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Multiple uses of forest biomass as nature-based solution in order to increase the share of green and renewable energy at the energy matrix of several industries

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INTRODUCTION

The whole world is looking at the climate change agenda which has gained emergency status. However, when we think about GHG emissions and climate change we shall think about energy. Among renewable sources, solar energy has huge potential in tropical countries; wind energy in several countries; hydrogen is the "big promise". Yet, none of those options can address the climate change mitigation so accurately and share so many values like forest biomass coming from planted forests.

SCOPE AND MAIN OBJECTIVES

The forest-based industry in Brazil holds 9.5 mi ha of planted trees and sets aside 6 mi ha of native vegetation for conservation purposes. Plantations are established in degraded areas which is important for restoration of services like carbon removals and storage; conservation of soil; habitat for biodiversity, etc. Wood coming from Eucalyptus and Pine are important raw material for industries like pulp, paper, panels; laminate flooring, package, etc. However, what is not much known is the importance of forest biomass as energy supply for forest-based industry and several others. The object of this poster is to show the relevance of this source of energy, particularly the black liquor and charcoal in the Brazilian economy.

RESULTS

The forest-biomass energy can be found in many formats like chips, black liquor, pellets, briquettes, charcoal, biofuels, etc.

And can be used in many situations: in mills, houses, transportation, etc.

73% of the sector has its energy matrix based on black liquor and 16% on forest biomass, which means an 89% renewable matrix.

It is estimated that for every 1 mi ton of pulp produced in Brazil, 4 million GJ of electricity are generated.
This industry produces 200,000 GJ of bioeletricity per day, equivalent of 80% of the energy needed in São Paulo city – the biggest in Latin America.

In the last 6 years, the production of bioelectricity of this sector increased 25%, and its sale s increased 39%. It makes biomass an important energy security agent in Brazil, contributing to a renewable energy matrix.

In 2020, the increase in bioelectricity production was 2%. 80.4 mi GJ were produced, representing 77.4% of the 104 mi GJ consumed by the sector, which ensured an important rate of energy self-sufficiency. In 2019, this rate was 69%. Part of this improvement comes from the 8.7% reduction in consumption, meaning an improvement in energy efficiency.

There was also a drop of 28.6% (16 thousand GJ) in energy purchases. The sector still managed to sell 16.3 mi GJ to the market. This is a result of investments in circular bioeconomy which transform residue in renewable bioenergy, as well as energy efficiency.

Brazil is the biggest producer of Eucalyptus charcoal worldwide. Traditionally, the charcoal is used for cooking; however, in Brazil it is also used as bioenergy and bioreducer to produce pig iron, used at steel, ferroalloys and metallic silicon industries, instead of coal.

In 2016, the use of charcoal in the production of pig iron made up 19.3% of the production, and grew year after year reaching 24.62% in 2020.
In the same period, the growth in consumption of charcoal in absolute numbers was 27.5%.

It is estimated that 1.6 ton of CO_2eq is avoided for each 1 ton of pig iron.
In 2020, the use of charcoal avoided avoiding the emission of 13,095,126 tons of CO_2eq in relation to the global average production.
Such contribution has gained attention from an initiative called Sustainable Steelmaking Project - unique from Brazil and that has significant importance in social, environmental and economic aspects.

CONCLUSIONS

- The perspectives for bioelectricity are of increasing, due to: a) New pulp mills which are more modern and shall export energy; b) Investment in energy efficiency; and c) Cogeneration at charcoal industry (from gases from pyrolysis).
- The scenario is also positive for charcoal. The biggest charcoal producer company of the world has announced in 2021 the increase of 20% of their forest plantation for charcoal production.
- International regulations such as Carbon Border Adjustment Mechanisms of European Union started pressuring industries to reduce carbon emission that is favorable for charcoal.

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