European Commission research and innovation initiatives on hydrogen

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Regione Emilia Romagna – Commissione Politiche Economiche

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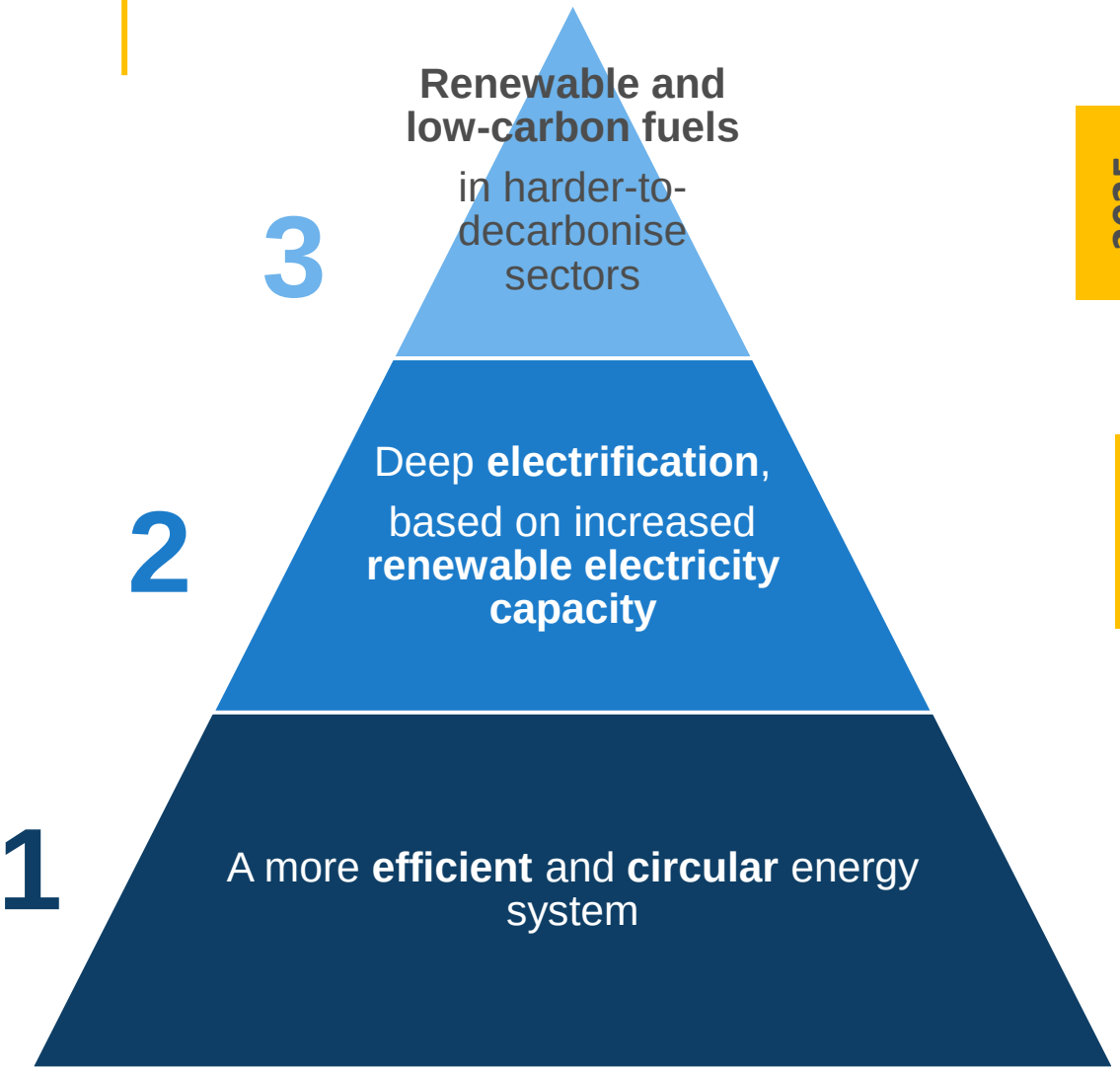
Introduzione

- Idrogeno rinnovabile
  - Principale sistema di produzione: elettrolisi dell'acqua, usando energia elettrica da fonti rinnovabili (~50-60 $kWh_e/kg\ H_2$)
  - Vettore energetico 'pregiato' – lunga catena di trasformazione - bassa efficienza energetica complessiva
  - Efficienza dei sistemi energetici é una precondizione
  - Necessità di ingente produzione da nuovi impianti da fonti rinnovabili
  - Uso diretto di energia elettrica viene prima (dove possibile)
  - Priorità nel breve-medio termine: settori non altrimenti decarbonizzabili e/o che usano attualmente idrogeno da fonte non rinnovabile come materia prima o tramite carburanti rinnovabili (produzione di ammoniaca, raffinerie, acciaierie, trasporto pesante su strada, trasporto navale, aviazione)

Dati chiave

- 11.5 Mt of production capacity and 8.7 Mt of demand (EU, EFTA and UK, October 2020 – source: Hydrogen Europe)
- Conventional hydrogen production capacity accounted for 99.3% of total in 2020
- Average fossil hydrogen production costs for 2021 were estimated at 2.65 EUR/kg and grew as high as 10 EUR/kg in August 2022
- Estimated renewable hydrogen production costs in the EU, UK, and Norway in 2021 vary from 3.3 EUR/kg to 6.5 EUR/kg
- Current (as of August 2022) water electrolyser manufacturing capacity amounted to over 3.3 GW/y. Planned capacity should increase 16-fold, reaching 53 GW/y by 2030
- Transport infrastructure: in total, there is roughly 1,800 km of hydrogen pipelines in Europe. Within Europe, the longest pipelines are in Belgium and Germany, at 600 km and 400 km, respectively

Hydrogen: timeline for uptake



Prospective timeline for H2 uptake in EU

2025

6 GW of renewable hydrogen electrolysers
Replace existing H2 production based on natural gas
Set up of regulatory framework
Planning of hydrogen infrastructure

2030

40 GW of renewable hydrogen electrolysers
New applications in steel and transport
Development of Hydrogen Valleys
Cross-border infrastructure being built

+ REPowerEU objectives
20 Mt/year of renewable hydrogen used in the EU
5 Mt as per pre-existing hydrogen strategy + 5 Mt additionally produced in EU and 10 Mt imported

2050

Scale up to all hard-to-decarbonise sectors
Expansion of hydrogen-derived synthetic fuels
EU-wide infrastructure network
Open international market

A hydrogen strategy for a climate-neutral Europe – COM (2020) 301 final of 8.7.2020

REPowerEU plan - COM(2022) 230 final of 18.05.2022

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Regulatory framework: incentivising use of renewable hydrogen

(Commission proposals)

- Renewable Energy Directive revision:
  - **'Fit for 55' package - 14 July 2021:** The Commission proposes to increase the energy mix to 40% binding target of **renewable sources** in the EU'
  - **REPowerEU Plan – 18 May 2022:** the Commission proposes to increase the EU's 2030 **target for renewables from 40% to 45%**. Targets for use of renewable hydrogen **in industry** 75% (up from 50% from Fit for 55 package) **and transport** 5% (up from 2.6% from Fit for 55 package).

- ReFuelEU Aviation Initiative: obligation on fuel suppliers to aircraft carriers.
- FuelEU Maritime Initiative: GHG intensity threshold for ships calling in EU ports.
- Inclusion of all hydrogen production facilities (> 25t/day) under EU ETS.
- Revision of Energy Taxation Directive with lowest tax levels for renewable, low carbon hydrogen.

REPowerEU plan
Accelerating the clean energy transition – **permitting**

Recommendation on permitting and power purchase agreements

Legislative proposal on 'go to' areas and simpler and faster permitting (amendment of the Renewable Energy Directive - REDII)

Joint event with MS RES and environmental assessment experts

Promotion of **regulatory sandboxes**

Fast transposition of current RED II to speed up permitting

COM(2022) 230 final of 18.05.2022

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Green Deal Industrial Plan

EU initiative to boost its clean tech competitiveness

Four pillars:

- A predictable and simplified regulatory environment (Adopted on 16 March 2023)
  - **Net-Zero Industry Act** to identify goals for net-zero industrial capacity and provide a regulatory framework suited for its quick deployment (faster and more predictable permitting)
  - **Critical Raw Materials Act**, to ensure sufficient access to those materials, like rare earths, that are vital for manufacturing key technologies
  - **Reform of the electricity market design**, to help consumers benefit from the lower costs of renewables
- Faster access to funding
  - EU domestic part of the **Hydrogen Bank** (800 M€ competitive bid to support production of renewable hydrogen – in autumn 2023) – fixed premium per kg of H2 produced for a maximum of 10 years of opeartion
- Enhancing skills
- Open trade for resilient supply chains

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Supporting industry for producing renewable hydrogen

- Support for renewable hydrogen projects under EU funds
- Eligibility of renewable and low-carbon hydrogen production, transmission, storage and dispatch under State Aid guidelines
- Hydrogen Important Projects of Common European Interest (IPCEI) – Hy2Tech (EUR 5,4 bn) and Hy2Use (EUR 5,2 bn)
- European Clean Hydrogen Alliance: Project pipeline

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R&I support to **hydrogen policy**

- **Horizon Europe**:
  - **Public/private partnerships** (Clean Hydrogen Joint Undertaking), transport and industry partnerships
  - **Public/public:** Clean Energy Transition (CET) partnership
  - **Cluster 5 and 4** collaborative projects
  - **European Innovation Council** (EIC)
  - **EIT KIC InnoEnergy**
- **H2020: Green Deal call**
- **ERA pilot on green hydrogen and SET Plan revamping**
- **Mission Innovation – Clean Hydrogen Mission**

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Clean Hydrogen Joint Undertaking

- Public-private partnership with a EUR 1 billion budget from Horizon Europe.
- Call for proposals 2023 available for applications until April 18, 2023.
  - EUR 195 million total budget:
    - 7 topics – 49M€ funding **Renewable Hydrogen Production**
    - 5 topics – 36M€ funding **Hydrogen Storage and Distribution**
    - 3 topics – 25.5M€ funding **Transport**
    - 4 topics – 19M€ funding **Heat and Power**
    - 3 topics – 7.5M€ funding **Cross-cutting projects**
    - 2 topics – 38M€ funding **Hydrogen Valleys**
    - 2 topics – 20M€ funding **Strategic Research challenges**

R&I support to **hydrogen policy**

Commission staff working document on R&I to support the EU hydrogen strategy - in the frame of the **ERA Pilot on Green Hydrogen** – ERA action 11.1

- An ERA for uptake to market: **Open Innovation Test Bed (OITB) on Hydrogen Production Technologies**:
  - Cluster 4 WP 2022 → CLEANHYPRO; HORIZON-CL4-2022-RESILIENCE-01-20
  - Cluster 5 WP 2023-2024, (Horizon Europe Work Programme published on 6 December 2022; deadline: 18 April 2023)

- An ERA of data: **the EU Clean Hydrogen Observatory**
  - Clean Hydrogen JU contract → project started in 2023

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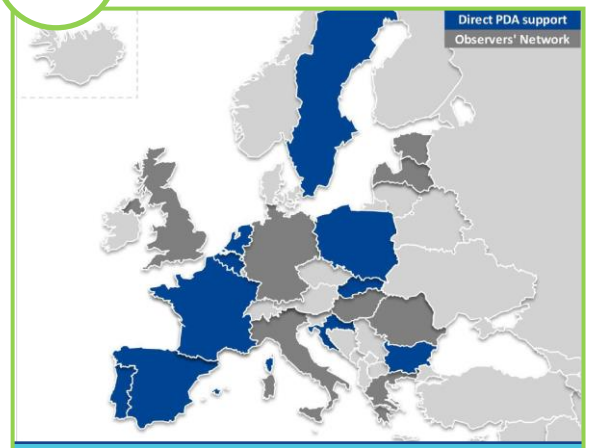
Commission staff working document - Role of EU R&I investments to deliver on EU's Hydrogen Strategy SWD (2022) 15 of 20.1.2022

Hydrogen Valleys

1 Project Development Assistance (PDA)



Great opportunity to bring on-board and share learnings with 'less FCH ready' but higly interested central and eastern European regions

2 EU H_2 Valleys Partnership

Partnership led by:
North of Netherlands (NL)
Auvergne-Rhône Alpes (FR)
Le Normandy (FR)
Aragon (ES)
56 regions joined

http://s3platform.jrc.ec.europa.eu/hydrogen-valleys

3 Creation of H_2 Valleys

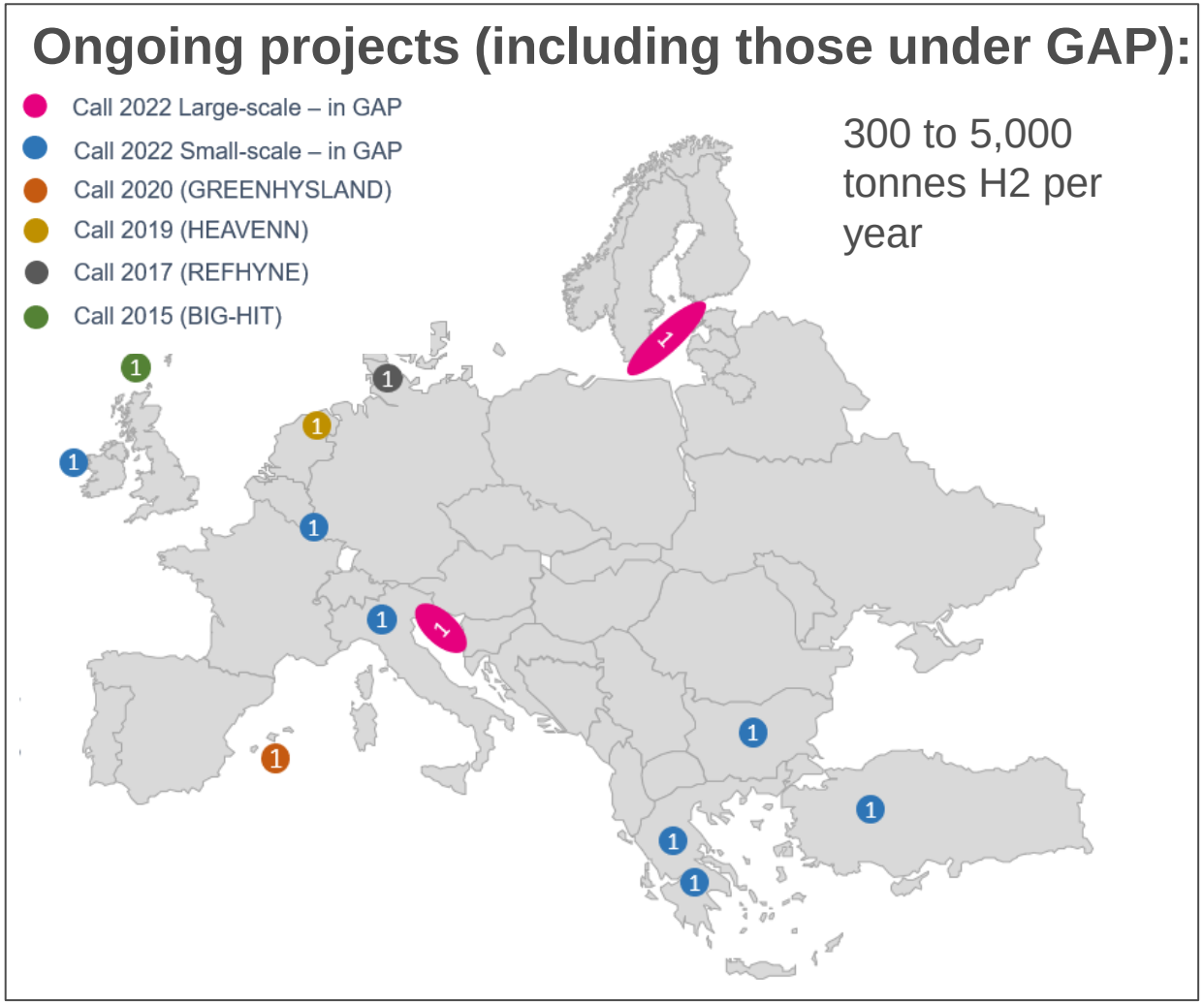
"I want Next Generation EU to create new European Hydrogen Valleys *to modernise our industries, power our vehicles and bring new life to rural areas."*

4 EUR 200M top-up from RePowerEU

5 Joint declaration on Hydrogen Valleys (March 2023) and upcoming EU Hydrogen Valleys Roadmap

Hydrogen Valleys
154.44 MEUR

Ongoing projects (including those under GAP):



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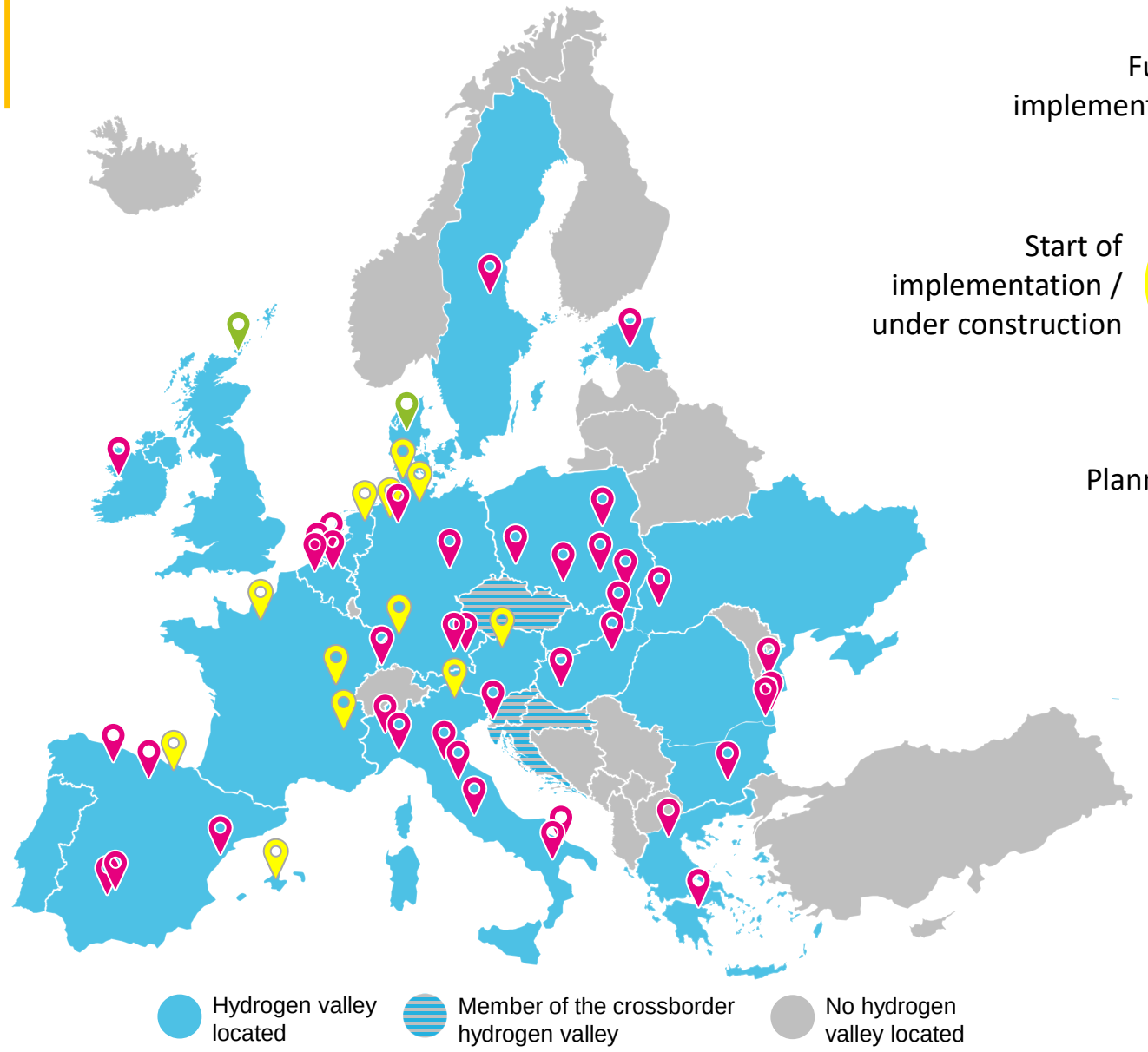
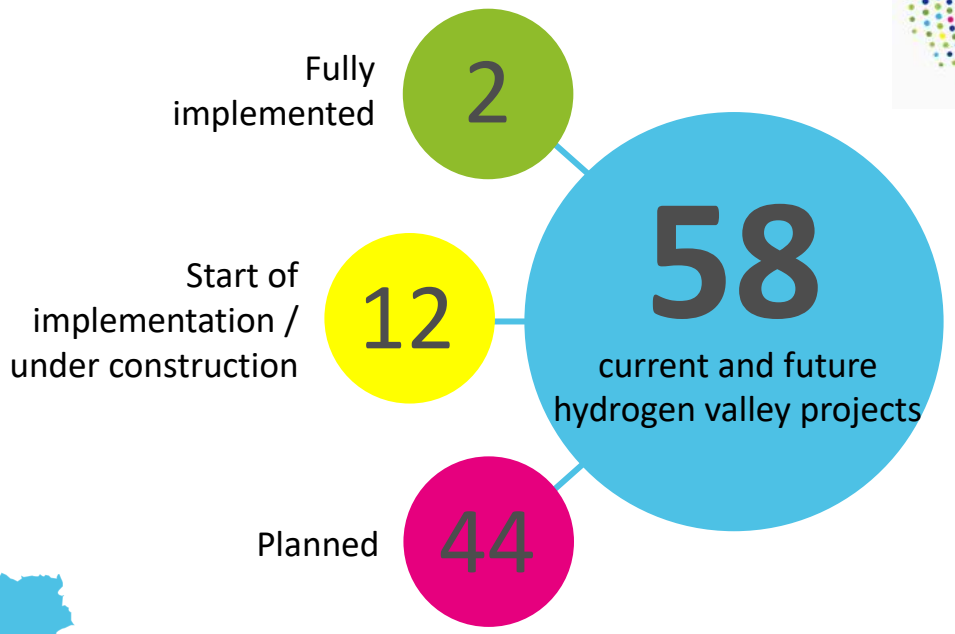
Hydrogen Valleys





EU will continue to support Hydrogen Valleys and complement it with **Renewable Energy Valleys** → [topic in Horizon Europe Work Programme 2023/2024]

Thank you for your attention!

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