



# Company Presentation Hydrogen Expo 2022, Piacenza

9 giugno 2022

# About FRIEM

Leader in energy conversion  
International player in the energy transition



- Headquarter: Segrate (Milan) – Italy
- Founded in: 1950
- Product Application: Power conversion unit
- Employees: ≈ 120 across Italy, Brazil, USA
- Turnover: ≈ 35 M€ (2021)
- Production capacity: 2 GW per annum

**#history**

**#knowledge**

**#expertise**

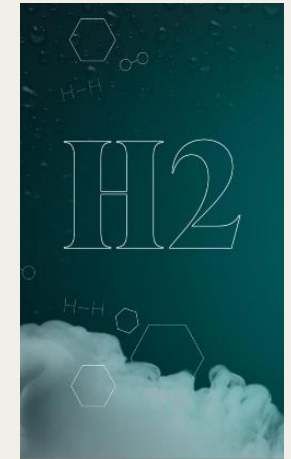
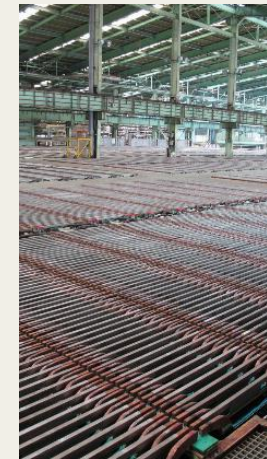
**#customization**

Cassa Depositi e Prestiti, through CDP Equity – FITEC, became shareholder of FRIEM from April 2022 (with a minority stake)

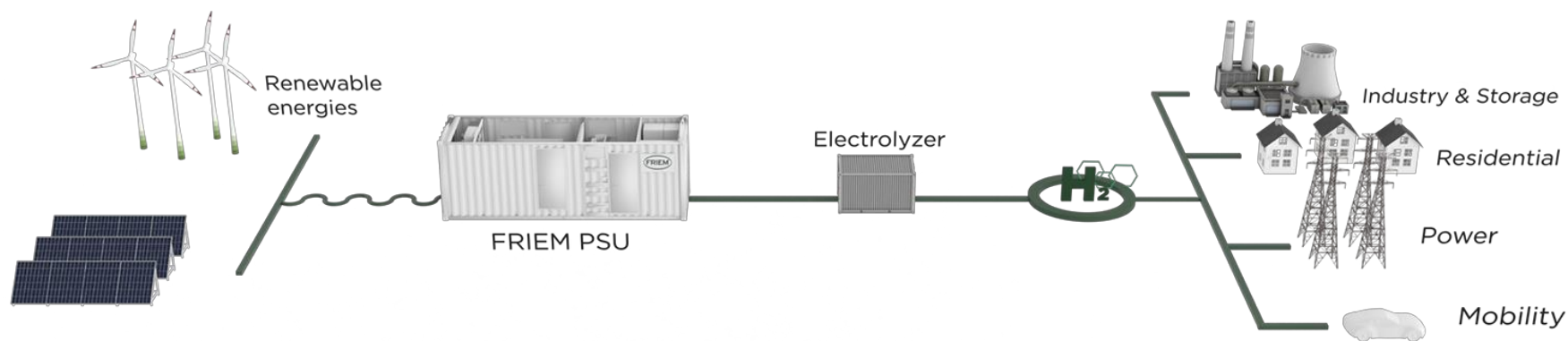
# We serve the process industry since 1950

with our  
high current rectifiers

- Chlorine and hydrogen electrolysis
- Copper, Zinc, Nickel, Molybdenum
- Aluminum
- Graphite
- Steelmaking



# Power converters for green hydrogen



## Products

- Power converters for H<sub>2</sub> Electrolysis
- BEV recharging infrastructure
- Battery Energy Storage System

## Technology Platforms

- Rectifier
- Active Front-End (AFE) Rectifier
- Chopper
- Inverter
- Isolated Inverter

## Semiconductors

- Diode/thyristor up to 60MW – 180 kA
- IGBT up to 2,5MW – 2,4 kA
- SiC up to 125kW – 125 A



# Power Supply Unit for H2 Production – Thyristor



## Technical Data

Installation	Outdoor
Supply Voltage	Up to 36 kV
Power Rating	> 5 MW
Maximum Operating Voltage	1200 Vdc
Cooling	Water/Air cooled
Operation	Local(HMI)/Remote

## Benefits

- ✓ Robust and reliable
- ✓ Plug&Play
- ✓ Reduced CAPEX and OPEX

# Rectifiers for large scale H2 Production – Thyristor



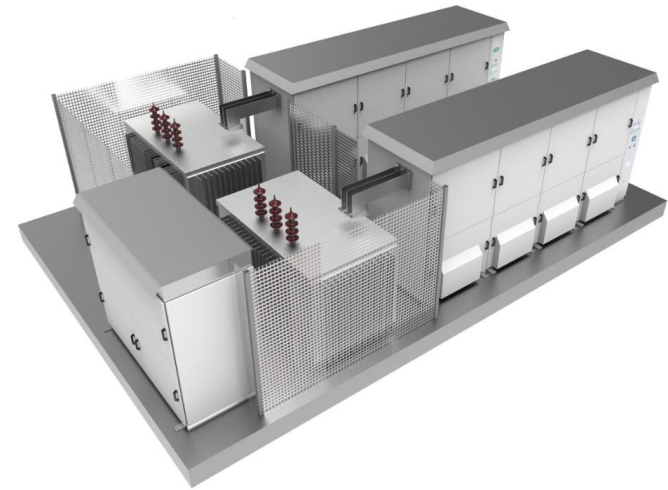
## Technical Data

Installation	Indoor/Outdoor
Supply Voltage	MV and HV
Power Rating	10, 20, 40, 60 MW
Maximum Operating Voltage	800 Vdc
Cooling	dmW/rawW or air
Operation	Local(HMI)/Remote

## Benefits

- ✓ Robust and reliable
- ✓ Simplicity on large scale
- ✓ High Efficiency: 95% to 98%

# Power Supply Unit for H2 Production – IGBT



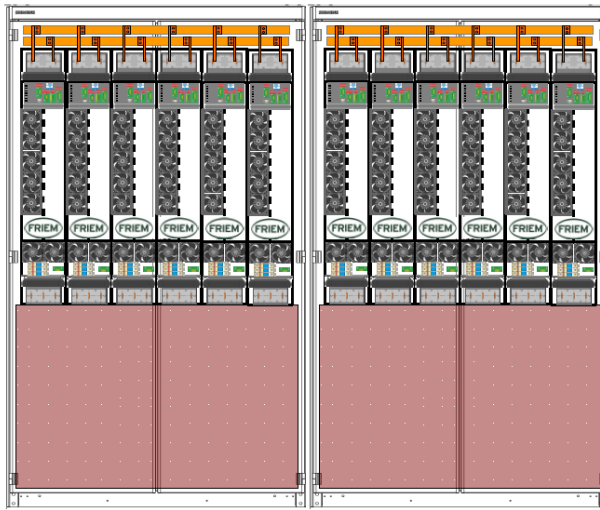
## Technical Data

Installation	Indoor/Outdoor
Supply Voltage	Up to 36 kV
Power Rating	Up to 5 MW
Maximum Operating Voltage	1500 Vdc
Cooling	Air cooled
Operation	Local(HMI)/Remote

## Benefits

- ✓ Power Quality
- ✓ Reduced transformer rating
- ✓ Fast system response

# Power Supply Unit for H2 Production – SiC



## Technical Data

Installation	Indoor
Supply Voltage	400 V
Power Rating	Up to 2,5 MW
Maximum Operating Voltage	1000 Vdc
Cooling	Air cooled
Operation	Local(HMI)/Remote

## Benefits

- ✓ Power Quality
- ✓ Footprint super compact
- ✓ Low noise thanks to high switching frequency (50 kHz)

*Ready in 2023*





FUEL CELLS AND HYDROGEN  
JOINT UNDERTAKING



# PEM Fuel Cell gensets - IGBT



## Technical Data

Installation	Outdoor
Supply	Hydrogen
Power Rating	25 kW and 100 kW
Output voltage	400 V 3f
Cooling	Air cooled
Operation	Local(HMI)/Remote

## Consumption of H2

- ✓ 100kW FCPS: 13 kWh/kg
- ✓ 25kW FCPS : 11,5 kWh/kg

## Tested loads

- ✓ Resistive
- ✓ Cranes in construction sites
- ✓ Electric vehicles

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 779606.



## References



2016 – AWE – 2,5 MW



2022 – PEM – 24 MW



2023 – PEM – 12 MW



European projects (EveryWh2ere) to increase hydrogen technology social awareness, enhancing its application and benefit for the community.



**Thank you**

**Maurizio Stucchi**

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