



SOLUTIONS FOR HYDROGEN PRODUCTION & PURIFICATION

Sumaré – SP – Brazil - 2021 - Version 1

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NEUMAN & ESSER GROUP

AGILE. SOLUTION. EXPERTS.



COMPRESSORS

The H₂ Experts



28 Companies in 10 Strategic Countries



COMPRESSORS

The H₂ Experts



Employees:

1,230

Consolidated Sales 2020:

230 Mio. EUR

The NEA GROUP Portfolio for the H₂ Value Chain



Biomass
CH₄ + H₂ up to 8000 Nm³/h
1-10 to 70-80 bar

Refinery & Processing and Liquefaction Plants
Hydrocracking
Desulphurization
Synfuels

Gas Storage

H₂ Transportation, LH₂ Regasification, LOHC

800-5000 Nm³/h
30-200 to 500-900 bar

Natural Gas Grid
H₂ feed in 100-200 kNm³/h
1-30 to 70-80 bar (10-20%)

Transportation

Wind, Solar, Hydro

H₂ Generation Electrolyzers, SMR+CCS, Pyrolysis, ...

Salt Cavern H₂ Storage

H₂ Pipeline Grid
200-2000 kNm³/h
30 to 70-80 bar

Service & Commercial
Industry, e.g. Steel, Glass, ...

Surplus Power from Conventional Power Plant

200-5000 Nm³/h
1-30 to 500 bar

H₂ Turbine Power Plant
Electrical Grid

Fuel Cell Power Plant
Residential



Primary Energy

Conversion & Processing

Storage

Transport & Distribution

Final Energy Demand

HYTRON'S PRODUCTS



HyPEM
ELECTROLYSER

HyALK
ELECTROLYSER

Electrolyser

Use of renewable sources
H₂ and O₂ production
Green H₂ applications
Higher electrical consumption compared to reformers
Higher global demand for modular applications

HyREF
NG REFORMER

HyREF
EtOH REFORMER

Steam Reforming

Use of local feedstocks
Pure H₂ or H₂ + CO production
Continuous production (no intermittence)
Interest of the NG industry
Green Solutions:
(Biomethane end ethanol)

HyPSA
Gas Purification System

Pressure Swing Adsorption

H₂ Purification
Methane Purification (others)
It may be included in our equipment, or sold separately



HyPEM

ELECTROLYSER

<https://www.youtube.com/watch?v=FTJaI93xHKA>

HyPEM Water Electrolysis

Plant Sizes



“Small-Scale”		Industry / Energy	
HyPEM 10-40	10 Nm ³ H ₂ /h; 40 bar _g (50 kW Plant)	HyPEM 60-40	60 Nm ³ H ₂ /h; 40 bar _g (300 kW Plant)
HyPEM 20-40	20 Nm ³ H ₂ /h; 40 bar _g (100 kW Plant)	HyPEM 100-40	100 Nm ³ H ₂ /h; 40 bar _g (0.5 MW Plant)
HyPEM 30-40	30 Nm ³ H ₂ /h; 40 bar _g (150 kW Plant)	HyPEM 200-40	200 Nm ³ H ₂ /h; 40 bar _g (1 MW Plant)
		HyPEM 400-40	400 Nm ³ H ₂ /h; 40 bar _g (2 MW Plant)
		HyPEM 600-40	600 Nm ³ H ₂ /h; 40 bar _g (3 MW Plant)
		HyPEM 800-40	800 Nm ³ H ₂ /h; 40 bar _g (4 MW Plant)
		HyPEM 1,000-40	1,000 Nm ³ H ₂ /h; 40 bar _g (5 MW Plant)

PS: the association of HyPEM 1,000-40 systems creates Multi-MW solutions

First MW Electrolyser in Brazil

1,3 MW Plant Structure EDP Pecém – Ceará - Brazil



HYTRON proudly announces the Contract and Purchase Order receipt for the **first MW-sized electrolyser to be installed in Brazil's green hydrogen hub in Ceará state.**

The customer “EDP Brasil”, part of the Group “Energias de Portugal”, awarded the order to HYTRON based on the technological expertise it has been shown them since the beginning which gave them confidence to speed up to a very swift Purchase Order.

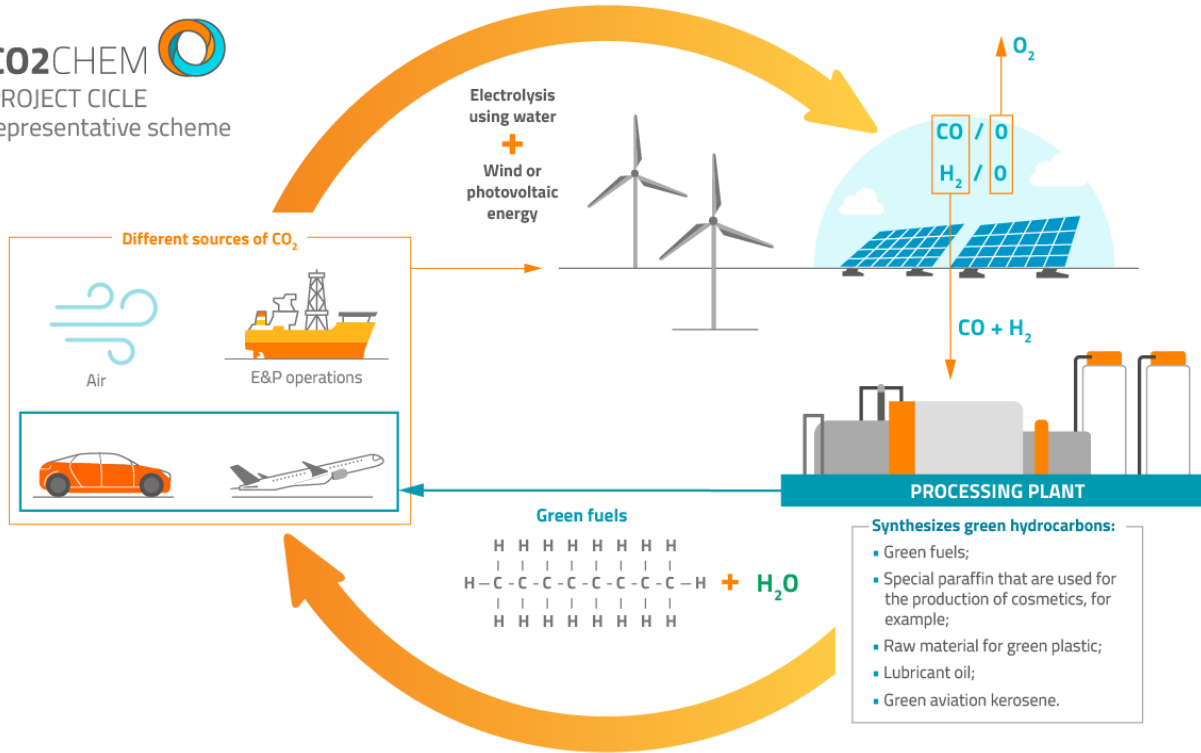
The total supply is about 1,3MW Electrolyser powered by solar and wind sources that will be suitable to generate 250Nm³/h of GREEN HYDROGEN.



CO2CHEM

Power to X

CO2CHEM 
PROJECT CICLE
representative scheme



Repsol Sinopec Brasil

Hytron

INSTITUTO SENAI
DE INOVAÇÃO BIOSYNTHETIC AND FIBERS

USP

HyREF
EtOH REFORMER

HyREF
NG REFORMER



Solutions Portfolio

FUEL REFORMING

Fuel Reformers

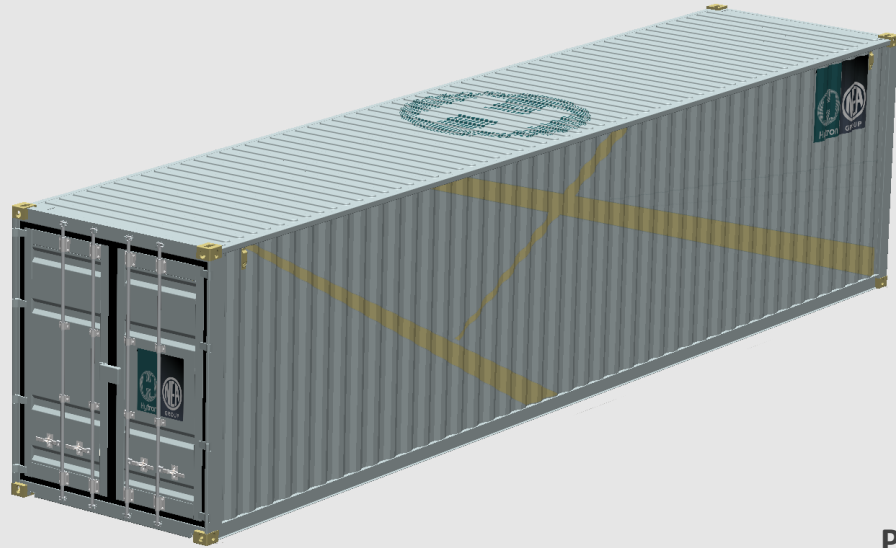
Product Performance – Biomethane



Biomethane / NG
4.85 Nm³ / kg H₂

Water
35 L / kg H₂

Electricity
4.71 kWh / kg H₂

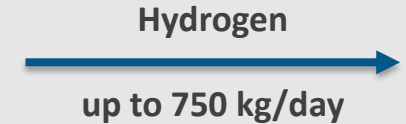
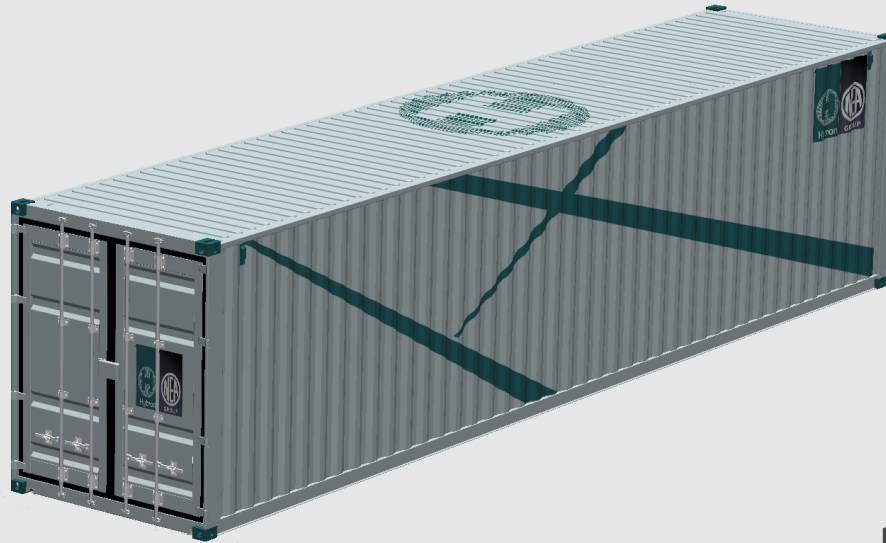
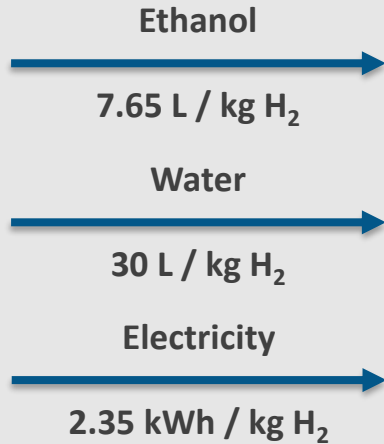


Hydrogen
up to 750 kg/day

Process: Steam-Reforming
H₂ Purification: PSA (Pressure Swing Adsorption)
H₂ Purity: up to 99.9999% (SAE J2719 / DIN EN 17124 compliant)
H₂ Pressure: 10 bar_g (typical)

Fuel Reformers

Product to Come – Ethanol



Process: Steam-Reforming
H₂ Purification: PSA (Pressure Swing Adsorption)
H₂ Purity: up to 99.9999% (SAE J2719 / DIN EN 17124 compliant)
H₂ Pressure: 10 bar_g (typical)

Advantages of Using Ethanol for H₂ Production

Ethanol as Green Hydrogen Carrier



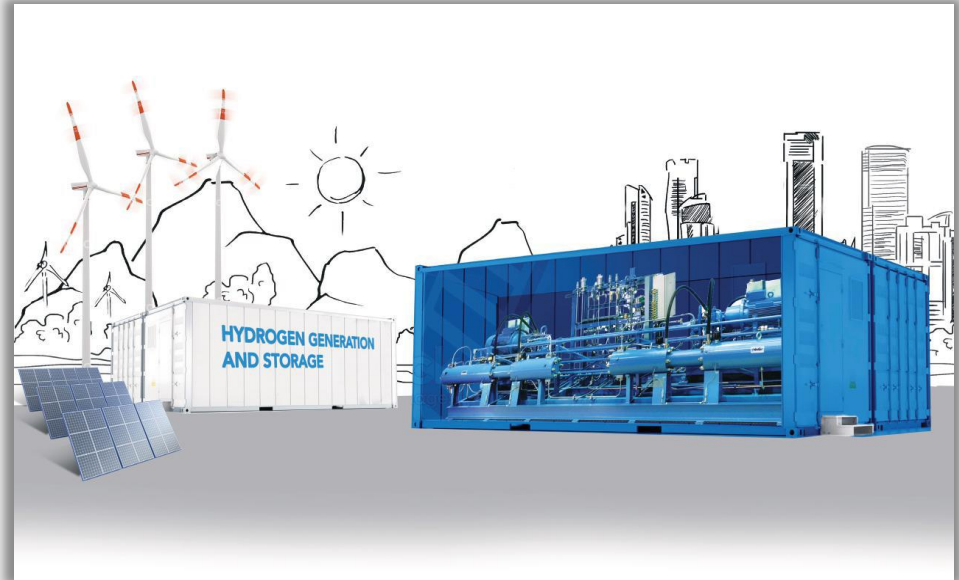
- **Fact of being a renewable fuel**
- **Ease of transportation (usual for the Brazilian case)**
- **Brazil's potential as an important global player**
- **There is already an entire value chain established**
- **It is not a toxic fuel**
- **Enables the flat production of Green H₂ (without intermitence)**
- **Easy to store**
- **Enables local production of H₂ close to consumption**

HYDROGEN GENERATION PLANTS

HRS PROJECT REFERENCE

- **Electrolyzer Unit**
 - One 20" standard container for Electrolysis system
- **Compressor Unit & Storage Unit**
 - One 20" standard container for Compressor system

These dimensions are only for reference. NEUMAN & ESSER solutions for Hydrogen plants are tailor made for each customer and application. Actual plant dimensions are defined during Technical discussions and Engineering phase.



HYDROGEN GENERATION PLANTS

Compressor Units



Diaphragm Compressors



Hydraulic Driven Compressors

HYDROGEN GENERATION PLANTS

Storage



- High pressure hydrogen storage for both stationary and mobile applications
- Storage solutions for pressures of 200 bar up to 1,000 bar
- Type II or IV pressure vessels



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THANK YOU!