Gas for Climate

Webinar:
Market State & Trends of renewable and low-carbon gases in Europe

Tuesday 12th of December 2023

Moderator

Jaap Peterse

Senior Consultant
at Guidehouse

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Agenda

10.00 – 10.05	Welcome and introduction from Gas for Climate
10.05 – 10.30	Renewable and low-carbon gases in EU
	• Biomethane and CO_2
	• Hydrogen
	• Policy landscape
10.30 – 10.40	State of renewable gases in Europe - perspective of IEA
10.40 – 11.00	Q&A

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Welcome from the Consortium

Gas for Climate was initiated in 2017 to analyse and create awareness about the role of renewable and low carbon gas in the future energy system. Gas for Climate is committed to achieve net zero greenhouse gas emissions in the EU by 2050.

Marie-Claire Aoun

Director of Prospective and Institutional Relations

Teréga

Consortium members

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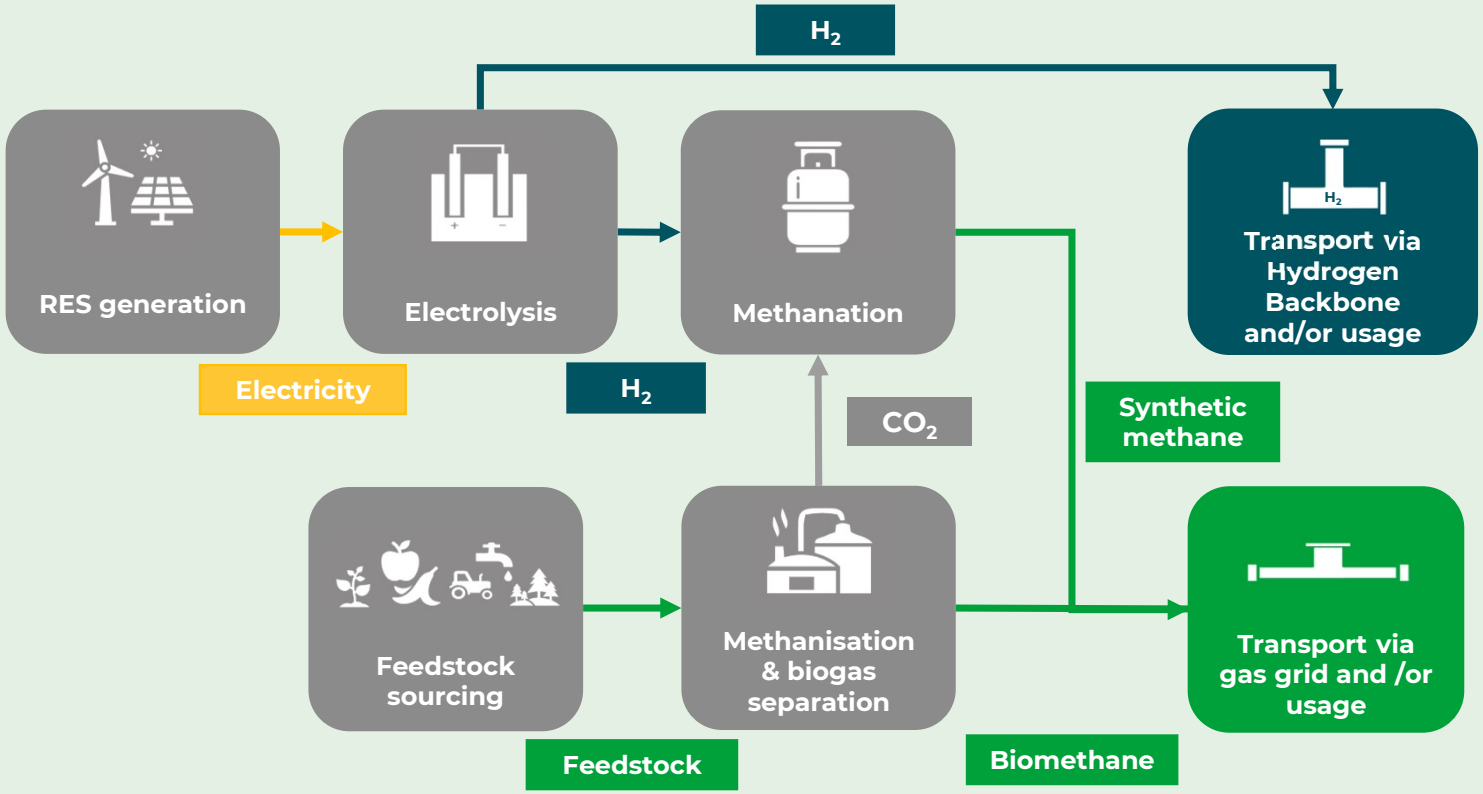
Gas for Climate over the years

New Gas for Climate Market state and trends report

- Overview of most recent **market developments** across the biomethane, hydrogen and CO_2 value chain in Europe
- Highlight key **technological** and **innovative trends** for biomethane, hydrogen and CO_2
- Provide latest **insights** into European strategies and **policies** on renewable and low-carbon gases

Just published now, download it on our Gas for Climate website!

Synergies between renewable and low-carbon gases



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Presenter – Biomethane and CO_2

Eugenia Morino

Consultant
at Guidehouse

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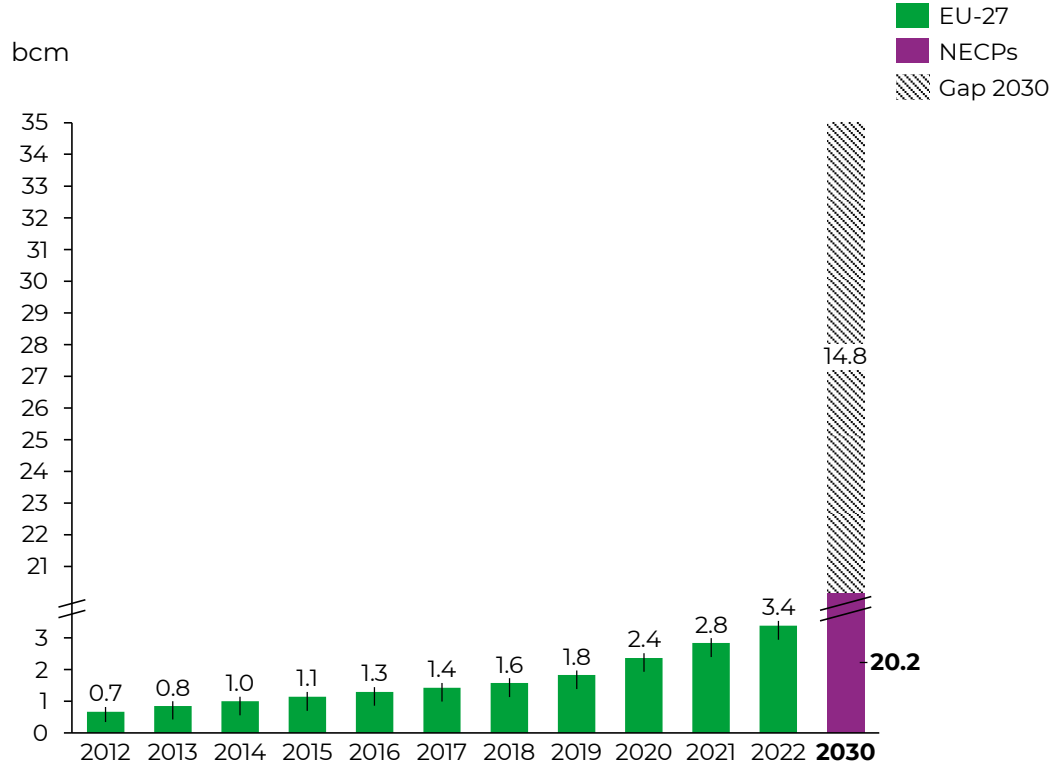
Biomethane production is growing but additional initiatives are needed to reach the 2030 35 bcm target

- EU biomethane production is **concentrated** in Germany, France, Italy, Denmark, the Netherlands and Sweden
- Biomethane is consumed nationally, with **limited cross-border trade**
- **Published NECPs** 2030 production targets sum up to **20.2 bcm**
- Planned investments cover only **20%** of future needs
- Critical initiatives include catalysing biomethane demand with **blending obligations**, development of more efficient technologies and **ambitious NECPs targets**



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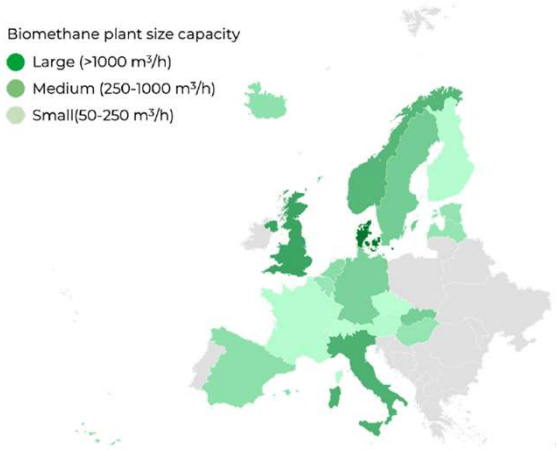
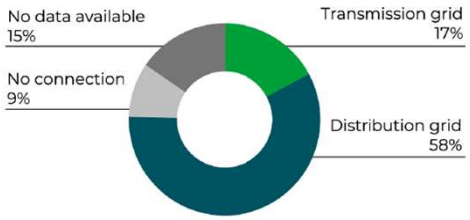
Transmission and distribution pipeline connection is needed to ensure a larger uptake of biomethane

75% of biomethane plants are **connected** to the existing gas grid

Measures to support **grid planning** are needed to **scale-up the ease of connecting**

1) mapping of best possible network connections in relation to biomethane potential
2) lowering the pressure level in the local distribution grid
3) buffer storage in the distribution network
4) network meshing between local consumption areas





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Gasification technologies are gaining momentum and hold substantial production potential

Thermal gasification

- Dry and solid waste treated at low pressure and high temperature to produce syngas
- Transform residues and solid waste that are currently poorly recovered
- Injected in the distribution network

Hydrothermal gasification

- Treat wet and liquid feedstock of both organic and non-organic origin
- Higher conversion rates compared to AD
- Injected in the high-pressure gas grid

Innovation & Technology case study

GAYA and Salamander projects

SCW Systems

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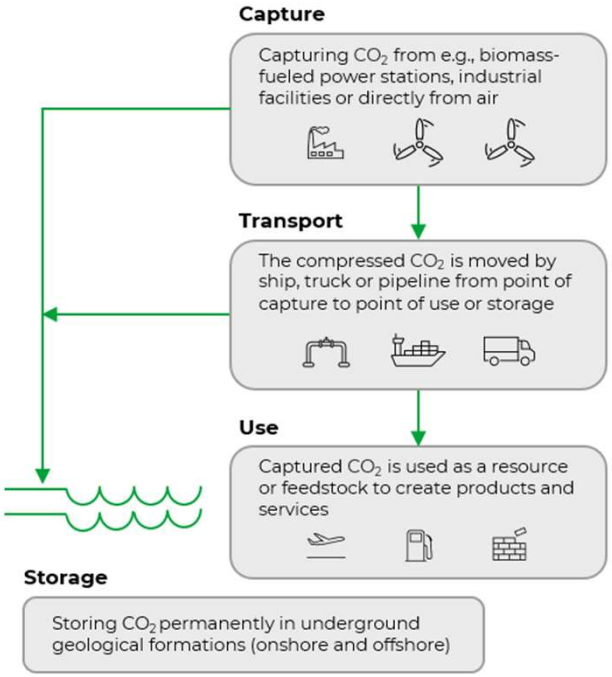
Existing synergies between CCUS development and low-carbon gases should be further leveraged

Critical synergies include

- **Capturing** biogenic CO_2 from the **biogas** and biomethane industry
- Synthetic fuels and synthetic methane production
- Low-carbon **hydrogen** production
- **Bioenergy** production with CCS or CCU

CO_2 capture potential for permanent sequestration in onshore and offshore locations **is largely untapped**



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CCUS development across Europe is accelerating with +60 projects announced in the past five years

- Three large-scale CCS projects have taken **positive FID**
  - *Porthos in the Netherlands* →
  - *Longhip in Norway*
  - *Ørsted Kalundborg CO_2 Hub in Denmark*
- TSO-driven initiatives are catalysing projects across the CCUS value chain
- CO_2 transport network owned and operated by TSOs prevents inefficiencies, **avoiding lock-ins** due to decision-making based on individual business interests

Innovation & Technology case study

CO_2 in the Netherlands

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Presenter – Hydrogen & Policy developments

Agustin Roth

Senior Consultant
at Guidehouse

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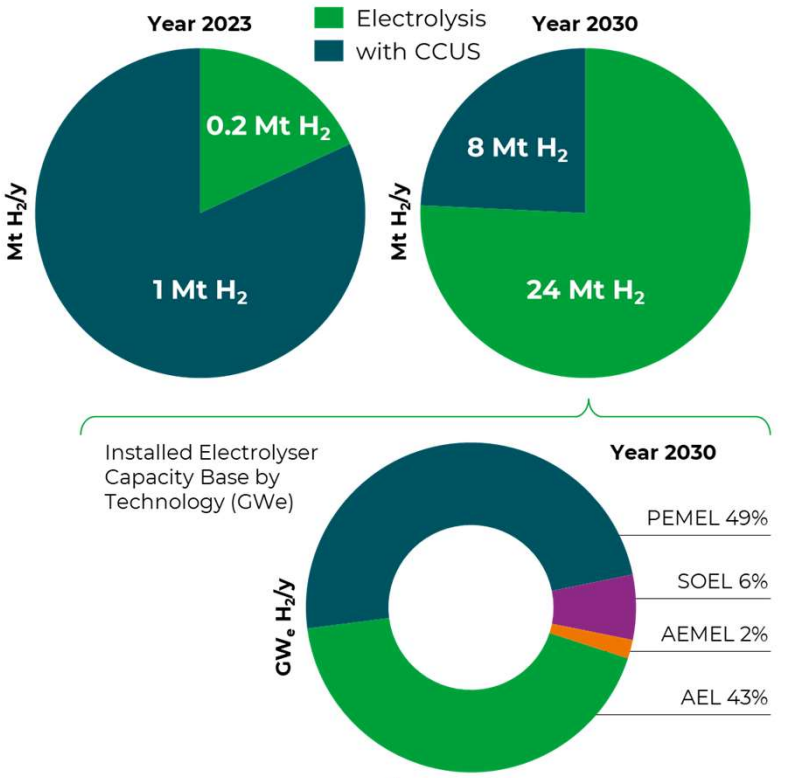
Renewable and low-carbon H2 expansion continues but high interest rates add challenges

- **REPowerEU:** 10 Mt from domestic production in 2030. Europe is amongst the **front runners** in announced electrolytic hydrogen production projects.
- The combination of **inflation and high interest rates increased the cost of capital**. Previous costs estimates for 2030 as low as €1.2 to €4.15 per kg have now been revised upwards to €5 to €8/kg for central Europe.
- **Support policies as the EU H2 Bank are needed** to accelerate the roll-out of projects and stimulate **demand**.
- To cover demand, **imports (and derivatives) will play a fundamental role.**

Hydrogen Production (Mt/y) by Production Route, Europe



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Europe needs rapid development of interconnected H2 infrastructure to enable a competitive market

Infrastructure

- Europe needs an interconnected H2 infrastructure to enable a **competitive, liquid, pan-European H2 market**.
- The EHB initiative has developed **hydrogen maps** reflecting important elements such as salt caverns, aquifers, repurposed and new pipelines, etc.

Storage

- **H2 storage will play a key role in the H2 economy**.
- Innovative examples. Austria counts with the 1st storage facility in an **underground porous reservoir**. Storage in **salt caverns** are also in place in the UK and Germany.
- **Linepack storage** will also provide system flexibility.

Cross-border projects

- Several countries are already **developing (cross-border) infrastructure projects**:
- Projects can obtain the status of **Project of Common Interest (PCI) or Mutual Interest (PMI)** and benefit from a simpler permitting process and access to funding.
- Already 2 **Important Projects of Common European Interest (IPCEIs)** have received state aid approval by the EU Commission: Hy2Tech and Hy2Use.

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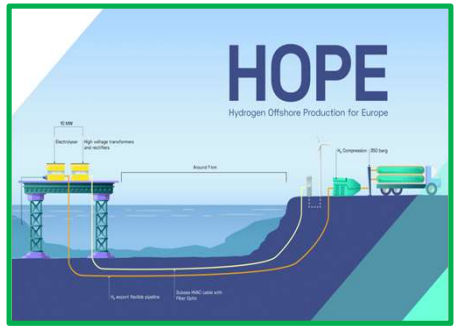
Integrated offshore H2 production projects with pipelines to shore are ramping-up

- With further buildout of renewable energy capacity, **integration in the energy system will become increasingly challenging.**
- For offshore wind integration, **offshore hydrogen production and transport** to shore could mitigate these challenges.
- **Transmission cost for hydrogen is lower than for electricity** and offshore pipelines enable the aggregation of offshore hydrogen production from several wind farms.

Hydrogen Offshore production for Europe (HOPE) (*off the port of Ostend, BE*): a consortium prepares for a 10 MW offshore hydrogen asset, where the hydrogen will be landed to shore with a composite pipeline and brought to customers in industry and the transport sector. Operation is expected to start mid-2026.



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The Green Deal and the Fit-for-55 Package will impact on the entire value chain of H2, biomethane and CO2

The EU Green Deal: Climate Neutrality by 2050
Fit-for-55 Package: 55% emissions reduction by 2030

RED III

- **RFNBO share** for H2 used in **industry** shall reach 42% by 2030 & 60% by 2035.
- To facilitate the certification of **RFNBOs**, the EU Commission defined the **sustainability criteria** to follow.

REFuel EU Aviation & FuelEU Maritime

- Blending obligation on fuel suppliers for **Sustainable Aviation Fuels (SAF)**: 6% by 2030, 70% by 2050
- Obligation on shipping companies: **GHG intensity** of energy used on board ships to be reduced 6% by 2030, 80 % by 2050

Gas Market Package

- **TSOs and DSOs** for hydrogen will be **split**.
- MS shall ensure the **right of customers** to switch supplier in a cost-efficient way.
- **Network development plans** for H2, electricity and natural gas should be **well coordinated**

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Guest Speaker: “State of renewable and low-carbon gases”

Uwe Remme

Head of Hydrogen and Alternative Fuels
at the International Energy Agency

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Rapidly growing pipeline of electrolyser projects in Europe

Announced electrolyser projects in 2030

Electrolyser projects

Committed

Potentially installed capacity

4 GW

Rapidly growing pipeline of electrolyser projects in Europe

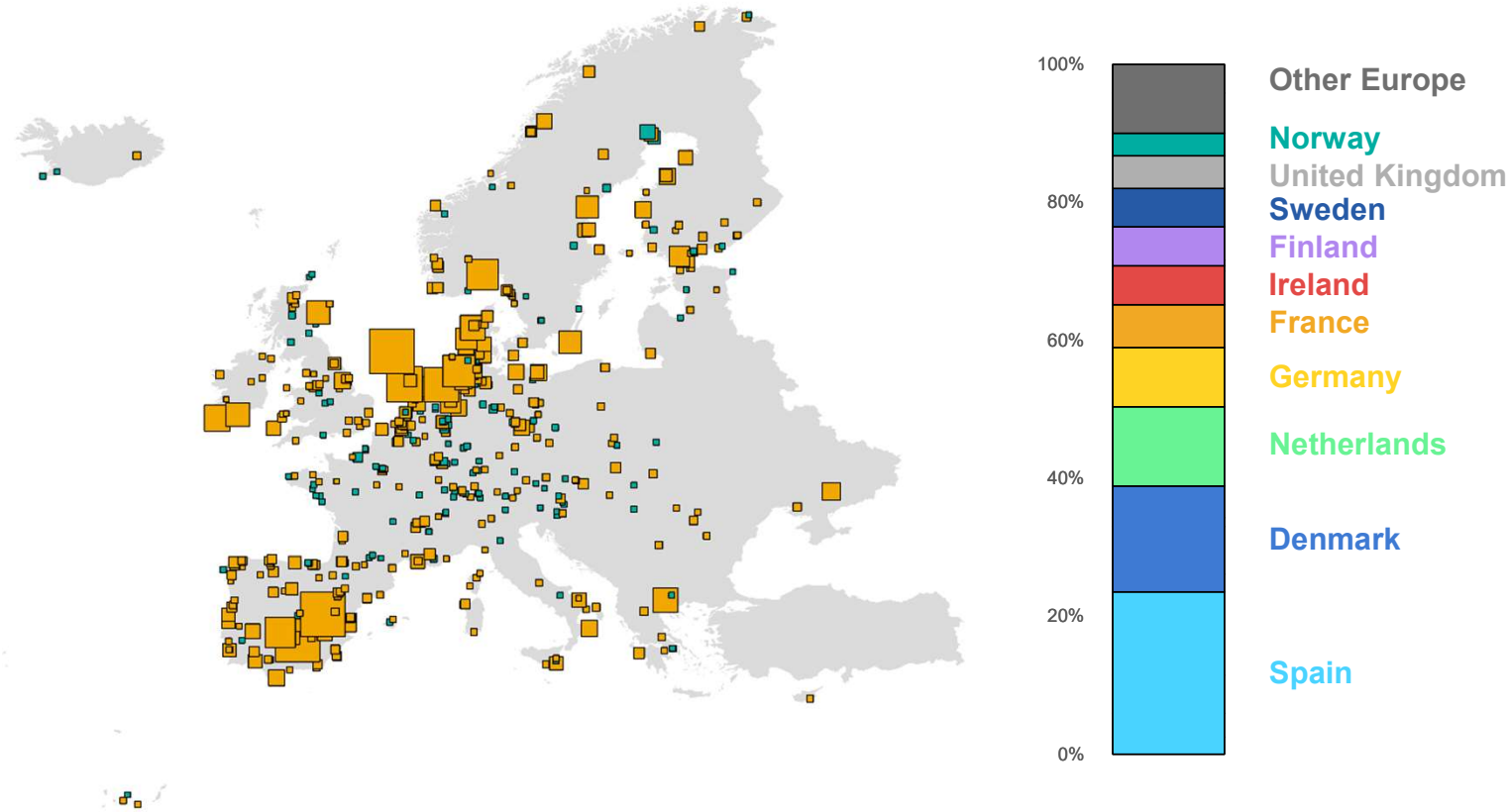
Announced electrolyser projects in 2030

Electrolyser projects

- Committed
- Planned

Potentially installed capacity

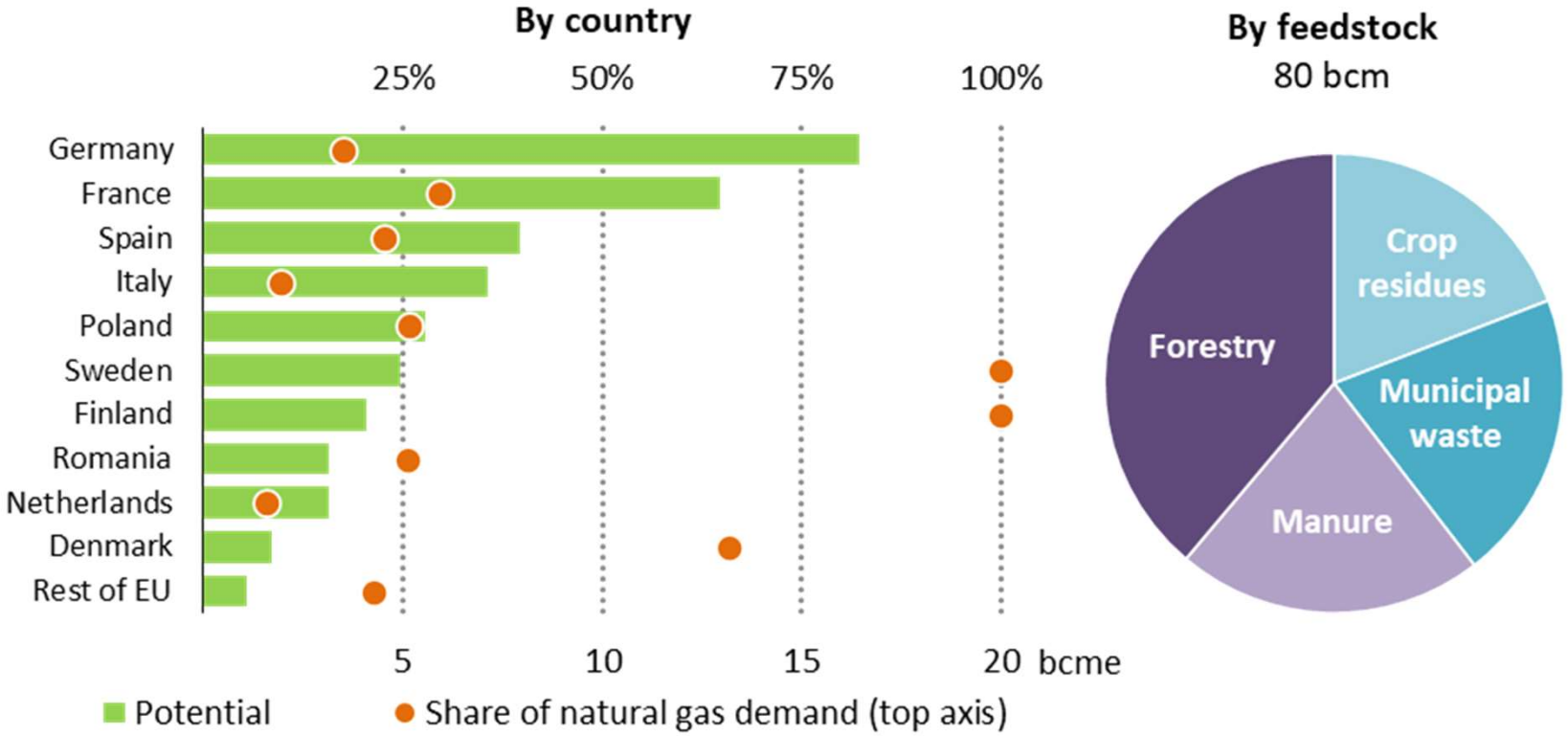
133 GW



Announced electrolyser projects in Europe could account in 2030 for more than a quarter of the global project pipeline, with a potential low-emissions production of 8 Mt.

Biomethane potential in the European Union

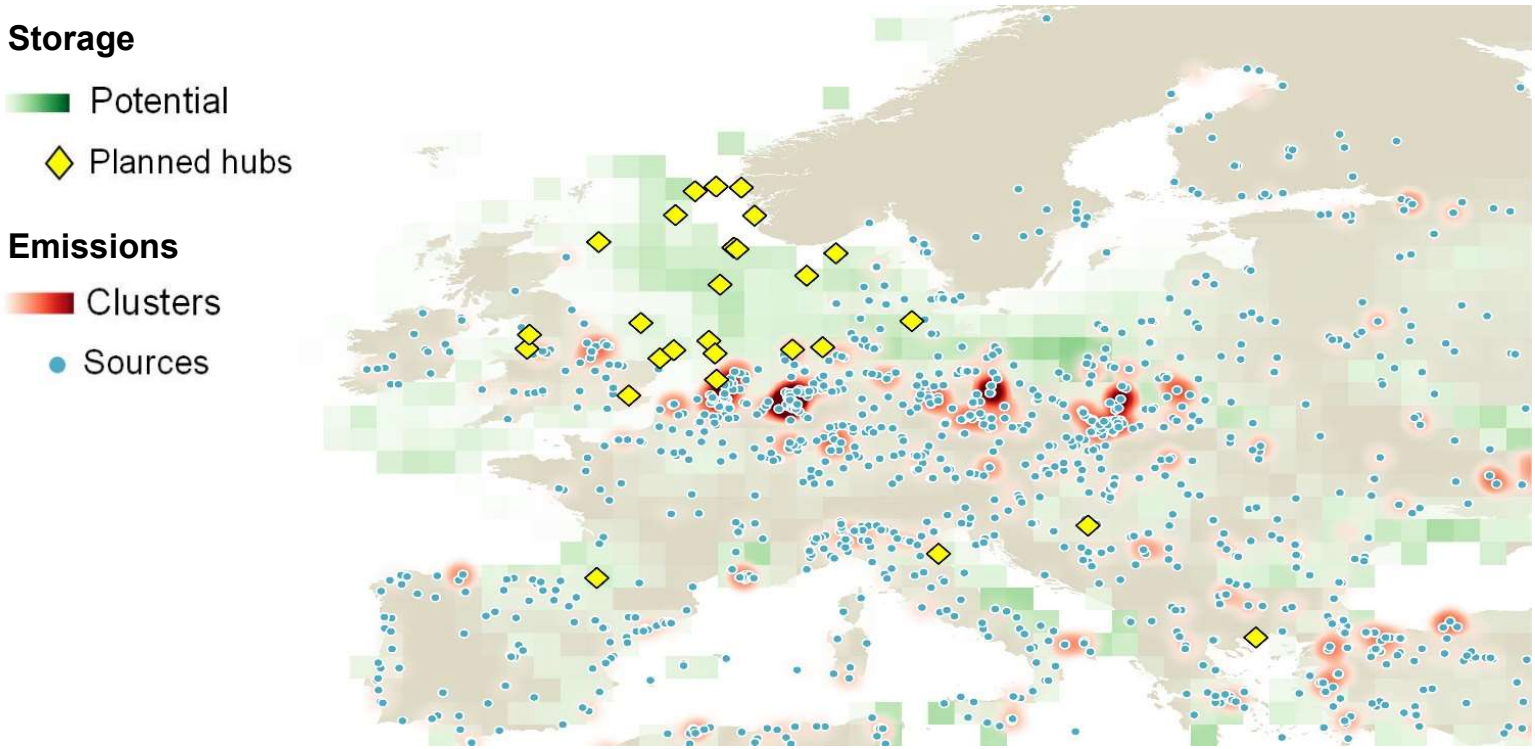
Biomethane potential in the European Union by 2030 compared with share of natural gas demand in 2021



Up to 80 bcm of biomethane could be produced sustainably in the European Union by 2030; some countries have potential exceeding their current natural gas demand

CCUS: Tackling new project complexities

CO_2 emissions clusters and storage hubs in planning in Europe, 2023



Policy tools

- ✓ Long-term liability
- ✓ Competitive solicitations for hubs
- ✓ One-off backstop agreements for first movers
- ✓ London Protocol
- ✓ Definition of high-quality removals
- ✓ Monitoring, reporting and verification

Infrastructure deployment needs to adapt to sectoral requirements and regional contexts. Governments have a central role to play in co-ordinating hub development

Q&A

Biomethane

Biomethane **production continues to grow** reaching 4.2 bcm in Europe, with 3.4 bcm in the EU-27 in 2022, but **additional initiatives** are needed to reach the 35 bcm target in 2030 set by the REPowerEU plan

Transmission and distribution **pipeline** connection is needed to ensure a **larger uptake** of biomethane

Gasification technologies are gaining momentum and hold large production **potential**

Hydrogen

Reaching the 10 Mt of domestic renewable hydrogen (set by the REPowerEU Plan) require almost **100 GW of installed electrolyser** capacity **by 2030** but projections lag behind target

The rapid development of an interconnected **European hydrogen infrastructure** is fundamental to enable a competitive, liquid, pan-European hydrogen market

Offshore hydrogen production projects with transport infrastructure to shore can **facilitate the integration** of increasing **renewable energy** capacity in the energy system

CO_2

Existing **synergies** between CCUS development and low-carbon gases (biomethane and H_2) can be **further leveraged** as climate mitigation solution to achieve net-zero

CO_2 capture potential for permanent sequestration in onshore and offshore locations is currently **largely untapped**

CCUS project development across Europe is **gaining momentum** with more than **60 projects** announced in the past five years

Policy developments

The new policy architecture of the **Fit-for-55 Package** will have a **large impact on the entire value chain** of hydrogen, biomethane and CO_2

REFuel EU Aviation and FuelEU Maritime set important obligations that can **unlock further RFNBOs uptake**

To facilitate the certification of RFNBOs, the **EU Commission defined the sustainability criteria** to follow

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