EU Industry Days

All roads lead to low-carbon ammonia: Regional perspective

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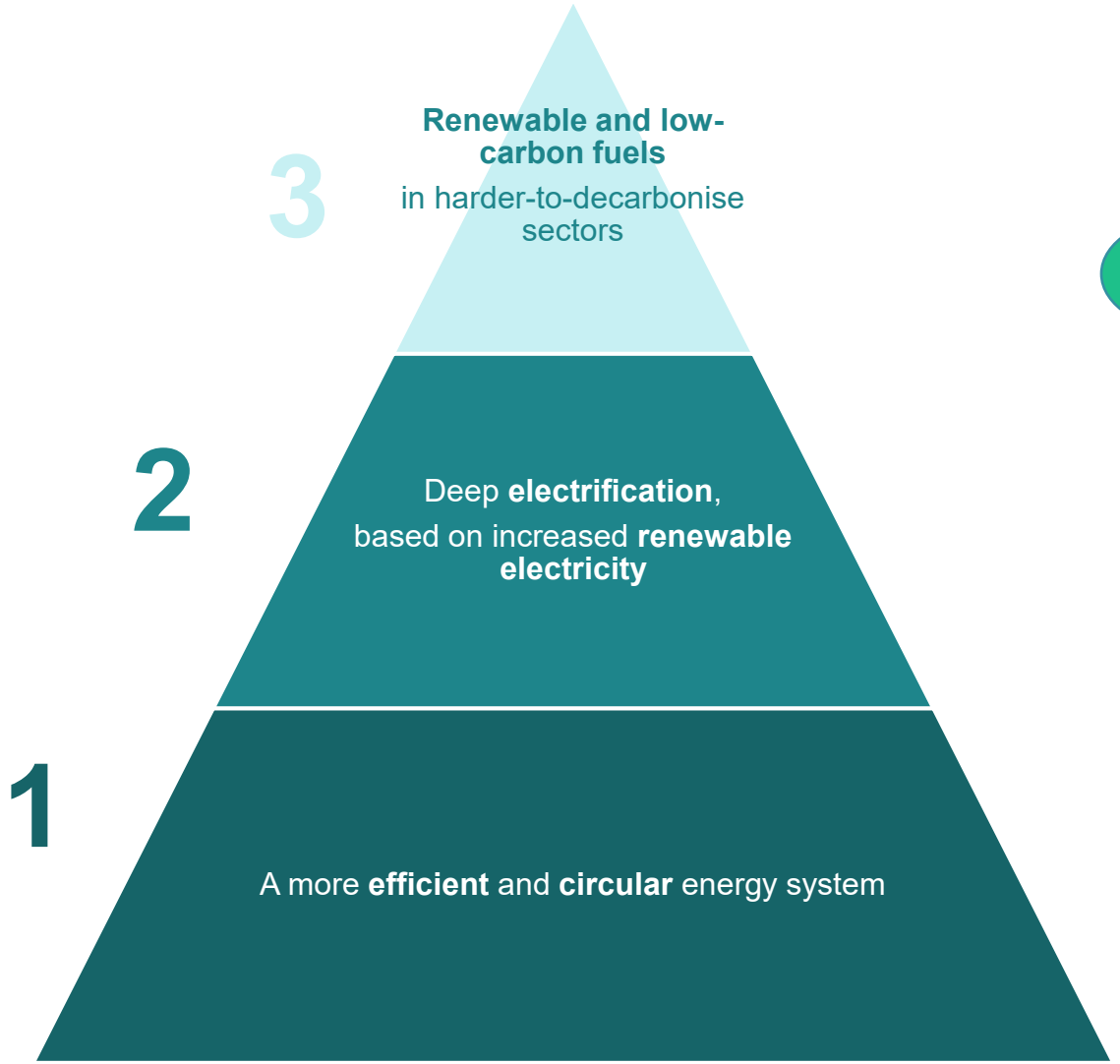
Transforming our energy system



2025

- **6 GW** of renewable hydrogen electrolysers
- Replace **existing hydrogen production**
- Regulation for liquid hydrogen markets
- Planning of hydrogen infrastructure

2030

- **40 GW** of renewable hydrogen electrolysers
- New applications in **steel and transport**
- Hydrogen for electricity balancing purposes
- Creation of “Hydrogen Valleys”
- Cross-border logistical infrastructure

2050

- Scale-up to **all hard-to-decarbonise sectors**
- Expansion of hydrogen-derived **synthetic fuels**
- EU-wide infrastructure network
- An open international market with € as benchmark

European Commission

Rationale

- Use clean hydrogen to decarbonise hard to abate industry and transport sectors
- Direct electrification key, but meeting EU climate goals will require clean hydrogen as highly carbon-emitting industries cannot be electrified (steel, cement, chemical processes …)
- Same rationale for transport sectors requiring high autonomy / energy amounts (maritime, rail, aviation, heavy-duty vehicles)
- Hydrogen as a means to store energy and balance energy systems

Potential

- Hydrogen is expected to account for up to 24% of total energy world demand in 2050
- Current EU production: approx. 9m tons p.a. from gas and coal (grey hydrogen): uses 8-10% of total EU gas consumption & emits 70-100 tons CO2 p.a. (3-5% of total EU emissions)
- 2030 target: 10m tons p.a. from wind / solar power (green hydrogen) plus X from nuclear power (pink hydrogen) and gas with CCS (blue hydrogen)
- Hydrogen technologies and applications mature for market deployment
- EU industry a global leader in hydrogen technologies and applications

Challenges

- Upstream: Availability of large quantities of renewable electricity
- Downstream: Developing a market for clean hydrogen (chicken-egg problem)
- Technology: Upscaling to market-scale
- Lack of regulatory framework / clarity
- High investment needs (production; infrastructure; offtake)
- Industry and value chains still emerging

Strategy: Regulatory framework

- ✓ Fitfor55 package (July 2021)
  - ✓ Definition, certification, targets renewable hydrogen
- ✓ Hydrogen & Gas package (December 2021)
  - ✓ Definition & certification low-carbon hydrogen
  - ✓ Regulation of hydrogen infrastructure (pipelines, storage, terminals etc.)
  - ✓ Incentives for development of hydrogen infrastructure
- ✓ Delegated Act on Additionality (forthcoming)
  - ✓ Regulation of production of green hydrogen

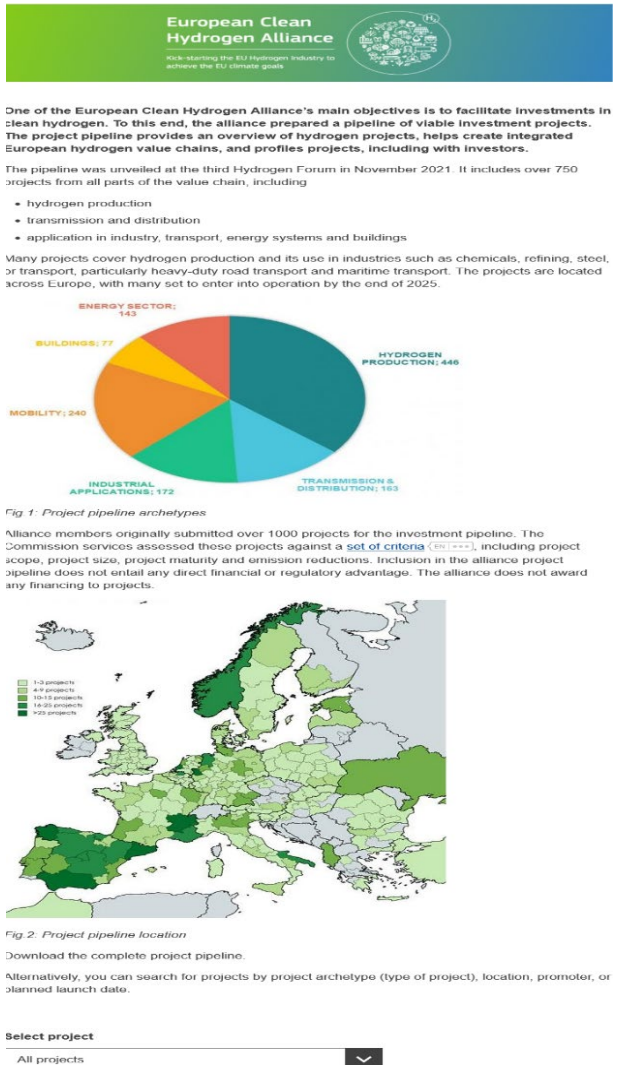
Strategy: Investments

- ✓ Mobilising EU Funds: Target: **€800m per year** starting 2022
- ✓ **EU Recovery and Resilience Facility:** €10bn
- ✓ Priority to EU **state aid clearance** of hydrogen projects (IPCEI, CEEAG)
- ✓ Co-operation with **EIB and EBRD**
- ✓ Mobilising **private investments**
- ✓ **Hydrogen Public Funding Compass**
  https://ec.europa.eu/growth/industry/strategy/hydrogen/funding-guide_en

Strategy: Linked-up Industry / Value Chains

- European Clean Hydrogen Alliance:
  - Objective: create more integrated EU hydrogen ecosystem / facilitate industry / value chain integration
  - 1700 stakeholders (mostly companies) from all parts of value chain
  - Roundtables, working groups, match-making (technical and CEO-levels)
  - Created project pipeline: 750+ projects: includes **30 projects** using clean hydrogen to produce ammonia with a wide geographical spread: AT, BE, FI, FR, DE, IT, LV, NL, NO, PL, PT, SK, ES, SE

Project Pipeline



Searchable online database:

https://ec.europa.eu/growth/industry/strategy/industrial-alliances/european-clean-hydrogen-alliance/project-pipeline_en

Pipeline includes for each project:

- Name of project
- Company(ies) undertaking the project
- Project archetype (project type)
- Location of project
- Maturity of project (start date)*
- Size of project*

* Available for many projects

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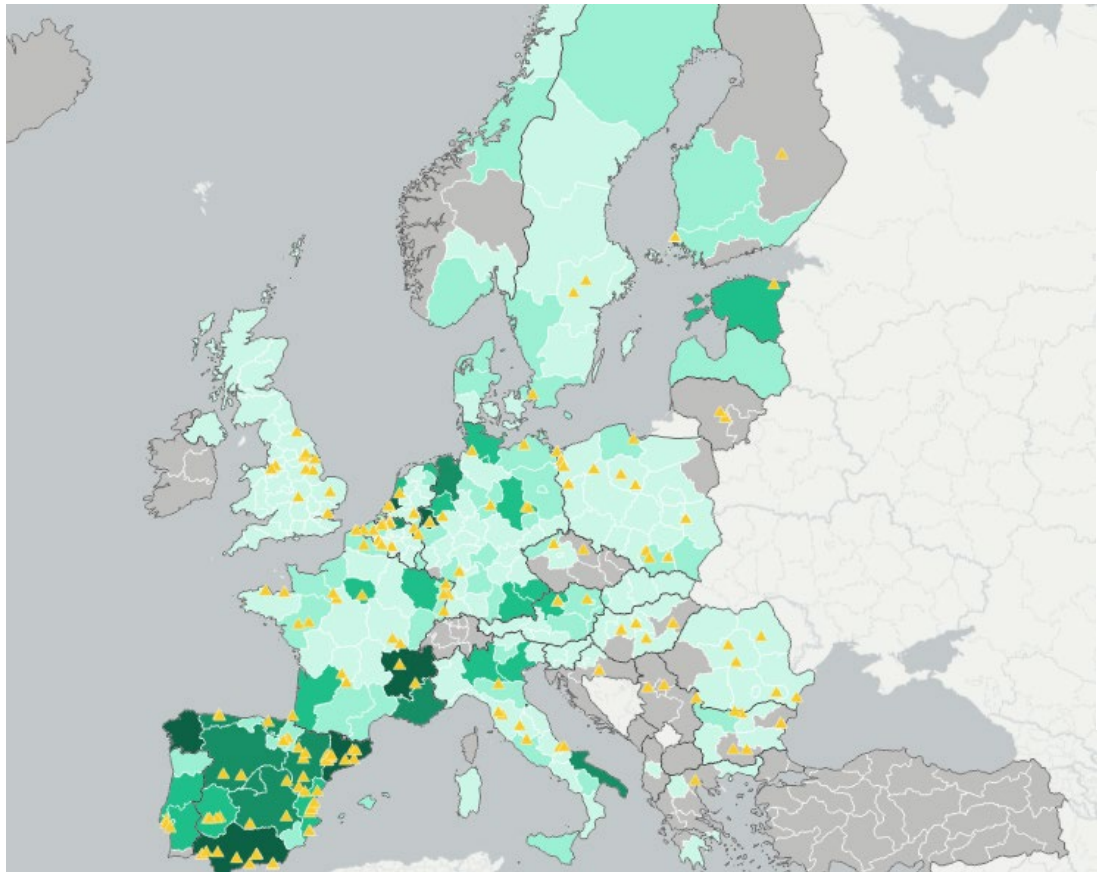
Energy & Industry Geography Lab (EIGL)
Fertilizer and hydrogen production facilities



EIGL 2022. Data source: Project pipeline of the European Clean Hydrogen Alliance, European Pollutant Release and Transfer Register (E-PRTR), Eurostat GISCO OSM contributors

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