

# Brazil SynCrude: Sustainable hydrogen production derived from biogas and green hydrogen

Cooperation between GIZ, Mele, Coopernan and Ambicoop

## The Challenge

Located in the western part of the Brazilian state of Paraná, the municipalities of Toledo and Nova Santa Rosa and more neighbored municipalities are the strongholds of the agricultural economy in Brazil. According to official data, about 2500 farms are in the common municipal area, producing pork and poultry, as well as milk and cassava root processing. Animal husbandry results in waste, the disposal of which causes considerable environmental problems. For example, about 7.3 million cubic meters of manure from pig farms are stored inadequately in open ponds, from which they infiltrate the soil over time and enter the adjacent water system of the Paraná River. Due to high direct solar radiation, manure ferments on the surface of the lagoons to methane, a greenhouse gas harmful to the environment, and escapes into the atmosphere - estimated at least 6 million cubic meters per year. In addition, there are about 353.000 tons of poultry manure and 35,000 tons of cassava processing residues each year.

The objective of the syncrude production project is to use the valuable waste from agriculture and livestock in a sustainable way and move forward with the technological solutions needed to produce green hydrogen or green hydrogen derivatives as carriers of energy and fuels and to significantly reduce pollutant emissions. At the same time, the income situation of the rural communities is improved through new income streams.



*Luiz Diat/GIZ*



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## The Solution

Waste, such as liquid manure and plant waste, is fermented to biogas in a bioreactor. This is then separated into two streams, CO<sub>2</sub> and biomethane, which are combined with green hydrogen to form the SynCrude derivative. Green hydrogen is produced by electrolysis, the required renewable electricity is covered by local PV plants as well as an adjacent wind farm directly connected to the electrolysis plant. The estimated production of Syncrude is 100 thousand tons annually.

In addition, fermentation residues from biogas plants will be processed in natural fertilizer in a composting plant to produce approximately 500.000 tons/year and replace the artificial fertilizer currently used.

Liquid manure is transported through a network of pipelines from the farms. This ensures a permanent and gas-tight supply to biogas plants without the need to transport vehicles by road. The transport of other waste materials will be organized in the medium term using electric vehicles. In order to keep transport routes as short as possible, a total of up to 30 biogas plants will be built in a decentralized manner in the project area.

## Our Services

Within the framework of this public private cooperation, the partners will develop a replicable concept to carry out the technical installations and their necessary components to produce the SynCrude. This includes the following analysis and activities:

- Certification and sustainability aspects
- Animal welfare practices
- Technical-economic plant concept
- Enabling regional partners to implement the concept.
- Finance options
- Dissemination and public relations

The concept will be structured in such a way that it can be used as a project in other regions of the country. The aim is to enable as many agricultural cooperatives as possible to replicate the concept.

In addition, potential off-takers for the SynCrude are identified.



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## Impacts and results

Participating cooperatives will be able to sustainably reuse their agricultural and livestock waste, which could not be used in the past, to produce green SynCrude, for later use as e-fuels, e-kerosine, or as input to chemical products. In

this way, they are making a major contribution to climate protection in the region.

At the same time, the concept allows cooperatives to generate greater economic benefits from their activities and thus increase the monthly income of cooperatives. With the development of a business model, the concept can be replicated and made even more attractive to other applications in neighboring or similarly structured regions.

Briefly	
<b>Duration of services</b>	January/2023 to December/2023
<b>Countries</b>	Municipalities of Toledo and Nova Santa Rosa and other municipalities, State of Paraná, Brazil
<b>Objective</b>	Allow participating cooperatives to develop a concept for the sustainable use of agricultural waste to produce green SynCrude and build knowledge about technical possibilities and economic opportunities with the aim of accelerating the development of the green hydrogen market and its derivatives.
<b>Partners</b>	Mele Group, a German biogas company; COOPERSAN and AMBICOOP, two cooperatives of the region, each with more than 100 associated farms.
<b>Expected results</b>	Participating regions will benefit ecologically and economically from the transfer of know-how and technical applications. The concept will improve the economic situation of participating cooperatives and their members and support the expansion of a regional hydrogen economy.

**Published by:**  
Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

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