BIOMASS WORLD TRADE

11/17/2024

"A seed grows with no sound.
But a tree falls with huge noise.
Destruction has noise but creation is quiet.
This is the power of silence … grow silently."
Confucius' counsel

INTRODUCTION

In 2023, the USA exported more biomass energy than it imported, making it a net exporter of biomass energy. It exported biomass in the form of Wood Pellets and Densified Biomass Fuels. It exported 9.54 million metric tons of wood pellets in 2023, valued at $1.75 billion. This was up from 9.01 million metric tons exported in 2022. The USA is the world's largest exporter of biomass, followed by Brazil, Germany, mainland China, and India. The USA Department of Energy (DOE) released the 2023 Billion-Ton Report (BT23), which reported that the USA could sustainably triple its biomass production to over 1 billion tons per year. It also identified feedstocks that could be used to produce biofuels for transportation and industrial processes. The USA currently uses about 342 million tons of biomass, including corn grain for ethanol and wood/wood waste for heat and power to meet roughly five percent of its annual energy demand.

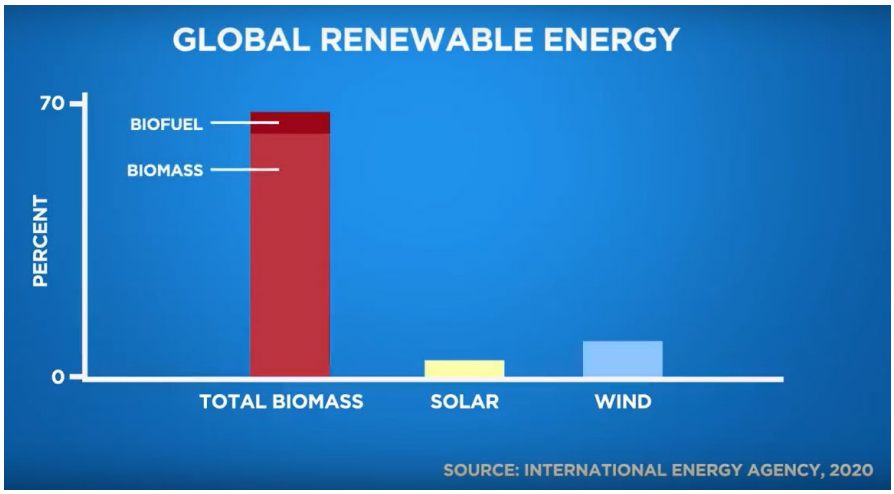

Figure 1. Biomass is the largest source of renewable energy globally, accounting for 55 percent of renewable energy and over 6 percent of global energy supply exceeding the contributions from wind and solar energy generation, combined. Source: IEA, International Energy Agency, 2020.

As biomass is produced, an equivalent amount of carbon is absorbed, making modern bioenergy a near zero-emission fuel. It is the largest source of renewable energy globally,

accounting for 55 percent of renewable energy and over 6 percent of global energy supply exceeding the contributions from wind and solar energy generation combined.

However, a time lag exists between harvesting and replacement of the energy resource that can range from months to hundreds of years. This loophole has been exploited in the Kyoto Treaty by multiple countries so that they can meet their treaty obligations. Wood pellets produced in the USA come predominantly from whole trees, not from wood residues or unmerchantable wood.

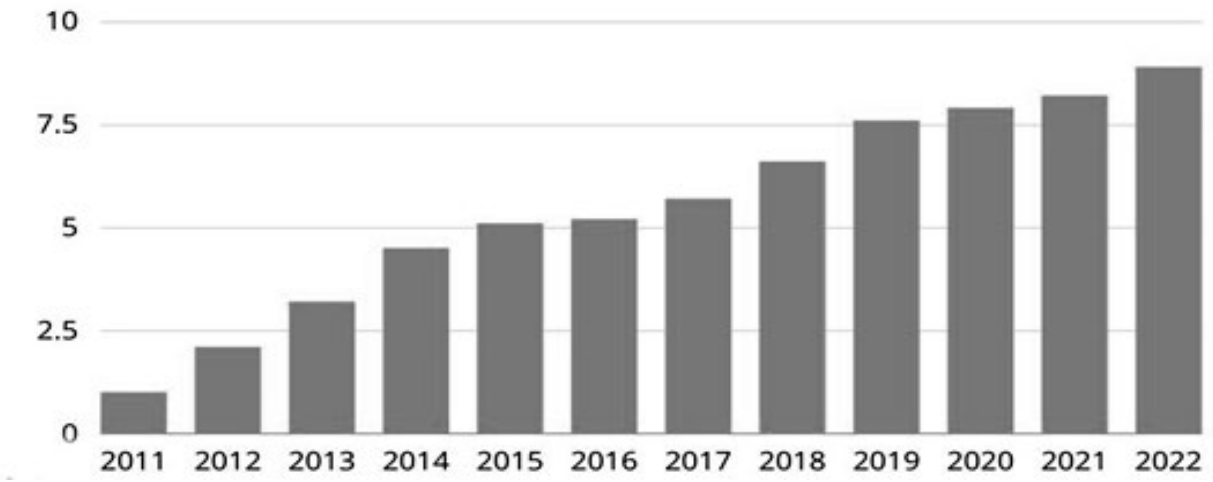

Figure 2. USA exports of wood pellets, million tons/year.

Figure 3, Loading wood pellets from barges onto cargo ships for export.

Figure 4. Loaded wood pellets on barge.

Figure 5. Loading cargo ship with wood pellets from barge.

BIOMASS EXPORTS FROM USA

Wood pellets from the USA's South are used globally in electricity production or heating schemes identified as renewable. Wood pellets have been exported to 75 countries since 2012. Particularly, over 75 percent of USA wood pellets have been exported to the UK. Only four countries have received more than a million tons of wood pellets from the USA from 2012-2020:

United Kingdom: 37 million tons,
Belgium: 5.2 million tons,
Denmark: 2.1 million,
The Netherlands: 2.1 million tons.

The percentage of wood pellets going to each country will continue to vary as bioenergy companies like Enviva secure long-term contracts with governments and their power plants.

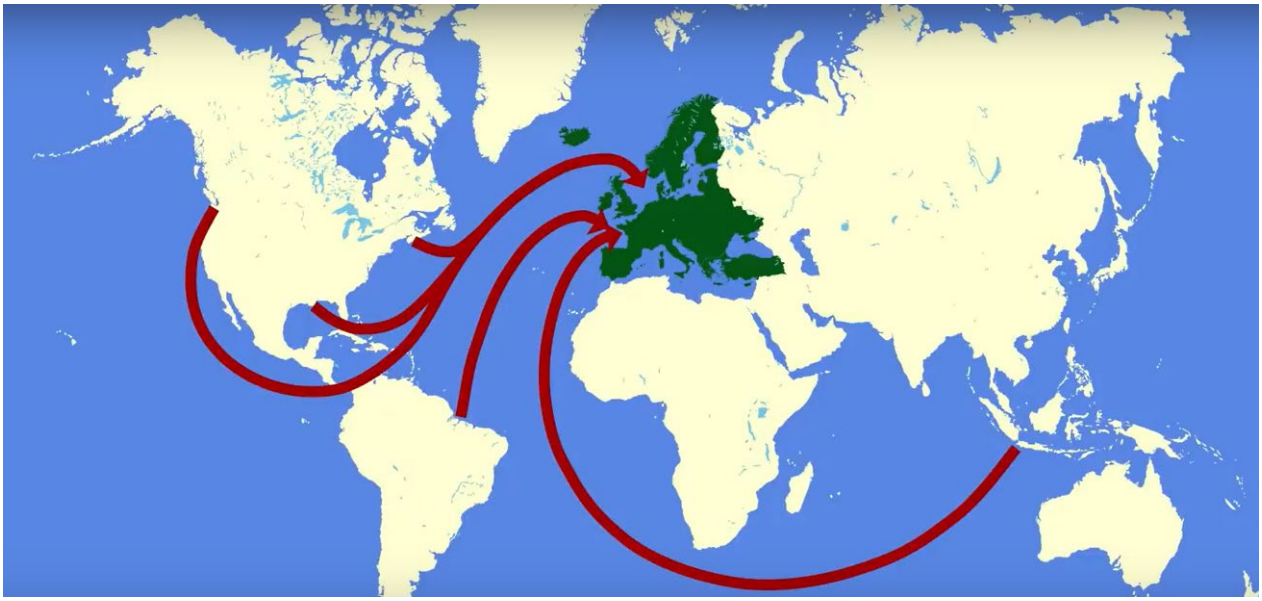

Figure 6. Biomass exports to the European Union, EU from North American, South American, and South Asian forests.

BIOMASS PRODUCTS, DENSIFIED BIOMASS FUEL

Biomass is formally defined as organic material that comes from crop residues, agricultural and food wastes, forest residuals, livestock, as well as biomass crops that are grown specifically as feedstocks to produce biobased products. After harvest or collection, biomass can be used to make sustainable fuel, fibers, electricity, construction materials, plastics, insulation, personal care items, and many other biobased products. Biobased products contributed $489 billion to the USA's economy in 2021, a more than five percent increase from $464 billion in 2020.

Densified biomass fuel, a growing energy source in the USA, consists primarily of compressed wood pellets, briquettes, and logs. These fuels are easy and economical to store and transport. The manufacture of wood pellets utilizes wood residues from sustainably managed forests as well as high-quality wood waste from a variety of industrial activities such as construction and logging. Wood pellet combustion has a high efficiency level, averaging about 80

percent, and extremely low particulate emissions. Additionally, wood pellets are considered as a renewable energy source.

Densified biomass fuel is used for heating in wood pellet stoves or furnaces in residential settings and in large-scale boilers in commercial buildings. Industry uses utility-grade wood pellets in processes that require thermal energy, such as generating electricity.

BIOMASS PRODUCTION

As of August 2024, 77 operating manufacturers of densified biomass fuel had a total production capacity of 13.34 million tons per year and collectively had an equivalent of 2,432 full-time employees. The manufacturers purchased 1.73 million tons of raw biomass feedstock, produced 0.93 million tons of densified biomass fuel, and sold 0.89 million tons of densified biomass fuel. Domestic sales of densified biomass fuel in the USA were 0.15 million tons and averaged a price of $229.48 / ton. Exports in August 2024 were 0.73 million tons and averaged $187.41 / ton.

Wood pellets are made from compressed sawdust or other wood waste. When burned in power plants, they produce ash and emit more carbon dioxide than coal. Because wood pellets come from trees, wood pellets are sometimes touted as a “green” energy source.

However, there are multiple environmental issues associated with wood pellets use:

1. Producing wood pellets requires large amounts of energy: logging, transport, processing, and shipping. These processing steps add an estimated 10-20 percent more carbon emissions to the final carbon impact of these products.
2. Wood pellets are less efficient than other fuels in the electrical production sector. Wood pellets used for heating are moderately efficient, but wood pellets take more energy to combust than coal. They produce less energy for the same heating interval. For this reason and because of associated mechanical limitations, wood pellets are often burned mixed with coal.

DISCUSSION

Wood pellets speed up the process of releasing carbon into the atmosphere. This is true when comparing wood pellets to other wood products. For instance, the carbon stored in furniture or home construction may stay in the biosphere for decades or centuries. However, the carbon stored in wood pellets is released within a few years. The carbon input to the Earth’s atmosphere by logging is significant.

Clear-cutting forests and wooded areas to harvest wood for wood pellets additionally results in faunal and floral habitat loss and other environmental damage. A study found that more logging residues get removed during a bioenergy harvest. Those are branches, leaves, and smaller trunks. This leads to more significant impacts on the soil and leads to longer forest recovery. As a result, the true environmental impact of wood pellet production is highly contested.

Communities with wood pellet mills complain about constant traffic, and the resulting thick dust that blankets everything. Community members wash their cars multiple times a week. Wood pellet mills promise jobs to communities, but these jobs are often temporary or involve contract with few benefits and securities.

Mills were twice as likely to be placed in under-resourced communities. The wood pellet mills in North and South Carolina were placed in these so-called “Environmental Justice” communities.

European countries are importing wood pellets in satisfaction of their commitments in the international climate treaties. The existing climate treaties presume that trees can be grown quickly within a time constant of tens of years, unlike fossil hydrocarbon fuels with hundreds of years. Therefore, wood pellets are treated as "carbon neutral" in most countries' carbon ledgers. However, substantial greenhouse gases are emitted when wood pellets are burned. Because wood pellets burn hotter than coal, one ton of wood pellets will produce more greenhouse gases than one ton of coal. Technically, other sources like wind and solar are far more efficient and possess a lower carbon signature than wood pellets.

The USA is a substantial producer of solid biomass for the following reasons:

1. The USA's South is already "the wood basket of the world" providing between 10-20 percent of the world's paper, pulp, and other wood products.
2. The USA has already cleared 95 percent of its old-growth forests. In the forestry sector, any younger forests are fair game for harvest.
3. Subsidies offset the cost of building wood pellet mills, both from the USA's government and the purchasing countries.
4. The USA South has many forests, and over 90 percent of the forest resources are privately owned. Harvesting woody biomass, fuel wood, and wood chips is not subject to significant protective environmental regulations.

While many countries produce some wood pellets, the USA dominates the wood pellet export market. In 2020, the USA was responsible for 25 percent of total global wood pellet exports. The USA exported more biomass resources than the next two countries of Vietnam and Canada combined.

The number of mills built for wood pellet exports is expanding. Many foreign countries believe that wood energy is a viable way forward. As a result, there exists a high wood fiber demand from external sources.

As of 2022, there were 24 operating mills for wood pellet exports in the USA's South. An An additional fifteen mills are either planned or under construction.

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