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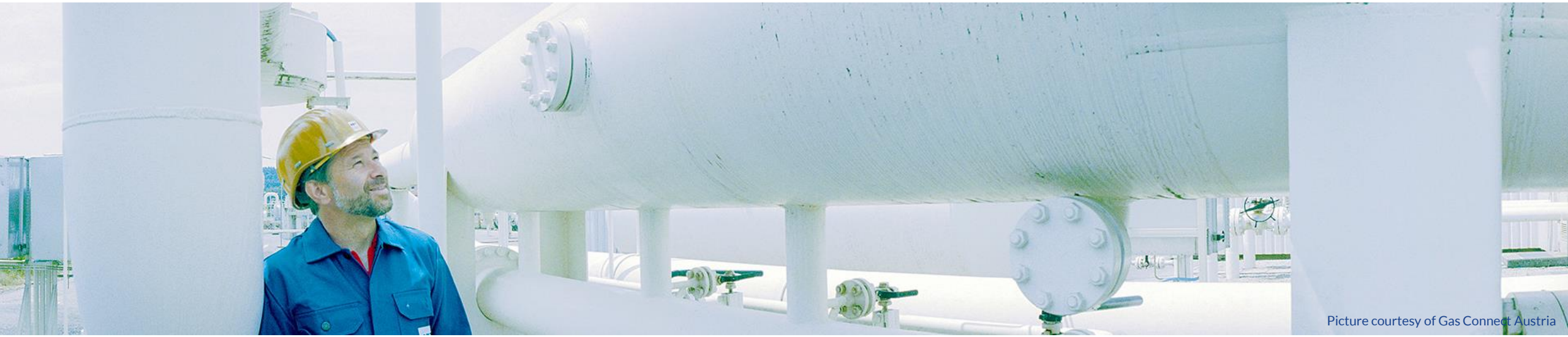
Rev 3



Picture courtesy of Gas Connect Austria

Advisory Panel for Future Gas Grids

Kick-off meeting on 27 January 2020

Jan Ingwersen, ENTSOG General Director

Online

Future of Gas Grids Panel – WHY?

Why is ENTSOG establishing this Advisory Panel?

- Need to deliver on EC Hydrogen and Energy System Strategies
- Speed up discussions on repurposing of existing infrastructure
- Start building first ‘no regrets' hydrogen backbone in the EU
- Growing TSO-DSO & storage interdependence for uptake of new gases
- Inform and streamline ENTSOG work of TYNDP and European Clean Hydrogen Alliance

HOW TO DO THE TRANSITION OF THE GAS GRIDS ?
WHO WILL BE INVOLVED AND/OR IMPACTED ?

Broad Stakeholder Representation

Hydrogen Europe
eurogas
CEER Council of European Energy Regulators
International Association of Oil & Gas Producers
ifiec europe international federation of industrial energy consumers
GEODE
Gas Distributors GD4S For Sustainability
cefic
fertilizers europe
ehi association of the European Heating Industry
gie Gas Infrastructure Europe
Cerame-Unie
C.E.F.A.C.D
COGEN EUROPE
GAS FOR CLIMATE A path to 2050
EFET
European Engine Power Plants Association ENGINE
EUTurbines
CEDEC
EUROFER The European Steel Association
NGVA Europe for sustainable mobility
EBA European Biogas Association
afecor
H2GAR
EASEE-gas Streamlining the gas business
marcogaz TECHNICAL ASSOCIATION OF THE EUROPEAN NATURAL GAS INDUSTRY
GERG THE EUROPEAN GAS RESEARCH GROUP
FSR Florence School of Regulation
cerre
Copenhagen School of Energy Infrastructure (CSEI)

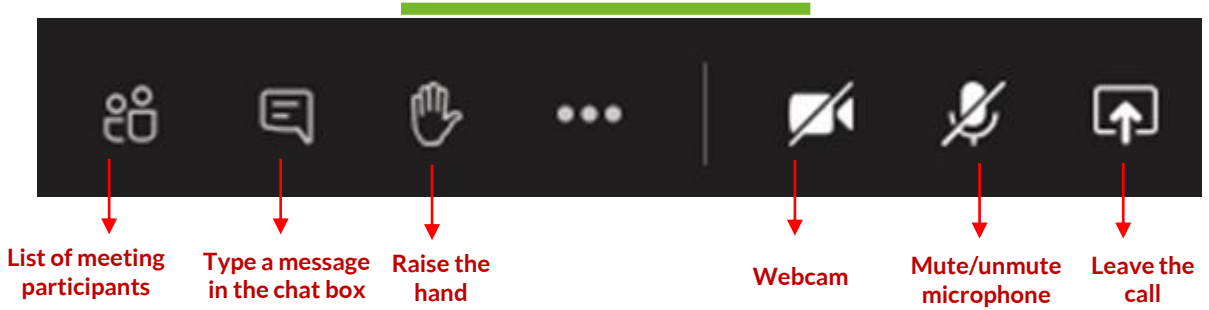
Observers:

European Commission
ACER Agency for the Cooperation of Energy Regulators

Agenda

Description	Time
1. Introduction and welcome by Jan Ingwersen	13:00 – 13:10
2. Update on the recent proposal for TEN-E regulation revision by Miklós GÁSPÁR, DG ENER, European Commission	13:10 – 13:25
3. Presentation and discussion on the scope of the Panel	13:25 – 13:55
4. ENTSOG's initiatives – Prime Mover set ups	13:55 – 14:10
5. Gas grids repurposing – how and when? 5.1. Viewpoints: Tour de Table interventions (5 min per representative)	14:10 – 16:10
6. Summary of key aspects: related to infrastructure, market & technical	16:10 – 16:30
7. Way forward and Action points 6.1. Provide coordinated input to Madrid, Copenhagen and Florence Fora 6.2. Produce a 2021 Recommendation Report	16:30 – 16:55
8. AoB	16:55 – 17:00
9. Closure of the meeting	17:00

Housekeeping



General:

- Please **mute your microphone** when not speaking
- Please **use the webcam** function only when you present
- Do **not connect via multiple devices**
- If you dialled in via phone, please **press *6 to mute/unmute**

Posing questions/interventions:

- Use **chat box** for **questions**
- '**Raise the hand**' if you want to intervene

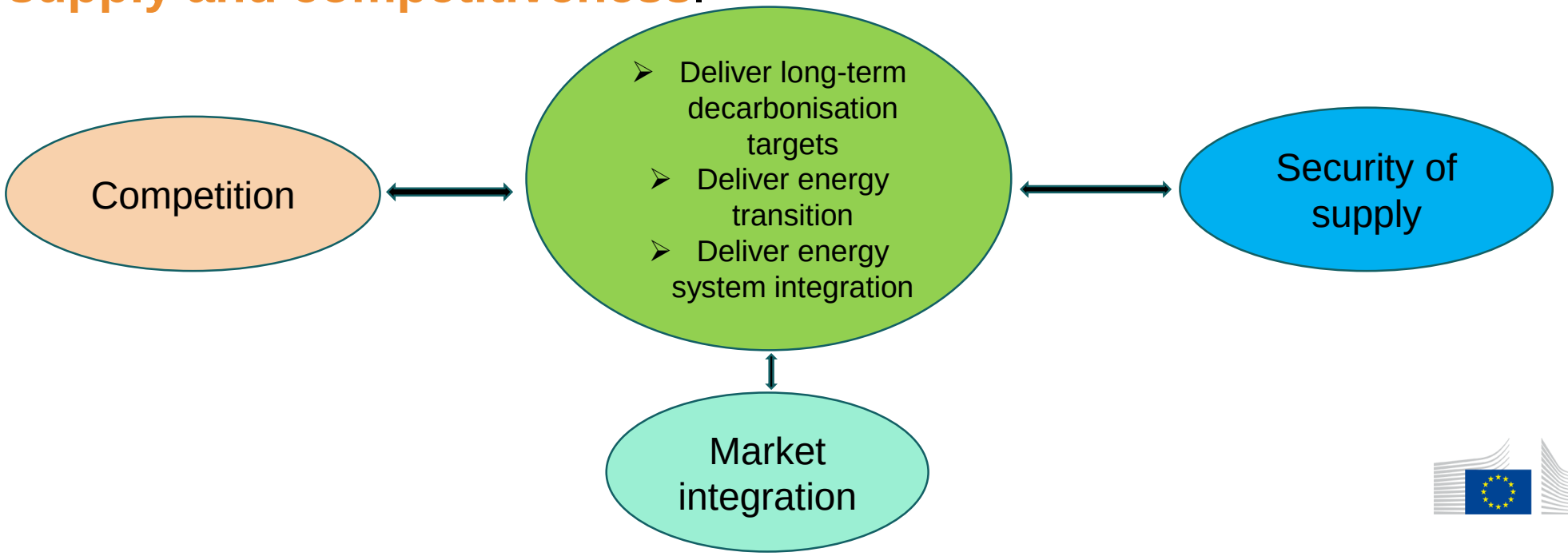
2. Update on recent EC-proposal for TEN-E Regulation

The revised TEN-E Regulation

Proposal for a regulation on guidelines for trans-European energy infrastructure

TEN-E, a central instrument for the Green Deal

- Revised TEN-E proposal: fit for the infrastructure needs of the clean energy system of the future focusing on the (upgraded) **2030/ 2050 climate and energy targets**, the **climate neutrality objective** and **technological developments** whilst ensuring contribution to market **integration, security of supply and competitiveness**.



European Commission

A. Full alignment of infrastructure with the EGD

- Through an increased focus on **offshore grids** covered under four new priority corridors reflecting Europe's sea basins and building on **regional cooperation strengths;**
- The TEN-E operationalizes the ambitions in the EU Strategy for Offshore RES by including dedicated planning (**integrated offshore development plans**), permitting (**one-stop shop**) and regulatory tools (**incentives**) to facilitate scale-up of offshore grids to the target 300 GW in 2050;
- Through supporting the scale-up of **smart electricity grids by** streamlining and modernizing the eligibility criteria to reflect technological development, **digitalisation and cybersecurity** in transmission and distribution network;

European Commission

Full alignment of infrastructure with the EGD

- **Exclusion of natural gas infrastructure** due to achieving an integrated and shock-resilient gas grid in Europe
- **Exclusion of oil pipelines**

Instead:

- Support for new and repurposed **dedicated hydrogen networks and electrolysers** above 100 MW
- Tapping into locally produced renewable and low-carbon gases (biogas, biomethane) through IT-focused **smart gas grids**

European Commission

A. Full alignment of infrastructure with the EGD

- Through inclusion of **mandatory sustainability criterion** for all infrastructure categories:
  - Criteria and indicators detailed in Article 4 and Annex IV for each category to be developed and applied in CBA methodologies by Regional Groups;
  - By and large, sustainability to be assessed in terms of the integration of renewable energy sources into the grid or the reduction of greenhouse gas emissions.
  - The more a candidate project contributes to sustainability – meaning renewable energy integration or CO2 reduction, the higher it ranks in the list.

B. Strengthened EU planning governance

- Creates an **optimal and efficient integrated infrastructure planning** on the basis of **scenarios** that are fully in line with the latest Union decarbonisation targets and Commission scenarios; identifies **infrastructure needs** based on the energy efficiency first principle.
- Introduces **oversight from the Commission** on the main inputs to the TYNDPs and **strengthens role of ACER**
- Ensures coordination in long-term planning and development of offshore and onshore electricity grids – introduces **integrated offshore network development plans** in the TYNDPs on the basis of Member States commitments on offshore renewable generation per each sea basin, with the support of the Commission.

C. Accelerated permitting and increased transparency

Although TEN-E framework helped shorten duration of permit granting in the Member States to 4/3.1 years for electricity PCIs and gas PCIs, PCIs still experience delays.

New provisions:

- Introduce **one-stop shop per sea basin** for offshore permitting
- Clarify permitting regimes
- Introduce **accelerated court proceedings** (where applicable)

Whilst increasing **transparency and monitoring** of compliance with EU public participation and environmental acquis.

D. Projects of Mutual Interest (PMIs)

- Scope extended to projects connecting the EU with third countries (PMIs) given their expected increasing role in achieving the climate objectives.
- On the basis of:
  - **Regulatory alignment** of the neighbouring country with the EU
  - Impact on at least **two Member States**
  - Mutual benefit, including through contribution to **EU decarbonisation goals**

Thank you

https://ec.europa.eu/energy/topics/infrastructure_en

European Commission

3. Presentation and discussion on scope of Panel

ENTSOG Annual Conference 2020

Kadri Simson, EU Energy Commissioner

"Natural Gas will help us manage the variability of the energy sources. Decarbonising is the way forward for the sector in the longer term. Renewable hydrogen has the potential to be a game changer."

Silviu Busoi MEP, Chair of the ITRE committee of the European Parliament

"EU should make best possible usage of the existing gas infrastructure it has build for decades and proofing the future one."

Catharina Sikow-Magny, DG ENER, European Commission

"We believe that the TSOs are the ones that have the knowledge, the experience, the data on the grids and they are the best placed to design, do assessments on disruption scenarios and to plan the future grid."

Thorsten Herdan, German Federal Ministry for Economic Affairs and Energy

"We need to make sure that the Hydrogen produced in Europe as well as H2 imported will find its way to the end-users. Its absolutely clear that the current gas infrastructure has to adapt. In Germany we have to be able to realize first projects."

EC President Ursula von der Leyen

- **“First**, we have set **clear targets.** We want to cut our emissions by at **least 55% by 2030**, on the way to climate neutrality by 2050.
- **Second**, **we are investing** in clean hydrogen to create Hydrogen Valleys and Hydrogen Islands
- **Third**, we are **changing the rules** to **facilitate the deployment** of clean hydrogen - we proposed a revised regulation for the TEN-E.
- **And fourth**, we have created **a new alliance with the private sector** - the European Clean Hydrogen Alliance.”

“On my side, I can assure you that Europe is serious about clean hydrogen. Clean hydrogen - is part of our future.”

Ursula van der Leyen in a speech at the Hydrogen Council, 19 January 2021

Future of Gas Grids Panel – WHY?

Why is ENTSOG establishing this Advisory Panel?

- Need to deliver on EC Hydrogen and Energy System Strategies
- Speed up discussions on repurposing of existing infrastructure
- Start building first ‘no regrets' hydrogen backbone in the EU
- Growing TSO-DSO & storage interdependence for uptake of new gases
- Inform and streamline ENTSOG work of TYNDP and European Clean Hydrogen Alliance

HOW TO DO THE TRANSITION OF THE GAS GRIDS ?
WHO WILL BE INVOLVED AND/OR IMPACTED ?

Panel vis-à-vis other initiatives

- Focus on projects & barriers

European Clean Hydrogen Alliance

European Net-zero Alliance

- Focus on electricity, H2, biogas, heating, transport, etc

Advisory Panel for Future Gas Grids

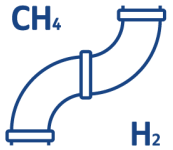
- Focus on coordination & transparency along H2/gas value chain on how to transition gas grids
- Focus on regulatory, market & technical topics
- Framework umbrella for Prime Movers

- Focus on development & transferability of GOs under existing & future legal framework

Prime Mover Group on GOs & Certificates

External contributions from GfC/EHB, H2GAR, civil society, etc

Prime Mover Group on Gas Quality & H2 Handling



Focus on delivering concrete principles on gas quality management

Basic Scope is “HOW”

Scope

- **Coordinate** between gas & H2 value chains
- **Discuss <u>how</u>** to convert and adapt the existing system to future needs
- **Support** gas TSOs, DSOs & stakeholders in identifying practical challenges & solutions in preparing future EU gas grids

Focus

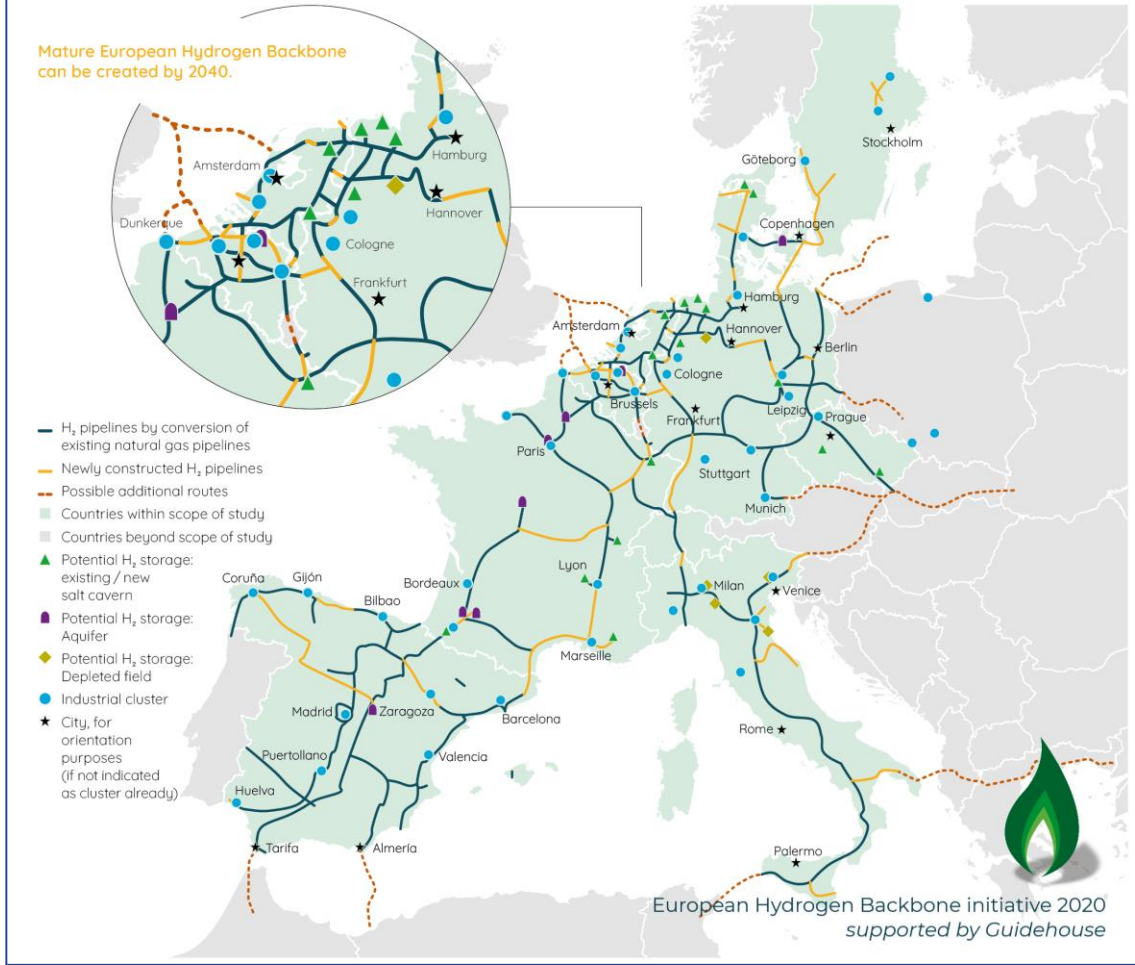
- Infrastructure: H2 backbone development & retrofitting/ repurposing of existing gas infrastructure
- Markets: Same/similar market design and regulatory framework for H2 & gas grids
- Regulatory: Which market design features are needed as enablers
- Technical: Interoperability aspects (role of blending, EU-wide approach for CO2 infrastructure)

Deliverable

- Produce Recommendation Report
- Provide coordinated input to Madrid, Copenhagen and Florence Fora

Infrastructure

- Revision of TEN-E regulation
- ENTSOG & ENTSO-E TYNDP 2020
- European Hydrogen Backbone
- IPCEI H2 projects
- European Clean Hydrogen Alliance investment pipeline of projects

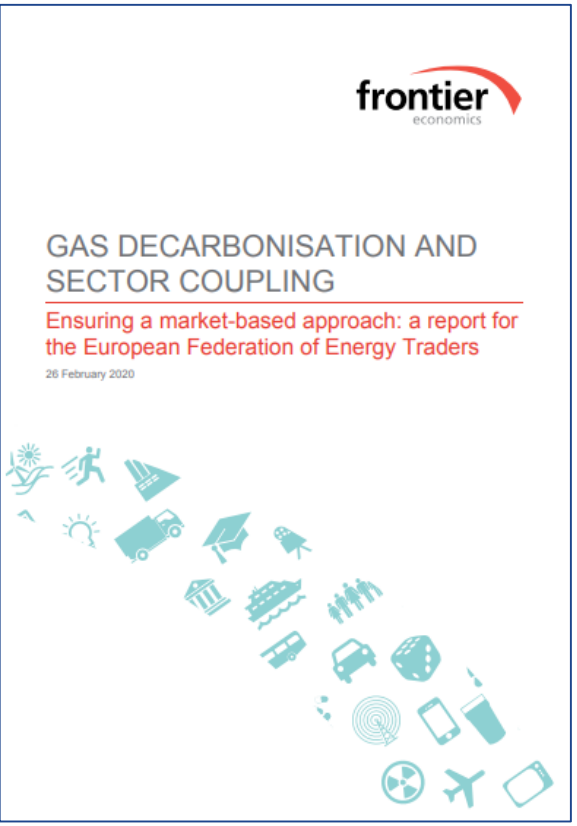


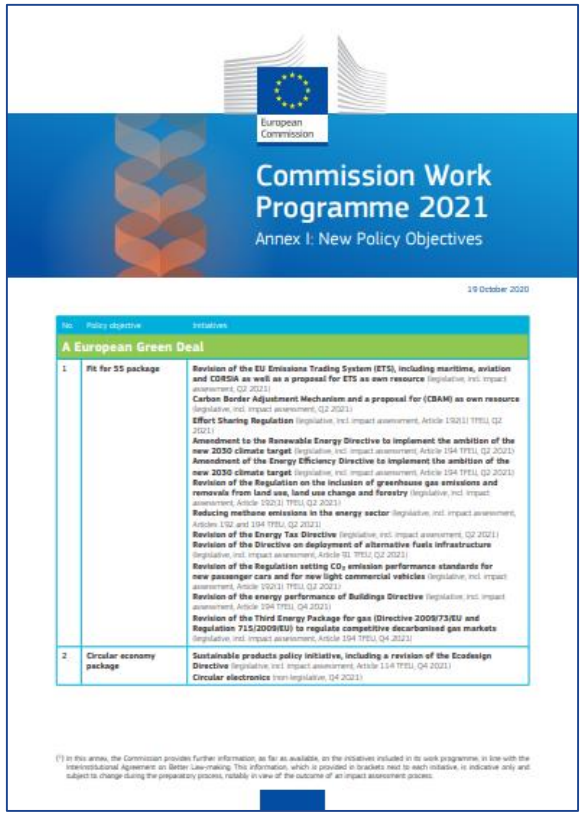
A European hydrogen infrastructure is needed for Europe to achieve its climate and energy objective.

6800 km pipeline by 2030

23000 km pipeline by 2040

European Hydrogen Backbone report, Gas for Climate (July 2020)





Markets

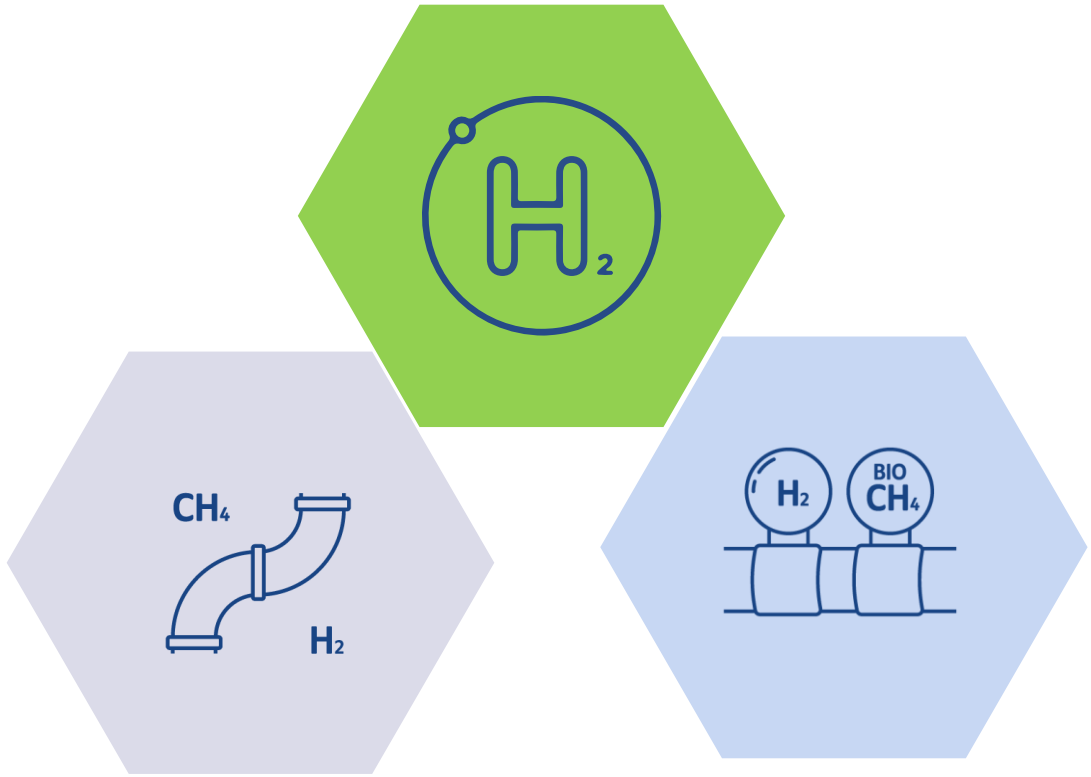
- EC: Fit for 55 Package:
  - Revision of Gas legislation
  - Revision of Renewable Energy Directive
  - Revision of Energy Efficiency Regulation
  - Revision of Energy Taxation
  - Revision of Emissions Trading System (ETS)
  - Sustainable Finance

"The current policy landscape is fragmented and does not send consistent signals for gas decarbonisation."

(Gas Sector Decarbonisation & Sector Coupling, Frontier, 2020)

Technical

- Blends & GQ variation / Dedicated H2 systems
- ReStream study
- Gas Quality & Hydrogen Handling Prime Movers Group
- Marcogaz/GIE methane emissions reporting template & guidelines for target setting
- H2 Gas Assets Readiness (H2Gar)
- ERGAR



Start adapting for a future with renewable and decarbonised gases

Overall aim of the Panel

Connecting the dots between:

- market players/stakeholders
- initiatives/activities
- work streams (technical, markets, infrastructure, regulation)

All with focus on HOW to do the transition of the gas grids.

Questions on the setup?

4. ENTSOG’s current engagements – Prime Movers

Prime movers' group on Gas Quality and H2 handling

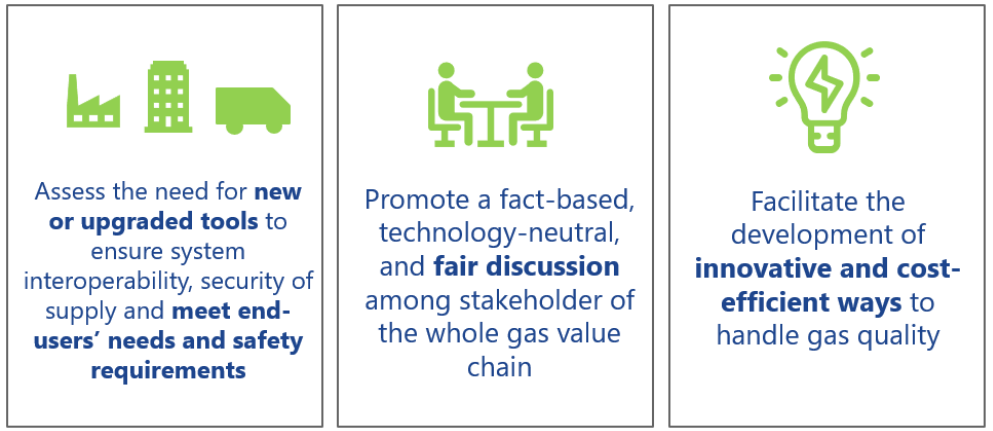
Around 40 EU organisations have joined

Prime movers' group on Gas Quality and H2 handling

Develop recommendations on the **main principles** to handle Gas Quality and Hydrogen to optimize

- ✓ Supply diversification
- ✓ Decarbonization
- ✓ Guarantee safe, efficient and low GHG usage

While providing necessary technical inputs to future Commission proposals in 'gas market design'



Deliverables proposed for 2021

1. Regulatory framework for WI classification system proposal (Sub-group 1)
2. Fact-based recommendations and guidelines about which tools and options are available and could be implemented for gas quality & H2 management along the different interfaces (Sub-group 3)
3. A co-developed roadmap aiming at checking the feasibility of technically interlinking different gas value chain interfaces forming a decarbonised system (Sub-group 2)

Around 40 EU organisations representing the whole gas value chain have joined

Guarantees of Origin Prime Movers Group - Members

AIB
association of issuing bodies

CertifHy

EBA
European Biogas Association

EFET
SO YOU CAN RELY ON THE MARKET

entsog

ergar
European Renewable Gas Registry

eurogas

gie Gas Infrastructure Europe

NGVA Europe

Co-chaired by ENTSOG and GIE

Guarantees of Origin Prime Movers Group

Mission:

to develop a concept and recommendations for **the EU-wide Certification scheme for renewable and low-carbon gases based on the Guarantees of Origin (GO) system** and life cycle analysis of emissions to facilitate their cross-border trade.

Key Deliverables:

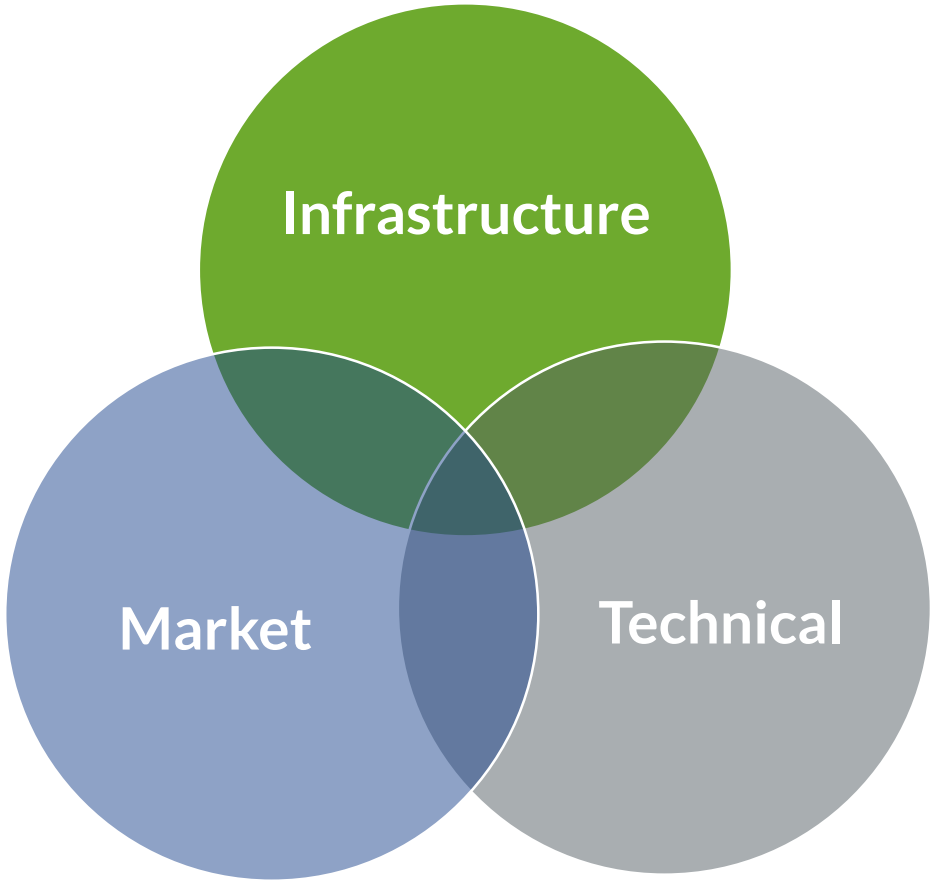
- Provide an **overview of the requirements**, definitions and structure of GO schemes for renewable and low-carbon gases;
- **Review the EU regulatory framework** (e.g. RED II, GO Standard EN 16325) and check if there are any barriers / gaps for the development of GO schemes for renewable and low-carbon gases;
- Develop **proposals and recommendations** for the development of the regulatory framework for GOs for renewable and low-carbon gases (taking into account country examples);
- Consider the **interrelation of the GO schemes and other climate related obligations** such as the EU ETS;
- Support a **quick set-up, effective functioning and interoperability of national GO schemes** in line with the revised GO Standard EN 16325.

5. Gas grids repurposing – how and when?

Tour de table

Gas grids repurposing – HOW & WHEN?

(5 minutes per representative)



European Engine Power Plants Association

EUGINE

EUTurbines

Gas Grids Repurposing – when and how? Input from EUTurbines & EUGINE

Advisory Panel for Future Gas Grids, 27 Jan 2021

Hydrogen in Power Generation / Cogeneration

- **H2-power plants** will provide dispatchable power and heat, operating when needed to ensure a reliable & flexible decarbonised energy system

- **Focus on**
  - Flexible large-scale backup for periods with insufficient wind & PV, especially longer gaps
    -> H2 supply: no constant demand but large quantities during limited periods – connected to transmission grid
  - Decentral electricity grid balancing for grids dominated by small local renewable electricity generation
    -> H2 supply: no constant demand - one of many users in the distribution grids
  - Cogeneration in case of parallel heat & electricity demand (industrial processes, district heating grids and micro-cogeneration)
    -> H2 supply: steady demand – mainly in distribution grids

- **When will we see this happen?**
  - Pressure on decarbonising power generation vs low willingness to invest
  - Progress in electrification of heating will increase the seasonal challenge

3 Key Priorities for Gas Grid Transition

Create predictability – allowing to develop the best technical solutions

- Which gas: 100% H2 – or blending? If blending: constant or fluctuating?
- Clarify the blending policy also for the distribution grids

Ensure access also for power generation

- Will grid transition plans also include power plants or only “hard-to-decarbonise-sectors”?
- Clear schedule for availability / conversion of pipelines and grids
- How to ensure that, close to system-relevant power plants, a grid access is available?

Provide sufficient quantities

- Lack of H2 quantities from the grid to even test a larger power plant
- How will H2 storage be handled – important for the seasonal demand

Gas for Climate &

European Hydrogen Backbone

A Gas for Climate spin-off project

ENTSOG Advisory Panel for
Future Gas Grids

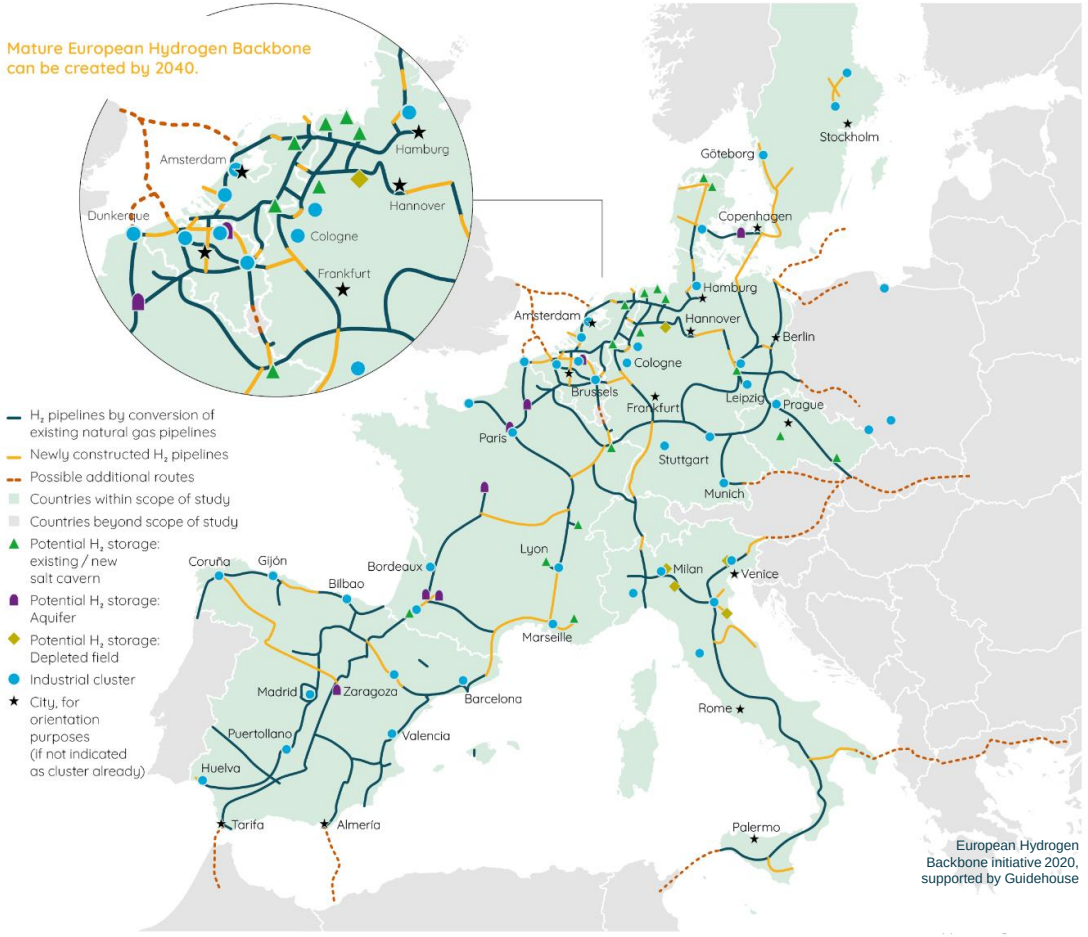
Marie-Claire Aoun. Chair GfC

27 January 2021

Gas for Climate: analysis-based dialogue since 2017

2040 – A European hydrogen highway at an affordable cost

July 2020 paper showed a pan-EU backbone with a length of almost 23,000 km



Important developments and corridors

1. A core, pan-EU hydrogen infrastructure of almost 23,000 km, with large corridors connecting most of Western Europe with valuable extensions into Central and Eastern Europe.
2. The backbone will consist of 75% retrofitted pipelines, with diameters ranging from 24-48 inch, providing 3-13 GW_{LHV} transport capacity per pipeline. Combined with a fit-for-purpose compression system, the backbone should be able to meet currently expected annual hydrogen flows in Europe by 2040.[1]
3. The EHB enables connection to global hydrogen flows, including North Africa, the North Sea (UK and Norway), possibly Ukraine and Russia
4. Total investment cost of the envisaged 2040 EHB is expected to be between **€27 to €64 billion**. This translates to a levelized cost of **0.09-0.17 €/kg/1000km[1]**

1. Preliminary estimation, the actual capacity of the meshed grid requires more detailed analysis

Guidehouse

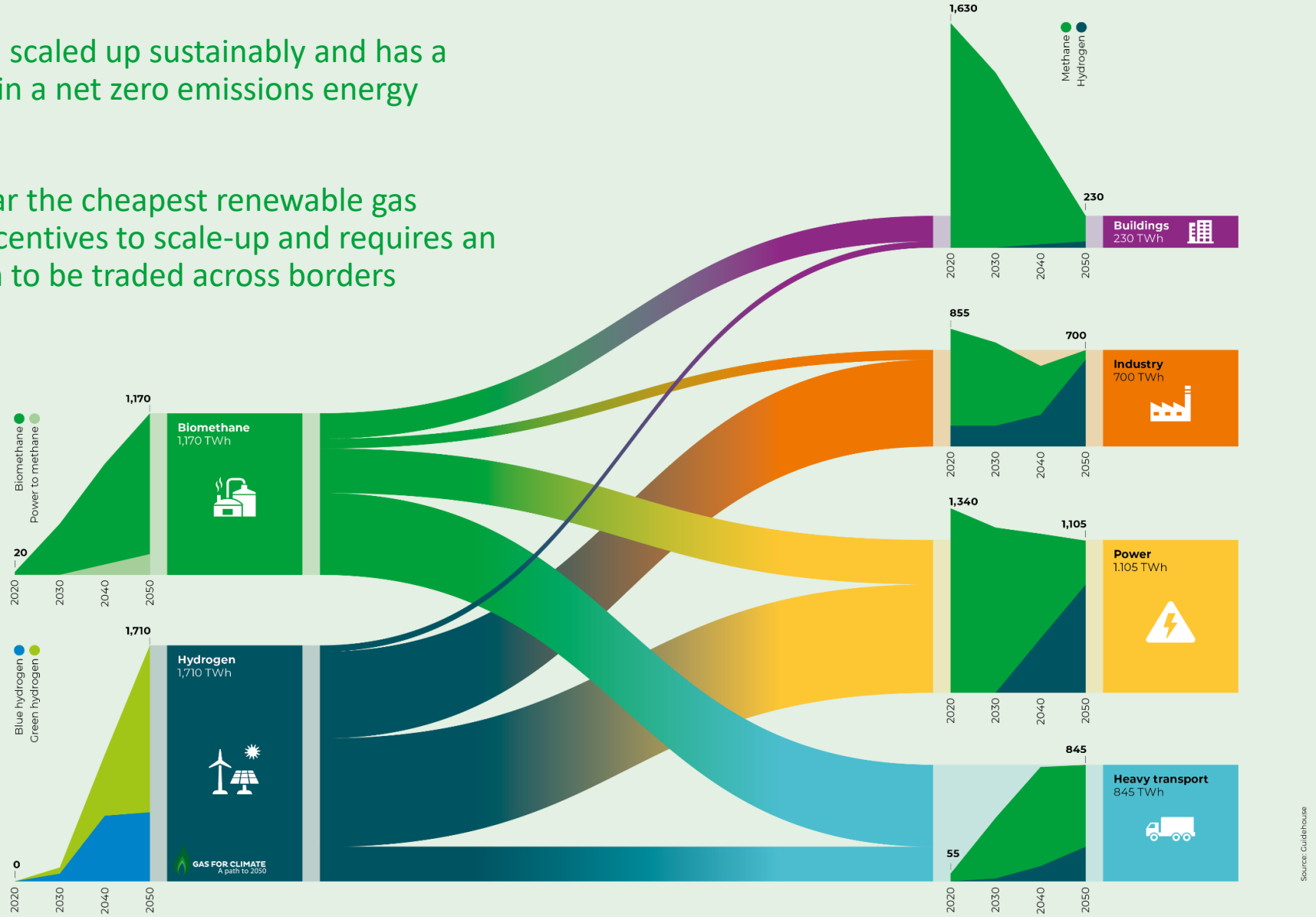
EHB follow-up. New analysis with 18 TSOs

Updated maps in May 2021, now also covering Poland, Great Britain, Austria, Greece, Slovakia

Boosting Biomethane

Biomethane can be scaled up sustainably and has a high societal value in a net zero emissions energy system

Biomethane is by far the cheapest renewable gas today, yet needs incentives to scale-up and requires an EU wide GO system to be traded across borders

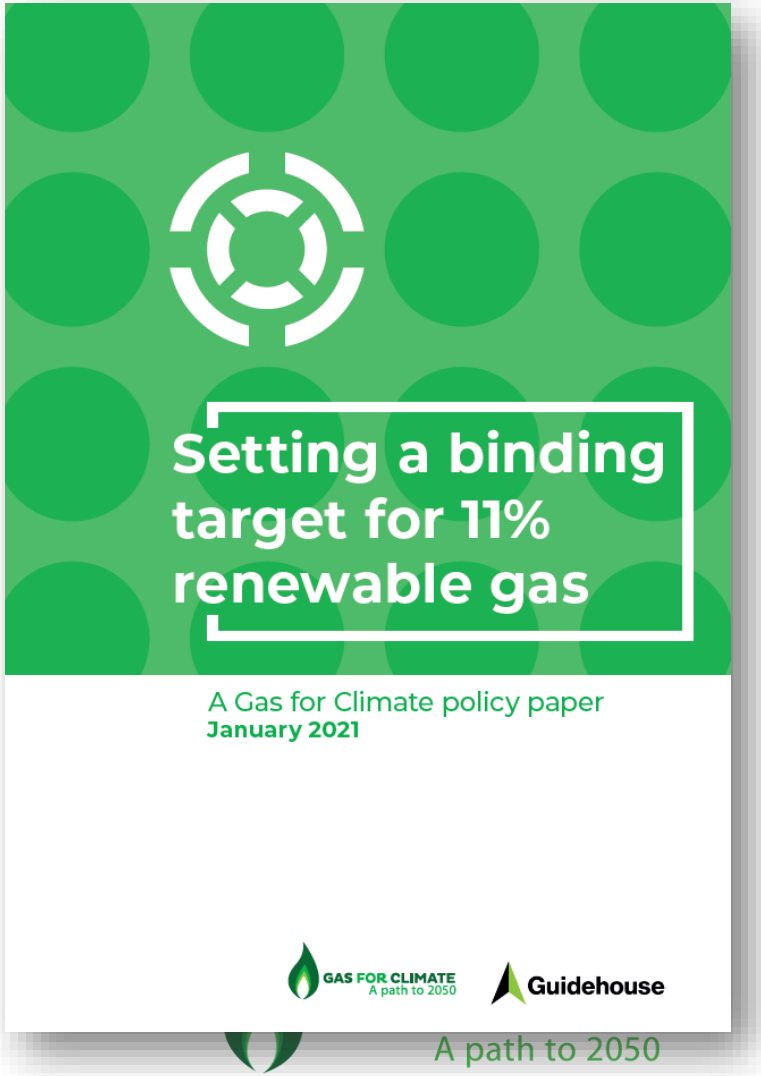


2030 renewable gas target

Gas for Climate policy paper launched 26 January 2021

Binding target for 11% renewable gas by 2030

- Gas for Climate advocates in new policy paper, that by 2030, 11% of all gas consumed in the EU should be renewable gas
- The envisioned binding target is supported by two sub-targets for 8% sustainable biomethane and 3% renewable hydrogen. The target should be introduced in the EU Renewable Energy Directive.
- The sub-targets reflect that biomethane is commercially available today and scalable in a sustainable manner, while green hydrogen should ramp up during the 2020s too.



H2 Gas Assets Readiness (H2GAR)

Advisory Panel Future Gas Grids – KoM

January 27th 2021

V. Musazzi

H2GAR: Why? How?

1

Contribute to a robust development of new standards and technologies essential to the future gas transmission systems

2

Sharing current technical knowledge on H_2 gas asset readiness

3

Building a common view on the H_2 readiness of our infrastructures

4

Non overlapping with other ongoing works (in other organisations) and aimed to enable a smart and quick cooperation table for TSOs open to external contributions

Technical topics

WG 1 - Pipelines

WG 2 – Compressor Stations

WG 3 – Separation Systems

WG 4 – Metering / Other Instrumentation

WG 5 – Safety

WG 6 – Underground Gas Storage

H2 Gas Assets Readiness (H2GAR)

3 key priorities for gas grids transition

Allow infrastructure operators to invest in H_2

1

- *REMOVE REGULATORY BARRIERS*
- *ADOPT CONSISTENT LEGISLATION (i.e.: Taxonomy; TEN-E)*

Fix targets for renewable gas

2

- *BINDING TARGETS*
- *EUROPEAN vs NATIONAL*
- *GUARANTEE OF ORIGIN*

Share views and development plans

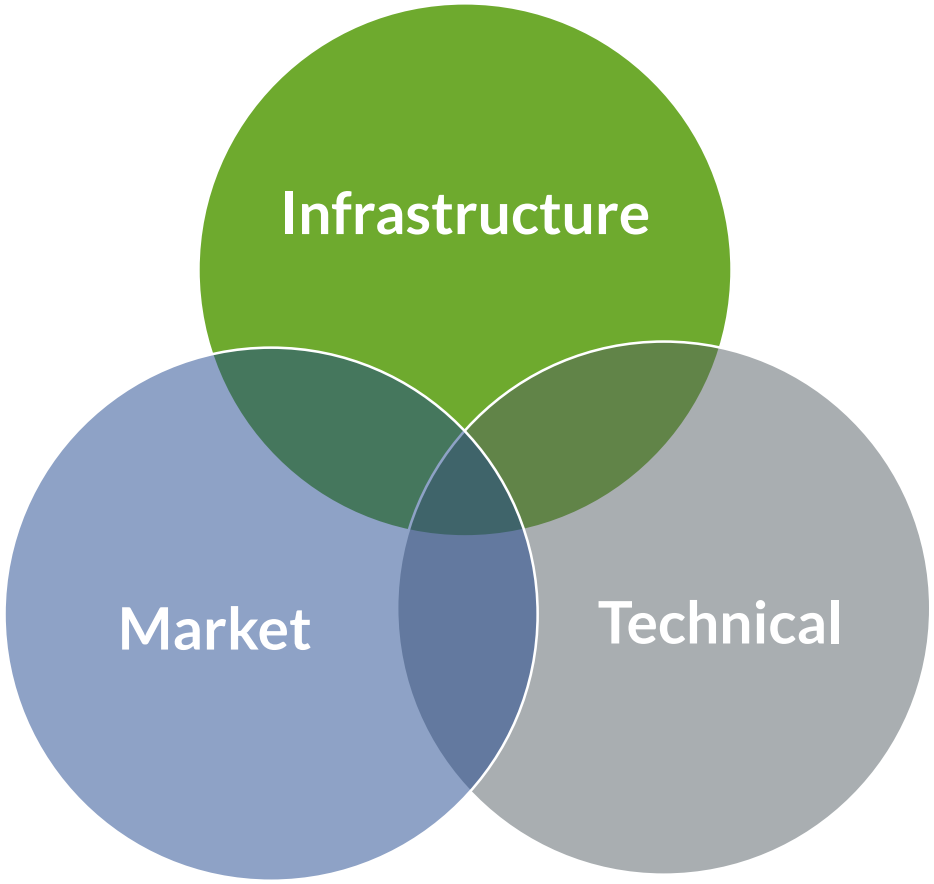
3

- *JOINT NETWORK PLANNING*
- *MARKET MODEL*
- *H2 BLENDS / NO BLENDS*

Tour de table

Gas grids repurposing – HOW & WHEN?

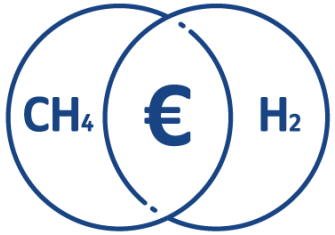
(5 minutes per representative)



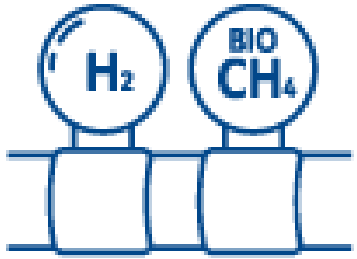
6. Summary of Key Aspects

Summary of Key Points Raised

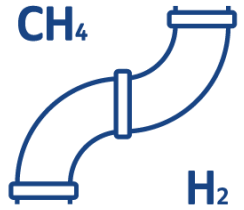
Markets



Infrastructure

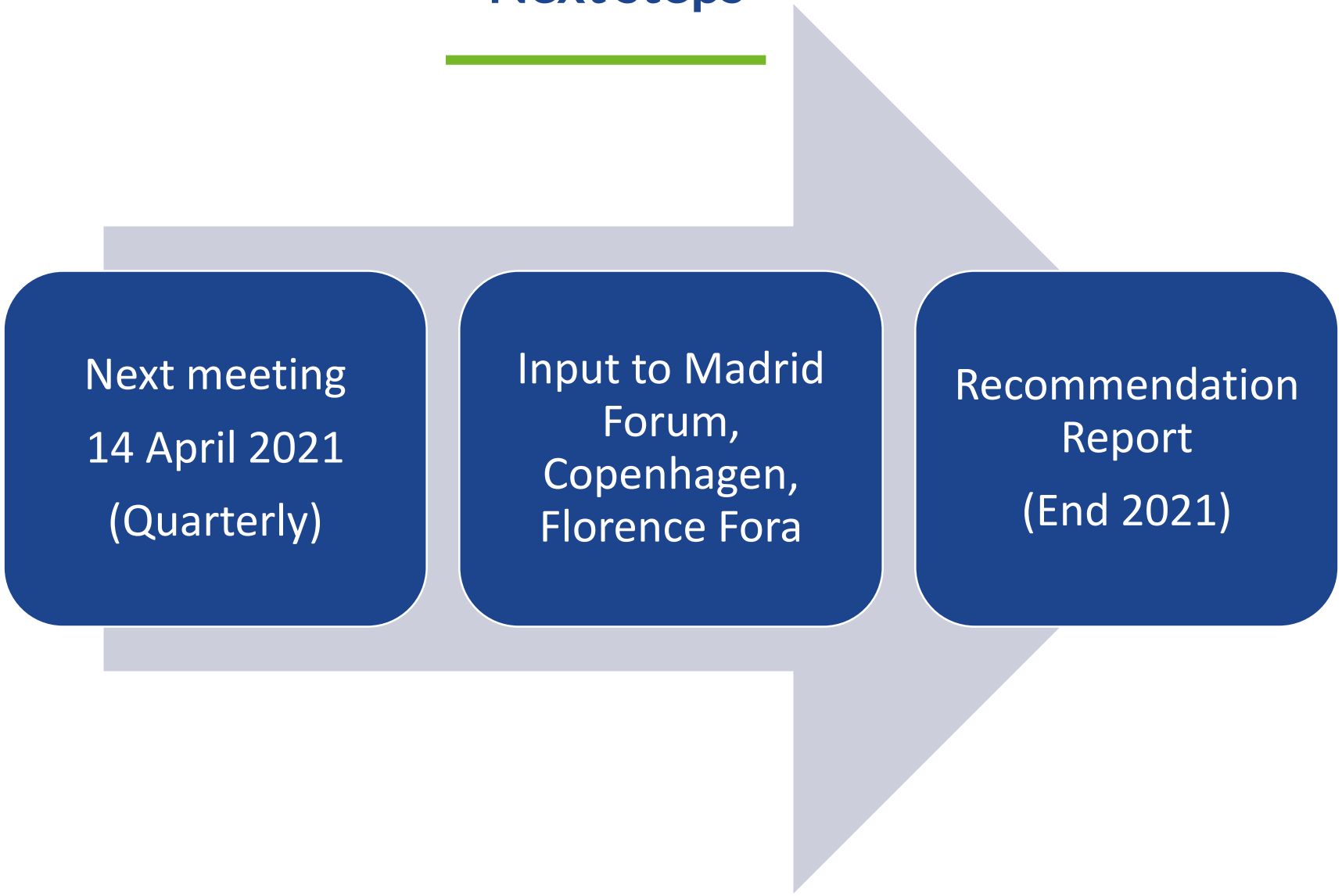


Technical



7. Way forward and Action points

Next steps


Next meeting
14 April 2021
(Quarterly)
Input to Madrid Forum, Copenhagen, Florence Fora
Recommendation Report
(End 2021)

Thank you for your attention

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