



SUSTAINABLE

WOODY BIOMASS



INTRODUCTION

Sustainable woody biomass encompasses organic materials obtained from trees and woody plants through sustainable forest/agriculture management practices. These renewable resources play a pivotal role in combating climate change, simultaneously supporting local economies and enhancing societal well-being.

- Woody biomass serves as a versatile source of renewable energy, reducing dependence on non-renewable resources and contributing to a diversified and resilient energy portfolio.
- Woody biomass is converted to energy through various processes, especially direct combustion (burning) to produce heat and thermochemical conversion to produce solid, gaseous, and liquid fuels.
- Woody biomass can also be turned into transportation fuels using three main methods.
 - The first method involves heating wood with limited oxygen to create syngas, which can be turned into liquid fuels, e.g. ethanol or diesel¹.
 - The second method breaks down parts of wood into sugars, ferments them into ethanol using microbes, which convert them into ethanol².
 - The third method heats wood without oxygen, so called pyrolysis (thermochemical) to produce bio-oil, which can be refined into diesel, gasoline, or other related products³.

¹ Tunã P, Hulteberg C. Woody biomass-based transportation fuels-A comparative techno-economic study. *Fuel*. 2014 Jan 30;117:1020-6.

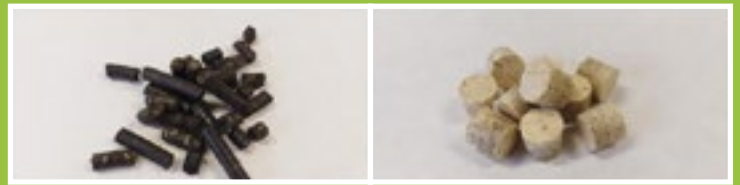
² Wackett LP. Biomass to fuels via microbial transformations. *Current opinion in chemical biology*. 2008 Apr 1;12(2):187-93.

³ Isahak WN, Hisham MW, Yarmo MA, Hin TY. A review on bio-oil production from biomass by using pyrolysis method. *Renewable and sustainable energy reviews*. 2012 Oct 1;16(8):5910-23.



- Wood pellets are a type of solid biomass fuel made from compacted sawdust, wood shavings, and other wood waste materials. These small, cylindrical pellets are produced through a process called pelletization.

Figure 1. Wood pellets



- Another valuable product derived from woody biomass is biochar, a carbon-rich material produced through the process of pyrolysis, which involves heating biomass in the absence of oxygen. This results in a stable, charcoal-like substance that can be used for various purposes, particularly in agriculture. Sources of biochar from woody biomass include twigs and leaf litter forestry.



Figure 2. Biochar

**DO YOU
KNOW THAT
WOODY
BIOMASS
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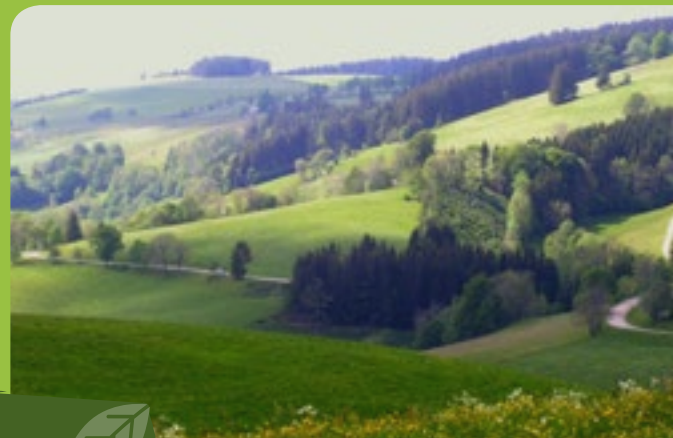
...IS CONSIDERED „CARBON NEUTRAL“ ?

It means the carbon footprint associated with combustion or utilization of woody biomass is considered to be neutral or close to zero, as the carbon emitted during its utilization is offset by the carbon sequestration that occurred during the trees and plants's growth phase

...SOURCES OF WOODY BIOMASS ARE NOT ONLY FROM PRIMARY PRODUCTS OF NATURAL FORESTS AND PLANTATIONS?

They also encompass residues and wastes, such as those from plantation and agriculture operations, wastes from construction and wood processing industries, as well as household wood waste.

Figure 3: Forest trees and agriculture crops →



GOOD PRACTICE

“Let's clean up the Czechia” (www.kamsnim.cz)

A project from a non-profit organization to collect recycled materials including woody biomass for reutilization with more than 50,000 collection points.

⁴ FAO. Implications of Woodfuel Use for Greenhouse Gas Emissions. In Asia-Pacific Forestry Sector Outlook Study: Regional Study on Wood Energy Today and Tomorrow in Asia; Working Papers Series. Field Document No. 50; Regional Wood Energy Development Programme in Asia: Bangkok, Thailand, 1997.