

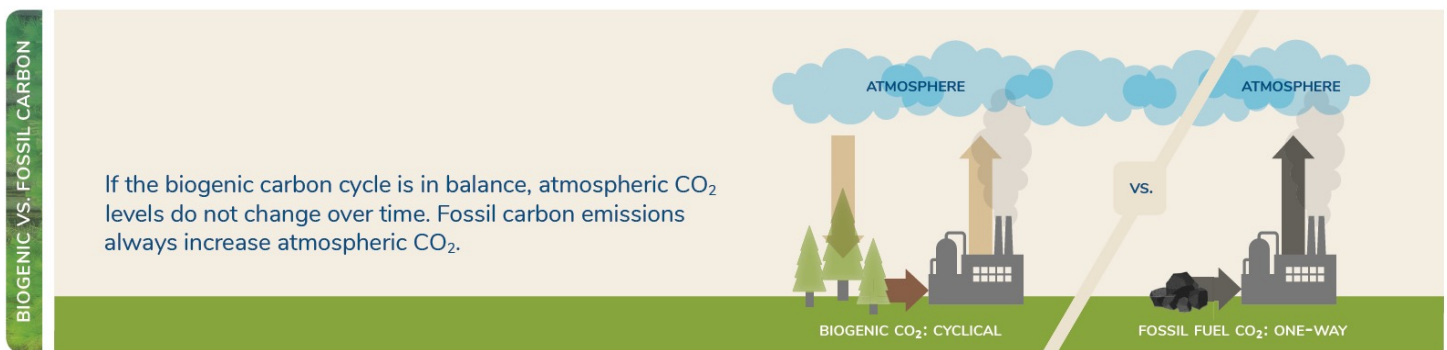


PID
FLOORS

Biomass Carbon Neutrality
in the Context of the
Wood Products Industry

Biomass is the name for a range of organic materials that can be used to produce energy. A salient example are forestry products like wood. Biomass and biofuels made from biomass are alternative energy sources to fossil fuels, such as coal. Burning either fossil fuels or biomass releases carbon dioxide (CO₂) into the air. However, the plants that are the source of biomass for energy capture almost the same amount of CO₂ through photosynthesis while growing as is released when biomass is burned. Therefore, biomass can be made a carbon neutral energy source.

When we think about the wood products industry specifically, we examine forests. When biomass carbon emissions are completely offset by forest growth, biomass carbon neutrality is achieved. Neutrality can also occur when the carbon in the biomass would have returned to the atmosphere even if it had not been used for products or fuel.




Notice that on the right side of the diagram, carbon dioxide is released into the air, but the coal cannot absorb it. Whereas on the left side, the trees can absorb the carbon dioxide they released and thus maintain the level of CO₂ in the air.

To be environmentally beneficial and sustainable, we must not use biomass faster than we can grow it. If we do not maintain the life cycle, more CO₂ will enter the atmosphere and deforestation will occur. Well-managed biomass can be regarded as a renewable energy. When we maintain the life cycle of trees, we create a sustainable system.

Advocates of biomass energy agree that when forests are harvested sustainably, and the timber industry thinnings are used as fuel, the smokestack emissions are cancelled out by the carbon absorbed by forest regrowth. However, some scientists say that this carbon accounting doesn't add up. "Wood bioenergy can only reduce atmospheric CO₂ gradually over time, and only if harvesting the wood to supply the biofuel induces additional growth of the forests that would not have occurred otherwise," says John Sterman, an expert on complex systems at Massachusetts Institute of Technology.

It is important we assess biomass carbon neutrality in our forests to ensure they are harvested sustainably. Below are three different forest approaches to determining biomass carbon neutrality:

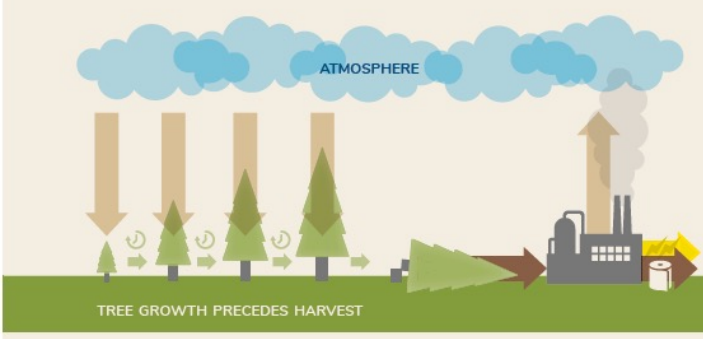
HARVESTED MATERIALS



TREE GROWTH IS CONCURRENT WITH HARVEST

FOREST APPROACH 1: Compare carbon lost due to harvesting to flows of carbon from the atmosphere into the remaining, growing trees within a specified area. Carbon is “neutral” if the flows into growing trees completely offset concurrent losses of carbon due to harvest within that area.


HARVESTED MATERIALS



TREE GROWTH PRECEDES HARVEST

FOREST APPROACH 2: Compare the carbon removed from the atmosphere during tree growth to that returned to the atmosphere following harvest. With this approach, under most circumstances biogenic carbon is “neutral.” In some cases (e.g., if there is land use change), biogenic carbon may not be “neutral”.

HARVESTED MATERIALS



TREE GROWTH FOLLOWS HARVEST

FOREST APPROACH 3: Compare the carbon lost due to harvesting to flows of carbon into trees that regrow after harvesting. With this approach, “neutrality” of the carbon depends primarily on what is regrown, its growth rate and the future time horizon used to calculate CO₂ removals from the atmosphere.

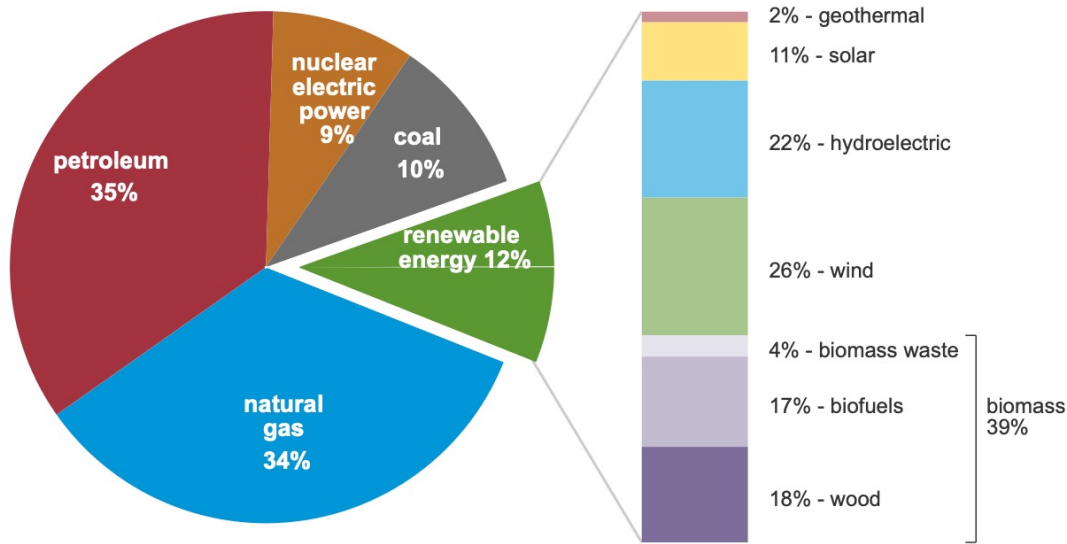
A variation of this approach is to also consider the carbon that would have been removed from the atmosphere had the tree not been harvested.

The table below breaks down the energy used and produced in the United States, and you can see that renewable energy only makes up 12%.

U.S. primary energy consumption by energy source, 2020

total = 92.94 quadrillion
British thermal units (Btu)

total = 11.59 quadrillion Btu



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1, April 2021, preliminary data
 Note: Sum of components may not equal 100% because of independent rounding.

RESOURCES

- <https://awc.org/publicpolicy/biomass>
- <https://www.eia.gov/energyexplained/biomass/biomass-and-the-environment.php>
- <https://www.eia.gov/energyexplained/us-energy-facts/>
- <https://www.ncasi.org/resource/biomass-carbon-neutrality-in-the-forest-products-industry/>
- <https://physicsworld.com/a/biomass-energy-green-or-dirty/>

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