

Biomass: The Heavy Toll of Burning Trees for Energy

- 1 What is biomass and why is it harmful?
- 2 Why doesn't biomass work as a climate solution?
- 3 How does biomass perpetuate environmental inequities?
- 4 What clean energy and policy solutions avoid reliance on biomass?
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“Trees are more valuable alive than dead both for climate and for biodiversity.”

That's what a group of renowned scientists and economists stated in a February 2021 letter to President Biden and other world leaders.¹ Yet, throughout the United States, trees are being cut down, chopped up, and compressed into wood pellets that are then burned to produce electricity. Policymakers like to call it a “climate solution,” but in reality, this practice of producing biomass energy does more harm than good for our communities, our health, the environment, and the climate.

Key Facts

- **Processing biomass harms nearby communities.** Woody biomass is often processed into wood pellets or biodiesel. These production processes release significant amounts of air and water pollution, produce alarming levels of noise throughout the night, and pose many other risks, including dangerous fires and explosions.² It's no surprise that people who live near wood pellet plants—predominantly Black communities in the Southeastern United States—experience disproportionately poorer health and quality of life.³
- **Biomass is expensive.** Using biomass to fuel electricity production or transportation is more expensive than other less-polluting alternatives, including solar, geothermal, and wind energy.⁴
- **Burning biomass is dirtier than coal.** Burning biomass for energy releases harmful air pollution that already surpasses the impacts of coal in many places. Even the cleanest biomass plants can generate more health-damaging air pollutants per unit of energy produced than coal.⁵
- **Biomass does not help address climate change, but actually makes it worse.** Biomass production and use often generate more greenhouse gas emissions than the fossil fuels they are intended to replace.⁶ Carbon is released by logging, processing the logs into pellets, and then transporting them overseas. In addition, logging trees for electricity destroys valuable carbon sinks—natural areas that absorb more carbon than they release, such as forests and bodies of water.
- **Billions in subsidies and incentives are needed to sustain the biomass industry.** In Europe and the United States, renewable mandates that include biomass direct billions of dollars in subsidies to the industry each year. Without these massive subsidies, the biomass industry simply could not compete with wind and solar.⁷
- **We don't need to burn trees for electricity when we have proven climate solutions.** Decision makers should redirect incentives for biomass into proven solutions, such as zero-emission, renewable energy; more sustainable practices in wood waste management; and reforestation.

1 <https://www.documentcloud.org/documents/20482842-scientist-leter-to-biden-van-der-leyden-michel-suga-moon-february-11-2021>

2 <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

3 <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>

4 https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

5 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 5, <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

6 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 5, <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

7 <https://www.nrdc.org/sites/default/files/dominion-investments-biomass-electricity-ib.pdf>

1 What is biomass and why is it harmful?

Biomass is organic material that comes from plants and animals, which contain chemical energy from the sun. Plants produce biomass through photosynthesis, and this biomass can be burned directly to produce heat or electricity, or it can be converted into fuel through various processes.⁸

Biomass that is used to produce heat, electricity, or fuel comes from the following four sources:

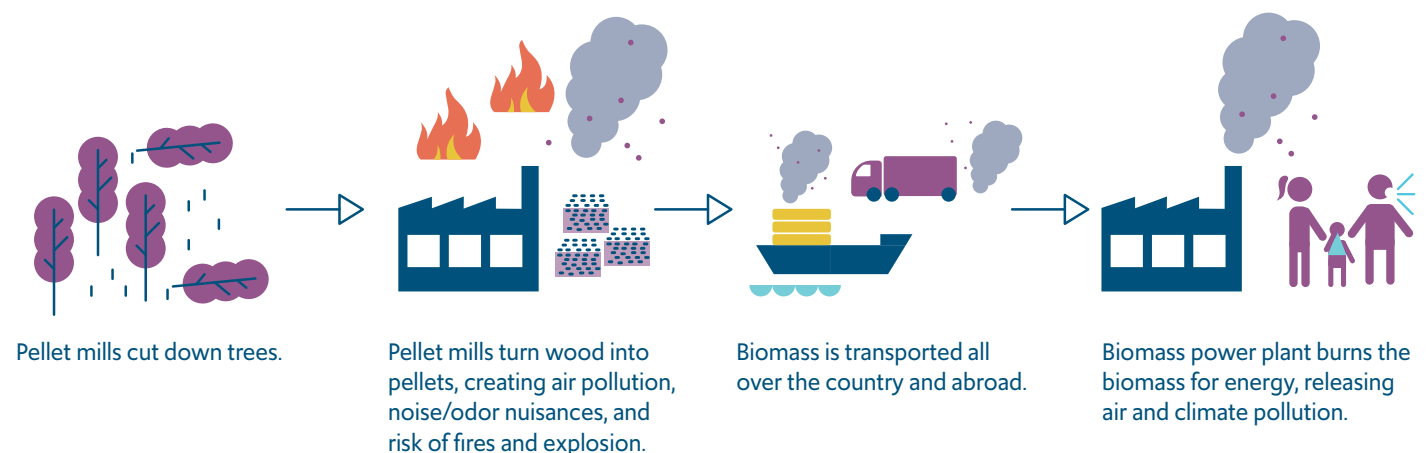
- **Wood and wood waste**, including firewood, wood pellets, and wood chips generally burned for heat or electricity;
- **Agricultural crops**, including corn, sugar cane, woody plants, and algae generally converted into biofuel;
- **Organic materials in municipal solid waste** generally burned to produce electricity or heat; and
- **Manure and human sewage**, generally used to produce biogas.⁹

This briefing paper will focus on woody biomass. **Box 1** covers bioenergy from agricultural crops, known as bio-diesel, which has a related but different set of issues. Other Equity Fund briefing papers discuss biogas and municipal solid waste.¹⁰

Production

Wood used for biomass energy is often processed and transported before it is burned (see **Figure 1**). To turn wood into pellets, woody biomass is ground up and then placed under high pressure to fuse together.¹¹ The pellets may also need chemical additives to bind the processed wood.

Figure 1. How Trees Are Made Into Biomass Energy



⁸ <https://www.eia.gov/energyexplained/biomass/#:~:text=Biomass%20is%20renewable%20organic%20material,and%20heating%20in%20developing%20countries>

⁹ <https://www.eia.gov/energyexplained/biomass/#:~:text=Biomass%20is%20renewable%20organic%20material,and%20heating%20in%20developing%20countries>

¹⁰ The Equity Fund's policy briefs on biogas and municipal solid waste are online at <https://www.theequityfund.org/energy-transition-concerns>

¹¹ <https://extension.psu.edu/manufacturing-fuel-pellets-from-biomass>

Pellet production is energy intensive and expensive¹² and can lead to increased risks and harms to local communities, including:

- **Air Pollution:** Wood pellet manufacturing produces high levels of air pollution, from soot and smog to airborne asbestos and volatile organic compounds, all of which can lead to health and environmental problems.¹³ Communities near wood pellet manufacturing sites also endure high levels of particulate matter in the form of wood dust. Year-round exposure to particulate matter pollution has been linked to asthma and reduced lung function in children, as well as increased risk of cancer, heart attacks, strokes, and death from cardiovascular disease.¹⁴
- **Violations of Permits and Control Requirements:** A 2018 study from the Environmental Integrity Project (EIP) found that more than one half of wood pellet manufacturing facilities either failed to keep emissions below the legal limit or failed to install required pollution controls.¹⁵
- **Dangerous Fires and Explosions:** Wood pellet manufacturing has a troubling history of dangerous fires and explosions. The same EIP study found that at least eight of the 15 largest operating facilities have had fires or explosions in recent years.¹⁶ These fires and explosions have injured employees and/or released dangerous levels of pollution. For example, a fire in Port Arthur, Texas, burned for two months and forced many community members to seek medical attention.¹⁷

As of 2021, there were more than 100 wood pellet plants in the United States, mostly concentrated in the Southeast and disproportionately sited in low-income communities of color (see Figure 2).¹⁸

Usage

Biomass is used in two primary ways: it can be burned in a facility to create heat or electricity, or it can be converted into a liquid and burned as fuel in an engine (see **Table 1**). Both of these methods have negative environmental impacts:

- **High Levels of Harmful Air Pollution:** Biomass combustion produces enormous amounts of harmful air pollutants. Even the cleanest biomass plants produce more nitrogen oxides, volatile organic compounds, particulate matter, and carbon monoxide than coal plants, per unit of energy produced.¹⁹ In fact, biomass plant pollution can exceed that of natural gas plants by more than 800 percent for every major pollutant.²⁰ Biomass combustion can also emit hazardous air pollutants, including dioxins, lead, arsenic, and mercury, which are dangerous to human health.²¹ A [recent analysis](#) found that the health impacts from biomass and wood combustion are higher than the impacts from either coal or gas.²²
- **Inefficient and Expensive:** Biomass combustion is less efficient than other types of energy resources because biomass fuel must first burn off water in order to produce useful energy. Not only is biomass less efficient, it is also more expensive than other clean resources, in part because of the high cost of cutting down and processing trees.²³
- **Greenhouse Gas Emissions:** Biomass combustion also generates significant amounts of greenhouse gas because it releases the carbon that was previously stored within the organic materials (discussed further in **Section 2**).

12 <https://extension.psu.edu/manufacturing-fuel-pellets-from-biomass>

13 <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

14 <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>

15 <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

16 <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

17 <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

18 <https://biomassmagazine.com/plants/listplants/pellet/US/page:1/sort:plant/direction:asc>; <https://www.liebertpub.com/doi/full/10.1089/env.2017.0025>

19 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 5. <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

20 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 5. <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

21 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 6. <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

22 <https://iopscience.iop.org/article/10.1088/1748-9326/abe74c>

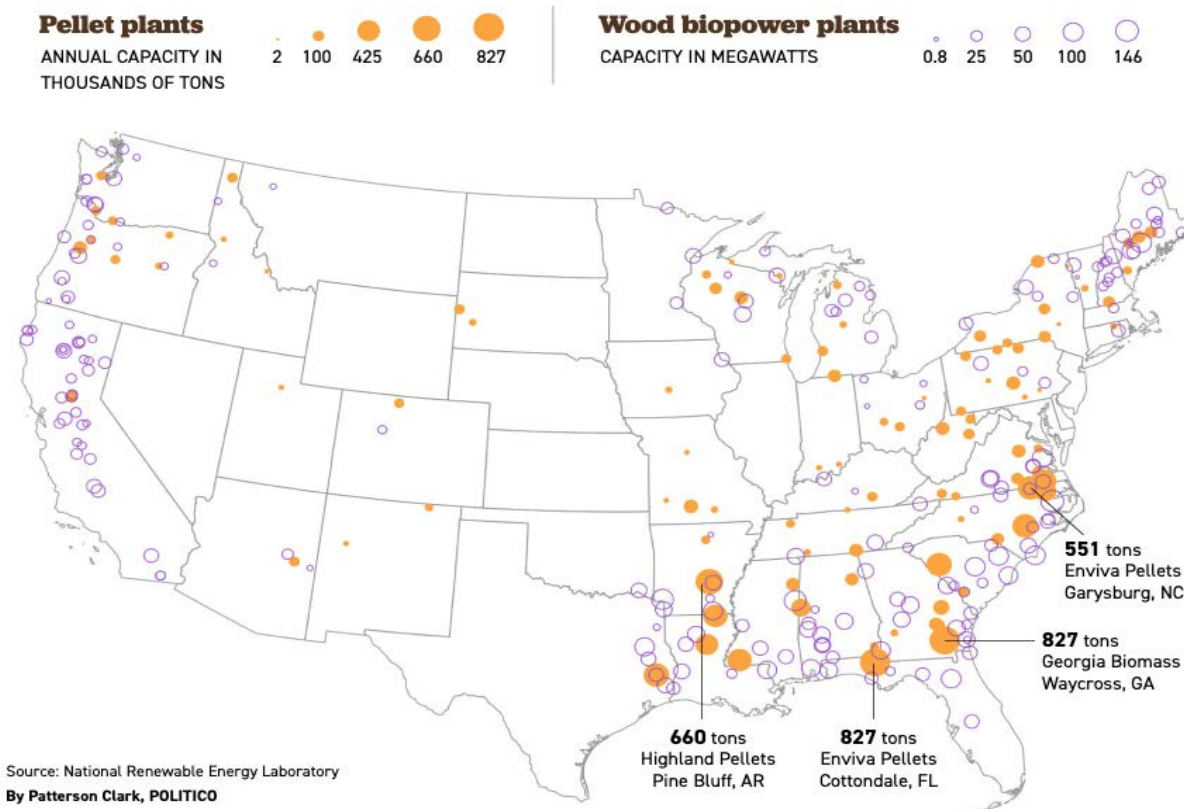
23 The high operational costs of biomass make it more expensive on a total levelized cost basis than solar, onshore wind, and geothermal energy, see https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

Table 1. Main Uses of Biomass

Type of Use	Example of Current or Proposed Use	Environmental Concerns
Electricity	Combustion of biomass (generally in the form of wood pellets) in fossil fuel infrastructure to produce electricity	<ul style="list-style-type: none"> ▪ Emits greenhouse gases ▪ Emits more health-damaging air pollution than fossil fuel facilities ▪ More expensive than clean alternatives²⁴
Transportation	Combustion of biomass fuel (biodiesel) in engines	<ul style="list-style-type: none"> ▪ Emits greenhouse gases ▪ Emits health-damaging air pollutants ▪ Generally more expensive than electrification alternatives
On-Site Processes	Use of biomass to heat buildings or produce power on site: for example, paper production facilities may use leftover biomass to produce steam, which is converted to energy	<ul style="list-style-type: none"> ▪ Can emit toxic air contaminants and health-damaging air pollutants if combusted ▪ Can pollute water and land

As of 2022, there were more than 160 biomass plants in the United States, exposing hundreds of thousands of people to hazardous and toxic air pollution every day (see Figure 2).²⁵

Figure 2. Pellet Plants and Wood Biomass Plants Are Concentrated in the U.S. Southeast



Source: [Politico, 2021](#).

²⁴ Biomass is more expensive on a total levelized cost basis than solar, onshore wind, and geothermal energy, see https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

²⁵ <https://biomassmagazine.com/plants/listplants/biomass/US/>

Box 1. Biodiesel: What About Growing Food for Fuel?

Oil-rich biomass—typically in the form of agricultural crops like sunflowers, palm trees, and soybeans—can be converted into liquid fuels, such as biodiesel. Biodiesel is produced from oil-rich crops through a process that breaks down the plant cell wall, then chemicals and microorganisms are added through additional biological or chemical processing.

Biodiesel production can have many adverse environmental impacts.²⁶ Biofuel production increases water usage and water pollution from excess nutrients, pesticides, and sediment.²⁷ Crops used for fuel end up competing with food crops for land, creating problems such as higher food prices and deforestation.²⁸ The biorefineries that convert biomass into fuel and other byproducts emit hazardous air pollution, impacting nearby communities.²⁹

Moreover, the climate impact from biodiesel is substantial. Studies have shown that greenhouse gas emissions from biofuel production and use can be higher than those from fossil fuels.²⁹ Changes in land-use patterns can also increase greenhouse gas emissions by expanding agriculture onto undeveloped land.³⁰ Converting land—for example, chopping down dense forests for crop fields—changes the landscape so that it can no longer capture and store new carbon.³¹ Land conversion also destroys native habitats and poses a threat to biodiversity.³² In fact, between 2008 and 2012, the conversion of land to grow crops for biodiesel released an estimated equivalent of the annual carbon dioxide emissions of 28 million cars.³³

Using biodiesel in our cars, buses, and other transportation also releases harmful air pollution. In fact, burning biofuels emits a number of pollutants from combustion that are not present when fossil fuel is used. For example, chemicals from pesticides and fertilizers, such as nitrogen and phosphorus, can introduce a broad spectrum of harmful pollutants, which are emitted when the biofuels are burned. These pollutants can include formaldehyde and acetaldehyde, which can irritate the lungs in even small quantities.³⁴

Instead of biodiesel, investments should be made to transition to electric vehicles that do not emit harmful air pollution. A faster transition to electric vehicles would help reduce the price of food and preserve land to absorb carbon.³⁵



26 <https://www.epa.gov/environmental-economics/economics-biofuels>

27 <https://www.epa.gov/environmental-economics/economics-biofuels#impacts>

28 <https://www.epa.gov/environmental-economics/economics-biofuels#impacts>

29 <https://www.epa.gov/environmental-economics/economics-biofuels#impacts>

30 <https://www.epa.gov/environmental-economics/economics-biofuels#impacts>

31 <https://earthjustice.org/from-the-experts/2022-april/biofuels-why-growing-food-for-fuel-is-a-foolish-choice>

32 <https://earthjustice.org/from-the-experts/2018-december/renewable-fuels-grassland>

33 <https://earthjustice.org/from-the-experts/2022-april/biofuels-why-growing-food-for-fuel-is-a-foolish-choice>

34 <https://insideclimatenews.org/news/09062010/new-questions-about-toxic-products-biofuel-combustion/>

35 <https://energypost.eu/evs-vs-biofuels-new-study-looks-at-ethanols-impact-on-agricultural-land-use-food-prices-emissions/>

2 Why doesn't biomass work as a climate solution?

Living, growing trees remain one of the most promising solutions for capturing and storing carbon. If those trees are cut down and burned, all that sequestered carbon is released into the air. Thus, biomass energy, which mostly relies on cutting down trees, is not a climate solution because producing and burning it produces significant greenhouse gases. For example, if the biomass is processed into wood pellets, carbon is released by logging, by processing the wood into pellets, and by transporting the pellets. Biomass combustion also generates significant greenhouse gas emissions. In fact, a plant burning wood chips can emit nearly 50-percent more carbon dioxide per unit of energy than a coal plant.³⁶

Biomass proponents often suggest that biomass is carbon neutral, but evidence of climate impacts has shown that this claim is not true. Any argument that emissions of greenhouse gases can be offset if the fuel is sourced from forest residues that would have decomposed and released greenhouse gases in any case is misleading. Studies show that the cumulative emissions of the entire biomass process can exceed emissions from a fossil fuel plant in the same time period.³⁷

In February 2021, more than 500 scientists and economists wrote to President Biden and other world leaders to warn that converting wood to power is a carbon disaster.³⁸ In their words, "Overall, for each kilowatt hour of heat or electricity produced, using wood is likely to add two to three times as much carbon to the air as using fossil fuels."³⁹

The evidence against biomass as a solution for people and the planet is clear. So, the questions remain: **Why is the biomass industry booming? What is enabling its growth as "green"?**

To find answers, we must look to Europe. In 2009, the European Union pledged to shift from fossil fuels to renewables, like wind and solar. However, because Europe considers biomass as "renewable,"⁴⁰ many energy providers were incentivized to burn biomass instead of coal at their facilities. For example, a coal plant in England receives more than \$1 billion in annual subsidies to now run on woody biomass.⁴¹ This shift prompted a huge increase in the demand for wood. And who filled the gap? The U.S. Southeast, which is heavily forested and largely owned by commercial interests.⁴²

At least 15 "new generation" mills have been built in that region of the United States since 2008 specifically to supply the international demand for wood pellets.⁴³ A study by the [Environmental Integrity Project](#) found that 21 U.S. wood pellet mills exporting to Europe emitted 3.1 million tons of greenhouse gasses annually—equivalent to the impact of more than 667,000 cars annually⁴⁴—and 16,000 tons of health-damaging air pollutants.⁴⁵ In other words, Europe's biomass industry is simply outsourcing much of its pollution to environmental justice communities in the U.S. Southeast.⁴⁶

While the United States does not yet have the same level of renewable mandates as Europe, the U.S. biomass industry still benefits from massive subsidies (see **Table 2**).

For each kilowatt hour of heat or electricity produced, using wood is likely to add two to three times as much carbon to the air as using fossil fuels.

36 Mary S. Booth, *Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal*, p. 5, <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

37 See Tara W. Hudiburgh et al., (2011) Regional carbon dioxide implications of forest bioenergy production, *Nature Climate Change*, 1, <http://dx.doi.org/10.1038/nclimate1264>; Jérôme Laganière et al., (2017), Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests, *GCB Bioenergy*, 9:2 <http://dx.doi.org/10.1111/gcbb.12327>; D. A. DellaSala & M. Koopman, (2015), *Thinning combined with biomass energy production may increase, rather than reduce, greenhouse gas emissions*. Geos Institute, http://www.energyjustice.net/files/biomass/library/biomass_thinning_study.pdf

38 <https://www.documentcloud.org/documents/20482842-scientist-leter-to-biden-van-der-leyden-michel-suga-moon-february-11-2021>

39 <https://www.documentcloud.org/documents/20482842-scientist-leter-to-biden-van-der-leyden-michel-suga-moon-february-11-2021>

40 <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF>

41 <https://www.politico.com/news/magazine/2021/03/26/biomass-carbon-climate-politics-477620>

42 For a map of where forests are located and their ownership, see: <https://www.politico.com/news/magazine/2021/03/26/biomass-carbon-climate-politics-477620>

43 <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

44 Calculated using the EPA's [GHG Equivalencies Calculator](#), accessed Oct 7, 2022.

45 <https://environmentalintegrity.org/news/biomass-report/>

46 <https://www.cnn.com/interactive/2021/07/us/american-south-biomass-energy-invs/>

Table 2. Examples of Federal Programs Subsidizing Biomass Energy⁴⁷

Program	Agency/Department	What It Provides
Tax Section 45 Credit for Electricity Produced from Biomass Facilities	U.S. Treasury	Tax break for biomass production
Tax Section 48 Energy Investment Tax Credit	U.S. Treasury	Tax break for biomass property investment
Rural Energy for America Program	U.S. Department of Agriculture	Grant and loan program intended to support projects like wind and solar but has also subsidized bioenergy
Biomass Crop Assistance Program	U.S. Department of Agriculture	Program for planting, collecting, harvesting, storing, and transporting biomass feedstocks
Bioenergy Program for Advanced Biofuels	U.S. Department of Agriculture	Payments intended for biofuels have also subsidized mature bioenergy
Community Wood Energy and Wood Innovation Program	U.S. Department of Agriculture	Grant program for woody biomass projects

And at the end of the day, biomass cannot compete with solar and wind without massive subsidies. A [2018 analysis](#) found that even with subsidies, a utility's least-expensive biomass electricity was still more than double the cost of energy efficiency measures and 50 percent more expensive than electricity from wind and solar.⁴⁸

Lastly, biomass companies rely on greenwashing tactics and disinformation to maintain perceptions of sustainability. For example, Enviva will seek "sustainable" certification for their wood pellets through programs run by their industry peers.⁴⁹

Without massive subsidies, biomass cannot compete with solar and wind.

47 <https://www.taxpayer.net/energy-natural-resources/biomass-subsidy-fact-sheet/>; the Inflation Reduction Act also extended most biomass and biofuel tax incentives until 2034, see: <https://www.congress.gov/bill/117th-congress/house-bill/5376/text>

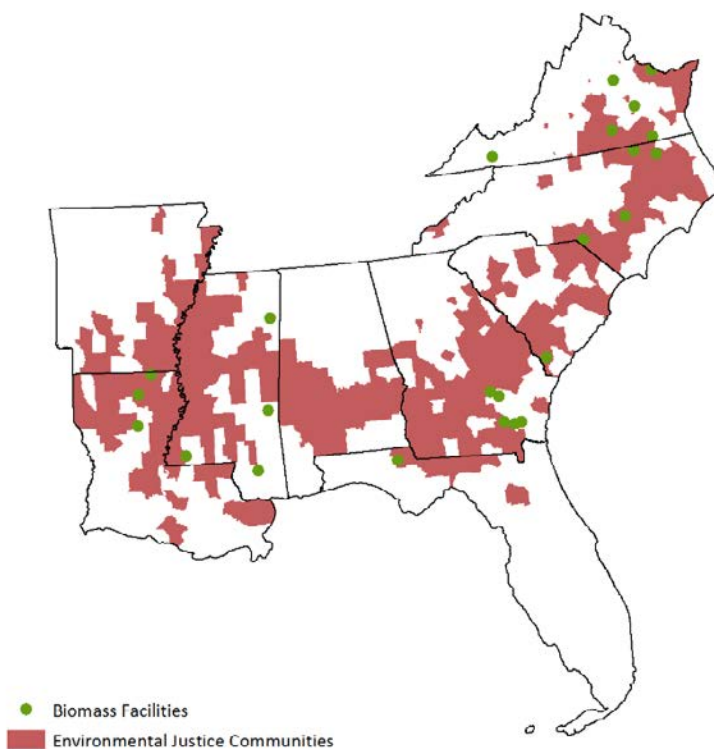
48 <https://www.nrdc.org/sites/default/files/dominion-investments-biomass-electricity-ib.pdf>

49 <https://www.nrdc.org/resources/our-forests-arent-fuel>

3 How does biomass perpetuate environmental inequities?

Wood pellet mills—the production source for woody biomass energy—are often established in communities of color and low-income communities that have a history of being overburdened with industrial pollution.⁵⁰ Mostly located in the Southeastern United States, the wood pellet industry has built 23 mills over the past decade, all in or near low-income communities and/or communities that are predominantly Black, Indigenous, or People of Color (BIPOC; see **Figure 3**). The production and combustion of wood pellets has the greatest impact on these “environmental justice” communities due to the hazardous and poisonous air pollution released every day, including carbon monoxide, smog, airborne asbestos, sulfur dioxide, and large particulate matter. They are often the same communities that have endured the legacy of fossil fuel pollution. The only difference is that biomass perpetuates the same injustices under the false premise of being a “green fuel.”

Figure 3. Existing Wood Pellet Mills Are Mostly Located in or Near Environmental Justice Communities

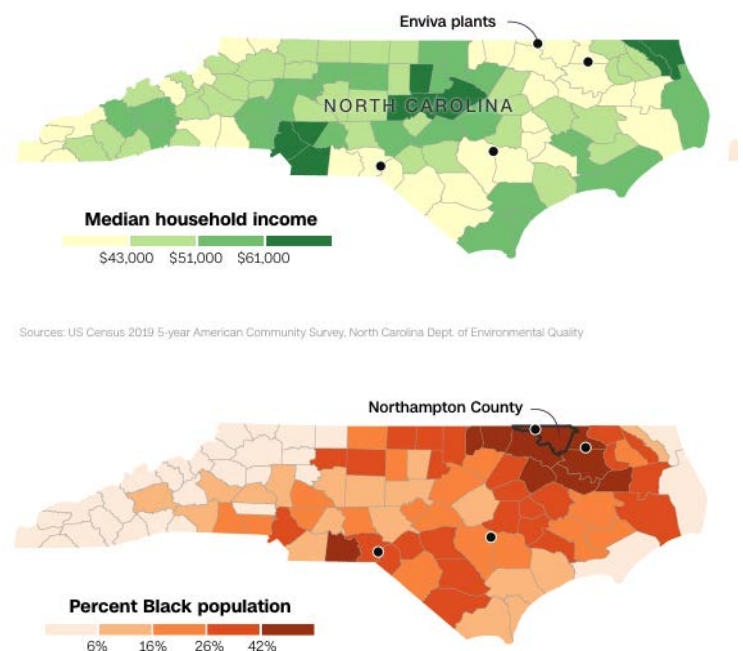


Source: [Dogwood Alliance, 2020](#).

North Carolina: Enviva Plants Impact Local Communities' Health, Environment, and Quality of Life

Over the past decade, Enviva wood pellet plants have spread throughout North Carolina (see **Figure 4**). Grassroots groups like the Dogwood Alliance have long advocated against the biomass industry and Enviva plants, which have dramatically adverse impacts on the health and environment of several communities. For example, when an Enviva plant opened in Northampton County in 2013, residents reported “not being able to spend more than five minutes outside without coughing” and being “unable to sleep at night” due to the plant’s constant noise.⁵¹ A predominantly Black area, Northampton has one of the highest numbers of major air pollutants per capita in the state. One in ten adults residing in the county had asthma in 2018.⁵²

Figure 4. Enviva Plants in North Carolina Are Disproportionately Sited in Predominantly Black Areas



Sources: US Census 2019 5-year American Community Survey, North Carolina Dept. of Environmental Quality

Source: [CNN, 2021](#).

50 <https://www.liebertpub.com/doi/full/10.1089/env.2017.0025>; <https://www.southernenvironment.org/news/selc-95-other-orgs-warn-president-biden-about-dangers-of-biomass-energy/>

51 <https://www.cnn.com/interactive/2021/07/us/american-south-biomass-energy-invs/>

52 https://files.nc.gov/ncdeq/Air%20Quality/permits/2021_public_notice_documents/environmental_justice/Draft-EJ-Report-Enviva-Northampton-2021.pdf

In 2022, environmental justice advocates working to limit the impact of wood pellet plants celebrated a victory when a biomass energy company officially withdrew plans for a new facility.⁵³ The company was facing legal action for pollution violations and its withdrawal comes as a huge relief to the community.

But advocates hope their fight to protect communities can extend to the state level. Even though North Carolina's Clean Energy Plan states that "the wood pellet industry [would] not advance North Carolina's clean energy economy [because] biomass production releases carbon into the atmosphere at a faster pace than if those forests were left intact," the pellet industry continues to receive permits and increase its market share.⁵⁴

All but one of Enviva's nine operating plants in the United States are located in communities that have a higher percentage of Black residents than their respective state as a whole, and all the Enviva plants are in low-income areas.⁵⁵ Moreover, a study showed that the high rate at which Enviva plants are consuming wood and clearing forests will result in degraded water quality for communities downstream and the destruction of important wildlife habitats.⁵⁶

Virginia: State Agencies' Weak Enforcement Undermines Wins for Pollution Control

The community near the Enviva wood pellet plant in Southampton County, Virginia, has suffered adverse impacts from the plant's operation for years.⁵⁷ Despite evidence that the facility had violated air emissions limits,⁵⁸ Enviva requested a 46-percent production increase in 2019.⁵⁹ In response to community concerns and advocacy efforts, the State of Virginia required the facility to install improved air pollution controls, but no action was taken regarding past violations.⁶⁰ Although the new controls will help limit pollution, the lack of enforcement and the increased production are worrisome.

Georgia: Communities Mobilize Against Biomass Expansion

In Georgia, community advocacy groups like the Southern Environmental Law Center and Concerned Citizens of Cook County have been organizing to stop the wood pellet industry from expanding. In 2022, Georgia's environmental agency granted an air quality permit for a planned wood pellet plant sited in yet another predominantly Black and Latine environmental justice community. At least two other biomass companies have plans to build new pellet plants in the same region, as well. These facilities intend to produce more than 1.7 million tons of wood pellets annually, which are commonly shipped overseas where they will be burned to generate electricity.⁶¹

Community advocates are concerned about the amount of dust, toxic pollution, and foul smells these facilities will bring to neighborhoods already struggling with high rates of asthma and other health concerns. But Georgia's air quality standards seldom take the cumulative impacts of the facilities into account, and as a result, they fail to adequately protect the most vulnerable communities.⁶² Advocacy groups continue to monitor air quality permits and organize for policy changes that limit biomass expansion.

Massachusetts: The Seesaw of Limiting Government Incentives for Biomass

Environmental justice and public health advocates have long advocated that the State of Massachusetts stop incentivizing biomass facilities. In 2021, this advocacy resulted in the state changing its recommendation to not allow renewable energy subsidies for any biomass facility located within five miles of an environmental justice community.⁶³ Then, in 2022, the state backtracked on its proposal so that the removal of incentives only applies to new biomass facilities built near environmental justice communities.⁶⁴

Later, the Massachusetts legislature passed a bill that removed woody biomass from the definition of renewables, which would prevent woody biomass from receiving renewable energy incentives.⁶⁵ This significant victory was partly undone when the original version was amended

53 <https://www.southernenvironment.org/news/abandoned-biomass-plans-make-one-less-thing-to-worry-about/>

54 <https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-plans-and-progress/clean-energy-plan>

55 <https://www.cnn.com/interactive/2021/07/us/american-south-biomass-energy-invs/>

56 <https://www.southernenvironment.org/news/new-study-confirms-harmful-impacts-of-biomass/>

57 <https://www.virginiamercury.com/2019/09/12/deq-calls-for-stricter-pollution-controls-at-enviva-wood-pellet-plant-but-some-environmentalists-say-enforcement-is-overdue/>

58 www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf

59 <https://www.virginiamercury.com/2019/09/12/deq-calls-for-stricter-pollution-controls-at-enviva-wood-pellet-plant-but-some-environmentalists-say-enforcement-is-overdue/>

60 <https://www.virginiamercury.com/2019/09/12/deq-calls-for-stricter-pollution-controls-at-enviva-wood-pellet-plant-but-some-environmentalists-say-enforcement-is-overdue/>

61 <https://georgiarecorder.com/2022/08/24/georgia-communities-mobilize-against-expansion-of-foul-smelling-wood-burning-energy/>

62 <https://georgiarecorder.com/2022/08/24/georgia-communities-mobilize-against-expansion-of-foul-smelling-wood-burning-energy/>

63 <https://www.wbur.org/news/2021/04/16/rps-changes-biomass-renewable-energy-subsidies-springfield>

64 <https://www.wbur.org/news/2022/03/29/massachusetts-biomass-environmental-justice-updates>

65 <https://www.lawandenvironment.com/2022/08/11/massachusetts-passes-climate-bill-focused-on-clean-energy-and-offshore-wind/>

to prevent only new facilities constructed after January 1, 2022, from counting as renewables.⁶⁶ Massachusetts still includes biomass in other incentive programs.⁶⁷ Continued advocacy to remove woody biomass from the definition

of renewable energy will be critical to reducing reliance on biomass because these facilities rely heavily on incentives to be cost effective.

4

What clean energy and policy solutions avoid reliance on biomass?

Trees should not be cut down to produce biomass. Trees should be planted, and forests should be reforested, rather than logged.⁶⁸ Lower-cost, safer, and more equitable energy solutions exist, and they should be prioritized. Some types of solutions that should be explored to avoid reliance on harmful biomass are:

- 1. End incentives and preferential treatment for biomass.** Subsidies and incentives for biomass facilities should be removed. Without subsidies, biomass doesn't turn a profit. Ending this shell-game of incentives will avoid new construction and continued operation of these polluting facilities. As the experts have said, "Government subsidies for burning wood create a double climate problem because this false solution is replacing real carbon reductions."⁶⁹
 - a. Remove and redirect incentives for biomass.* Policymakers can take action to facilitate the transition away from woody biomass and biodiesel through legislation. Legislation can stop grant programs and incentives for biomass.
 - b. Avoid supporting biomass as renewable energy or a "clean fuel."* To facilitate the transition to

zero-emission energy solutions, policymakers should shift subsidies away from biomass to truly clean energy production and remove biomass from the list of renewable energy sources.

- 2. Improve waste management practices for biomass.** Instead of burning biomass, other waste management options are better for the climate and local communities. Wood waste can be recycled and reused in other materials, or wood can be buried, which would help promote carbon storage in the soil.⁷⁰
- 3. Focus on promoting zero-emission energy solutions.** By investing in clean energy like wind, solar, and energy storage, states can move away from a reliance on biomass as a fuel for electricity generation. Solar energy infrastructure can be deployed at both small and large scale—from spaces on rooftops or parking lots to large farms in less dense areas. Wind can often provide energy at night to complement solar energy, and battery storage can help to ensure that energy is available when needed. Zero-emission energy solutions like these are more sustainable over the long term and are healthier for people and the planet.

5 Conclusion

When energy companies burn trees to make electricity, the result is poor health and diminished quality of life for local communities, irreversible air and climate pollution, and devastated ecosystems. It is also a lost opportunity: the billions of dollars in subsidies used for biomass could instead build a truly clean and renewable energy system.

The case of biomass also highlights how the impacts of one region's policy can reverberate throughout the world. The inclusion of biomass in Europe's policy means those

who live in communities near wood pellet facilities in the United States cannot sleep and must breathe in dirty dust every day. What we consider "green" and "clean" has major implications not only for our future, but for the current well-being of vulnerable communities that pay the price for misguided decisions. At the end of the day, burning trees for energy is just not compatible with goals for better climate, justice, and health.

66 <https://www.pfpi.net/wp-content/uploads/2022/07/100-group-sign-on-letter-on-biomass-in-climate-bill-july-30-2022.pdf>

67 <https://www.sierraclub.org/massachusetts/blog/2022/07/summary-h5060-act-driving-clean-energy-and-offshore-wind>

68 <https://kleinmanenergy.upenn.edu/news-insights/biomass-energy-climate-solution-or-potential-catastrophe/>

69 <https://www.documentcloud.org/documents/20482842-scientist-letter-to-biden-van-der-leyden-michel-suga-moon-february-11-2021>

70 <https://environment-review.yale.edu/finding-greener-end-life-wood>

6 FAQs

1. What is the difference between biomass and biodiesel? And what about biogas?

There are many similar types of energy derived from organic material with similar sounding names. Their organic origin is the reason for the suffix *bio-*, but it doesn't mean they are green or clean. Although biomass, biodiesel, and biogas are all derived from biological organic material, they each have different forms. **Biomass** is the *solid* plant or organic material that has not been processed, such as wood waste. **Biodiesel** refers to the *liquid* that is produced by refining biomass, generally from plants such as soybeans and sugar cane, into a liquid form. **Biogas** refers to the *gas* that is produced when biomass materials are digested by bacteria. They are all types of **biofuel** that are then combusted, whether they are in the solid (biomass), liquid (biodiesel) or gas (biogas) forms. Consequently, each of these biofuels produces harmful health impacts in their production and their use.

2. Isn't it better to use biomass than coal or gas?

No, it can actually be worse for two reasons:

First, carbon is released by logging, when the timber is processed into pellets, and when the pellets are transported overseas. Then, biomass combustion can emit nearly 50 percent more carbon dioxide per unit of energy than coal.⁷¹

Second, biomass production releases more toxic air pollution than coal or gas plants. Even the cleanest biomass plants produce more health-damaging air pollutants than coal per unit of energy produced.⁷² And a recent [analysis](#) found that the health impacts from biomass and wood combustion are higher than the impacts from either coal or gas.⁷³

Overall, converting wood into power destroys forests (a valuable carbon sink), it's inefficient, and it's not any better for people and the planet than coal or gas.

3. Where is biomass energy used?

Wood-generated electricity is mostly used in Europe where there are incentives for shifting to this type of energy. Generating energy from woody biomass is currently not very economically feasible in the United States. However, most of the wood pellets burned to generate electricity are produced in the U.S. Southeast. In other words, the logged and pelletized trees from another continent—which bears all the consequential health and environmental impacts—are fueling Europe's "green" energy industry.

4. So, Europe enables biomass energy that drives the bulk of biomass problems in the United States? Is Europe doing anything about this?

Europe has started to take a more nuanced and critical view toward biomass, even though the majority of Europe's renewable energy is derived from this source.⁷⁴ In 2021, Europe strengthened its sustainability requirements by requiring solid biomass used in heating, cooling, and electricity installations to meet EU sustainability requirements.⁷⁵ In September 2022, the European Parliament voted to cap the amount of energy that can be generated by burning trees.⁷⁶ It is unclear, however, how effective this increased focus on sustainability will be as there is insufficient data about the source of biomass used in Europe's electricity production.⁷⁷ Without data, it will be impossible to analyze the impacts of biomass usage. While these actions represent important steps forward, more effort is needed to mitigate the climate threat from burning trees for Europe's energy.

71 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 5, <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

72 Mary S. Booth, Trees, Trash, and Toxics: How Biomass Energy Has Become the New Coal, p. 5, <https://www.pfpi.net/wp-content/uploads/2014/04/PFPI-Biomass-is-the-New-Coal-April-2-2014.pdf>

73 <https://iopscience.iop.org/article/10.1088/1748-9326/abe74c>

74 [https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biomass_en#:~:text=Biomass%20for%20energy%20\(bioenergy\)%20continues,the%20EU%E2%80%9D%20\(2019\)](https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biomass_en#:~:text=Biomass%20for%20energy%20(bioenergy)%20continues,the%20EU%E2%80%9D%20(2019))

75 <https://op.europa.eu/en/publication-detail/-/publication/7120db75-6118-11eb-8146-01aa75ed71a1/language-en/format-PDF/source-228484245>

76 <https://www.wwf.eu/?7546791/REDIII-revision-EPPlenary-vote>

77 "We observe that the tendency of reporting as unknown origin the wood used for energy production is increasing," see: <https://op.europa.eu/en/publication-detail/-/publication/7120db75-6118-11eb-8146-01aa75ed71a1/language-en/format-PDF/source-228484245>

5. Who are the biggest proponents of biomass? What claims do they make about its use or efficacy?

Not surprisingly, the companies most likely to profit from increased reliance on biomass are the biggest proponents of biomass. Companies that produce biofuels and wood pellets or rely on burning biofuels are most likely to lobby for increased biomass usage. These companies claim that they can replace coal facilities and “fight climate change.”⁷⁸

As explained in this brief, however, these claims are misleading. Many types of clean zero-emission energy can replace coal facilities, including energy from solar and wind

facilities. The simple truth is that biomass facilities do not fight climate change. On the contrary, biomass production and combustion often produce even more climate pollution than coal plants. Thus, the biased claims of biofuel companies should not be relied on: biomass production is not a clean or just energy solution.

Although the federal government has policies that endorse biomass production, it has been heavily influenced and lobbied by the biofuel industry, which has employed hundreds of lobbyists and spent millions of dollars to secure biofuel subsidies.⁷⁹

7 Additional Resources

Helpful Explainers:

- NRDC, 2020. “Our Forests Aren’t Fuel.” <https://www.nrdc.org/resources/our-forests-arent-fuel>

Great Media Deep Dives and Reports:

- CNN, 2021. “How marginalized communities in the South are paying the price for ‘green energy’ in Europe.” <https://www.cnn.com/interactive/2021/07/us/american-south-biomass-energy-invs/>
- Politico, 2021. “The ‘Green Energy’ That Might Be Ruining the Planet.” <https://www.politico.com/news/magazine/2021/03/26/biomass-carbon-climate-politics-477620>
- Environmental Integrity Project, 2018. “Dirty Deception: How the Wood Biomass Industry Skirts the Clean Air Act.” <https://www.environmentalintegrity.org/wp-content/uploads/2017/02/Biomass-Report.pdf>

Academic Articles:

- Mary S. Booth, 2018. “Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy.” *Environmental Research Letters*. Vol. 13, No. 3. <https://iopscience.iop.org/article/10.1088/1748-9326/aaac88>
 - Article that summarizes Booth, 2018: <https://www.pfpi.net/biomass-energy-has-big-climate-impact-even-under-best-case-scenario>
- Stephan Koester & Sam Davis, 2018. “Siting of Wood Pellet Production Facilities in Environmental Justice Communities in the Southeastern United States.” *Environmental Justice*. Vol. 11, No. 2. <https://www.liebertpub.com/doi/10.1089/env.2017.0025>

Letters:

- [Letter Regarding Use of Forests for Bioenergy](#) to President Biden and other leaders, Feb 2021.
- [Letter Against the Expansion of Bioenergy](#) to the Biden Administration, signed by 96 organizations, Sep 2021.
- [Resolution in Opposition to Wood Pellets Manufacturing and Use of Wood-Bioenergy](#) by the NAACP, Oct 2021.

⁷⁸ <https://www.envivabiomass.com/>

⁷⁹ <https://www.taxpayer.net/wp-content/uploads/2021/09/Political-Footprint-of-the-Biofuels-Industry-September-2021-FINAL-VERSION.pdf>