



**FUEL CELLS AND HYDROGEN**  
JOINT UNDERTAKING

***Cross-cutting: pre-  
normative research,  
safety issues, education  
& training, socio-  
economic &  
benchmarking***

**Alberto  
Garcia Hombrados**

**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 6

### **CROSS-CUTTING: Pre-normative research, safety issues, education & training, socio-economic & benchmarking**

- |               |   |
|---------------|---|
| 11:30 - 11:50 | Portfolio overview by <b>Alberto Garcia Hombrados</b> , FCH JU  |
| 11:50 - 12:10 | HYPACTOR: Pre-normative research on resistance to mechanical impact of composite overwrapped pressure vessels                     |
| 12:10 - 12:30 | SOCTESQA: Solid oxide cell and stack testing, safety and quality assurance  |
| 12:30 - 12:50 | HYTECHCYCLING: New technologies and strategies for fuel cells and hydrogen technologies in the phase of recycling and dismantling |
| 12:50 - 13:10 | KNOW HY: Improving the knowledge in hydrogen and fuel cell technology for technicians and workers                                 |
| 13:10 - 13:30 | CERTIFHY and Guarantees of Origin: Developing a European Framework for the generation of guarantees of origin for green hydrogen  |



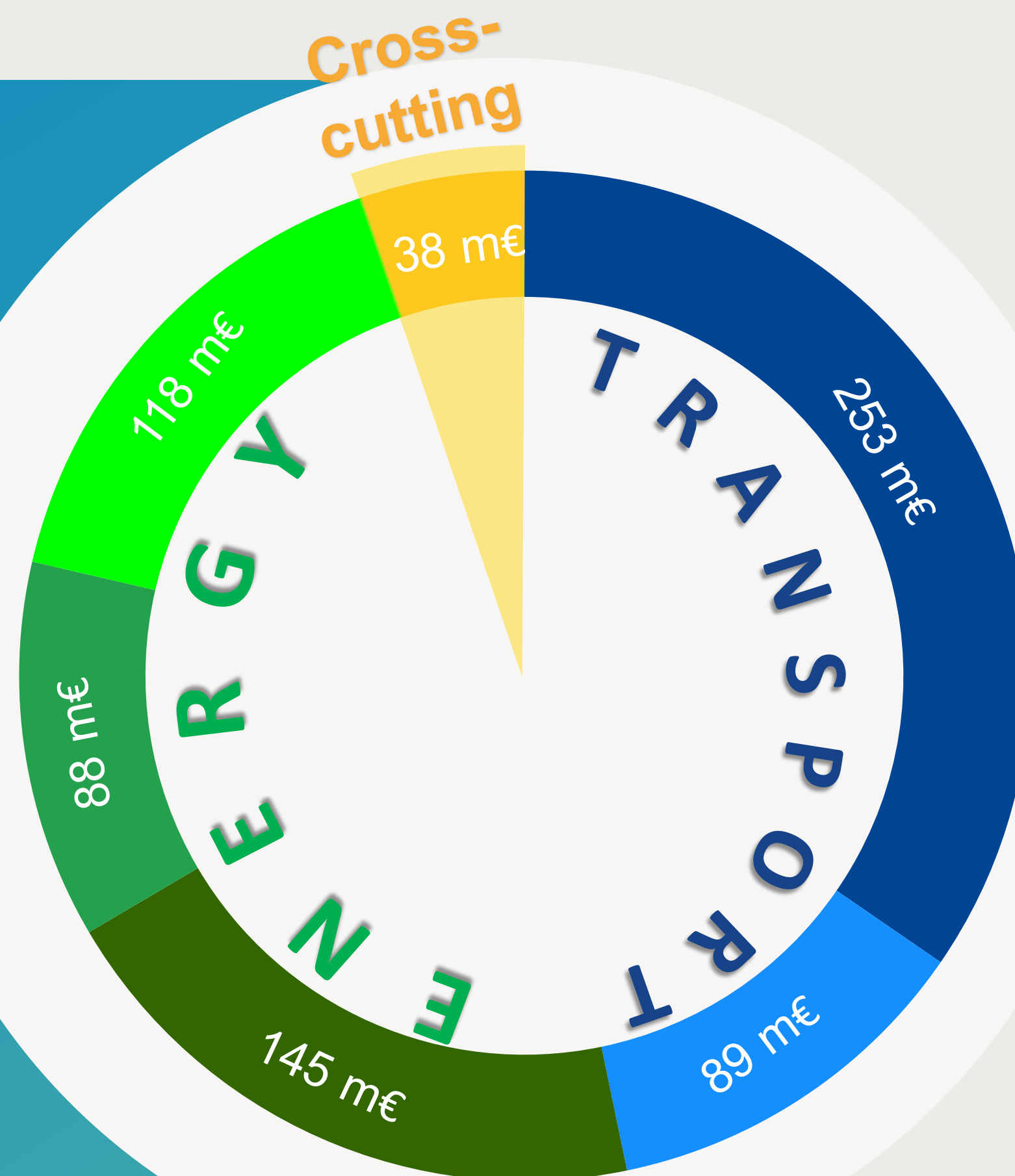


# CROSS-CUTTING ACTIVITY AREA

## FCH JU Objectives



- H<sub>2</sub> storage for grid balancing
- Green hydrogen production
- Heat & electricity production
- Minimal use of critical raw materials
- Clean Transport



## Cross-cutting

5 %

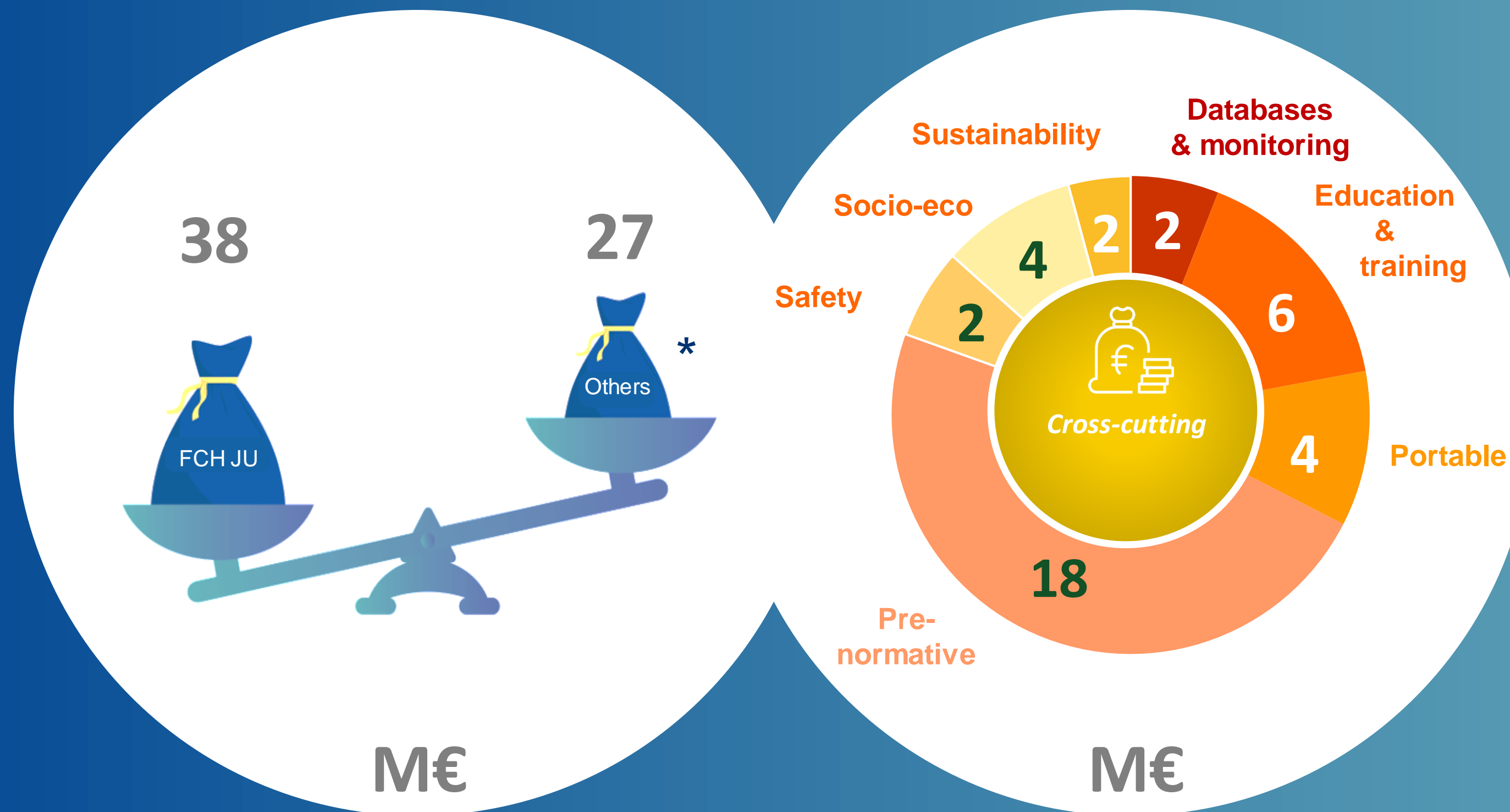


**38** M€

**33** Projects

# Coordinating support activities

33 projects – 65 M€



Supporting and facilitating the market take up



Strengthening the European FCH sector



Fostering the commercialization in Europe



# Cross-cutting Activity Area

Addressing topics in the industrial field and the societal domain





# At a glance

Cross-cutting activities comprise projects and complementary actions



## Projects



Legal,  
administrative  
and regulatory  
framework



Education and  
training



Safety



Social  
awareness  
& public  
acceptance



Sustainability



Databases &  
Monitoring

## Complementary Actions

Regulations, Codes and Standards Strategy Coordination Group (RCS SCG)



European Hydrogen Safety Panel



Collaboration with JRC



Additional initiatives, studies ...





# Cross-cutting Activity Area

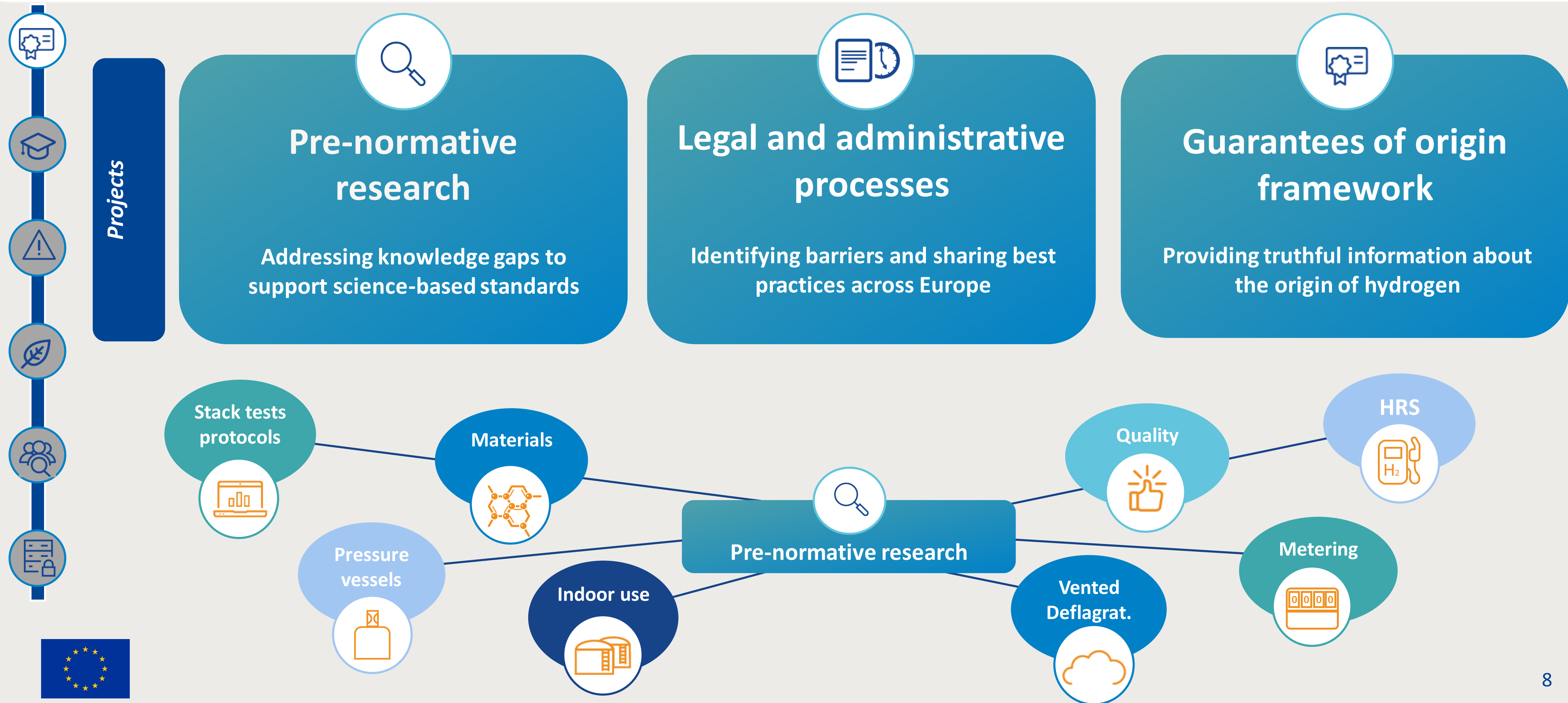
Actions Areas





# Developing suitable environments for FCH technologies in Europe

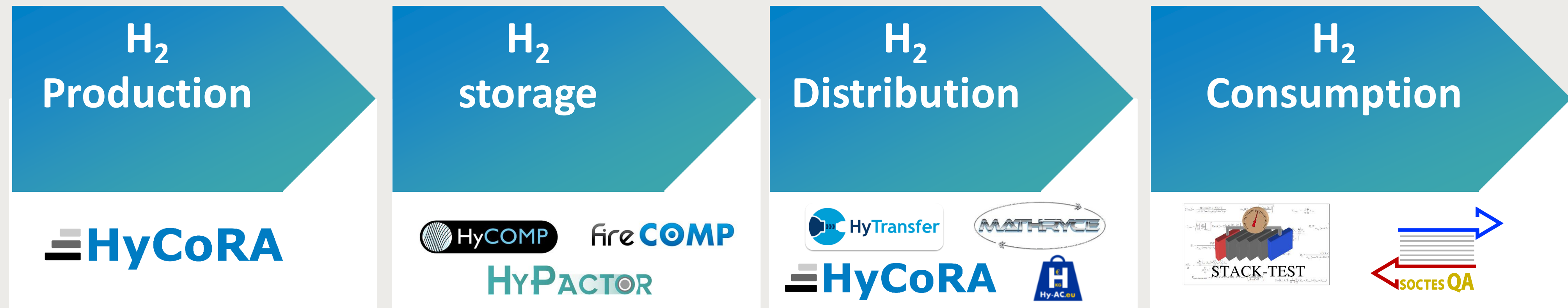
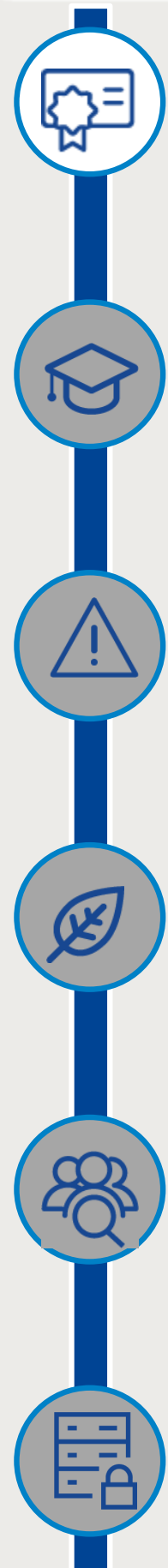
Supporting and facilitating adequate frameworks for market take up





# Pre-normative projects address the entire hydrogen chain

Providing science-based information to improve and develop standards



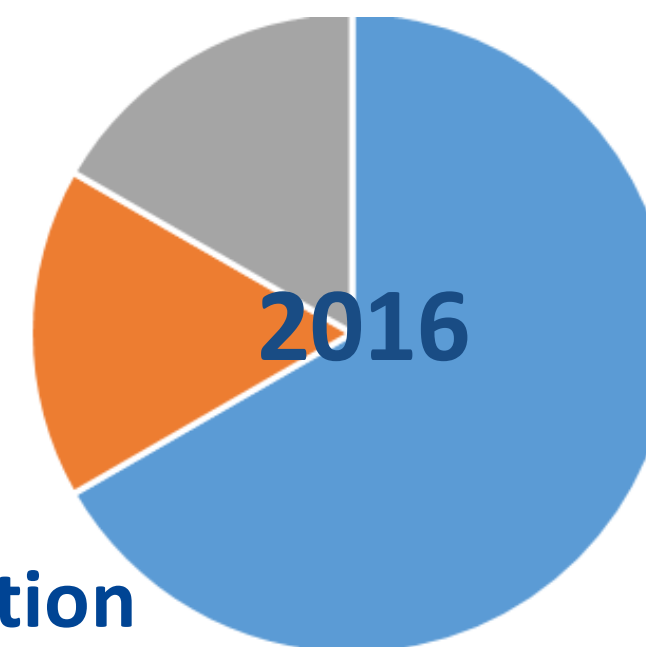
## Targeting standards at European and International level

International Electrotechnical Commission



CENELEC

European Committee for Standardization  
European Committee for Electrotechnical Standardization



International Standardization Organization



# Coordinating RCS needs of strategic importance for Europe

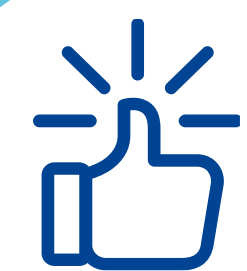
Lack of harmonized RCS is one of the major barriers for the commercialization of FCH technologies in Europe



## Regulations, Codes and Standards Strategy Coordination Group (RCS SCG)

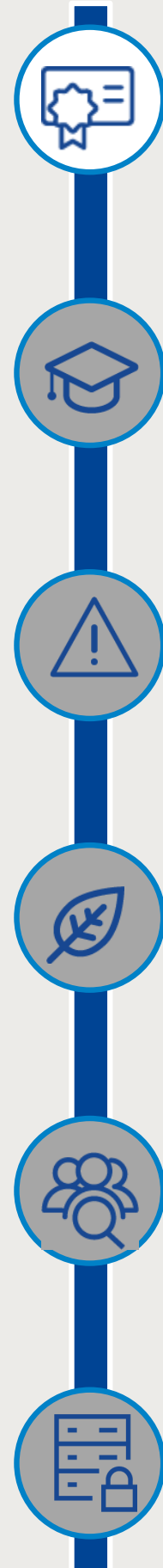


Identification and prioritization of RCS needs  
Definition of the strategy to achieve the RCS priorities  
Identification of PNR activities to support the RCS priorities



Definition of 4 main action areas and priorities  
Definition of implementation strategy  
Topics proposed for annual calls for proposals

Interest in participating?  
Membership open!!





# Cross-cutting Activity Area

Actions Areas





# Preparing the European workforce

Promoting excellence in Europe



## Increasing expertise across Europe and contributing to prepare the European workforce

Post graduates  
and Young  
Professionals



Technician  
and workers



**FCH JU**  
*supports*

Technical  
professionals



Regulators and  
Public Safety  
Officials

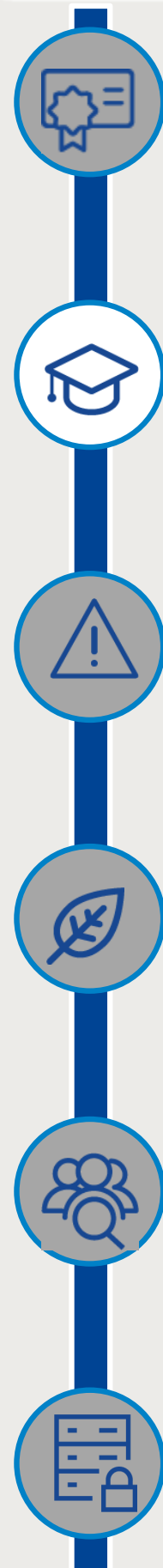


First  
Responders



**Covering...**

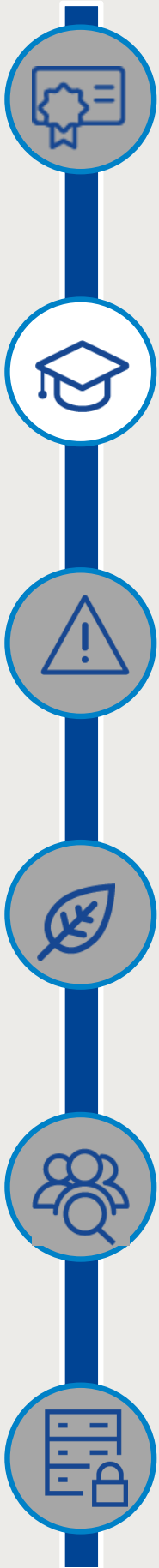
*Vocational undergraduate Graduate*





# Preparing the European workforce

Projects running over 2016 include training packs in different languages, formats, means, etc.



Training for  
first  
responders

Courses for  
professional  
s/ general  
public

European hydrogen emergency response training program for first responders

Home Educational training Operational training VR training Emergency Response Guide Events Contacts Members Links

Improving the Knowledge in Hydrogen and Fuel Cell Technology for Technicians

About Courses Registrations Workshop Latest News Partners Contact

Core module. Picture source: Audi

Specialisation modules

Workshop on advance training program for Hydrogen and Fuel Cell Technicians  
When? October 20th 2017 Where? ICEPS-CTC BONN, International Clean Energy Partnership foundation – Climate Technology Center, Kalkofenstr. 5 53340 Meckenheim/Bonn The Project Consortium is pleased to present the workshop organized within the ... READ MORE 10 OCT 2017

Register NOW for the first courses for Fuel Cells and Hydrogen applications  
The second call for courses are open now in the following countries: THE NETHERLANDS ITALY SPAIN UNITED KINGDOM GERMANY PORTUGAL BELGIUM FRANCE . READ MORE 1 FEB 2017

Plan of the next KnowHy courses on FC&H2 Copy  
The plan of the upcoming courses in Belgium, Germany, Portugal, France, Italy, The Netherlands, Spain and UK is downloadable knowhy-courses\_runnings-plan Please, visit the registration page to register. READ MORE 14 OCT 2016

About Courses Workshop Latest News Partners Contact

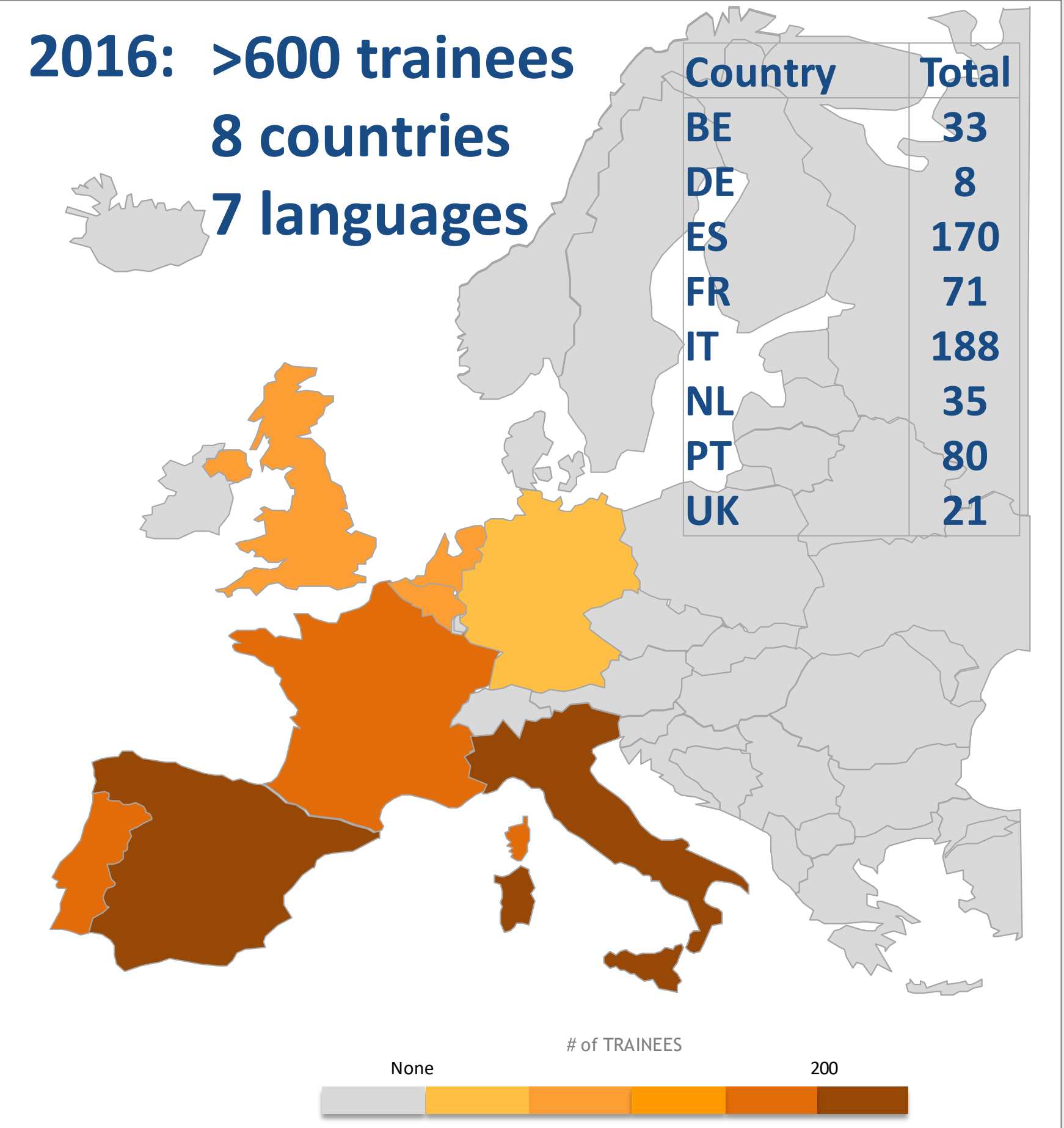
project's website

Hy project supported by EC Fuel Cell and Hydrogen Joint Undertaking (June 2013 - 2016) is the first comprehensive training programme for first responders, i.e. a European Hydrogen response training program for first responders. The developed core training programme is art knowledge in hydrogen safety, operational training on mock-up real scale hydrogen and g reproducing in detail an entire accident scenario, including influence of first responder's d during the project. The Emergency Response Guide, explaining details of intervention e pilot training sessions to receive attendees' feedback, which is also available for download and were established to engage as much as possible European stakeholders and provide doped and available to train first responders to deal with all safety aspects for a range of ses, forklifts, refuelling stations, backup power, stationary fuel cells for combined production

After the end of the project (September 2016), the website hosts the deliverables of the open safety training for First Responders, Emergency Response Guide, links to relevant training sessions, etc, all available for download.

If you don't find what you are looking for on this website, don't hesitate to contact us.

2016: >600 trainees  
8 countries  
7 languages



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





# Cross-cutting Activity Area

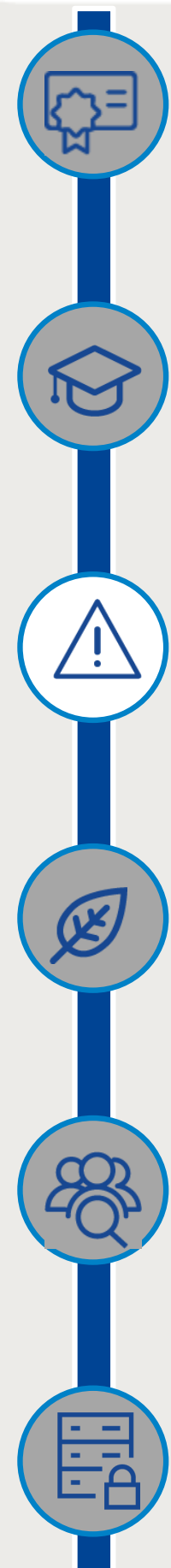
Actions Areas





# Multidisciplinary approach to key safety-related issues

Addressing safety-related issues from multiple perspectives



Projects



## Hydrogen Sensors

Guidelines to select and use the best sensor for a particular application



## CFD for safety analysis

Development of best practices, HYMEP evaluation protocol



## Safety expert groups

Development of H2 safety expert groups

## European Hydrogen Safety Panel initiative



Project level



Program level

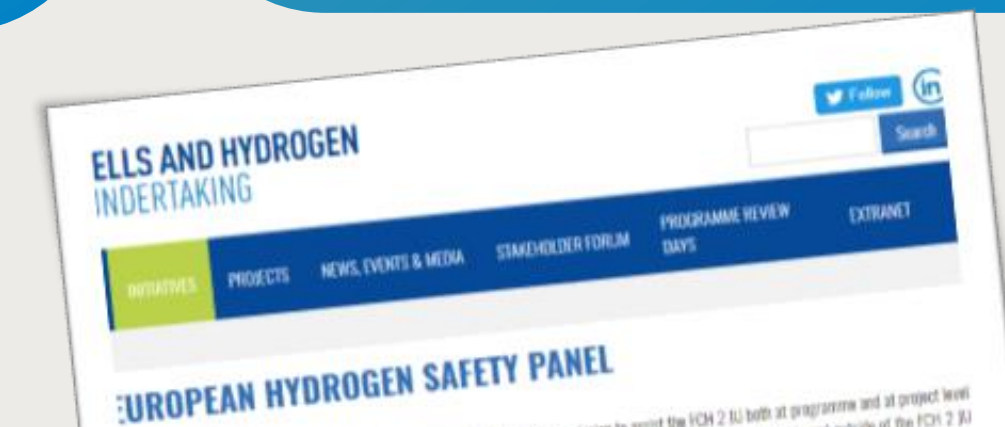


Data Collection



Public Outreach

European Hydrogen Safety Panel



Interest in participating?  
Call for expression of interest  
on line!





# Cross-cutting Activity Area

Actions Areas



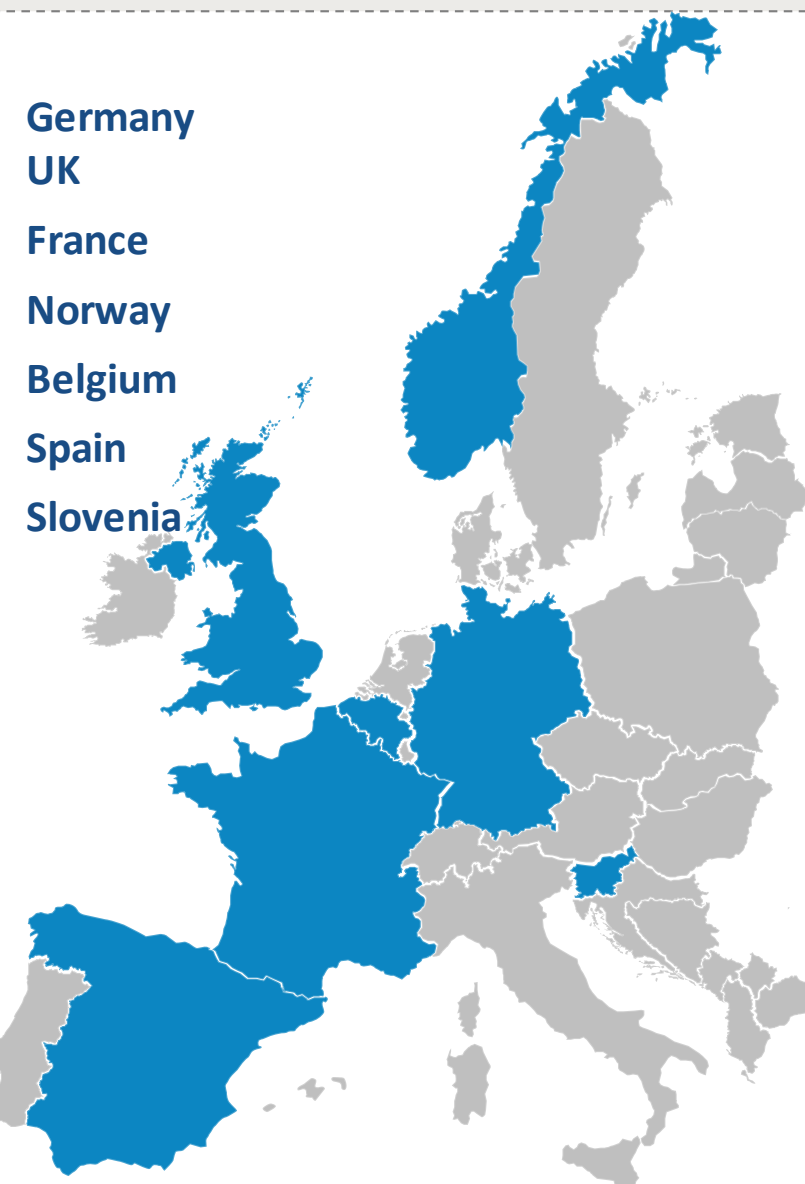


# Raising social acceptance and public awareness

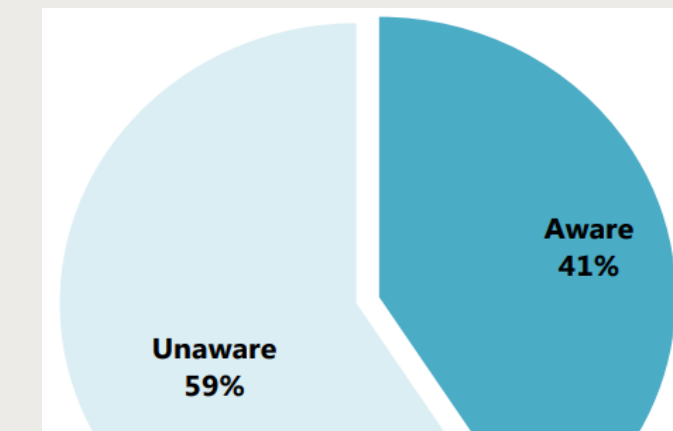
Providing a deeper knowledge on social and economic factors around FCH technologies

## Biggest exercise ever on social research around FCH in Europe !

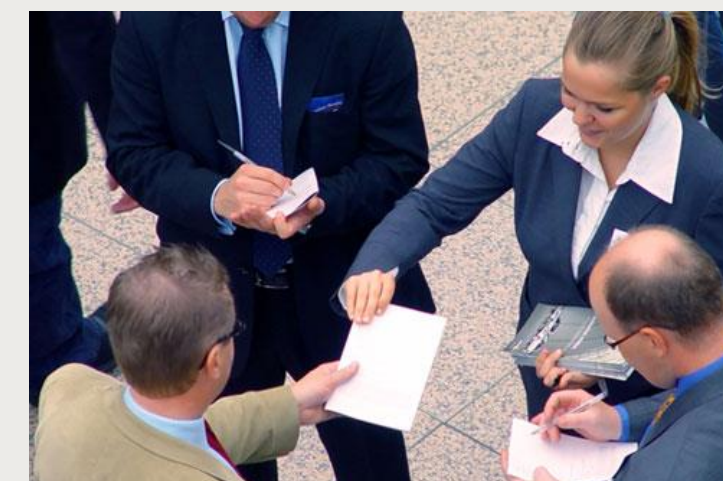
Understand awareness and acceptance across Europe  
Identify the main drivers of social awareness and acceptance -> recommendations



**Survey**  
**1000 participants**  
**7 European countries**



**Survey**  
**333 participants**  
**5 European countries**



**Semi-structured interviews**  
**145 participants**  
**5 European countries**



**Study 1. Public awareness and acceptance**  
**Study 2. Stakeholder acceptance**



**Toolbox to help stakeholders to integrate issues related to social acceptance**



# Cross-cutting Activity Area

Actions Areas





# Bringing sustainability to FCH technologies

Ensuring FCH technologies are environmentally friendly



## Projects



### Life Cycle Assessment

Developing guidance for LCA application to FCH technologies



### Recycling & dismantling

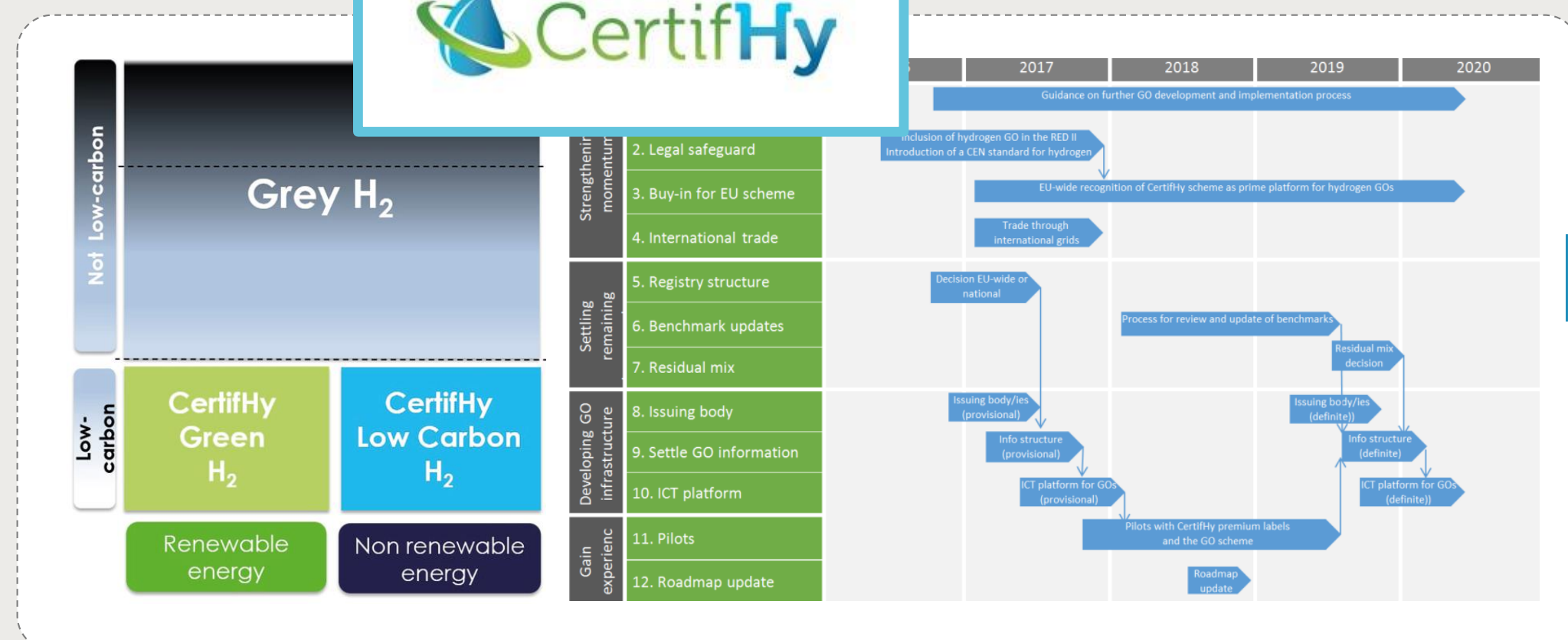
Developing technologies and strategies for recycling and dismantling



### Guarantees of Origin Framework

Providing truthful information about the origin of green hydrogen

## Cross-Cutting Actions



### Guarantees of Origin Stakeholder platform





# Cross-cutting Activity Area

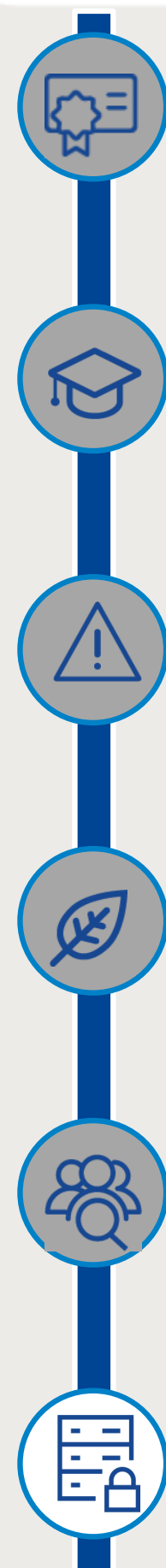
Actions Areas





# Empowering the European FCH sector

Developing advanced databases to find information easily and seamlessly



Projects

## Legal, administrative processes (LAP)

Compilation of LAPs around FCH technologies across Europe

## Education and training

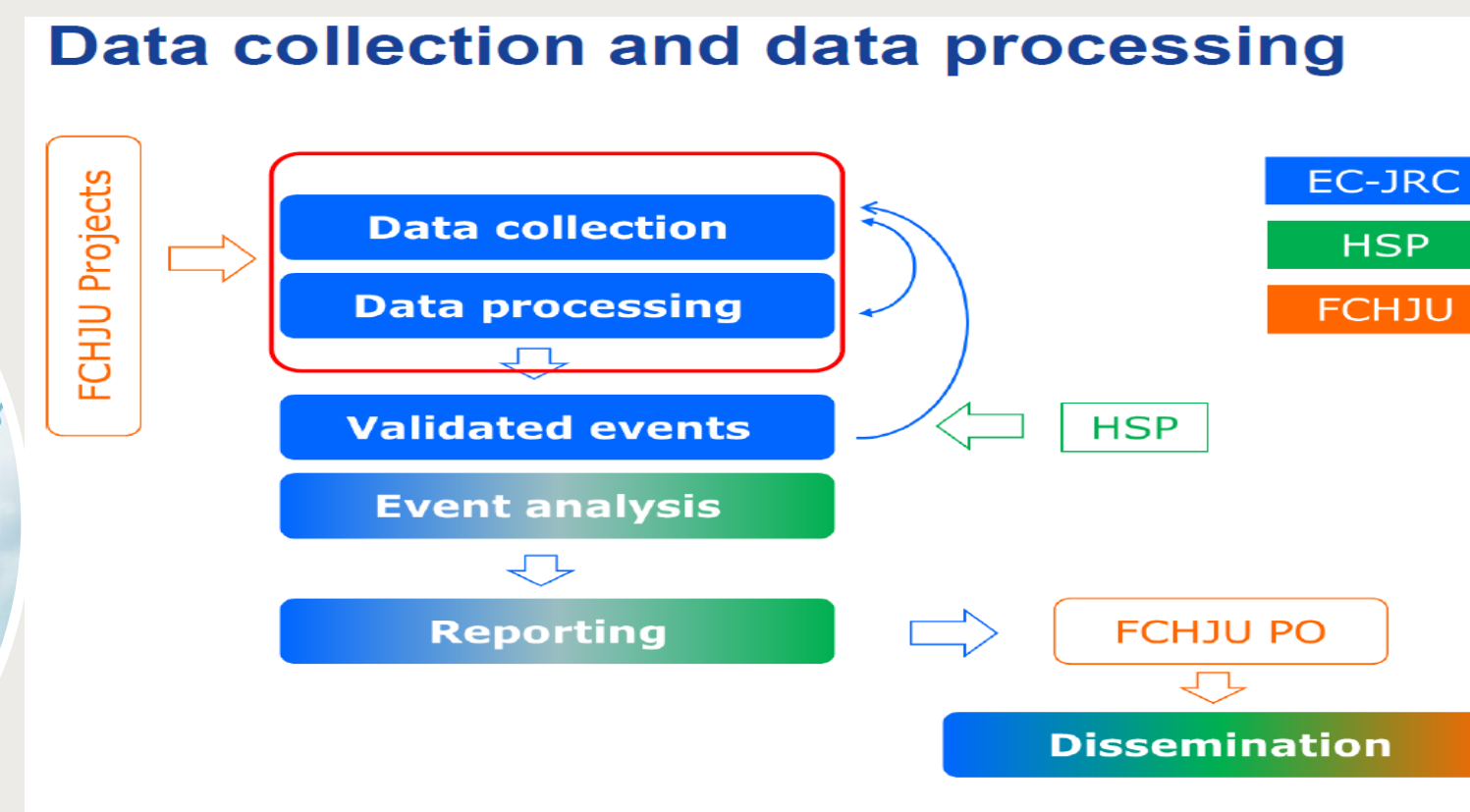
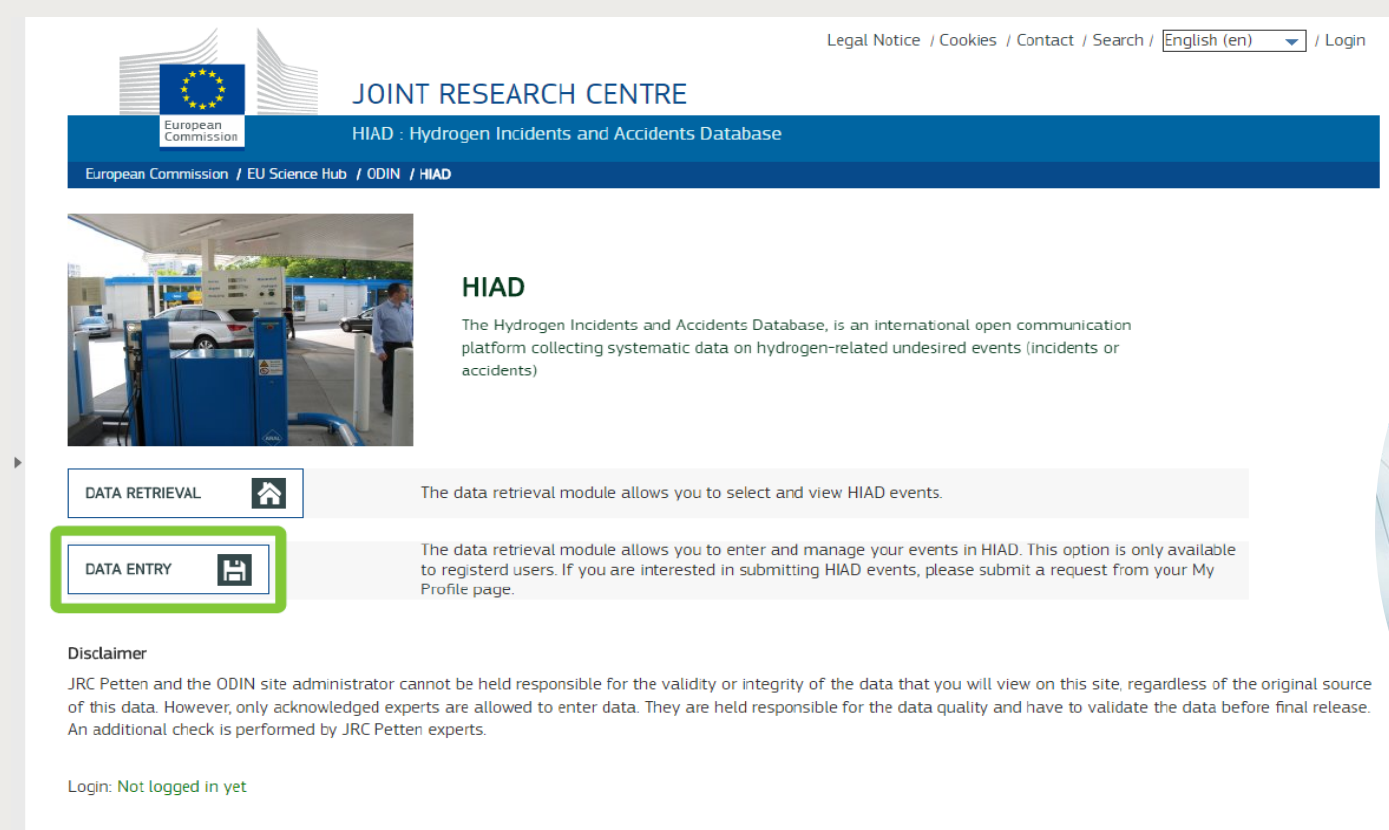
Providing digital tools and services for educational issues and training

## Safety

Validation and verification of CFD models, safety experiments...

Complementary Actions

## HIAD: Hydrogen incidents and accidents database





# Mapping the European FCH sector

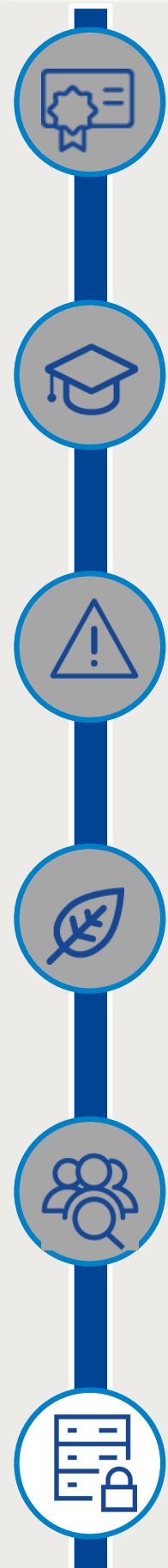
Study on value chain and manufacturing competitiveness analysis for hydrogen and fuel cells technologies



## In-depth analysis and mapping of European FCH value chain

European FCH value chain actor database  
> 400 entities, geographical distribution, etc.

Interest in participating?  
On line form soon!





# Cross-cutting Activity Area

## Summary



**Successful Cross-cutting projects outcomes bringing multiple benefits and providing tangible legacy**



**Complementary activities contribute to FCH sector interests and increasing over time**



**Comprehensive portfolio of activities enriching the FCH 2 JU programme and the whole FCH sector**







**FUEL CELLS AND HYDROGEN**  
JOINT UNDERTAKING

**Alberto J. Garcia Hombrados**

Project officer

[Alberto.GarciaHombrados@fch.europa.eu](mailto:Alberto.GarciaHombrados@fch.europa.eu)

**For further informations**

[www.fch.europa.eu](http://www.fch.europa.eu)



@fch\_ju



Fch-ju@fch.europa.eu



FCH JU





## Agenda



# FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

### PANEL 6

#### CROSS-CUTTING: Pre-normative research, safety issues, education & training, socio-economic & benchmarking

- |               |   |
|---------------|---|
| 11:30 - 11:50 | Portfolio overview by <b>Alberto Garcia Hombrados</b> , FCH JU  |
| 11:50 - 12:10 | HYPACTOR: Pre-normative research on resistance to mechanical impact of composite overwrapped pressure vessels                     |
| 12:10 - 12:30 | SOCTESQA: Solid oxide cell and stack testing, safety and quality assurance  |
| 12:30 - 12:50 | HYTECHCYCLING: New technologies and strategies for fuel cells and hydrogen technologies in the phase of recycling and dismantling |
| 12:50 - 13:10 | KNOW HY: Improving the knowledge in hydrogen and fuel cell technology for technicians and workers                                 |
| 13:10 - 13:30 | CERTIFHY and Guarantees of Origin: Developing a European Framework for the generation of guarantees of origin for green hydrogen  |
| 13:30 - 14:30 | <b>Lunch break</b>  |