Brazilian Green Methanol: Sustainable Fuel Production from Biogas and Green Hydrogen

Cooperation between GIZ, Mele, Coopersan 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 sustainable fuels 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 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.

Luíz Diaz/GIZ

Photo: Luíz Diaz/GIZ

The Solution

Waste, such as liquid manure and plant waste, is fermented to biogas in a bioreactor. This is then separated into two streams, CO2 and biomethane, which are combined with green hydrogen to form a mix of biogenic and non-biogenic e-methanol. Green hydrogen is produced by electrolysis powered with renewable electricity from local PV plants as well as from the grid. The estimated production of green methanol is 275,000 tons annually, 30% of this is considered e-methanol.

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

Federal Ministry for Economic Affairs and Energy

mele UNTERNEHMENSGRUPPE

AMBICOOP

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 40 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 developed a replicable concept to carry out the technical installations and their necessary components to produce the green methanol. This included 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 has been 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 derivate have been identified.

Photo: Luíz Diaz

Impacts and results

Participating cooperatives are able to sustainably reuse their agricultural and livestock waste, which could not be used in the past, to produce green methanol, 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 and generate income. The construction of the first biogas plant will be starting shortly.

The concept has inspired other agricultural cooperatives and regional governments to develop own projects and action plans to use agricultural residues for the production of hydrogen derivates.

Briefly	
Duration of services	January 2023 to May 2024
Budget	€ 2,111,762, of which 22% is public contribution
Countries	Municipalities of Toledo and Nova Santa Rosa and other municipalities, State of Paraná, Brazil
Partners	Mele Group, a German biogas company; COOPERSAN and AMBICOOP, two cooperatives of the region, each with more than 100 associated farms.

Download the final report.

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

On behalf of the
Federal Ministry for Economic Affairs and Energy

Registered offices
Bonn and Eschborn, Germany

Address
Postcode and town, country
T +49 61 96 79-0
F +49 61 96 79-11 15
E info@giz.de
I www.giz.de

Brazil, January 2026

Author/Responsible/Editor, etc.:
Regine Dietz

Photo credits:
Luiz Diaz / GIZ

URL links:
Responsibility for the content of external websites linked in this publication always lies with their respective publishers. GIZ expressly dissociates itself from such content.

GIZ is responsible for the content of this publication.

Contact Information:
GIZ Brazil
N Markus Francke
E markus.francke@giz.de
I www.giz.de

COOPERSAN
N Geraldo Zimmermann
E coopersan.nvsr@outlook.com

AMBICOOP
N Maiara Guedes
E diretoria.executiva@ambicoop.com.br

MELE
N Helmut Tündermann
E h.tuendermann@me-le.de

The International Hydrogen Ramp-up Programme (H2Uppp) is supporting entrepreneurial engagement in the ramping-up of hydrogen in the Global South and is a programme of the:

Federal Ministry for Economic Affairs and Energy

Implemented by:

giz