

# Perspectives for sustainable forest biomass as energy source in Brazilian Central West region

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Brazil is the 4<sup>th</sup> largest agricultural producer in the world, with soybeans, corn, rice, and seed cotton as main crops. In this scenario, the state of Mato Grosso, in the Central West region, stands out as the largest agricultural producer, contributing approximately 27% of the total grain production in the country. In the forest scenario, the country also stands out with approximately 9.55 million hectares of planted tree crops and an average annual productivity of 36.8 m<sup>3</sup>/ha. However, the state still has an incipient planted area despite the high demand aimed at serving the agricultural sector for grain drying and energy generation. In this context, the state of Mato Grosso emerges as an option for investments in commercial reforestation, leveraged mainly by the consumption of biomass to meet the agroindustry's thermal energy demand, especially those of ethanol from corn, a growing sector in this region.

This work aims to develop an overview of the perspectives for forest-based biomass energy segment in the state of Mato Grosso. A literature review was carried out presenting the use of this biomass in the national and state energy mix, in addition to the energy analysis of the state and its mesoregions. In order to determine the main uses and possibilities to expand its use in the state, the agricultural and forestry scenarios were evaluated with a focus on energy generation and, based on this information, the projections for wood demand were estimated. Thus, it is intended to collaborate in the promotion of bioelectricity and the use of thermal energy, as well as in the development of a public policy to encourage the use of forest biomass in the production of energy in the state of Mato Grosso.

For the theoretical evaluation of the wood demand, it was considered only the main agricultural products that require drying, namely soybeans and corn. For this purpose, it was used existing scenarios to produce each type of crop for the next 5 years. (Table 1).

To calculate the wood demand projection for grain drying, the Annual Average Increase of 35.6 m<sup>3</sup>.ha.year was used for the dendrometric variable Total Volume with Bark, at 4.5 years; final was adopted equal to 14%, volume of wood for drying soybeans being 0.0218 m<sup>3</sup>/t and, for corn, 0.0574 m<sup>3</sup>/t. The results obtained for the total amount of wood and the area required for planting eucalyptus are presented in Table 2.

The scenarios carried out in this work estimate that the demand for forest biomass for the agricultural sector, in the next 5 years, is 15,211,819 m<sup>3</sup> of wood and 427,298 hectares of planted area (considering only the already available land, with no deforestation).

Forest biomass use increase as a source of thermal and electrical energy can promote greater sustainability and security of the national electricity mix, thus meeting the targets for reducing Brazil's carbon emissions in the Paris Agreement and for meeting the targets set out in the National Policy on Climate Change law.

There are many challenges for the full establishment of sustainable eucalyptus plantations in the state of Mato Grosso. However, its potential is considerable, since the use of forest biomass as an energy source is fundamental to the

maintenance of other agribusiness production chains, mainly for grain drying. In addition, the expected increase in corn production, aimed at the ethanol market, promote forest planting of fast-growing species to produce solid biofuels to meet the thermoelectric demand of this sector.

Table 1 - Average\* soybean and corn production projections for the next 5 harvests.

<b>Product</b>	<b>2023/24</b>	<b>2024/25</b>	<b>2025/26</b>	<b>2026/27</b>	<b>2027/28</b>	<b>TOTAL</b>
<b>Soybean</b>	39,909	41,056	42,273	43,634	44,832	<b>211,704</b>
<b>Corn</b>	34,661	35,807	36,921	38,050	39,172	<b>184,611</b>

\*in thousand tons.

Source: Own elaboration (2022).

Table 2 - Wood volume and planting area needed for grain drying in Mato Grosso.

<b>Parâmetro</b>	<b>2023/24</b>	<b>2024/25</b>	<b>2025/26</b>	<b>2026/27</b>	<b>2027/28</b>	<b>TOTAL</b>
<b>Volume (m<sup>3</sup>)</b>	2.859.558	2.950.343	3.040.817	3.135.291	3.225.810	<b>15.211.819</b>
<b>Area (ha)</b>	80.325	82.875	85.416	88.070	90.613	<b>427.298</b>

Source: Own elaboration (2022).