

Potentials of sector coupling for decarbonisation

- Regulatory barriers in linking gas and electricity sectors

EU-Russia Gas Advisory Council's (GAC WS2)

21 October 2019

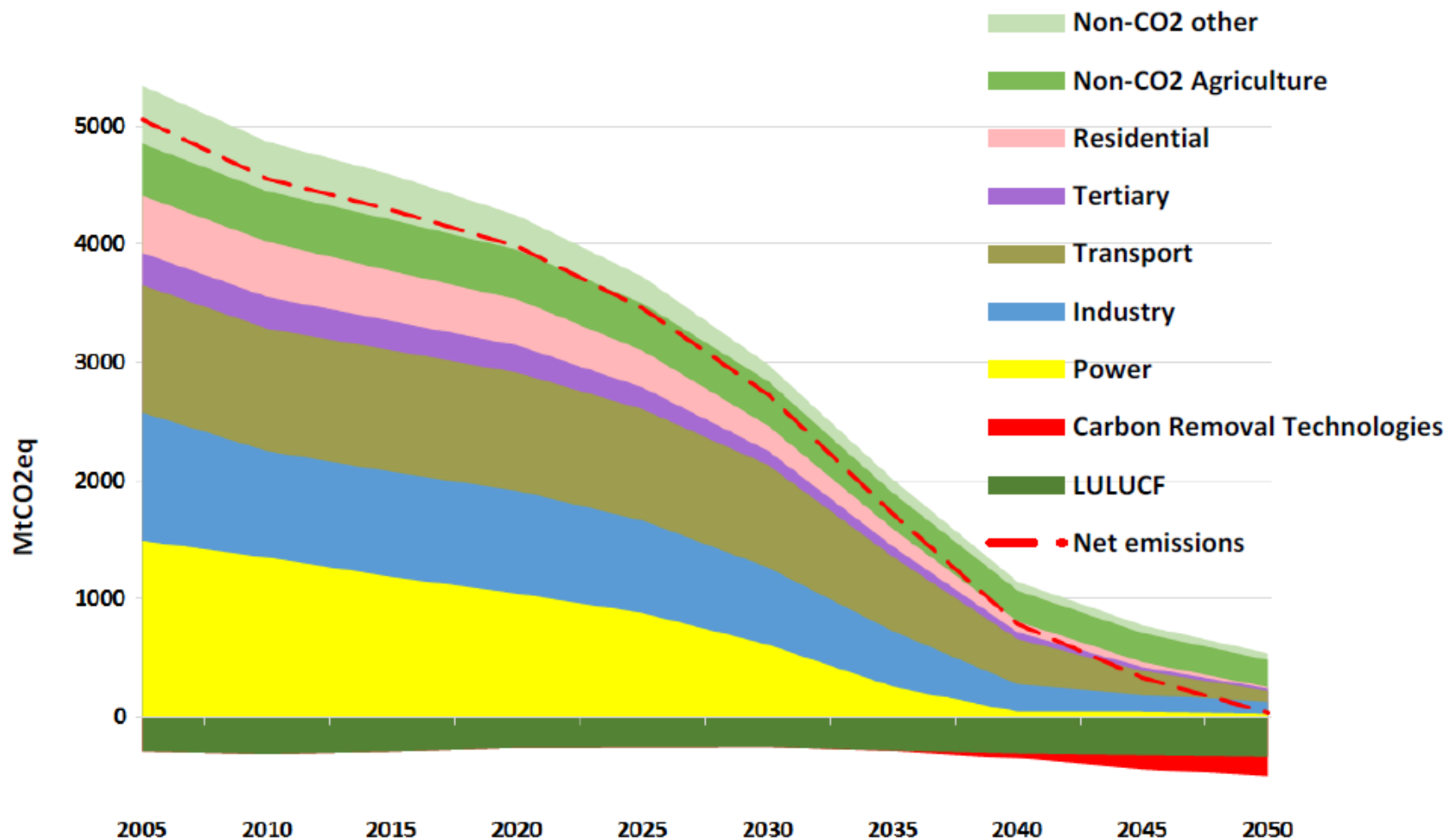


Contents

1.	Context	3
2.	Role of low carbon gas	5
3.	Regulatory barriers and gaps – and solutions	11

1.	Context – decarbonisation in all sectors	3
2.	Role of low carbon gas	5
3.	Regulatory barriers and gaps – and solutions	11

To comply with 2050 climate targets the EU must achieve highly ambitious CO2 reductions in all sectors of the economy



Source: EC (2018), A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final Brussels, 28.11.2018,

1.	Context	3
2.	Role of low carbon gas	5
3.	Regulatory barriers and gaps – and solutions	11

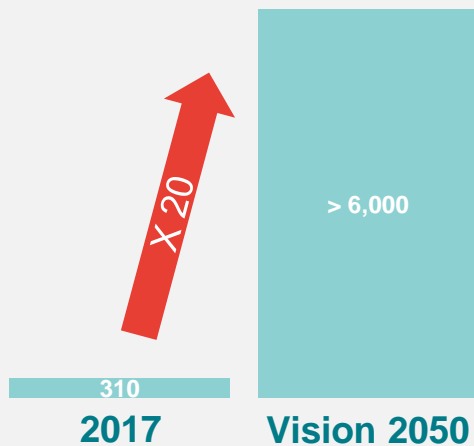
The three big challenges of decarbonisation: Supply, storage and transport of large amounts of (mostly renewable) energy ...

1

REN supply



Final energy demand served by electricity from wind and solar (TWh/a) in EU28*



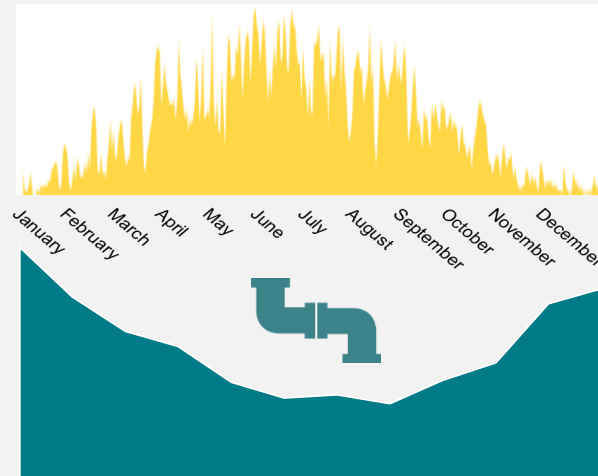
Need for renewable energy generation will be substantial, creating the challenge of finding appropriate and accepted generation locations within Europe

2

Energy storage



Schematic annual profile of PV generation

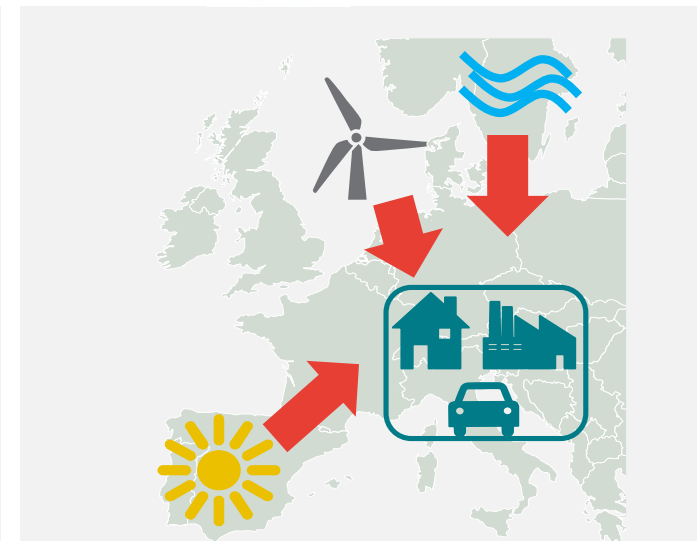


Monthly average gas load in 8 countries analysed

Intermittent renewables and seasonal heat demand require vast seasonal energy storage

3

Energy transport



Effective energy transport and distribution is crucial when exploring more and more renewables

... and (low carbon) gas can contribute in all three areas

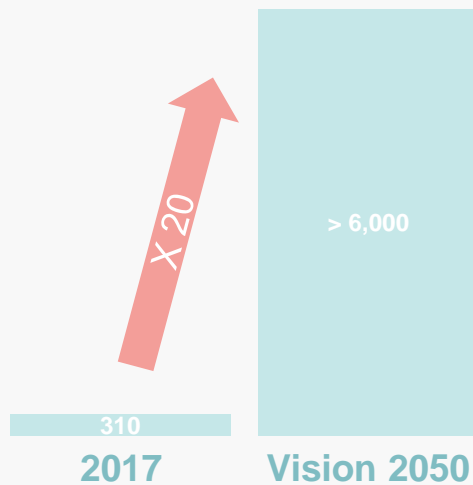
Source: Frontier Economics

Gas infrastructure offers solutions... Existing gas infrastructure suited for a variety of REN & low-carbon gases, diversifying energy supply

1 Challenge of REN supply

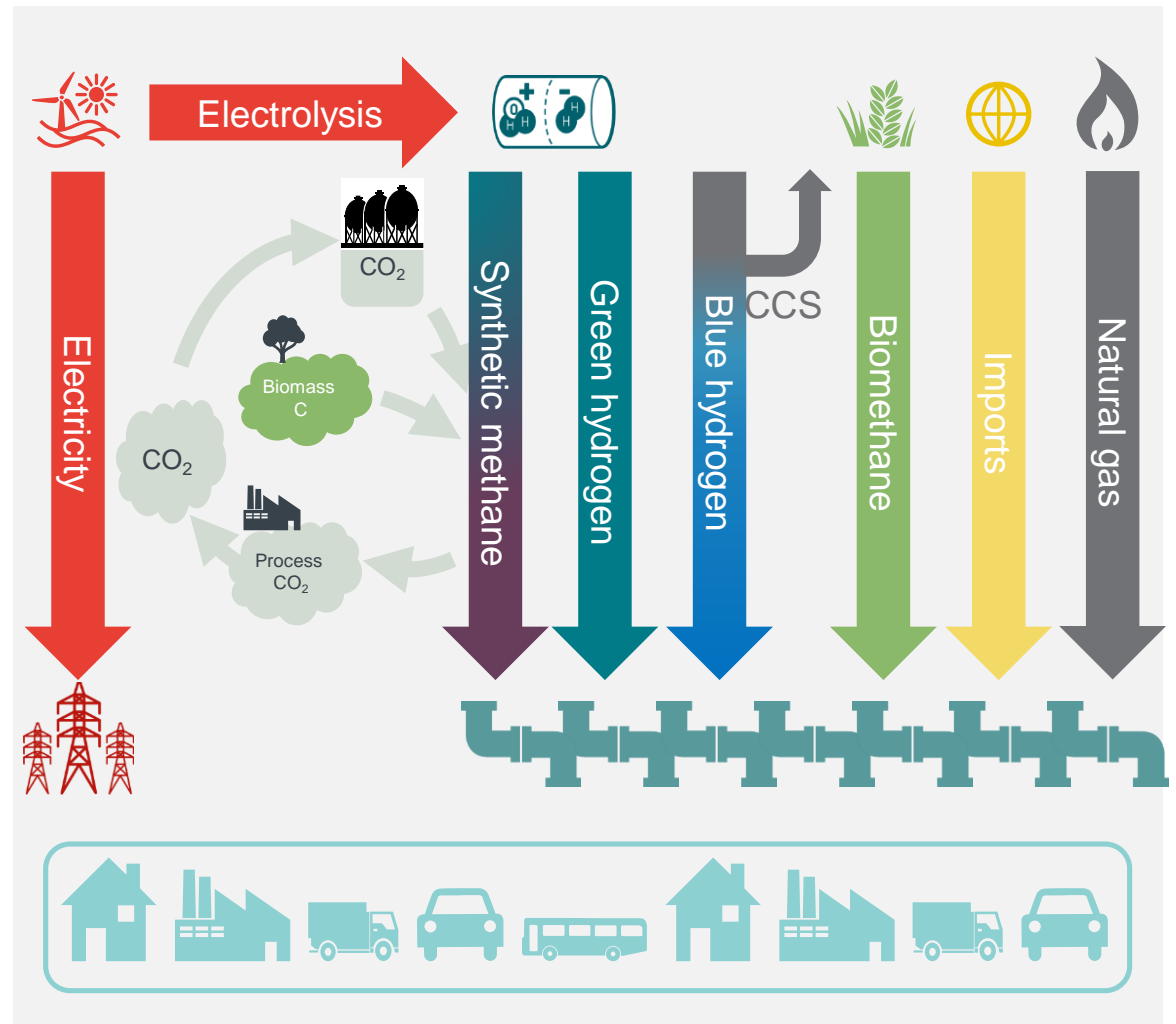


Final energy demand served by electricity from wind and solar (TWh/a) in EU28*



Need for renewable energy generation will be substantial, creating the challenge of finding appropriate and accepted generation locations within Europe

Gas infrastructure can accommodate a variety of renewable and low-carbon gases



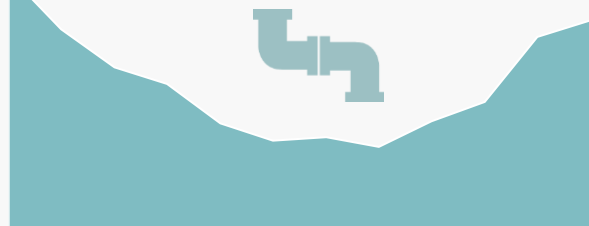
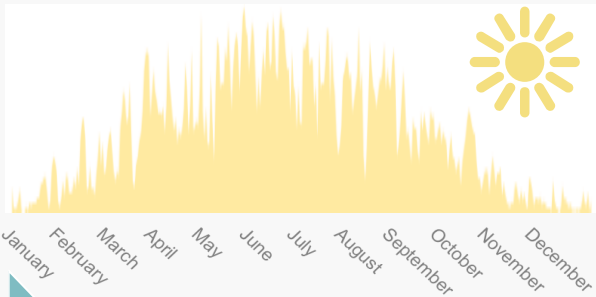
Gas infrastructure offers solutions...

Gas is **easily storable** and already stored in bulk

2 Challenge of energy storage



Schematic annual profile of PV generation

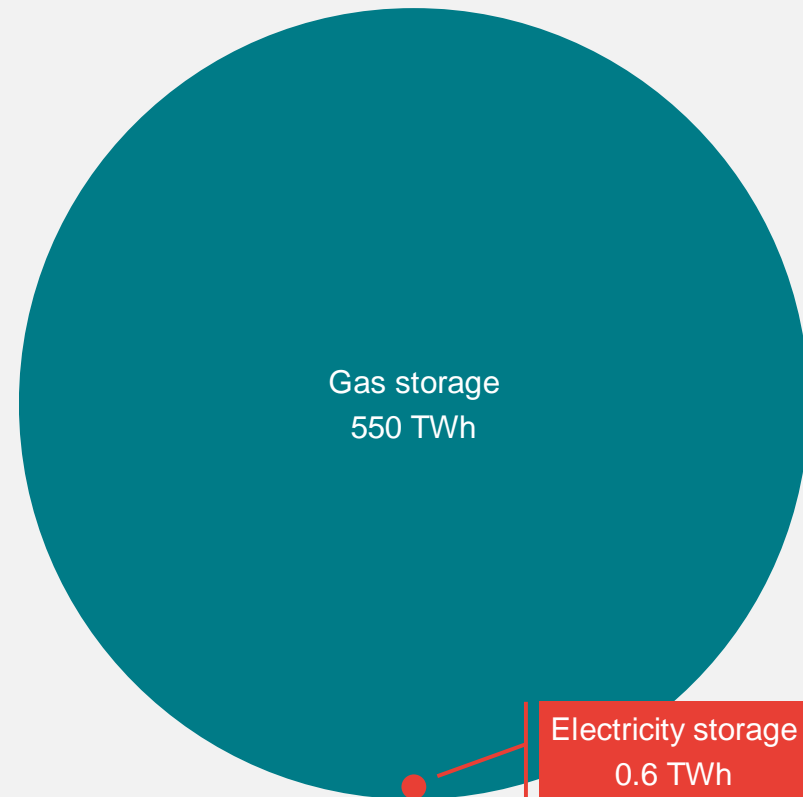


Monthly average gas load in 8 countries analysed

Intermittent renewables and seasonal heat demand **require vast seasonal energy storage**

Gas storage volume is almost 1,000 times as large as electricity storage volume in analysed countries

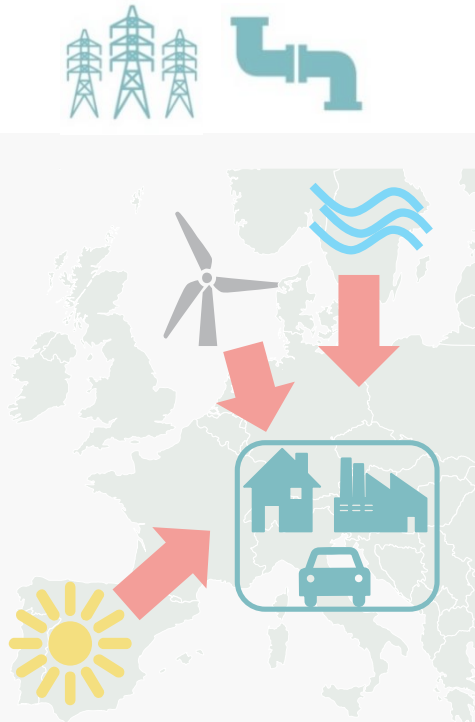
Energy storage volume in 8 analysed countries



Source: Frontier Economics based on Gas Infrastructure Europe and Geth et al.

Gas infrastructure offers solutions... Transport capacities of gas infrastructure are enormous and exceed those of electricity by large

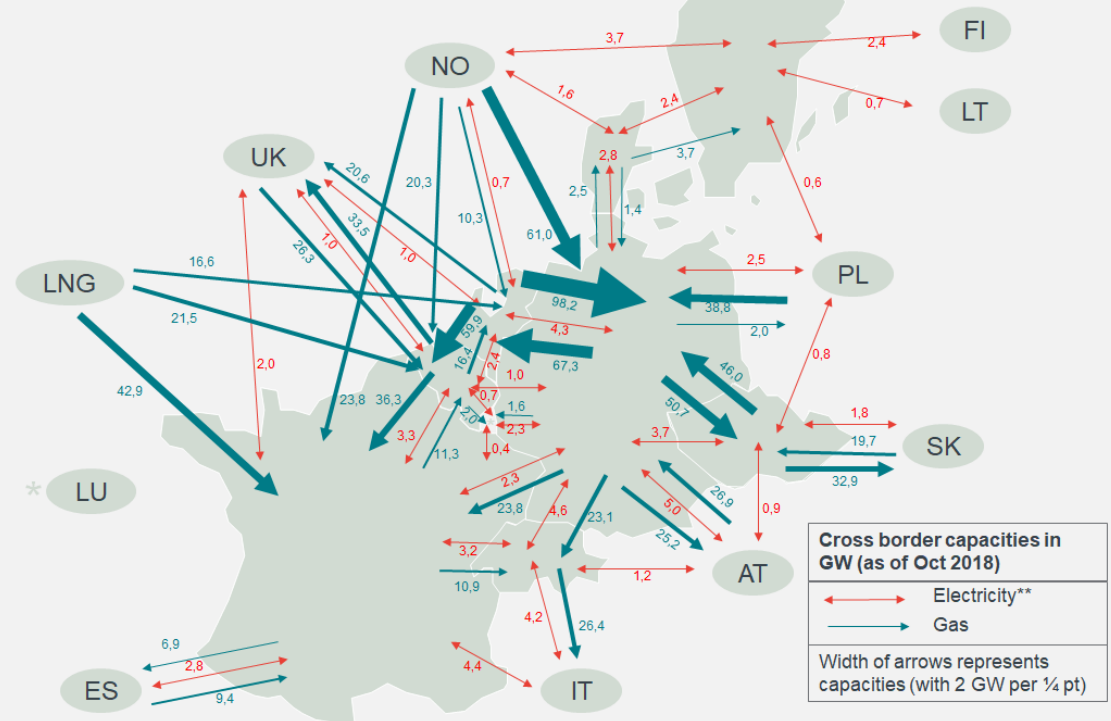
3 Challenge of energy transport



Effective **energy transport and distribution** is crucial when exploring more and more renewables

Cross-border transport capacities for gas exceed those of electricity by large

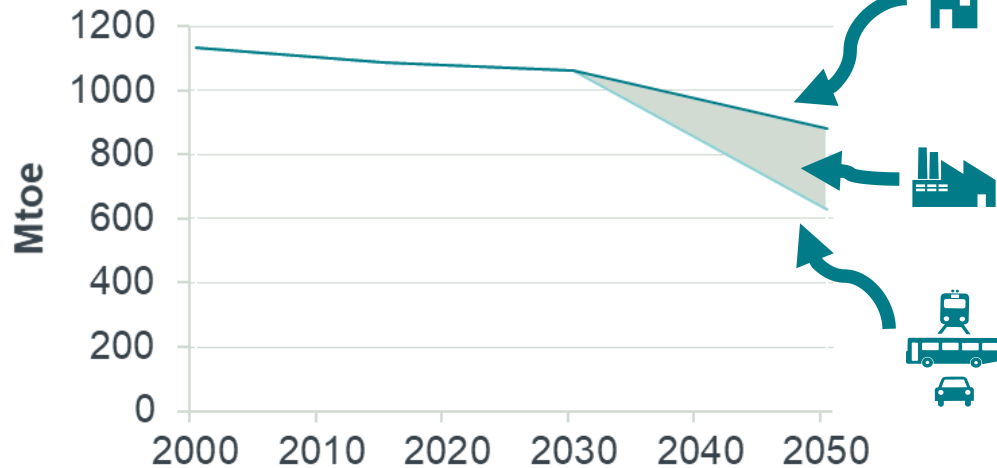
Cross-border transport capacities for gas and electricity to / between eight countries analysed



Source: Frontier Economics based on Entso-E and Entso-G

Despite the uncertainties, scenario studies consistently find a long-term role for gases...

EU final energy demand is expected to fall



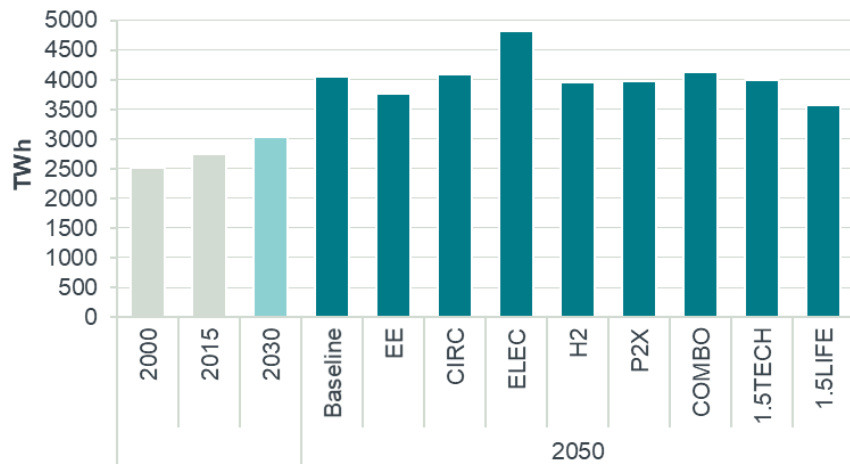
Source: Frontier Economics and CE Delft, based on EC (2018)

With renewable electricity accounting for a high share of the mix by 2050



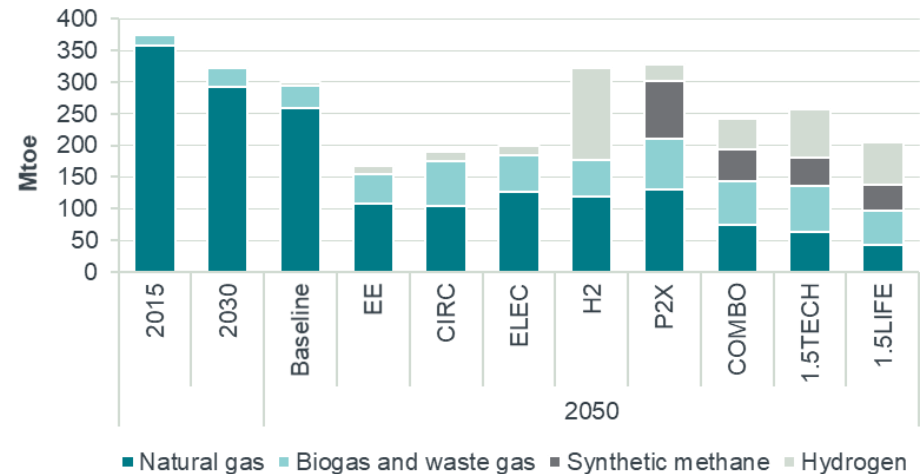
Source: Frontier Economics, based on sources indicated.

While electricity demand is expected to increase



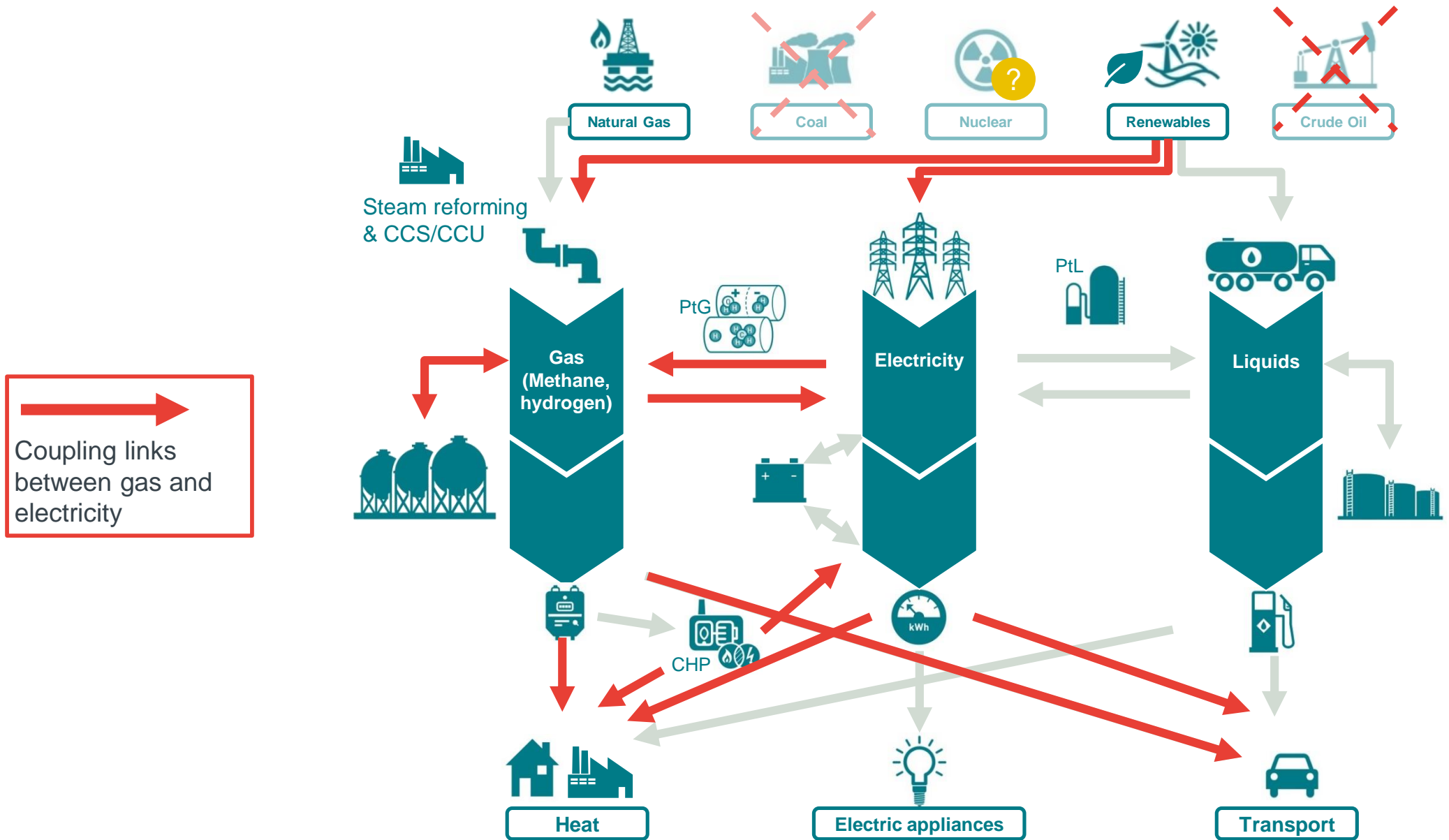
Source: Frontier Economics, based on EC (2018)

Gases help with transport / (seasonal) storage needs

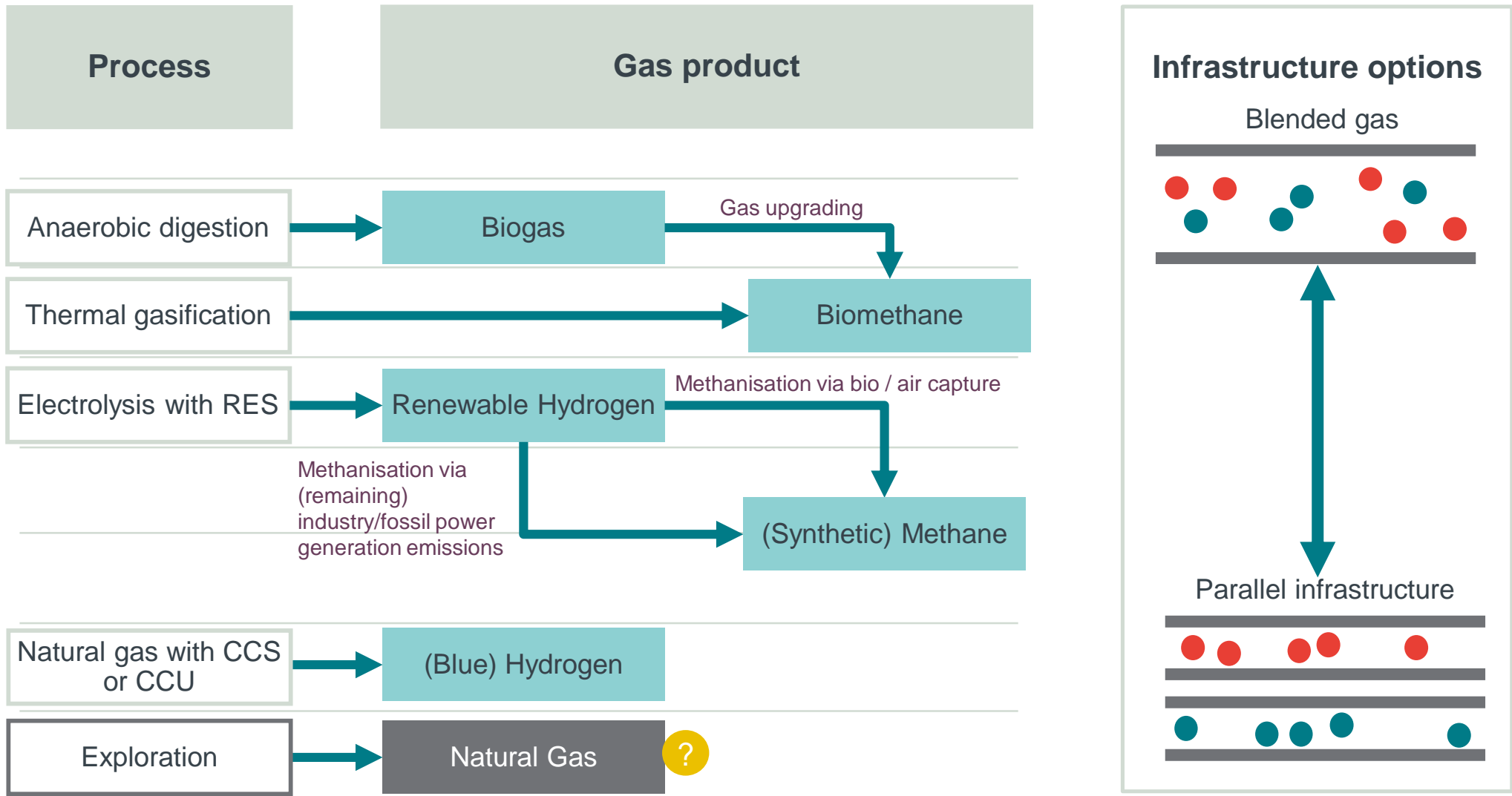


Source: Frontier Economics and CE Delft, based on EC (2018)

... and increasing interaction between electricity and gas, as well as between different types of gases

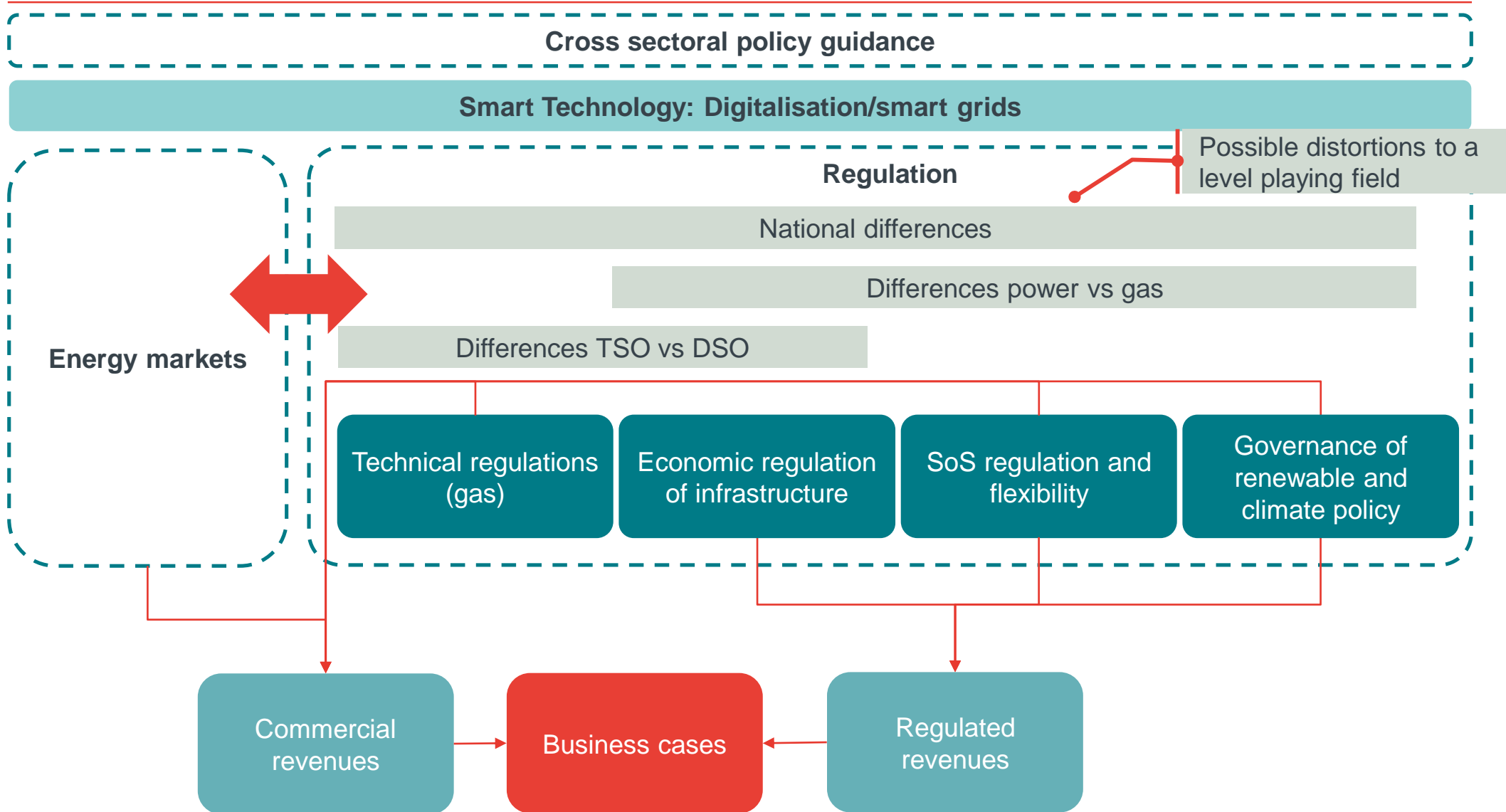


Gas supplies will need to be increasingly renewable / low-carbon – with natural gas potentially helping the ‘transition’

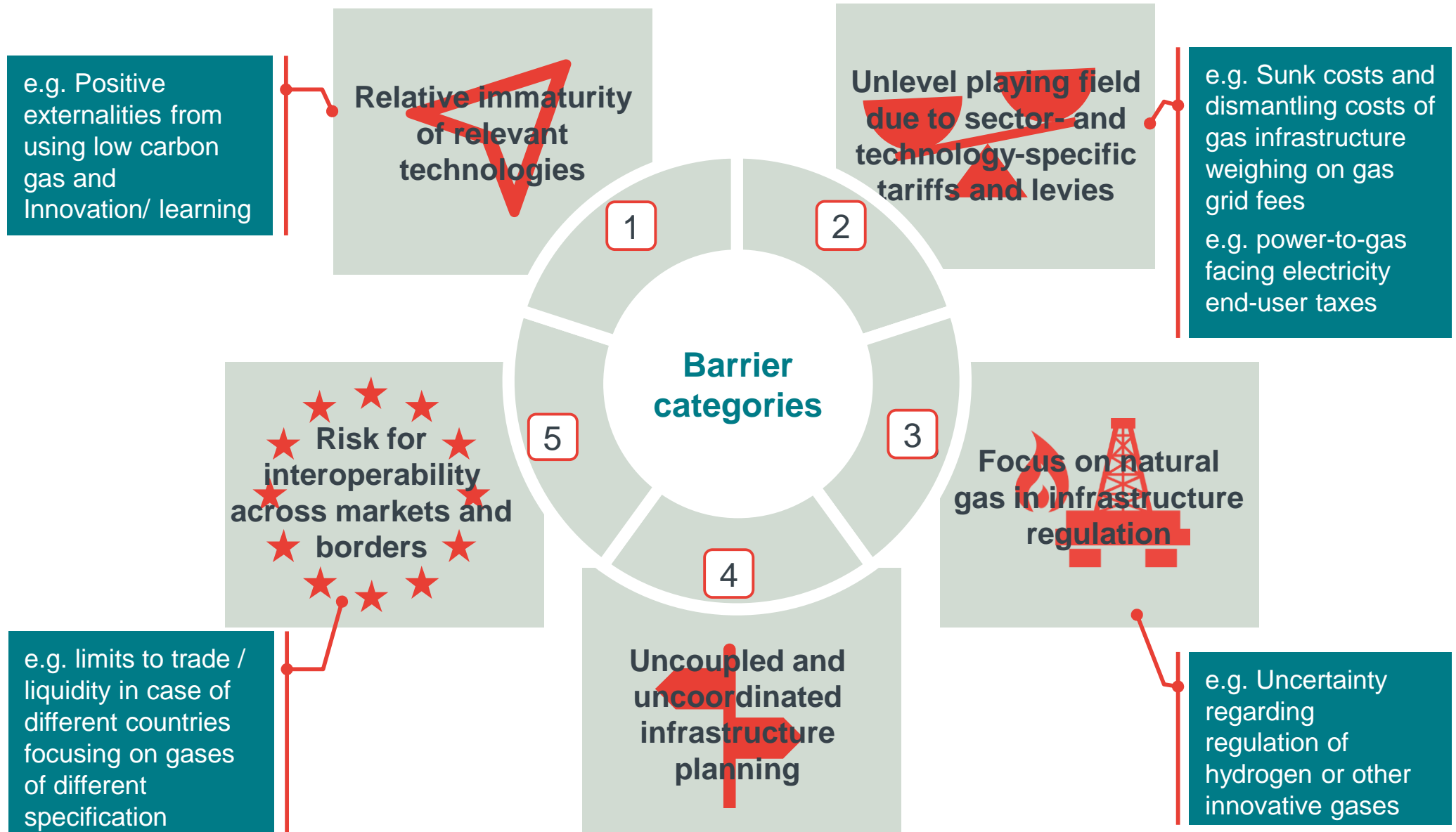


1.	Context	3
2.	Role of low carbon gas	5
3.	Regulatory barriers and gaps for sector coupling – and solutions	11

Market design and regulation therefore need to be consistent and technology neutral in a range of areas



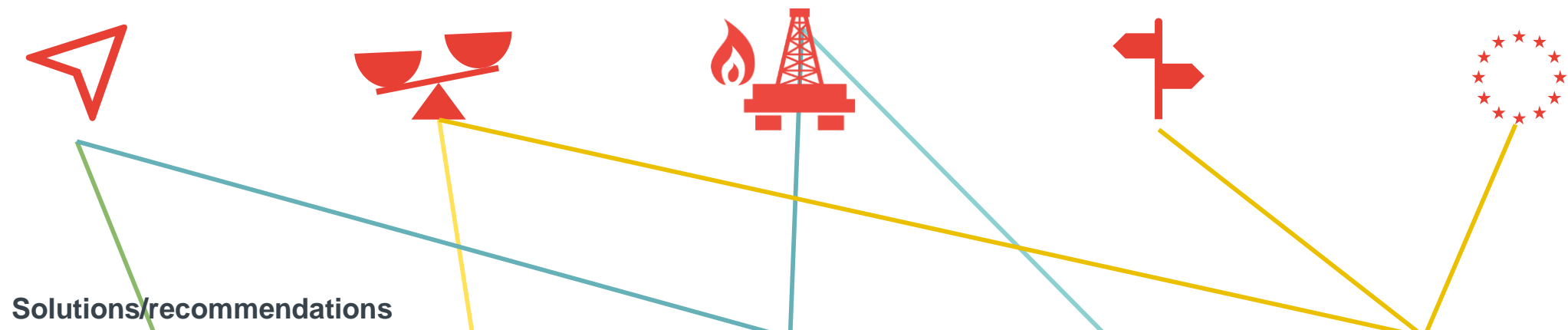
Barriers and gaps can be grouped into five categories



A range of solutions will be required to address the barriers and gaps identified


Barriers

- 1 Relative immaturity of relevant technologies
- 2 Unlevel playing field due to sector- and technology-specific tariffs and levies
- 3 Focus on natural gas in infrastructure regulation
- 4 Uncoupled and uncoordinated infrastructure planning
- 5 Risk for interoperability across markets and borders




Solutions/recommendations


Climate / renewable policy and support for innovation




Regulatory toolbox to address cost recovery issues




Fit for purpose market design and charging arrangements



Clarity on access to infrastructure



Co-ordinated infrastructure planning and decommissioning



Regulatory clarification – role of grid operators in PtG for R&D/pilots

Clarify who is best placed to bear the cost of stranded assets (and other legacy costs, e.g. for RES support)

Clarify under what conditions Gas Directive rules on TPA / unbundling apply to hydrogen (and other gases)

Thank you for your attention!



Dr Christoph Riechmann

✉ christoph.riemann@frontier-economics.com



Frontier Economics Ltd is a member of the Frontier Economics network, which consists of two separate companies based in Europe (Frontier Economics Ltd) and Australia (Frontier Economics Pty Ltd). Both companies are independently owned, and legal commitments entered into by one company do not impose any obligations on the other company in the network. All views expressed in this document are the views of Frontier Economics Ltd.