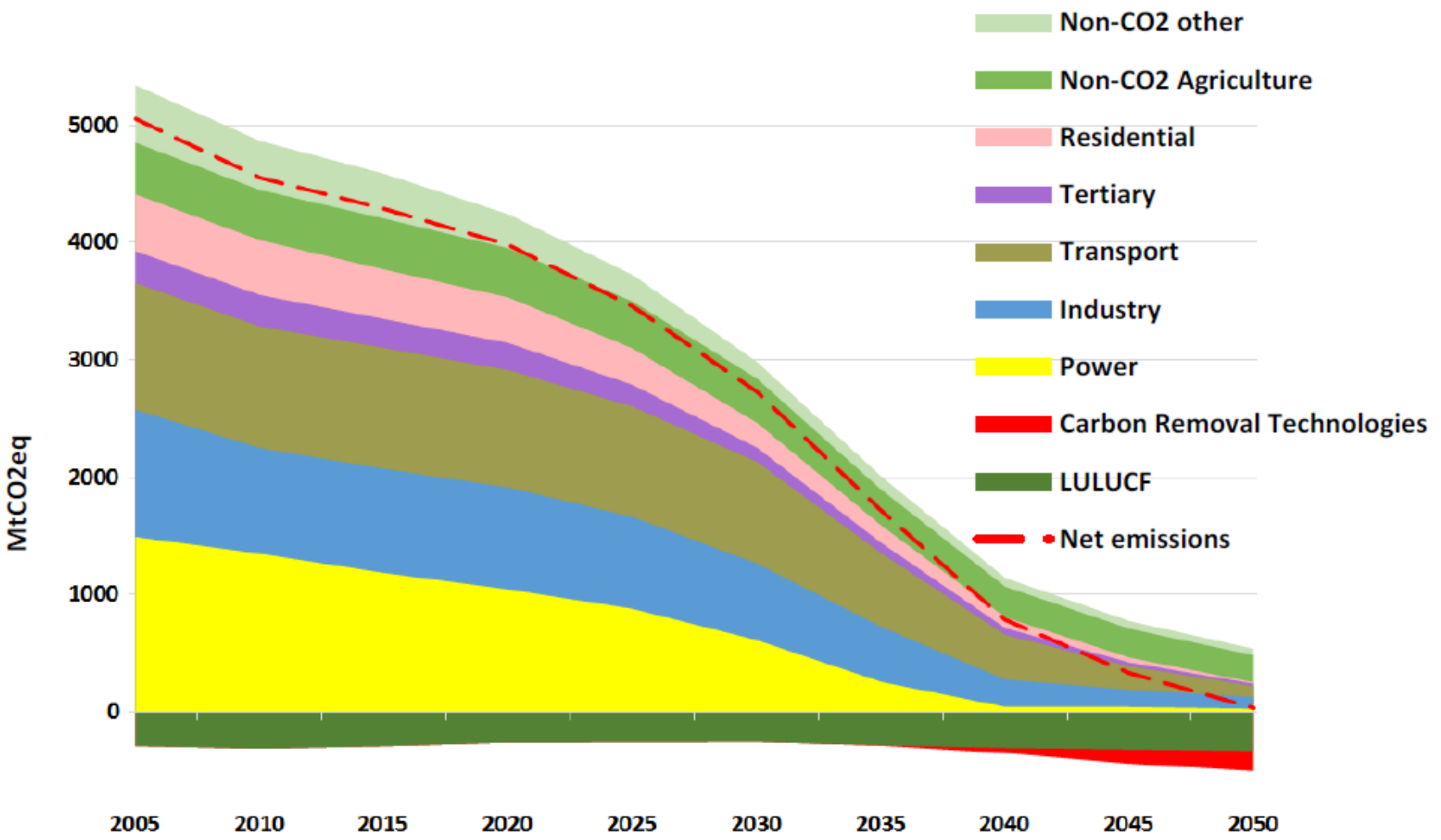
EU Climate targets and their impact on the gas market

Balkan and Black Sea regional gas conference, Istanbul

22 November 2019

Contents

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



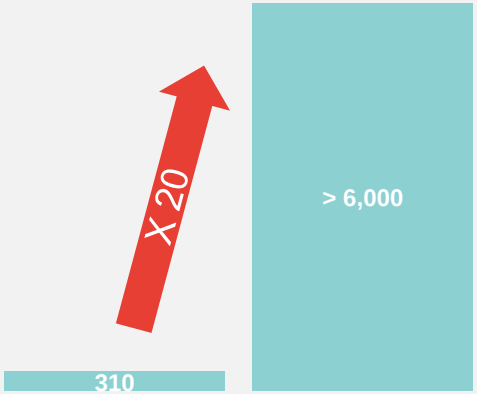
Source: EC (2018), A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final Brussels, 28.11.2018,

… with implications also for the gas sector

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

1 REN **supply**

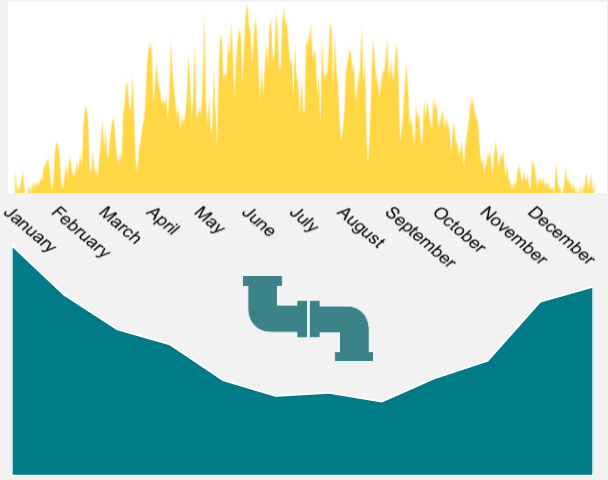
Final energy demand served by electricity from wind and solar (TWh/a) in EU28*



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

2 Energy **storage**

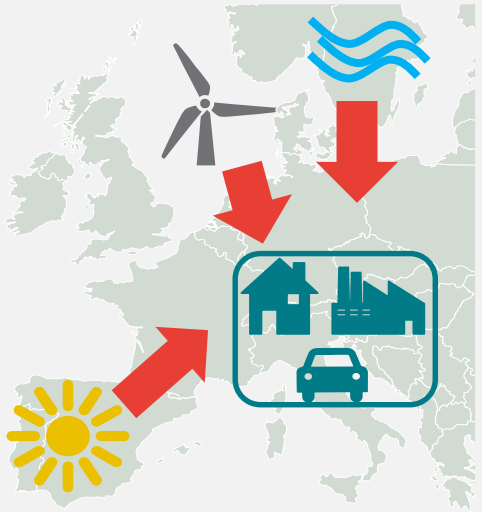
Schematic annual profile of **PV generation**



Monthly average **gas load** in 8 NW European 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

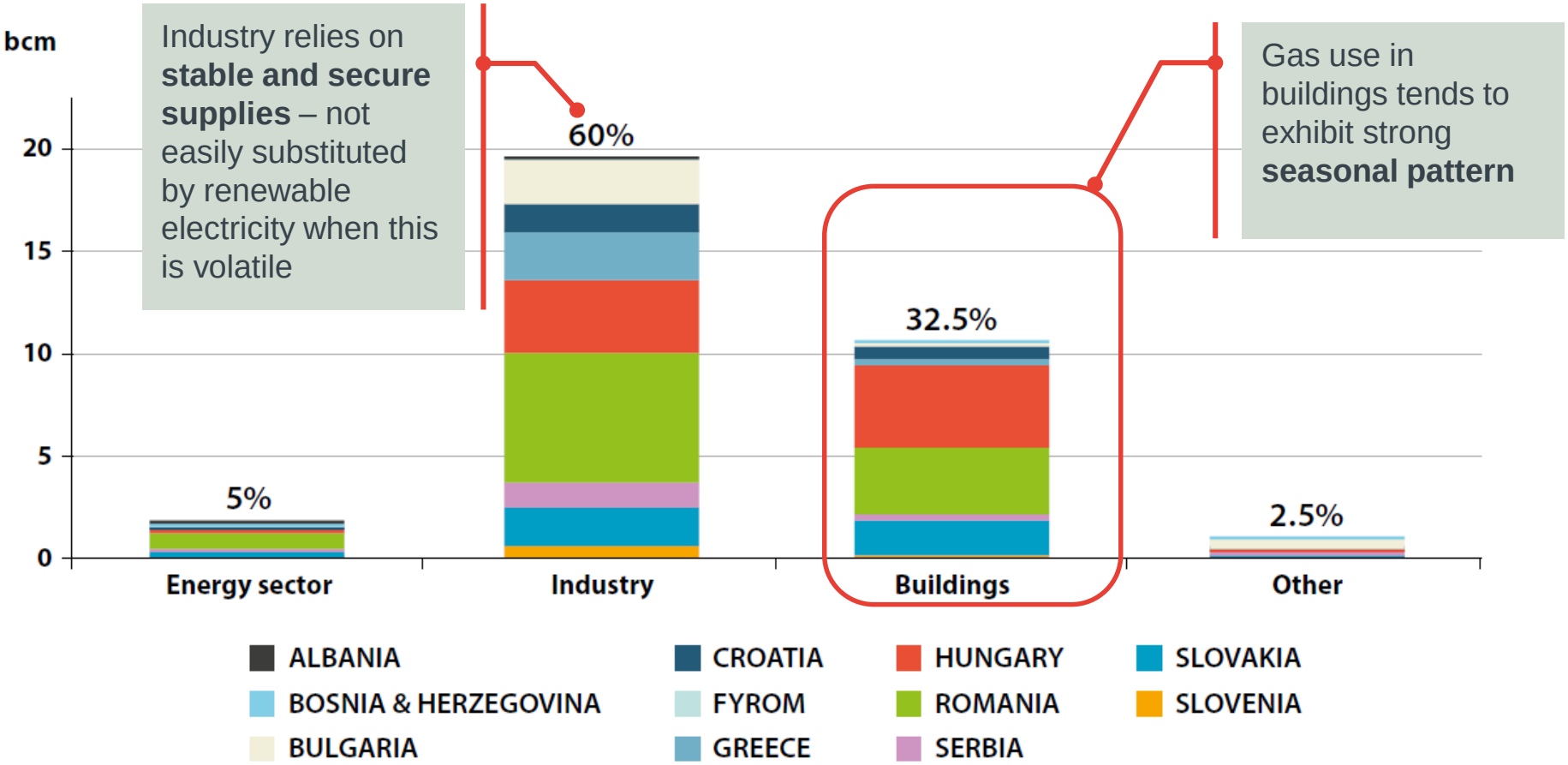
Source: Frontier Economics

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

Source: Frontier Economics (2019):The value of gas infrastructure in a climate neutral Europe, https://www.frontier-economics.com/media/3120/value-of-gas-infrastructure-report.pdf

Gas demand in SEE driven by Industry and residential use

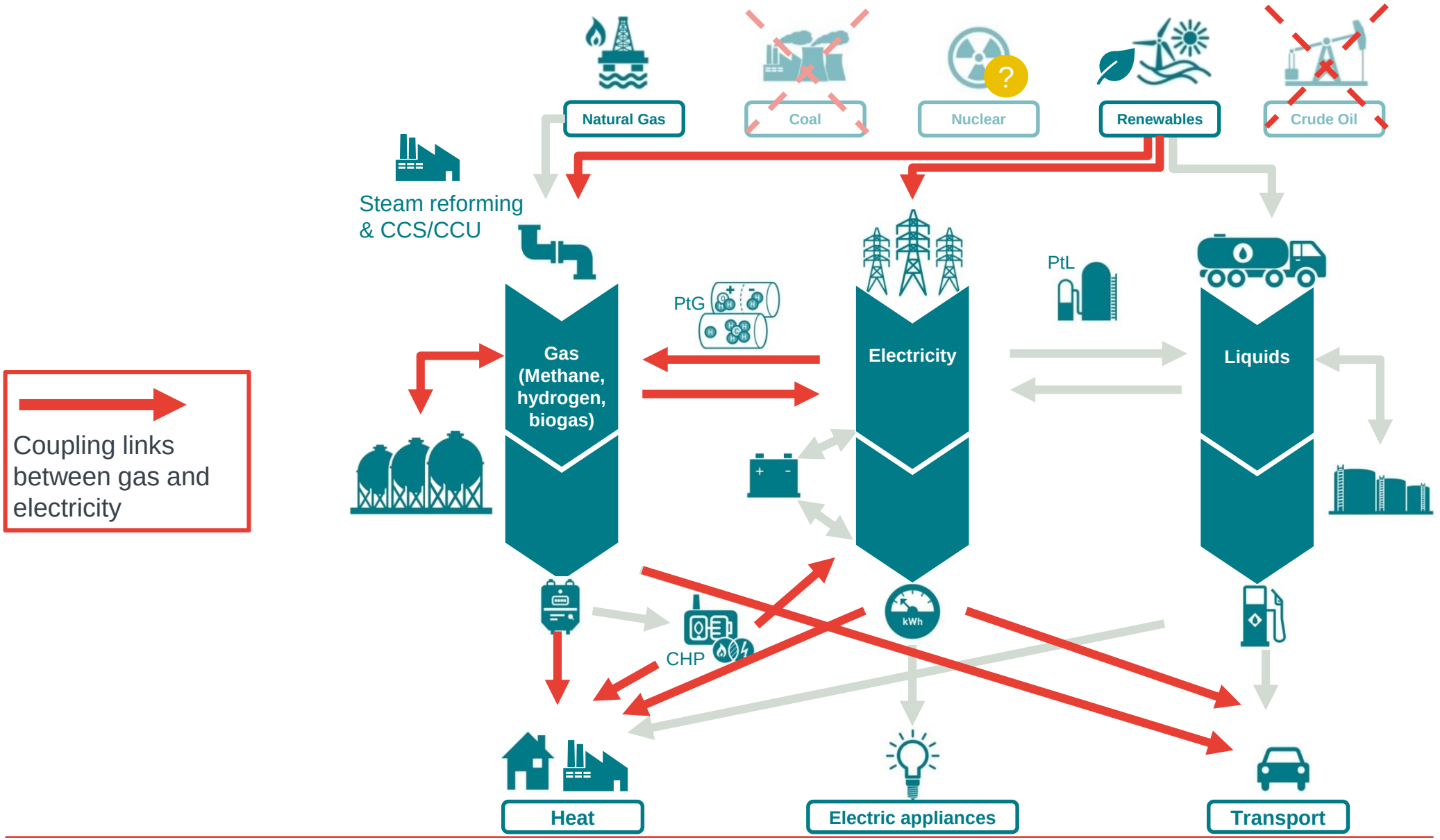
Figure 4 - Sectoral gas use in the target region (Source: Eurostat, 2014[15])



Source: Building Performance Institute Europe (2017) based on Eurostat 2014

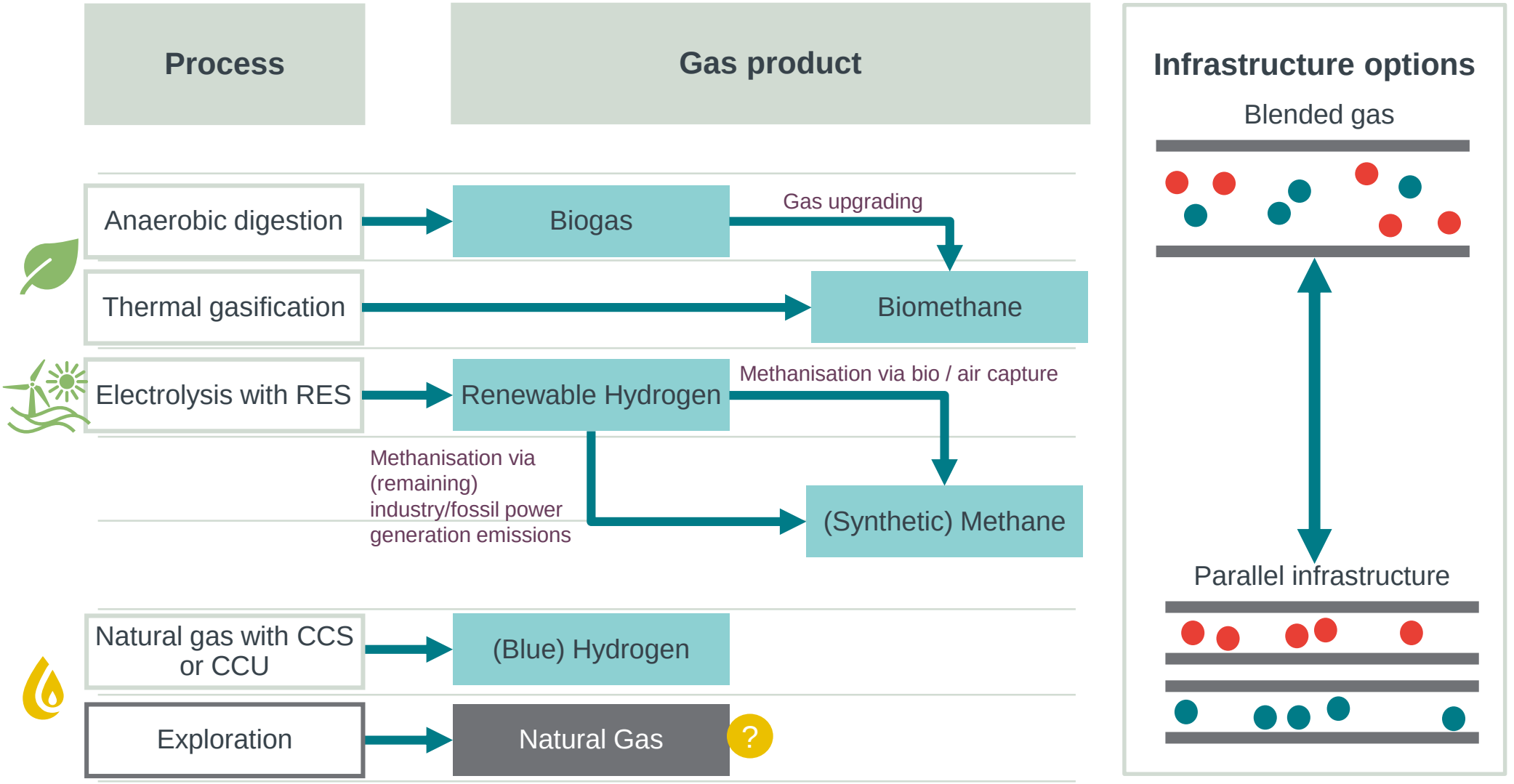
… and this will practically require seasonal storage of energy in the form of (in future: low carbon) gas

This leads to increasing interaction between electricity and gas, as well as between different types of gases



Source: Frontier Economics and CE Delft (2019):
https://ec.europa.eu/info/sites/info/files/frontier_-_potentials_of_sector_coupling_for_decarbonisation.pdf

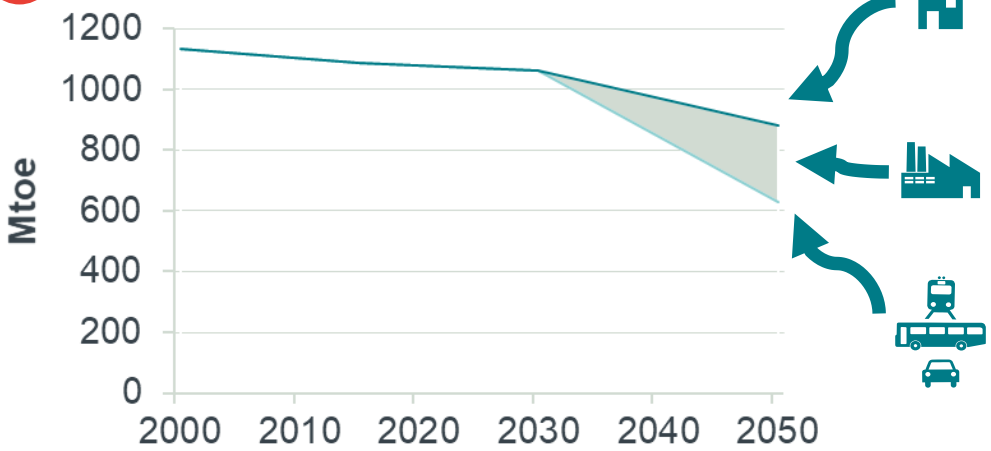
Gas supplies will need to be increasingly renewable / low-carbon – with natural gas potentially helping the 'transition'



Source: Frontier Economics and CE Delft (2019)

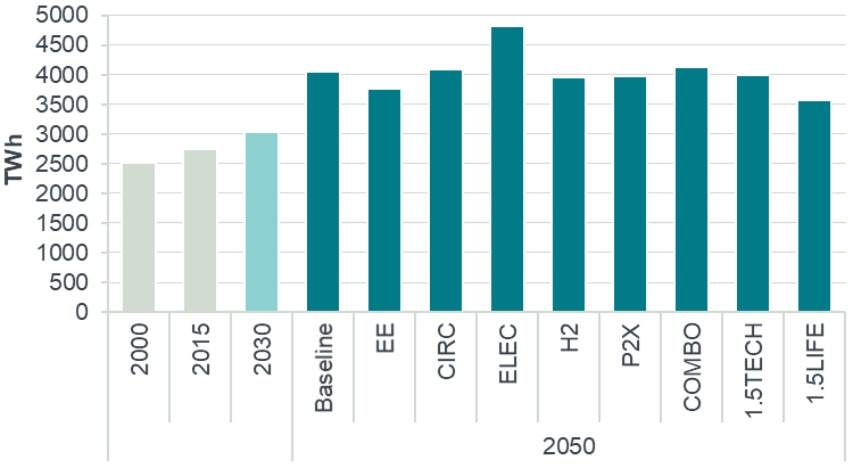
Despite the uncertainties, scenario studies featuring deep decarbonisation consistently find a long-term role for gases…

1 EU final energy demand is expected to fall



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

2 Electricity demand is expected to increase

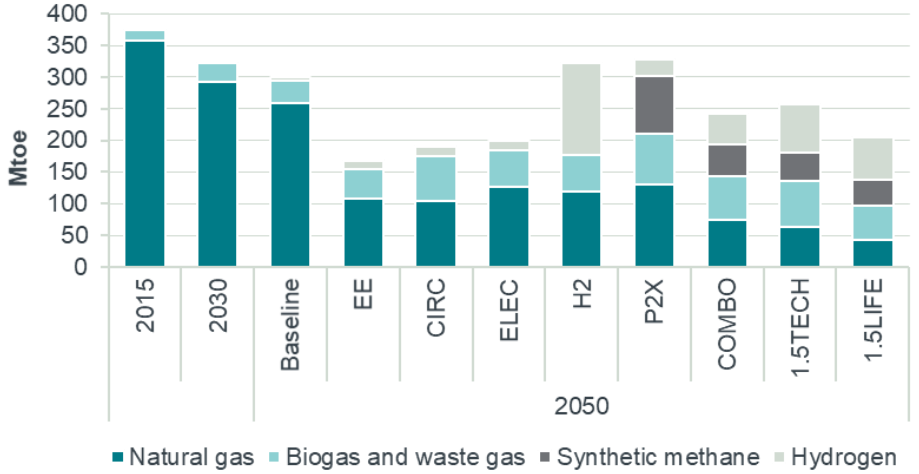


Source: Frontier Economics, based on EC (2018)

3 More of that electricity will come from renewables – implying a greater need for energy system flexibility

Source: Frontier, based on sources indicated. Projected 2050 RES-E share of electricity supply.

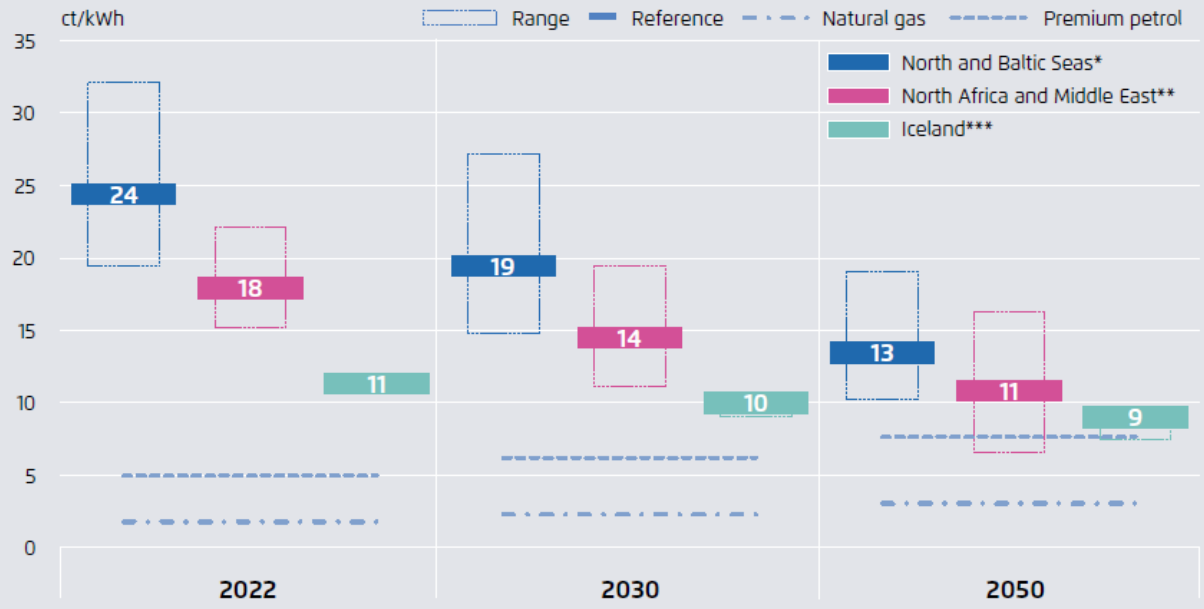
4 So no surprise that studies show a role for gases



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

Some renewable electricty can be converted to synethtic (low carbon) gas to make it storable including for seasonal profiling

Cost of synthetic methane and liquid fuels in cent$_{2017}$ per kilowatt hour final product (without network charges and distribution cost) Figure 5



Note: Prices of natural gas and premium petrol are based on average values from scenarios by the World Bank and the IEA. Other cost reductions for PtG / PtL may result from advancements in PV, from battery storage that increases full load hours, and from especially large electrolysis facilities. Cost increases may result from higher cost of capital due to higher country risks.

* Offshore wind power
** PV and PV / wind systems
*** Geothermal / hydropower (total potential limited to 50 terawatt hours)

Note: 10 cents per kilowatt hour is equivalent to around 90 cents per liter of liquid fuel.

Own calculations based on Frontier Economics (2018), with weighted average cost of capital of 6% (values rounded).

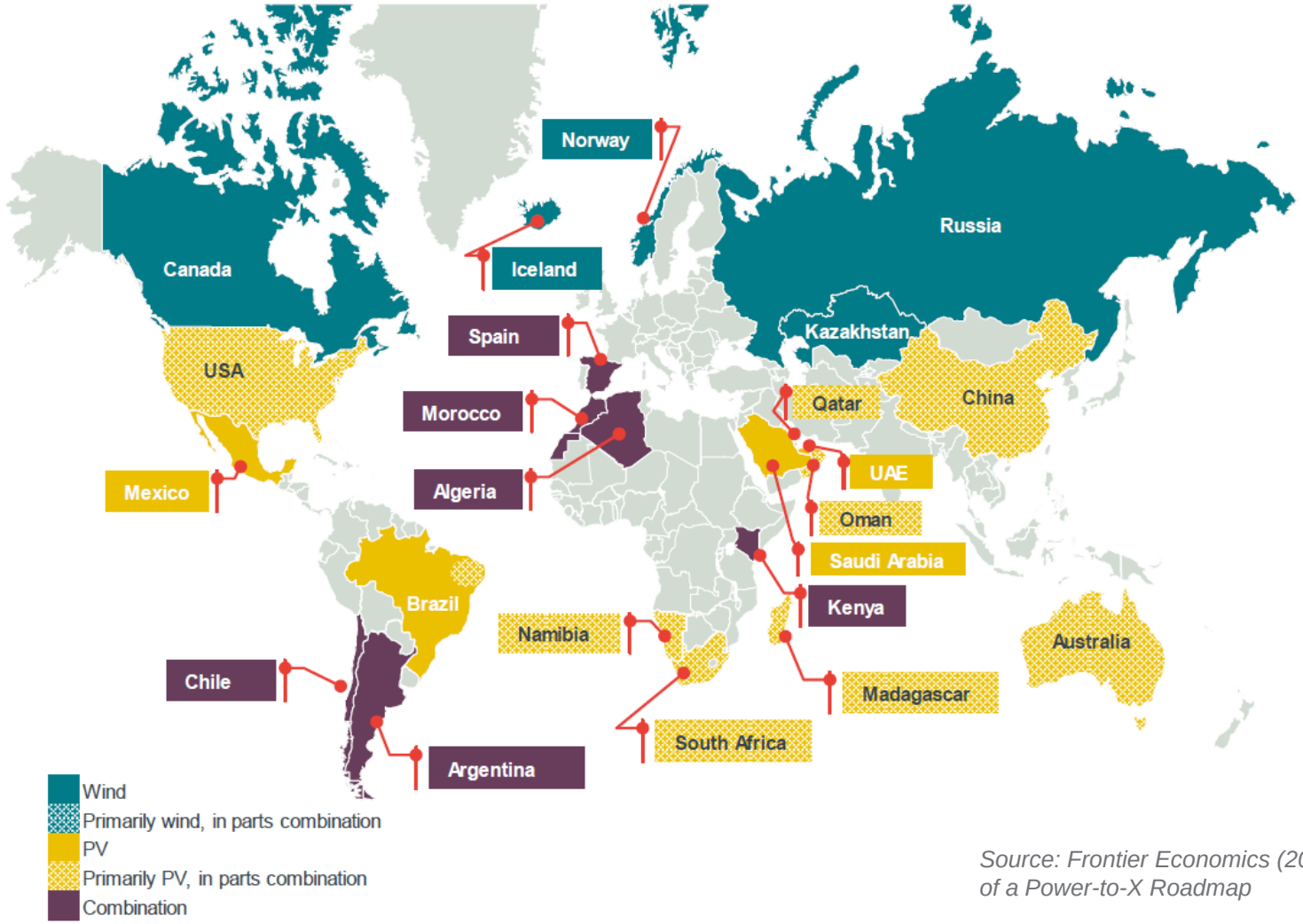
Source: Agora/Frontier Economics (2018): The Future Cost of Electricity-Based Synthetic Fuels

https://www.agora-energiewende.de/fileadmin2/Projekte/2017/SynKost_2050/Agora_SynKost_Study_EN_WEB.pdf

… but technology is yet to achieve learning curve effects and non-European producers are at a cost advantage

Potential importing producers of low-carbon gas and fuels include traditional hydrocarbon producers, but also some new players

Figure 1 Snapshot of the variety and diversity of potential PtX producing countries



Source: Frontier Economics

Note: Illustrative presentation of the strongest RES potentials only; not an extensive list of all countries.

Source: Frontier Economics (2018): International Aspects of a Power-to-X Roadmap

https://www.frontier-economics.com/media/2642/frontier-int-ptx-roadmap-stc-12-10-18-final-report.pdf

ENTSO scenarios illustrate the possible role of low carbon gases including imports to EU

- Strong role for indigenous Biomethane
- Import of low carbon methane and hydrogen
- Unabated natural gas in decline

National Trends

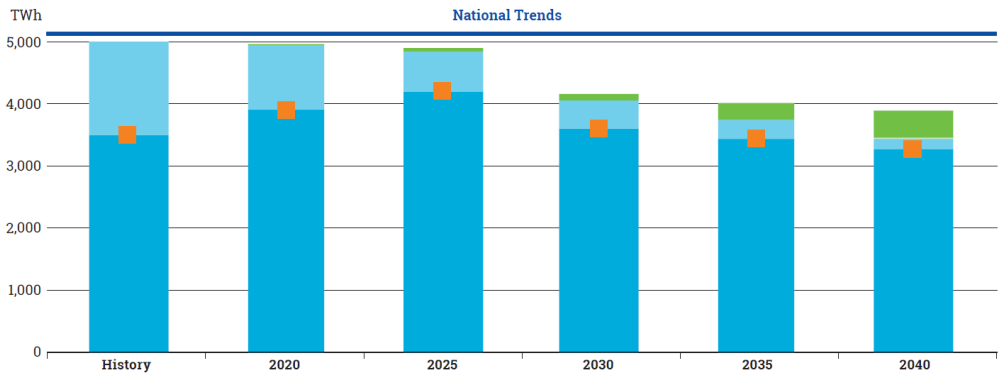


Figure 23: Gas source composition: National Trends

Global Ambition

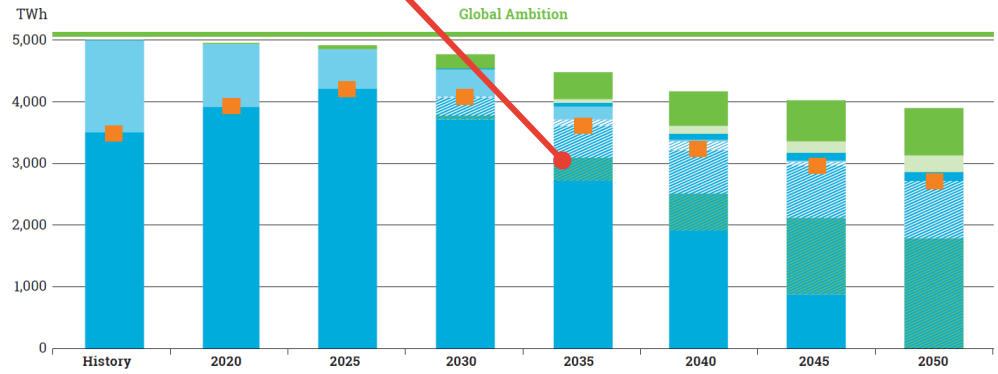


Figure 25: Gas source composition: Global Ambition

Imported Natural Gas: Unabated

Indigenous Natural Gas: Unabated, Abated

Power-to-Hydrogen, Power-to-Methane, Biomethane, Imports (incl. Norway)

Imports for Methane Demand*, Imports for Hydrogen Demand**

*decarbonised, either by natural gas imports with post-combustive CCU/s or any other technology
**natural gas converted to hydrogen at import point/city gate or direct hydrogen imports

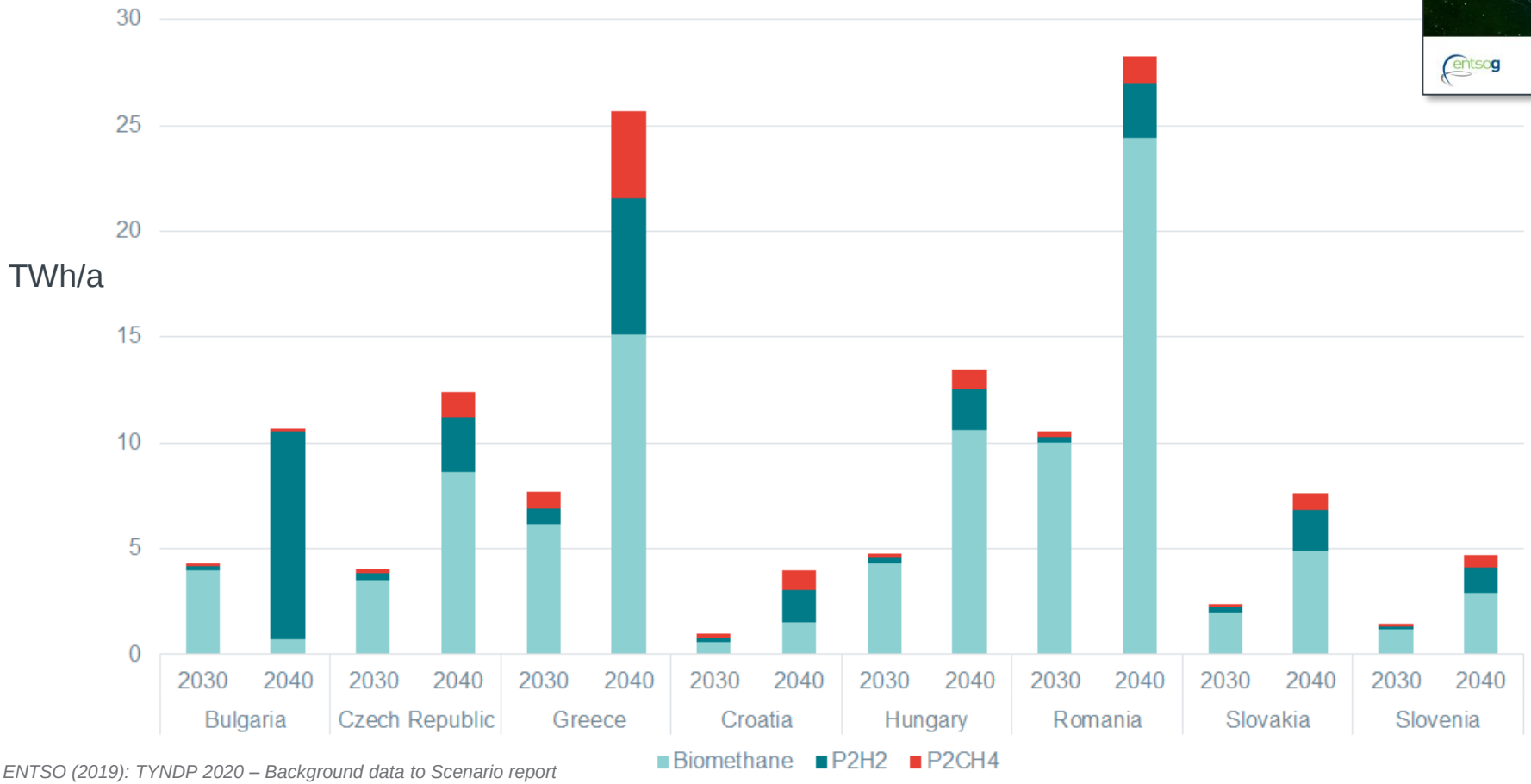
Source: ENTSO (2019): TYNDP 2020 – Scenario report

- Based on National Energy and Climate Plans (NECPs), applying a bottom up approach
- Consistent with 80% overall CO2 abatement, not consistent with Paris climate agreement

- Based on Top Down Scenario (starting with primary energy demand) that makes EU net carbon neutral by 2050
- consistent with Paris climate agreement
- Relies on a more centralised approach to decarbonisation (as compared to the „Distributed Generation“ scenario)

The ENTSO scenarios also show potential for low carbon gas in SEE

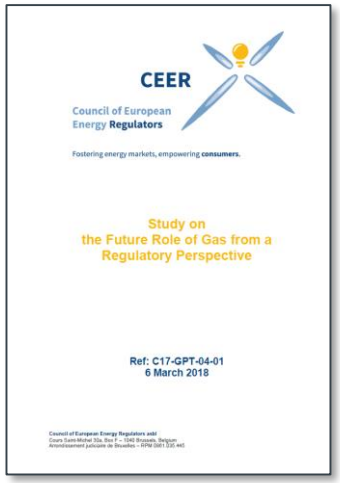
Global ambition scenario (reflective of Paris climate targets for 2050)



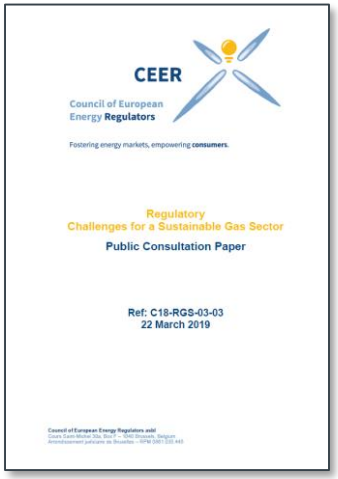
Source: ENTSO (2019): TYNDP 2020 – Background data to Scenario report

… but this will require a change to current market designs and climate policy

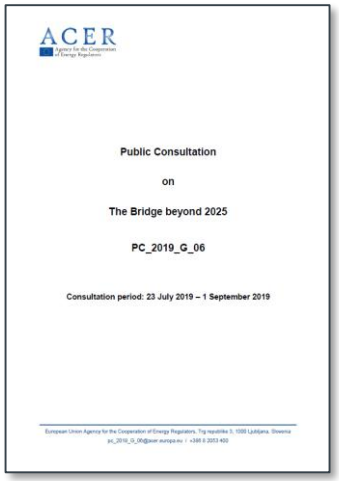
European Authorities have started consulting on market design for a decarbonising gas market and more policy input will follow



CEER Study, March 2018



CEER Consultation, March 2019



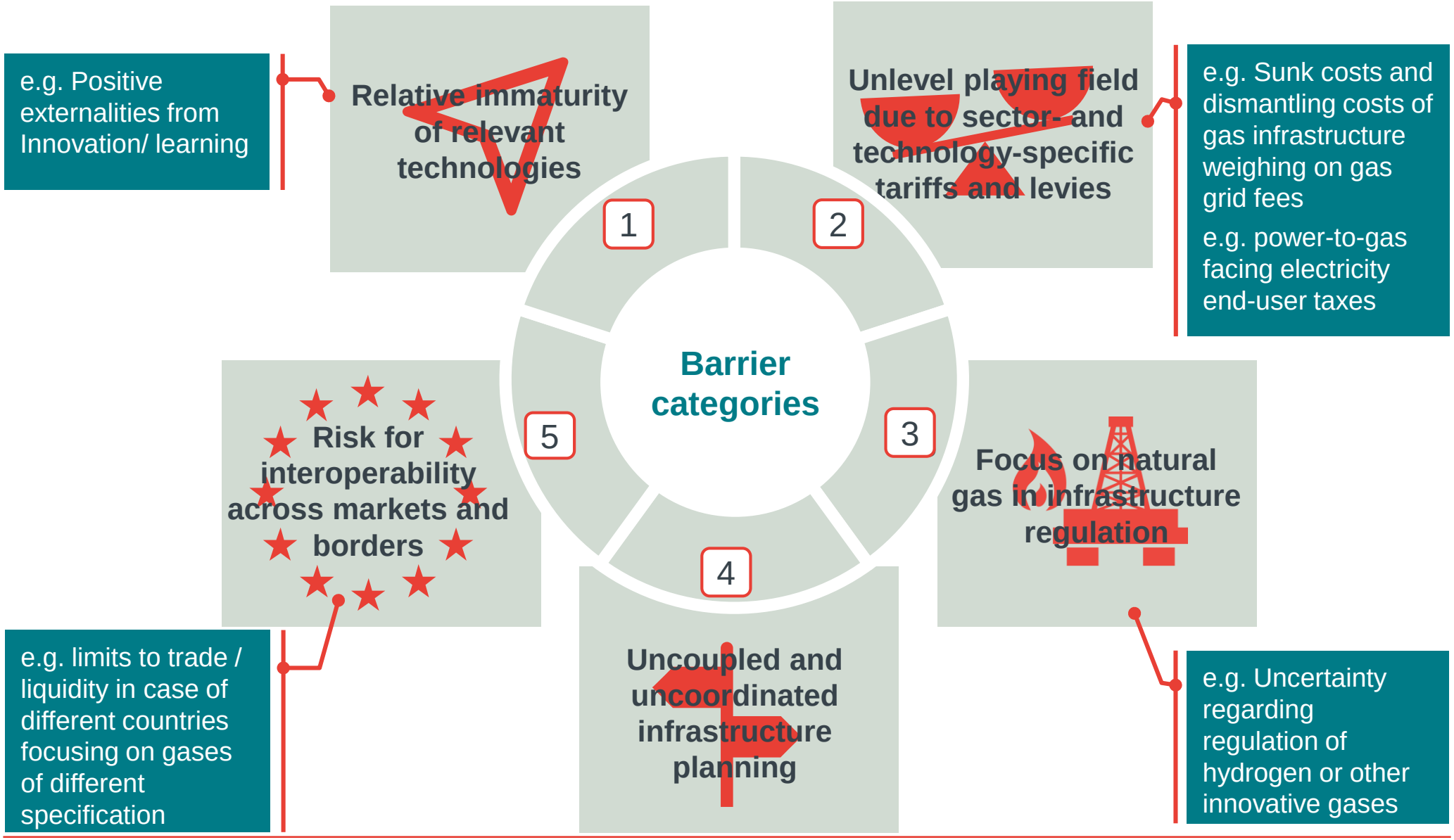
ACER Consultation, July 2019

Madrid Gas Regulatory Forum, June/Oct 2019

Green Deal

Decarbonisation Package (2021?)

Barriers and gaps have been identified in five areas



Source: Frontier Economics and CE Delft (2019):
https://ec.europa.eu/info/sites/info/files/frontier_-_potentials_of_sector_coupling_for_decarbonisation.pdf

Two key dimensions incentivise investment / operation: price or subsidy (or a hybrid version), and level of application

Climate / renewable policy and support for innovation

		Carbon price	Hybrid carbon price & subsidy regime	Subsidy regime
		Price paid for emitting CO2 varying by gas CO2 content	Mix of carbon price and subsidy scheme for different types of gases	Subsidy paid to low carbon gas producers based on CO2 abated
Applied at production / import level	Producers or importers pay CO2 price or receive support payments	Design 1	Design 5	Design 3 (tenders for low carbon gas)
Applied at sale to final customer	Party selling to final customers pays CO2 price or has obligation to purchase low carbon	Design 2	Design 6	Design 4 (certificate scheme)

Reflects the reality of most support for RES-E today

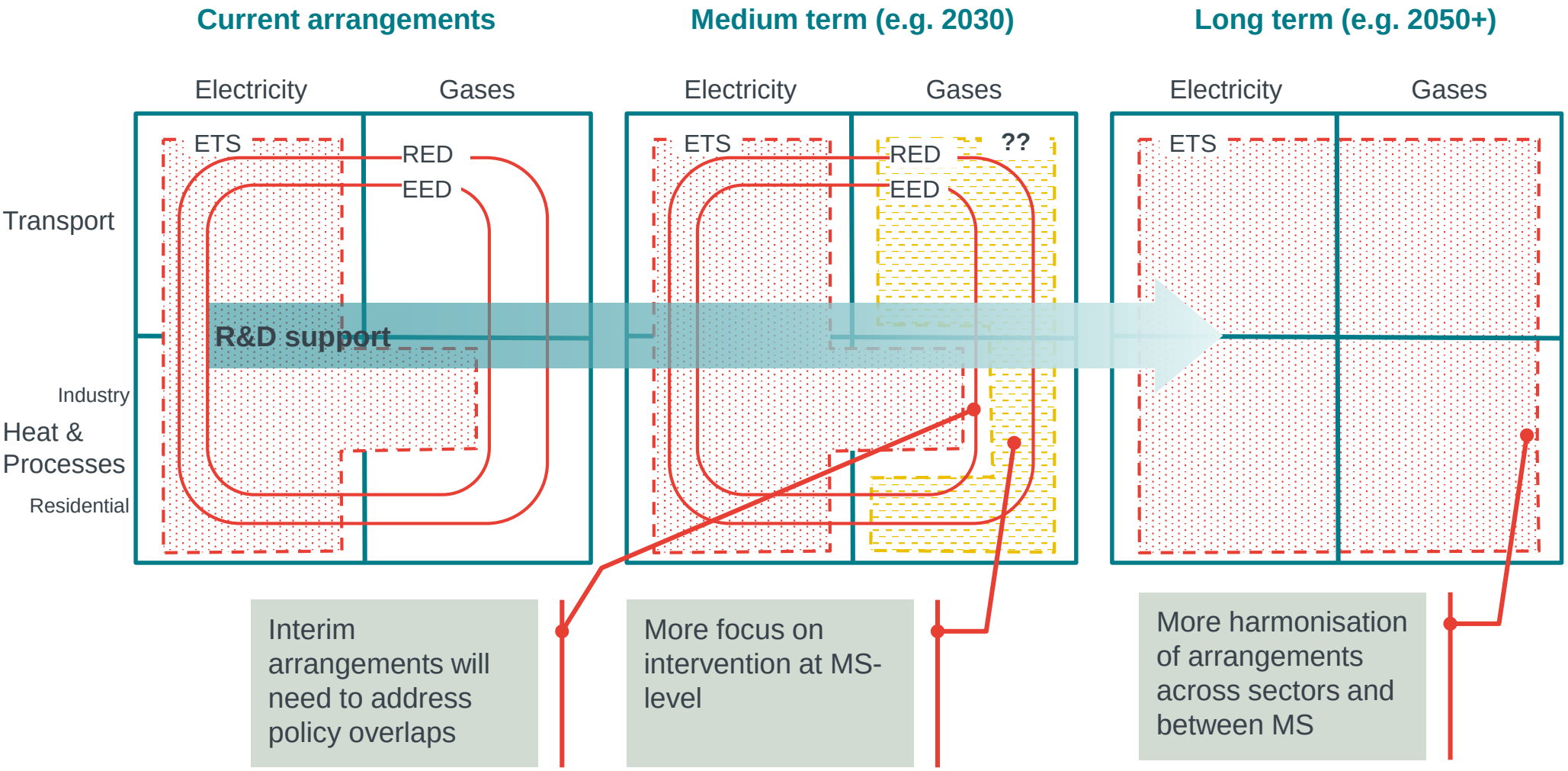
Interim period to 2030

Enduring regime to 2050

Source: adapted from Frontier report for EFET (interim results)

Over the longer-term, it is possible to envisage a more stringent and integrated climate policy

Climate / renewable policy and support for innovation



For consistency the climate policy framework could and should extend to liquid fuels

Source: adapted from Frontier report for EFET (interim results)