

MOBILE BRENNSTOFFZELLE: HERAUSFORDERUNGEN IN DER ENTWICKLUNG AUF METHODEN-, KOMPONENTEN- UND SYSTEMEBENE

● Auftakt H2 Forschungszentrum Wels, Nov. 15, 2023

Dr. Ewald Wahlmüller



PLASTIC OMNIUM



RESEARCH &
DEVELOPMENT

Our DNA

A family-owned company (60%), driven by intuitive entrepreneurs since 1946

Both front runner and challenger, **constantly reinventing ourselves;**

Upstream the value chain of mobility, enabling us to be the leading force behind changes.

Innovation-driven, accelerating positive and impactful breakthrough.

2022 Eco. Revenue

€9.5BN



40,500

Employees



150

Plants and

43

R&D centers



93

Customers



5 DIVISIONS with world leading positions



LIGHTING
2 in BEVs



**INTELLIGENT
EXTERIOR SYSTEMS**
1



MODULES (HBPO)
1



**CLEAN ENERGY
SYSTEMS**
1



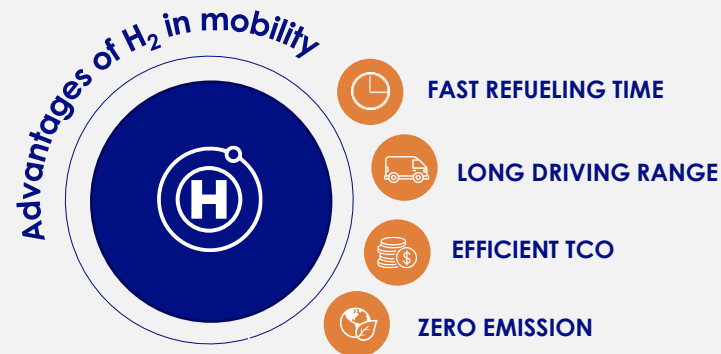
NEW ENERGIES
1 target



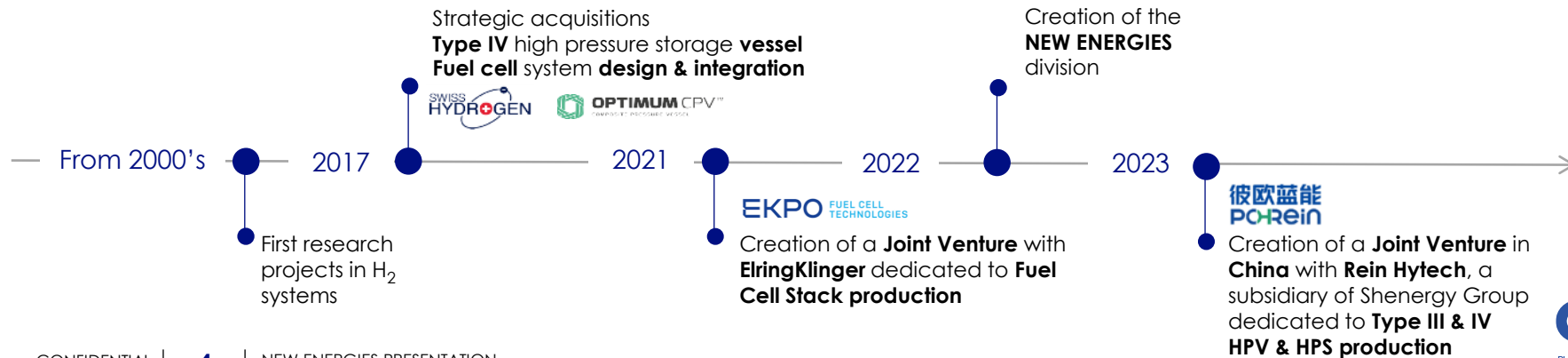
Supporting software-defined vehicles developments

A strong position in hydrogen mobility

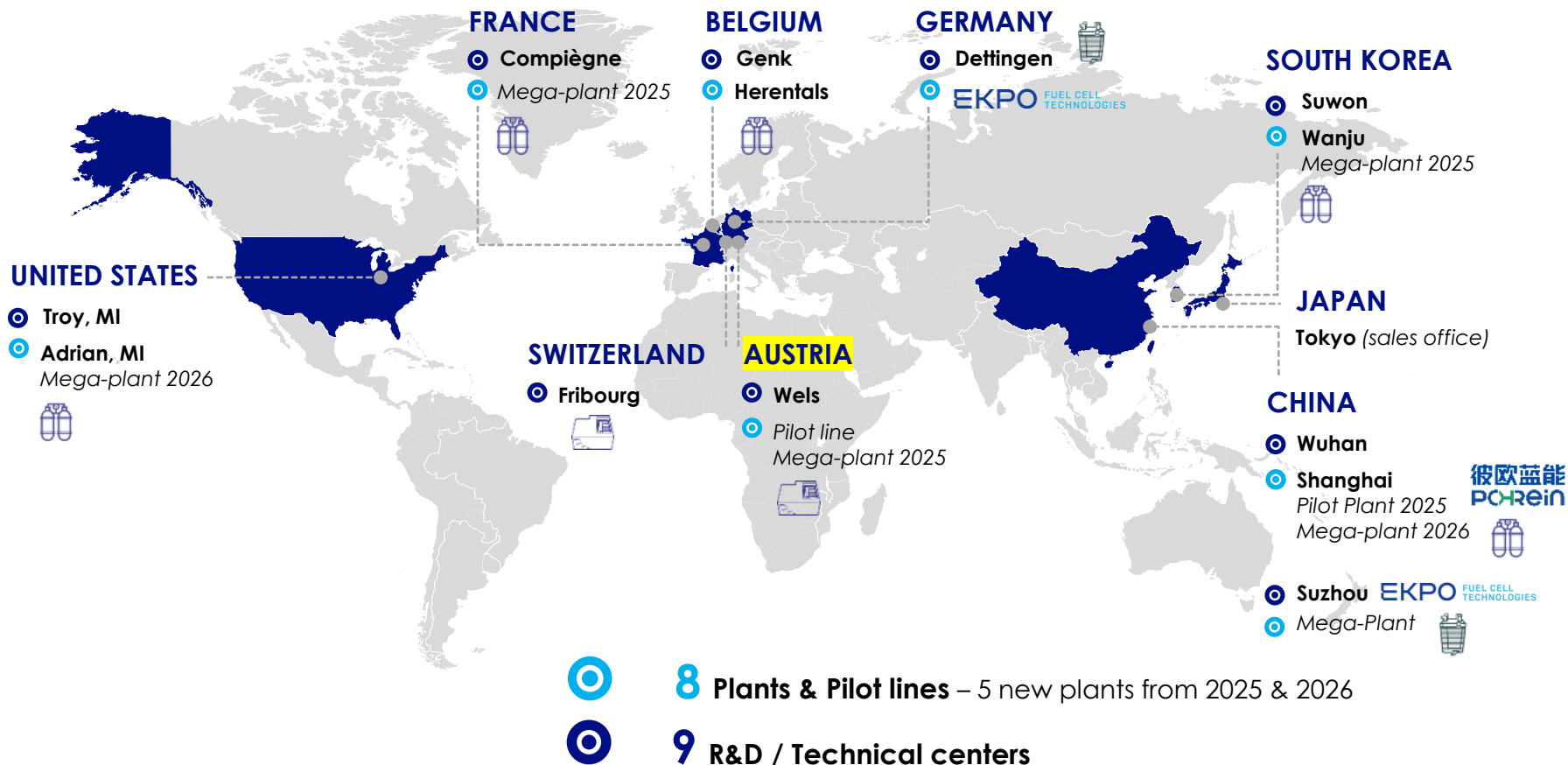
Hydrogen mobility is key
to decarbonizing the
mobility sector



Plastic Omnium long-term strategy in hydrogen

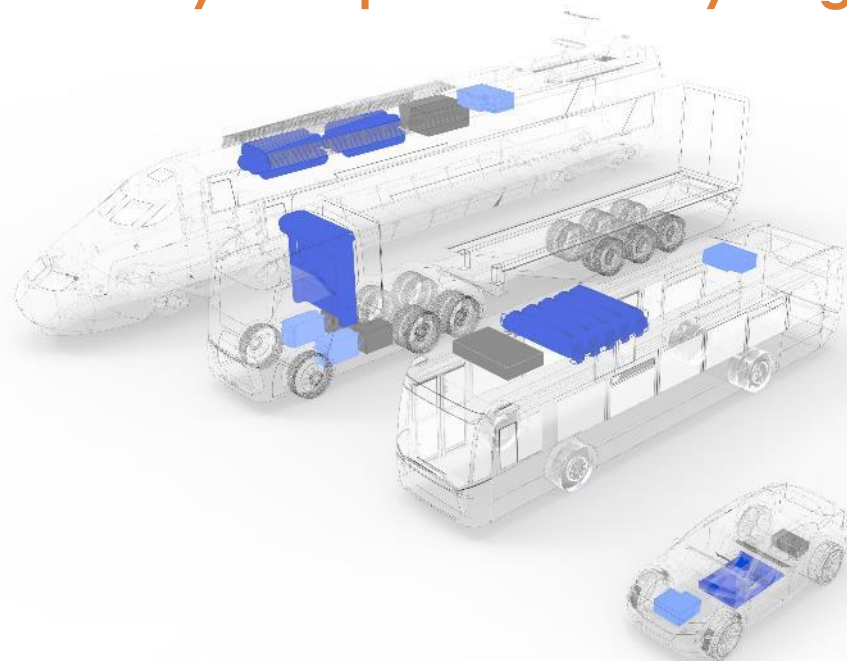


New Energies global footprint



New Energies division

A trusted system provider for hydrogen mobility



PASSENGER
CARS



BUSES



TRUCKS



LIGHT
COMMERCIAL
VEHICLES



OFF-
HIGHWAY



TRAINS

€3Bn

Revenue target by
2030 to be **#1** in
hydrogen mobility



25% MS*
HPVs



10% MS*
FC stacks



10 % MS*
FC systems

€100Mio

investment per year
to develop
hydrogen products
and scale up
industrial capacities

A product range to address the entire FCEV value chain



HIGH PRESSURE VESSELS & SYSTEMS

Type IV - Thermoplastic or
thermoset liner surrounded with
carbon fibers

Various architectures
of system design

>25%

Market share
In high pressure systems
by 2030



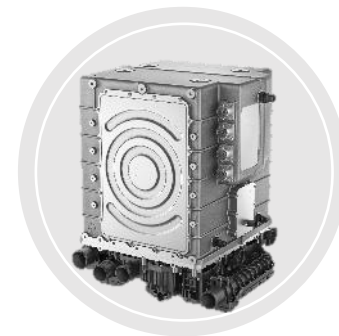
PEM FUEL CELL SYSTEM

Proton Exchange Membrane
Fuel cell stack

Full integrated system
components
Balance Of Plant (BOP)

c.10%

Market share
In fuel cell stacks
by 2030



EKPO FUEL CELL
TECHNOLOGIES

FUEL CELL STACK

Assembly of bipolar plates
& membranes

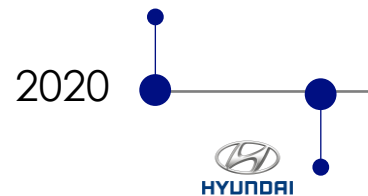
Media module

c.10%

Market share
In integrated hydrogen systems
by 2030

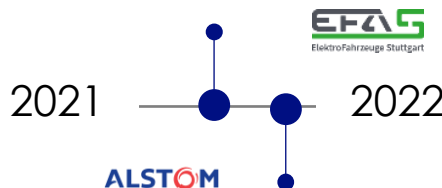
A peek at our recent business successes

Hydrogen storage for future H₂ Le Mans series



700-bar hydrogen vessels for passenger cars

Fuel cell systems for hydrogen trucks



Hydrogen storage for regional trains

Hydrogen vessels and fuel cells for bus

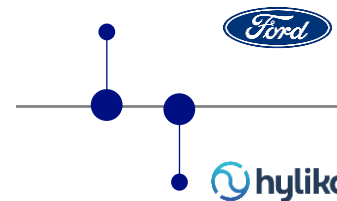


Hydrogen storage for commercial vehicles



Hydrogen storage for commercial vehicles

Hydrogen storage for passenger car

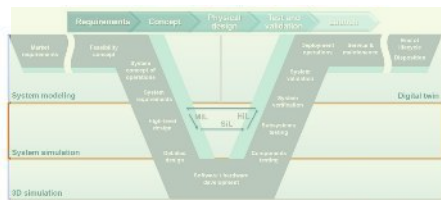


Hydrogen storage for trucks

Challenges mobile FCS development & industrialization

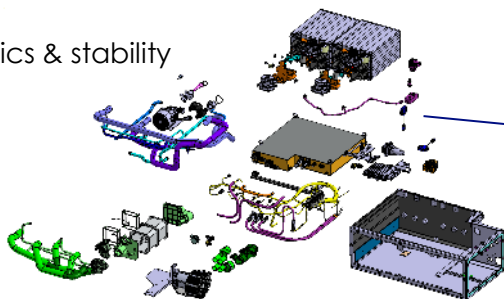
Model based system design & validation

- * Requirements engineering (norms & standards, ...)
- * Transfer of V-Model for ICE to FCS
- * Digital tool chain HW & SW development (Simulation, MiL, SiL, HiL, ViL, sustainability / LCA, ...)



Fuel Cell System (FCS)

- * FC system function integration & power density
- * Energy efficiency
- * Thermal management
- * Process ctrl. for dynamics & stability
- * Freeze start
- * PGM catalyst load & low-cost materials
- * Stack & BOP lifetime
- * Safety



Industrialisation & production

- * Component production process vs. volume
- * Supply chain stability
- * Industrial cleanliness
- * Production process scalability
- * EOL test system & procedure



Clean Hydrogen Partnership | H2Haul - Duration: 02/2019 – 01/2026



Hydrogen storage & refueling

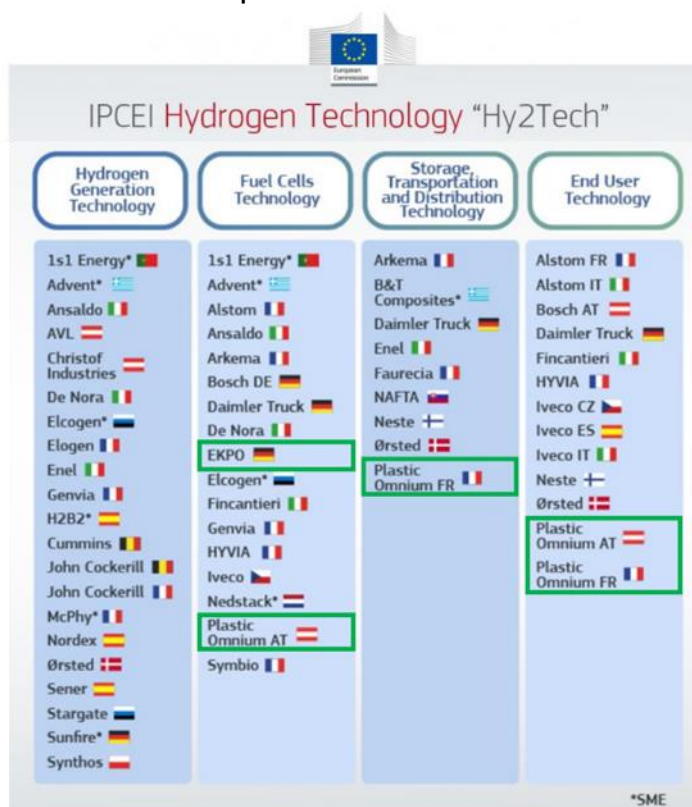
10-20min refueling
350bar / 40kg / ~400km
700bar / 67kg / ~700km

Electric drive unit

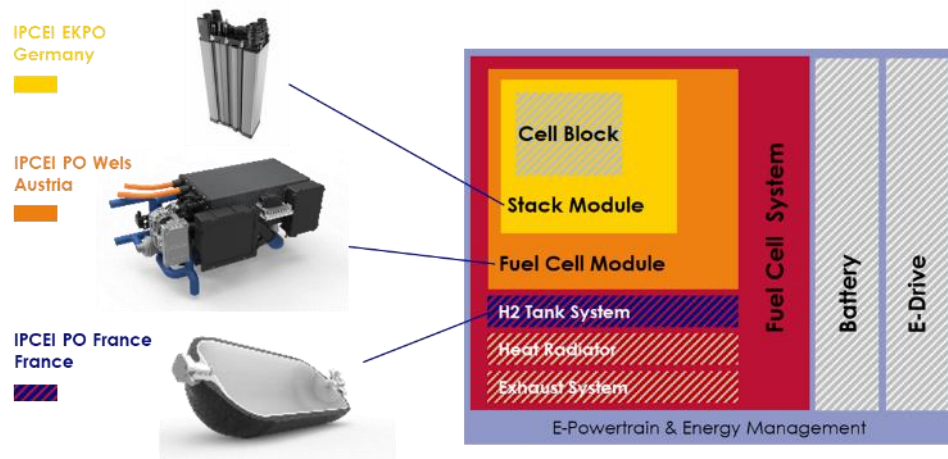
HV battery system

IPCEI Hy2Tech

Hy2Tech: €5.4 billion public investment which will unlock €8.8 billion private investment



Plastic Omnium IPCEI Hy2Tech involvement



IPCEI PO Wels objectives

- Development of FCM150 for heavy-duty applications
- Innovations on components, control strategy & cost reduction
- High volume production process development
- Lead customer vehicle integration & test
- Environmental impact assessment & recycling
- Spill-overs to Universities, research organisations, SMEs & public



FCM150

Module configuration	NM12-twin stack High-pressure cathode HVDC/DC integrated
Power max BoL (kW _{el})	150 (164)
Output voltage (V)	520-850
Weight (kg)	<350
Dimensions (L x W x H)	1020 x 700 x 680
Power density (kW/L)	0,34
Durability* (h)	>25,000
System efficiency BoL (%)	>60 (max) 48 (rated power)
Ambient (°C)	-30 to +45

Summary & Outlook

- **PO New Energies** is **strongly committed to hydrogen** as key factor **for decarbonizing the mobility sector**
- PO New Energies is operating in an **industrial network of leading automotive suppliers** and fuel cell technology providers
- PO New Energies is targeting a **one stop shop offer of hydrogen technologies** for the electric mobility market
- PO New Energies Wels is focusing on FCM product development and production and is looking for **cooperation to develop a hydrogen technology value chain in Upper Austria, Europe and worldwide**





PLASTIC OMNIUM

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