Thank you for your attention

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ENTSOG Approach for Gas Package 2020

- To develop Roadmap 2050 for decarbonising the gas grids
  - Parallel pathways for the various technologies and efficient usage of the electricity and gas grids
  - Addressing issues related to technical, regulatory, market, consumption, and climate aspects.

- To facilitate extensive dialogues with stakeholders, EC and ACER/regulators
  - Engage full value chain – producers, TSOs, DSOs, mid-streamers, traders and consumers
  - Support an open and fact-based approach

- To support an opened policy-making process taking place on the best possible basis – allowing all technologies hereof to contribute to the most efficient decarbonisation of the energy sector
ENTSOG Messages for Gas Package 2020

BUILD ON SYNERGIES
- EU and MS political support for a hybrid energy carrier system
- Improve sector integration between electricity and gas
- Improve regulatory coordination between electricity and gas
- Ensure level playing field for green energy technologies

INNOVATE WITH GAS
- Promote and support innovation on decarbonising the gas sector
- Establish consistent terminology for renewable & decarbonised gases
- Establish EU-wide gas guarantees of origin & certification
- Incentivise TSO product/service innovation
- Clarify role of grid operators in facilitating decarbonisation of EU energy system
- Establish risk-reward scheme for gas-related innovation
Hybrid Energy System

Gas System

Increasingly decarbonised gas

Optimisation and service innovation

Gas to power

Need to scale up

Power to Gas

Electricity System

Increasingly decarbonised electricity

€98B/y
Pöyry (2018) estimate of savings for the EU under hybrid energy system model

€138B/y
Ecofys (2018) estimate of savings for the EU under hybrid energy system model

€600B
DENA-Leitstudie (2018) estimated savings for Germany up to 2050 under hybrid energy system model

Decarbonising:
Heating
Mobility
Industry

Sector coupling offers strategies to maximize integration of renewables for heating, mobility and industry and needs to start now
The Hybrid Energy System
building on increasingly decarbonised electricity and gas

Realising synergies between electricity and gas systems offers benefits for EU - building on new technologies and digitalisation

Source: ENTSOG, April 2019
Hydrogen is flexible, clean and can be produced in a variety of ways. ENTSOG supports development of the various hydrogen production pathways and integration of hydrogen into the gas system.

Hydrogen can provide up to 24% of total energy demand, or up to ~2,250 TWh (230 bcm) in EU by 2050.
Biogas

Between 2011 and 2016, EU biogas production increased by factor 20 (195 TWh) to 1.5 bcm (14.6 TWh), and may reach 98 bcm (957 TWh) by 2050 (Ecofys study).

France, Denmark and Sweden having most advanced plans - up to 15% uptake in the TSO grids.

ENTSOG supports TSOs in developing:
- Schemes for certification tracking with guarantees of origin
- National biogas registries and for
- Cross border exchanges

Biogas and Biomethane forecast for Europe

Source: Ecofys, 2018

Significant potential for biogas in Europe, offering secure and sustainable energy supply
### Several Pathways for Gas Decarbonisation

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Methane through renewable sources</strong></td>
<td>Biogas via anaerobic decomposition of organic matter. Upgrading offers flexibility and possibly negative emissions.</td>
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<tr>
<td><strong>Synthetic methane</strong></td>
<td>Range of feedstock, from waste/biomass gasification to processes based on hydrogen and methanation.</td>
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<tr>
<td><strong>Hydrogen - SMR and Pyrolysis</strong></td>
<td>H2 can be produced via Steam Methane Reforming – and CO₂ to be stored. Pyrolysis converts methane to H2 and solid carbon.</td>
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<tr>
<td><strong>Power to Gas</strong></td>
<td>Power-to-gas converting electricity to hydrogen.</td>
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<tr>
<td><strong>Pure Hydrogen</strong></td>
<td>Pure hydrogen, produced from renewable sources or natural gas – distributed via converted parts of gas system or dedicated systems.</td>
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The (parallel) pathways can use the existing infrastructure with some adaptations and with careful localisation of technologies.
ENTSOE Dimensions

**GOAL**

**Technical dimension**
- Deliver security of supply in the most efficient way

**Market dimension**
- Creating framework for European gas markets

**Climate dimension**
- Support gas infrastructure’s contribution to decarbonisation

**TOOLKIT**

**Technical dimension**
- Safe operations, digitalisation and gas quality management

**Market dimension**
- Tradability of gases within European Internal Market

**Climate dimension**
- Enable certificates and guarantees of origin system

**Dynamic incentives, regulatory stability & new business models**

**Technical dimension**
- Investing in robust infrastructure for now & for the future

**Market dimension**
- Create incentives for cross-border and cross-sectoral cooperation as well as balancing short-term & long-term market signals

**Climate dimension**
- Allocate costs of climate change mitigation
Gas infrastructure can cope with extreme demand situations (i.e. cold winter) by offering high flexibility necessary for seasonal energy storage and peak saving.
Europe’s Gas Infrastructure: Key Facts

<table>
<thead>
<tr>
<th>EU28 Cross-border flow:</th>
<th>EU28 Storage capacity:</th>
<th>EU28 consumption:</th>
<th>EU SPACE HEATING SOURCES</th>
</tr>
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<tbody>
<tr>
<td><strong>Gas:</strong> 3315 TWh</td>
<td><strong>Gas:</strong> 1130 TWh</td>
<td><strong>Gas:</strong> 4.454 TWh, low calorific value (LCV)</td>
<td>43% Other, 57% Gas</td>
</tr>
<tr>
<td><strong>Electricity:</strong> 0.456 TWh</td>
<td><strong>Electricity:</strong> 0.0016 TWh</td>
<td><strong>Electricity:</strong> 2.779 TWh, (LCV)</td>
<td>Source: Eurostat, 2016</td>
</tr>
</tbody>
</table>

Source: ENTSOG & ENTSOE Transparency Platform, 2017
Source: TYNDP, 2018 & Eurogas
Source: TYNDP, 2018 & EASE, Delta-ee 2018
Source: Eurostat, 2016
Source: BP Statistical Review, 2018

225 000 km transmission & 2 ml km distribution system

20% of electricity in the EU is generated from gas
Who we are

ENTSOG: Achieving European Union energy goals by facilitating cooperation between the Transmission System Operators and with EU institutions and stakeholders.

Gas provides 23% of EU’s energy through a well-functioning market.

44 TSO Members, 3 Associated Partners and 8 Observers

Our key deliverables include:

- Network Codes development and Monitoring
- Ten Year Network Development Plan (TYNDP)
- Winter and Summer Supply Outlooks
- Coordinating our Members’ regional investment plants (GRIPs)
- Transparency Platform
- Functionality Platform
- Innovative Projects Platform

ENTSOG – fair partner to all
The future European energy system in this regard is clear: it is one of a dual or hybrid model based first and foremost on electricity from renewable sources but sustained and complemented by renewable and decarbonised gas.

Klaus-Dieter Borchardt, Deputy Director General, DG Energy
ENTSOE’s vision for a decarbonised gas sector

THE HYBRID ENERGY SYSTEM