ENTSOG 2050 ROADMAP FOR GAS GRIDS

EXECUTIVE SUMMARY

ABOUT ENTSOG

The European Network of Transmission System Operators for Gas (ENTSOG) represents 44 gas Transmission System Operators (TSOs), 3 Associated Partners and 8 Observers from 36 countries across Europe.

ENTSOG was established on 1 December 2009 and was given legal mandates by the EU's Third Legislative Package for the Internal Energy Market, which aims to further liberalise the gas and electricity markets in the EU.

With new challenges ahead to meet EU Climate and Energy goals, ENTSOG with the expertise of its members and in dialogue with European Commission (EC), Agency for the Cooperation of Energy Regulators (ACER), industry and other stakeholders will collaborate to achieve the decarbonisation of the gas grids.

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INTRODUCTION

The ENTSOG Roadmap 2050 explores the various aspects of how decarbonisation of the gas infrastructure can materialise in order to provide input to the European Green Deal, based on some key principles:

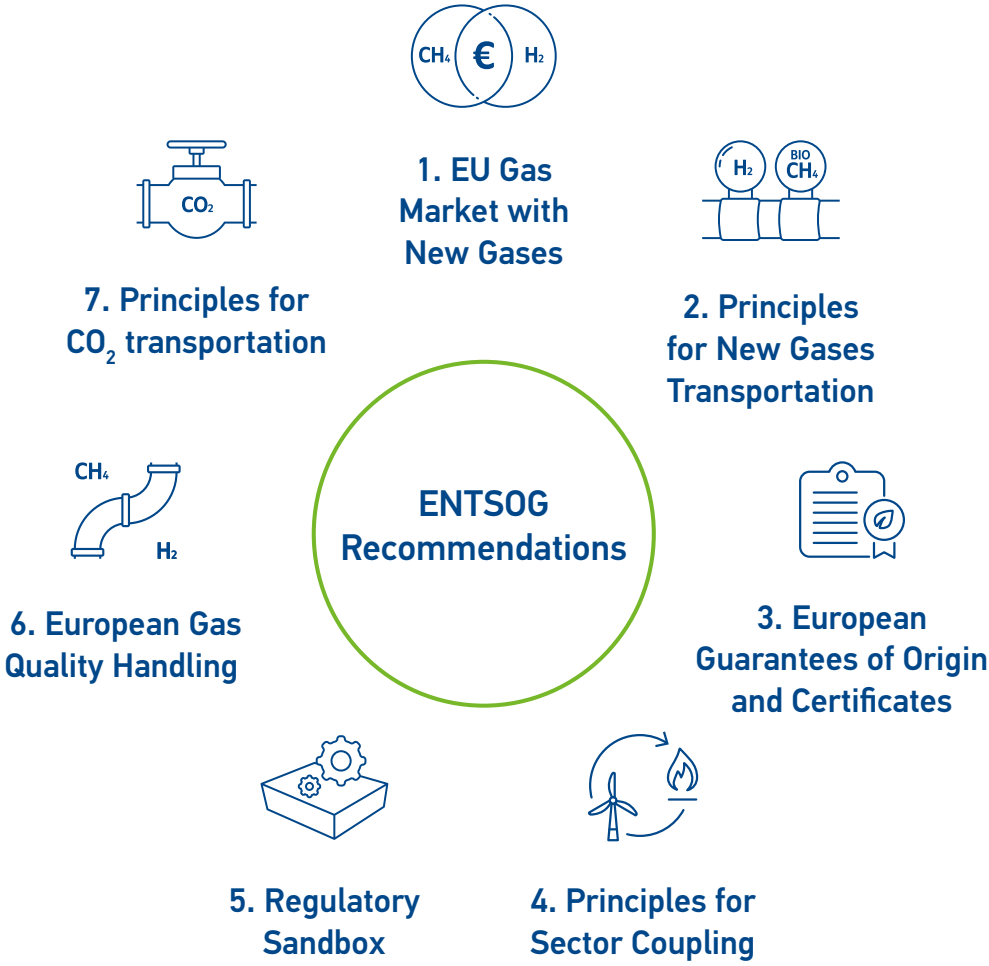
- **Gas and gas grids can decarbonise** – utilising existing gas systems and thereby supporting an efficient energy transition – time and cost-wise.
- **Biomethane, hydrogen and Carbon Capture Utilisation and Storage (CCUS) will be some of the important elements** in this transition.
- **Natural gas will still be an important part of the energy mix** in many Member States, and still representing substantial potentials for CO_2 and local pollution reductions by substituting other fuels.
- **The Hybrid Energy System** builds on infrastructure synergies and efficiencies between the electricity and gas sectors – including long-haul energy transport, short- and long-term energy storage, security of supply and resilience of having two main energy carriers. It addresses issues on balancing, flexibility and dispatching of the European energy supplies.

Development of renewable, decarbonised and low-carbon gases is dependent on **political choices and decisions** in the Member States and are beyond the remit of the gas TSOs. The choices and decisions – as well as the speed of which they materialise – are influenced by the overall EU climate and energy policies and will differ amongst the EU Member States.

The gas grids will have to be ready for and able to adapt to the EU decarbonisation process – and ENTSOG and the gas TSOs will actively be supporting such development to reach the EU sustainability goals.

In order to progress the decarbonisation of the gas transmission system, ENTSOG has the following recommendations – which are to be considered as ENTSOG's input to the upcoming European Green Deal and further legislative acts.

ENTSOG RECOMMENDATIONS



1. EU GAS MARKET WITH NEW GASES

During the last ten years a lot has been achieved regarding well-functioning gas markets, a robust gas infrastructure and a high level of security of supply.

On this basis, ENTSOG finds that maintaining and further developing these achievements should be a key goal for the future development of gas and gas infrastructure. It is obvious that the emergence of new gases – in particular biomethane and hydrogen – will create some challenges for the gas infrastructure in its present form.

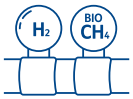
Nevertheless, irrespective of a chosen pathway, ENTSOG suggests aiming for keeping one European gas market for the commercial as well as for the technical aspects.

RECOMMENDATIONS:

Maintain and further develop the internal market achievements and gas market design:

1. Aim for existing gas legislation to include hydrogen and strengthen the role of biomethane
2. **Technical layer:** Include in TSOs' services and establish the principles for reasonable remuneration of services provided by the gas grid companies: blending, conversion, flow management, digitalisation and data provision, providing the flexibility for energy system
3. **Energy value:** Continue to trade biomethane, hydrogen and natural gas based on energy content
4. **Climate value:** Document and track climate value of a given source of gas, a trustworthy EU-wide GOs/ certificate system should be established

2. PRINCIPLES FOR NEW GASES TRANSPORTATION



It is important to allow potential integration of hydrogen and (bio/synthetic) methane markets to deliver one price signal for gaseous energy, in a manner similar to the integration of H-gas and L-gas in some EU markets.

This integration will prevent market fragmentation as hydrogen usage develops alongside (bio)methane usage. Benefits of TSOs managing hydrogen pipelines would be as follows:

- Infrastructure optimisation and cost savings as a result of coordinated planning reflecting the development needs of the sector (e.g. blending and/or dedicated pipelines; full/partial conversion to hydrogen of existing pipelines etc);
- TSOs may own and operate P2G as conversion facilities without ownership of commodity on a TPA basis according to market nominations like for basic transportation services. It would show that in the end it is the market which manages the facility, avoiding energy market distortion.
- Ensuring non-discriminatory TPA regime for market players to the hydrogen network. "Large" gas producers using methane reforming would have access as well as "small" users of a P2G facilities. On the consumer side, establishing a level playing field between consumers with large demand and more modest needs will also be beneficial for competition.
- Guaranteeing viability of pipelines in development stage, as load factor progressively increases.

RECOMMENDATIONS:

1. Establish principles for how to transport hydrogen and biomethane, maintaining one gas market
2. Coordinate planning reflecting sector needs with methane and hydrogen demand
3. Ensure existing level of interoperability and security of supply, in particular for emergency situations
4. Convert some parts of the existing network to hydrogen network while integrating existing hydrogen pipelines and islands, if the hydrogen pathway is chosen
5. Integrate hydrogen and biomethane with the market to deliver a common price signal to gaseous energy, similar to H-gas and L-gas zones that are currently integrated in some EU countries
6. Ensure TSOs' conversion services and their cost r ecovery
7. Reopen Trans-European Networks – Energy (TEN-E) to address renewable, low-carbon and decarbonised gases

3. EUROPEAN GUARANTEES OF ORIGIN AND CERTIFICATES

Pan-EU trade of renewable, decarbonised and low carbon gases does not only require a well-interconnected and integrated market to move molecules across borders, but also the development of a certificate system to document and trade the 'climate value' across Member States.

ENTSOG welcomes **development** of national registers and the cross-border trade of biomethane and hydrogen certificates among the member registries by establishing an **European GOs/certificates**.

RECOMMENDATIONS:

1. Establish a standardised EU-wide GOs/Certificate framework for renewable, decarbonised and low-carbon gases
2. Ensure GOs/Certificates transferability from one energy carrier to another (molecules and electrons) as well as transferability across borders
3. Make GOs/Certificate framework for gas compatible with the ETS and transport sectors (i.e. ETS directive and CO_2 emission performance standards for new heavy-duty vehicles)
4. Enable synthetic methane to be classified as a renewable energy. However, guidance is needed to avoid double counting of CO_2 reduction between the provider and the user of CO_2

4. PRINCIPLES FOR SECTOR COUPLING

Cooperation between the energy sectors, in particular electricity and gas, will reduce the costs of the energy sector's decarbonisation.

A Hybrid Energy System building on the regional strengths of existing energy infrastructure, will also require EU-wide principles for **Sector Coupling**. The legislative framework for sector coupling has not been integrated in the legislation so far. Present market conditions do not seem to support sufficiently an up-scaling as commercial activities needed for optimising gas and electricity infrastructure functioning.

ENTSOG finds that TSO ownership of P2G facilities should be considered – as a way socialising costs as well as ensuring third-party access to such infrastructure. P2G could be considered as conversion facilities – converting from the electricity system to the gas system – as system activity, similar to LNG terminals.

RECOMMENDATIONS:

1. Establish the regulatory framework for the Hybrid Energy System
2. Align regulatory framework for electricity and gas where relevant
3. Coordinate planning of electricity and gas investment in infrastructure at national and EU level
4. Consider P2G definition as a conversion facility in gas legislation
5. Clarify the roles and responsibilities of the electricity and gas players
6. Clarify attribution of costs and benefits between gas and electricity consumers
7. Address distortion by taxes/levies on P2G in the context of sector coupling

5. REGULATORY SANDBOX

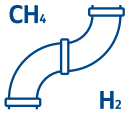
The current market framework has not allowed for the development of the necessary technologies, which calls for creating new incentives. Gas decarbonisation technologies should be assessed for their maturity and necessity for support under the regulatory, financial and market mechanism of regulatory sandboxes.

The latter is a concept of introduction of investment framework allowing for R&D friendly regulatory flexibility in terms of the application of some general rules like state aid, funding access criteria, ownership unbundling, access to costs socialization via TSOs regulatory asset based on a specific regulatory oversight and cross-sectoral consultation. The access criteria for projects to the regulatory sandbox could be linked to sustainability criteria in (renewed) PCI process under the upcoming TEN-E revision.

RECOMMENDATIONS:

1. Accept the framework concept of regulatory sandbox at EU level and implement also at national level under supervision by the NRAs, so that the TSOs can develop R&D and pilot decarbonisation projects
2. Provide framework for regulatory sandbox to address issues on need for regulatory innovation in controlled and transparent manner to facilitate investment framework allowing for flexibility/freedom from general EU rules (i.e. state aid, funding access criteria, ownership unbundling, cost socialisation via Regulated Asset Base) under regulatory oversight
3. Assess gas decarbonisation technologies for maturity and necessity for support under R&D friendly framework, targeted in time and effect under certain conditions
4. Establish Regulatory Sandbox guidelines to offer some regulatory flexibility for TSOs' pilot projects and clarity for NRAs for cost allocation in technology incubation/roll out phase

6. EUROPEAN GAS QUALITY HANDLING



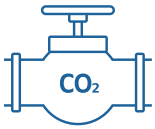
The development of renewable, decarbonised and low-carbon gases will bring a European gas system with diverse gas compositions which need to be handled technically.

The European Gas TSOs have experience and knowledge in gas quality handling as part of their daily business is handling gasses from different sources. With decarbonisation and increasing shares of hydrogen and biomethane in the system, the handling of differing qualities becomes even more important and challenging. The handling of the diverse gas qualities should go hand-in-hand with maintaining and developing the achievements of integrating the European gas market.

RECOMMENDATIONS:

1. Establish EU-wide hydrogen threshold assessment and necessary alignment at interconnection points to prevent market fragmentation
2. Coordinate cross-border and regional gas quality inventory, in dialogue with consumers
3. Create Roadmap for end users' safety thresholds for hydrogen-methane blends – review of national/EU safety and standardisation
4. Establish principles for cost recovery mechanisms for gas quality handling
5. Establish principles for market and technical interfaces for single quality/off-grid islands

7. PRINCIPLES FOR CO_2 TRANSPORTATION



ENTSOG and its members find that an efficient and sustainable approach to decarbonisation will include CCUS which, besides storage, will require CO_2 transportation systems in regions where needed.

Principles for CO_2 transportation should address how to ensure efficient and safe transport and management (logistics and economics) of CO_2 from emitting locations to storage or usage locations.

RECOMMENDATIONS:

1. Develop EU regulatory approach to CO_2 infrastructure, including TPA, role of gas TSOs, transmission charges and liabilities
2. Promote CCU technologies and CCS as a service of common good
3. Provide rules for CO_2 accounting/avoided CO_2 emissions – i.e. pyrolysis, low-carbon gases
4. Include CCUS activities in National Energy & Climate Plans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