# DON'T BE FOOLED BY BIOMASS ENERGY

**Woody biomass energy is dirty energy**. Burning trees and crop residues to make energy releases large volumes of climate and air pollution, worsening the climate crisis and harming public health.[1] As frontline communities and scientists continue to expose these harms, the biomass industry and its allies are trying to greenwash their dirty business by pushing new types of biomass facilities under different names, claiming they're "clean." **Beware of three new ways of greenwashing biomass energy. It is a false solution that harms the climate, communities, and forests.**

**Biomass Energy with Carbon Capture and Storage (BECCS):** BECCS boosters promote adding carbon capture and storage (CCS) equipment to biomass facilities to capture some $CO_2$ from industrial smokestacks. CCS has proven to be ineffective, unsafe, energy-intensive, and expensive,[2] so BECCS facilities would still produce significant climate and air pollution and threaten public safety. And contrary to industry claims, BECCS projects are neither carbon neutral nor carbon negative.

**Gasification and Pyrolysis:** Instead of burning biomass, gasification and pyrolysis heat biomass to high temperatures to convert it into gases, liquids, and solids for electricity, hydrogen, or fuels production. But just like combustion, the main products are climate and air pollutants like $CO_2$ and particulate matter that worsen the climate crisis and threaten public health. It's the same biomass problems under a different name.

**Hydrogen Made from Biomass:** Hydrogen can be made from the gasification of trees and other woody biomass, but this process is dirty even if some try to label it as "green." Biomass gasification to make hydrogen releases large amounts of planet-heating $CO_2$ and toxic air pollutants and uses lots of water. To the extent hydrogen is made at all, it should be produced in the cleanest way possible — by splitting water using 100% solar or wind energy.

## Biomass Energy with Carbon Capture and Storage (BECCS)

Biomass energy with carbon capture and storage adds one bad idea to another. Carbon capture and storage (CCS) is energy-intensive, ineffective, unsafe, expensive, and targets environmental justice communities.[3] CCS operations have high energy requirements to separate, compress, transport, and inject $CO_2$, typically requiring at least 15-25% more energy, which results in increased greenhouse gas and air pollution emissions.[4] CCS projects have consistently failed to meet their carbon-capture targets, often by large margins.[5] In the U.S. almost all the $CO_2$ captured by CCS is used to pump more oil and gas out of the ground,[6] worsening the climate emergency. And CCS poses significant new health, safety, and environmental risks. Inevitable blowouts of $CO_2$ pipelines and leaks from underground $CO_2$ storage can sicken and even kill people.[7]

BECCS proponents often claim their projects are carbon neutral or even carbon negative (that they will lead to a net removal of $CO_2$ from the atmosphere) based on the inaccurate assertion that woody biomass is a carbon neutral feedstock and that CCS will capture $CO_2$. The claim that woody biomass is carbon neutral has been repeatedly debunked.[8] Biomass energy is more polluting at the smokestack than coal, and substantial carbon emissions are released from cutting trees and other biomass with machinery, transporting biomass often long distances in trucks, and chipping, drying, and processing.[9] The reality is the combustion and gasification of trees and other woody biomass for energy — including residues considered to be "waste"— leads to a net increase of carbon emissions in the atmosphere for decades to centuries.[10] Adding CCS at best would capture only some $CO_2$ from the smokestack and risks inevitable leakage from pipelines and underground storage.

**Gasification and Pyrolysis**

Biomass gasification and pyrolysis are not clean processes. Their main products are climate and air pollutants. Gasification heats biomass to high temperatures (800-1200°C) using water and a controlled oxygen stream to produce a "syngas" containing large amounts of $CO_2$, as well as methane ($CH_4$), carbon monoxide (CO), and hydrogen ($H_2$), in addition to liquid hydrocarbons and tar, solid char and ash residues and a wide array of air pollutants. Pyrolysis heats biomass to temperatures of 350-600°C without oxygen and produces similar products to gasification, with the addition of pyrolytic oil and larger quantities of char. Both processes produce a wide range of health-harming pollutants including fine particulate matter, nitrogen oxides (NOx), sulfur oxides (SOx), benzene and other carcinogens, tar and soot, heavy metals, and persistent organic pollutants.[11]

**Hydrogen Made from Biomass**

Hydrogen can be made from the gasification of woody biomass. Like making hydrogen from fossil fuels, producing hydrogen from biomass is a dirty process that releases large amounts of $CO_2$ and air pollutants. It's also expensive and highly water intensive.[12] Hydrogen, once produced, poses risks to the climate and public health and safety. Hydrogen is a potent, indirect greenhouse gas with 100 times the heating power of $CO_2$ over a 10-year period,[13] and it's leakage prone. It's also dangerous to transport: it's more likely to explode, burns hotter, and is more corrosive to pipelines than methane.[14] Although the biomass and fossil fuel industries are heavily pushing new uses for hydrogen, it's unnecessary for decarbonization since cleaner, safer electrification alternatives are available across sectors.[15]

## Harmful and Unnecessary

In reality, these false solutions release large amounts of planet-heating $CO_2$ and toxic air pollutants, target communities of color and low-income communities already suffering from high pollution burdens,[16] deplete forests, and are extremely expensive, relying on massive public subsidies. Although they are being promoted using many justifications, they are dangerous and unnecessary.

**Not needed to meet climate targets:** We can meet the international climate target of limiting global heating to 1.5°C without using BECCS and other biomass false solutions, as mapped by the Intergovernmental Panel on Climate Change.[17] We must rapidly phase out fossil fuels and transition to clean renewable solar and wind energy, along with some "nature-based" carbon dioxide removal (CDR), like protecting forests, wetlands, and other carbon-rich ecosystems and increasing soil carbon storage, to drawdown existing $CO_2$ from the atmosphere.[18]

**Not needed for biomass residue disposal:** Where forest thinning occurs, woody materials can be left in the forest, broken down and scattered on the forest floor to create wildlife habitat, retain vital nutrients, and build soil organic carbon.[19] Agricultural residues can be chipped and added to the soil, composted, or mulched to revitalize soil health and increase crop yields.[20]

**Not effective for community wildfire safety:** Research shows that the most effective way to prevent wildfires from harming communities is to make communities themselves ignition-resistant through home hardening and vegetation work in the defensible space within 60 to 100 feet from structures — not logging forests.[21] And biomass facilities themselves can pose wildfire ignition risks. The 2022 Mill Fire in Weed, California, which killed two people and destroyed or damaged 144 structures, started at a biomass facility.[22]

**Not effective for reducing wildfire emissions:** Although biomass proponents claim that thinning forests will reduce wildfire emissions, the reality is broad-scale thinning for wildfire management leads to more carbon emissions than it prevents from being released in a wildfire. Overall, thinning leads to a net increase of carbon emissions to the atmosphere and net decrease in forest carbon storage.[23]

**It is clear we must reject these biomass industry scams and invest in the needed just transition to clean, affordable solar and wind energy.**

DTE Stockton combustion biomass power plant

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at Table 1 (biomass gasification to make hydrogen is by far the most water-intensive of all hydrogen production methods, using 305.5 kg water per kg $H_2$ produced)

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[14] Kuprewicz, R.B., Safety of Hydrogen Transportation by Gas Pipelines, Pipeline Safety Trust (2022), https://pstrust.org/wp-content/uploads/2022/11/11-28-22-Final-Accufacts-Hydrogen-Pipeline-Report.pdf.

[15] Center for Biological Diversity, Hydrogen Hurts the Climate and Frontline Communities (2023), https://www.biologicaldiversity.org/programs/climate_law_institute/pdfs/hydrogen-factsheet-2024-05-23.pdf

[16] Existing and proposed biomass facilities often target communities of color and low-income communities already suffering from high pollution burdens, worsening environmental injustice. For example, in California, idled biomass power plants near homes and schools in the disadvantaged Central Valley communities of Mendota, Madera, and Delano are being proposed to be restarted as biomass gasification with CCS facilities.

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