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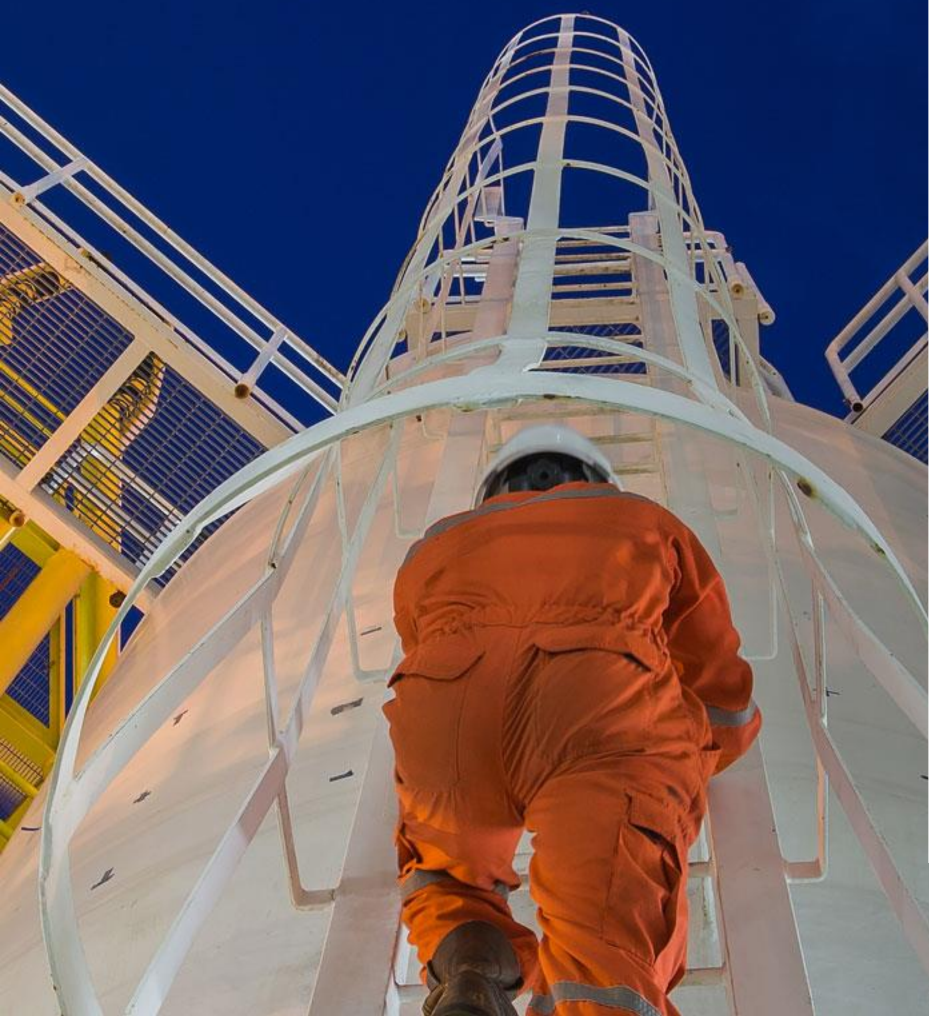

Implementing the Green Deal targets for sustainable demand

~ Setting the scene

European Hydrogen Week, 19 November 2024

Brussels, Belgium

Christian Zinglersen, *ACER Director*

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Hydrogen in Europe today ~ key figures

7.2 Mt

EU hydrogen (H_2) consumption in 2023

- 99.7% of it produced from fossil fuels
- EU likely to miss the consumption goal of 20 Mt renewable H_2 by 2030

62 GW

EU Member State's electrolyser capacity targeted for 2030

- 216 MW installed capacity in 2023
- EU likely to miss the 100+ GW needed for the 2030 10 Mt H_2 renewable production target

42,000 km

Length of planned EU+Norway H_2 network by 2034

Additional plans for:

- 693 GWh/d import capacity
- 49 TWh storage space

3-4 times

Higher production costs

- Renewable H_2 compared to fossil based H_2 discouraging early offtake

The EU needs to speed up to achieve its 2030 targets. Strong national commitments are necessary to materialise plans and projects. Current cost gap is the key barrier for renewable hydrogen uptake.

‘If you build it, they will come …’ ~ also true for H2?

Hydrogen network: How much, by when & where?

- Future demand is uncertain, increasing financing risks
- Actual cost of repurposing may vary significantly
- Inter-dependencies with gas and electricity system call for integrated planning
- Electricity grid delays affect deployment of electrolysers and renewable generation
- Where to locate electrolysers is important

42,000 km of pipelines

693 GWh/d of imports

49 TWh of storage

Hydrogen terminal (GWh/day)

Hydrogen storage (GWh)

Transmission lines

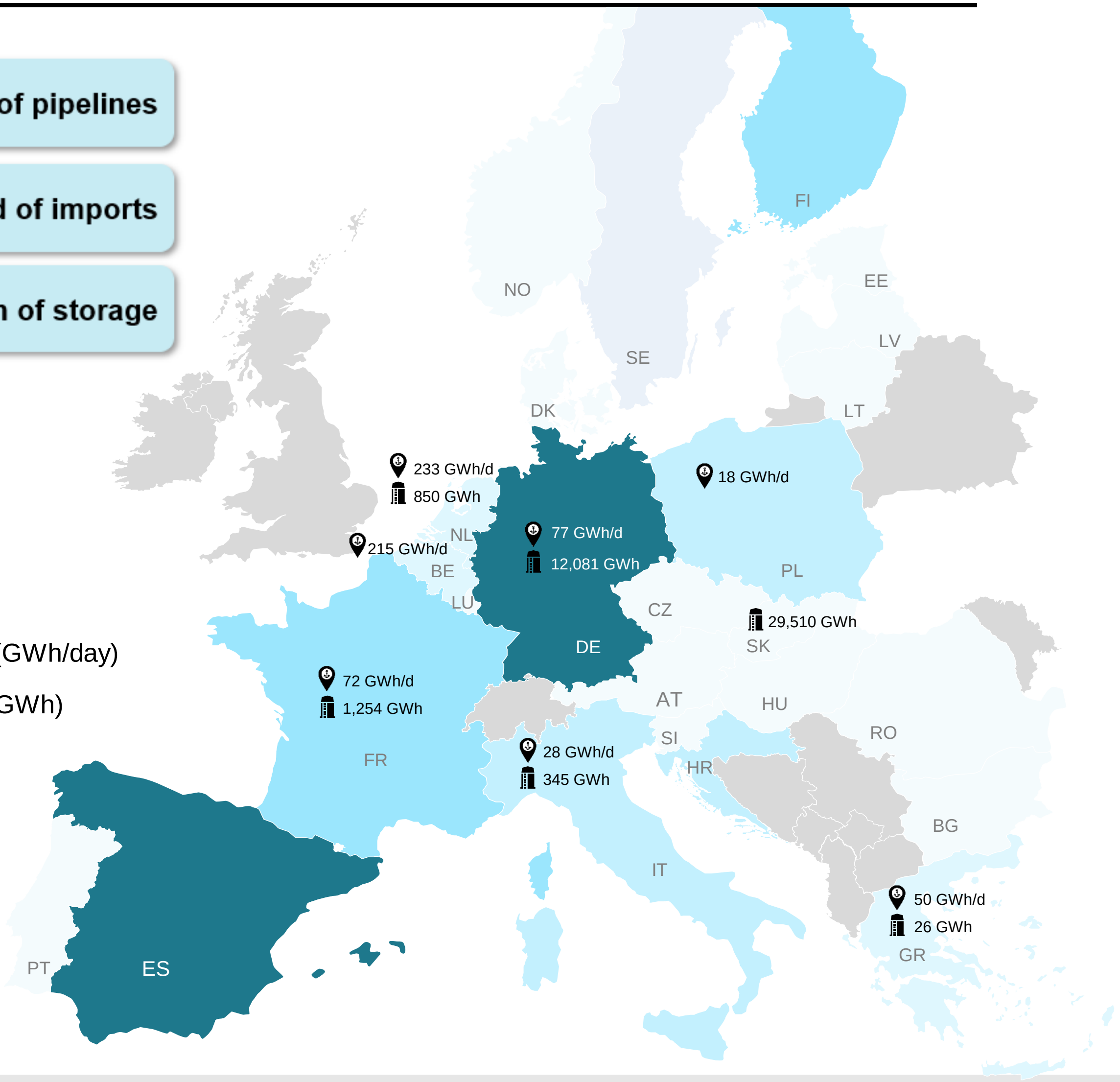
< 1000 km

1000-2000 km

2000-3000 km

3000 – 5000 km

> 5000 km



Source: ACER based on the TYNDP-2024 project list.

Whilst national plans are relatively ambitious …

Planned hydrogen production and demand and electrolyser capacity in 2030

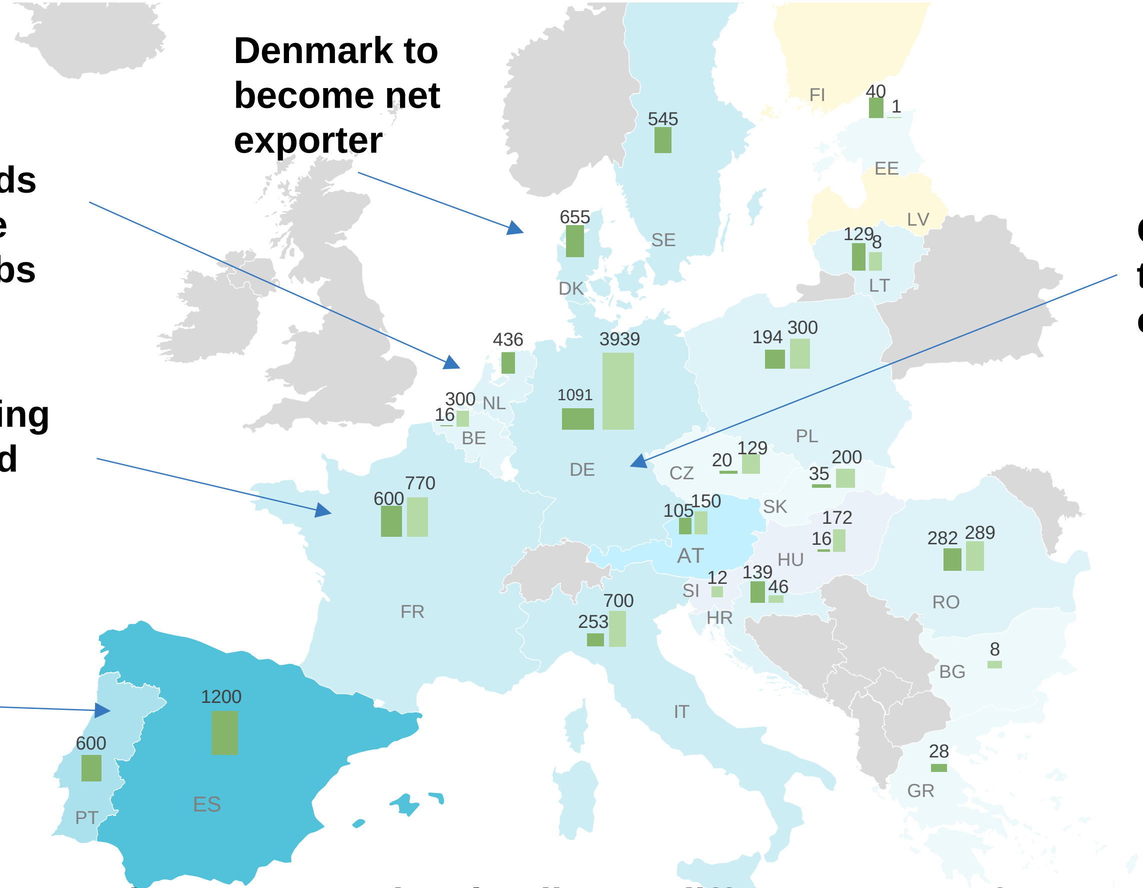
Belgium-Netherlands to become import hubs

Denmark to become net exporter

France mainly focusing on own industrial and transport targets

Portugal and Spain to become net exporters

Germany to more than double consumption



2030 Targets

Renewable H_2 production (kt)

Total H_2 demand (kt)

Planned electrolysers' capacity

N/A

< 1 GW

1 - 5 GW

5 - 10 GW

> 10 GW

Ambition across Member States varies, leading to different paces of sector development. Hydrogen networks will be important to link favourable production sites and import hubs with demand centres, but demand uncertainties need to be tackled. Setting national and EU market rules quickly is key.

Source: ACER based on national hydrogen strategies and roadmaps, NECPs, and information provided by national regulatory authorities.

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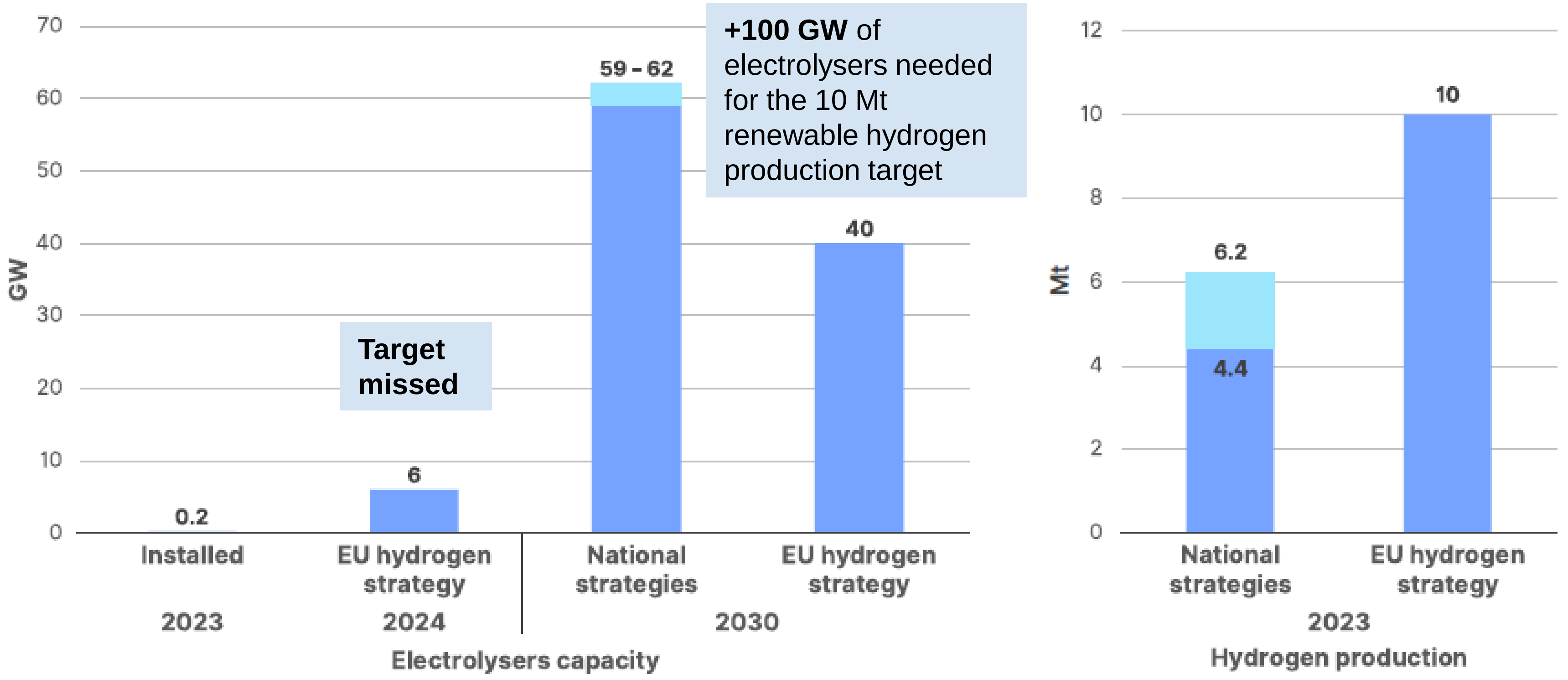
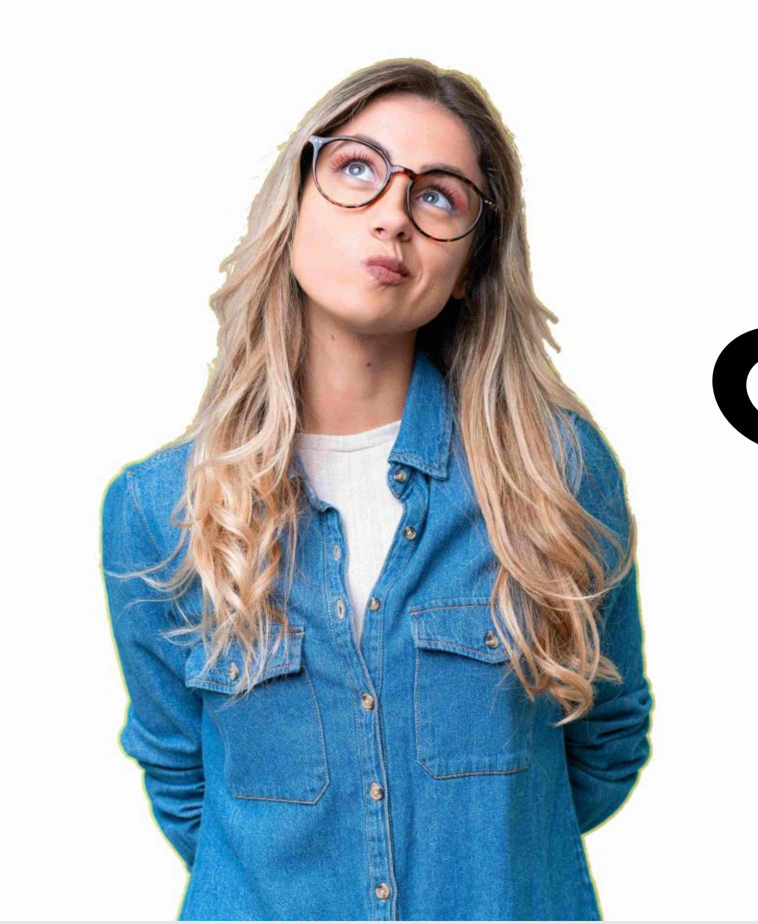
… overall, we are likely to miss EU 2030 targets

Comparison of EU targets with national ones according to the national strategies on electrolyser capacity (left, GW) and hydrogen production (right, Mt)



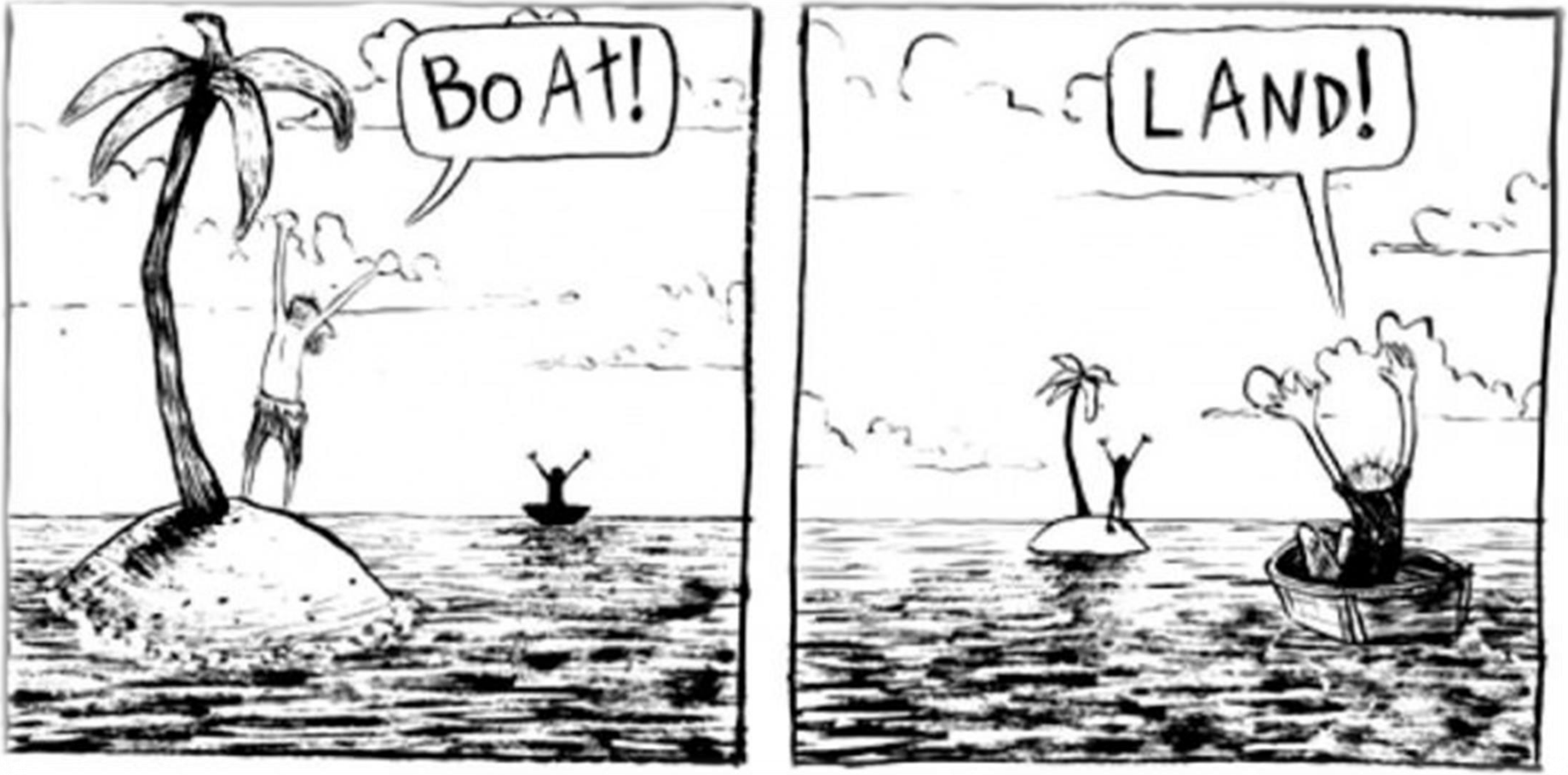
The current pace of deployment of electrolysers is not enough to meet the EU targets. Some 70 GW of projects still 'on paper' due to high uncertainty.

Source: ACER based on national hydrogen strategies and roadmaps, NECPs, and information provided by national regulatory authorities.
Note: Actual installed capacity of electrolysers in 2023 is based on data from the European Hydrogen Observatory

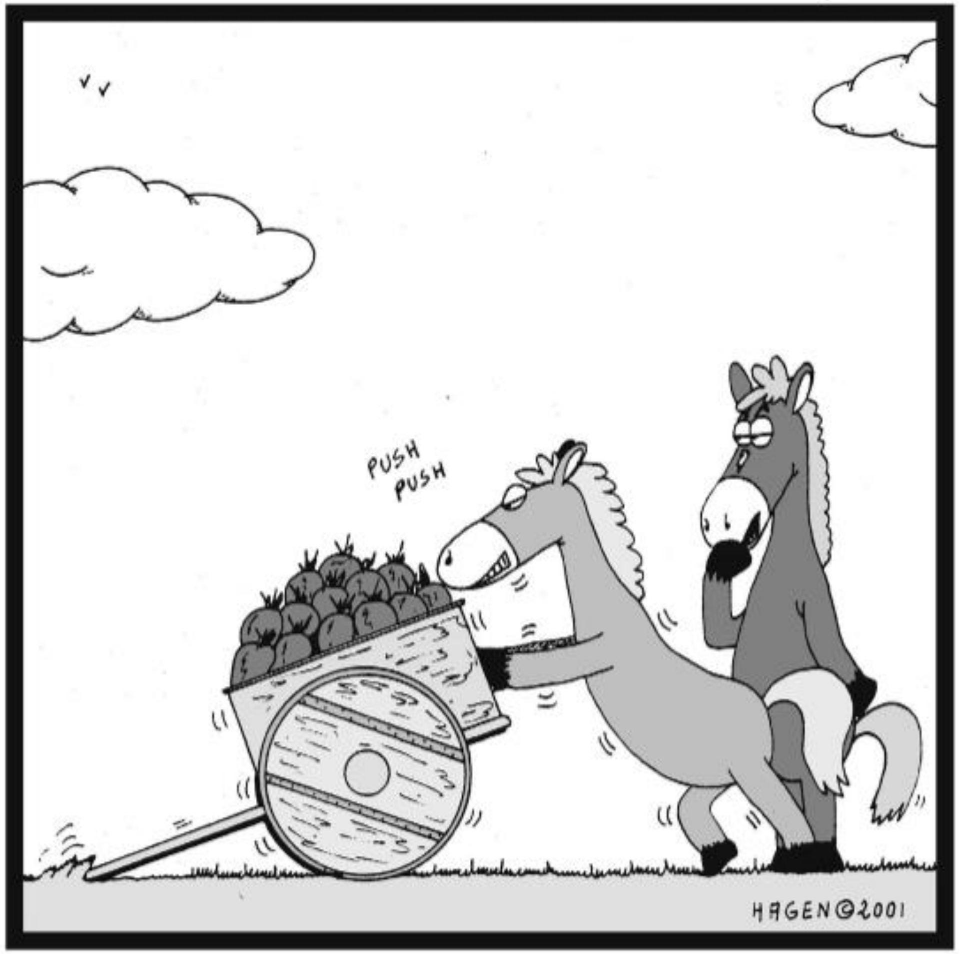


“Hmm … so what gives?”

It’s the supply. No, it’s the demand. No, it’s the …



Uncertain demand outlook is not exclusive to H2



Hang on... We must be doing something wrong...
How does the saying go again?

IEA: *“EU electricity consumption is not expected to* ***return to 2021 levels until 2026 at the earliest****”*

ACER: *“… according to the ongoing adequacy assessment of ENTSO-E (ERAA 2024)* ***demand in some Member States would have to grow at an annual rate of up to 12% every year from 2024 to 2026.****“*

Source: IEA Electricity 2024, ACER reply to the ERAA 2024 public consultation.

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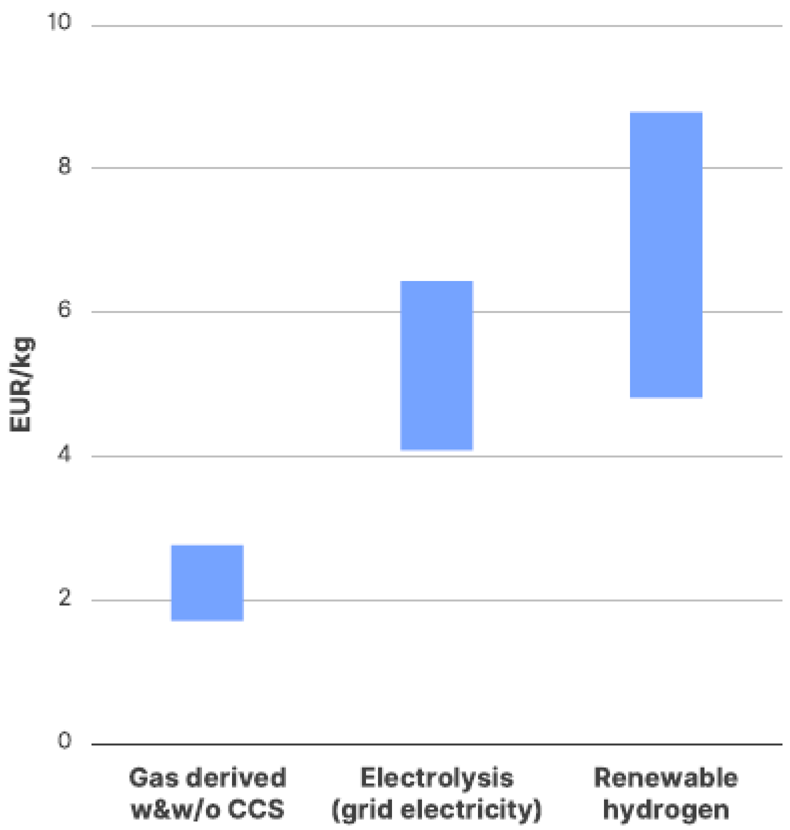
Renewable hydrogen is largely ‘out of the money’

- Renewable hydrogen is 3-4 times more expensive to produce than fossil-based hydrogen
    - Current gap is too large to enable rapid deployment
    - Cost reduction expectations may discourage first-movers
- Yet, European Hydrogen Bank’s first auction results indicate instances of both very low production cost and high-enough willingness to pay for renewable hydrogen
- Clarifying low-carbon hydrogen’s role is key for market development and long-term climate goals
- Scaling electrolyser deployment and continuing the rapid decarbonisation of electricity is essential for renewable hydrogen competitiveness

Cost ranges of hydrogen by production method



Source: ACER based on S&P Global cost estimates for January-September 2024.

With additional planning complexity coming on top

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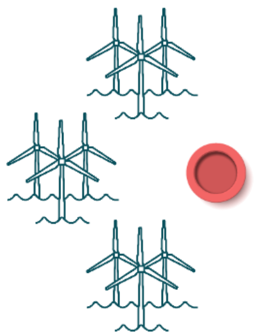
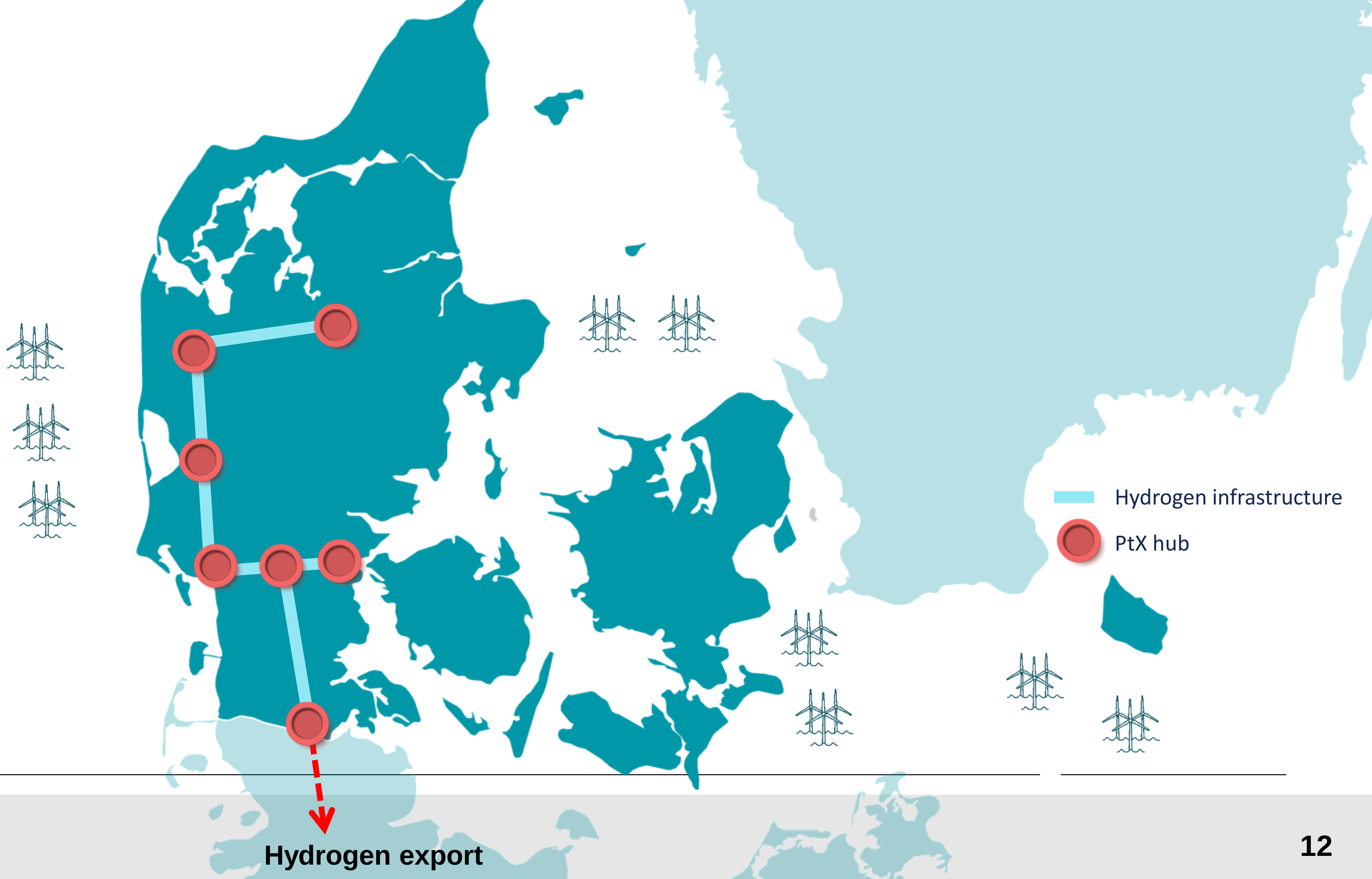
ELECTRICITY GRID NEEDS	LOCATION OF ELECTROLYSERS	ELECTRICITY SERVICE PROVIDERS
To reach 10 Mt of renewable H_2 target		
• +100 GW electrolysers • 550 TWh of renewable electricity • Up to 180 GW of wind/solar • Vast grid expansion	• Co-location with demand or proximity to renewable generation? • Congestion amplifiers or alleviators? • Central planning or market choices? • Which role for locational signals?	• System flexibility • Ancillary services • Renewable curtailment
DELAYS IN ELECTRICITY GRID DEVELOPMENT ALREADY ENCOUNTERED	INTEGRATED ASSESSMENT NOT YET IN PLACE	ENABLING NATIONAL FRAMEWORK NOT ALWAYS IN PLACE

Hydrogen brings challenges to what is already rather stretched and congested electricity grids in some areas. Rapid progress on integrated planning and coordination of investments in electrification, electrolysers, renewables and (electricity and hydrogen) networks is needed, yet remains ‘easier said than done’.

One Down-to-Earth example



- Increasing offshore wind capacity means more power generation for e.g. renewable hydrogen production
- Hydrogen infrastructure is a prerequisite to transport hydrogen on a large scale
- Hydrogen producers need sufficient certainty about offtake ahead of financial decision
- **Cross-border integration enhances the potential yet also adds to the complexity**



Source: Danish Energy Agency.

Complexity + Uncertainty = Advance with Prudence

Integrated network planning

To mitigate the risks of oversizing:

- Improved demand forecasting during the planning phase is essential (incl. market tests).
- Readiness to adjust to align infrastructure with actual market needs.
- Incremental infrastructure development when uncertainty is high.
- Carefully repurposing gas networks for hydrogen to minimise costs, but without overlooking impacts on the gas sector (continuous security of supply).

Tackling demand risks in financing hydrogen infrastructure

Uncertain future hydrogen demand can lead to underutilised networks and stranded assets.

- Inter-temporal cost allocation mechanism (as e.g. in Germany) could help. Continuous monitoring is important.
- Effective risk and cost allocation between users, operators and the State is crucial.
- For cross-border hydrogen networks, timely cooperation and coordination among Member States and regulators are essential.

ACER's key recommendations

Source: ACER's Market Monitoring Report ('European hydrogen markets'), 19 November 2024.

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ACER's key recommendations

Legislation	**Quickly transpose the hydrogen and decarbonised gas package into national legislation** and proceed with its implementation. Member States need to develop their national hydrogen markets in line with the European framework to enable infrastructure development and avoid fragmentation.
Electrolyser deployment	**Speed up electrolysers deployment and decarbonisation of electricity sector** to increase renewable hydrogen competitiveness.
Forecasting and planning	**Improve forecasting and accelerate integrated planning** to identify realistic hydrogen infrastructure needs, avoiding overinvestments and reducing cost related to under-recovery risks.
Infrastructure development	When future demand is highly uncertain consider **incremental infrastructure development** based on market needs (to avoid building too much network too fast and avoid stranded assets).
Repurposing of gas networks	**Consider carefully the repurposing of gas networks** for hydrogen to minimise costs, but do not overlook the potential impacts on the broader gas sector (including security of gas supplies).
Risk mitigation	**Address future demand risk in financing hydrogen networks.** Properly identify different risks associated with uncertain future hydrogen demand. Allocating these risks among stakeholders (considering also cross-border implications) is key to enable hydrogen infrastructure investments.
Market certainty	**Provide market certainty over the role of non-renewable, low-carbon hydrogen.** Clarity on the uptake of non-renewable hydrogen should be provided by the European Commission and Member States.

Source: ACER's Market Monitoring Report ('European hydrogen markets'), 19 November 2024.

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ACER is hiring!

Join us in powering Europe’s energy future.

Check out our job vacancies (in many areas).

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ACER role and governance

- **Supporting the integration of energy markets in the EU** (by common rules at EU level). Primarily directed towards transmission system operators and power exchanges.
- **Contributing to efficient trans-European energy infrastructure**, ensuring alignment with EU priorities.
- Monitoring energy markets to ensure that they function well, **deterring market manipulation and abusive behaviour**.
- Where necessary, **coordinating cross-national regulatory action**.
- Governance: **Regulatory oversight is shared** with national regulators. **Decision-making** within ACER is collaborative and joint (formal decisions requiring 2/3 majority of national regulators). **Decentralised enforcement** at national level.
- Headquartered in Ljubljana, Slovenia. **Engaged across the EU**.

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ACER's role regarding the hydrogen market

Overview of ACER's competences regarding the hydrogen market

Hydrogen Market Rules and Monitoring

Network codes (NCs)
- Prepare non-binding framework guidelines.
- Review and revise NCs proposals.
- Monitor NCs implementation.

Market Monitoring
- Assess the impact of market developments on consumers.
- Evaluate access to the network.
- Review progress on interconnectors.
- Identify barriers to cross-border trade
- Publish an annual report.

Hydrogen network tariffs

- Provide recommendations on the methodologies for:
  - inter-temporal cost allocation;
  - determination of the asset transfer value;
  - financial transfers and allocation among final customers.
- Give the factual opinion on the methodology for setting the hydrogen network access tariffs or reserve prices for interconnection points.

Hydrogen network infrastructure

- Provide an opinion on national hydrogen TYNDPs to assess their consistency with the EU TYNDP.
- Give an opinion on ENNOH's draft Union-wide TYNDP, the draft annual work plan, and other related documents.
- Provide an opinion on the hydrogen PCI/PMI list.
- Monitor the implementation of PCIs/PMIs.

Governance

- Provide opinion to the European Commission (EC) on the draft statutes, member list, and draft rules of procedure of ENNOH and the EU DSO entity.
- Monitor the execution of ENNOH's tasks (and those of the EU DSO Entity) and report findings to the EC.
- Oversee the implementation of network codes and guidelines by ENNOH.

Source: ACER's Market Monitoring Report ('European hydrogen markets'), 19 November 2024.