Study on sector coupling

Assessing regulatory barriers in linking the gas and electricity sectors in the EU

CESEC Gas Plenary and Working Group
13 January 2020

Energy

Methodology

Issue: *The role of the EU gas sector in the energy transition*

Objective:

- *Identify regulatory barriers and gaps preventing closer linking of the EU gas and electricity sectors (both in terms of their markets and their infrastructure) and hindering the deployment of renewable and low-carbon gases, incl. hydrogen.*

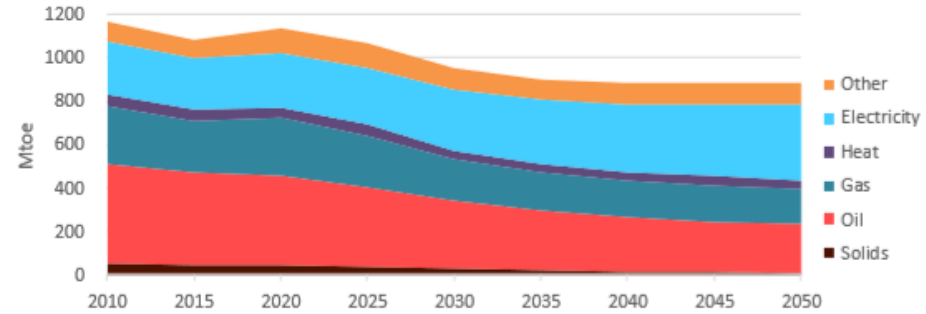
- *In three steps:*
  1) ***Initial analysis:*** *Considering the EU's climate goals, describing for 2030 and 2050 a possible future EU energy system and the role of gases within this.*
  2) ***Regulatory barriers and gaps:*** *Identify possible areas of regulatory barriers and gaps and assess these. Output: a long list of regulatory barriers.*
  3) ***Potential approach:*** *Provide possible ways to overcome the identified regulatory barriers allowing for the participation of relevant technologies and for the deployment of renewable and low-carbon gases.*

Initial analysis

Potential future energy system and the role of gases - Main trends identified

- Significant fall in final energy demand
- Increased electricity demand and growth of renewable electricity generation (intermittent)
- Increased need for energy system flexibility and increased need for electricity transportation

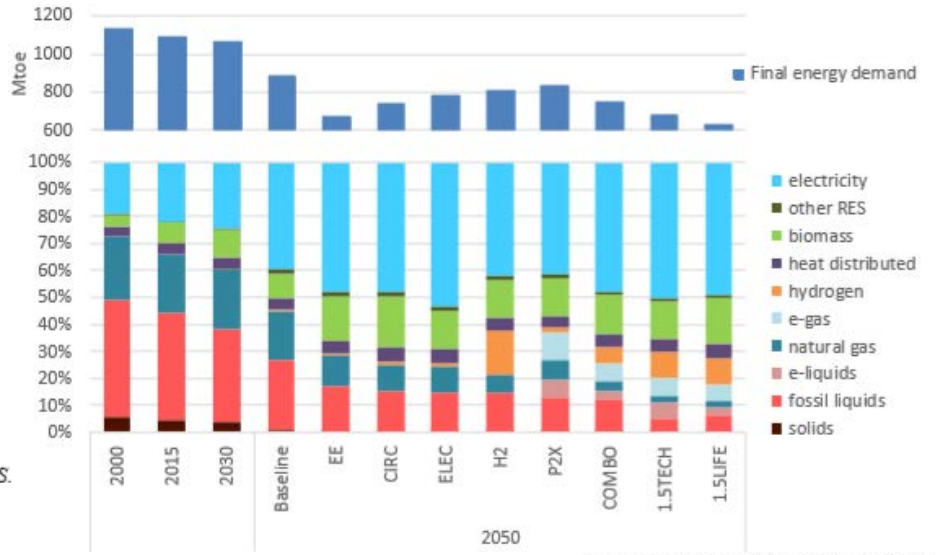
Final energy consumption by fuel / energy carrier - Baseline



Note: "Other" includes biomass and waste.

Source: Eurostat (2010, 2015), PRIMES.

Gross inland energy consumption

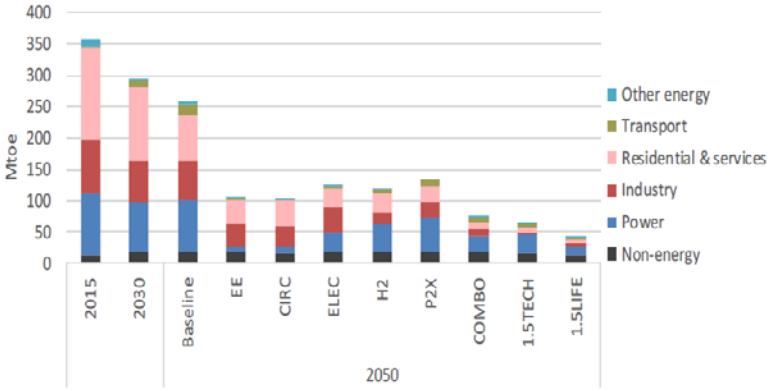


Source: Eurostat (2000, 2015), PRIMES.

Initial analysis

European Commission

Figure 28: Consumption of natural gas by sector



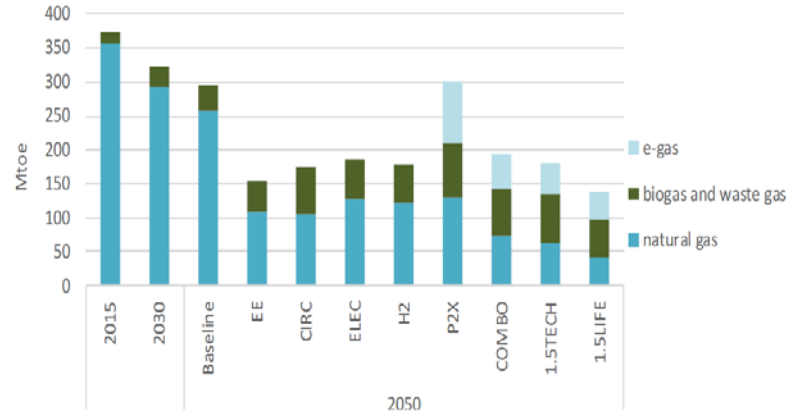
Note: "Residential and services" also includes agriculture.

Source: Eurostat (2015), PRIMES

Decline in demand for natural gas (and gases overall)

- Significant existing seasonal storage (for which few other alternatives exist) and transportation infrastructure; could be re-purposed for renewable and low-carbon gases
- The latter's share of demand will increase; but overall gas demand will decline (timing and precise extent of the decline is uncertain, and depends on factors such as the role of nuclear energy or CCS)
- Natural gas demand may increase in the transition (particularly in power and transport) but largely phased out by 2050. Any residual use of natural gas in combination with CC(U)S

Figure 31: Total gas consumption per gas type



Source: Eurostat (2015), PRIME

Future roles of different low-carbon and renewable gases uncertain today

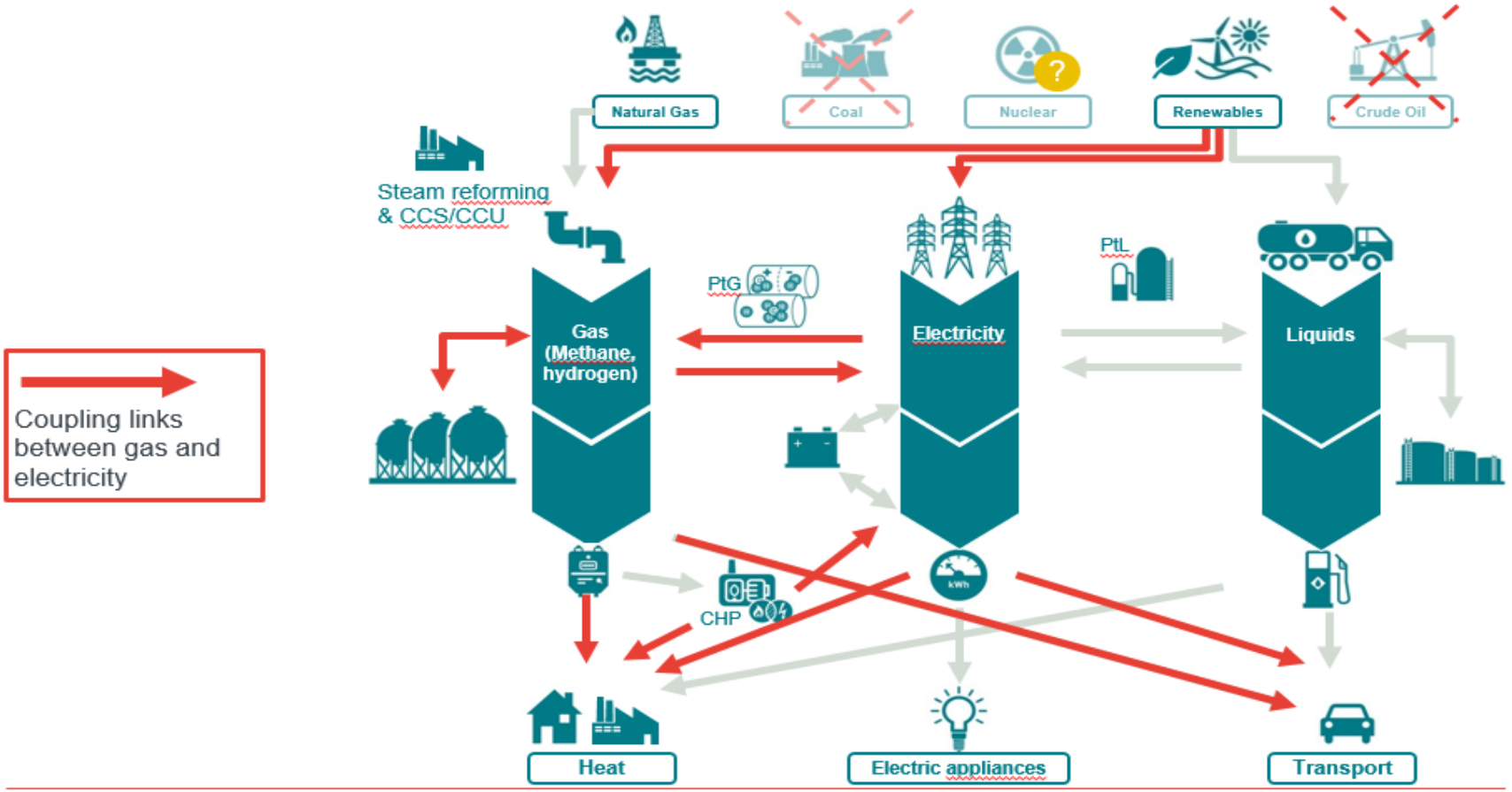
- Possible to use renewable and low-carbon gases in a range of applications (in some cases with adaptation of infrastructure / appliances)
- Different gases may feature more strongly in different countries / regions
- Uncertainties regarding costs and (in case of biogas) availability of (sustainable) feedstock
- Imports of gases receive little focus in scenario studies (despite possible cost advantages)
- Uncertainty regarding policy

Source: Frontier Economics

Initial analysis

European Commission

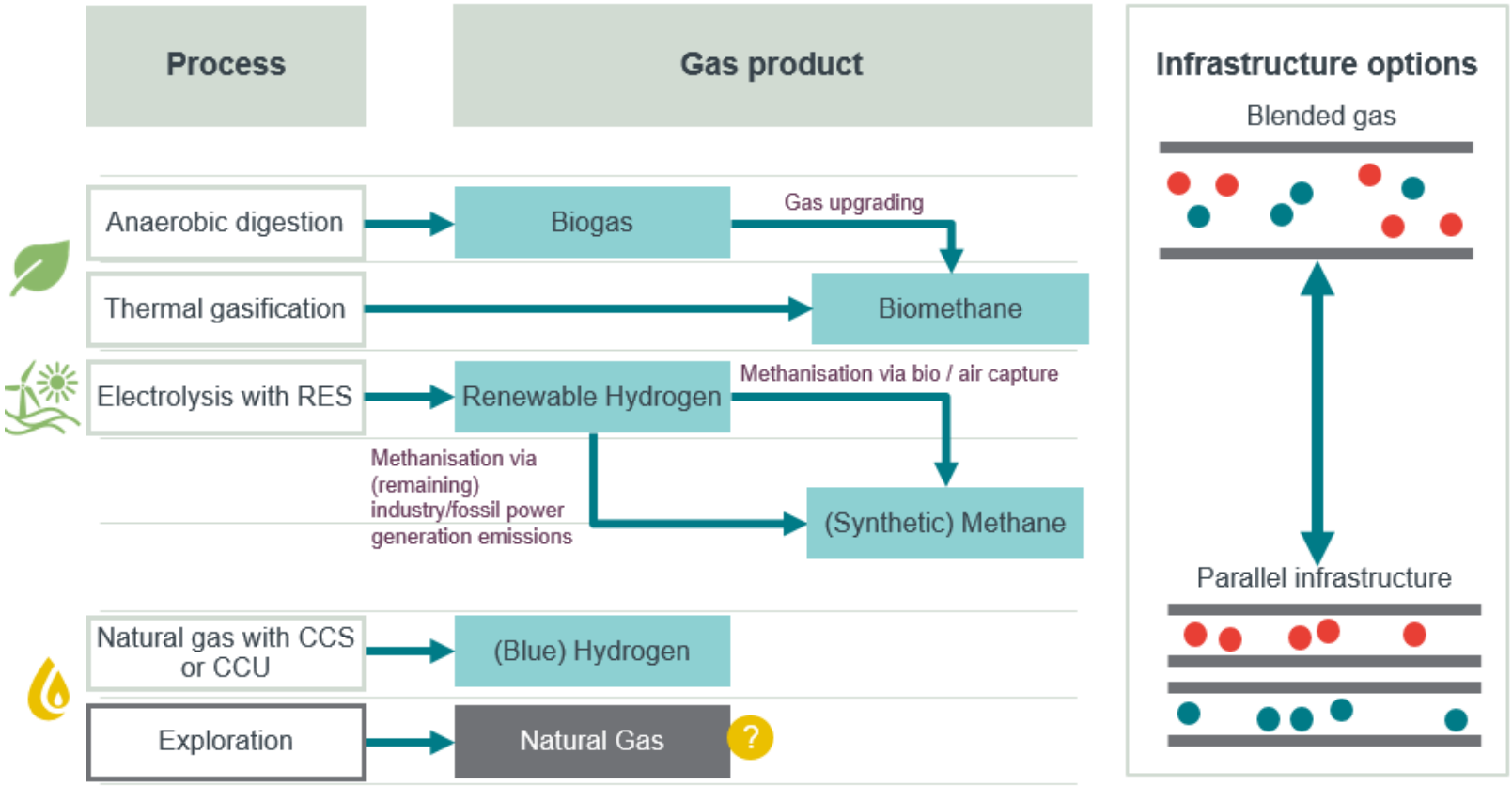
Increased interaction between electricity and gas and between different types of gases



Initial analysis

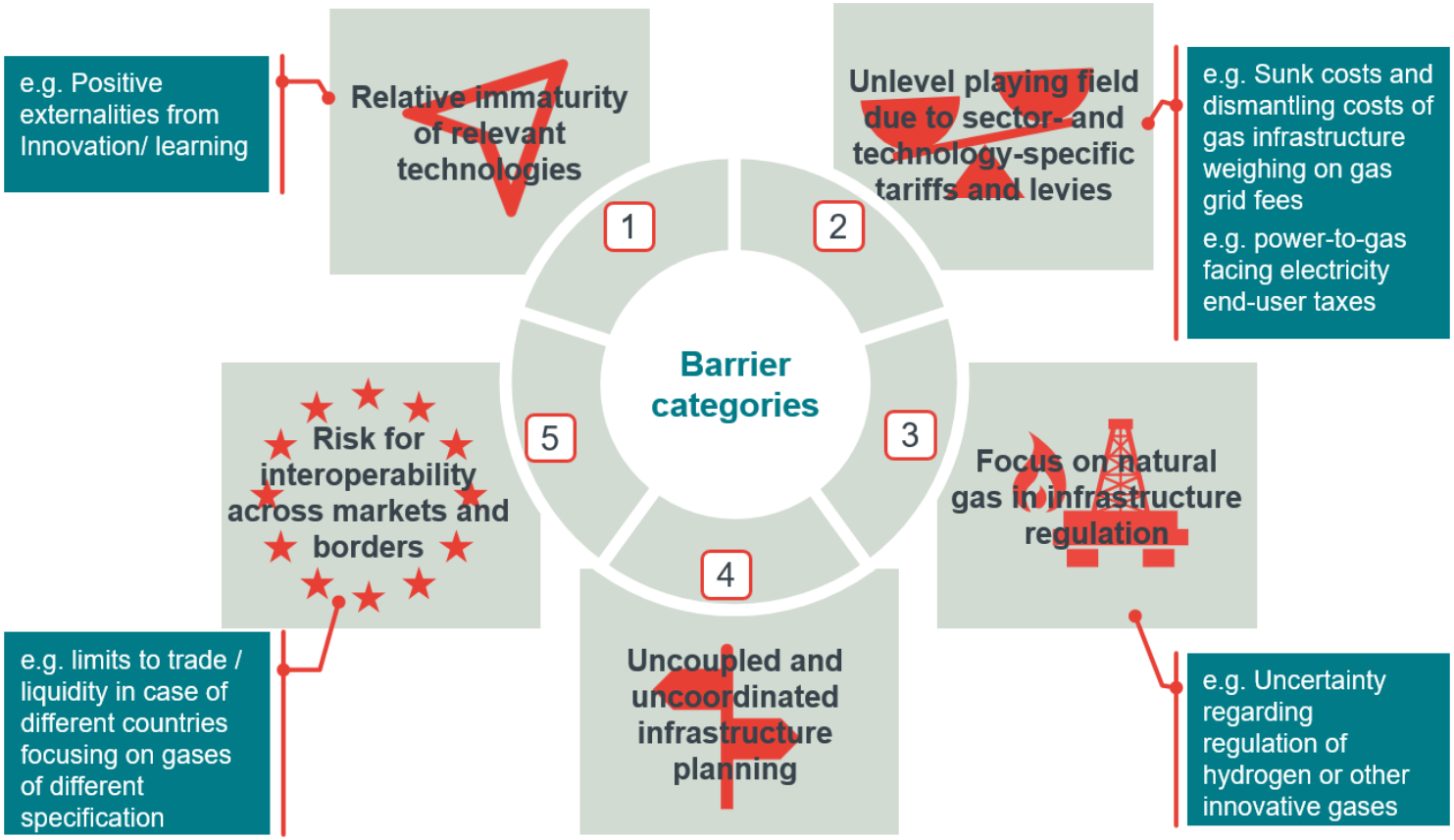
European Commission

To enable this, gas supplies will need to be increasingly renewable / low-carbon – with natural gas potentially helping the 'transition'



Barriers – 5 categories

The consultants identified a list of barriers categorised in five groups:

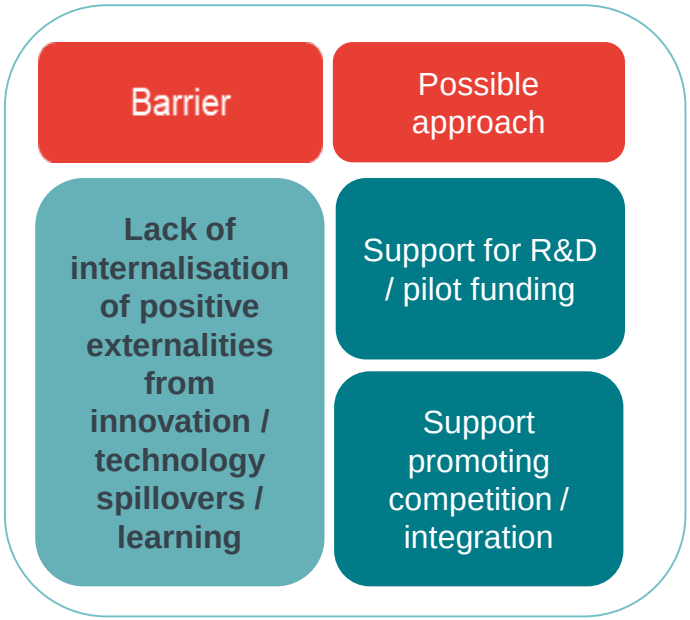


Source: Frontier Economics

In all categories attention needs to be paid on how to ensure that different gases can co-exist both within and between countries and regions

Category 1

1. Relative immaturity of sector coupling and renewable gases technologies



Source: Frontier Economics

R&D, pilot and demonstration projects

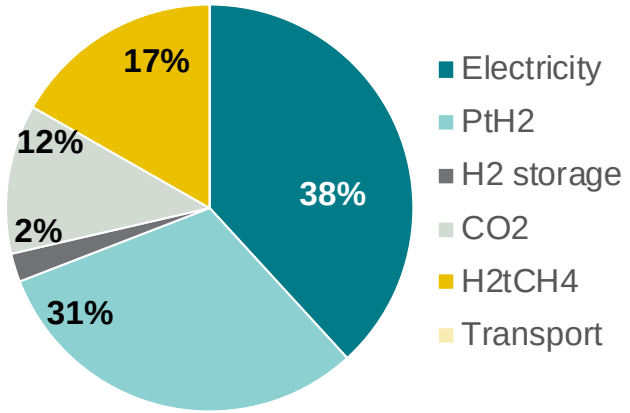
- **Support for R&D and funding for pilot and demonstration projects** would be a direct way to address the market failure.
- Support for R&D and pilots for e.g. sector coupling technologies comes at a cost in the near term but can help to **deliver reduced costs** associated with decarbonisation over the longer term.
- Trade-off between focusing at the most promising technologies and avoiding closing off other technology options for the future.
- **The benefits of** ongoing support to immature technologies **will be enhanced if support is granted in ways that promote competition and market integration.**

Category 2

2. Unlevel playing field due to sector and technology-specific tariffs and levies

Barrier	Possible approach
Power-to-Gas facing end-user taxes on electricity	Tax/levy final electricity use only

Electricity is the main cost driver for power-to-methane; Source: Frontier, Agora



Electricity costs as main driver of synthetic fuel costs

- **Power-to-gas facilities** are treated as **end consumers**, electricity costs include end-user taxes and levies
- **Taxes and levies** constitute **2/3** of the average EU retail electricity bill.
- Electricity costs amount to almost 40% for **synthetic methane**
- A concern arises where these taxes and levies are not '**cost-reflective**' and intended to drive a specific behaviour (as is the case, for example, with carbon taxes), but instead are intended to recover costs, such as those of supporting RES
- Risk of distortion of the level playing field between synthetic gases and other renewable gases as biomethane, as the latter's input costs are not significantly increased by end-consumer taxes and levies

Source: Frontier Economics

Category 3

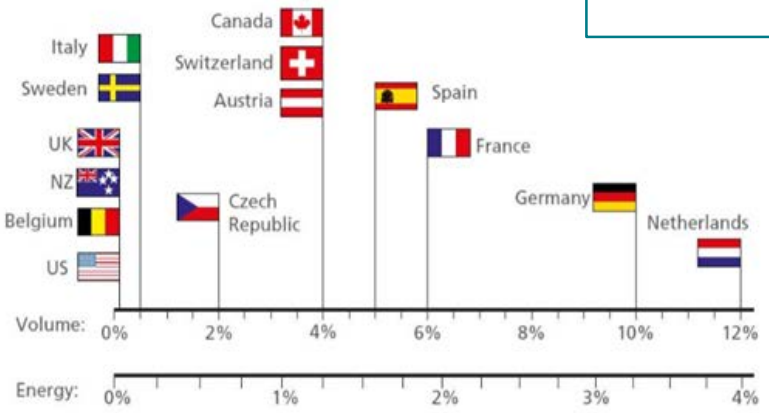
3. Focus on natural gas in infrastructure regulation

Barrier	Possible approach
Uncertain or inadequate quality standards	Visibility on gas quality
	Clear rules on how quality is managed on ongoing basis

Along with updates to quality standards themselves, developers need improved clarity on gas quality and how it will be managed

- **Improved visibility on gas quality for gas producers:** Particularly in short-term where this is not covered by ENTSOG forecasts or by Interoperability Network Code (which requires information provision to consumers, DSOs and storage operators)
- **Clear rules for managing quality on an ongoing basis:** Trade-off between managing quality issues in the grid versus before injection? How to manage quality variations in real time?

Limits on hydrogen blending into national gas grids

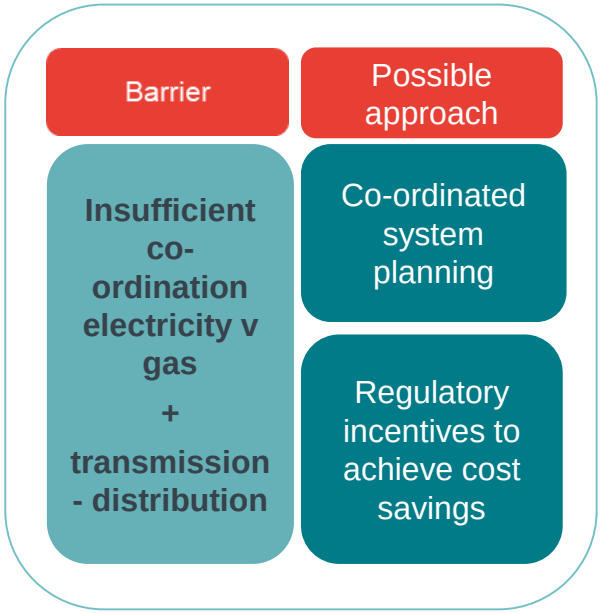


While norms have been adopted in relation to biomethane in several countries, there is ongoing uncertainty e.g. on the allowed hydrogen blend

Source: Frontier Economics

Category 4

4. Uncoupled and uncoordinated infrastructure planning



Current co-ordination to be reinforced and extended

- **First steps are taken in this direction:** joint scenario planning and interlinked gas and electricity model by ENTSOs
- Ensuring greater co-ordination between electricity and gas TSOs (and DSOs) and similar co-ordination at national level would be beneficial
- **Mandating co-ordinated system planning** would allow operators to identify required investments, having in mind the feasible options across electricity and gas networks to achieve cost savings
- System operators could be incentivised to opt for investments maximising synergies across electricity and gas as well as across transmission and distribution systems

Source: Frontier Economics

Category 5

5. Risks for interoperability across markets and borders

Barrier	Possible approach
Lack of liquidity for heterogenous gases	Liquidity impacts to be considered in system planning

Fragmentation of current market into:

- Different products (hydrogen, natural gas, biomethane)
- Effect of localised production – potentially not traded between MS – either due to technical (e.g. H2) or legal restrictions

Risk: liquidity could fall – but to what extent?
Another uncertainty for developers (and retailers)

But also:

- links between supply chains, e.g. to extent hydrogen is derived from natural gas, still possible to hedge hydrogen by trading natural gas
- Increasing integration of EU gas market through interconnection and market reforms

Source: Frontier Economics

European Commission

Thank you for your attention!

http://ec.europa.eu/energy/