

Carbon and water footprint of hydrous ethanol from Brazilian sugarcane produced by Odebrecht Agroindustrial

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ABSTRACT

Odebrecht Agroindustrial operates in the production and commercialization of ethanol, electricity and sugar. It has an annual production capacity of 3.7 billion liters of ethanol, 700 thousand tons of VHP sugar and 3.1 thousand GWh of electricity from biomass, supplying to the Brazilian and foreign markets two types of ethanol fuel: anhydrous and hydrated ethanol.

The work carried out in partnership with the team from the Center for Sustainability Studies from FGV (GVces) consisted of developing an LCA study for the hydrated ethanol produced at the Rio Claro plant (Caçú – Goiás, Brazil), considering the climate change (carbon footprint) and water (water footprint) impacts. The software OpenLCA and the Ecoinvent database version 3.2 were used; the functional unit defined for the project was the generation of 1 MJ for use in an internal combustion engine of a car.

The results of this study contributed to the identification of the hot spots for both the greenhouse gas (GHG) emissions and the water consumption. The emissions from the agricultural stage (production and transportation of sugarcane) represents about 76% of the product's total GHG emissions. The industrial and the distribution of ethanol stages represent, together, about 17% of emissions and the ethanol burning as fuel represents about 7%. For the water consumption, the irrigation of the sugarcane represents 46% of the product's total lifecycle. Another 40% of water is consumed in the industrial stage of ethanol production. From the remaining water calculated, there is a share of 13% in the production of fertilizers (urea and superphosphate) and 2% in the production of other input materials and transports.

In the data collection process, two suppliers were directly involved: a transportation services supplier and a sugarcane supplier (responsible for a small part of the sugarcane used in the production process that is brought externally). Odebrecht is responsible for producing about 88% of the sugarcane used in ethanol production, which allows it to have direct influence in the GHG emissions and water consumption along the product's lifecycle. For example, the company can take actions to reduce GHG emissions and water consumption at this stage of the process, the most significant for both impact categories. The results of the study were presented to Odebrecht's board of directors and resulted in concrete life cycle management actions: from now on, quarterly reports will be published to follow up on these indicators and to identify synergies with other areas of the company (Agricultural, Maintenance, Industry and EHS). These information will support the development of improvement projects regarding the hot spots and strategic areas identified. In addition, the results derived from this LCA study will be used by third parties (Odebrecht's clients) involved in the supply chain of the green polyethylene, a polymer derived from ethanol from sugarcane.

Key words: carbon, water, ethanol, sugarcane, life cycle management, LCA