



FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

***FCH-JU:
Accelerating the
Implementation of
hydrogen and fuel
cells in Europe***

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3/10/2019 Kosice, SK

Science
Meets
Parliaments



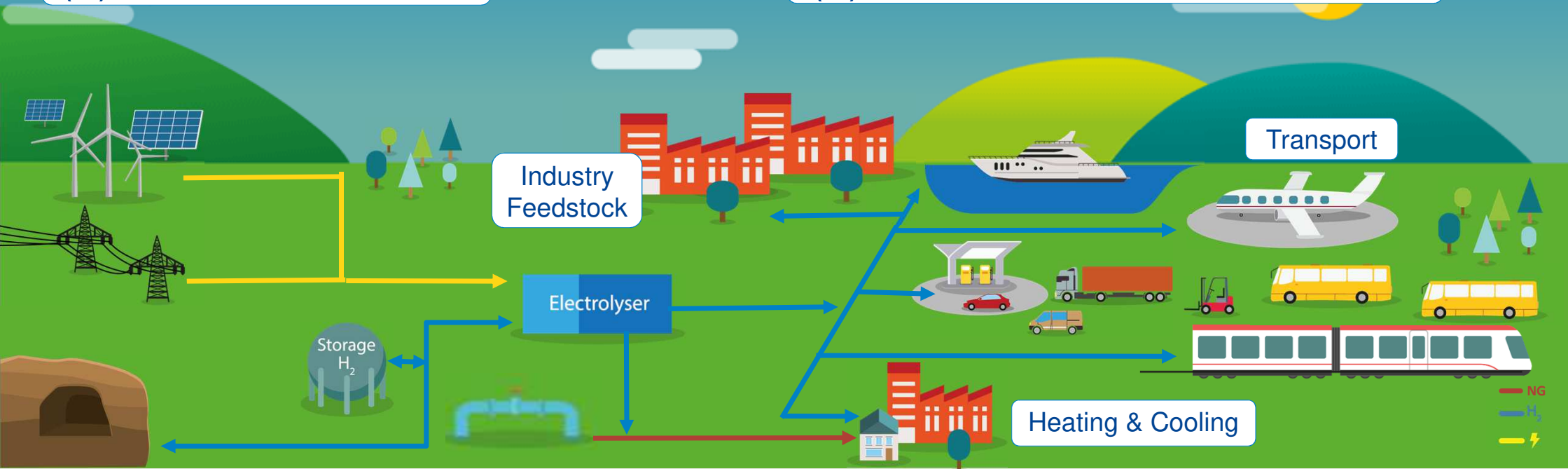
The role of hydrogen in our society & economy

Hydrogen allows more renewables in the energy system through storage and enables sectoral integration



(1) STORAGE (seasonal)

(2) SECTORAL INTEGRATION



Besides CO₂ abatement, deployment of the hydrogen roadmap also cuts local emissions, creates new markets and secures sustainable employment in EU



2050 hydrogen vision



~24%

of final energy demand¹



2

~560 Mt

annual CO₂ abatement²



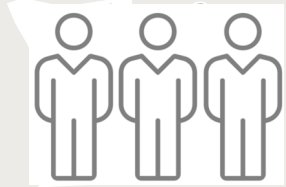
~EUR 820bn

annual revenue (hydrogen and equipment)



~15%

reduction of local emissions (NO_x) relative to road transport



~5.4m

jobs (hydrogen, equipment, supplier industries)³



1 Including feedstock 2 Compared to the reference technology scenario 3 Excluding indirect effects

SOURCE: Hydrogen Roadmap Europe team

Strong public-private partnership with a focused objective

A combined private-public of 1.85 billion Euro has been invested to bring products to market readiness by 2020



FUEL CELLS AND HYDROGEN JOINT UNDERTAKING



Industry grouping
>130 members
50% SME



Research grouping
70 members



Energy

H₂ production and distribution
H₂ storage
F/C for CHP



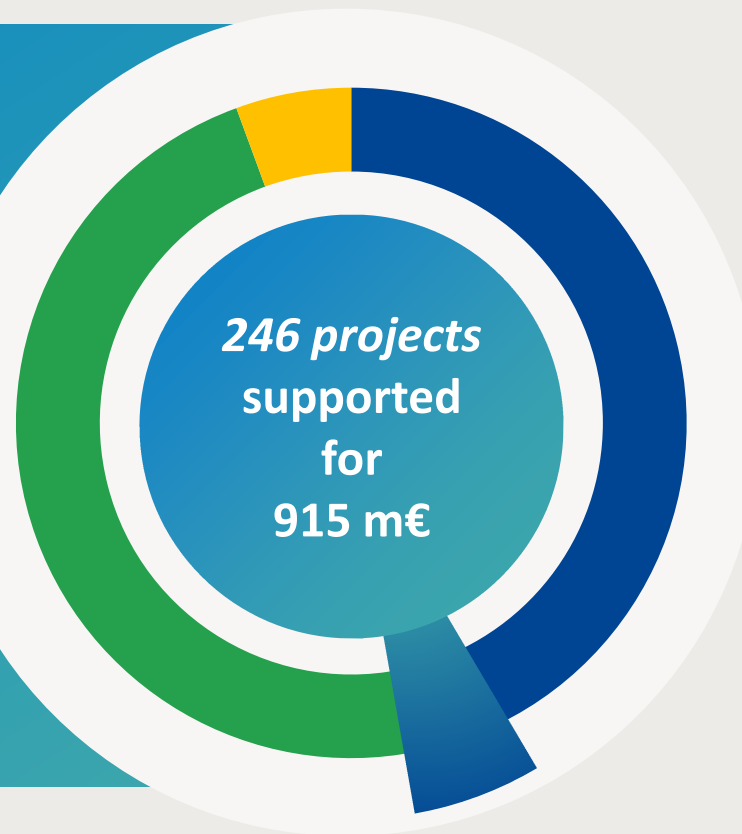
Transport

Road vehicles
Non-road vehicles
Refueling infra
Maritime, rail and aviation applications



Cross-cutting

standards, safety, education, consumer awareness, ...



47 %



428 million euros
136 projects

42 %



388 million euros
66 projects

6 %



53 million euros
40 projects

5 %



46 million euros
4 projects



Similar leverage of other sources of funding: 935 m€

Overview of FCH JU activities in V4 countries



Poland



- FCH JU Contribution: 2.6 M€



- 11 Beneficiaries



- 21 Projects



Slovak Republic



- FCH JU Contribution: 0 M€



- 0 Beneficiaries



- 0 Projects



Czech Republic



- FCH JU Contribution: 2.7 M€



- 8 Beneficiaries



- 12 Projects



Hungary



- FCH JU Contribution: 21 k€



- 3 Beneficiaries



- 2 Projects



SECTOR



Clean H₂ production and industry

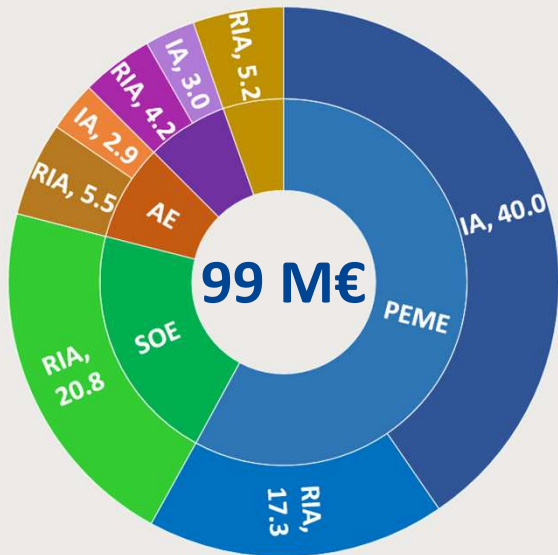


Electrolysis demonstrations for energy storage and greening of Industry

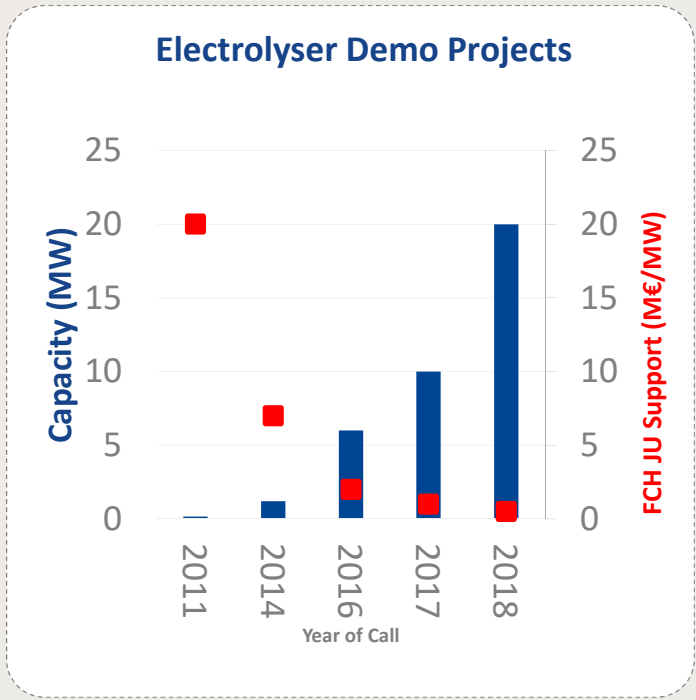
Continues support to develop higher capacity electrolysers led to cost reduction and increased interest by industry



Electrolysers, M€ FCH JU support



30 Projects



HRS



Steel industry



Refineries



Food industry

6MW @ Steel factory



<https://www.h2future-project.eu/>

10MW @ Refinery



<https://www.refhyne.eu/>





SAFETY, STANDARDS, EDUCATION...



Preparing the European workforce

Projects running include training packs in different languages, formats, means, etc.



European hydrogen emergency response training program for first responders
Follow-up project to start in Jan '20



**in person training, e-learning, blended learning...virtual reality, serious games...
 ...mock-up installations...**

HyResponse A comprehensive training program

Educational



Virtual reality



Operational



TeachHy
undergraduate & graduate education PhD BEng/BSc MEng/MSc

KnowHy
Courses for professionals/ general public

FCH-JU initiative: 92 Regions/Cities from 22 countries (about 25% of EU) study to:



- (1) assess FCH applications,
- (2) identifying financing/funding options
- (3) develop roadmaps,
- (4) engage their stakeholders

<p>Belgium</p> <ul style="list-style-type: none"> >Flanders >Pom West-Vlaanderen 	<p>United Kingdom</p> <ul style="list-style-type: none"> >Swindon and Wiltshire >Aberdeen >Birmingham >Cornwall >Dundee >Fife >Leeds 	<p>Norway</p> <ul style="list-style-type: none"> >Akershus >Møre og Romsdal >Oppland County Municipal >Sogn og Fjordane 	<p>Sweden</p> <ul style="list-style-type: none"> >Gavleborg >Mariestad 	<p>Germany</p> <ul style="list-style-type: none"> >Baden-Württemberg >Bremerhaven >Hamburg >HyCologne-Hydrogen Region Rhineland >Kreis Steinfurt
<p>France</p> <ul style="list-style-type: none"> >Auvergne Rhone-Alpes >Bourgogne-Franche-Comté >Centre-Val de Loire >Grenoble >Grand Dole >La Roche sur Yon >Normandie >Occitanie-Phyrenees >Orléans >Pays de la Loire >Pays de St Gilles 	<p>Spain</p> <ul style="list-style-type: none"> >Aragon >Barcelona >Castilla – La Mancha 	<p>Iceland</p> <ul style="list-style-type: none"> >Reykjavik 	<p>Finland</p> <ul style="list-style-type: none"> >Kokkola 	<p>Denmark</p> <ul style="list-style-type: none"> >Guldborgsund >Lolland
<p>Italy</p> <ul style="list-style-type: none"> >Lazio >South Tyrol >Favignana 	<p>Netherlands</p> <ul style="list-style-type: none"> >Assen >Drenthe >Emmen >Groningen >Helmond 	<p>Estonia</p> <ul style="list-style-type: none"> >Tallinn 	<p>Latvia</p> <ul style="list-style-type: none"> >Riga 	<p>Czech Republic</p> <ul style="list-style-type: none"> >Trutnov
<p>Portugal</p> <ul style="list-style-type: none"> >Torres Vedras >Médio Tejo 	<p>Austria</p> <ul style="list-style-type: none"> >Tirol 	<p>Slovenia</p> <ul style="list-style-type: none"> >Velenje 	<p>Croatia</p> <ul style="list-style-type: none"> >Split >Split-Dalmatia County 	<p>Romania</p> <ul style="list-style-type: none"> >Constanța
<p>Greece</p> <ul style="list-style-type: none"> >Alimos >Agia Paraskevi >Ierapetra >Kozani >Milos >Vrilissia 	<p>Bulgaria</p> <ul style="list-style-type: none"> >Bulgarian Ports >Sofia 	<p>Saxony-Anhalt</p> <ul style="list-style-type: none"> >Recklinghausen >Saxony-Anhalt 	<p>Bulgaria</p> <ul style="list-style-type: none"> >Kalymnos >Heraklion >Western Macedonia >Papagoou-Halargos >Region of Crete 	<p>Greece</p> <ul style="list-style-type: none"> >Kalymnos >Heraklion >Western Macedonia >Papagoou-Halargos >Region of Crete



Signing ceremony 23 Nov. 2016 with CøR President Markku Markkula + FCH-JU and 40 regions

NEXT

Yearly program review days and stakeholder forum



Program Review days
19 & 20 Nov. 2019

Stakeholder Forum
21 Nov 2019

Charlemagne building Brussels,
Belgium





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