IS BIOMASS GOOD FOR THE CLIMATE?

DOGWOOD ALLIANCE

OUR FORESTS. OUR STRENGTH.

Stand4Forests Report Series

Wood pellets are being heralded by producers as the savior to our fossil fuel and climate change crises. However, the reality is that wood pellets are very damaging to our forests, our climate, and the communities where they are produced and used.

Here's the truth of the matter:

- **Wood pellets are not carbon neutral; their production and combustion introduce a substantial amount of carbon dioxide to the atmosphere, up to 50% more than coal.**
- **Logging, which includes logging for wood pellets, is the predominant cause of carbon emissions from US forests, more than insects, drought, fire, and wind combined.**
- **Wood pellets have been produced from clearcutting over 900,000 acres in the US South in the last decade.**
- **The growing biomass industry negatively impacts wildlife, which contributes to a worsening climate.**

In conclusion, we need new policies designed to scale back forest disturbance from logging and leave more forests standing.

MYTH: Wood pellets are carbon neutral

TRUTH: Wood pellet production and combustion both inject a large amount of carbon dioxide into the atmosphere.

Wood pellets are considered carbon neutral by some, but there is a substantial and significant carbon cost to wood pellet production and combustion. During production, carbon is released when (a) forests are logged, (b) logs are transported, (c) when logs are processed into pellets, and (d) when they are shipped from the production facility to the point of combustion.[1] Throughout the lifecycle, around 50% more carbon is released from wood pellets than from coal per unit of energy generated.[2,3]

TRUTH: Carbon neutrality depends on a lot of factors, and wood pellets do not meet the standard.

Industry-favorable analyses automatically exclude the carbon stored in the fuel (former trees) itself, but this is an unfair assumption because the carbon is still emitted.[4–6] After harvest, there is an undeniable "carbon debt" on those acres until they regrow enough to restore the carbon lost during harvest, and exceed the carbon benefits from previous fossil-fuel based power generation.[7,8] Estimates of carbon debt range between 20-200 years, but most average around 90 years, and are based on variables that primarily include the type of harvest (tops and limbs, large residues, or whole trees) and pre-existing land cover (natural or artificial stands).[8–10] An average 90 year estimated carbon payback / drawdown period is not an appropriate solution for addressing the urgent, 1-2 decade need for action on climate change.

TRUTH: Regional accounting doesn't accurately account for impacts of wood pellet harvests.

A frequent response to site-level carbon analysis (above) is that if the entire region is storing more carbon than it's losing, then harvesting for wood pellets is fine. Although harvesting for wood pellets is not turning regional forests into carbon emitters, it is reducing their ability to store carbon long term. Without markets for wood pellet exports, forests in the region would be growing and storing carbon at a substantially higher rate. Over 95 million tons

of CO_2e from wood pellet harvests in the US South have been sent overseas to be combusted for electricity. This carbon is above and beyond what is already being lost to regular logging operations.

Logging, which includes logging for wood pellets, is the primary cause of carbon loss, tree cover loss, and forested wetland loss in the US.[11–13] In the South, forest carbon losses are overwhelmingly due to the impacts of increased extraction from Southern forests. A full 85% of carbon emissions from US forests was attributed to silvicultural activities like clearcutting, more than fire, insect, drought, and wind damage combined.[11] Another study found that around half of tree cover loss in North America was driven by forestry activities, and that particular tree cover loss was predominantly in the United States, not Canada.[12]

MYTH: The impacts of wood pellet production are inconsequential

TRUTH: There is a substantial greenhouse gas impact in areas where forests are logged for wood pellet production, as well as where they are combusted.

There are carbon emissions associated with logging, production, and combustion of wood pellets. From 2011-2019, the wood pellet industry exported 40.2 million tons of wood pellets from the US South, predominantly (> 95%) to countries in Europe.[14] These 40.2 million tons of exported wood pellets represent nearly a million (965k+) acres impacted by harvests for wood pellets.[15] These acres of forest were previously providing critical ecosystem services like storm and flood protection, water filtration, and habitat for wildlife. That massive amount of wood pellets has released over 95 million additional tons of CO_2e during harvest, production, and combustion. This is equivalent to 22 coal plants operated for one year, or 47 million tons of coal burned.[16]

TRUTH: Wood pellet production extracts more wood than other types of harvesting.

The large demand for wood pellets opens up more forests to logging and also leaves less wood behind for sapling regeneration, soil protection, and wildlife habitat. Although some "waste" material, defined as tops and limbs of trees, is used, the majority of wood used by Enviva falls in the "whole tree" categories, as identified by forest type in their own data.[1,17] The systematic over-extraction of forests in the US has significant impacts on species composition, water quality, and resilience against extreme events. We extract so much from our forests that forest harvest accounts for 85% of carbon emissions from US forests, more than insects, drought, disease, wind, and conversion combined.[1,11] Furthermore, forest operations can leave lasting impacts on soils, altering physical, biological, and chemical properties due to the use of agrochemicals and heavy machinery.[18]

TRUTH: Wood pellet production reduces biodiversity of harvested areas.

Bioenergy production requires a substantial amount of land to be reserved for fuel growth and harvest. In practice, this means the pattern of converting natural forests to plantations will continue. **Land-use change from intensifying wood product extraction is a major cause of biodiversity loss.**[19] It is well-documented that there are losses to biodiversity when bioenergy production is expanded, and even the IPCC acknowledges the risks.[20–22]

Wood pellet production also immediately increases emissions in the atmosphere, further contributing to climate change. Recent analyses indicate that a high percentage of species in local ecosystems could be exposed to potentially dangerous climate conditions simultaneously.[23] In a region like the US South, with very large concentrations of endemic and threatened amphibian species, both avoiding habitat conversion and mitigating climate change are key to successful conservation.[24]

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CASE STUDY: ENVIVA

Enviva is the largest wood pellet export company in the United States, and they have the highest concentration of pellet production facilities in North Carolina. Collectively, those four Enviva facilities in North Carolina will be responsible for exporting 2.5 million tons of wood pellets annually from 2020 onwards. By the end of 2020, the cumulative impact (2013-2020) of wood pellets in North Carolina will be over 300,000 acres logged for wood pellets, releasing 28 million tons of CO_2e during harvest, transport, production, and combustion. The Greenhouse Gas Impact is equivalent to an additional 14 million tons of coal burned, or six and a half coal plants operated for a full year.[16]

REFERENCES

1. Davis SL, Perez N, Koester S. Forests Are Not Fuel. Reference Module in Earth Systems and Environmental Sciences. Elsevier; 2019.
2. Booth MS. Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. *Environ Res Lett*. 2018;13: 035001.
3. Biomass Energy: Efficiency, Scale, and Sustainability. Biomass Energy Resource Center; 2009. Available: https://www.biomasscenter.org/policy-statements/FSE-Policy.pdf
4. Magelli F, Boucher K, Bi HT, Melin S, Bonoli A. An environmental impact assessment of exported wood pellets from Canada to Europe. *Biomass Bioenergy*. 2009;33: 434–441.
5. Hoefnagels R, Junginger M, Faaij A. The economic potential of wood pellet production from alternative, low-value wood sources in the southeast of the U.S. *Biomass Bioenergy*. 2014;71: 443–454.
6. Brack D, Hewitt J, Marchand TM. Woody Biomass for Power and Heat: Demand and Supply in Selected EU Member States. Chatham House; 2018 Jun. Available: https://www.chathamhouse.org/publication/woody-biomass-power-and-heat-demand-and-supply-selected-eu-member-states/2018-06-07-woody-biomass-power-heat-eu-brack-hewitt-marchand.pdf
7. Mitchell SR, Harmon ME, O'Connell KEB. Carbon debt and carbon sequestration parity in forest bioenergy production. *Glob Change Biol Bioenergy*. 2012;4: 818–827.
8. Walker T, Cardellichio P, Colnes A, Gunn J, Saah D. Biomass Sustainability and Carbon Policy Study. 2010 [cited 20 Jun 2019]. Available: http://dx.doi.org/
9. Zanchi G, Pena N, Bird N. The Upfront Carbon Debt Of Bioenergy. Joanneum Research; 2010 May. Available: https://www.transportenvironment.org/sites/te/files/media/The_upfront_carbon_debt_of_bioenergy_Joanneum_Research.pdf
10. Ter-Mikaelian MT, Colombo SJ, Lovekin D, McKechnie J, Reynolds R, Titus B, et al. Carbon debt repayment or carbon sequestration parity? Lessons from a forest bioenergy case study in Ontario, Canada. *GCB Bioenergy*. 2015;7: 704–716.
11. Harris NL, Hagen SC, Saatchi SS, Pearson TRH, Woodall CW, Domke GM, et al. Attribution of net carbon change by disturbance type across forest lands of the conterminous United States. *Carbon Balance Manag*. 2016;11: 24.
12. Curtis PG, Slay CM, Harris NL, Tyukavina A, Hansen MC. Classifying drivers of global forest loss. *Science*. 2018;361: 1108–1111.
13. Dahl TE. Status and Trends of Wetlands in the Conterminous United States 2004 to 2009. US Fish and Wildlife Service; 2011. Available: https://www.fws.gov/wetlands/Documents/Status-and-Trends-of-Wetlands-in-the-Conterminous-United-States-2004-to-2009.pdf
14. U.S. Census Bureau. Census Trade Online. 2019 [cited 20 Jun 2019]. Available: https://usatrade.census.gov/
15. Koester S, Davis S. Siting of Wood Pellet Production Facilities in Environmental Justice Communities in the Southeastern United States. *Environ Justice*. 2018;11: 64–70.
16. US EPA. Greenhouse Gas Equivalencies Calculator. 28 Aug 2015 [cited 27 Apr 2020]. Available: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
17. Track & Trace. In: Enviva [Internet]. 2017 [cited 20 Jun 2019]. Available: http://www.envivabiomass.com/sustainability/track-and-trace/
18. Cambi M, Certini G, Neri F, Marchi E. The impact of heavy traffic on forest soils: A review. *For Ecol Manage*. 2015;338: 124–138.
19. Martinuzzi S, Withey JC, Pidgeon AM, Plantinga AJ, McKerrow AJ, Williams SG, et al. Future land-use scenarios and the loss of wildlife habitats in the southeastern United States. *Ecological Applications*. 2015. pp. 160–171. doi:10.1890/13-2078.1
20. Kline KL, Martinelli FS, Mayer AL, Medeiros R, Oliveira COF, Sparovek G, et al. Bioenergy and Biodiversity: Key Lessons from the Pan American Region. *Environ Manage*. 2015;56: 1377–1396.
21. Special Report on Climate Change and Land — IPCC site. In: IPCC [Internet]. 2019 [cited 30 Apr 2020]. Available: https://www.ipcc.ch/srccl/
22. Fletcher RJ Jr, Robertson BA, Evans J, Doran PJ, Alavalapati JRR, Schemske DW. Biodiversity conservation in the era of biofuels: risks and opportunities. *Front Ecol Environ*. 2011;9: 161–168.
23. Trisos CH, Merow C, Pigot AL. The projected timing of abrupt ecological disruption from climate change. *Nature*. 2020;580: 496–501.
24. Jenkins CN, Van Houtan KS, Pimm SL, Sexton JO. US protected lands mismatch biodiversity priorities. *Proc Natl Acad Sci U S A*. 2015;112: 5081–5086.

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ABOUT DOGWOOD ALLIANCE • Dogwood Alliance mobilizes diverse voices to protect Southern forests and communities from destructive industrial logging. For over 20 years, Dogwood Alliance has worked with diverse communities, partner organizations and decision-makers to protect Southern forests across 14 states. They do this through community and grassroots organizing, holding corporations and governments accountable and working to conserve millions of acres of Southern forests.