Potentials of sector coupling for decarbonisation - Assessing regulatory barriers in linking the gas and electricity sectors in the EU

Stakeholder workshop

6 March 2019

Agenda

1015-1030	**1.**	**Introduction by the Commission**
1030-1130	**2.**	**"Potentials of sector coupling for decarbonisation - Assessing regulatory barriers in linking the gas and electricity sectors in the EU"** **Introduction of the study: state of play and methodology - Presentation by the consultant and discussion**
	3.	**Potential regulatory barriers – Presentation by the consultant and discussion**
1130-1215	3.A	Group 1: Relative immaturity of sector coupling and renewable gases technologies – where are the barriers?
1215-1300	3.B	Group 2: Is there an unlevel playing field due to sector and technology-specific tariffs and levies?
1300-1430	Lunch Break	
1430-1530	3.C	Group 3: Is the current regulatory framework for natural gas a barrier for renewable and low-carbon gases?
1530-1615	3.D	Group 4: Would uncoupled and uncoordinated infrastructure planning constitute a barrier?
1615-1645	3.E	Group 5: Does the energy transition pose risks for the interoperability across markets and borders?
1645-1700	**4.**	**Conclusions and next steps – Commission**

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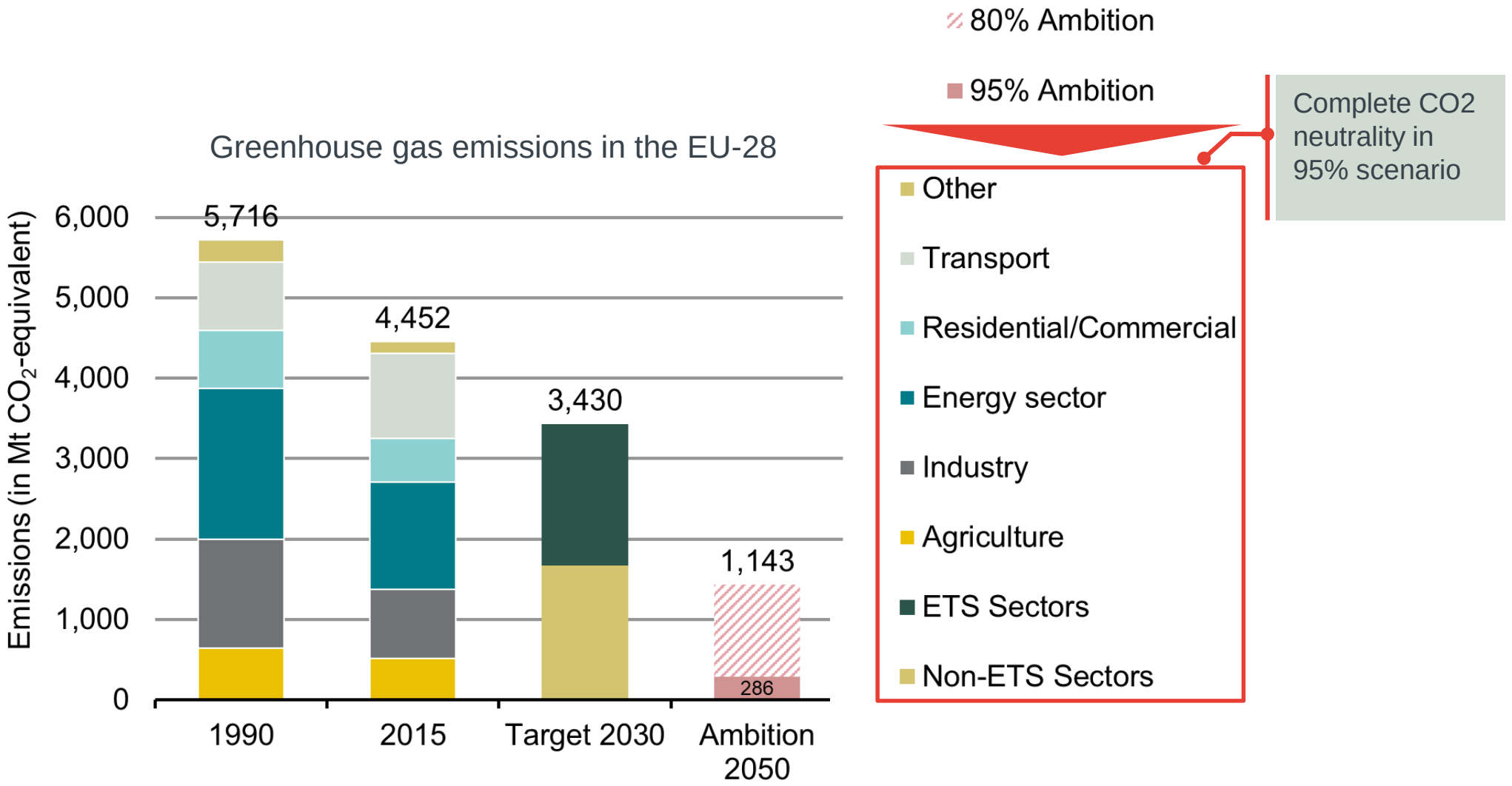
The ambitious EU climate targets require an (almost) complete decarbonisation of all sectors

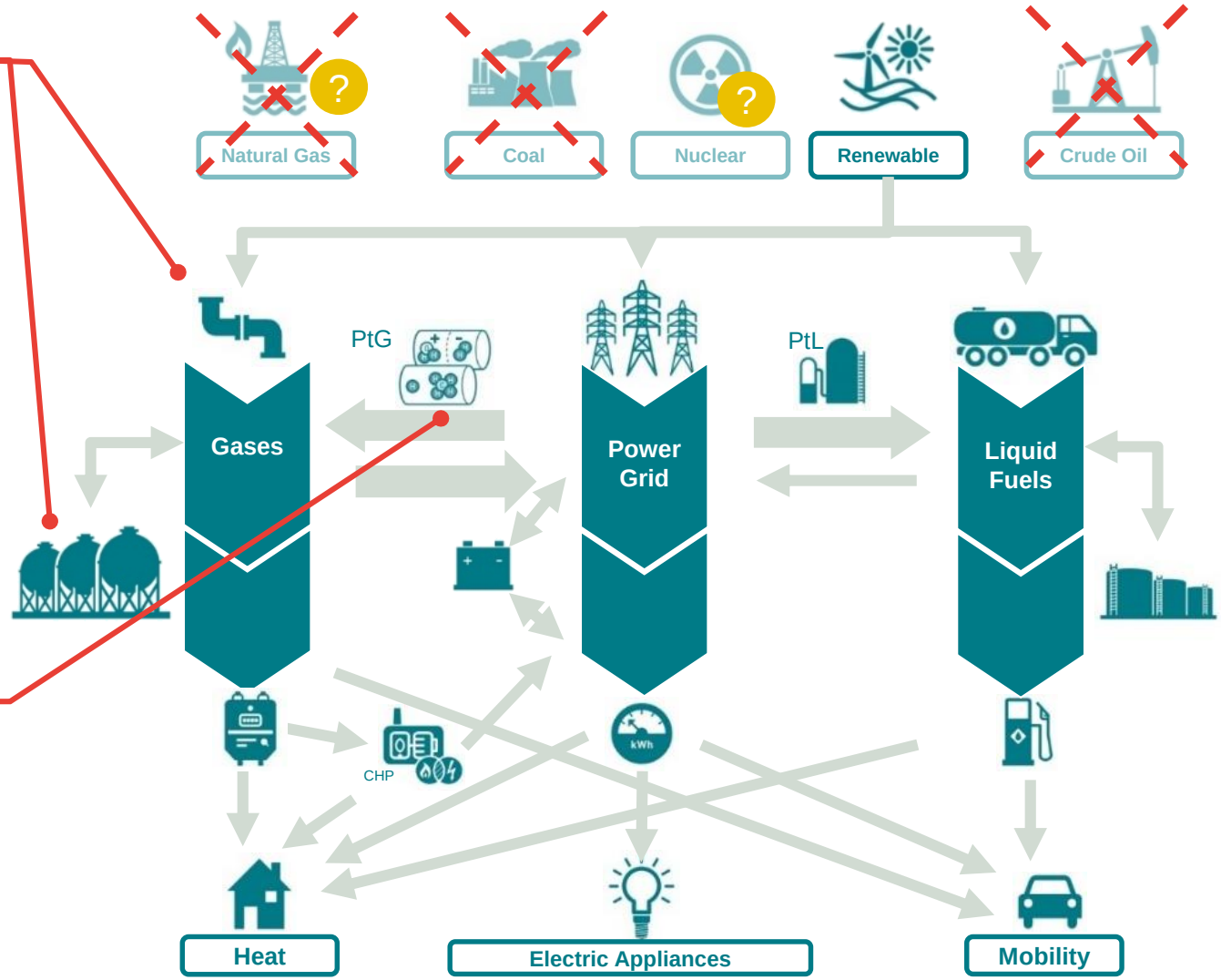


Source: Frontier Economics based on European Environment Agency data.

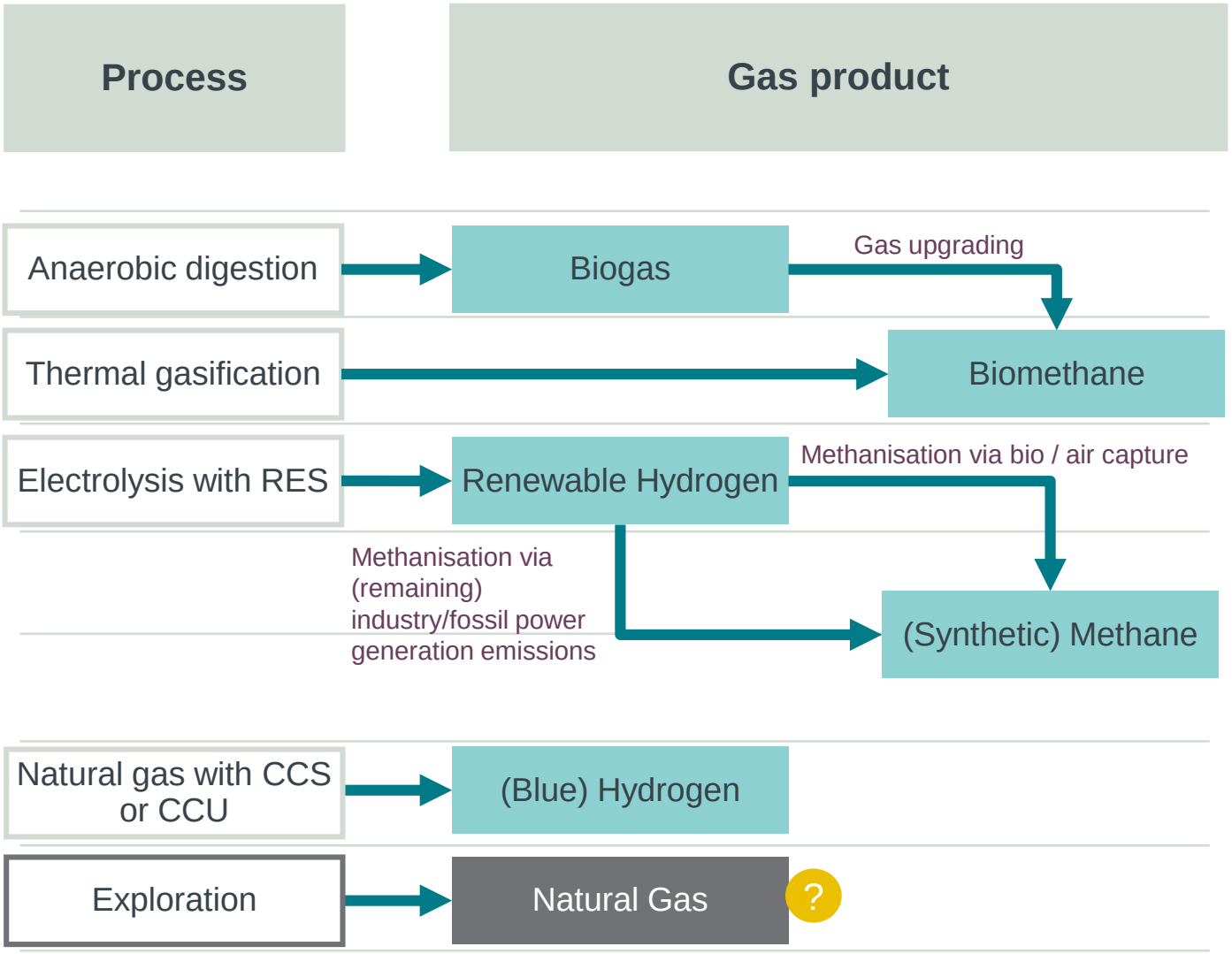
There is a growing recognition that gases (and gas infrastructure) can play a role in helping to meet these targets

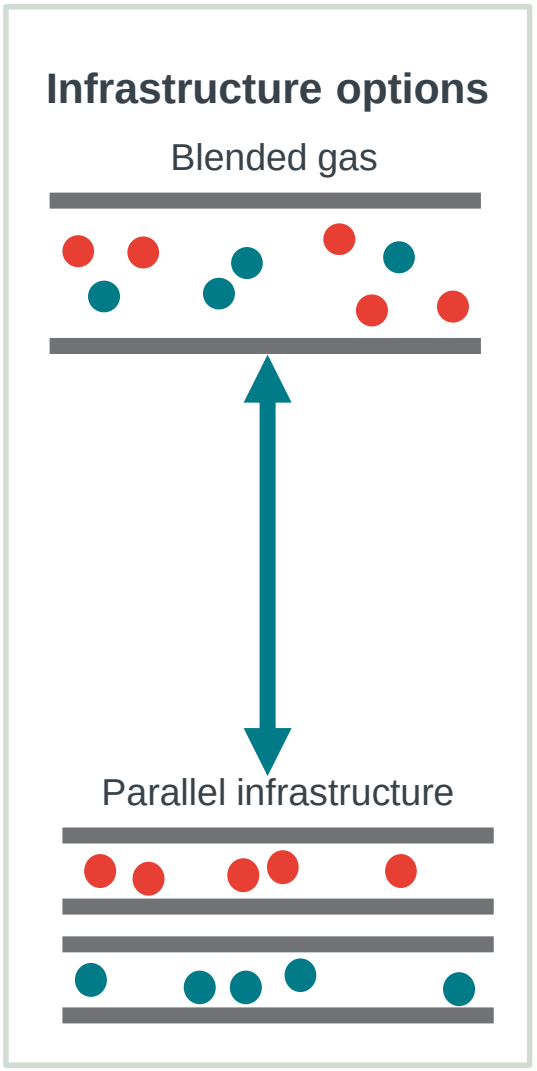
Significant existing transport and (seasonal) storage infrastructure

Growing ‘coupling’ of gas and electricity supply chains



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





Study objective: Identify barriers which may limit the potential of relevant technologies to contribute to cost-effective decarbonisation in the EU

This overarching objective has been divided into three sub-objectives:

Initial analysis

Considering the EU's climate goals, describe for 2030 and for 2050:

- possible **future EU energy system**
- **the role of gases** within this and
- **relevant** sector-coupling and renewable gas **technologies**

Regulatory barriers and gaps

- Identify possible areas of **regulatory barriers and gaps** in MS reviewed
- Assess presence of **regulatory barriers and gaps** in MS reviewed

Policy recommendations

Provide recommendations for a potential **regulatory framework** that **allows for the participation of relevant technologies,** which can contribute to providing the needed flexibility in the energy system and to reaching the decarbonisation targets.

The initial analysis has been completed – we now summarise its findings

Initial analysis

Considering the EU's climate goals, describe for 2030 and for 2050:

a) possible **future EU energy system,**
b) **the role of gases** within this and
c) **relevant** sector-coupling and renewable gas **technologies**

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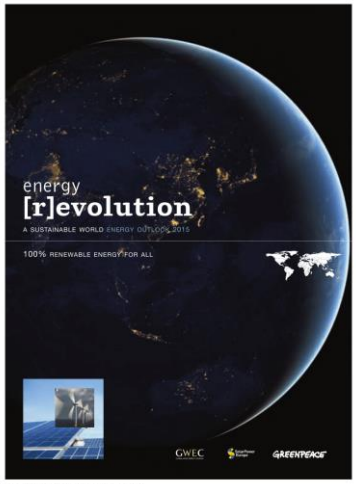
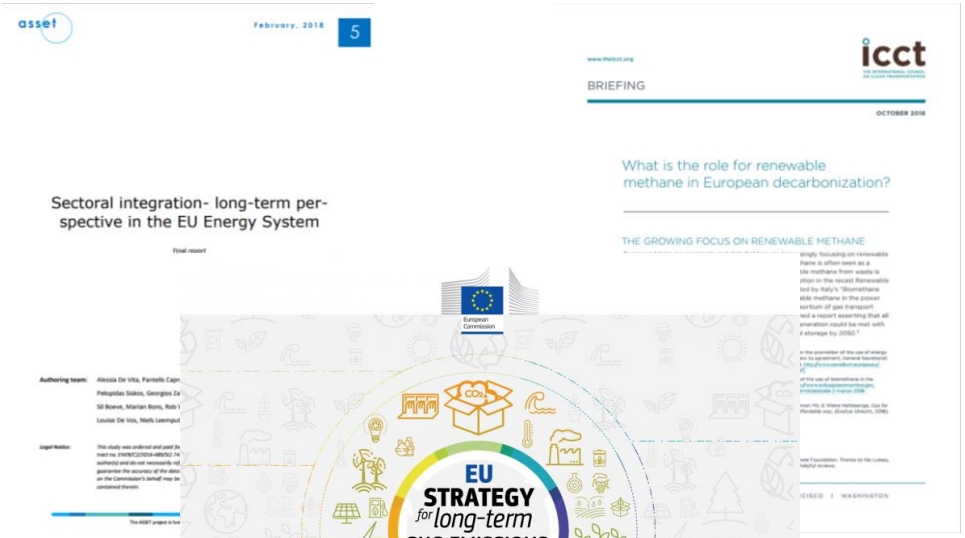
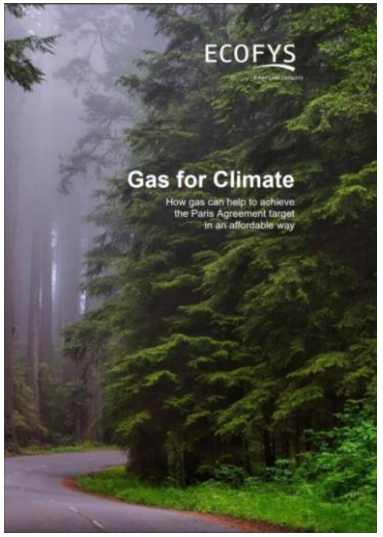
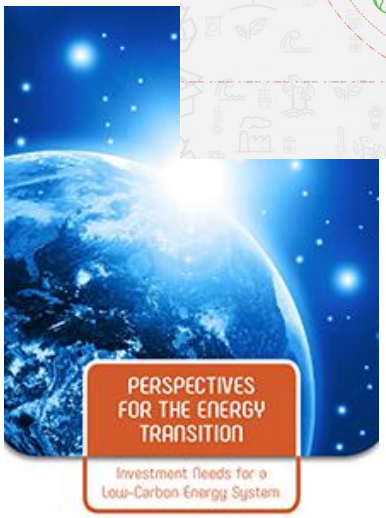
We reviewed recent studies describing potential future decarbonised EU energy systems and the role of renewable gases

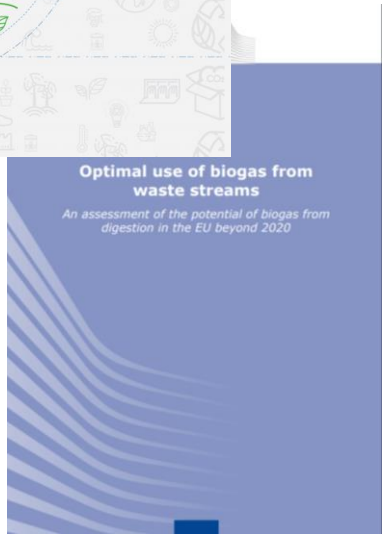




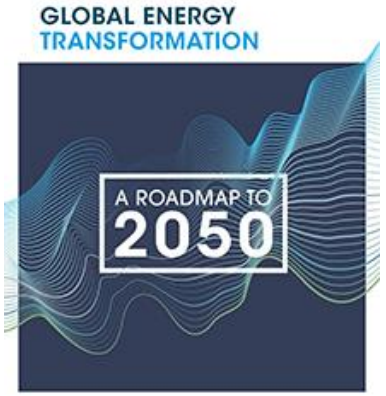


Trinomics



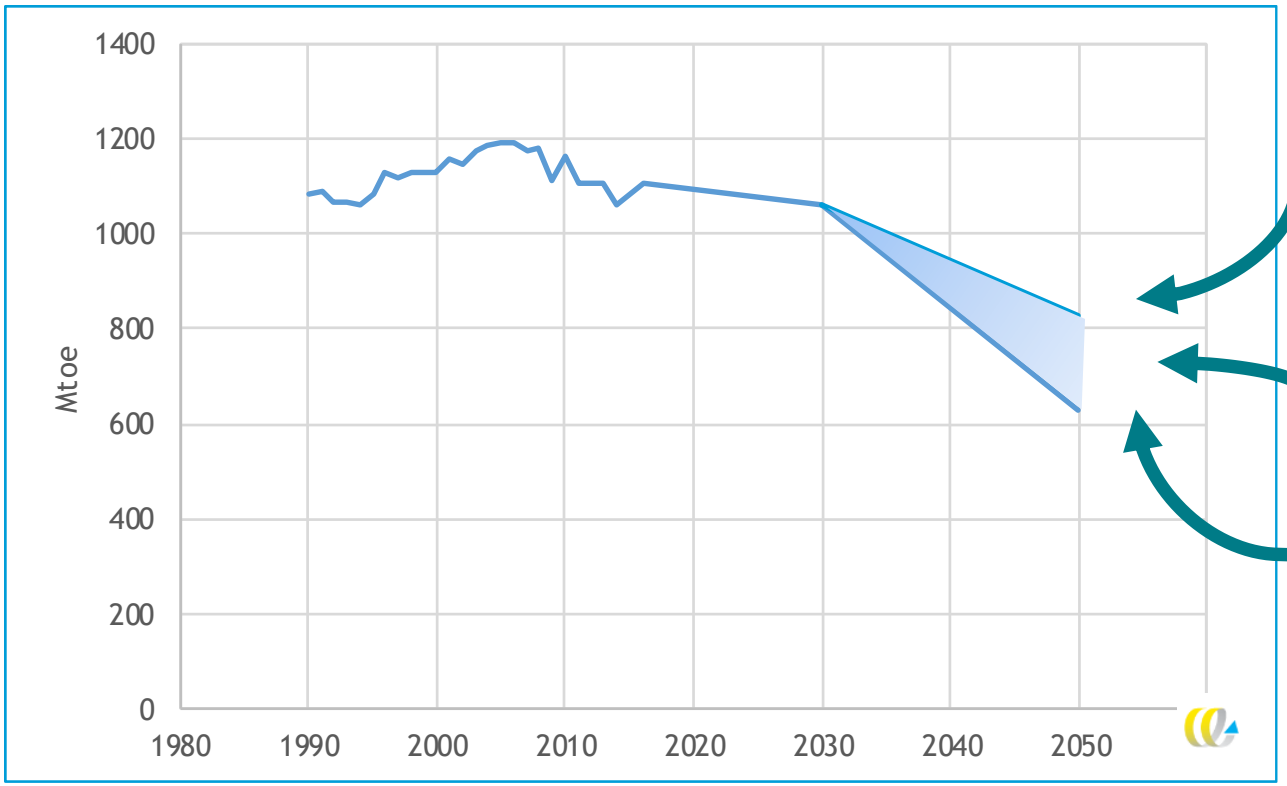


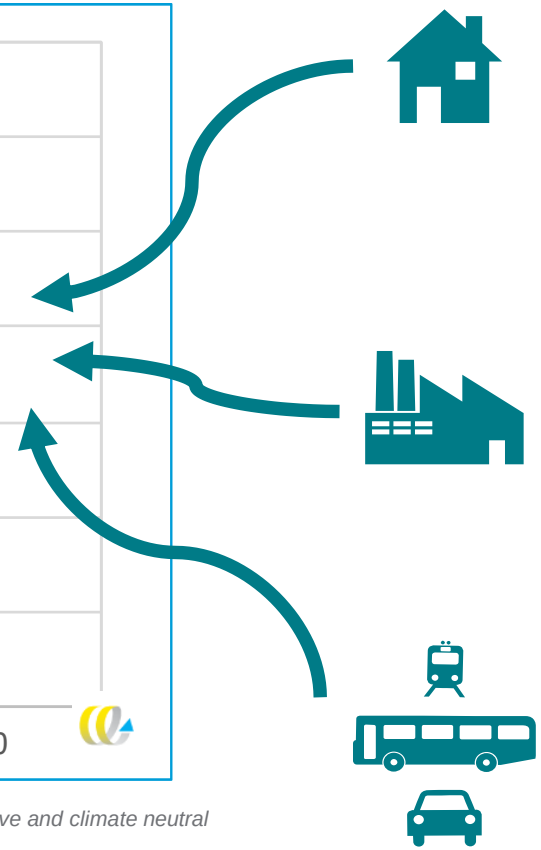
IRENA



A consistent finding across all scenarios is a significant fall in final energy demand

EU final energy demand: historic data, forecast for 2030 and average for the decarbonisation scenarios for 2050 developed for the Long Term Strategy





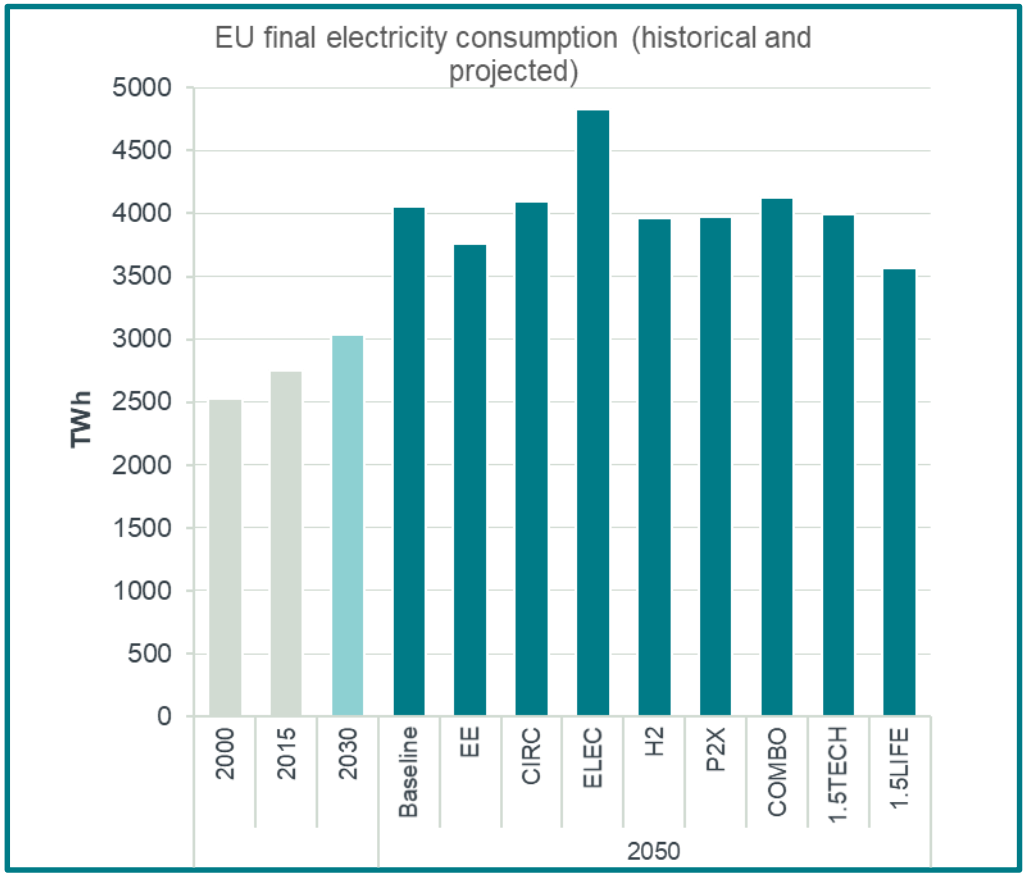
Strong reduction of heat demand

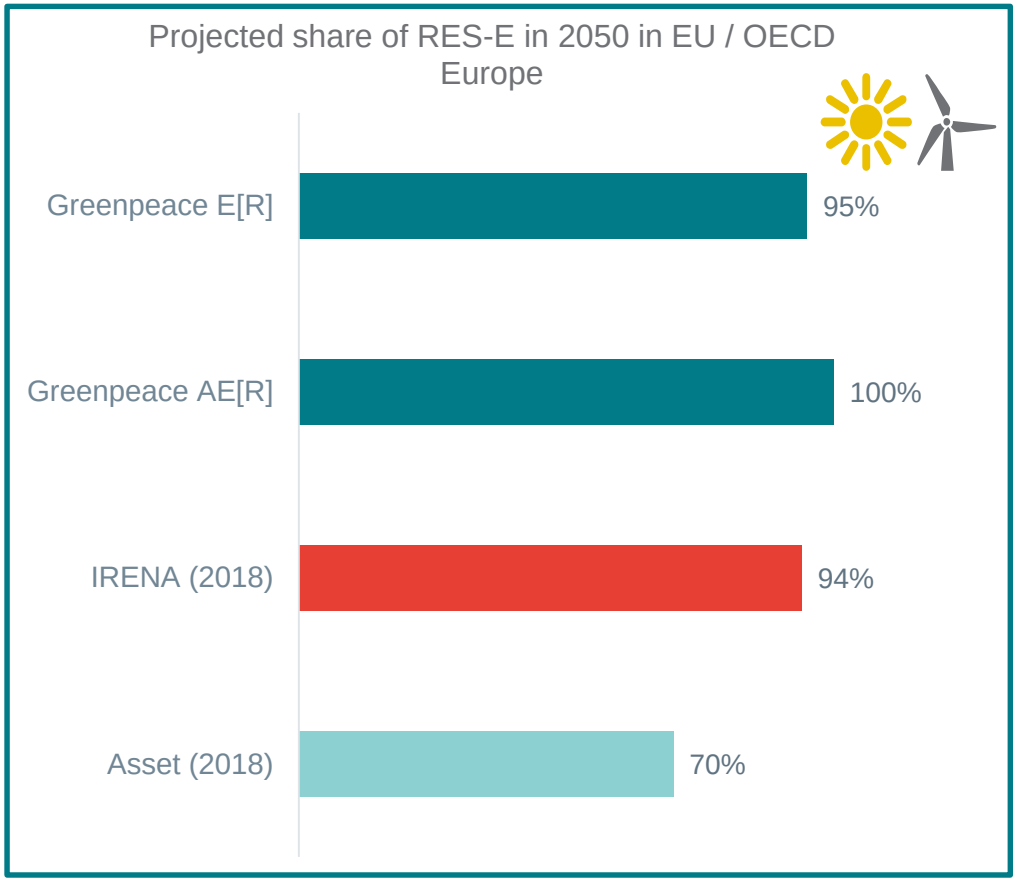
Energy efficiency (best available technologies and innovation)

Modal shift and energy efficiency

Source: EC (2018a) 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: European Commission (EC)

Other trends: Increased electricity demand, growth of intermittent renewable electricity, increased need for power system flexibility



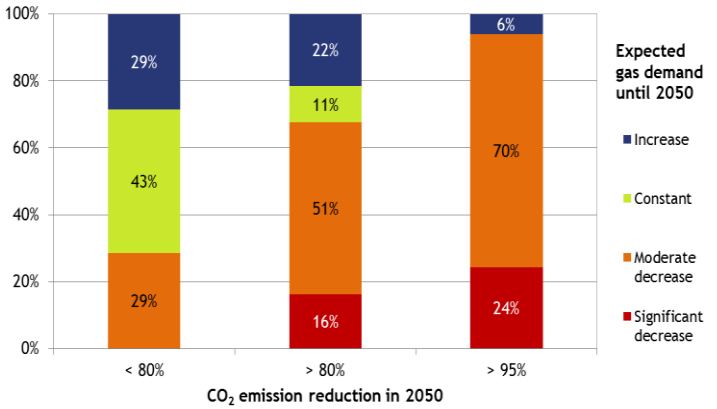


Source: EC (2018a)

Increasing flexibility needs over short-term (e.g. within day) and between seasons + increasing need for electricity transportation (connecting new sources of energy to demand centres; connecting EVs)

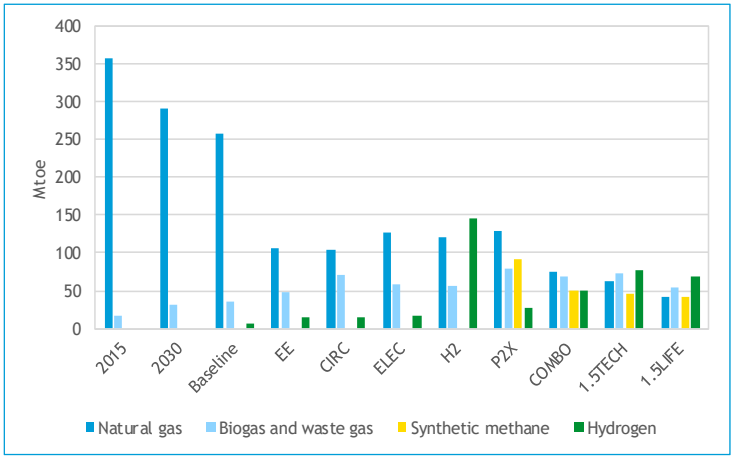
It is therefore not surprising that all scenarios retain a role for gases and gas infrastructure

Overall demand for gases - EU



Source: Trinomics, Ludwig Bölkow Systemechnik, Artelys and E3-Modelling (2018).

Scenarios for gas demand 2050



Source: EC (2018a)

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

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

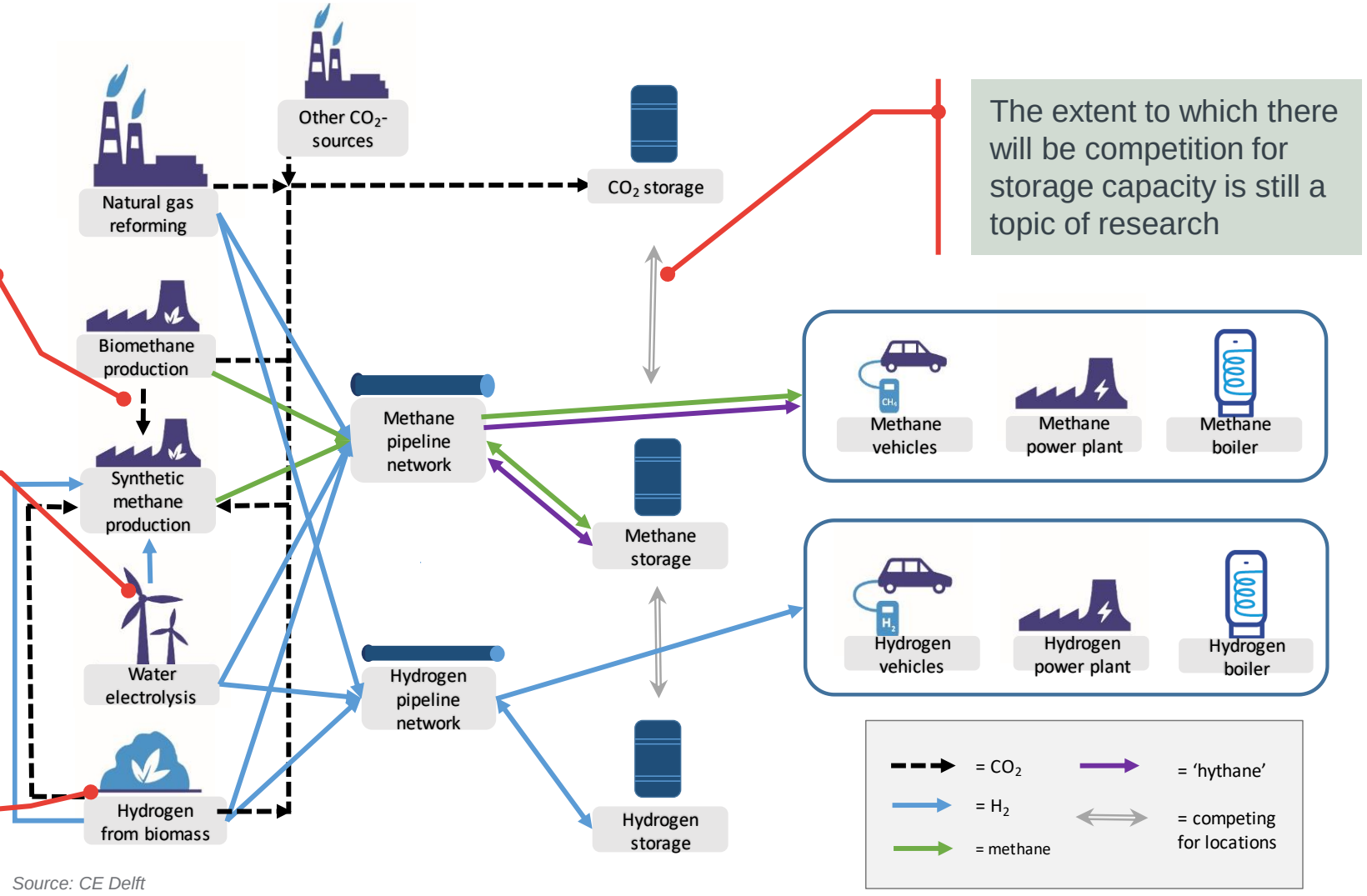
- Possible to use renewable and low-carbon gases in a range of applications (in some cases with adaptation of infrastructure / appliances)
- Different gases may feature more strongly in different countries / regions
- Uncertainties regarding costs and (in case of biogas) availability of (sustainable)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

There is a wide range of potential approaches to renewable and low-carbon gas production and consumption…

CO2 from anaerobic digestion could be used in methane production

Electrolysis – new linkage between electricity and gas

Competition for biomass use with biomethane production



Source: CE Delft

The extent to which there will be competition for storage capacity is still a topic of research

… which is likely to lead to new linkages between sectors

The initial analysis has influenced the focus of our barriers analysis

Demand for natural gas (and gases overall) will decline, although timeline/extent uncertain	▪ Focus of regulation needs to shift from natural gas to renewable and low-carbon gases ▪ Regulation increasingly will also need to consider how to deal with decommissioning and asset stranding uncertainty
Different low-carbon and renewable gases likely to be key to the future energy system	▪ Importance of continued innovation / learning in immature technologies ▪ Importance of a level playing field between different gases ▪ One approach may not fit all countries / regions: consider how different products can co-exist in the future
Increasing linkages between sectors	▪ Power-to-gas technologies link electricity and gas sectors ▪ Importance of co-ordinated approach to infrastructure planning, risk preparedness and system operation across sectors (and between transmission and distribution)
Consumers are being asked / required to make significant changes	▪ Consider the way in which consumers engage with new gases (and new uses for gas, e.g. in transport)

Description of methodology for assessing regulatory barriers and gaps

Initial analysis

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Our methodology leads us to a long list of barriers

Develop regulatory strawman

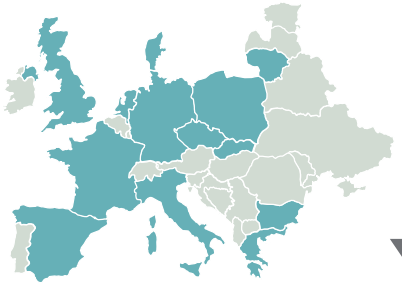
Define a conceptual benchmark using

- Insights from own experience (clients, conferences)
- Recent studies
- Stakeholder insights

Country cases

Business cases

- Compare country/value chain regulation against the conceptual benchmark



Long List

- Retrieve long list of regulatory barriers and gaps in MS

We

- developed a regulatory strawman and
- assessed countries' regulations and technological business cases against it

➢ to identify barriers.

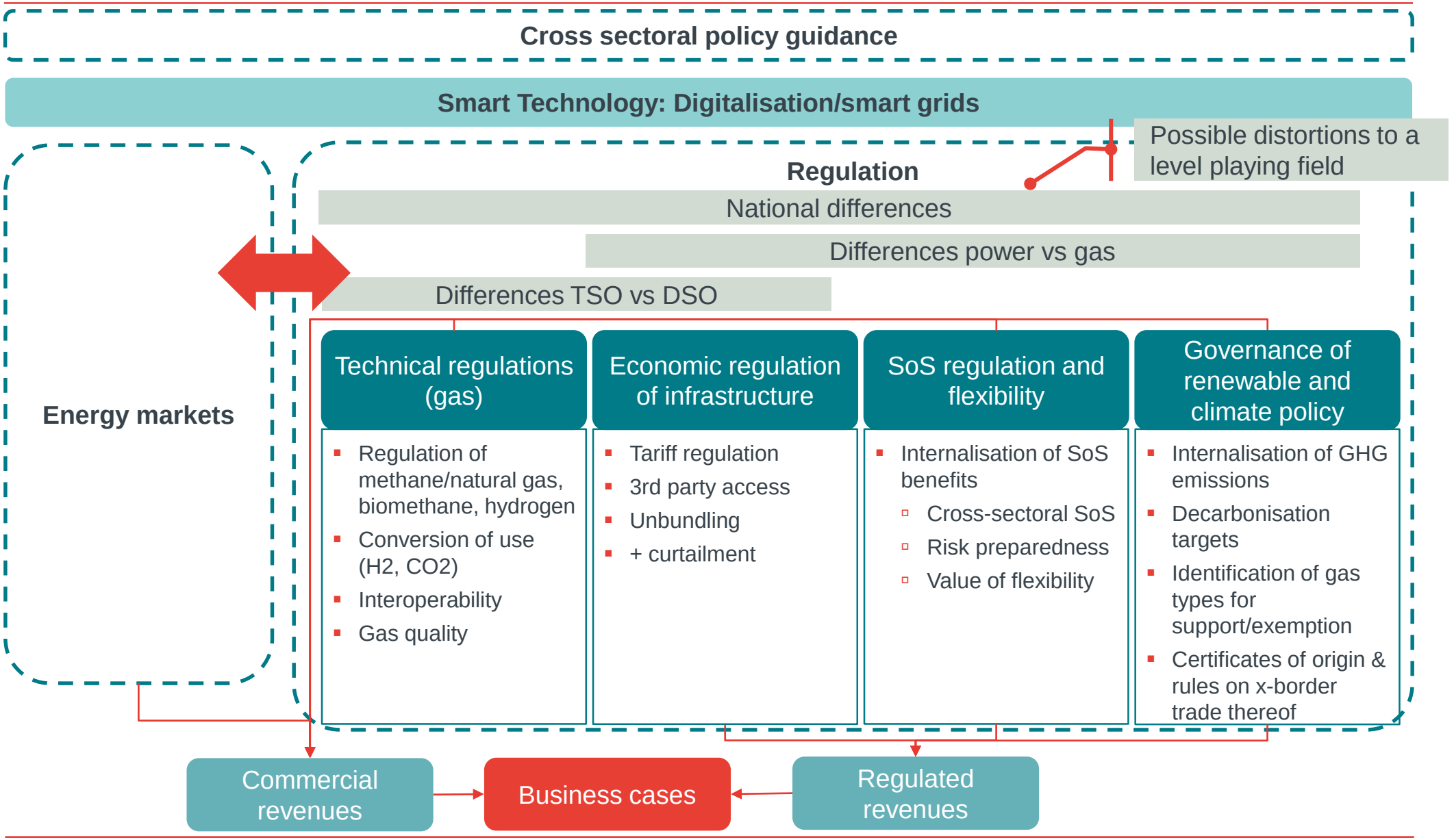
Short List

- Identify priority areas

Policy recommen-dations

- Recommend how to address barriers

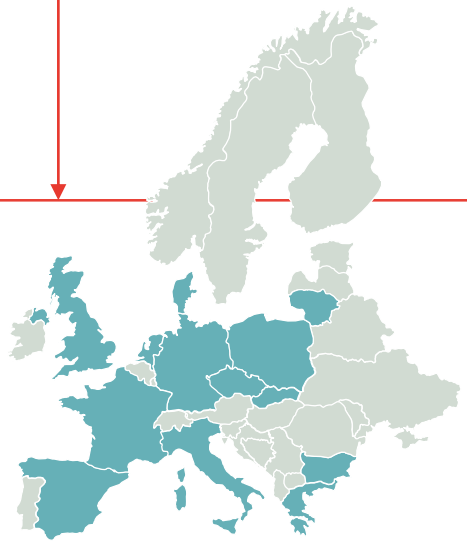
We developed a regulatory strawman to ensure coverage of barriers embedded anywhere in the system



We investigated regulatory frameworks and pilot projects across 13 member states to identify barriers and gaps…

Regulatory strawman

I … on the country level



Overview and local context

- A Technical Regulation for Gas
- B Economic Regulation for Gas
- C Security of Supply and flexibility
- D Renewable and Climate Policy

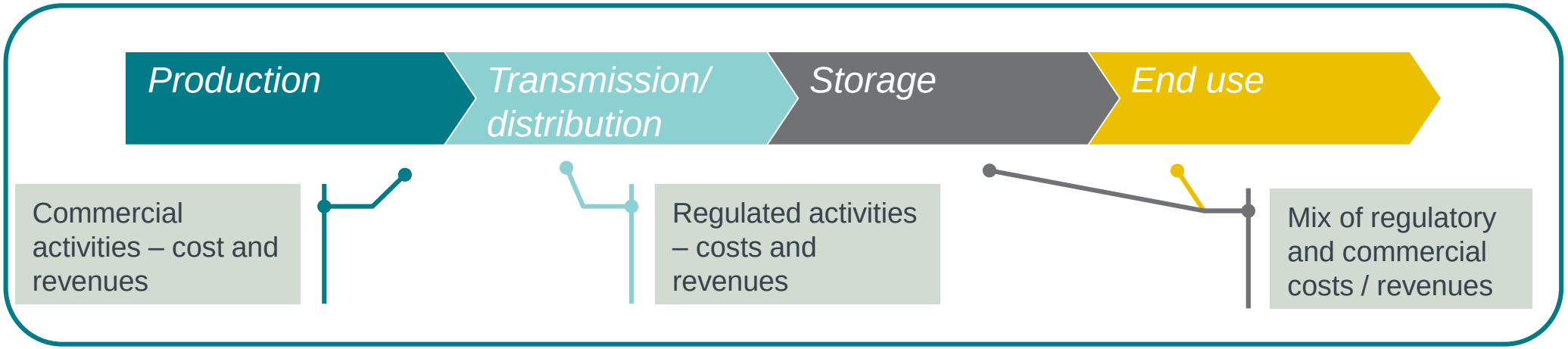
II … across member states

Detect regulatory inconsistencies

- between states
- between electricity and gas
- between TSOs and DSOs

We also used a value chain-based approach to think through barriers potentially relevant for specific business cases

Structure technology business cases



For each technology business case, consider and assign barriers to each stage of the value chain

Illustrative business cases spanning a range of potential sector coupling applications	▪ 1: T-connected PtG facility (electrolysis) injecting gas (CH4 or H2) into dedicated gas infrastructure serving (industrial) final consumers ▪ 2: D-connected PtG facility (electrolysis) injecting gas (CH4 or H2) into existing gas D-grid (no direct link to final consumer) ▪ 3: Biomethane injection facility injecting into existing gas grid (T or D, no direct link to final consumer) ▪ 4: D-connected power-to-gas-to-power storage facility (hydrogen) with dedicated on-site gas storage, arbitraging between off-peak and peak electricity prices

So on a high level what do we regard as a regulatory barrier?

Regulation …

- **Legal framework** on EU or MS level
- **Acts** of regulatory bodies and agencies
- **Administrative Practice**

The absence of a regulation may also pose a barrier. We also **cover gaps.**

… is a barrier if it threatens …

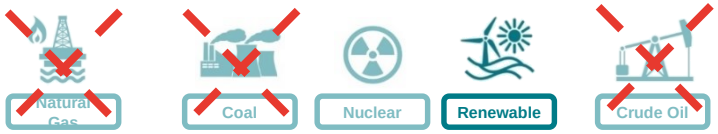
- either a **level playing field** between technologies to ensure cost-efficient deployment
- or the **development of** (promising?) **innovative technologies**

… which finally leads to

- a threat to achieving the climate policy targets (**effectiveness**) or
- extra costs of the energy transition (**efficiency**)

As well as adjusting to facilitate the uptake of sector coupling technologies [**transition issues**]…

…regulation may also need to adapt in other ways once they are adopted [**steady state issues**]



More specifically, barriers have to fall into one of three categories!

Market failures

When a free market does not result in efficient outcomes from a societal perspective.

Market failure arises because individual players' incentives are not in line with society's interests. Examples likely to be relevant here include:

- **Missing markets:** the market simply does not supply certain goods/services
- Negative (positive) **externalities**: When the social cost (benefit) of production/consumption exceeds the private cost (benefit), leading to over-(under-)consumption, relative to the socially optimal level.

Behavioural barriers and **equity (fairness) issues** are also sometimes described as market failures.

Regulatory failures

An economic inefficiency caused by regulatory intervention.

In this context, regulation could hinder:

- either a **level playing field** between technologies (to ensure cost-efficient deployment); or
- the **development of** (promising?) **innovative technologies**

Regulatory failure could also include barriers created by rules on international trade.

Allocation of risk

Key risks faced by investors include:

- Revenue risk
- Offtake ('route to market') risk
- Political / regulatory risk
- Construction risk
- Operating and performance risk
- Decommissioning risk

Risk can price a technology out of the market (high cost of capital) and more widely deter promoters from developing a technology (unfinanceable projects)

Regulatory barriers emerge if.

- Risk is **misallocated**: Economic efficiency requires that the risk is borne by the player that is able to manage it best at lowest cost
- Risk is **aggravated**
- Risk is **mitigated heterogeneously**

Which issues have we already excluded from the long list of barriers?

- Storage / DSR / biogas generation not allowed in CRMs (or discriminated against)
- Incomplete short-term electricity markets to monetise flexibility
- Regulated retail prices disguising true social costs (electricity v gas)

→ **Already addressed in (in some cases forthcoming) EU legislation (Network code implementation, new Electricity Regulation and Directive)**

- Lack of priority access to grid for renewable / low-carbon gases
- Lack of EU targets for renewable / low-carbon gases
- TSOs blocked from owning / operating PtG
- Support schemes do not account for all positive externalities

→ **Pointing to a solution rather than the underlying barrier**

The relative merits of different solutions will be addressed in the final stage of the study

Today we propose to discuss the long list of barriers, and to organise this discussion around 5 categories…

1. **Relative immaturity of sector coupling and renewable gases technologies – where are the barriers?**
2. **Is there an unlevel playing field due to sector and technology-specific tariffs and levies?**
3. **Is the current regulatory framework for natural gas a barrier for renewable and low-carbon gases?**
4. **Would uncoupled and uncoordinated infrastructure planning constitute a barrier?**
5. **Does the energy transition pose risks for the interoperability across markets and borders?**

We reiterate that today's discussion revolves around barriers, before we turn to solutions

Today we focus on

- Barriers
- Rather than solutions

Barriers

Long List

- Retrieve long list of regulatory barriers and gaps in MS

Short List

- Identify priority areas

Solutions

- Acceptance
- Consumer protection
- SoS
- Economic efficiency
- Timelines
- Complexity
- Investment environment

Policy recommen-dations

- Recommend how to address barriers

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Relative immaturity of sector coupling and renewable gases technologies – where are the barriers?

Barriers in this group appeared as particularly different between the transition and the steady state

Transition

Producer level	Consumer level
Positive externalities from innovation / technology spillovers / learning	Behavioural or information barriers to switching
Lack of know-how / engagement from players controlling process inputs	Affordability issues
Lack of liquid market for feedstock (biomass)	
First mover disadvantage - high infrastructure connection costs with 'deep' connection charging	Sector-specific targets biasing choice of technologies by end consumers

e.g. role of farmers currently not engaged with the energy sector

e.g. Limited public awareness; Perception of gas vehicles as dangerous

Issues may be lower than for electrification

e.g. Fleet targets discriminate in favour of electric vehicles

Steady State

Uncertain ability to monetise renewable / low-carbon characteristics

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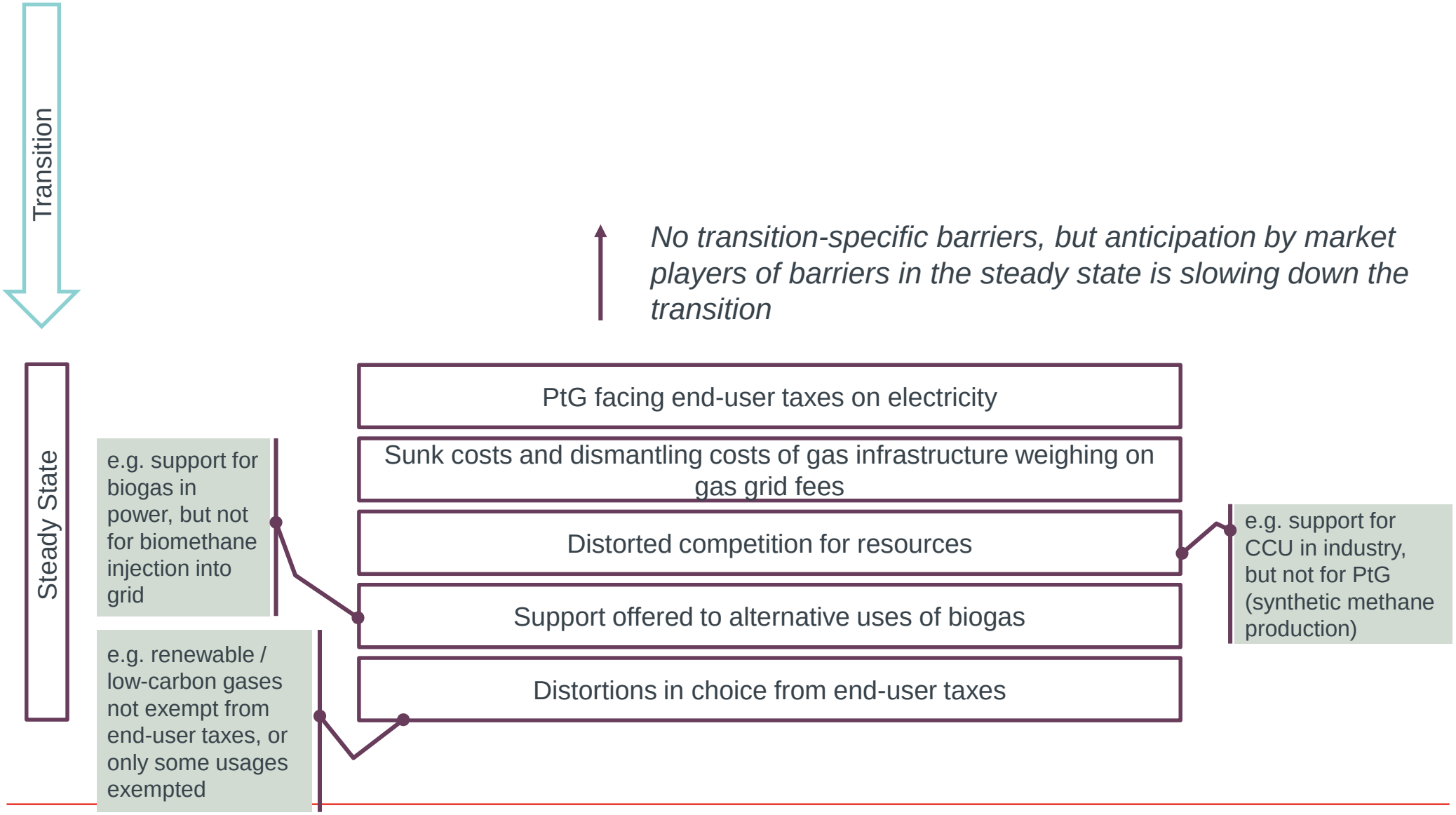

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1530-1615	3.D	Group 4: Would uncoupled and uncoordinated infrastructure planning constitute a barrier?
1615-1645	3.E	Group 5: Does the energy transition pose risks for the interoperability across markets and borders?
1645-1700	**4.**	**Conclusions and next steps – Commission**

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1030-1130	**2.**	**"Potentials of sector coupling for decarbonisation - Assessing regulatory barriers in linking the gas and electricity sectors in the EU"** **Introduction of the study: state of play and methodology - Presentation by the consultant and discussion**
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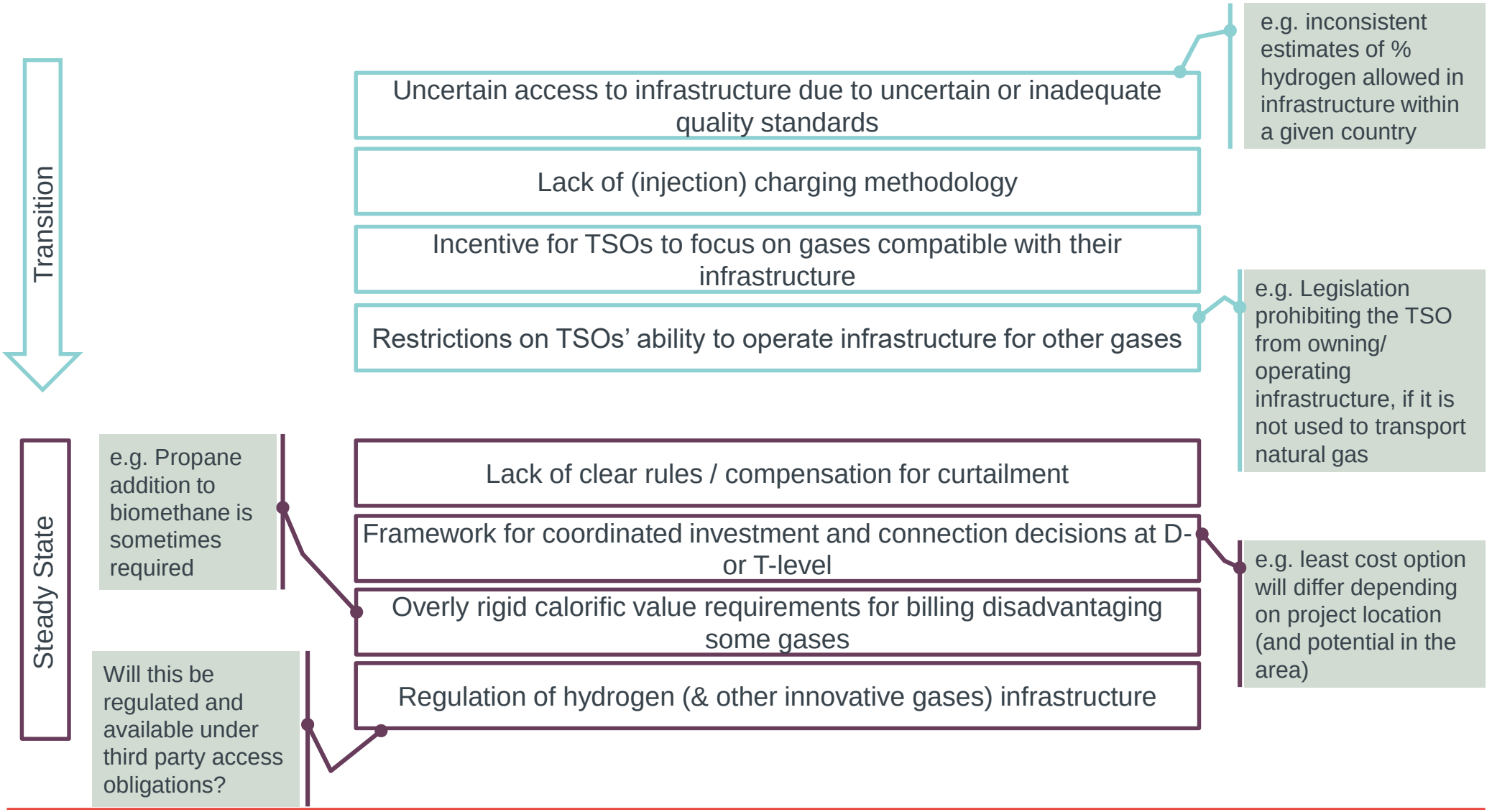

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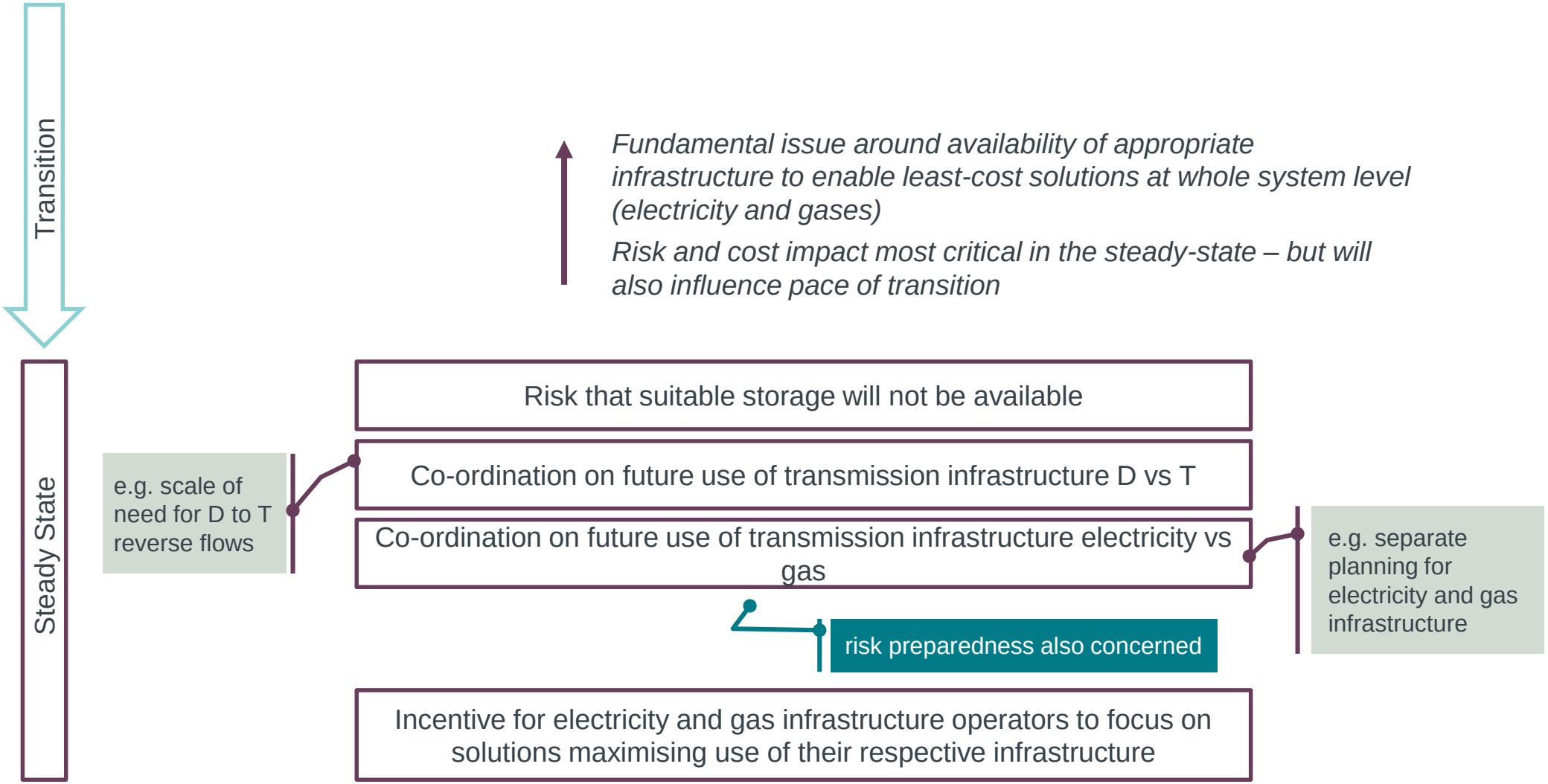

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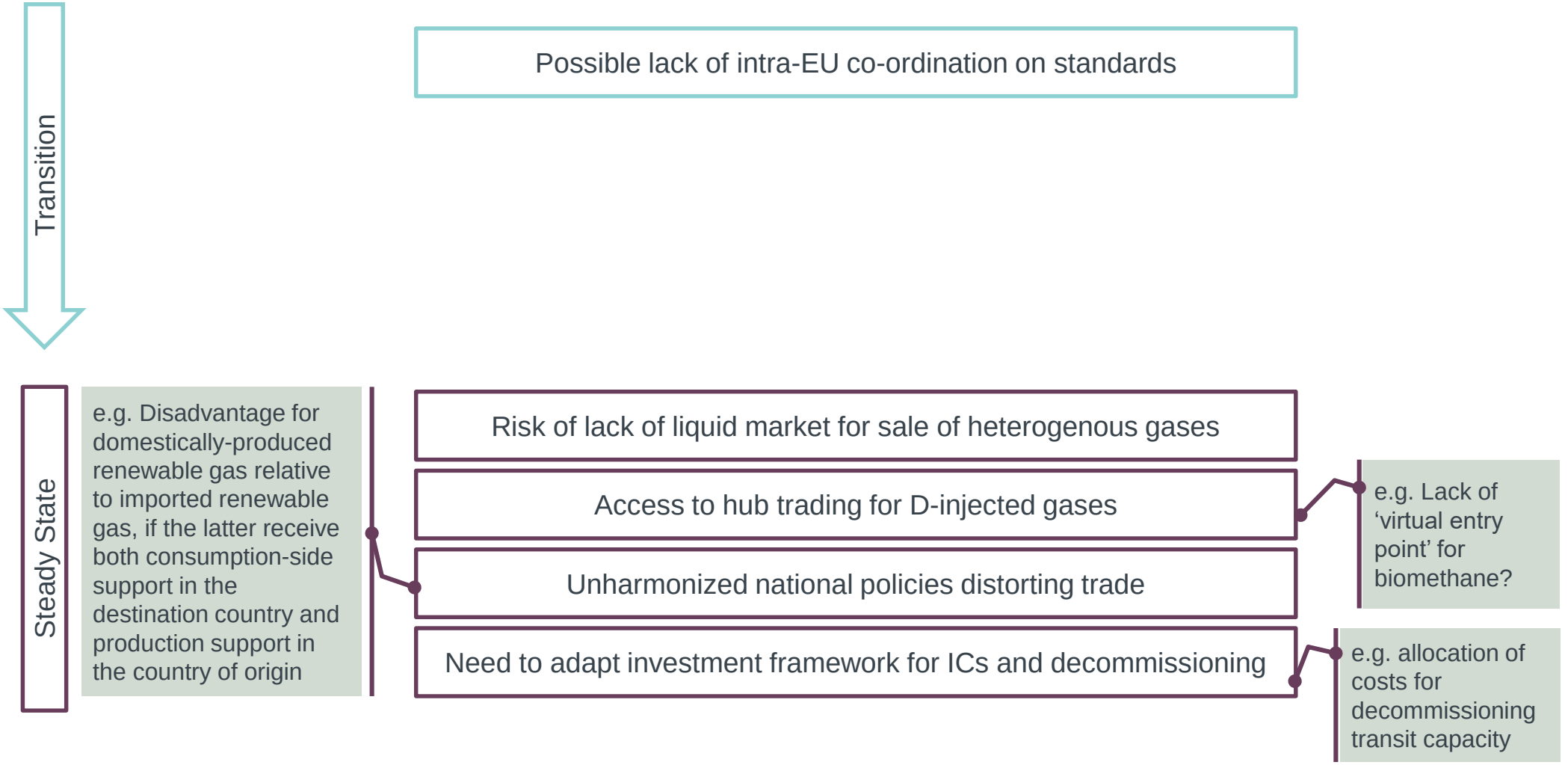

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Next steps

Develop regulatory strawman

Define a conceptual benchmark using

- Insights from own experience (clients, conferences)
- Recent studies
- Stakeholder insights

Country cases

Business cases

- Compare country/value chain regulation against the conceptual benchmark

Long List

- Retrieve long list of regulatory barriers and gaps in MS

Short List

- Identify priority areas

Policy recommen-dations

- Recommend how to address barriers