



**Hydrogen Europe  
Research**

---

# **Policy Working Group**

---

***17 June 2022***

# Agenda

## 1. Welcome & Approval of the agenda

## 2. Updates on activities

- Feedback on the Delegated Act on Additionality
- Feedback on the Delegated Act on GHG emissions calculation from RFNBOs
- Reaction to REPowerEU

## 3. Latest updates on EU institutions' activities

- Fit for 55 - where do we stand
- EU Taxonomy
- ACER-CEER Reaction on the Gas Package

## 4. Agenda process - green hydrogen



# Updates on

- ▶ activities

# Feedback on the additionality DA

**Scope:** The delegated act aims at establishing rules for the production of RFNBO.

- Support to additionality mechanism (36 months + repowering possibilities)
- Support to the temporal correlation (one hour) and proposed to generalize this approach to the system of GO for renewable electricity.
- Welcomes the exemption to the temporal correlation if projects remain viable after the exemption period.
- **Support to the 90% renewables threshold to consider renewable electricity renewable. A similar approach could be applied for low carbon electricity.**
- Welcome the exemption for research, testing and demo projects benefitting from state aid.
- Support to the application of a transitional period and the proposed grandfathering clause.

# Feedback on the GHG emission methodology



**Scope:** The Delegated Act (& annexed methodology) set out detailed rules for the production of RFNBOs and accounting their GHG emissions. Draft feedback based on inputs from 3 members.

## Key content points:

- Call for accounting emissions from H2 handling in the methodology.
- Ask for clarifying the definition of compressed H2 (include a pressure reference of 3MPa)
- Specify the hierarchy to allocate GHG emissions to co-products (1-system expansion, 2-physical relationship, 3-other)
- Propose to introduce a grandfathering clause for e-fuels produced from unavoidable emissions.
- Underline the shortcomings of not considering the full LCA of the different systems in use to produce electricity (more specifically for RES where the bulk of the emissions are from infrastructures)
- Call for more detailed data for the emission intensity of electricity in the EU [to be specified]
- Support the methodology for accounting emissions from ex end-use
- Apply consistently the mass balance approach among all renewable energy sources
- Delete footnote 1

# Reaction to REPowerEU

REPowerEU reminds the relevance of H<sub>2</sub> and its derivatives to diversify the EU energy mix and

i. The enhanced ambitions for the hydrogen market will be challenging for the entire sector.

ii. Different types of hydrogen are needed to meet the heightened production targets.

*New development to be confirmed.*

iii. Measures to stimulate hydrogen demand should be further explored.

iv. The assumption that 20 liters of water is needed to produce one kilogram of hydrogen is outdated.

*Need review.*

v. Recycling will be the next priority to ensure a sustainable and resilient hydrogen sector.

*Need review.*

vi. Funding for research and development should be continued and increased.

vii. Alignment between European, national and regional levels must be ensured.



# Latest updates on ▶ EU institutions' activities

# Fit for 55- European Parliament



| Proposal   | Status   |
|--|--|
| Revision of the EU Emission Trading System ( <a href="#">EU ETS</a> )  | Rejected in plenary session 8/06 (+256, -340, abst. 34), postponed 23/06 |
| A carbon border adjustment mechanism (CBAM)  | Vote postponed to next plenary 23/06                                     |
| A Climate Action Social Facility   | Vote postponed to next plenary 23/06                                     |
| Effort Sharing Regulation ( <a href="#">ESR</a> )  | Adopted in plenary (+437, -142, abst. 40)                                |
| Amendment of the regulation setting <a href="#">CO2 emission standards for cars and vans</a>                                 | Adopted in plenary (+339, -249, abst. 24)                                |
| Revision of the EU Emissions Trading System for aviation   | Adopted in plenary (+479, -130, abst. 32)                                |
| ReFuelEU Aviation - on sustainable aviation fuels  | <i>7/07 Tentative plenary sitting date</i>                               |
| FuelEU Maritime - on greening Europe's maritime space  | <i>12/09 Indicative plenary sitting date</i>                             |
| Amendment of the Renewable Energy Directive to implement the ambition of the new 2030 climate target ( <a href="#">RED</a> ) | <i>12/09 Indicative plenary sitting date</i>                             |
| Revision of the alternative fuels infrastructure directive ( <a href="#">AFID</a> )  | <i>12/09 Indicative plenary sitting date</i>                             |
| Revision of the <a href="#">energy taxation directive</a>  | <i>12/09 Indicative plenary sitting date</i>                             |



# Fit for 55- Council

- **RED II Revision - new proposal for a compromise in relation with administrative procedures for planning and licensing of renewable energy projects.**

In particular, it provides for renewable energy projects to be considered as being in the interest of public health and safety and as being carried out for imperative reasons of overriding public interest in order to accelerate their deployment with a view to achieving the EU's climate objectives. This status allows for derogations from certain provisions of the Directive (2009/147) on the conservation of wild birds and the Directive (92/43) on the conservation of natural habitats and of wild fauna and flora.

This in-line with the REPowerEU proposal on this very same topic.

- **Revision of the ETS - new compromise [on future reviews to expand the scope]**

# EU Taxonomy

- On 14 June, a resolution was voted to reject the delegated act in a common vote in the ENVI & ECON committee (+76, -62, 4 abst. no nominal vote). It is an intergroup coalition.

*"We are not saying no to gas or nuclear. We are saying 'no' to 'sustainable' finance being diverted to additional investments."* (MEP Christophe Hansen, EPP, Luxembourg)

- The next step for this coalition is to have the resolution adopted in the plenary in July (4 to 7), the outcome of the vote is unsure.
- If the resolution passes, the Commission will have to review the delegated act.

# ACER-CEER Reaction to the European Commission's Hydrogen and Decarbonised Gas Market Package ([here](#))

## In particular, ACER and CEER welcome:

- ✓ The willingness to establish core principles for the regulation of a dedicated hydrogen sector, entrusted to national energy regulatory authorities.
- ✓ The extensive mirroring of the consumer protection provisions already in place for electricity consumers to the benefit of gas consumers.
- ✓ The proposed role for regulatory authorities in approving and amending national development plans for gas as a way to promote a user-oriented and efficient development of the energy system.

Turning to the detailed elements of the proposals, regulators present below recommendations to enhance the effectiveness of the provisions in the Package, with a focus on

Comprehensive  
system design

Integrated  
network  
development

Inclusive  
consumer  
protection



Joint Research and  
Innovation

▶ Initiative on Green  
Hydrogen: New ERA



# Hydrogen Europe Research



european  
research area

Agenda process  
**Green Hydrogen**

Joint Research and Innovation  
Initiative on **Green Hydrogen: New ERA**

Daria Vladikova [d.vladikova@iees.bas.bg](mailto:d.vladikova@iees.bas.bg)



## Agenda process **Green Hydrogen**

### Joint Research and Innovation Initiative on **Green Hydrogen: New ERA**

December 2020 – May 2022

**WHY TO DO IT ???**

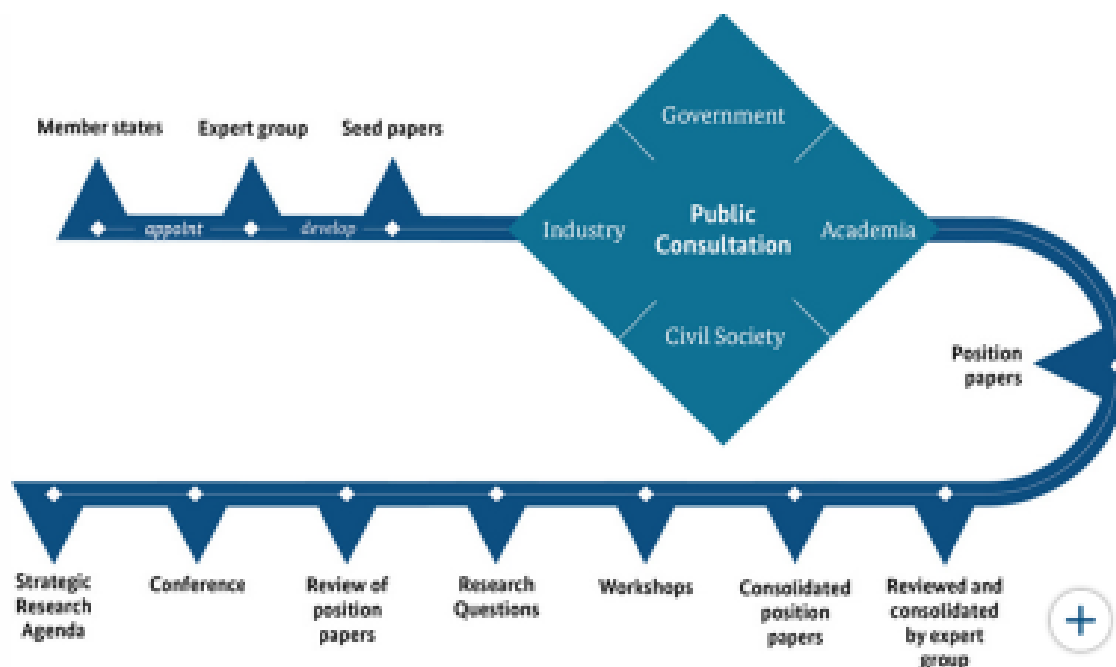
**ISN'T THERE OVERLAPING WITH OTHER  
STRUCTURES & ACTIVITIES ???**



ONE OF THE AIMS WAS TO CHANGE THE EU H2 MAP INVOLVING ALL MEMBER STATES

## Agenda process Green Hydrogen

### Joint Research and Innovation Initiative on **Green Hydrogen: New ERA**

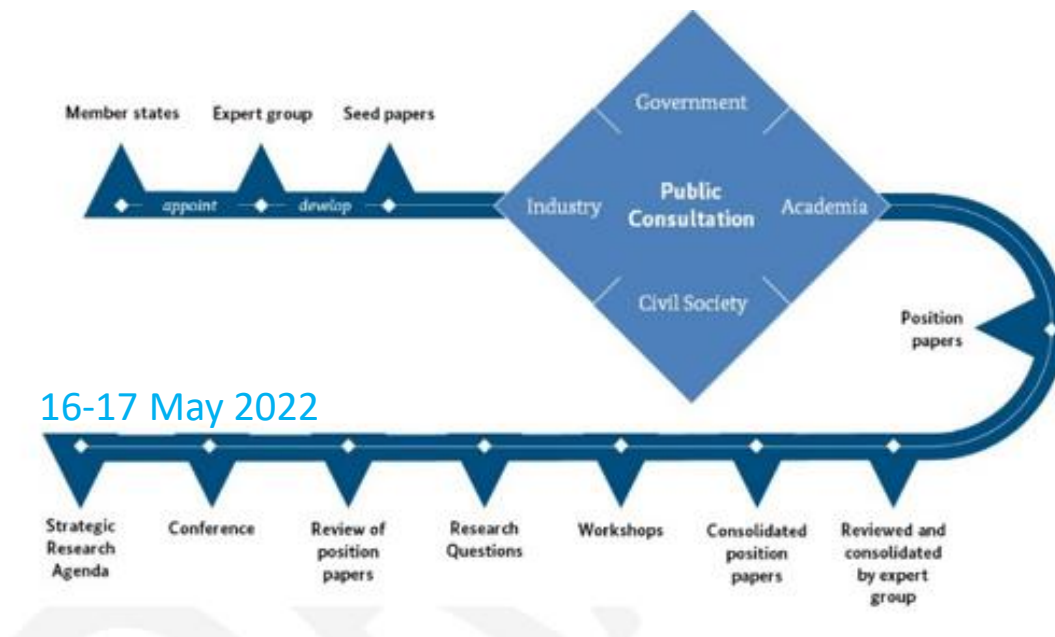


- All member states (via Ministries of Science and Innovation)
  - Task Force Group - 2 representatives: Ministry; Scientific community
- Bottom-up Approach
  - Scientists
  - Research institutions
  - Industry
  - Public authorities
  - Civil Society (citizens)



## Agenda process **Green Hydrogen**

### Joint Research and Innovation Initiative on **Green Hydrogen: New ERA**



#### ■ Main Research Topics:

- Production (It; BG)
- Transport and infrastructure (De)
- Market stimulation (A)
- Regulation and standards (All)



## Expert Group in Production

### ▪ Research:

- Antonino Arico (IT) - Steering Committee (HER - SNR)
- Angelo Moreno (IT) - Steering Committee (Ex Member of HER GB)
- Stanko Hocevar (SVN)
- Sonya Calnan (Helmholtz Zentrum - HER)
- Carmen M. Rangel (PRT) - National Representative in FCH JU

### ▪ Industry

- Africa Castro (SP) - CEO B2H2 SP (HE)
- Ervin Tal-Gutelmacher (IS)
- Nicholas Fleischhacker (AUT) (Green Energy Center AUT)

### ▪ Society

- Julian Popov (BG) - Steering Committee (Climate-KIC BG -Knowledge and Innov. Community )
- Vasco Amorin (PRT) (INESC TEC)



Agenda process  
**Green Hydrogen**

## Technical Analysis of the Results from the Consultations on the Production Seed Paper



## Section 1. General Information

## Agenda process Green Hydrogen

**Participants: 101**

Contries: 21 (18 from EU) –  
**national views**

Organizations: 2

**Stakeholders Group:**

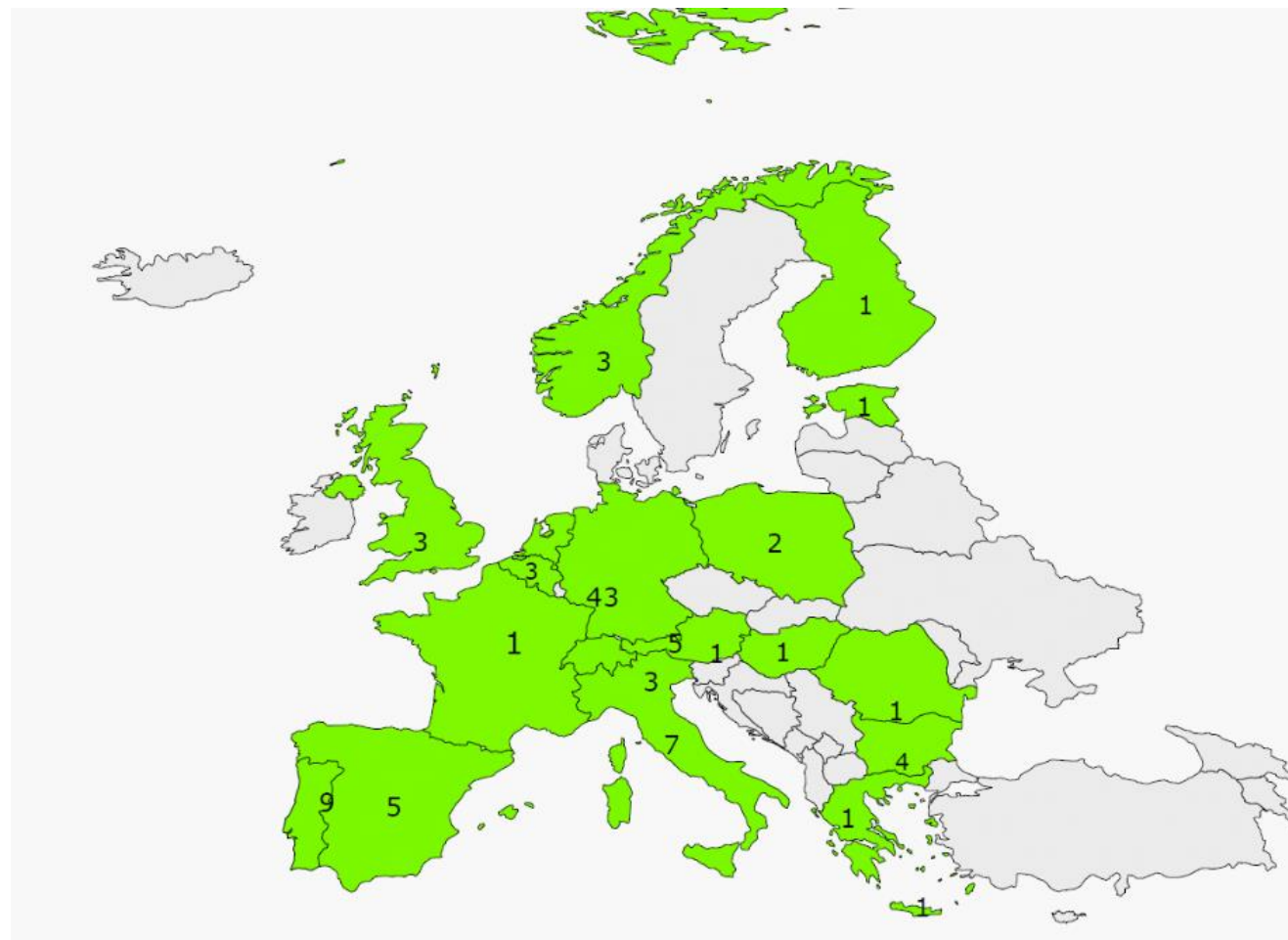
Science: 33

Industry: 31

Civil Society: 5

Public Administration: 15

Others: 15

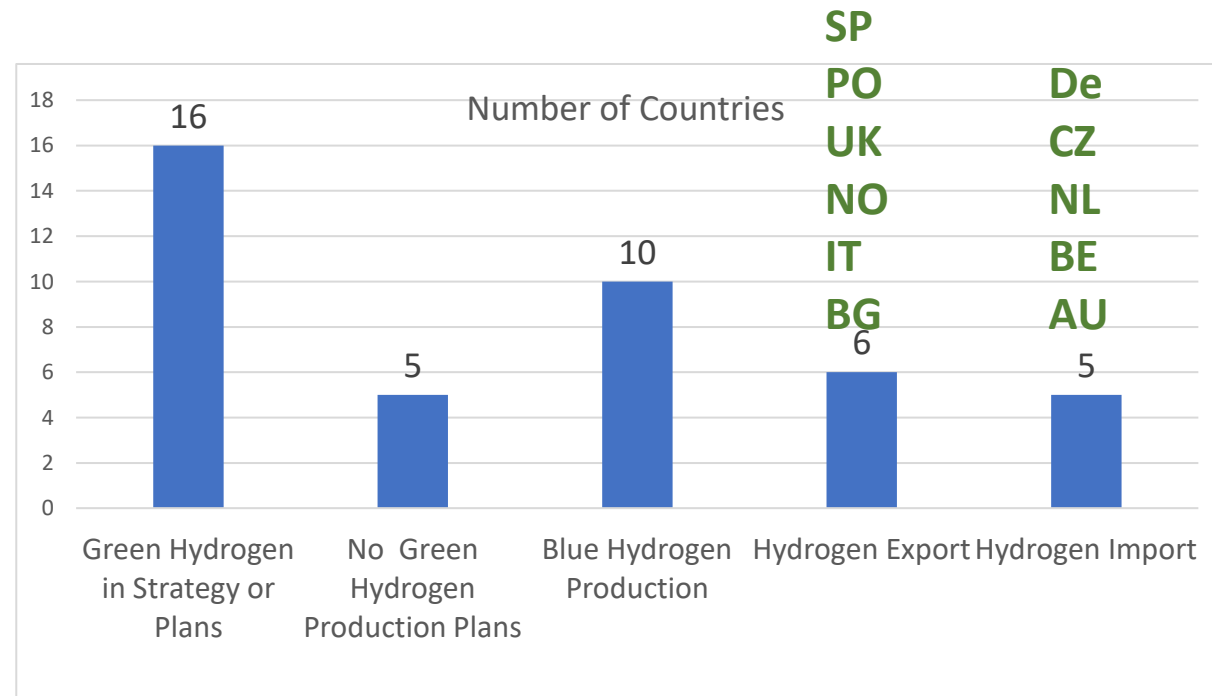




## Section 2. Country-specific conditions on Green Hydrogen

**Q 1. Are there any national plans to develop a green hydrogen production?**

**Which strategy is followed by your country (export or import, blue hydrogen )**



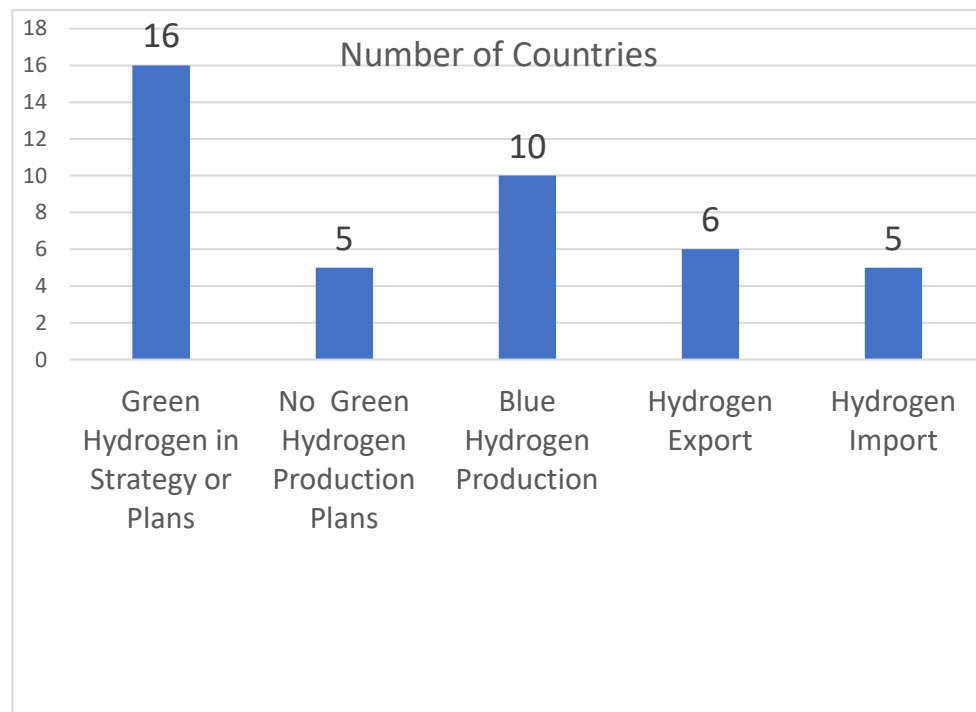


## Agenda process Green Hydrogen

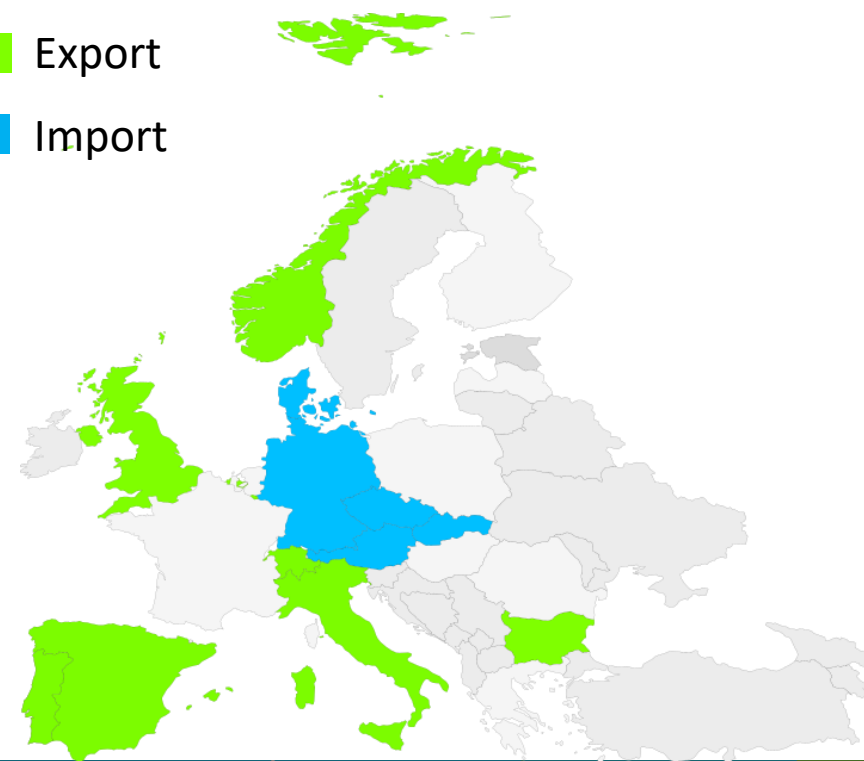
### Section 2. Country-specific conditions on Green Hydrogen

Q 1. Are there any national plans to develop a green hydrogen production?

Which strategy is followed by your country (export or import, blue hydrogen )



■ Export  
■ Import



## Section 2. Country-specific conditions on Green Hydrogen

Q 2. How far developed are the **current hydrogen production facilities**?

**8** countries declare **current hydrogen production** by electrolysis 1- 10 (20/30) MW, or running projects:  
**4** of them will import Hydrogen

**AU:** H2Future, Mellach, C2Pat H100 Fif2

**ES:** Sun2Hy, Hysland Mallorca

**Be:** Flemish Moonshot

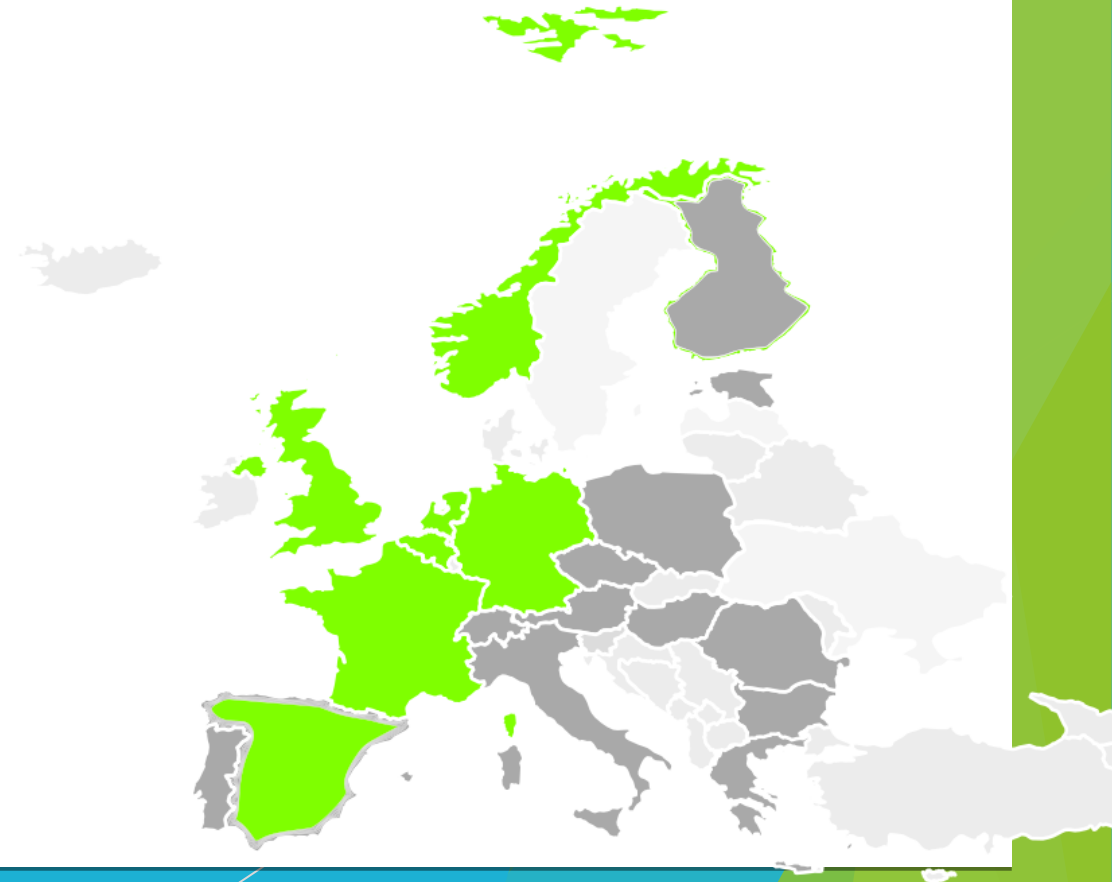
**FR:** Masshylia, H2V, Horizeo

**DE:** TransHyDe, H2Mare, H2Giga, P2X, ENSURE, SynErgie, REFHYNE  
Reallabore, HyLAND, Enapter Campus, Get H2 Nukleus, H2Stahl,

**NL:** ELYgator, H2Gate, H2ero, MULTIPLHY, FUREC, Brigh2, Haddock,  
SEAH2LAND

**NO:** 50 MW electrolyser for Steel; hydrogen in Titanium production

**UK:** Gigastack, Dolphyn, BIG HIT, H100 Fife



## Section 2. Country-specific conditions on Green Hydrogen

Q 2. How far developed are the **current hydrogen production facilities?**



**8** countries declare hydrogen production by electrolysis (**1-10 MW**):

AU, Be, Fi, Fr, DE,NL,NO, UK

**4** of them will import Hydrogen

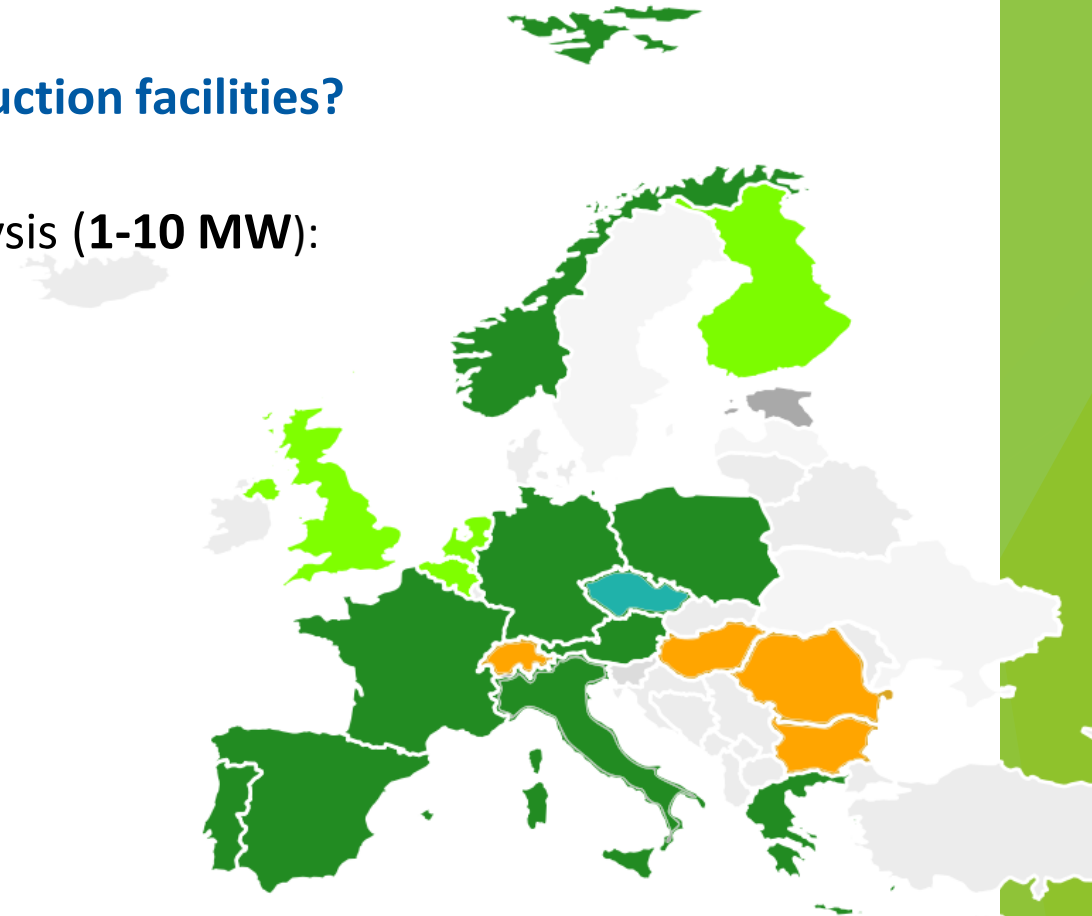


**9** countries – IPCEI (large scale hydrogen production)

AU, **Cz**, FR, DE, GR, IT, NO, PL, ES



**4** countries have ambitious national plans: BG, RO, HU, SW





## Agenda process Green Hydrogen

### Section 2. Country-specific conditions on Green Hydrogen

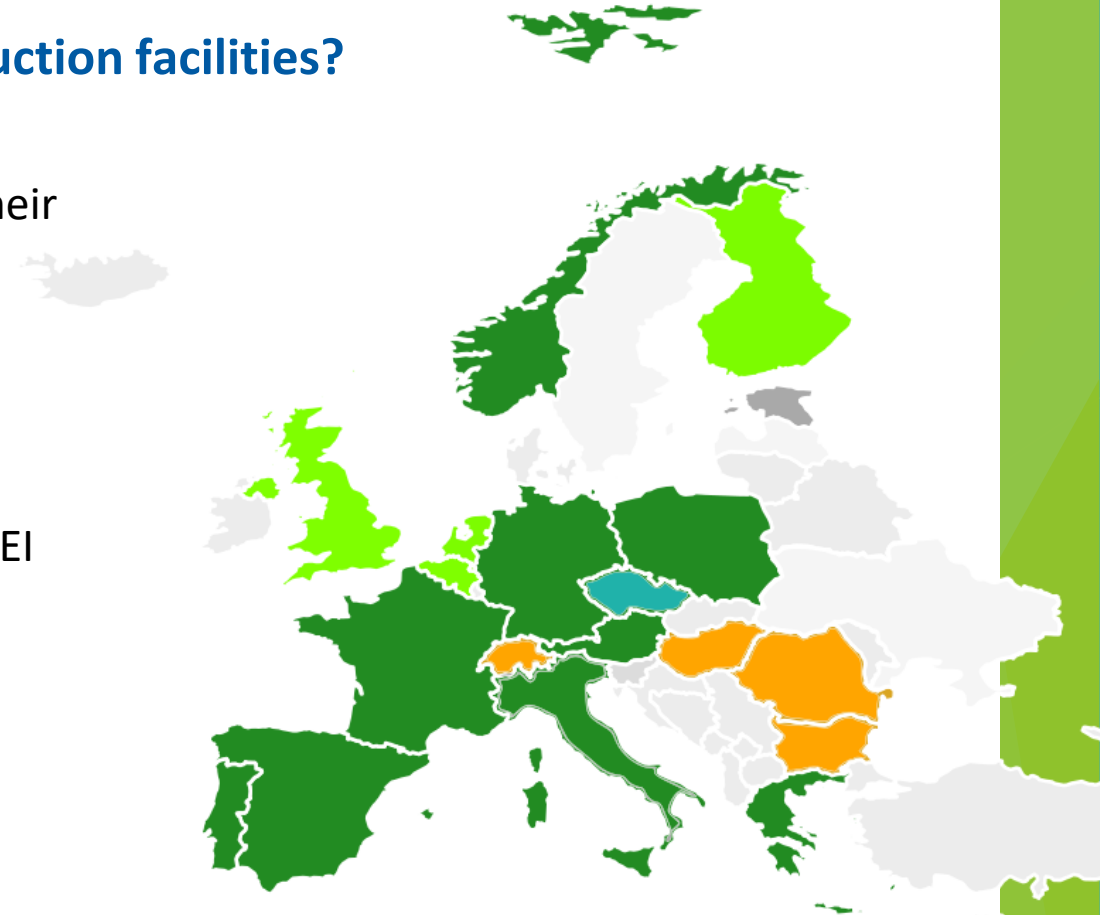
**Q 2.** How far developed are the **current hydrogen production facilities?**

#### Findings:

- Most of the EU countries have “green hydrogen production” in their national programs (strategies or recovery plans or regional programs)
- Currently electrolysis is operating in several demo projects (1-20 MW scale) mostly in countries that declare need of import
- Ambitious plans for mass H<sub>2</sub> production (0,5-1 GW scale) via IPCEI

#### Conclusions:

- Need of transnational collaboration for hydrogen production
- Need for mass production of electrolyzers
- Need of accelerated deployment (from 20 MW to 1 GW)







## Section 3. Fostering cooperation

Agenda process  
**Green Hydrogen**

One of the goals of the agenda process is **to identify research and deployment activities (current, or planned) for a better cooperation and networking** in hydrogen production at European scale.

Further **integration of different teams from different countries** will foster the European Research Area for Hydrogen (H2ERA). The following questions should lead to new insights in this respect.

Q 1. What are your **current activities/interests** in hydrogen and hydrogen production?

Q 2. What are your **plans for hydrogen production in the near and mid-term future** in the areas of research, demonstration and market deployment (select the area according to your expertise)?

Q 3. What would you consider a **priority for hydrogen production** in the areas of research, demonstration and market deployment (select the area according to your expertise)?

**More than 80 Answers (Country/Affiliation/Topic) – Open Assess**



## Section 3. Findings

Agenda process  
**Green Hydrogen**

### Q1&Q2: Current/future activities

| Country | Area    | Institution | Activity  |
|---------|---------|-------------|---|
| Spain   | Science | CNH2        | <b>Near future:</b> cost reduction and raw materials replacement in PEM water electrolysis.<br><b>Mid-Term future:</b> development of AEM technology through development of materials and component manufacturing processes |

#### Research:

- Development of electrolyzers: PEM, AL, AEM, SOEL, pSOEL from materials to systems - low to high TRL
- Reversible cells
- High pressure electrolysis & Electrochemical hydrogen compression
- Photoelectrocatalysis (PEC technology)
- Coupling RES with electrolysis
- Gasification from residual biomass and effluents
- Pyrolysis
- Synthetic fuels from biological CO<sub>2</sub> and green hydrogen



## Section 3. Findings

Agenda process  
**Green Hydrogen**

### Q1&Q2: Current/future activities

| Country | Area    | Institution | Activity  |
|---------|---------|-------------|---|
| Spain   | Science | CNH2        | <b>Near future:</b> cost reduction and raw materials replacement in PEM water electrolysis.<br><b>Mid-Term future:</b> development of AEM technology through development of materials and component manufacturing processes |

### Industry and Administration

- Market deployment of mature electrolyzer technologies (100-500 MW) in different sectors
- Gradual Increase of electrolyzer capacity production (100 MW – 4 GW/a) – UK,DE,SP,NL,NO (20 GW)
- Scaling SOEC systems to 10 MW by single size and plants in the range up to 100 MW (DE)
- Electrolyzers Recycling
- Renewable energy supply
- Introduction of model regions for emission free transport (AU)
- Development, demonstration and deployment of solar hydrogen production on roofs (BL)



## Section 3. Findings

## Agenda process Green Hydrogen

**Q3.** What would you consider a **priority for hydrogen production** in the areas of research, demonstration and market deployment (select the area according to your expertise)?

### Priorities: Research/Industry/Society

- **R&D beyond few predetermined applications!** – missing (only in FET projects)
- Support in CAPEX and **OPEX**
- Removal of tariffs for green electricity for electrolysers
- Balance of supply and demand
- Functioning hydrogen market
- Agreements on necessary standardization
- Foster understanding of the implications of policy choices for decarbonization
- Socio-economic and geoeconomic dimensions





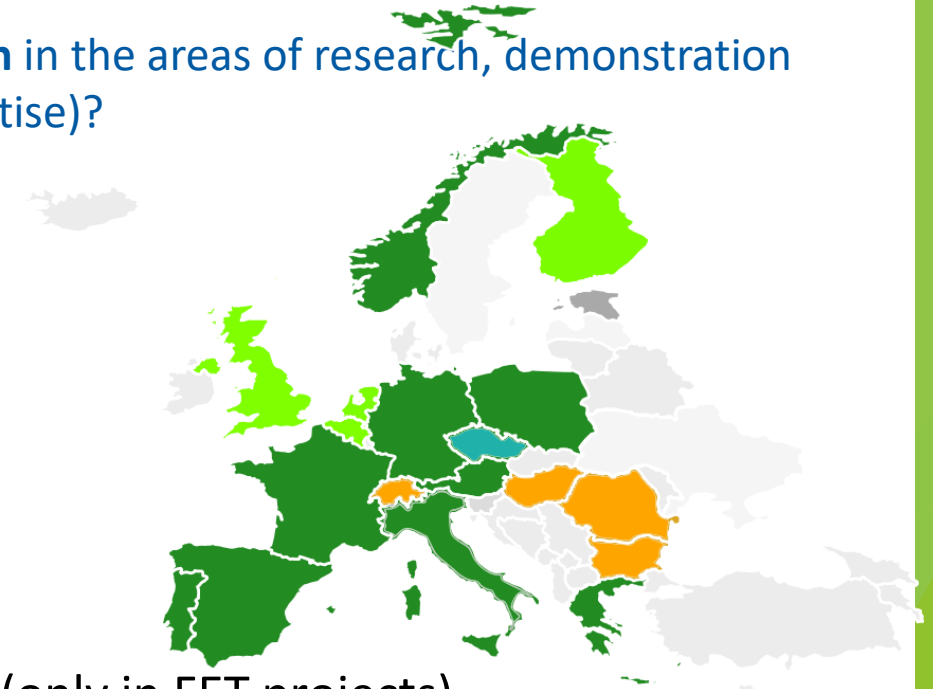
## Section 3. Findings

## Agenda process Green Hydrogen

**Q3.** What would you consider a **priority for hydrogen production** in the areas of research, demonstration and market deployment (select the area according to your expertise)?

### Priorities: Research/Industry/Society

- Support in CAPEX and **OPEX**
- Removal of tariffs for green electricity for electrolysers
- Balance of supply and demand
- Functioning hydrogen market
- **R&D beyond few predetermined applications!** – missing (only in FET projects)
- Agreements on necessary standardization
- Foster understanding of the implications of policy choices for decarbonization
- Socio-economic and geoeconomic dimensions





## Sections 4 & 5: Quantitative Evaluation

## Agenda process Green Hydrogen

Q.4/5 Please evaluate the following objectives of the initiative in terms of relevance (high to low) and urgency (short, medium, long-term)

1. **Integrating the hydrogen production** in the energy system **for effective sector coupling**, taking advantage of hydrogen being an energy vector

2 **Promoting early stage research** to force breakthroughs for overcoming scientific and technological challenges in hydrogen production for the different technologies

3. **Fostering collaboration between research and industry** applying both **breakthrough and underpinning** approaches **at low and high TRLs**

4. **Fostering company- and technology competition** in order **to decrease costs of electrolysis** (€ net per kW) due to **increased performance**



5. **Fostering company- and technology competition** in order to decrease costs of electrolysis (€ net per kW) due to generated **scale effects**



## Sections 4 & 5: Quantitative Evaluation

## Agenda process Green Hydrogen

Q.4/5 Please evaluate the following objectives of the initiative in terms of relevance (high to low) and urgency (short, medium, long-term)

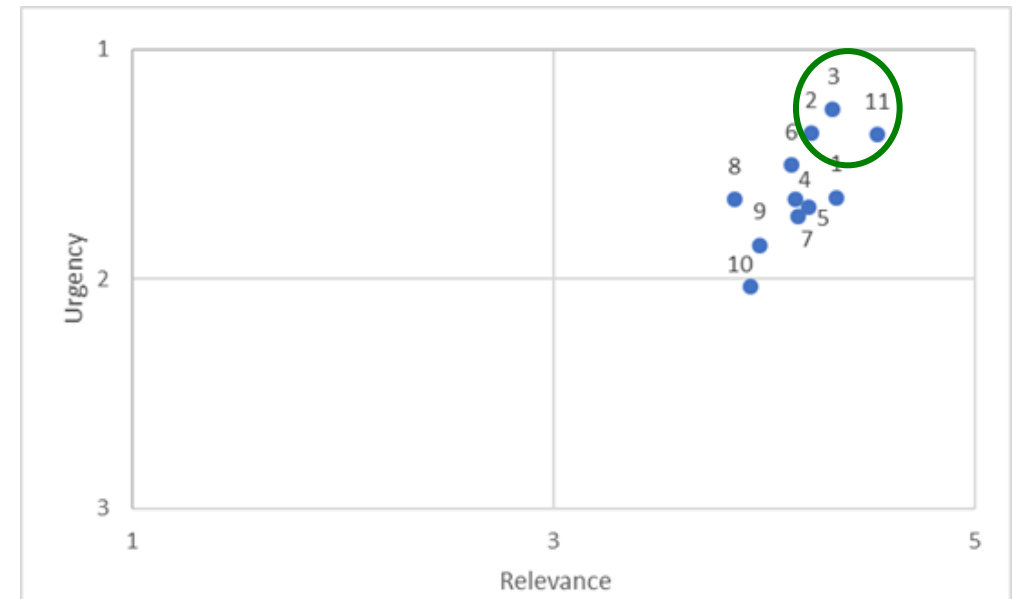
6. Creation of **Hydrogen Business Cases**: OPEX based and CAPEX funded business cases

7. Creation of **Hydrogen Business Cases**: **Direct use of electricity** for electrolysis and long term projects with **low electricity prices**

8. **Creation of Hydrogen Business Cases**: Additional **electrolysis exemption from net fees** (grid cost)

9. Increasing resilience of energy system by creating decentralized Green Hydrogen Economies based on **Hydrogen Hubs with 10 to 15 MW** (and more)

10. Increasing the **hydrogen role in a circular economy** context



11. **Deployment of legislation issues** (including regulations, codes and standards - RCS) unified on EU level





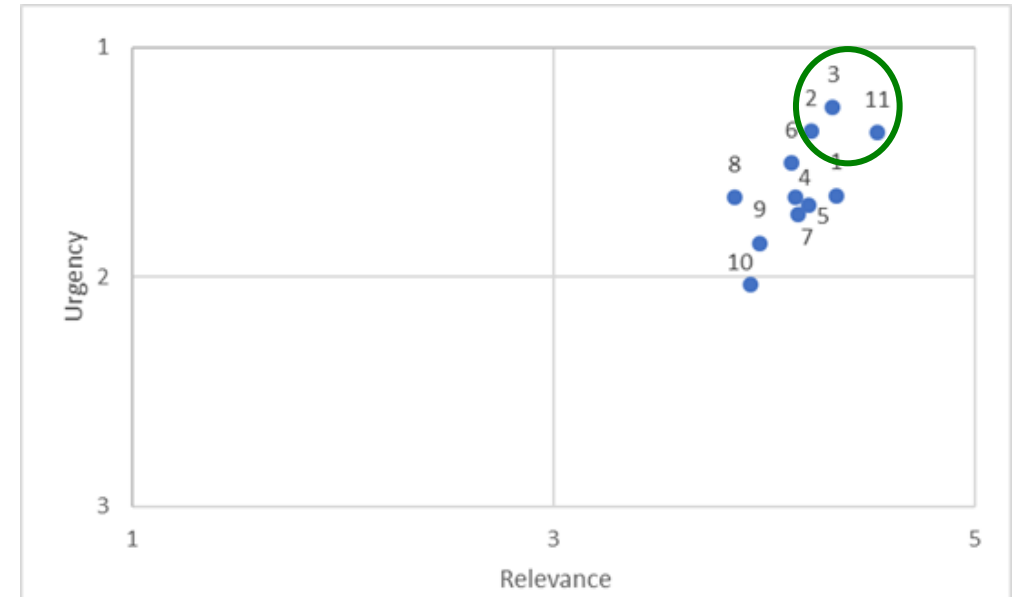
## Sections 4 & 5: Quantitative Evaluation

## Agenda process Green Hydrogen

Q.4/5 Please evaluate the following objectives of the initiative in terms of relevance (high to low) and urgency (short, medium, long-term)

1. Fostering **collaboration between research and industry** applying both breakthrough and underpinning approaches at low and high TRLs
2. Promoting **early stage research** to force breakthroughs for overcoming scientific and technological challenges in hydrogen production for the different technologies
3. Deployment of **legislation issues** (including regulations, codes and standards - RCS) unified on EU level

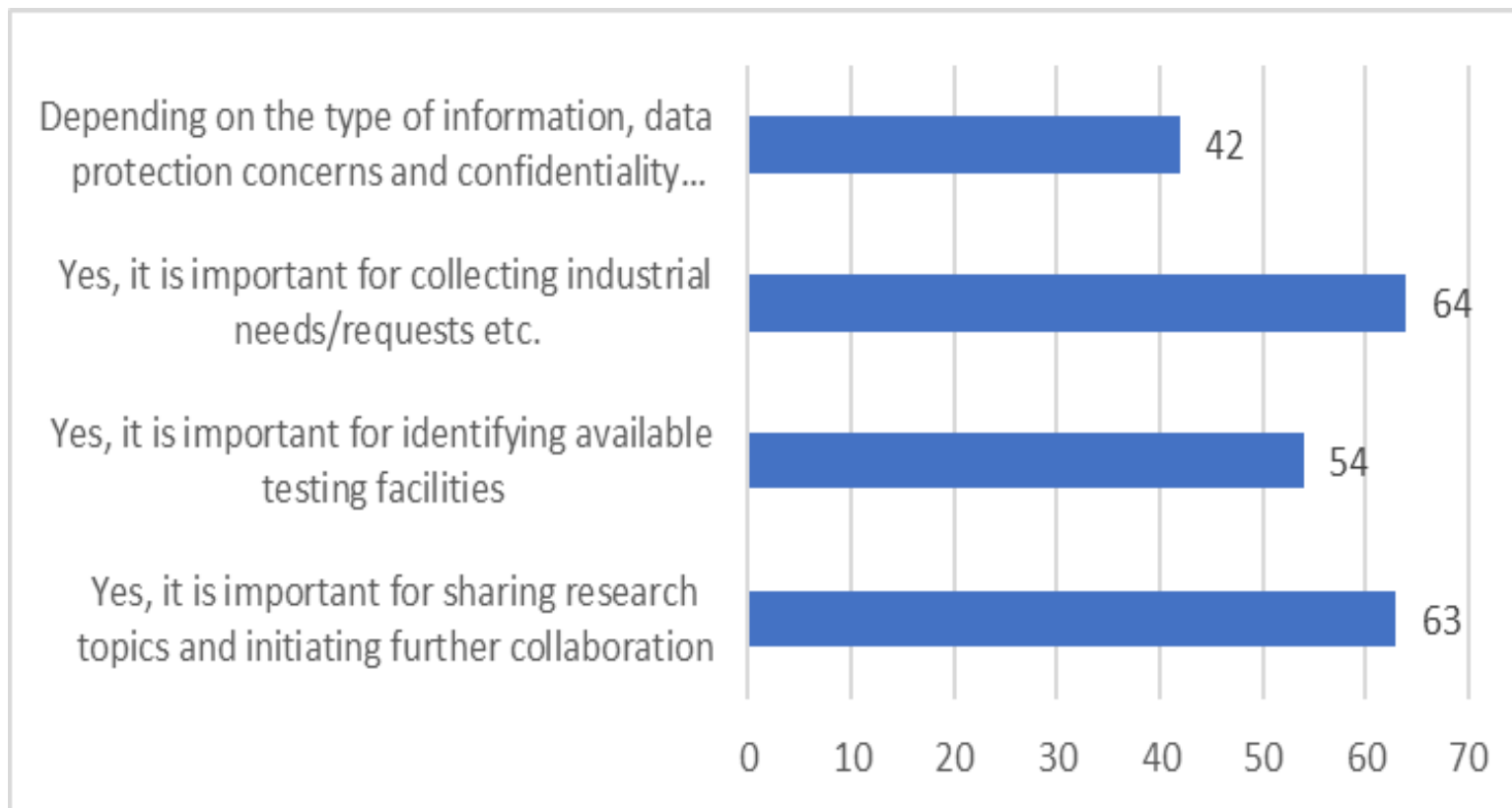
**Conclusion:** those 3 topics are less visible in the EU policy and need special attention





## Section 6. Agenda Process Communication Needs

What is your opinion on the establishment of a common digital platform (database) for the exchange of information?



**Answer: positive (for research collaboration & support of industry – common platform)**



*Ministero dell'università  
e della ricerca*



REPUBLIC OF BULGARIA  
Ministry of Education and Science

Agenda process  
**Green Hydrogen**

## R&I Initiative: Agenda Process on Green Hydrogen

### Thematic Workshop on Production

4/5 November 2021 | Rome | Venue CNR

**Co-organizers: Italy** - Ministry of University and Research  
**Bulgaria** - Ministry of Education and Science



Ministero dell'università  
e della ricerca



REPUBLIC OF BULGARIA  
Ministry of Education and Science

## Agenda process Green Hydrogen

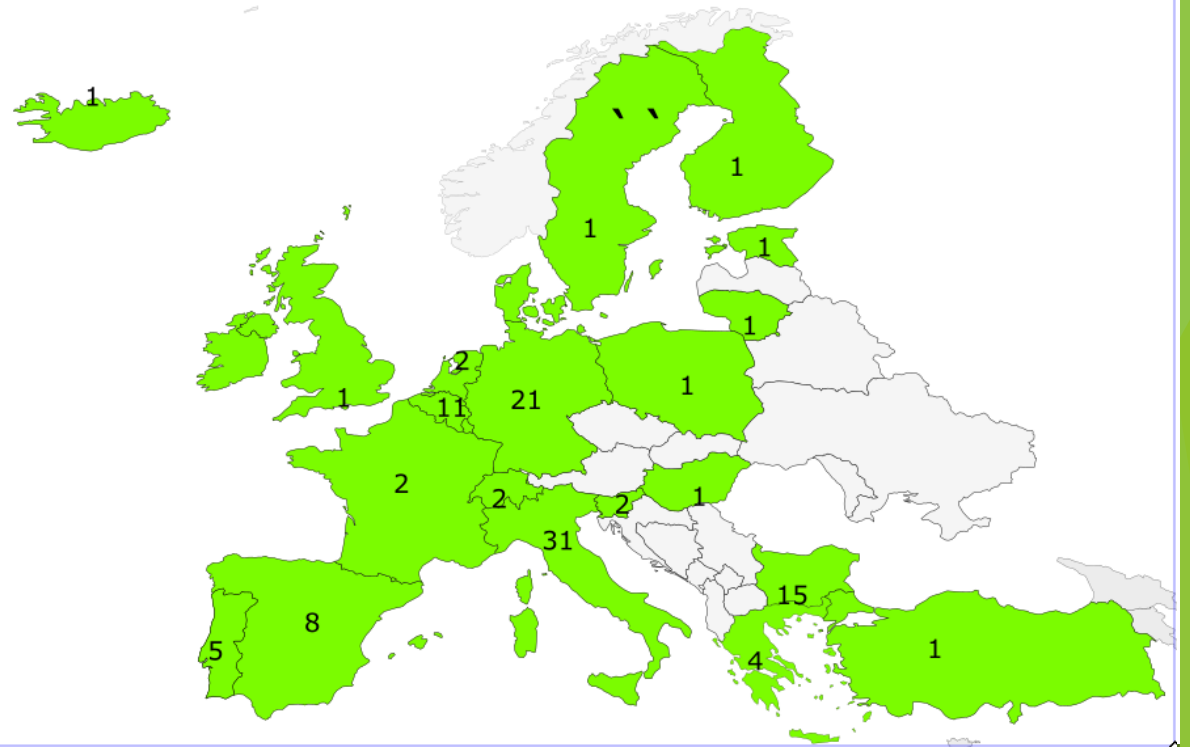
### R&I Initiative: Agenda Process on Green Hydrogen

Thematic Workshop on Production - 4/5 November 2021 | Rome | Venue CNR

121 Participants (45 physically)

26 countries:

- 20 from Europe (15 EU)
- 2 Africa
- 3 Asia
- 1 North America (Canada)





Ministero dell'università  
e della ricerca



REPUBLIC OF BULGARIA  
Ministry of Education and Science

# Agenda process Green Hydrogen

## R&I Initiative: Agenda Process on Green Hydrogen

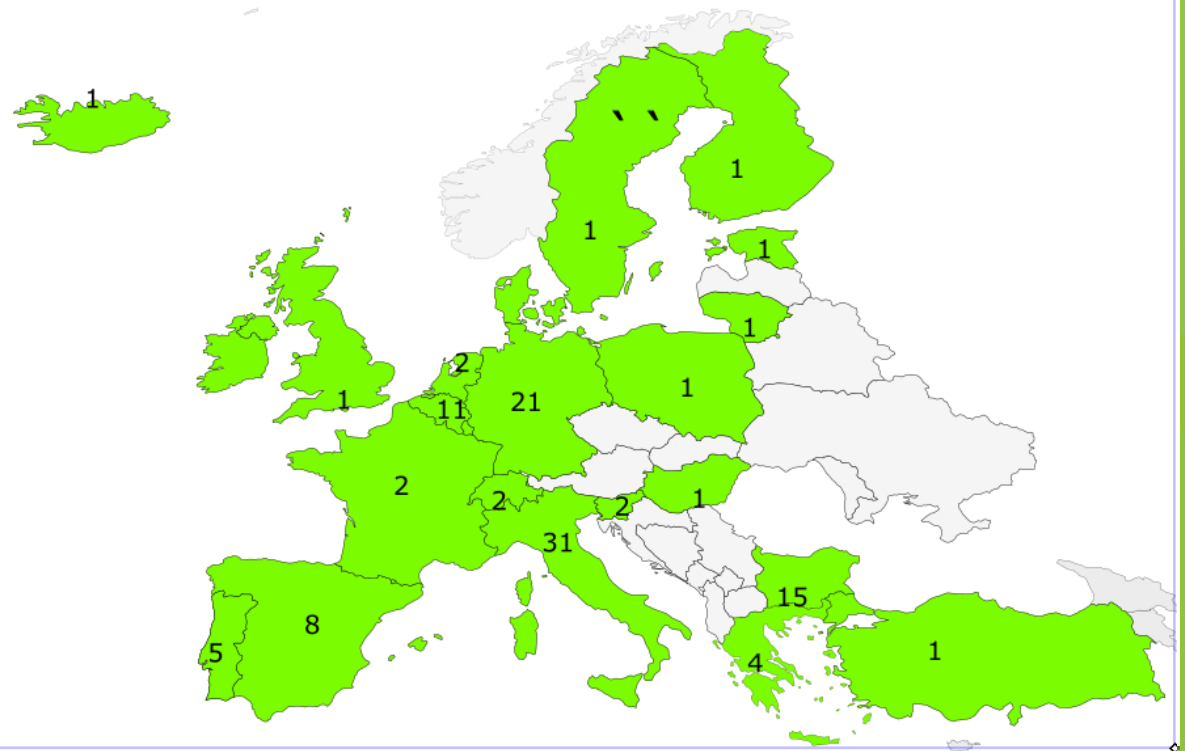
Thematic Workshop on Production - 4/5 November 2021 | Rome | Venue CNR

### 121 Participants by countries

- 31 IT
- 21 DE
- 15 BG
- 11 BE
- 8 SP

### 121 Participants by affiliation

- 57 - Science
- 25 Industry
- 24 Public Administration
- 8 Civil Society
- 7 Other





## Thematic Workshop on Production - Outputs

## Agenda process Green Hydrogen

### General Findings:

- ❑ EU countries are united in respect of Green Hydrogen Production necessity, however different countries have:
  - Different levels of technological maturity,
  - Different opportunities to produce green hydrogen ( RES)
    - **Solution:** Collaboration and the Agenda can ensure it because it combines the bottom up approach with political involvement
- ❑ The Agenda process finds political support (the national representatives of the ministries support the process)
  - **Proposal:** Common Meetings with politically engaged member states representatives



## □ Bottlenecks & Mitigation measures

- RES production – should be intensified
- Electrolyzers production – should be accelerated
- Green hydrogen production capacity – should be accelerated
- Lack of value chain related to hydrogen production – to be created
- Lack of balance between demands and production – should be done on National and European Scale
- Lack of link between R&I and industrial needs – to create link (common SRIA platform)
- Lack of certification (of equipment, of green hydrogen)
- Lack of hydrogen culture – should be created
- Lack of educated personnel – introduction of education, skilling and reskilling



□ **7.1 Public awareness: What do you think society wants to know about hydrogen production?**

- WHY we need hydrogen economy (sector coupling)
- Safety and security issues
- Costs (on a personal daily life level)
- Jobs creation

□ **7.2. Public Awareness: How to rise public awareness**

- Education on all levels
- **More active hydrogen policy with engagement of political figures**
- Demonstration of clear national strategy
- Dedicated demonstration activities making hydrogen visible and usable: public transport, household (CHP)



### □ What can be the member states input in the SRIA ?

#### ■ Production:

- Comprehensive analysis and mapping of green hydrogen production on national level and summarization on EU level (2024 and 2030)
- Pan-European hydrogen supply and demand analysis based on national supply and demand (2030, 2040 and 2050) )
- Elaboration of European green hydrogen production roadmap with respect to EU production and import/export among EU countries (2030, 2040, 2050)
- Comprehensive analysis (costs, infrastructure, transport) of the demand and realization of hydrogen import from outside EU

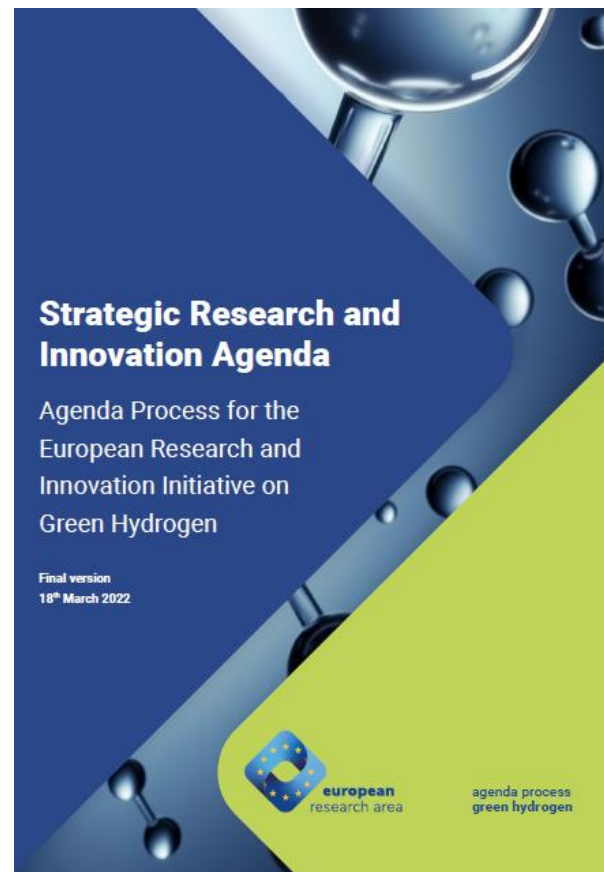
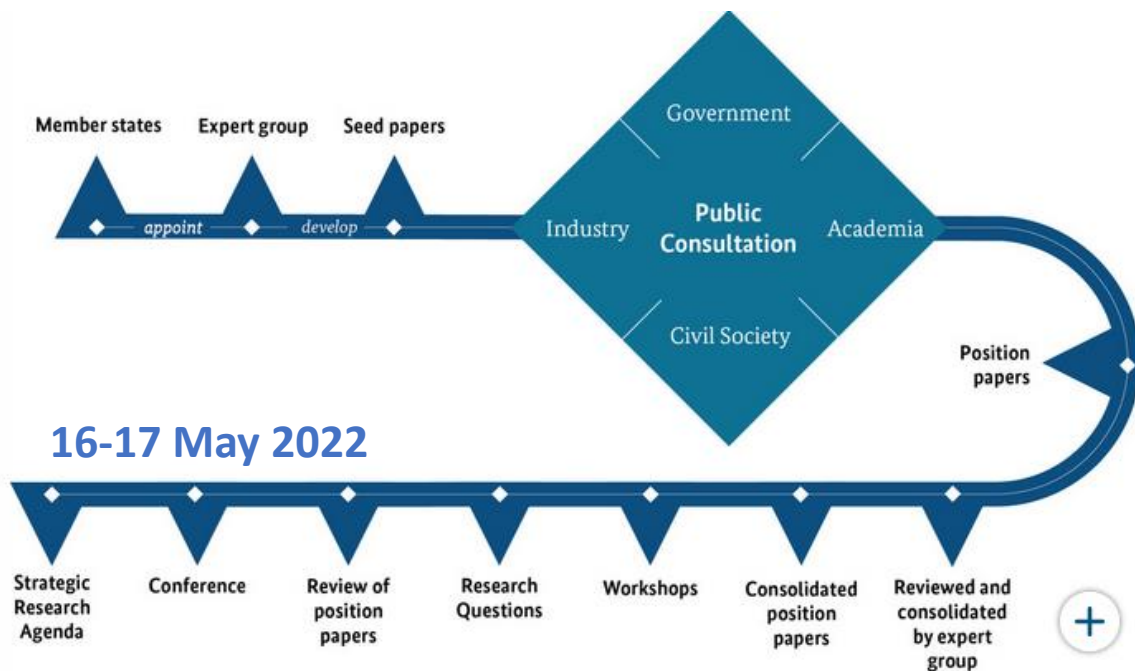




## Thematic Workshop on Production - Outputs

## Agenda process Green Hydrogen

# THANK YOU



**IMPLEMENTATION :** By collaboration: between MSs and with the other EU structures (CH JU, EERA, CET)



# Hydrogen Europe Research

## Thank you for your participation!

### **Contacts**

**Julia Cora**

[j.cora@hydrogeneuroperesearch.eu](mailto:j.cora@hydrogeneuroperesearch.eu)

**Louis Mazurkiewicz**

[l.mazurkiewicz@hydrogeneuroperesearch.eu](mailto:l.mazurkiewicz@hydrogeneuroperesearch.eu)

**Simona Vitali**

[s.vitali@hydrogeneuroperesearch.eu](mailto:s.vitali@hydrogeneuroperesearch.eu)