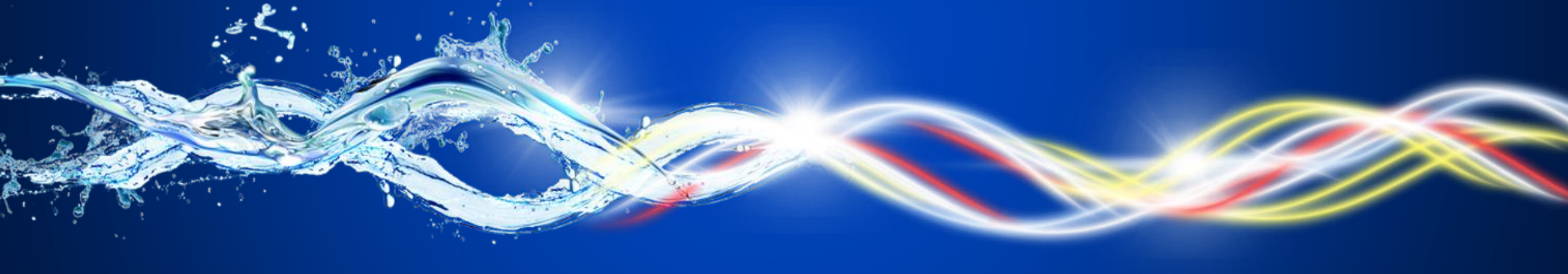


Initiatives in renewable energies for the sustainable development of the western region of Paraná state.



INTRODUCING *ITAIPU BINATIONAL*

BINATIONAL COMPANY

Brazil and Paraguay (50% share each)
2.800 employees (50% BR e PY)

HYDROLOGY

1.350 km² – Reservoir area
170 km – Reservoir length
11.800 m³/s – Affluent flow

A Milestone in Accumulated Production
2,6 billions MWh (1984 – 2018)
World Record - 103.098.366 MWh (2016)




Center of Research on Hydrogen (NUPHI)



- Production capacity: 10 Nm³/h (99.997% purity);
- Storage capacity: 66 kg (350 bar);
- A 6 kW PEM-type fuel cell unit is operated with hydrogen.

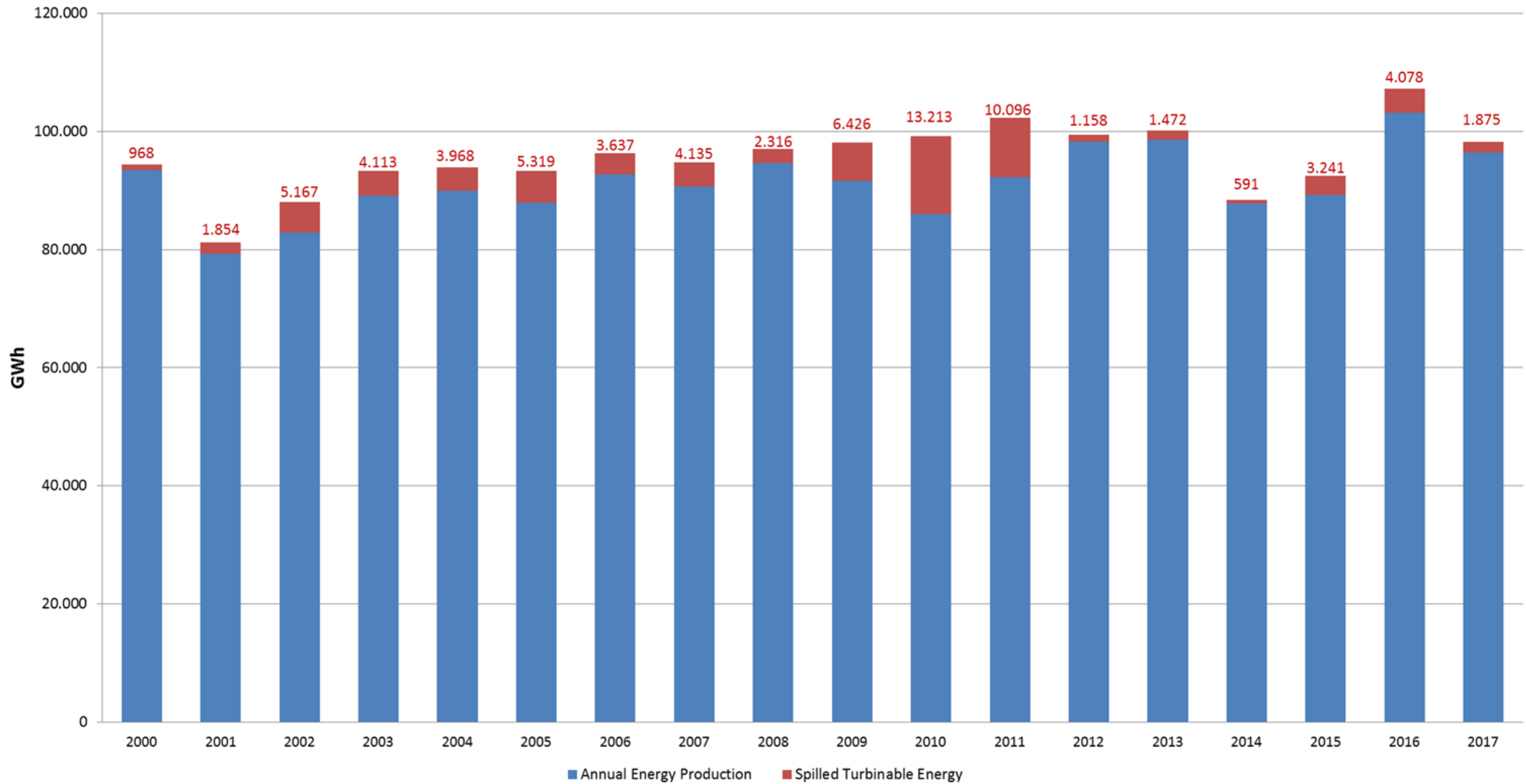




Center of Research on Hydrogen (NUPHI)

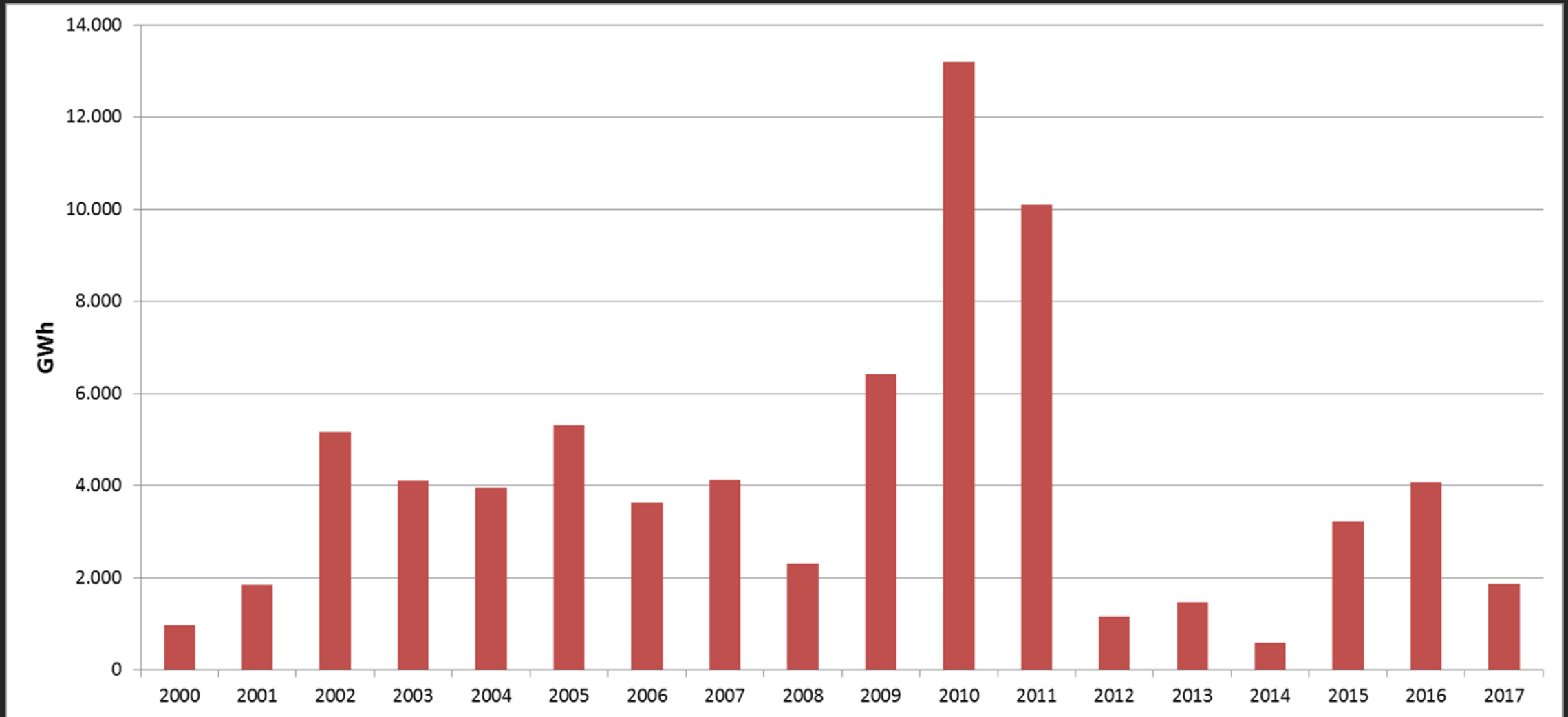
- New Project: Jan 2019 – Dec 2022
- R\$ 4.319.310,00 (≈ US\$ 1.120.000,00)
- Main Activities:
 - 1) Operation and maintenance of NUPHI;
 - 2) Technical-scientific study of the operation of the electrolyser, aiming at the nationalization of parts and components;
 - 3) Automotive engine development to tests of hydrogen fuel blend performance and biomethane;
 - 4) Application of membranes based on chitosan (quitosana) in PEM type fuel cell;
 - 5) Planning of automation systems for industrial plants of hydrogen production;
 - 6) Construction of an alkaline electrolyser prototype for hydrogen and oxygen production;
 - 7) Study of systems of direct current source of Itaipu Binacional aiming to assist in its technological updating.

ITAIPU Binational



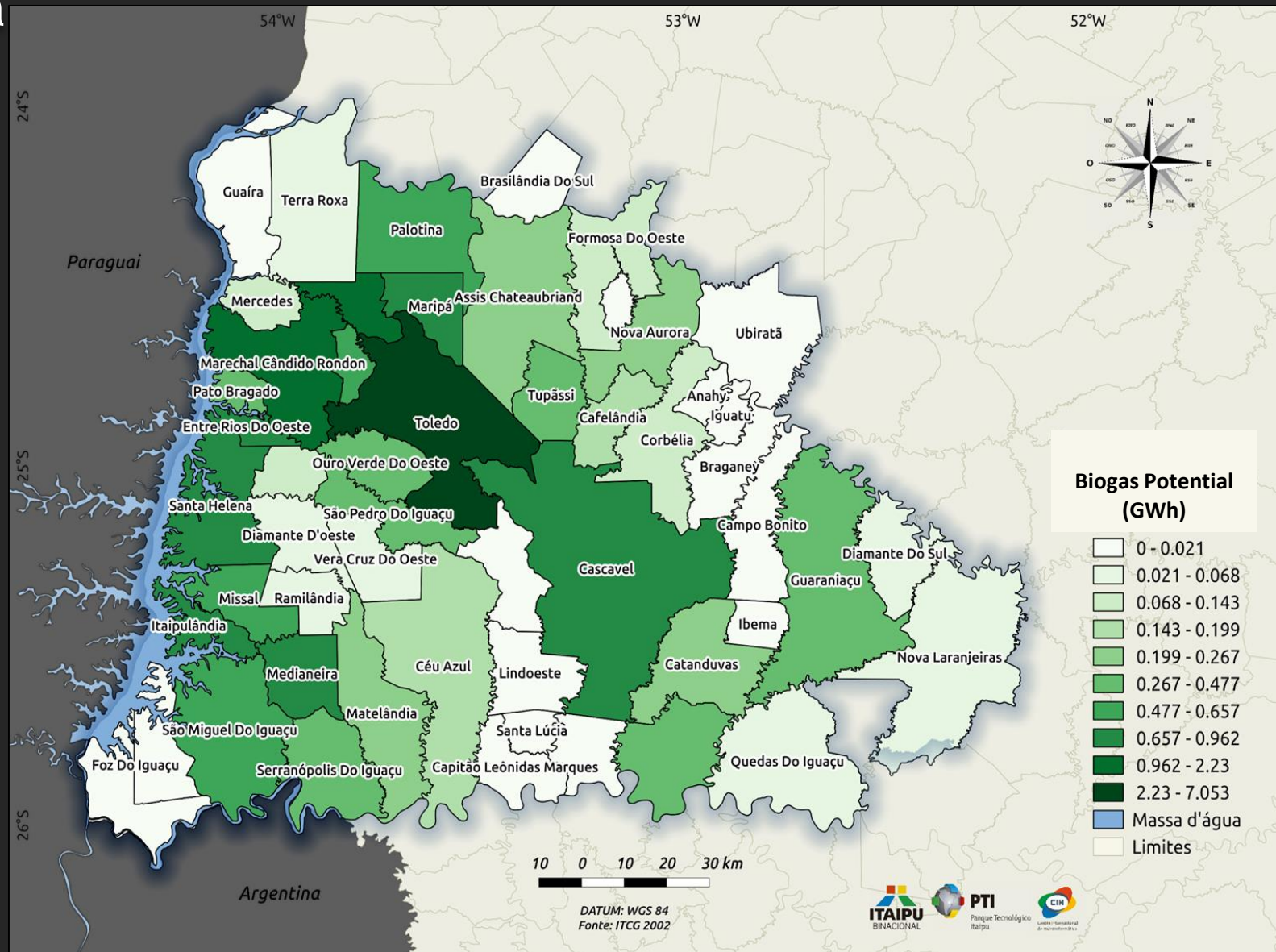


Spilled Turbinable Energy

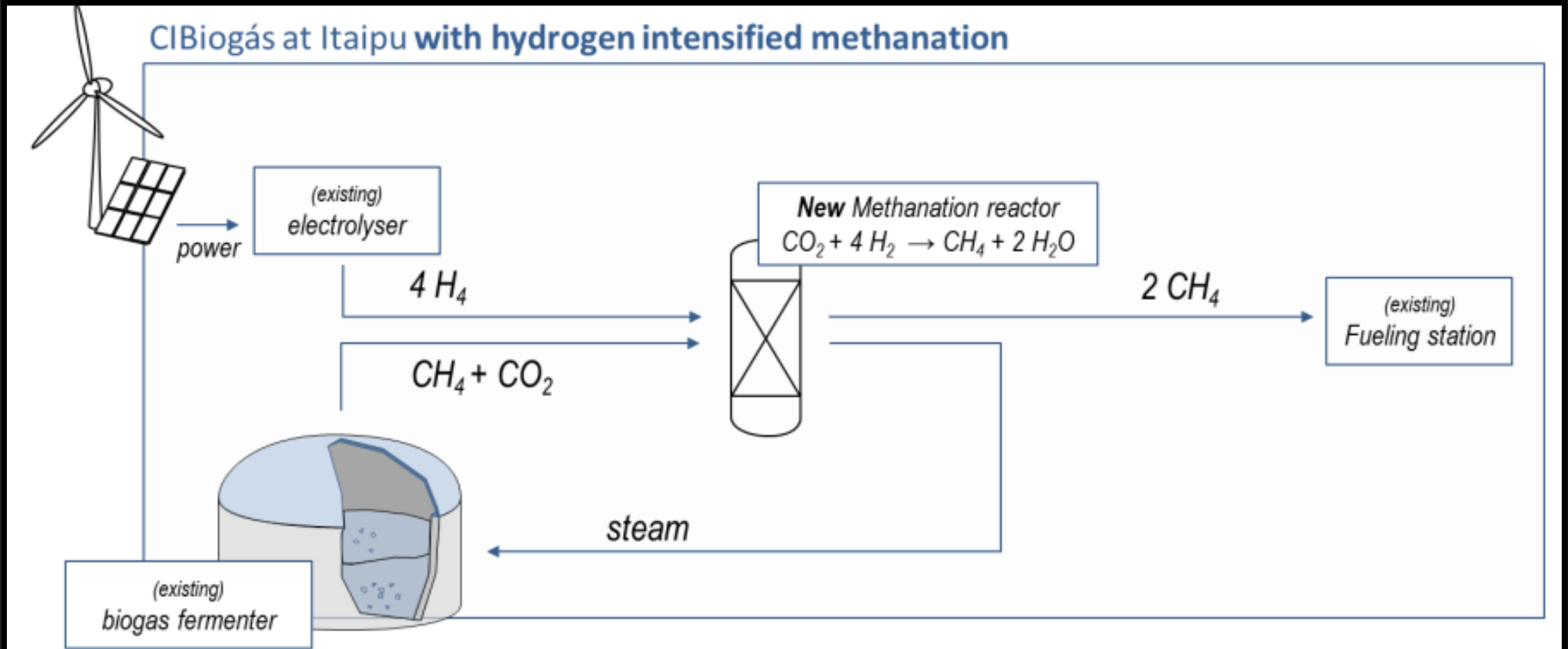


Western Region of Paraná

- 4.5 millions of pigs
- ≈ 16 millions m³ of waste per year.
- ≈ 320 millions m³ of biogas per year.
- ≈ 68 millions kg of H₂ per year.
(steam methane reforming - SMR)



Methanation



Demonstration Unit Itaipu Binacional - Biomethane

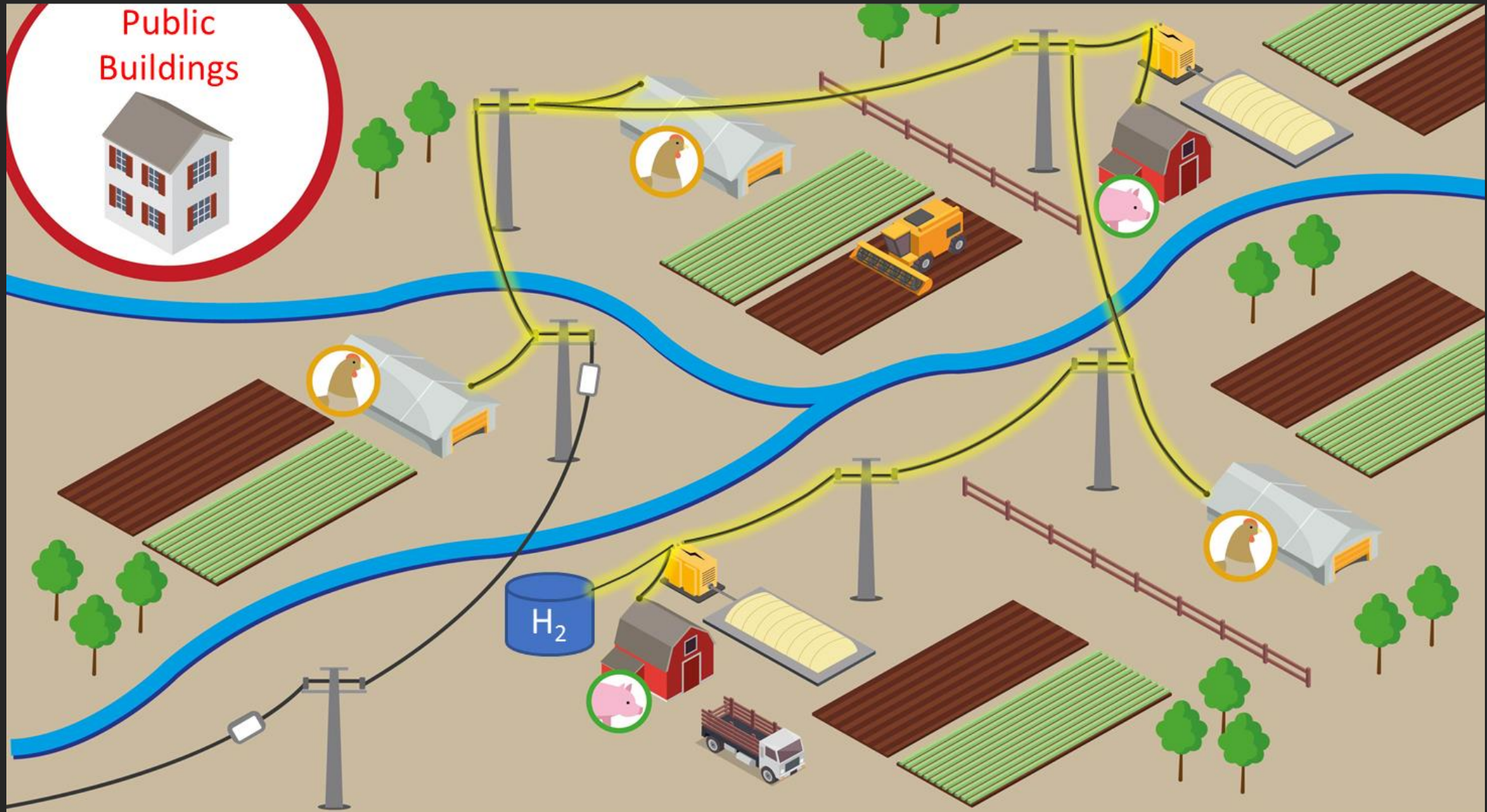
- January – October 2018:

- Treatment of 90 ton of restaurants residues;

- Produced 15330 m³ of Biomethane.



Microgrid in Rural Areas



A wide-angle photograph of a large dam with multiple spillways, situated on a river. The sky is filled with large, white clouds. The foreground shows a grassy embankment and a small structure near the water's edge. The overall scene is captured in a cinematic style with a blue-green color palette.

THANK YOU

Paulo Afonso Schmidt
ITAIPU Binational