. WISNER ET AL., *supra* note 39, at 17 (citing N. L. Harris et al., *Attribution of Net Carbon Change by Disturbance Type Across Forest Lands of the Conterminous United States*, 11 CARBON BALANCE MGMT. 24 (2016)).

89. Roger Drouin, *Wood Pellets: Green Energy or New Source of CO_2 Emissions?*, YALE ENV'T 360 (Jan. 22, 2015), https://e360.yale.edu/features/wood_pellets_green_energy_or_new_source_of_co2_emissions [https://perma.cc/6WPS-TDUH].

90. F.G. COURTNEY-BEAUREGARD ET AL., NAT'L WILDLIFE FED'N & S. ENV'T L. CTR., FORESTRY BIOENERGY IN THE SOUTHEAST UNITED STATES: IMPLICATIONS FOR WILDLIFE HABITAT AND BIODIVERSITY (2013). Conservationists claim that policymakers, including the UN Food and Agriculture Organization, conflate development of monoculture plantations with forest restoration. This conflation is dangerous given that natural forests are estimated to be forty times better at storing carbon than plantations, yet companies and countries can currently advertise conversion of forestland to commercial plantations for biofuels as forest restoration. It is difficult to track deforestation when companies refer to replacement plantations as forests. Simon Lewis et al., *Restoring Natural Forests is the Best Way to Remove Atmospheric Carbon*, 568 NATURE 25 (Apr. 4, 2019).

bottomland hardwood trees, which tend to be slow-growing, older trees that are substantial carbon sinks.[91] Some scientists argue that monoculture plantations benefit the climate by incentivizing private land-owners to maintain working forests rather than clear-cutting for agriculture or urban development.[92] However, natural forests store more carbon than plantations;[93] forests are estimated to be forty times better at storing carbon than plantations.[94] The wood pellet manufacturing industry also claims to source wood pellets from forest residuals, material discarded by other wood-based industries that would otherwise decompose, but investigations have shown this is often not the case.[95] A European Commission report revealed that EU imports of wood pellets from the U.S. South are being sourced from large-diameter wood, including whole trees.[96] After monitoring Enviva's Ahoskie, North Carolina plant, both the Natural Resources Defense Council (NRDC) and a forest industry consulting company, Forisk, determined that Enviva was harvesting hardwoods from bottomland areas and wetland forests, which tend to be found in ecologically-significant, biodiverse, older growth forests, despite claims to the contrary.[97]

Most recently, Mongabay published the allegations of an Enviva whistleblower, a former senior department head at two plants, in December 2022:

> 'The company says that we use mostly waste like branches, treetops and debris to make pellets,' the whistleblower told me. 'What a joke. We use 100% whole trees in our pellets. We hardly use any waste. Pellet density is critical. You get that from whole trees, not junk.'[98]

91. F.G. COURTNEY-BEAUREGARD ET AL., *supra* note 90, at 15.

92. Eric Niiler, *How 'Green' Are Wood Pellets as a Fuel Source*, WIRED (Nov. 18, 2021), https://www.wired.com/story/how-green-are-wood-pellets-as-a-fuel-source/?utm_source=ActiveCampaign&utm_medium=email&utm_content=Climate+news%3A&utm_campaign=TDC+Daily [https://perma.cc/SJA6-GPNP].

93. Bonnie Waring et al., *Forest and Decarbonization—Roles of Natural and Planted Forests*, FRONTIERS FORESTS & GLOB. CHANGE, May 8, 2021, at 1.

94. Simon Lewis et al., *Restoring Natural Forests is the Best Way to Remove Atmospheric Carbon*, 568 NATURE 25 (Apr. 4, 2019).

95. *See* ANDERSON & POWELL, *supra* note 14 at 4; Timothy Searchinger et al., *Europe's Renewable Energy Directive Poised to Harm Global Forests*, NATURE COMMC'NS, Sept. 12, 2018, at 1.

96. EUR. COMM'N, ENVIRONMENTAL IMPLICATIONS OF INCREASED RELIANCE OF THE EU ON BIOMASS FROM THE SOUTH EAST US 252 (2016).

97. Drouin, *supra* note 89.

98. Justin Catanoso, *Whistleblower: Enviva Claim of 'Being Good for the Planet. . . All Nonsense,'* MONGABAY (Dec. 5, 2022), https://news.mongabay.com/2022/12/envivas-biomass-lies-whistleblower-account/ [https://perma.cc/VM5L-LPDT].

In this same exposé, the Mongabay reporter witnessed the clearcutting of fifty-two acres for future industrial development, despite Enviva's claims of complete reforestation.[99] The gravity of this story is evidenced by the December 14, 2022 motion of the Netherlands' Parliament, which seeks to prevent the government from subsidizing wood pellet manufacturers that are found to be untruthful about methods of harvest.[100] Introduced by Representative Lammert van Raan, the motion cited the whistleblower's claims as evidence of fraud in so-called renewable biomass designation and as inspiration for the motion.[101] With increasing scrutiny surrounding the sustainability of Enviva's practices, the Seattle law firm Hagens Berman is now said to be reaching out to Enviva investors for a potential greenwashing class-action.[102]

Since forests are vital carbon sinks, increased deforestation is detrimental to climate change, and even when trees are replaced in the wood pellet production industry, mature hardwood forests are often replaced with the faster-growing softwood plantations that are less ecologically valuable.[103] Given that trees sequester more carbon with age, NRDC estimates that the carbon debt created by biomass power plant emissions and lost sequestration "can take trees anywhere from 35 to 100 years or more to repay."[104] It is also worth noting that forest residuals still require initial clear cutting of forests, albeit by a different industry. Secondary residuals are by-products of wood product operations including sawmills, pulp mills, paper mills, and wood product operations that take the form of sawdust, wood shaving, wood chips, etc.[105] Companies advertise sourcing wood from secondary residuals as sustainable because the residuals would otherwise go to waste. However, the most climate-friendly option

99. *Id.*

100. Justin Catnoso, *The Netherlands to Stop Paying Subsidies to 'Untruthful' Biomass Firms*, MONGABAY (Dec. 23, 2022), https://news.mongabay.com/2022/12/the-netherlands-decides-to-stop-paying-subsidies-to-untruthful-biomass-firms/ [https://perma.cc/X2BL-BXBS].

101. *Id.*

102. *Id.*

103. ANDERSON & POWELL, *supra* note 14, at 4.

104. Repayment entails sequestering enough carbon to make up for the carbon emitted in both the harvest and combustion of the biomass. NRDC, THE SUSTAINABLE BIOMASS PROGRAM: SMOKESCREEN FOR FOREST DESTRUCTION AND CORPORATE NON-ACCOUNTABILITY 3 (2017).

105. Brian Kittler et al., *Assessing the Wood Sourcing Practices of the U.S. Industrial Wood Pellet Industry Supplying European Energy Demand*, ENERGY, SUSTAINABILITY & SOC'Y, 2020, at 1, 3.

would be avoiding clear cutting entirely; despite the connotation of "by-products" and "waste," the loss of these trees is not inevitable.[106]

3. CO_2 Emissions from Combustion

The gravity of the renewable energy misnomer for wood pellets is made apparent by the fact that scientists have found that wood-fired power plants generate more CO_2 per kWh than coal.[107] This is because wood is a less efficient energy source due to higher concentrations of water. As previously mentioned, scientists estimate that it would take between 44 and 104 years for new trees to sequester enough carbon dioxide to make wood greener than coal.[108] Eight hundred scientists wrote a letter in 2018 imploring the European parliament to acknowledge this discrepancy in efficiency, and hundreds of scientists echoed this sentiment in a recent letter to President Biden.[109] Regardless of the long-term sequestration potential of replacement trees, the instant consequence of burning wood in lieu of coal is an increase in atmospheric levels of CO_2.[110]

The largest woody biomass power plant in the world, the U.K.'s Drax Power station, burns 13 million tons of wood pellets and emits as much as 23 million tons of carbon annually.[111] It would require the planting of 60 million trees and ten years of growth to sequester this much carbon.[112] The combustion phase of a wood pellet's life cycle is in fact the largest source of carbon emissions,[113] which highlights the incongruity of not calculating these emissions in wood pellet carbon accounting. The existing legal frameworks surrounding wood pellet production and combustion for energy fall short both in terms of protecting the health, and input, of local communities and working to slow the progression of the global climate crisis.

III. THE EXISTING LEGAL FRAMEWORKS FOR WOOD PELLETS AS AN ENERGY SOURCE

The recent spike in global biomass demand and resulting production of wood pellets in the U.S. South can be attributed to the

106. WISNER ET AL., *supra* note 39, at 12.
107. Sterman et al., *supra* note 4, at 2.
108. *Id.*
109. de Puy Kamp, *supra* note 7.
110. Sterman et al., *supra* note 4, at 2.
111. WISNER ET AL., *supra* note 39, at 29.
112. *Id.*
113. BRACK ET AL., *supra* note 74, at 35.

existing legal frameworks, and lack thereof. Consistent treatment of biomass as carbon-neutral has culminated in large subsidies and other incentives with limited safeguards for surrounding communities and their forests. Although this Note will focus on improvements that can be made to the Paris Agreement given the international scope of this problem, a general overview of wood pellet treatment by U.S., U.K., EU, and international law aids in exposing the consistent holes in carbon accounting and inadequate protection of communities that have resulted in the wood pellet problem in the U.S. South. The following is a brief overview of the major legal mechanisms in each area of law.

A. U.S. Law

In spite of the serious implications for both local communities and the climate crisis, wood pellets, and biomass in general, are underregulated in the United States, and the limited existing framework primarily incentivizes biomass with little oversight. This is in part because the majority of harvesting operations are located in private forests rather than on public lands; 86% of Southern forests are held by private landowners.[114] As a result, regulation of harvesting operations is largely limited. Moreover, siting of the affiliated wood pellet production plants is a land-use determination left to state and local authorities, with procedures varying by state.[115] Local zoning decisions are particularly vulnerable to the relegation of health concerns by city officials due to the prospect of economic benefits.[116]

Although stationary source CAA restrictions do not reach CO_2 emissions involved in international transport or international combustion of the wood pellets, these pollution controls theoretically should aid in protecting the public health of communities surrounding wood pellet plants. However, in practice, the CAA fails to protect communities in a number of ways.[117] The CAA requires EPA to set

114. U.S. DEP'T OF AGRIC., U.S. FOREST SERV., THE SOUTHERN FOREST FUTURES PROJECT TECHNICAL REPORT 103 (David Wear & John Greis eds., 2013).

115. WISNER ET AL., *supra* note 39, at 29.

116. Andrew Whittemore, *Racial and Class Bias in Zoning: Rezonings Involving Heavy Commercial and Industrial Land Use in Durham (NC), 1945–2014*, 83 J. AM. PLAN. ASS'N 235 (2017).

117. In the U.S., racial-ethnic minorities are exposed to disproportionately high levels of ambient fine particulate air pollution ($PM_{2.5}$), a criteria pollutant regulated under the CAA National Ambient Air Quality Standards (NAAQS) and the largest environmental cause of human mortality. Christopher Tessum et al., *$PM_{2.5}$ Polluters Disproportionately and Systematically Affect People of Color in the United States*, SCI. ADVANCES Apr. 28, 2021, at 1, 7.

emission standards for certain categories of pollutants and industries and requires adherence to technological standards for new and modified stationary sources,[118] which include wood pellet production facilities. These limits are enforced through state-level permitting of projects. New wood pellet production plants that qualify as major sources are subject to Title V operating and New Source Review (NSR) permitting requirements.[119] Differing technological standards apply to major sources built in areas that are in attainment and nonattainment of National Ambient Air Quality Standards (NAAQS).[120] Section 112 Hazardous Air Pollutant technological requirements may also apply if the major source facility emits air pollutants determined to be hazardous.[121] For minor sources under NSR, states are given much more discretion; states can customize minor NSR programs as long as they meet minimum requirements.[122] Although effective in reducing national pollution levels, these protections fail to account for pollution hotspots in disadvantaged communities.[123] Compliance with NAAQS is monitored using stations at "representative" locations in a region, which in practice can result in a region being designated as in attainment despite certain neighborhoods surpassing NAAQS, depending on proximity to hotspots and the number of monitoring sites.[124] Moreover, issuing permits is a prospective exercise in estimating emissions, which is not

118. *Summary of the Clean Air Act*, EPA (Sept. 12, 2022), https://www.epa.gov/laws-regulations/summary-clean-air-act [https://perma.cc/Z82F-7LWG]; *Learn About New Source Review*, EPA (Nov. 23, 2022), https://www.epa.gov/nsr/learn-about-new-source-review [https://perma.cc/ZJH2-GNRC].

119. *Who Has to Obtain a Title V Permit?*, EPA (May 25, 2022), https://www.epa.gov/title-v-operating-permits/who-has-obtain-title-v-permit [https://perma.cc/4MF7-CZVY].

120. Prevention of Significant Deterioration (PSD) Best Available Control Technology (BACT) standards apply to major sources built in areas that are in attainment of National Ambient Air Quality Standards (NAAQS) while Nonattainment NSR permits require adherence to the Lowest Achievable Emission Rate (LAER) and emission offsets. *Learn About New Source Review*, EPA (Nov. 23, 2022), https://www.epa.gov/nsr/learn-about-new-source-review [https://perma.cc/ZJH2-GNRC].

121. *Summary of the Clean Air Act*, EPA (Sept. 12, 2022), https://www.epa.gov/laws-regulations/summary-clean-air-act [https://perma.cc/Z82F-7LWG].

122. *Minor NSR Basic Information*, EPA (Oct. 26, 2022), https://www.epa.gov/nsr/minor-nsr-basic-information [https://perma.cc/TER5-4DUN].

123. Meredith Fowlie et al., *Climate Policy, Environmental Justice, and Local Air Pollution*, BROOKINGS (Oct. 20, 2020), https://www.brookings.edu/research/climate-policy-environmental-justice-and-local-air-pollution/ [https://perma.cc/GSA6-VELK].

124. *Id*. at 7. For a more general discussion of flawed monitoring and hotspots, *see* David Coursen, *Environmental Justice Requires Adequate Air Quality Monitoring System*, BLOOMBERG L. (Mar. 9, 2021), https://news.bloomberglaw.com/environment-and-energy/environmental-justice-requires-adequate-air-quality-monitoring-system [https://perma.cc/N7TY-GEZ2].

guaranteed to be ultimately accurate.[125] Thus, in addition to claims that the limits of operating permits themselves are insufficiently stringent due to the economic appeal of industry, wood pellet plants in the U.S. South have received criticism for violating CAA operating permit limits.[126] Although violations of permit limits allow for citizen suits and enforcement actions, inadequate monitoring often poses an obstacle.[127] CAA standards for certain pollutants, including PM 2.5, have also been criticized for being inadequately protective.[128] EPA may begin addressing these inadequacies in the near future, however, having established the Environmental Justice and External Civil Rights Office in October 2022.[129]

Turning from the wood pellet production plants to the regulation of biomass itself, most federal biomass regulations are limited to liquid biofuel; the Energy Policy Act of 2005 established Federal Renewable Fuel Standards (RFS), which requires the blending of a specific quantity of "renewable" fuel with gasoline.[130] The Energy Independence and Security Act of 2007 (EISA) requires that woody biomass be sourced from lands that are not federal, nor ecologically-sensitive, and limits sourcing in a few different ways.[131] However, EISA only applies to liquid cellulosic biofuels and therefore does not apply to wood pellet production for solid biomass use.[132]

In addition to a variety of subsidies for renewable energy in the United States,[133] biomass-specific subsidies can be found at both the

125. Meredith Fowlie et al., *Climate Policy, Environmental Justice, and Local Air Pollution*, BROOKINGS 8 (Oct. 20, 2020), https://www.brookings.edu/research/climate-policy-environmental-justice-and-local-air-pollution/ [https://perma.cc/GSA6-VELK].

126. ANDERSON & POWELL, *supra* note 14, at 1; Email from Louisiana Environmental Action Network et al., to Louisiana Department of Environmental Quality, Public Participation and Permit Support Division (Aug. 7, 2018).

127. Coursen, *supra* note 124.

128. Sarah Millender et al., *Stronger Standards on Soot Pollution Are Critical for Public Health and Environmental Justice*, CTR. FOR AM. PROGRESS (Nov. 3, 2022), https://www.americanprogress.org/article/stronger-standards-on-soot-pollution-are-critical-for-public-health-and-environmental-justice/ [https://perma.cc/8WNT-MCMB].

129. *EPA's New Office of Environmental Justice and External Civil Rights: A Moment in History*, EPA (Oct. 6, 2022), https://www.epa.gov/perspectives/epas-new-office-environmental-justice-and-external-civil-rights-moment-history [https://perma.cc/XEL4-XRKY].

130. *Renewable Fuel Standard*, U.S. DEP'T OF ENERGY, https://afdc.energy.gov/laws/RFS [https://perma.cc/653D-QRQR] (last visited Jan. 12, 2023).

131. KAREN L. ABT ET AL., EFFECT OF POLICIES ON PELLET PRODUCTION AND FORESTS IN THE U.S. SOUTH 12 (2014).

132. *Id.*

133. *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2016*, U.S. ENERGY INFO. ADMIN. (Apr. 24, 2018), https://www.eia.gov/analysis/requests/subsidy/ [https://perma.cc/H5ZV-VBXG].

national and state level. Federal grants are offered for forest biomass utilization,[134] research and development of biofuel production technologies,[135] and production of agricultural and forestry biomass feedstocks.[136] Another method of incentive takes the form of federal and state stewardship contracts. Contractors can remove woody biomass from lands managed by the Bureau of Land Management (BLM) in exchange for the value of the harvested wood.[137] An example of a state stewardship program is North Carolina's Present-Use Value Program, which reduces property taxes for land that is actively engaged in the commercial production of timber.[138] The U.S. does not appear to be reconsidering subsidization of wood pellet production, as the 2022 Infrastructure Investment and Jobs Act exempts certain logging operations from the National Environmental Policy Act (NEPA),[139] approves 30 million acres of logging on federal lands,[140] and subsidizes carbon capture and storage (CCS) at wood pellet manufacturing and power plants.[141] The 2022 Inflation Reduction Act (IRA) provides subsidies for logging on National Forest System and non-federal forest land[142] along with subsidies for wood innovation on non-federal forest land, which includes wood pellet facilities.[143] Critically, the omnibus spending bill, which passed on December 22, 2022, defines forest bioenergy as carbon neutral and directs federal agencies to adopt corresponding policies.[144]

At the state level, as of November 2022, thirty-six states and the District of Columbia had established Renewable Portfolio Standards (RPS), which are state-wide policies requiring minimum percentages

134. Energy Policy Act §§ 209, 210, and 944, 7 U.S.C. § 918c., 42 U.S.C. § 15855, 16253 (2005).

135. Energy Independence and Security Act § 223, 42 U.S.C. § 17032 (2007).

136. Agriculture Improvement Act of 2018, Pub. L. No. 115-334, § 9010, 132 Stat. 4887 (2018).

137. U.S. DEP'T OF THE INTERIOR, MS 5920, STEWARDSHIP END RESULT CONTRACTING PROJECTS (2016).

138. N.C. DEP'T OF REVENUE, PRESENT-USE VALUE PROGRAM GUIDE (2019).

139. Open Letter to President Biden and Members of Congress from Scientists: It is essential to Remove Climate-Harming Logging and Fossil Fuel Provisions from Reconciliation and Infrastructure Bills (Nov. 4, 2021) (on file with the John Muir Project).

140. *Id.*

141. *Id.*

142. Inflation Reduction Act of 2022, Pub. L. No. 117-169, Subtitle D § 23001–23002, 136 Stat. 1818, 2023–26 (2022).

143. *Id.* Subtitle D § 23002, 136 Stat. at 2025–26.

144. Marc Heller, *'Carbon Neutral' Scores Another Victory in Omnibus*, E&E DAILY (Dec. 22, 2022), https://www.eenews.net/articles/carbon-neutral-scores-another-victory-in-omnibus/ [https://perma.cc/TX3V-WQGH].

of renewable energy in electricity sold in retail by utilities.[145] While electricity generated from biomass is uniformly considered to be a form of renewable energy in state RPS programs, the definition of eligible biomass varies by state.[146] In comprehensively assessing each state's definition, one article determined that "nearly every state's RPS definition of eligible woody biomass fails to address GHG emissions from biomass and allows the use of whole trees not grown as energy crops without requiring that facilities demonstrate GHG emissions reductions."[147] To meet the applicable minimum renewable energy percentage, states with RPS programs incentivize burning of wood pellets for electricity through a variety of measures, including tax credits, tax exemptions, and loans.[148] Under the

145. *Renewable Energy Explained*, U.S. ENERGY INFO. ADMIN. (Nov. 30, 2022), https://www.eia.gov/energyexplained/renewable-sources/portfolio-standards.php [https://perma.cc/FM4B-B3L8].

146. Christine E. Zeller-Powell, *Defining Biomass as a Source of Renewable Energy: The Life Cycle Carbon Emissions of Biomass Energy and a Survey and Analysis of Biomass Definitions in States' Renewable Portfolio Standards, Federal Law, and Proposed Legislation*, 26 J. ENV'T L. & LITIG. 367, 401 (2011). The North Carolina RPS defines qualifying biomass as: "including agricultural waste, animal waste, wood waste, spent pulping liquors, combustible residues, combustible liquids, combustible gases, energy crops, or landfill methane" and the North Carolina Utilities Commission has held that this list is merely illustrative, approving the renewable energy label for a fuel mix including both forest residues and whole trees. Suz-Anne Kinney, *Definition of Biomass Clarified in North Carolina,* FOREST2MARKET (Sept. 20, 2010), https://www.forest2market.com/blog/definition-of-biomass-clarified-in-north-carolina [https://perma.cc/V59U-ZXHA]. The Massachusetts RPS biomass definition is: "low emission advanced biomass power conversion technologies using fuels such as wood, by-products or waste from agricultural crops, food or animals, energy crops, biogas, liquid biofuel including but not limited to biodiesel, organic refuse-derived fuel, or algae." MASS. GEN. LAWS ch.25A, §11F (2022). Maryland's is as follows:

> Qualifying biomass (l)(1) "Qualifying biomass" means a nonhazardous, organic material that is available on a renewable or recurring basis, and is: (i) waste material that is segregated from inorganic waste material and is derived from sources including: 1. except for old growth timber, any of the following forest-related resources: A. mill residue, except sawdust and wood shavings; B. precommercial soft wood thinning; C. slash; D. brush; or E. yard waste; 2. a pallet, crate, or dunnage; 3. agricultural and silvicultural sources, including tree crops, vineyard materials, grain, legumes, sugar, and other crop by-products or residues; or 4. gas produced from the anaerobic decomposition of animal waste or poultry waste; or (ii) a plant that is cultivated exclusively for purposes of being used at a Tier 1 renewable source or a Tier 2 renewable source to produce electricity. (2) "Qualifying biomass" includes biomass listed in paragraph (1) of this subsection that is used for co-firing, subject to § 7-704(d) of this subtitle. (3) "Qualifying biomass" does not include: (i) unsegregated solid waste or postconsumer wastepaper; (ii) black liquor, or any product derived from black liquor; or (iii) an invasive exotic plant species.

MD. CODE ANN., PUB. UTIL. § 7-701 (West 2021).

147. Zeller-Powell, *supra* note 146, at 401.

148. U.S. DEP'T OF AGRIC., RENEWABLE ENERGY TRENDS, OPTIONS, AND POTENTIALS FOR AGRICULTURE, FORESTRY, AND RURAL AMERICA 35 (2021).

Regional Greenhouse Gas Initiative (RGGI), which is a voluntary cap-and-trade scheme between eleven states,[149] states do not have to purchase emission allowances for CO_2 emitted by power plants that burn eligible biomass.[150] States also have varying forestry best management practices (BMPs) for harvesting, which only consider protection of water quality.[151]

Some states supplement BMPs with the Forest Guild's model guidelines for biomass harvesting, but the only southeastern states that do so are Kentucky, Maryland, and South Carolina.[152] Moreover, these guidelines are outdated; they take the form of regional reports with the most recent being the Pacific Northwest 2013 publication.[153] In the 2012 Report for the Southeast, the discussion of carbon considerations for biomass harvesting is sparse; the report acknowledges the importance of carbon sequestration and discusses the carbon benefits of harvesting "logging slash" (debris left by logging operations) and trees that are likely to die, over young, healthy trees.[154] Rather than recommending that logging slash be utilized for biomass, however, the report suggests consideration of conflicting goals, like biodiversity and productivity, when determining harvesting practices.[155] These Forest Guild guidelines are both inadequately protective and underutilized.

For the states that have independent biomass harvesting guidelines in addition to, or in place of, the Forest Guild guidelines, they mostly focus on down woody debris and logging residue removal limits.[156] However, the Massachusetts guidelines for biomass harvested explicitly for RPS are much more comprehensive, requiring certain

149. The RGGI participating states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia. *The Regional Greenhouse Gas Initiative*, REG'L GREENHOUSE GAS INITIATIVE, INC. (2023), https://www.rggi.org/rggi-inc/contact [https://perma.cc/3XUH-YVTZ].

150. *Emissions,* REG'L GREENHOUSE GAS INITIATIVE, INC. (2023), *https://www.rggi.org/allowance-tracking/emissions* [https://perma.cc/SPK6-8ZZ2].

151. *Best Management Practices*, NAT'L ASS'N OF STATE FORESTERS, https://www.stateforesters.org/bmps/ [https://perma.cc/BKW2-TFUC] (last visited, Jan. 10, 2023).

152. Other states include Massachusetts, Kentucky, Maryland, Maine, Michigan, Minnesota, Missouri, Pennsylvania, Indiana, South Carolina, and Wisconsin. U.S. DEP'T OF AGRIC., EFFECT OF POLICIES ON PELLET PRODUCTION AND FORESTS IN THE U.S. SOUTH 13 (2014).

153. *See Research and Management Publications*, FOREST STEWARDS GUILD, https://foreststewardsguild.org/research-and-management-publications [https://perma.cc/SPM3-TVGG] (last visited Feb. 21, 2022).

154. FOREST GUILD SOUTHEAST BIOMASS WORKING GRP., FOREST BIOMASS RETENTION AND HARVESTING GUIDELINES FOR THE SOUTHEAST 11 (2012).

155. *Id.* at 13.

156. ABT ET AL., *supra* note 131, at 14.

GHG reductions and efficiency levels in biomass energy production and placing limits based on biomass harvest weight, percentage of residues left after harvests, and limiting harvests to certain categories of wood, excluding steep slopes, old growth, naturally down woody material, and cavity trees.[157] In contrast, the state guidelines of Southern states are insufficient; for the few that provide guidelines outside of BMPs for water quality, they are voluntary and outdated.[158] These guidelines miss an opportunity to require sustainable harvesting practices, which would aid in alleviating the climate impacts of wood pellet production in addition to decreasing the scale of wood pellet operations, putting less strain on surrounding communities.

In sum, state and federal incentives for wood pellets exist both at the harvesting and energy production stages of the life cycle and take a number of forms. Sustainable harvesting requirements are not enforced at the federal level, and at the state level, they vary by state but are consistently inadequate in the U.S. South. Moreover, the CAA fails to comprehensively protect the air quality in communities surrounding wood pellet production plants. When paired with the carbon accounting loopholes and lack of community safeguards in U.K. and EU law, the result is a perfect storm: rapid expansion of wood pellet harvesting and production in the U.S. South without oversight, at the expense of historically marginalized communities.

B. EU and U.K. Law

Consuming approximately 29 million metric tons of wood pellets in 2018, EU wood pellet demand represents roughly 50% of the global market.[159] The driving policy behind increased biomass demand in the EU, and consequently increased production of wood pellets in the United States, is the European Commission's EU Renewable Energy Directive (RED).[160] Originally passed in 2009 and later revised in 2018, 2021, and 2022, RED requires in pertinent part that member

157. *Id.*

158. *See Frequently Asked Questions about Logging in North Carolina*, N.C. FOREST SERV., https://www.ncforestservice.gov/managing_your_forest/logging_faq.htm [https://perma.cc/CBC3-XEV6] (last visited Mar. 27, 2022); Ky. Div. of Forestry, Recommendations for the Harvesting of Woody Biomass (2011); S.C. Forestry Comm'n, South Carolina's Best Management Practices, Forest Biomass Harvesting Recommendations (2012); ABT ET AL., *supra* note 131, at 13–14.

159. This total includes U.K. consumption. BOB FLACH ET AL., BIOFUELS ANN. 6 (2020).

160. ABT ET AL., *supra* note 131, at 1.

states generate a percentage of energy using renewable fuels.[161] Despite the noble goal of achieving EU carbon-neutrality by 2050, scientists and advocates have publicly criticized RED for its treatment of biomass.[162] Specifically, in spite of the formal climate warnings of hundreds of scientists regarding the classification of wood as renewable,[163] the EU's RED II amendment explicitly classified wood as a renewable energy and low carbon biomass fuel source in 2018.[164] In response to the controversial move, the Center for Climate Integrity backed plaintiffs from six countries, Estonia, Ireland, France, Romania, Slovakia, and the United States, in a 2019 lawsuit before the European General Court in Luxembourg.[165] The plaintiffs alleged a violation of their fundamental rights and freedoms under Articles 32 and 57 of the EU Charter on Fundamental Rights, but ultimately failed on the issue of standing without reaching the merits, due to the directive's general rather that individualized application.[166] In January 2021, the Court of Justice rejected the plaintiffs' appeal on the same grounds.[167] While the future of similar litigation is uncertain, it underlines the growing dissatisfaction with the categorization of burning wood pellets as renewable energy.

In spite of this opposition, on September 14, 2022, the European Parliament voted to retain the characterization of forest biomass as renewable in RED III.[168] The categorization of biomass as renewable energy is significant in its responsibility for climbing demand for wood pellets to meet mandated emissions reductions, which in turn

161. *Renewable Energy Directive*, EUR. COMM'N, https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en [https://perma.cc/7728-BEN9] (last visited Feb. 21, 2022).

162. Majile de Pu Kamp, *How Marginalized Communities in the South Are Paying the Price for 'Green Energy' in Europe*, CNN (July 9, 2021), https://www.cnn.com/interactive/2021/07/us/american-south-biomass-energy-invs/ [https://perma.cc/ACW5-FQGY].

163. Letter from John Beddington et al., Professor, Oxford Martin Sch., to Members of the Eur. Parliament (Jan. 9, 2018) (on file with Empower Plants).

164. Caragh McMaster, *The Green Veneer of Renewable Energy in the European Union*, 36 CONN. J. INT'L L. 22, 24 (2020).

165. Press Release, EU Biomass Plaintiffs v. European Union, CLIMATE CHANGE LITIG. DATABASES (Mar. 3, 2019), http://climatecasechart.com/non-us-case/eu-biomass-plaintiffs-v-european-union/ [https://perma.cc/88PM-4FSZ].

166. *Id.*

167. *Id.*

168. Takanobu Aikawa, *European Parliament adopted REDIII: Voting to Maintain the Status of Forest Biomass as Renewable Energy,* RENEWABLE ENERGY INST. (Oct. 7, 2022), https://www.renewable-ei.org/en/activities/column/REupdate/20221007.php [https://perma.cc/2YYC-XX8P].

has led to conversion of coal-fired power plants to biomass plants rather than the more expensive construction of wind and solar installations.[169] The U.K.'s largest power plant, Drax, has converted four of its six generating units from coal to wood pellets and plans to soon run entirely on biomass.[170]

Acknowledging the significance of carbon sequestration in forests, RED II includes sustainability criteria that place limits on deforestation for biomass in certain circumstances, but critics argue that these fall short.[171] The criteria require that the harvesting country have national laws applicable in the area of harvest along with monitoring and enforcement systems ensuring:

> the legality of harvesting operations; forest regeneration of harvested areas; that areas designated by international or national law or by the relevant competent authority for nature protection purposes, including in wetlands and peatlands, are protected; that harvesting is carried out considering maintenance of soil quality and biodiversity with the aim of minimising negative impacts; and that harvesting maintains or improves the long-term production capacity of the forest.[172]

These standards apply extraterritorially, meaning that U.S. wood pellet exports must meet the standards.[173] However, in practice, these standards fall short of protecting forests in the U.S. South given that harvesting operations are legal and "forest regeneration" and "long-term production capacity of the forest" can be satisfied by replacing original forests with fast-growing plantations that have inferior carbon sequestration potential.[174] Additionally, the criteria only apply to biomass burned in new facilities producing 20 MW or more and therefore only apply to "a small fraction of the biomass burned in the EU."[175]

169. Justin Catanoso, *Burning Forests to Make Energy: EU and World Wrestle with Biomass Science*, MONGABAY (Aug. 19, 2021), https://news.mongabay.com/2021/08/burning-forests-to-make-energy-eu-and-world-wrestle-with-biomass-science/ [https://perma.cc/2YYC-XX8P].

170. *How to Switch a Power Station Off Coal*, DRAX (Aug. 22, 2018), https://www.drax.com/sustainable-bioenergy/switch-power-station-off-coal/ [https://perma.cc/A94S-5XC2].

171. Searchinger et al., *supra* note 95, at 2.

172. Renewable Energy Directive II, art. 29 (UK), https://www.legislation.gov.uk/eudr/2018/2001/article/29/data.xht?view=snippet&wrap=true [https://perma.cc/RHM7-58XY].

173. U.S. TRADE REPRESENTATIVE, 2020 NATIONAL TRADE ESTIMATE REPORT ON FOREIGN TRADE BARRIERS 182 (2020).

174. MARY S. BOOTH & BEN MITCHELL, PAPER TIGER: WHY THE EU'S RED II BIOMASS SUSTAINABILITY CRITERIA FAIL FORESTS AND THE CLIMATE 8 (2020) ("The [RED II] LULUCF criteria seek to equate 'sustainability' with carbon neutrality").

175. *Id*. at 10.

The most heavily criticized element of RED sustainability criteria is the gap in carbon accounting. While RED requires greenhouse gas reductions in bioenergy use, carbon emissions are only counted for biomass production (cultivation, harvesting, processing, and transport of biomass feedstocks), and the emissions released when the biomass is burned for energy are not.[176] This faulty method of carbon accounting is not unique to EU policy: The IPCC GHG accounting rules allow countries to omit emissions from combustion of biomass under the assumption that the countries responsible for the deforestation will count the carbon lost in their land use emissions calculations.[177] Not only does this method of carbon accounting pose major problems when a country like the United States has not ratified the applicable treaty, specifically the Kyoto Protocol, but it also operates under the assumption that deforestation is carbon neutral as long as trees are replanted. This is not the case when dealing with an issue as time-sensitive as the global climate crisis: "Large, old trees do not act simply as senescent (aging) carbon reservoirs, but actively fix large amounts of carbon compared to smaller trees; at the extreme, a single big tree can add the same amount of carbon to the forest within a year as is contained in an entire mid-sized tree."[178] The practical result of this policy loophole is that biomass in Europe is incentivized as carbon-neutral, receiving widespread subsidies alongside truly renewable energy sources like wind and solar, effectively erasing the carbon emitted by the thirty million metric tons of pellets burned annually.[179]

On July 21, 2021, the European Commission proposed revisions to RED to follow through with the European Green Deal,[180] which is a "set of proposals to make the EU's climate, energy, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030" with an aim for carbon neutrality by 2050.[181] The European Parliament voted in favor of these amendments (RED III) on September 14, 2022.[182] The revisions include an increase from the

176. Searchinger et al., *supra* note 95, at 3.

177. *See infra* Part III(C)(1).

178. N. L. Stephenson et al., *Rate of Tree Carbon Accumulation Increases Continuously with Tree Size*, 507 NATURE 90 (2014).

179. Catanoso, *supra* note 169.

180. EUR. COMM'N, *supra* note 161.

181. *Id*.

182. Takanobu Aikawa, *European Parliament adopted REDIII*, RENEWABLE ENERGY INST. (Oct. 7, 2022), https://www.renewable-ei.org/en/activities/column/REupdate/20221007.php [https://perma.cc/EQ26-9NYE].

existing objective of reaching 32% renewable energy source consumption in the EU by 2030 with a 14% transport sub-target, to achieving 45% in the same amount of time.[183] While the amendments did not change the renewable energy designation of biomass, the EU Parliament responded to concern about increased biomass production with a requirement that the share from total energy consumption of primary forest biomass remain at levels from 2017 to 2022.[184] In response to increasing pressure, the revisions do include stronger forest biomass sustainability provisions,[185] in addition to provisions that phase out subsidies for primary forest biomass power plants.[186] However, the director of the Partnership for Policy Integrity, Mary S. Booth, has expressed doubts about the potential for these policy changes to make a tangible impact on the industry given the "huge geographical carve outs"[187] as well as excessive exemptions from the definition of "primary woody biomass."[188] Moreover, while harvesting will be limited in primary forests, which are the most biodiverse and ecologically valuable, only 25% of U.S. forestland is primary forest,[189] leaving most forests in the U.S. South vulnerable to deforestation for biomass.[190]

In 2020, renewable energy overtook fossil fuels as the U.K.'s largest source of electricity for the first time, with biomass as the second-largest source of renewable energy at around 12% of the U.K.'s

183. *Commission Presents Renewable Energy Directive Revision,* EUR. COMM'N (July 14, 2021), https://ec.europa.eu/info/news/commission-presents-renewable-energy-directive-revision-2021-jul-14_en [https://perma.cc/8NX7-HKJU].

184. Aikawa, *supra* note 182.

185. *Id.*

186. Paul Messad, *European Parliament Backs 45% Renewable Energy Goal*, EURACTIV (Sept. 14, 2022), https://www.euractiv.com/section/energy-environment/news/european-parliament-to-adopt-a-45-renewable-energy-goal-for-2030/ [https://perma.cc/L9Z6-GQXX].

187. James Bruggers, *The Biomass Industry Expands Across the South, Thanks in Part to UK Subsidies. Critics Say It's Not 'Carbon Neutral,'* INSIDE CLIMATE NEWS (Oct. 17, 2021), https://insideclimatenews.org/news/17102021/biomass-wood-pellet-us-uk-subsidies/ [https://perma.cc/L9Z6-GQXX].

188. *European Parliament Vote Signals the Beginning of the End for Forest Biomass as Renewable Energy*, FOREST DEF. ALL. (Sept. 14, 2022), https://forestdefenders.eu/european-parliament-vote-signals-the-beginning-of-the-end-for-forest-biomass-as-renewable-energy/ [https://perma.cc/6FG5-GHEC].

189. Mila Alvarez, *The State of America's Forests: An Interactive Guide*, STATE OF AM.'S FORESTS, https://usaforests.org [https://perma.cc/A4DL-3G36] (last visited Feb. 27, 2023).

190. For a recent study on primary forest in the United States, *see* Dominick A. DellaSala et al., *Mature and Old-Growth Forests Contribute to Large-Scale Conservation Targets in Conterminous United States*, 5 FRONTIERS FORESTS & GLOB. CHANGE 1 (Sept. 28, 2022).

electricity.[191] This significant reliance on biomass underlines the importance of effective regulation. Although no longer bound by RED due to Brexit, the U.K. has not yet indicated an intention to abandon these obligations.[192] Given the U.K.'s demonstrated commitment to reducing carbon emissions, it is feasible that the country will continue to adhere to the EU requirements. While the U.K. has not transposed RED II into U.K. law, the RED definition of renewable energy as including biomass is applied in the U.K.'s Promotion of the Use of Energy from Renewables Sources Regulations 2011 (SI 2011/243).[193] Viewing biomass as renewable is significant in the context of the Climate Change Act of 2008, which imposed legally binding carbon reduction targets on the U.K. The most recent amendments have put forth a commitment to cut greenhouse gas emissions within the U.K.'s borders by 78% by 2035 (Statutory Instrument 2021/750) and to reduce greenhouse gas emissions by 100% by 2050 (SI 2019/ 1056).[194]

To aid in meeting these goals, the U.K. heavily subsidizes biomass energy. The U.K. utility and wood pellet burning and production company, Drax, received over eight hundred million pounds in subsidies in 2020, and if the current rate continues, will receive ten billion pounds in subsidies between 2012 and 2027.[195] Another significant subsidy scheme is the Energy Act of 2013 Contracts for Difference (CfD) scheme, under which "a generator is paid the difference between a 'strike price' (i.e., a price for electricity that reflects the cost of investing in a certain low carbon technology) and the 'reference price' (which is the average market price for electricity in the U.K. wholesale market) over a 15-year period."[196] There is no indication that this system of incentives will change until the subsidies expire in 2027.[197]

The current legal frameworks for woody biomass function to encourage the use of wood pellets as an energy source with inadequate sustainability requirements and nonexistent protections

191. David Jones, *EU Power Sector in 2020,* EMBER (Jan. 24, 2021), https://ember-climate.org/insights/research/eu-power-sector-2020/ [https://perma.cc/6J6G-UQJR].

192. Andrew Whitehead, *Brexit and the Energy Sector*, 9 RENEWABLE ENERGY L. & SOC'Y 7, 15–16 (2018).

193. OLIVER IRWIN ET AL., INTERNATIONAL COMPARATIVE LEGAL GUIDES RENEWABLE ENERGY 2022, 125 (Mhairi Main Garcia ed., 2d ed. 2022).

194. *Id.*

195. Bruggers, *supra* note 187.

196. LOUISE DALTON & SABRINA POLITO, THE RENEWABLE ENERGY LAW REVIEW: UNITED KINGDOM, L. REVS. (July 26, 2022). 187

197. Bruggers, *supra* note 187.

for communities located near wood pellet production operations. Although the RED III revisions provide a glimmer of hope for sustainable harvesting for wood pellet production supplying EU member energy, it is unclear how effective they will be in deterring unsustainable deforestation practices. With the renewable energy label for biomass codified in U.K. law, it remains to be seen whether the U.K. will continue to adhere to the limited RED sustainability requirements or instead cast aside all forest protections in an effort to meet its GHG reduction commitments. Given the failures across EU and U.K. law surrounding both accounting for wood pellet combustion emissions and safeguarding communities, international law can and should play a role in resolving the wood pellet dilemma.

C. International Law

This Note will now turn to parallel flaws in international environmental law that are perpetuating the wood pellet sacrifice zones in the U.S. South. Given the varying legal frameworks concerning wood pellet production and its use as energy, international law presents an opportunity to bridge the gap and prevent transatlantic problems of this nature. However, the existing treaties fall short in both accurately accounting for the carbon emissions of harvested wood products and in protecting the communities in which wood pellet facilities are located.

1. IPCC Carbon Accounting

The IPCC is the UN body established in 1988 by the UN Environment Program and World Meteorological Organization to assess climate change science to aid policymakers.[198] The IPCC has a Task Force on National Greenhouse Gas Inventories (TFI), which develops carbon accounting methodologies for GHG emissions and removals.[199] The TFI has released a number of methodology reports dating back to as early as 1994.[200] The most recent report, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, is the current methodology, subject to a few updates from the 2019 Refinement.[201] Under the 2006 Guidelines, CO_2 emissions from burning of biomass fuels are not

198. *IPCC Updates Methodology for Greenhouse Gas Inventories*, IPCC (May 13, 2019) https://www.ipcc.ch/2019/05/13/ipcc-2019-refinement/ [https://perma.cc/NYV7-6J65].

199. *Id.*

200. *Id.*

201. *Id.*

included in a country's national total in the energy sector, although they are reported as an information item.[202] CH_4 and N_2O, on the other hand, are estimated and included in the energy sector and national totals because their impact is independent from the forest stock changes estimated in the Agriculture, Forestry, and Other Land Use (AFOLU) sector,[203] which is not the case for net CO_2 emissions or removals.

Chapter twelve of the 2006 AFOLU sector report specifically details guidelines for "harvested wood products," which includes all wood material that leaves harvest sites.[204] Material left at harvest sites is considered to be dead organic matter and is accounted for in the respective land-use category in other chapters.[205] Chapter twelve presents three methodological options for harvested biomass accounting: when the harvested wood product (HWP) contribution value should be zero, when the annual change in HWP carbon in solid waste disposal sites is zero, and when an estimation method is appropriate to compute HWP contribution.[206] The report indicates that the values should be reported as zero when the annual change in stocks or carbon in solid waste disposal sites is "insignificant."[207]

When an estimation method is appropriate, without endorsing any approach for HWP, the report introduces four potential methodologies: the "stock-change approach" (consuming country reports changes in wood carbon stocks in the forest pool and changes in wood-products pool), "production approach" (producing country estimates changes in carbon stocks in forest pool and wood-products pool), "atmospheric flow approach" (consuming country estimates carbon fluxes to/from atmosphere for forest pool and wood products pool within national boundaries), and "simple decay approach" (producing company estimates net emissions or removals of carbon to/from atmosphere when wood products are traded and removals from atmosphere due to forest growth and emissions resulting from harvested wood product oxidation).[208] The first two approaches,

202. Amit Garg et al., *Introduction* to 2 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Simon Eggleston et al. eds., 2006).

203. Dario R. Gomez et al., *Stationary Combustion*, in 2 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Simon Eggleston et al. eds., 2006).

204. IPCC, *supra* note 198.

205. Kim Pingoud et al., *Harvested Wood Products*, in 4 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Simon Eggleston et al. eds., 2006).

206. *Id.*

207. *Id.*

208. *Id.*

stock-change and production, infer net emissions and removals of CO_2 from HWP from stock changes in HWP pools, while atmospheric-flow and simple-decay are based on CO_2 fluxes to and from the atmosphere from HWP.[209] Section 12.5.1 of the 2019 Refinement explicitly considers "treatment of CO_2 emissions from wood biomass burnt and used for energy purposes."[210] It sets forth that CO_2 emissions must be *reported* in the AFOLU sector but may be estimated as either an implicit component of carbon stock changes for land categories, or alternatively as carbon stock changes in the HWP pool.[211]

In addition to those from deforestation and combustion of wood pellets, fugitive emissions and emissions from transport are also addressed in the IPCC 2006 and 2019 reports. Fugitive emissions are defined as the "intentional or unintentional release of greenhouse gases . . . during the extraction, processing, transformation and delivery of fossil fuels to the point of final use."[212] While an official methodology is not provided for estimating wood pellet production fugitive emissions, Appendix 4A.2 for the Fugitive Emissions Chapter of the energy sector indicates that this will likely soon change.[213] It acknowledges that there was insufficient information to assess methodological approaches when the 2019 Refinement was drafted and goes on to provide a basis for future methodological development, citing the wood pellet drying, cooling, pelletizing, hammering, and conveying as fugitive emission sources (CO_2, CO, and CH_4) during manufacturing in addition to emissions during handling, storage, and transport of the materials.[214] Domestic transport in the wood pellet production process is accounted for under the energy sector based on a country's fuel consumption or vehicle kilometers traveled (VKT).[215] Guidelines are provided for international aviation and water-borne navigation, which includes international shipment of wood pellets, to be reported separately from domestic emissions and significantly, excluded from the national total.

209. Sebastian Rüter et al., *Harvested Wood Products*, in 4 2019 REFINEMENT TO THE 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Eduardo Calvo Buendia et al. eds., 2019).

210. *Id.*

211. *Id.*

212. Christian Boettcher et al., *Fugitive Emissions*, in 2 2019 REFINEMENT TO THE 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Eduardo Calvo Buendia et al. eds., 2019).

213. *Id.*

214. *Id.*

215. Christina D. Waldron et al., *Mobile Combustion*, *in* 2 2006 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES (Simon Eggleston et al. eds., 2006).

The IPCC accounting guidelines are incorporated into both the Kyoto Protocol and Paris Agreement, international treaties adopted under the United Nations Framework Convention on Climate Change (UNFCCC).[216] Applying the HWP framework creates a problematic loophole in UNFCCC wood pellet carbon accounting. Under the production approach, the producing country estimates the changes in carbon stocks in the domestic forest pool and wood-products pool, which does not account for combustion by the consuming country or fugitive emissions. The implications of this methodology for accurate carbon accounting are troubling; if the producing party is not a Party to the current UNFCCC treaty, as was the case for the United States, Canada, Japan, and Russia for the second commitment of Kyoto,[217] then wood pellet emissions are entirely excluded from accounting under that treaty.

To remedy the risk that producing countries don't account for emissions in land-use, Article 29(7) now requires the forest biomass country of origin to be a Party to the Paris Agreement and to have submitted an NDC covering changes in carbon stock associated with biomass harvest, or alternatively, to have national laws in place to conserve and enhance carbon stocks in the area of harvest with evidence that reported emissions don't exceed removals.[218] However, the calculation error that is assuming combustion emissions can be accounted for in changes to forest stock remains. Even if the producing country is a Party to the treaty and therefore does account for emissions in the land-use sector, the importing country is nonetheless off the hook for these emissions and can thus take credit for biomass as a means of reducing domestic emissions. Moreover,

216. Article 5 of the Kyoto Protocol indicates that methodologies for estimating anthropogenic emissions by sources and removals of GHGs "shall be those accepted by the Intergovernmental Panel on Climate Change and agreed upon by the Conference of the Parties at its third session." Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 2303 U.N.T.S. 162. Similarly, paragraph 7 of Article 13 of the Paris Agreement indicates that each Party shall provide a national inventory report of anthropogenic emissions prepared using "good practice methodologies accepted by the Intergovernmental Panel on Climate Change and agreed upon by the Conference of the Parties serving as the meeting of the Parties to this agreement." Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104.

217. Chloé Farand, *Nigeria, Jamaica, Bring Closure to the Kyoto Protocol Era, in Last-Minute Dash*, CLIMATE HOME NEWS (Feb. 10, 2022), https://www.climatechangenews.com/2020/10/02/nigeria-jamaica-bring-closure-kyoto-protocol-era-last-minute-dash/ [https://perma.cc/Z4GM-GZ7L].

218. Directive 2018/2001, of the European Parliament and of the Council of 11 December 2018 on the Promotion of the Use of Energy from Renewable Sources PE/48/2018/REV/1, 2018 O. J. (L 328/82) 7.

the assumption that combustion emissions can be captured by changes in the forest pool overlooks the time required for adequate carbon sequestration and the significant differences in emissions and removals based on a number of factors, including local climate, soil, and water availability, but most importantly, type of wood being harvested and type of tree being replanted.[219]

2. UNFCCC: Kyoto and Paris

Established in 1992, the UNFCCC is the parent treaty of both the 1997 Kyoto Protocol and 2015 Paris Agreement.[220] The Kyoto Protocol entered into force in 2005 with 192 Parties and operationalized the UNFCCC with binding GHG emission commitments for developed countries.[221] Although Kyoto is technically still in force, it has been largely superseded by the current legally binding international climate change treaty, the Paris Agreement, which was adopted by 196 Parties and entered into force in November 2016.[222] The objective of the Paris Agreement is to limit global warming to below 2 or 1.5 degrees Celsius and the means of achieving this objective turn on reporting and planning requirements for both climate change mitigation and adaptation along with financial, technical and capacity building support for developing countries.[223] As it currently stands, the Paris Agreement incentivizes the use of wood pellets for energy by treating them as carbon neutral and allowing Parties to correspondingly take credit for emissions reductions. Despite the promising mention of human rights and EJ values in the Paris Preamble,[224] explicit mention of human rights, local communities, and environmental and climate justice is otherwise

219. Searchinger et al., *supra* note 95, at 3.

220. *About the Secretariat*, U.N. CLIMATE CHANGE, https://unfccc.int/about-us/about-the-secretariat [https://perma.cc/8YTT-RLHT] (last visited Feb. 26, 2023).

221. *What is the Kyoto Protocol?*, U.N. CLIMATE CHANGE, https://unfccc.int/kyoto_protocol [https://perma.cc/6A8B-PC86] (last visited Feb, 26, 2023).

222. *The Paris Agreement*, U.N. CLIMATE CHANGE, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement [https://perma.cc/SL6C-6ZX3] (last visited Feb. 26, 2023).

223. *Id.*

224. "*Acknowledging* that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity." Paris Agreement to the United Nations Framework Convention on Climate Change, Dec 12, 2015, T.I.A.S. No. 16-1104.

absent, leaving the communities home to wood pellet operations vulnerable to abuse.

a. Paris Agreement: Sustainable Development Mechanism

The mechanism that most directly implicates the rights of local communities is the Paris Sustainable Development Mechanism (SDM), which is an updated iteration of the Kyoto Clean Development Mechanism (CDM). A holistic view of the wood pellet problem in the U.S. South reveals concerning parallels to a 2005 Kyoto Protocol effort to incentivize sustainable development in developing countries (non-Annex I countries) by allowing developed countries (Annex I countries) to invest in renewable energy projects and receive carbon emission offset credits (Certified Emissions Reductions) in return. This CDM faced widespread criticism for EJ issues in project host countries.[225] Problematic CDM projects included the development of monocultural palm oil plantations in which foreign corporations contracted with the government regardless of the desires and the customary rights of land ownership of locals.[226] Sometimes referred to as "sacrifice zones," communities and local environmental values were relegated at the expense of climate mitigation for the "greater good."[227] The Paris Agreement Article 6.4 Sustainable Development Mechanism (SDM) replaced the CDM after parties came to a final deal on November 13, 2021, during COP26 negotiations in Glasgow, outlining a similar carbon credit trading system without distinctions based on Annex category in an effort to avoid some of these EJ issues.[228]

The EU and U.K. are not funding wood pellet production projects in the United States as would be the case under these UN mechanisms, but they have created a market that is perpetuating analogous problems; low-income communities made up of a majority of people of color are suffering at the hands of purportedly renewable energy credits being cashed across the Atlantic. These communities in the

225. Dayna N. Scott & Adrian A. Smith, *"Sacrifice Zones" in the Green Energy Economy: Toward an Environmental Justice Framework,* 62 MCGILL L.J. 861, 898 (2017).

226. Dayna N. Scott & Adrian A. Smith, *Sacrifice Zones in the Green Energy Economy: The "New" Climate Refugees*, 26 TRANSNAT'L L. & CONTEMP. PROBS. 371, 373–74 (2017).

227. *Id.*

228. Frank Watson, *COP26: Nations Strike Deal on International Cardon Markets at Glasgow Summit*, S&P GLOBAL (Nov. 14, 2021), https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/111421-cop26-nations-strike-deal-on-international-carbon-markets-at-glasgow-summit [https://perma.cc/UAX6-SMJY].

U.S. South have effectively become the new green energy sacrifice zones. International law is falling short in both offering communities a voice as to whether wood pellet production plants should move in[229] and in protecting local air and water from wood pellet production pollution. While U.S. wood pellet production is outside the current scope of the SDM, it is relevant to the central mechanism of the Paris Agreement: National Determined Contributions (NDCs).

b. Paris Agreement: National Determined Contributions (NDCs)

Article 4 of the Paris Agreement presents the primary mechanism through which countries create and honor commitments pursuant to the treaty, nationally determined contributions (NDCs): "Each Party *shall* prepare, communicate and maintain successive nationally determined contributions that it *intends* to achieve. Parties *shall* pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions."[230] NDCs differ from the binding emissions targets of the Kyoto Protocol in that the only binding obligations are procedural in nature. In an effort to foster global participation, the Paris Agreement does not obligate a Party to achieve its proposed emissions reductions, instead merely requiring preparation and communication of the NDC along with the pursuit of domestic mitigation measures.[231] Guidance as to how countries should develop and communicate NDCs can be found in the Katowice Climate Package adopted at COP 24 in 2018, colloquially referred to as the Paris Rulebook.[232] Despite providing comprehensive requirements for NDC plans and implementation, the local impacts of energy projects are not considered.

Under the existing Paris Agreement framework, there are no protections for communities on the front lines of energy production projects, especially if these projects are not captured by the prescribed Article 6 voluntary cooperation in implementation of NDCs between countries. This gap in EJ protections coupled with the

229. Biomass Magazine estimates 1.7 million tons of wood pellet capacity production are proposed or under construction in North America. Anna Simet, *Building Out Capacity*, BIOMASS MAG. (Aug. 25, 2022), https://biomassmagazine.com/articles/19243/building-out-capacity [https://perma.cc/63EF-FC73].

230. Paris Agreement to the United Nations Framework Convention on Climate Change, Dec 12, 2015, T.I.A.S. No. 16-1104 (emphasis added).

231. *See infra* Part IV(B).

232. *Navigating the Paris Agreement Rulebook*, WORLD RES. INST., https://www.wri.org/paris-rulebook [https://perma.cc/G55T-FDPR] (last visited Feb. 27, 2023).

carbon accounting loophole have led to unacceptable circumstances on the ground in disadvantaged communities in the U.S. South.

IV. SOLUTIONS IN INTERNATIONAL ENVIRONMENTAL LAW

As it stands, international and domestic law consistently incentivize production of wood pellets, classified as renewable energy, with some limited sustainable harvest requirements and little to no consideration of affected communities. More specifically, operating under the assumption that the United States is adequately accounting for wood harvest in its land use sector and protecting its communities from unsafe pollution levels, the EU and the U.K. can take credit for combustion of wood pellets for domestic emission reduction goals along with Paris NDC goals. However, the United States is not holding up its side of the bargain with regard to EJ concerns, and despite ratifying the Paris Agreement, the future of U.S. participation in UNFCCC treaties is not guaranteed. It is critical that IPCC carbon accounting and the corresponding EU and U.K. legal treatment of wood pellets as carbon-neutral be modified to prevent all loopholes and that a framework of EJ safeguards be introduced to the Paris Agreement and future UNFCCC treaties for energy feedstock-producing countries.

A. Correcting Carbon Accounting and Removing Status as Renewable Energy

Stripping wood pellet biomass of its renewable energy status is not a novel concept—calls for this change are becoming increasingly common,[233] and on December 15, 2022, Australia made history by reversing its characterization of woody biomass derived from native forests as renewable.[234] This is a straightforward solution that could be implemented in the EU's RED and U.K.'s Promotion of the Use of Energy from Renewables Sources Regulations. In the United States, while a federal renewable energy standard is politically unlikely, states should be encouraged to adopt stringent definitions of renewable biomass, modeling after Massachusetts.

233. Jean-Pascal van Ypersele, *It's Time to End Subsidies for Burning Wood from Forests*, CLIMATE HOME NEWS (Nov. 2, 2021), https://www.climatechangenews.com/2021/02/11/time-end-subsidies-burning-wood-forests/ [https://perma.cc/8NCB-Y6YS].

234. Justin Catanoso, *Australia Rejects Forest Biomass in First Blow to Wood Pellet Industry*, MONGABAY (Dec. 21, 2022), https://news.mongabay.com/2022/12/australia-rejects-forest-biomass-in-first-blow-to-wood-pellet-industry/ [https://perma.cc/5RDA-TST3].

However, the IPCC GHG accounting guidelines have never labeled biomass as inherently renewable. Thus, closing the accounting loophole for the purposes of future UNFCCC international environmental treaties poses a more complicated problem. Solving the discrepancy between emissions estimates based on land-use stocks and emissions estimates based on combustion would involve shifting the HWP biomass accounting framework from the AFOLU Sector to the Energy Sector. In order to accurately calculate whether replanting trees accounts for combustion emissions in addition to lost removal capacity due to harvesting, standards would have to vary based on the category of the original forest (i.e., old growth, monoculture plantation, etc.) and its corresponding carbon sequestration capacity, the type of forest being used as a replacement, and how long it will take to sequester the same amount of carbon as was lost during harvesting.

An alternative option that is more extreme, yet appropriate to the urgency of the climate crisis, would be no longer treating replanting of trees as a viable carbon removal in response to immediate combustion emissions. In other words, the emissions from harvesting a tree, fugitive emissions of wood pellet production, and the emissions from combustion of wood pellets would all be accounted for in the energy sector. This would also in effect eliminate the renewable label except for fast-decaying wood wastes and residues that would otherwise go unused.

B. Paris Rulebook: NDCs and Reporting Requirements

The Paris rulebook outlines NDC planning requirements along with reporting requirements that reach beyond the NDC provisions. Both areas present the opportunity to introduce procedural EJ safeguards that can be modeled after existing UNFCCC EJ safeguard frameworks. The goal of these safeguards would be to incentivize companies to allow meaningful participation of local communities in wood pellet plant siting decisions, to prevent unsustainable harvesting practices, and to ensure compliance with laws aimed at preventing pollution. In the event of nonobservance, Parties like the EU and U.K. would be forced to turn to other sources of renewable energy, such as domestic solar and wind.

1. Planning-Oriented Instruments

The Paris Agreement Rulebook sets forth mandatory information to be incorporated into NDCs, including quantifiable information on the reference point, implementation time frames, scope and coverage (i.e., included sectors/gases, co-mitigation benefits, how parties have considered paragraph 31(c) and (d) of decision 1/CP.21),[235] planning processes (preparation and implementation), assumptions and methodological approaches including GHG accounting, Party's consideration of the fairness and ambition of its NDC contemplating its national circumstances, and how the NDC contributes to achieving the objectives of the Paris Agreement (Article 2).[236] While the Paris Rulebook details the appropriate accounting mechanism to be used in NDCs,[237] EJ concerns are entirely omitted. The closest reference to EJ can be found in the guidance concerning the NDC planning process:

> (a) Information on the planning processes that the Party undertook to prepare its nationally determined contribution and, *if available*, on the Party's implementation plans, including, *as appropriate*:
>
> (i) Domestic institutional arrangements, public participation and *engagement with local communities and indigenous peoples, in a gender-responsive manner;*
>
> (ii) *Contextual matters*, including, inter alia, as appropriate:
>
> a. *National circumstances*, such as geography, climate, economy, sustainable development and poverty eradication;
>
> b. Best practices and experience related to the preparation of the nationally determined contribution;
>
> c. Other contextual aspirations and priorities acknowledged when joining the Paris Agreement;[238]

235. Paragraph 31 reads as follows:

> *Requests* the Ad Hoc Working Group on the Paris Agreement to elaborate, drawing from approaches established under the Convention and its related legal instruments as appropriate, guidance for accounting for Parties' nationally determined contributions, as referred to in Article 4, paragraph 13, of the Agreement, for consideration and adoption by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement at its first session, which ensures that. . . (c) Parties strive to include all categories of anthropogenic emissions or removals in their nationally determined contributions and, once a source, sink or activity is included, continue to include it; (d) Parties shall provide an explanation of why any categories of anthropogenic emissions or removals are excluded;

U.N. Framework Convention on Climate Change, Decision 1/CP.21, Adoption of the Paris Agreement, U.N. Doc. FCCC/CP/2015/10/Add.1 at ¶ 31 (Jan. 29, 2016).

236. *Navigating the Paris Agreement Rulebook: NDC Mitigation: Deeper Dive*, WORLD RES. INST., https://www.wri.org/paris-rulebook/paris-rulebook-mitigation-deeper-dive [https://perma.cc/QZG4-B9RR] (last visited Feb. 27, 2023).

237. *Id.*

238. *Id.* (emphasis added).

In addition to being the only NDC guidance that mentions impacts on local communities yet still lacking any real EJ safeguards, these guidelines are inadequate for a number of reasons: the softening phrases "if available" and "as appropriate" allow Parties to simply ignore the subsequent guidance, "engagement" and "contextual matters" are vague terms that require further explication, and this section appears to only contemplate domestic communities, excluding application to energy sourced from abroad.

In requiring that certain information be included in the NDCs, the Paris Rulebook missed an opportunity to require a community impact assessment of each strategy contemplated to meet NDC goals. This EJ safeguard could have comfortably rested under the scope and coverage or planning processes umbrellas, or alternatively could have been its own required category of information. Procedural requirements of this nature may not seem immediately impactful, but the increasing success of EJ National Environmental Policy Act (NEPA) claims tells another story.[239] In the same way that the impact of NEPA suits often turns on accountability to the public, which is created by mandatory and publicized consideration of a project's impacts on local communities, climate, etc., a community-impact NDC requirement would force Parties to acknowledge the sources of their ostensibly clean energy. The EU and U.K. specifically have a reputation to uphold as they are traditionally leaders in the international environmental arena, so a procedural mechanism of this nature may well deter reliance on wood pellets sourced from destructive plants in the U.S.

2. Reporting-Oriented Instruments

Another missed opportunity to include EJ safeguards in the Paris Agreement lies in the reporting-oriented instruments (as opposed to the planning-oriented instruments like the NDC guidelines). In recognition that the impact of the Paris Agreement relies on the communication of accurate information, reporting requirements can be found in the Article 13 Enhanced Transparency Framework. The Paris Agreement Rulebook provides the applicable modalities, procedures, and guidelines, differentiating between both UNFCCC Annex I and non-Annex I Party obligations and Parties and non-

239. *See generally* NINA M. HART & LINDA TSANG, ADDRESSING ENVIRONMENTAL JUSTICE THROUGH NEPA (2021).

Parties to the Paris Agreement.[240] As Annex I Parties to Paris, the reporting obligations of the U.S., the U.K., and the EU include an Annual GHG Inventory, a Biennial Transparency Report, and a National Communication.[241]

The sufficiency of these outputs is in turn evaluated by the mechanisms established under Article 13.11: a technical expert review process and a facilitative, multilateral consideration of progress.[242] Parties must report five pieces of information via the Biennial Transparency Report, including the Article 4 information necessary to tracking the implementation and achievement of NDCs discussed above, a national inventory report of GHG emissions and removals, Article 7 adaptation communications concerning the impacts of climate change and adaptation measures, information on support (financial, technology-transfer, and capacity-building) provided to developing countries, and information on the same support that is needed and received by developing countries.[243]

The Biennial Transparency Report Paris Rulebook implementation guidelines present a second ideal location for an EJ safeguard. This safeguard could take many forms, ranging from inclusion in the Article 4 information previously discussed, to requiring EJ "communications" as is done for Article 7 adaptation purposes, which could entail a report on the anticipated and actual local-impacts of actions taken to achieve the Paris objectives, including both mitigation and adaptation. Again, these safeguards would put forth procedural rather than substantive requirements, but increased transparency surrounding the localized impacts of wood pellet production on communities in exporting countries would assist in importing Party decision-making and citizen participation by highlighting potential failures.

3. Existing EJ Safeguard Models

There are two existing UNFCCC safeguard systems that can serve as a model for the proposed EJ safeguard amendment to the Paris Rulebook, both of which incorporate monitoring and reporting requirements that mirror the NDC guidance outlined in the Paris Rulebook. The first, "the Cancun Safeguards," were adopted by the

240. WORLD RES. INST., *supra* note 236.

241. *Id.*

242. Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104

243. WORLD RES. INST., *supra* note 236.

UNFCCC COP in 2010 as part of the REDD+ mechanism that incentivizes conservation and sustainable forest management by monetizing the carbon sequestered by forests in developing countries.[244] REDD+ was established under Article 2 of the Kyoto Protocol and is now codified in Article 5 of the Paris Agreement. Relevant language in the Cancun Safeguards includes: "Respect for the knowledge and rights of indigenous peoples and *members of local communities*, by taking into account relevant international obligations, national circumstances and laws [. . .] The full and effective participation of relevant stakeholders, in particular indigenous peoples and *local communities,"* and "taking into account the need for *sustainable livelihoods of indigenous peoples and local communities and their interdependence on forests* in most countries."[245]

In order to be eligible for results-based payments for carbon sequestration under REDD+, summary information disclosing how the safeguards are being addressed and respected is required from developing countries according to the 2013 Warsaw COP19.[246] Moreover, after Decision 12/CP.19, paragraph 3, Parties must include a summary of information on how the Cancun Safeguards are being addressed in national communications or otherwise communicate the summaries in approved communication channels,[247] including the UNFCCC REDD+ web platform.[248] Parties are therefore financially incentivized to adhere to the Cancun Safeguards.

The second form of EJ safeguard under the UNFCCC is the Environment and Social Policy of the Green Climate Fund (GCF). Originally established under the 2010 Cancun Agreements, the GCF serves as the Financial Mechanism of the UNFCCC and Paris

244. *REDD+ Safeguards*, REDD+ SOC. & ENV'T STANDARDS, https://www.redd-standards.org/index.php?option=com_content&view=article&id=112&Itemid=104 [https://perma.cc/6ATT-MBSW] (last visited Feb. 27, 2023).

245. U.N. Framework Convention on Climate Change, *The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention*, U.N. Doc. FCCC/CP/2010/7/Add.1, app. 1 ¶ 2(c), 2(e) n.1, (Mar. 25, 2011).

246. *Safeguards*, REDD+ WEB PLATFORM, https://redd.unfccc.int/fact-sheets/safeguards.html [https://perma.cc/MM7U-7D7H] (last visited Feb. 27, 2023).

247. U.N. Framework Convention on Climate Change, *Guidance on Systems for Providing Information on How Safeguards Are Addressed and Respected and Modalities Relating to Forest Reference Emission Levels and Forest Reference Levels as Referred to in Decision 12/CP.19*, December 9, 2011, FCCC/CP/2013/10/Add.1 (Dec. 9, 2011).

248. *Id.*

Agreement.[249] The GCF aids developing countries in meeting NDC ambitions through mandating financial contributions to support developing countries and operating a network of "Accredited Entities" that work directly with countries on project design and implementation.[250] This policy requires that all GCF-supported activities, including REDD+ initiatives, commit to:

> a) Avoid, and where avoidance is impossible, *mitigate adverse impacts to people* and the environment . . .
>
> d) Give due consideration to *vulnerable and marginalised [sic] populations*, groups, and individuals, *local communities*, indigenous peoples, and other marginalized groups of people and individuals that are affected or potentially affected by GCF-financed activities.[251]

The policy sets forth a number of mechanisms to ensure adherence to these objectives, including monitoring, reporting, and disclosure requirements that parallel many of the NDC requirements discussed prior. The GCF has also established an independent Redress Mechanism that facilitates complaints and feedback from communities affected by the projects of accredited entities. Enforcement options vary depending on the legal agreement between the GCF and a specific accredited entity:

> Where the accredited entities fail to comply with the safeguard requirements, GCF will work with the accredited entities to develop and implement timebound corrective actions that will bring the activities back into compliance. GCF will also work with the accredited entities and the affected people to develop and implement measures to remedy the harms that occurred. Where the accredited entities fail to re-establish compliance within the applicable time frame and manner, GCF may exercise its remedies under its legal agreement with the accredited entities.[252]

The REDD+ Cancun Safeguards and UNFCCC GCF demonstrate the feasibility of implementing an EJ safeguard through planning and reporting requirements, although the GCF safeguards have more substantive teeth. While these frameworks have arguably stronger compliance incentives in that funding is withheld in the event of violation, barring reported emissions reductions in a Party's NDC when specified EJ requirements are not met could similarly induce compliance in the place of a monetary incentive.

249. *About GCF: Timeline*, GREEN CLIMATE FUND, https://www.greenclimate.fund/about/timeline [https://perma.cc/Z4GE-WCAX] (last visited Feb. 23, 2022).

250. *Id.*

251. Green Climate Fund, Revised Environmental and Social Policy 3–4 (2021).

252. *Id.* at 10.

Potential drawbacks to safeguards of this nature include confusion surrounding implementation of the vague yet ambitious objectives. It is not readily apparent what "Giv[ing] *due consideration* to vulnerable and marginalised populations, groups, and individuals, local communities . . ." and "the *full and effective participation* of relevant stakeholders, in particular indigenous peoples and local communities" mean in practice. In application to communities in the U.S. South specifically, discrepancies may arise in identifying the "local community" if community members do not in fact align in opinion with local or state officials. In developing the safeguard, it may be beneficial to include more specific targets, like offering a public hearing in the local community as an opportunity to hear concerns. On the other hand, increased comprehensiveness of the requirements would likely come at the expense of willingness to comply due to cost and efficiency considerations for Parties. Flexibility in modes of compliance would both provide for plans specifically tailored to varying circumstances of different Parties, which would ultimately be more impactful, in addition to avoiding deterrence of compliance with overly burdensome restrictions. Thus, it is advisable to err on the side of flexibility, which is ultimately the reason for the Paris Agreement's triumph of participation.

Obtaining the information necessary to meet these requirements would require cooperation from the U.S. government and wood pellet companies, which could present further complications that relate to issues of enforcement. However, if other countries follow the lead of the Netherlands in voting to require heightened sustainability certification standards surrounding imported wood pellet production, wood pellet companies will be incentivized to cooperate. As discussed above, the Paris Agreement provides a body to monitor compliance with the agreement: a technical expert review team established by the Secretariat. There is also a twelve-member Compliance Committee established pursuant to Article 15, which creates "a mechanism to facilitate implementation of and promote compliance with the provisions of this Agreement."[253] It was later established that the Committee may initiate consideration of issues if a Party does not communicate or maintain an NDC, fails to submit a biennial transparency report and information required under Article

253. Paris Agreement to the United Nations Framework Convention on Climate Change art. 15 ¶ 1, Dec. 12, 2015, T.I.A.S. No. 16-1104.

13, or does not participate in the facilitative, multilateral consideration of progress.[254]

These shortcomings all pertain to omission of reporting requirements entirely, but in the event of "significant and persistent inconsistencies of the information submitted . . . with the modalities, procedures, and guidelines" based on the technical expert review reports, the Committee may consider issues with the consent of the Party.[255] For an EJ safeguard to be effective, the Compliance Committee must have more power than the mere ability to consider issues and provide recommendations to Parties. This Note proposes that the Committee should have the authority to disqualify NDC emissions reductions that are sourced from an energy project for which EJ safeguard reporting requirements were omitted entirely or inadequate in some capacity. This would be an expansion of the Committee's power but the requirements would all remain procedural.

In sum, an EJ safeguard entailing required communication with local communities and consideration of adverse impacts, particularly those that pertain to public health, and corresponding reporting of these communications and considerations, should be introduced to the Paris Rulebook. This should be introduced via the NDC planning requirements, or alternatively, the overarching reporting requirements. These safeguards would not dictate how a Party would ensure respect for the rights of community members but would be consistent with the Paris Agreement's framework of procedural rather than substantive obligations by only requiring that the Party report how it is working to meet the objectives. To more effectively facilitate enforcement, the stakes must be made higher than what they currently are for inadequate planning and reporting. To do so, the Compliance Committee should take on the authority to assess the sources of emissions reductions in a Party's NDCs and ensure that the Party discounts reductions that can be linked to inadequate reporting. This would mean that the EU and U.K. would have to include an assessment of the impacts on local communities of their wood pellet sources in order to take credit for wood pellet-related emissions reductions.

254. *Navigating the Paris Agreement Rulebook: Compliance: Deeper Dive,* WORLD RES. INST., https://www.wri.org/paris-rulebook/paris-rulebook-compliance-deeper-dive [https://perma.cc/WTW9-E5SQ] (last visited Mar. 23, 2022).

255. *Id.*

V. CONCLUSION

As the questionable climate impacts of wood pellets continue to be spotlighted by concerned scientists, advocates, and politicians, it is the hope that reliance on woody biomass energy will decrease in the coming years. This necessary transition will depend upon the successful amendment of existing laws to exclude wood pellets from the renewable energy designation and the correction of carbon accounting for harvested wood products utilized by the IPCC. However, a new industry will inevitably take its place. The vulnerability of local communities to powerful economic interests is a pervasive and global problem that requires an international solution—particularly when international treaties are designed to incentivize specific sectors, and in turn, the corresponding industries necessary for a given sector to function. An enduring accountability mechanism is necessary to protect local communities from becoming the sacrifice zones for allegedly green energy projects that are driven by Parties' worthy aspirations to meet NDC goals and slow the warming of the planet. Inserting an EJ safeguard into the NDC planning and/or reporting requirements of the Paris Rulebook is a relatively straightforward means of requiring countries to at the least consider the impacts of their energy consumption on vulnerable populations and draw attention to potential EJ implications. More optimistically, this safeguard could thwart elaborate greenwashing efforts around the world and facilitate an equitable global transition from polluting energy sources to those that are authentically carbon-free.