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Biogas reduces the carbon footprint of cassava starch: A comparative assessment with fuel oil

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Greenhouse gases (GHG) emissions (100-year horizon), or carbon footprint of cassava starch production, were assessed based on three factories in Thailand. The system boundaries included farm stage (production of cassava roots), transportation to factory, processing into native starch. The functional unit (FU) was one ton of native cassava starch at 13% water content. The total CF of cassava starch was in the range 609–966 kg CO_2eq/FU. Agricultural production contributed approximately 60% of GHG emissions, mainly from the use of nitrogen fertilizers. GHG emissions of root production varied widely due to the diversity of agricultural practices within the same region. The contribution of the factory stage to the carbon footprint depended on the use of electricity, biogas and other fuels, ranging from 217 to 342 kg CO_2eq/FU. Allocation rules such as wet-weight or dry-weight basis allocations affected the results markedly, which highlighted the importance of the allocation method for co-products with high moisture contents. Biogas produced from the factory wastewater was the main source of thermal energy for starch drying (95–200m^3/FU). In the past 10 years, 90% of cassava starch factories in Thailand switched from fuel oil to biogas, which reduced GHG emissions of the cassava starch industry as a whole between 900,000 and 1,000,000 tons CO_2eq/year.

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