FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

Research activities for transport applications: MEAs, components, stacks and subsystems, HRS

Pietro Caloprisco

PRD 2017

24 November 2017

Agenda

PROGRAMME REVIEW DAYS 2017
FUEL CELLS AND HYDROGEN: FROM TECHNOLOGY TO MARKET
23-24 NOVEMBER, BRUSSELS

PROGRAMME REVIEW DAYS 2017
FUEL CELLS AND HYDROGEN: FROM TECHNOLOGY TO MARKET
23-24 NOVEMBER, BRUSSELS

PANEL 2

RESEARCH ACTIVITIES FOR TRANSPORT APPLICATIONS: MEAs, components, stacks and subsystems, hydrogen refuelling stations

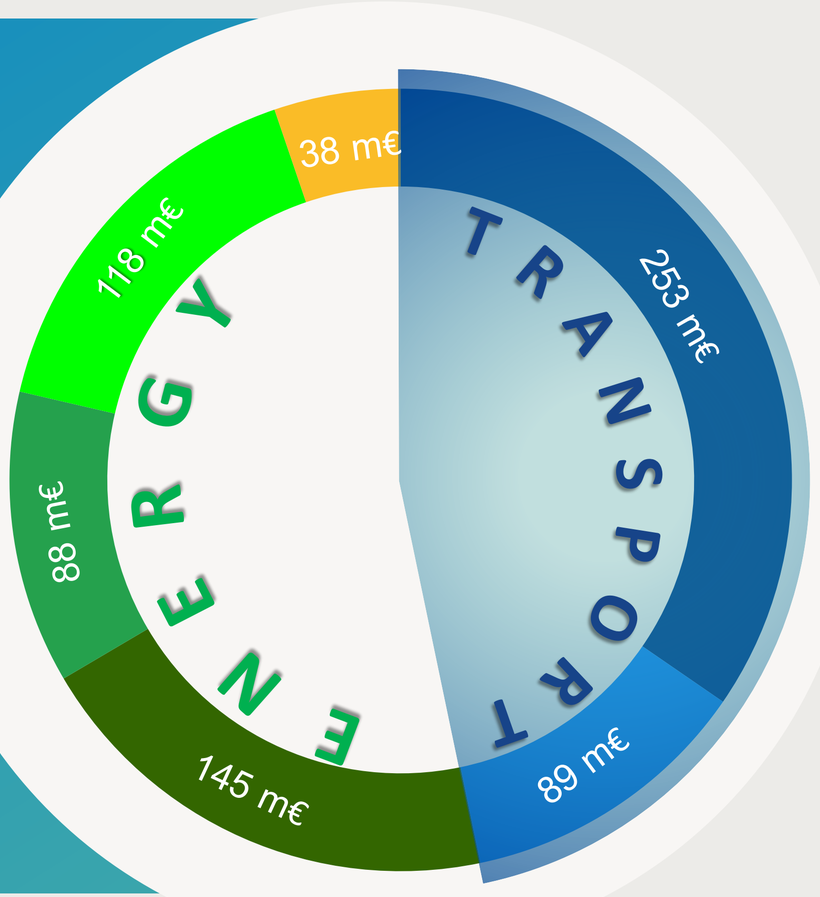
11:30 - 11:50	Portfolio overview by **Caloprisco Pietro**, FCH JU
11:50 - 12:10	NANO-CAT: Development of advanced catalysts for PEMFC automotive applications
12:10 - 12:30	IMPACT: Improved lifetime of automotive application fuel cells with ultra-low Pt-loading
12:30 - 12:50	GIANTLEAP: Giantleap Improves Automation of Non-polluting Transportation with Lifetime Extension of Automotive PEM fuel cells
12:50 - 13:10	COMPASS: Competitive Auxiliary Power Units for vehicles based on metal supported stack technology
13:10 - 13:30	AUTO-STACK CORE: Automotive Fuel Cell Stack Cluster Initiative for Europe II

Research activities in TRANSPORT APPLICATIONS

Related FCH JU objectives

Reduce fuel cell system costs for transport applications while increasing lifetime

Reduce use of critical raw materials



Transport

47 %

341 Mill Euros

53 Projects

Research Activities

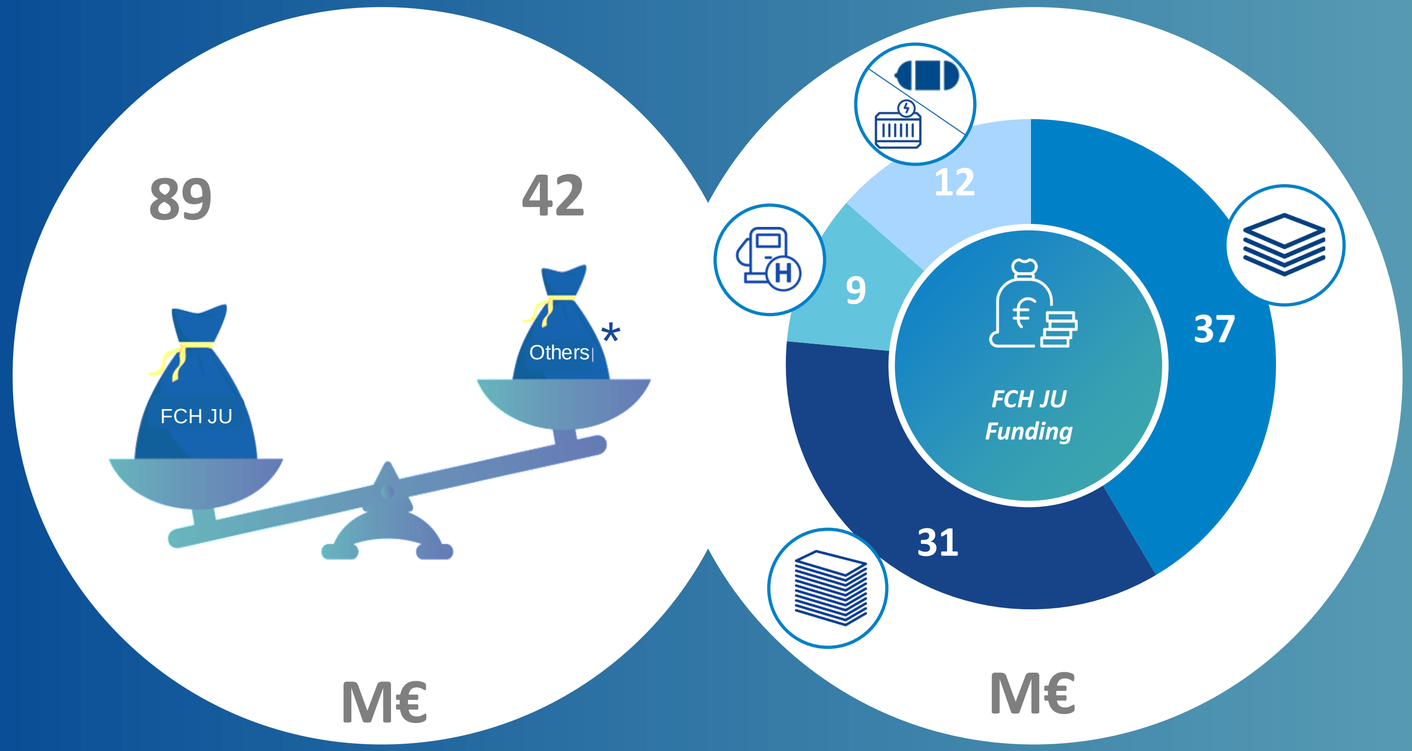
35 %

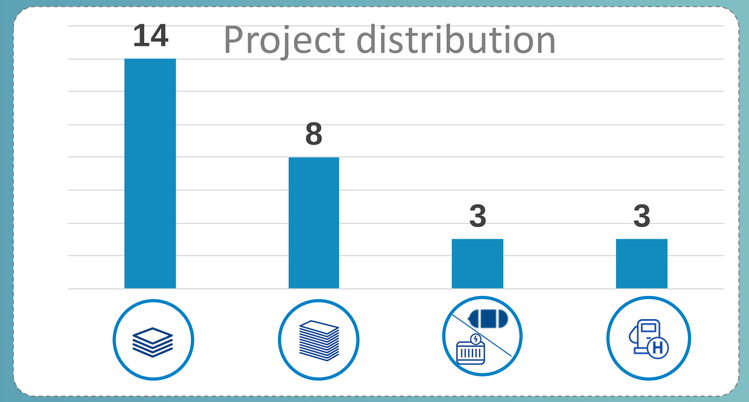
89 Mill Euros

28 Projects

Towards competitiveness

28 projects – 131 M€





MEA, catalysts, GDL, BPP, materials, manufacturing

Stack modelling, development, manufacturing

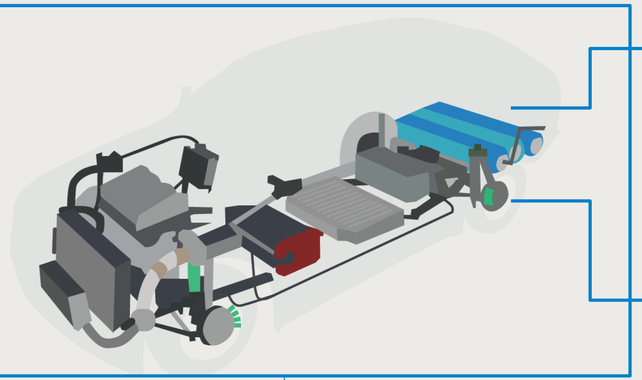
On-board H2 storage, auxiliary power units

Hydrogen refueling station

** Other resources including private and national/regional funding*

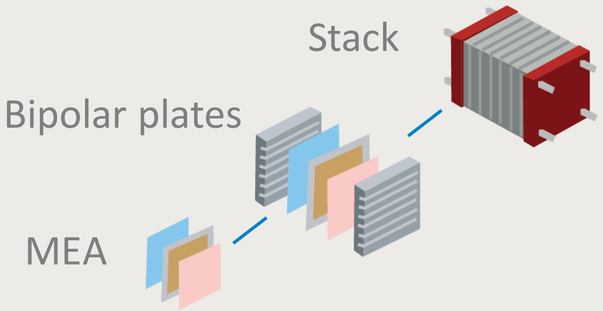
FCH JU support to all FCEV research aspects

Supporting the competitiveness of the EU supply chain

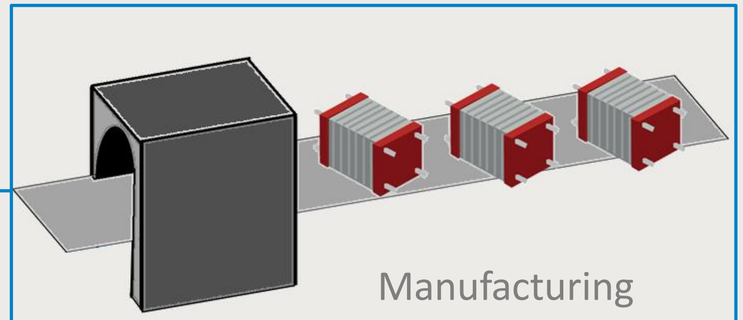


Tanks design optimisation and development of components

Optimised H_2 compression and storage systems



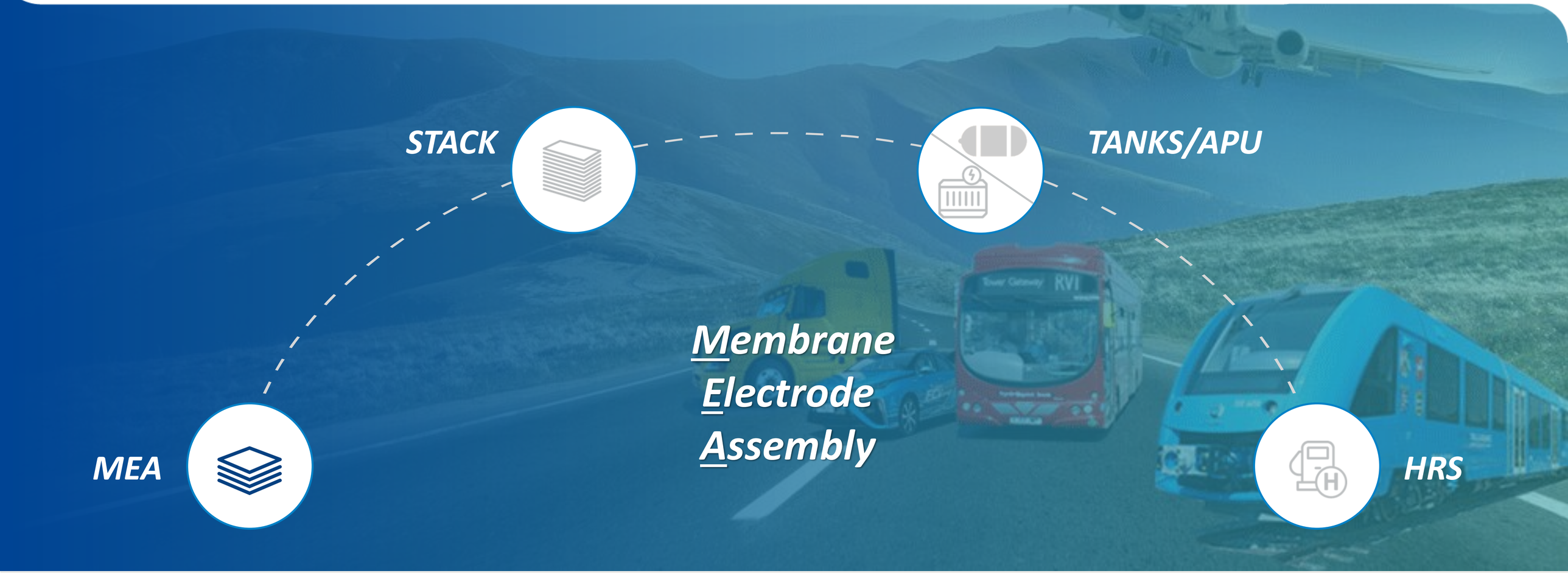
Low-costs and high-performance FC systems



Lean and quality manufacturing at volume

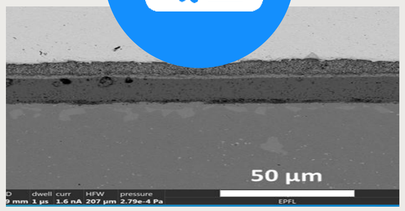
- From basic research to validation and testing
- From materials to manufacturing
- Very strong industrial and academic cooperation
- Connected projects

Transport Portfolio: Research & Innovation



Delivering durable and competitive building blocks for H2 mobility

Reducing use of critical materials remains a priority



Pt loading

<0.1mg/cm2

Efficiency

> 55%

Power density

> 1W/cm2

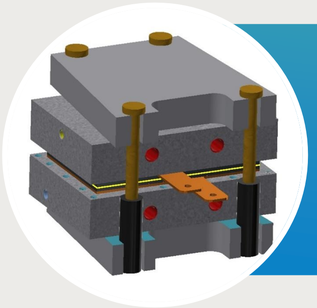
Durability

>5,000 h

No project has reached all indicators simultaneously

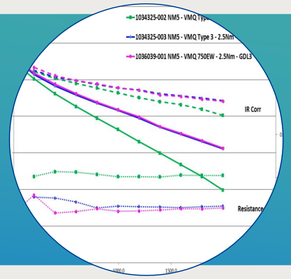
Promoting harmonisation and increasing lifetime

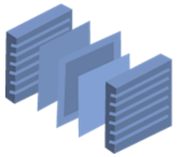
Testing in Lab & real life



Harmonisation with JRC:

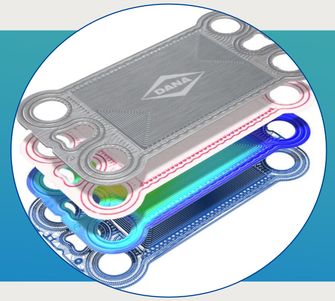
- Testing protocols
- Testing hardware





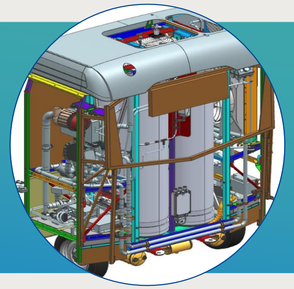
Bipolar plates

Real life testing in real life conditions

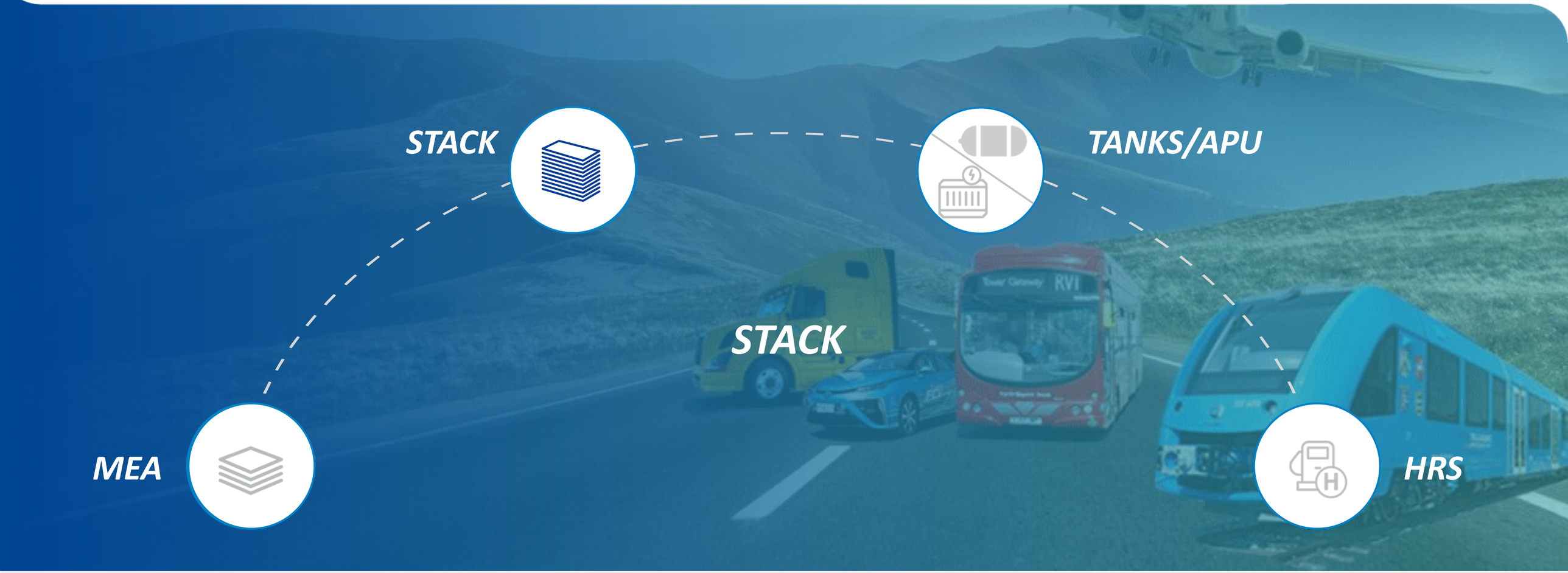


Diagnostic/Prognostic:

- improved lifetime, optimising the use of components



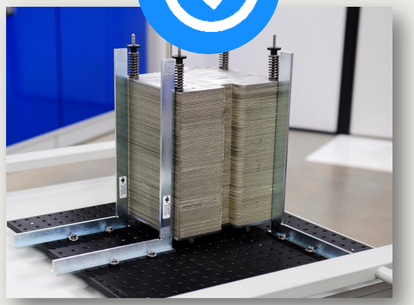
Transport Portfolio: Research & Innovation



Supporting the next generation of EU stacks

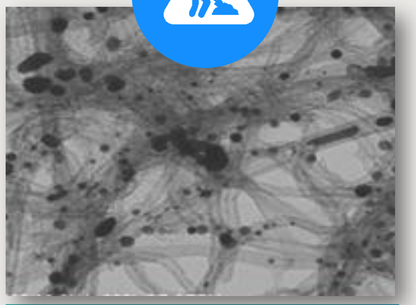
Competitive production at mass scale

Achievements



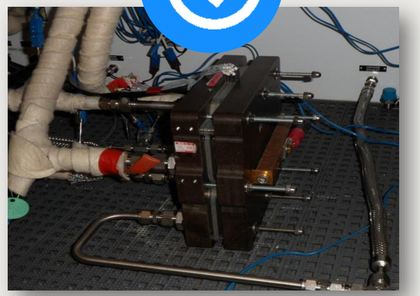
Volumetric power density

4 kW/l



Efficiency

>50 %



Durability

>2000 h

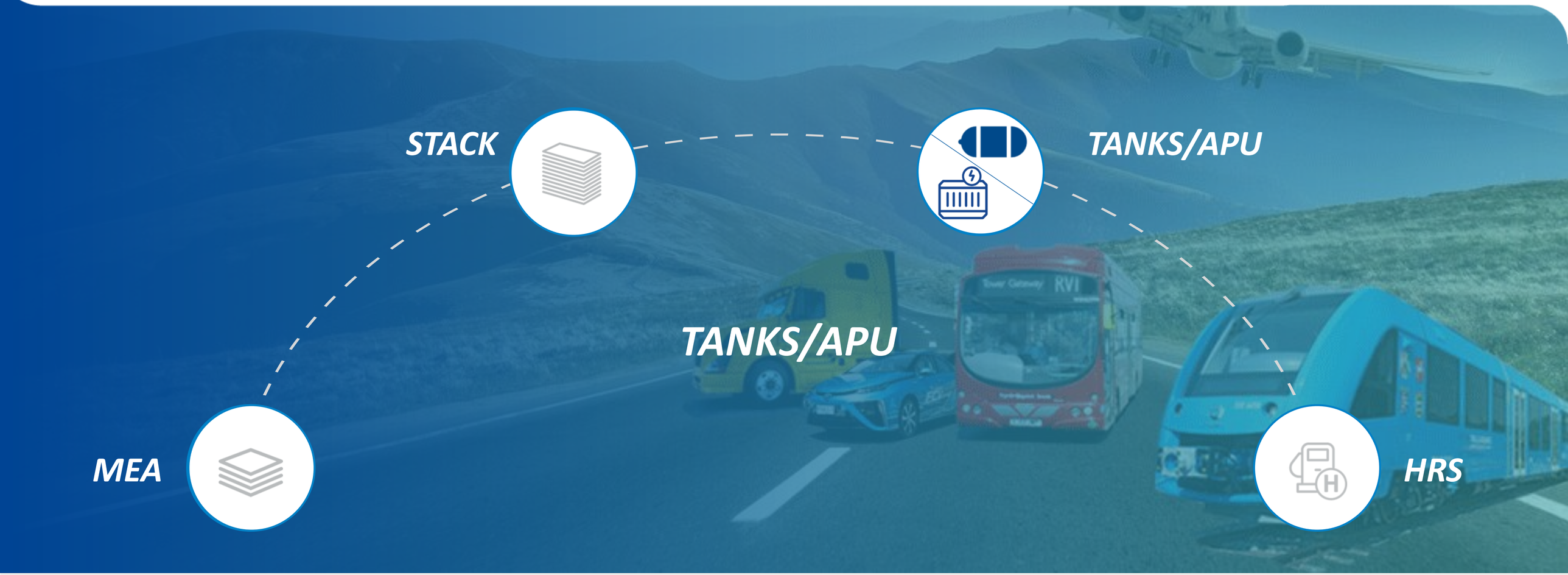
CAPEX @ mass production

36.8 €/kW

Performance

Costs

Transport Portfolio: Research & Innovation

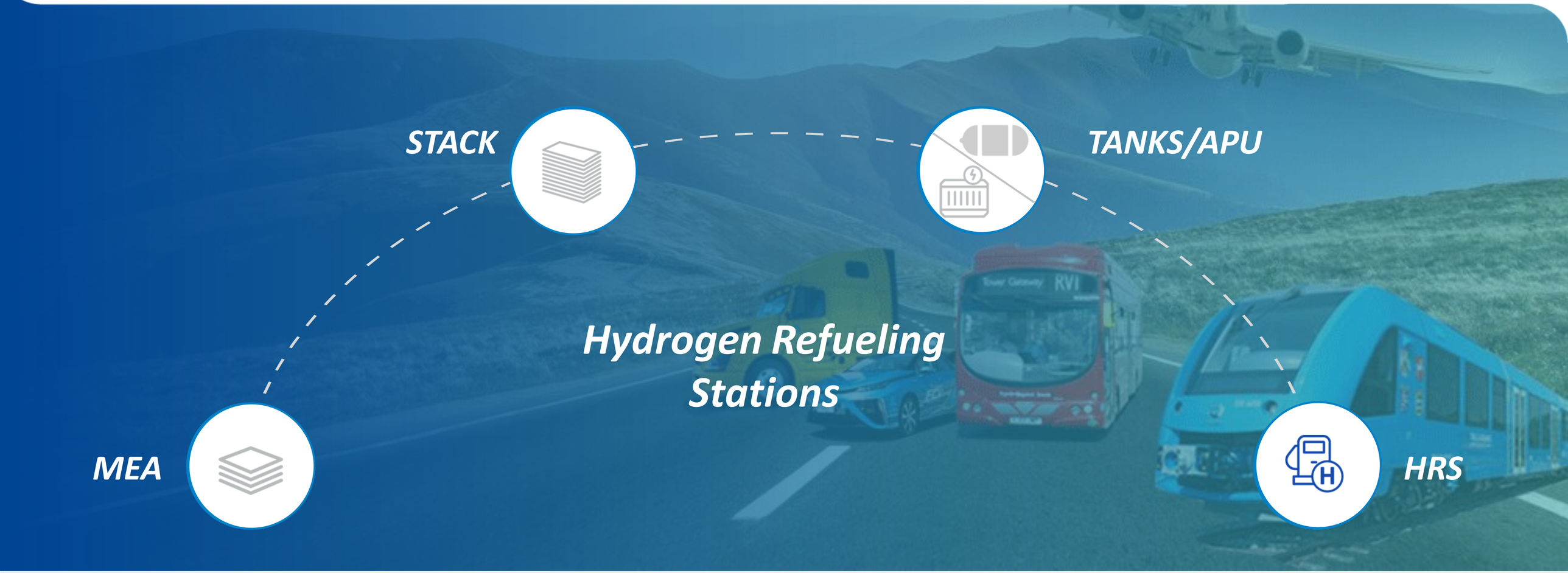


On-board H_2 storage and Auxiliary Power Units

Improved performance and technology

Cost	*Refueling time*	Gravimetric & volumetric capacity	*Stack durability*	*Efficiency*	Weight & dimension
600€/kg H2 - 80 %	3 min	5% 0.023Kg/l	5.000 h	>50 %	

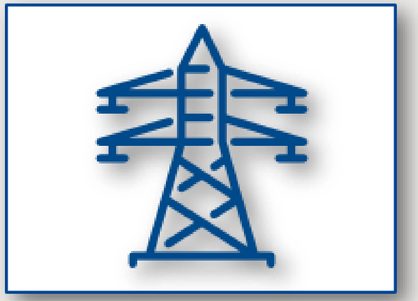
Transport Portfolio: Research & Innovation



Compression solutions for HRS

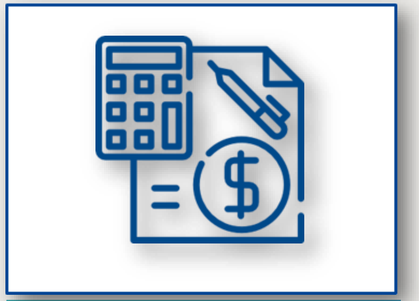
Performance and reliability

Goals



Energy demand

< 6 kWh / kg H2



System cost

< €2,000/ (kg H2/day)

Noise

< 60 dB @5 m

Compression & Buffering Module

TRL from 3 to 5

Dissemination and exploitation

Patents

2

Workshops

4

Publications

54

Upcoming events:

- **GIANTLEAP 12 December:**
  Lifetime extension of fuel cell systems for electrical buses

FCH support to innovation – success stories

Fostering commercialisation

FCH support as a jump-off base for further projects under European, national or regional fundings

Germany launches €60M, 3-year consortium project on high-volume production of automotive fuel cells; BMW, Daimler, Ford, VW

29.06.2017

AutoStack-Industrie: Der Deutschland-Stack

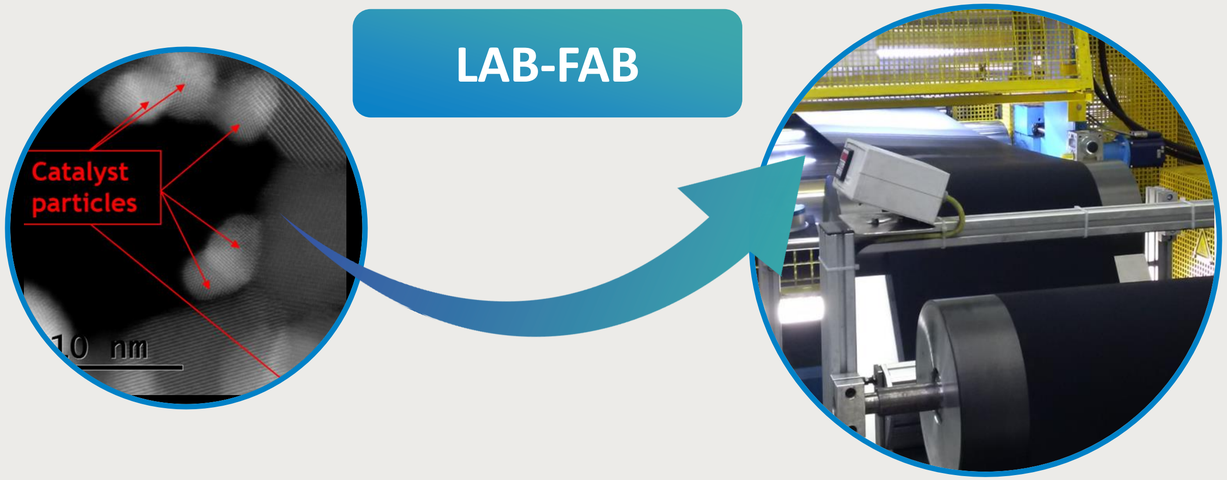
Budget x4

The FCH support has help innovative SME to create new jobs and launch new products on the market

Setting up for the manufacturing and commercialisation of the first European 64L 700 bar tank for on-board hydrogen storage

Key messages

Comprehensive view of FCH support in Research for Transport



LAB-FAB

Towards the development of an EU supply chain supported by strong research base

Transfer of progress between research and demo projects

Research to market

Demo GEN X

Research GEN X+1

Lessons learnt

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FCH JU

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