



Definition, the support and the role of clean hydrogen in the energy system

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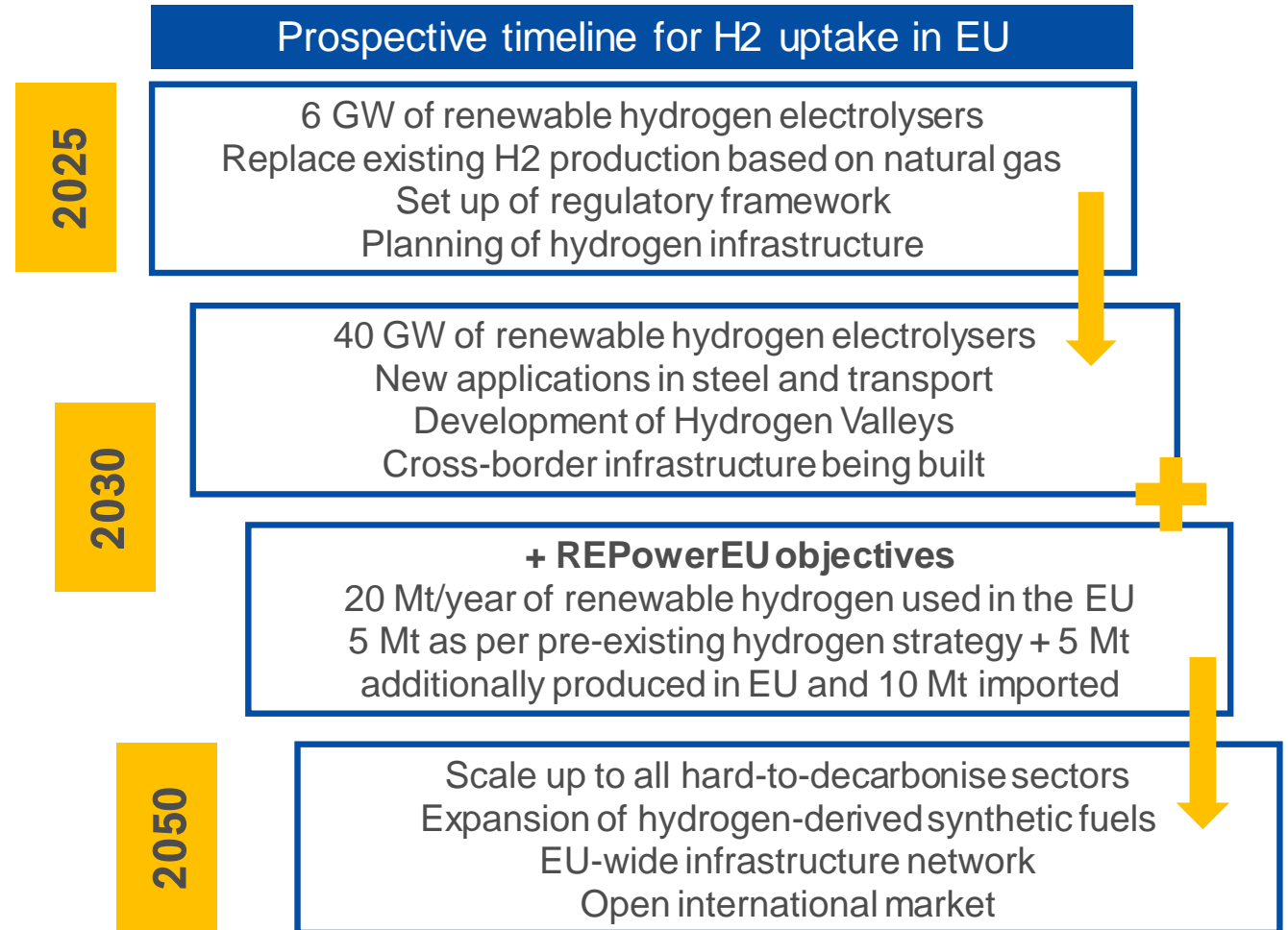
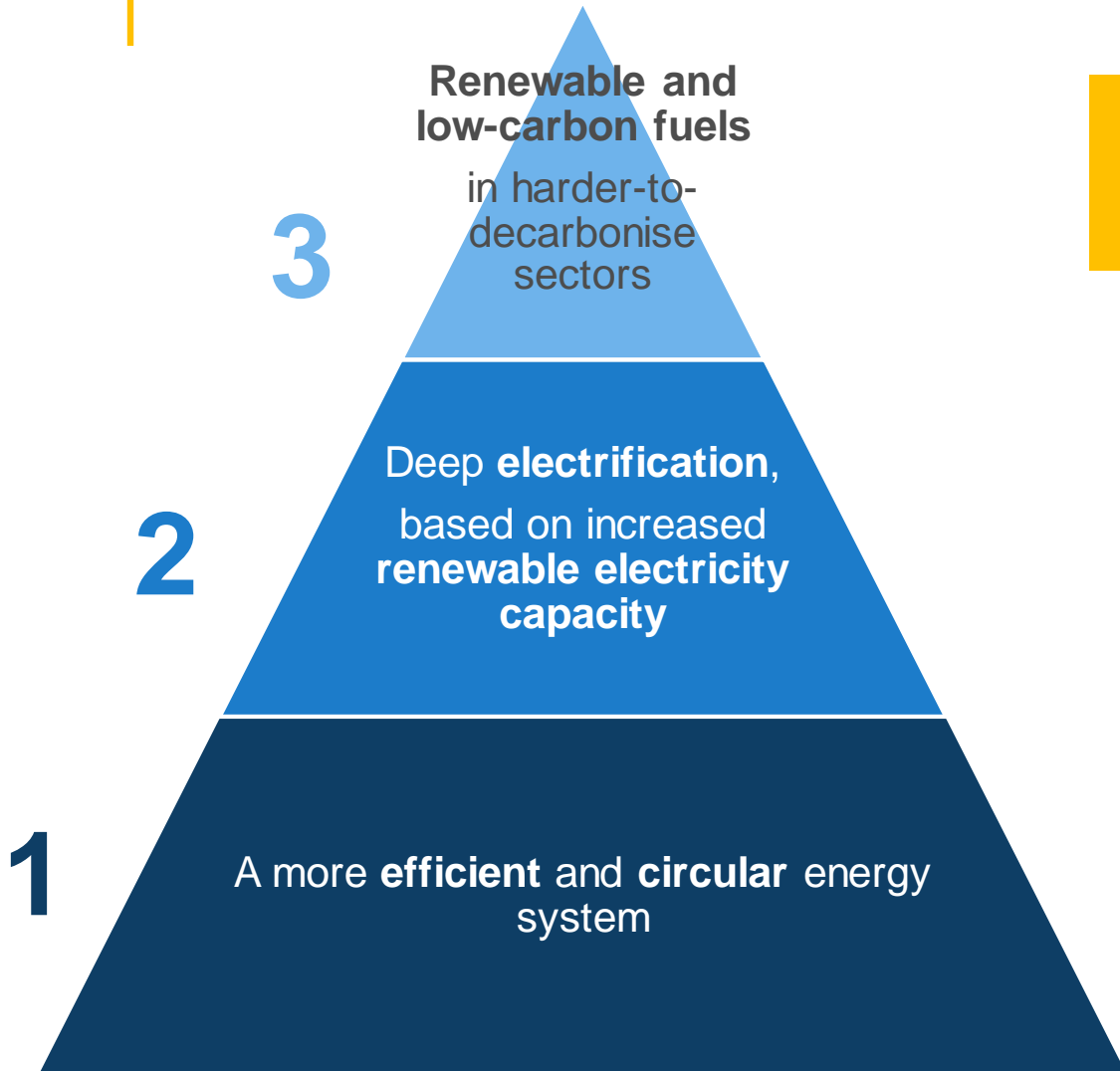
Policy officer on clean hydrogen

DG Research & Innovation – unit C1

Role of **hydrogen** in the energy system

- **Seasonal storage** of renewable energy.
- Alternative, directly or via renewable fuels, to some **hard-to-abate industries**.
- **Enabler**: non-immediately economically viable applications can become viable e.g. via **hydrogen valleys**.
- **Conditions**: **1)** increased efficiency, **2)** decreased costs, **3)** supportive regulatory environment.

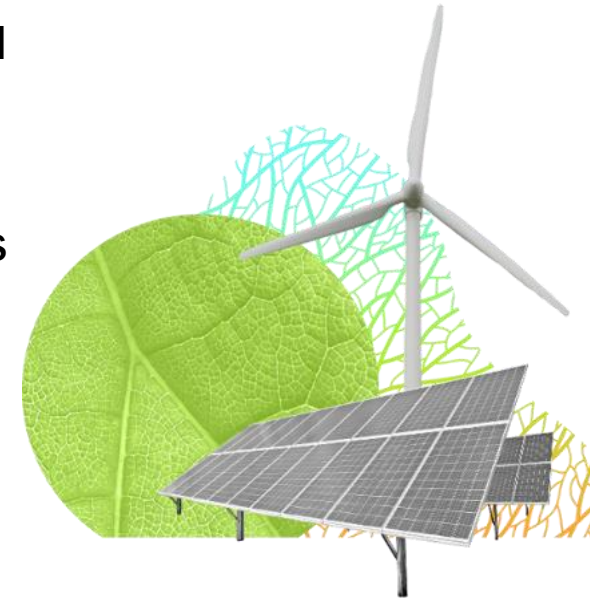
Hydrogen: timeline for uptake



Regulatory framework:

Hydrogen delegated acts required under the Renewable Energy Directive

- Union methodology setting out detailed rules for the production of renewable liquid and gaseous transport fuels of non-biological origin (RFNBOs)
 - Rules for determining when electricity used for the production of RFNBOs can be considered can be considered fully renewable.
 - **Additionality** → ensure that hydrogen production supports decarbonisation
 - Renewable hydrogen is only produced when and where sufficient renewable energy is energy is available (**temporal and geographic correlation**).
 - Requirements apply to domestic producers as well as from third countries.
 - Certification scheme – relying on voluntary schemes.
- Methodology for calculating life-cycle greenhouse gas emissions for RFNBOs
 - Full lifecycle greenhouse gas emissions
 - Minimum threshold for greenhouse gas emissions savings of recycled carbon fuels



Publication: 7 February
European Parliament and Council scrutiny period ongoing: 2 (+2) months

Regulatory framework:

Hydrogen delegated acts required under the Renewable Energy Directive

- Electrolyzers running before 2028 can use electricity from **existing** renewable installations until 2038.
 - From 2028, **max 36 months** will be allowed between the start of hydrogen production and renewable electricity generation.
- Electrolyzers can meet the ‘temporal correlation’ on a **monthly rather than hourly** basis until 2030.
 - From 2030 **evidence of hourly matching** between renewables output in the grid and hydrogen production is required.
- Grid electricity can be bought **only from renewables** in the same power market bidding zone, and from neighbouring zones only for equal or higher market prices than in the local bidding zone.
- GHG emissions threshold for the emission intensity of electricity is set at 18 gCO₂eq/MJ or **65 grams CO₂equivalent/KWh** on full life-cycle greenhouse gas emissions.

European Hydrogen Bank

Communication from March 16 accompanying the proposal for a Net-Zero Industry Act

- Support the uptake of renewable hydrogen **within the EU as well as imported from abroad.**
- **Unlocking private investments** in value chains by **efficiently** connecting renewable energy supply to demand and reduce the cost gap between renewable and fossil hydrogen.
- The Commission is currently designing the first pilot auctions on renewable hydrogen production to be launched under the Innovation Fund in the **autumn of 2023.**
- The auction will award a **subsidy** to hydrogen producers in the form of a fixed premium per kg of hydrogen produced – for a maximum of 10 years of operation.



Key R&I challenges to the creation of a renewable hydrogen economy

- **Circularity and sustainability** throughout the value chain.
- **Clean hydrogen production costs** – *still higher than fossil H₂*.
- **Integrating citizens' needs** in the process by **empowering** them.
 - **Role of skills** to ensure a **just transition**.
- **Infrastructure** for storage, transport and distribution (pipelines, refuelling stations, ...).
- **R&I** should address these through the developing (new) **technologies** and improving **existing ones**, by increasing efficiency of production processes and reducing costs.



R&I support to hydrogen policy⁽¹⁾

➤ **Horizon Europe:**

- **Public/private** (CHJU + transport and industry applications partnerships) & **public/public** (Clean Energy Transition) partnerships
- **Cluster 5 and 4** collaborative projects
- **European Innovation Council (EIC)**
- **EIT InnoEnergy**, ranked most active investor in the energy sector in 2022

➤ **H2020: Green Deal call**

➤ **ERA pilot on green hydrogen and SET Plan revamping**

➤ **Mission Innovation – Clean Hydrogen Mission**

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** ⁽²⁾

European Research Area (ERA) pilot on green hydrogen & Strategic Energy Technology (SET) Plan revamping

- Council Conclusions on the New ERA Dec. 2020 invited Member States + European Commission to start a pilot initiative on green hydrogen.
- Cooperation with MSs strengthened through ERA Action 11.
 - Action 11 “**an ERA for green transition**” includes an ERA thematic pilot on green hydrogen (action 11.1) + the revamping of the SET Plan (Action 11.2).

ERA on hydrogen & SET Plan

- ERA Pilot on Green Hydrogen (ERA action 11.1)
 - Task force produced a [Strategic Research and Innovation Agenda \(SRIA\)](#) (March 2022)
 - [Building a European Research Area for clean hydrogen – Commission Staff Working Document](#) (January 2022)
- SET Plan revamp (ERA action 11.2) – work ongoing
 - Proposal of a new SET Plan Implementation Working Group (IWG) on hydrogen, to continue the work of the ERA pilot on green hydrogen task force
- Amendment of Cluster 5 Work Programme 2023/2024: proposal of a Coordination and Support Action (CSA) to support the hydrogen IWG (planned for 3.4.2023)

R&I support to hydrogen policy ⁽³⁾

- An ERA for **uptake to market**: Open Innovation Test Bed (OITB) on Hydrogen Production Technologies:
 - Cluster 4 WP 2022 → HORIZON-CL4-2022-RESILIENCE-01-20.
 - Cluster 5 WP 2023-2024 → HORIZON-CL5-2023-D2-01-06 (EUR 10m), deadline for applications next April 18.
- An ERA of **data**: the EU Clean Hydrogen Observatory:
 - Clean Hydrogen JU call for tenders → evaluation ongoing.
- An ERA for **skills**: the new project under ERASMUS+ (GreenSkills4H2):
 - Project started in July 2022; 34 partners in 14 countries (include Pilot curriculum, Pilot trainings, ...).
- Reinforced connection with the **international** frame:
 - MI, cooperation with Africa and the Mediterranean Union, support large-scale demonstrators via the EU-Catalyst.
- Hydrogen Valleys

GreenSkills4H2 – identifying occupational profiles

- One of the deliverables of this project is to identify the most **in-demand Occupational Profiles** in clean hydrogen activities across EU Member States.

Research	Product Innovation	Project development	Manufacturing
<ul style="list-style-type: none"> - Highly qualified engineers and scientists with a Master's degree and/or PhD - Work in research centres, laboratories and universities 	<ul style="list-style-type: none"> - Highly qualified engineers and scientists with a Master's degree and/or PhD - Work on developing new products or adapting existing products to hydrogen 	<ul style="list-style-type: none"> - Experienced project managers, design engineers and financiers - Hydrogen production, transport, storage and distribution companies 	<ul style="list-style-type: none"> - Specialists in all technical areas, both engineers and technicians - Material suppliers, equipment manufacturers, engineering procurement and construction contractors, operation and maintenance companies
<ul style="list-style-type: none"> ▪ Czech ▪ Romania ▪ Ireland ▪ Slovakia 	<ul style="list-style-type: none"> ▪ Finland ▪ Italy ▪ Switzerland 	<ul style="list-style-type: none"> ▪ Italy ▪ Austria ▪ Belgium ▪ Finland ▪ Estonia ▪ Poland 	<ul style="list-style-type: none"> ▪ Netherlands ▪ Italy ▪ Greece

Thank you for your attention!

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