EPRG Spring Research Seminar

Policy responses to the energy crisis: implications for market design

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UNIVERSITY OF CAMBRIDGE
Energy Policy Research Group

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Contents

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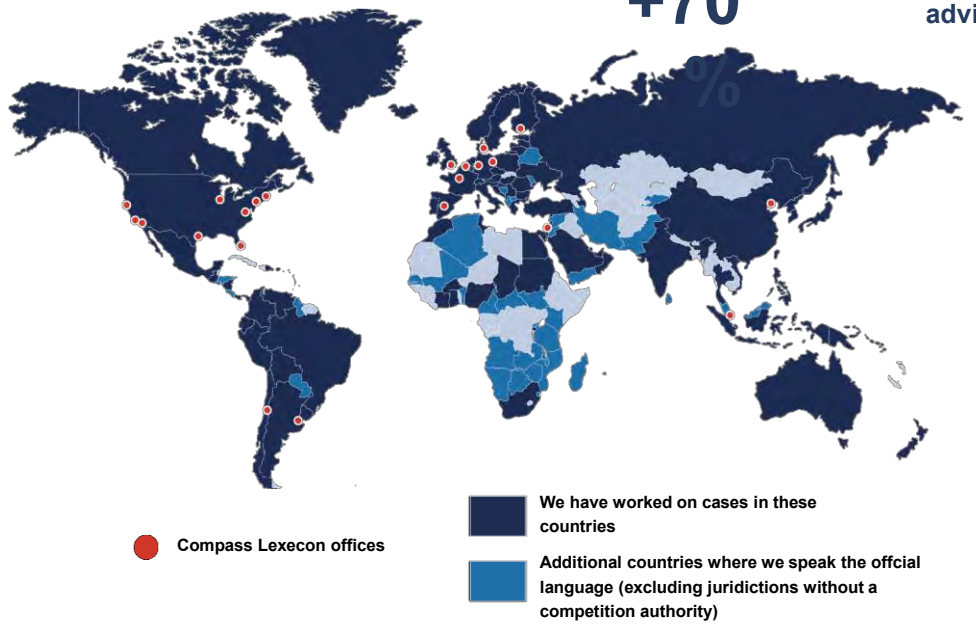

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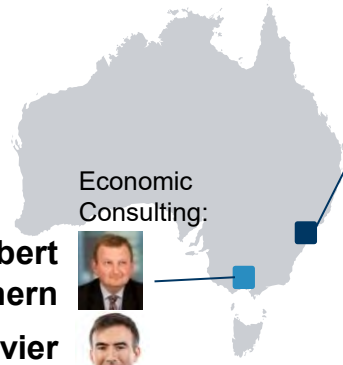

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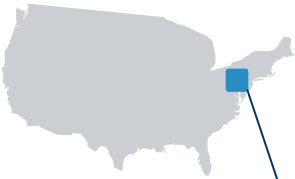


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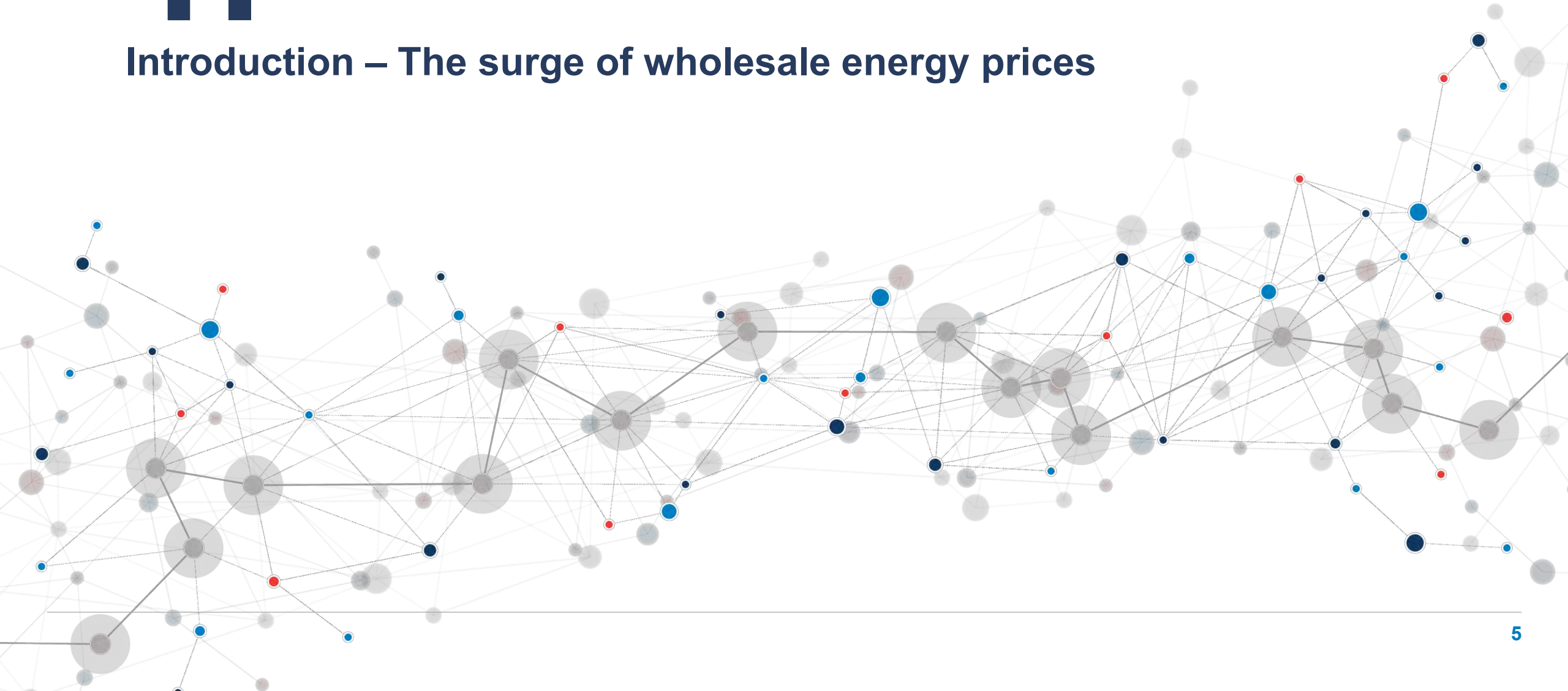
1.

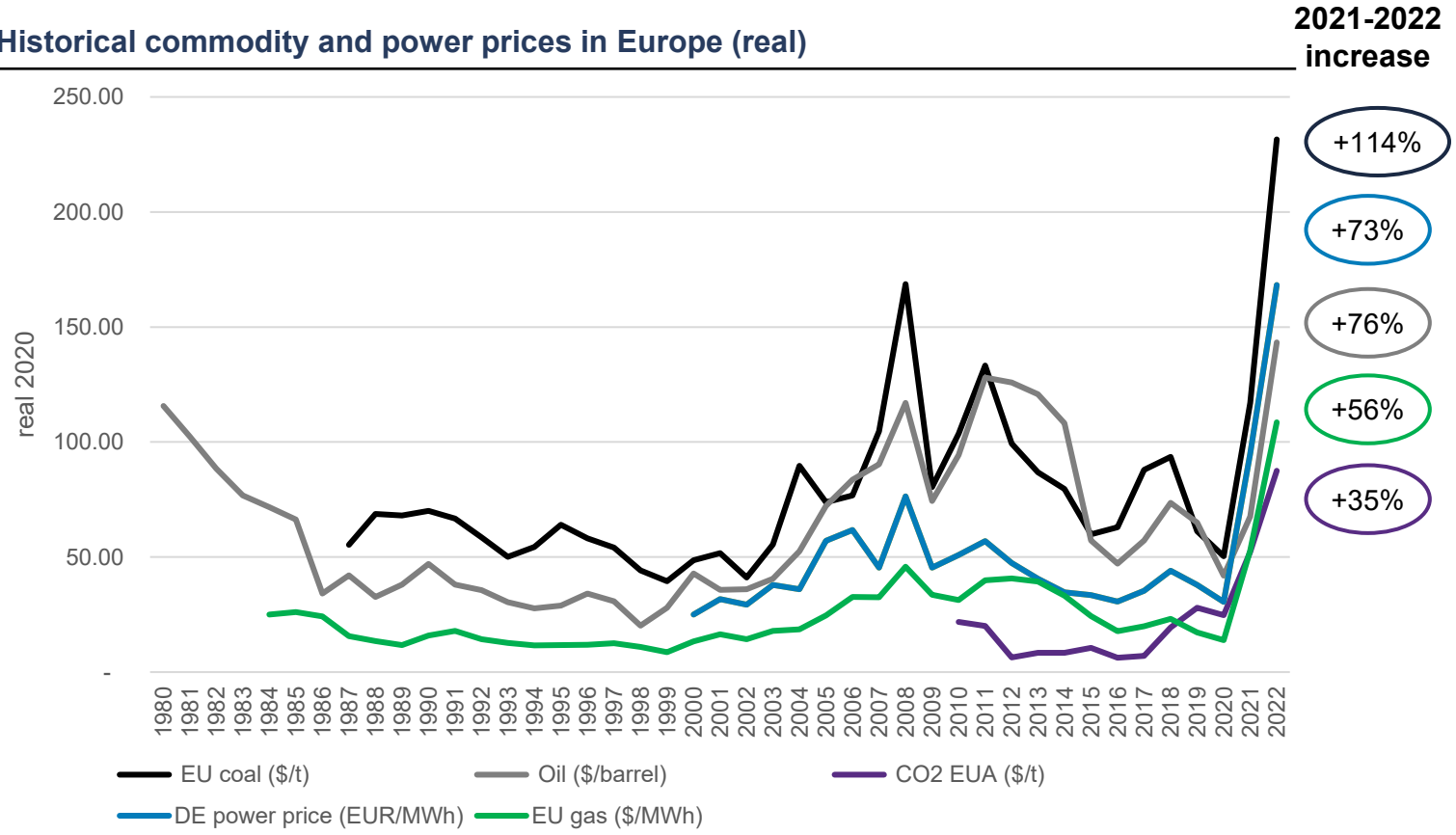
Introduction – The surge of wholesale energy prices



Commodities and power prices have reached uncharted territories in Europe but the commodity price increase predates the Ukrainian war

- **Oil:** The post-Covid economic rebound and sanctions against Russia have contributed to a fall in oil production and created significant uncertainty in the market.
- **Gas:** EU gas prices have reached levels driving some demand destruction, factoring the probability of a supply disruption due to the Russo-Ukrainian conflict and the obligation to replenish gas storages ahead of next winter.
- **Coal:** The Chinese embargo on Australian coal and the announcement of an EU embargo on Russian coal contribute to the tension on the global steam coal market.
- **CO2 prices** have increased driven by expectations of the reform of the EU ETS associated with the EU 'Fit for 55' agenda.

Historical commodity and power prices in Europe (real)



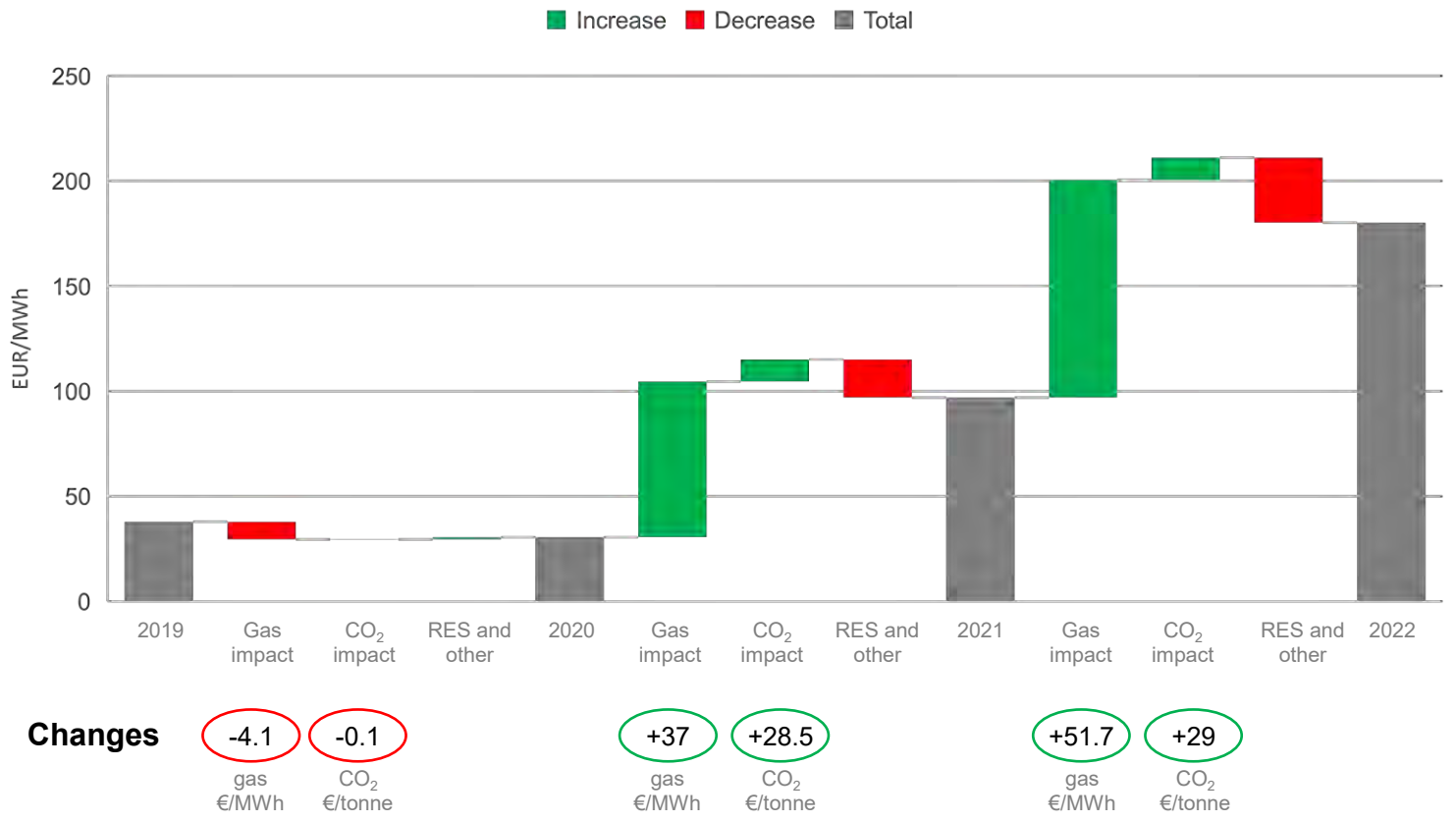
Notes: *CO2 corresponds to EU-ETS price; EU gas corresponds to the average German import price: 1986-1990 German Federal Statistical Office, 1991-2020 German Federal Office of Economics and Export Control (BAFA); EU coal corresponds to IHS Northwest Europe prices for 1987-2000 are the average of the monthly marker, 2001-2020 the average of weekly prices. Oil is Brent dated*

Source: *BP Statistical outlook, Energy Market Price, CL analysis*

The increase in EU wholesale power prices has been primarily driven by the evolution of the gas price…

- **Gas** is the primary driver of the recent power price increase, having a substantial impact on power price formation via the production cost of gas plants, typically marginal in European power markets.
- The increase of **CO_2** prices also impacted power prices but to a much smaller extent than gas prices.
- In contrast, the growing penetration of low marginal cost **renewable** technologies exerts a downward pressure on average power prices.

Impact of evolution of gas, CO_2 prices and mix on power prices in Germany (EUR/MWh)



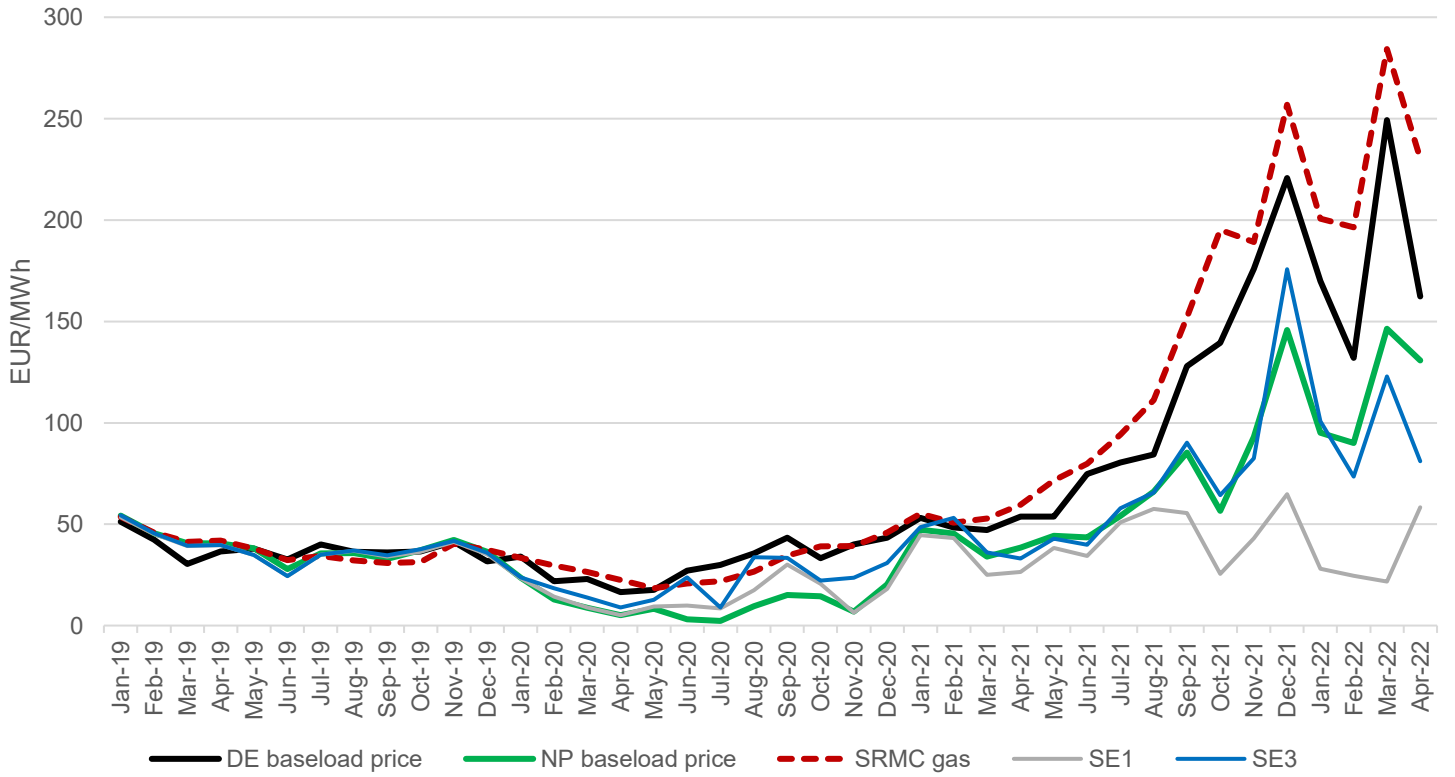
Notes: Decomposition calculated based on the assumption that a gas plant is marginal, breaking-down its SRMC between a gas component and a CO2 component
Source: Energy Market Price, CL analysis

…although a decoupling between power prices and gas prices is gradually materialising as renewables develop

- The differentiated evolution of power prices in the past years across countries / prices zones reveals a growing disconnection between SRMCs of thermal plants and power prices in areas with a large share of renewables.

- The crisis has also magnified the impact of some network congestion issues, for instance in Sweden where the Northern prices zones have been much less affected by the cost increase of thermal plants.

Comparison of power prices between Germany and Nordpool / Swedish prices (EUR/MWh)



Notes:
Source: Energy Market Price, CL analysis

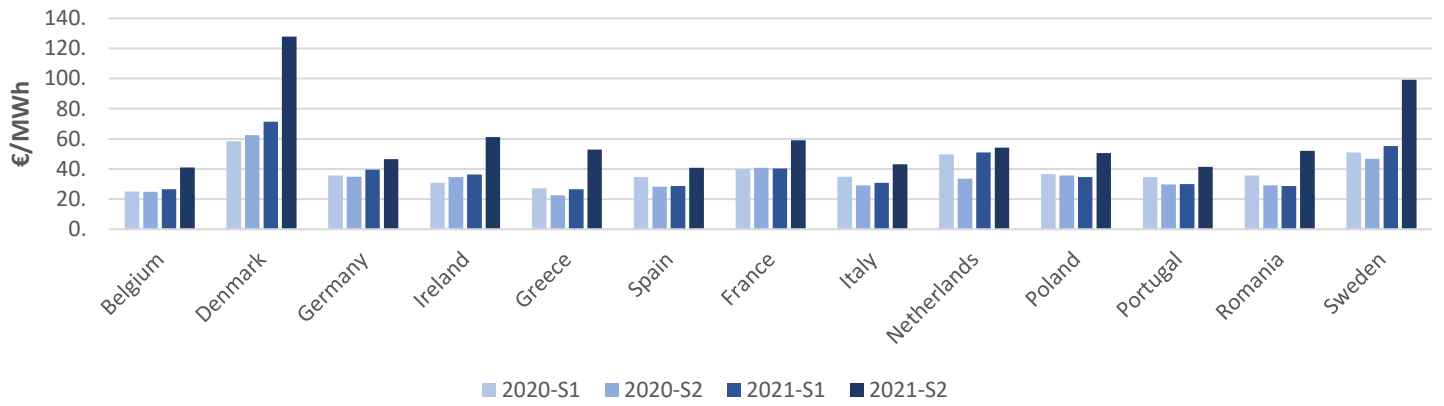
2.

Policy responses and their impact on retail prices

The impact of the gas price rise on retail consumers is markedly different across EU countries depending on the role of gas and on the contracting and pricing approaches

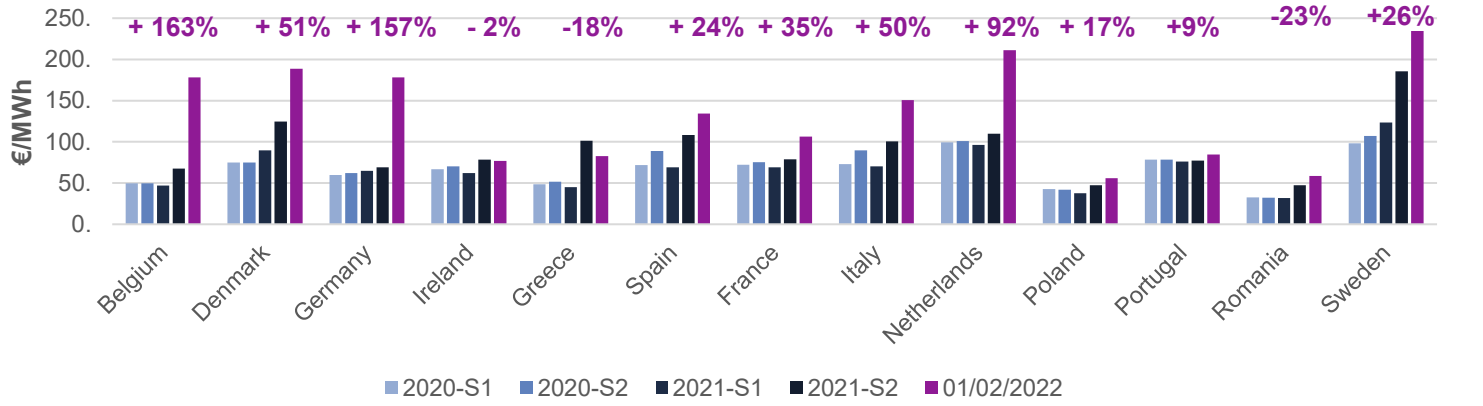
- Consumers in EU countries have been affected by the gas price rise to different extents, depending on the contracting and pricing / indexation approaches.
- Many countries – particularly in Southern / Eastern Europe - have implemented measures to dampen the impact of rising wholesale gas prices, especially where consumers and the power sector are especially reliant on gas.

Gas prices* for non-household consumers 2020/2021



Gas prices* for household consumers 2020/2021/2022

2021-S2 to Feb 2022 increase

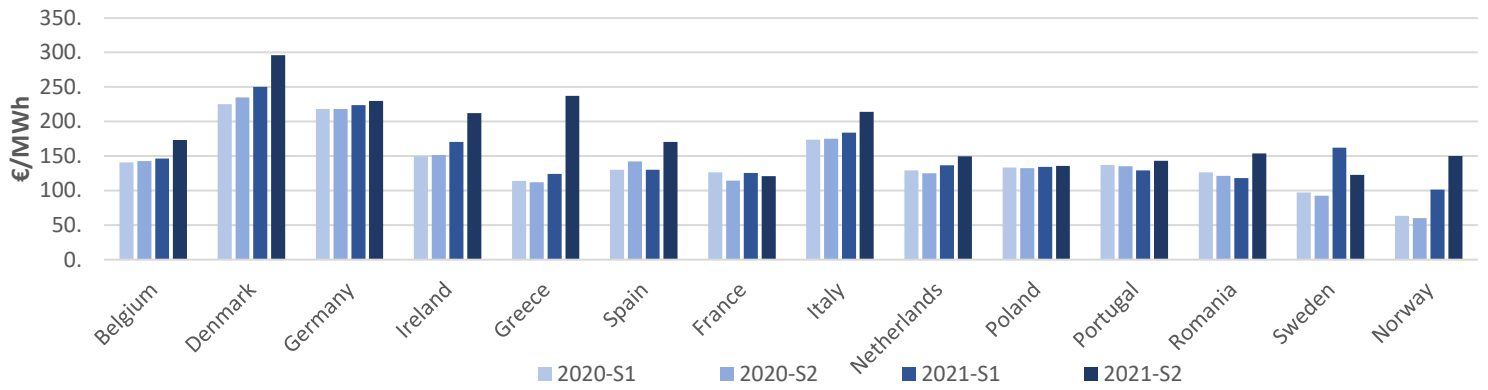


Notes: **All taxes and levies included*
Source: *Eurostat, household energy price index for europe*

Similarly, the increase of retail power prices differs across EU countries depending on the generation mix and policy measures

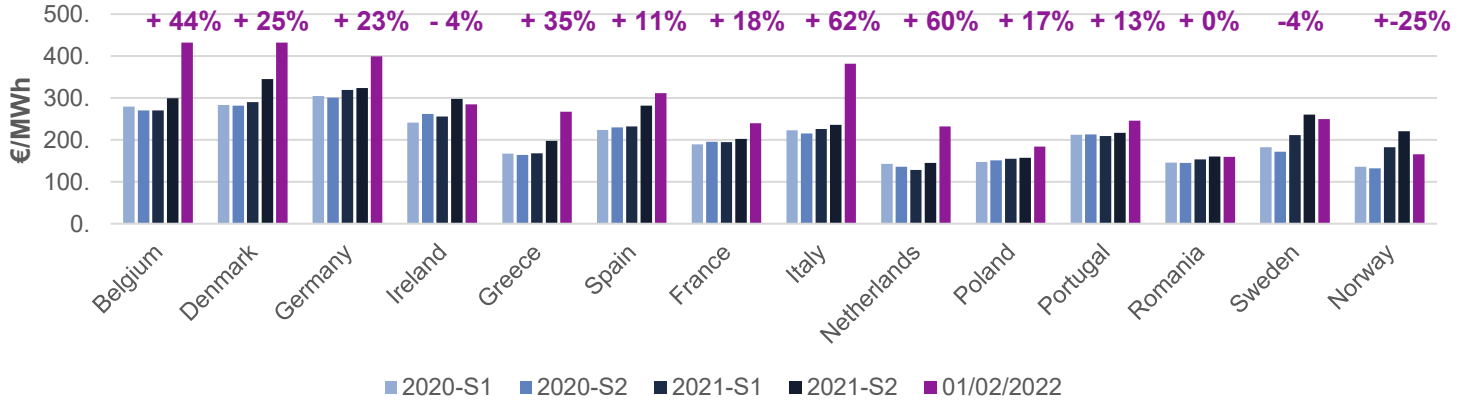
- The wholesale electricity price increase has been passed on to consumers in a differentiated way across Europe, depending on the typical sourcing / hedging approaches and the extent of policy interventions.
- In many countries, a range of measures have been adopted to shield households and/or industrial consumers from energy price increases, whereas other countries have been more reluctant to intervene in the market.

Electricity prices* for non-household consumers 2020/2021



Electricity prices* for household consumers 2020/2021/2022

2021-S2 to Feb 2022 increase

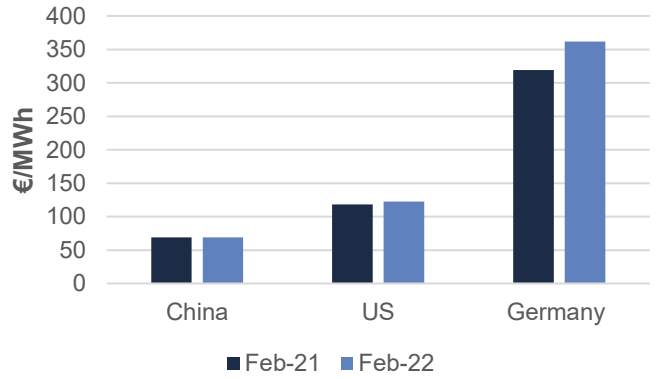


Notes: **All taxes and levies included*
Source: *Eurostat, household energy price index for europe*

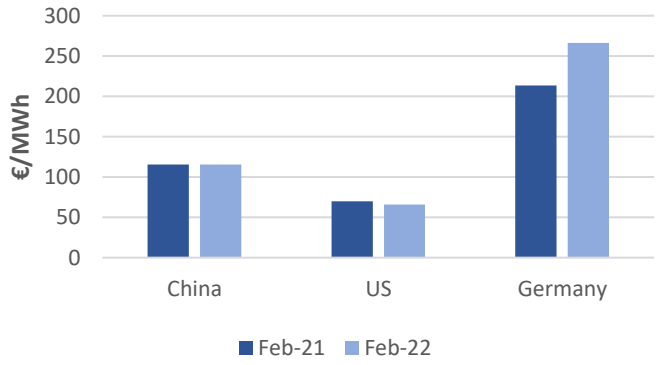
Energy prices did not increase as much in the US (and to some extent Asia), leading to growing competitiveness concerns for industry

- The historical gap in energy supply costs has widened substantially due to the ongoing crisis.
- This raises concerns about the competitiveness of some industrial activities in Europe.

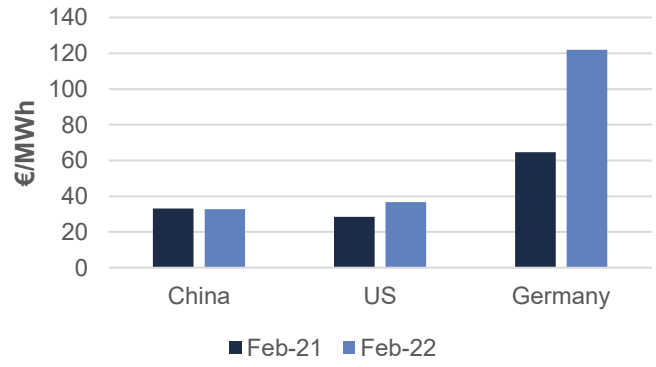
Electricity prices* for household 2021/2022



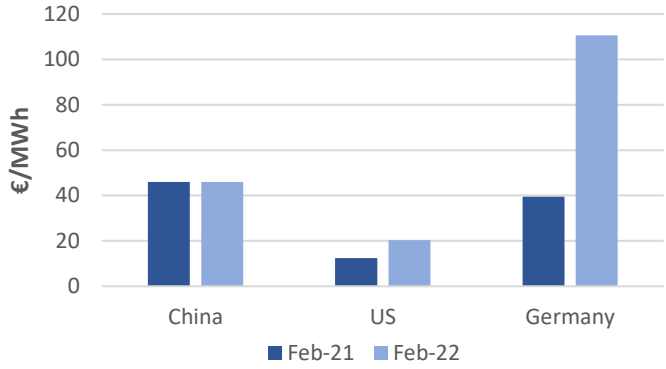
Electricity prices* for industrials 2021/2022



Gas prices* for household 2021/2022



Gas prices* for industrials 2021/2022



*Notes: *All taxes and levies included, we consider Shanghai prices for Chinese industrial prices.*
Source: Eurostat for EU, BDEW for Germany, EIA for USA (average of all states), CEIC data for China

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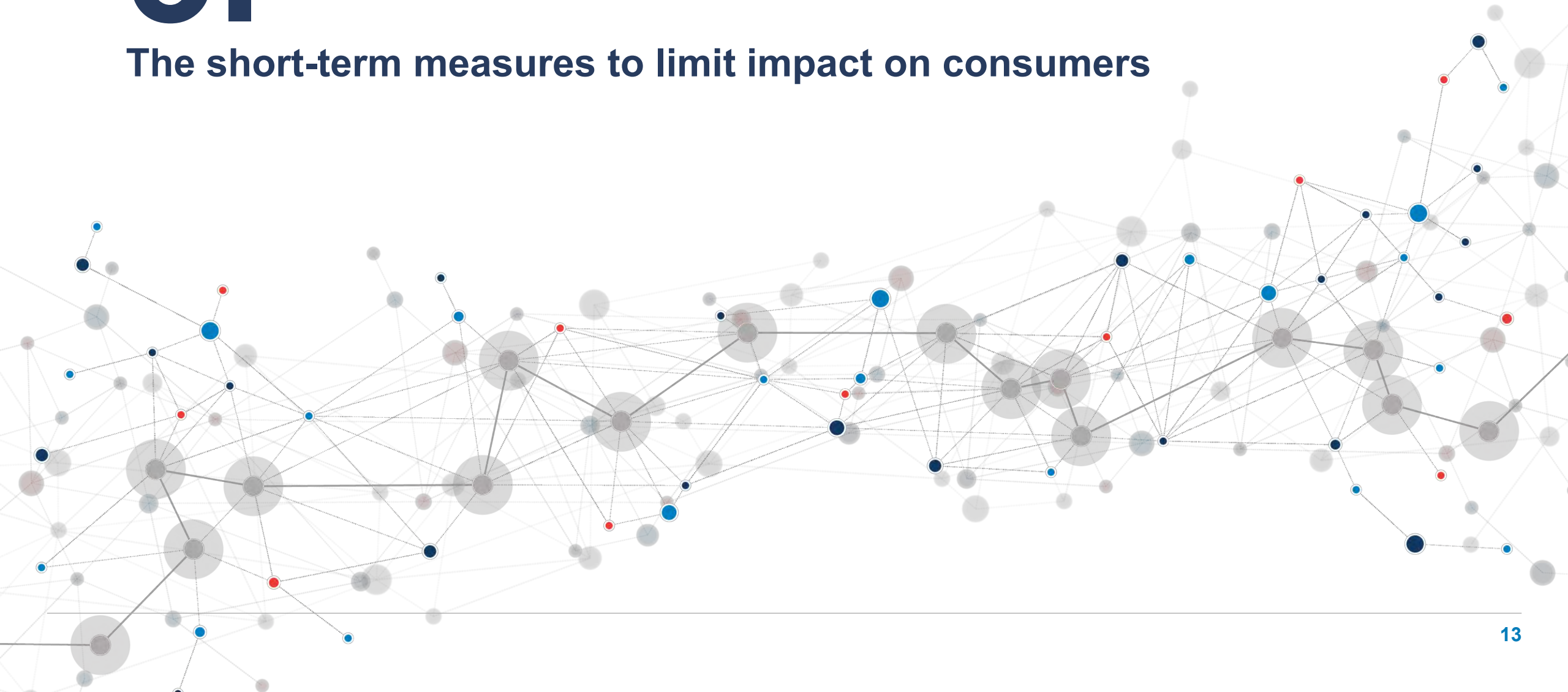
The short-term measures to limit impact on consumers



Recent policy interventions correspond to a range of interrelated policy objectives / rationales

Policy objectives/ rationales for intervention	Justification
Affordability and competitiveness – redistributive issues	➢ Addressing consumer exposure to unprecedented energy price spikes and volatility
Perception of excess returns / windfall profits	➢ Capping allegedly excessive market revenues benefitting to (some) generators
Inflationary pressures and macroeconomic effects	➢ Addressing macroeconomic consequences of high energy prices (inflation, recession, etc.)
Decoupling domestic electricity prices from international commodity prices	➢ Fostering energy autonomy and reducing import dependency

"Finland is not alone in trying to compensate increasing energy costs. More than 20 European countries have taken action." - **Finnish Finance Minister, Saarikko, 2021**

"Those who have obtained stellar profits from the increases of recent months, without having an increase in their costs, must be asked for a solidarity contribution." - **Italian Deputy Minister of the Economy, Castelli, 2022**
"We should tax extra-profits." - **Italian Minister of Economic Development, Giorgetti, 2022**

"We must not leave consumers out in the cold. We want to raise the hurdles for discontinuing supply and put the instrument of basic and substitute supply on new footing." - **German Parliamentary State Secretary in the Federal Ministry of Economics, Krischer, 2022**

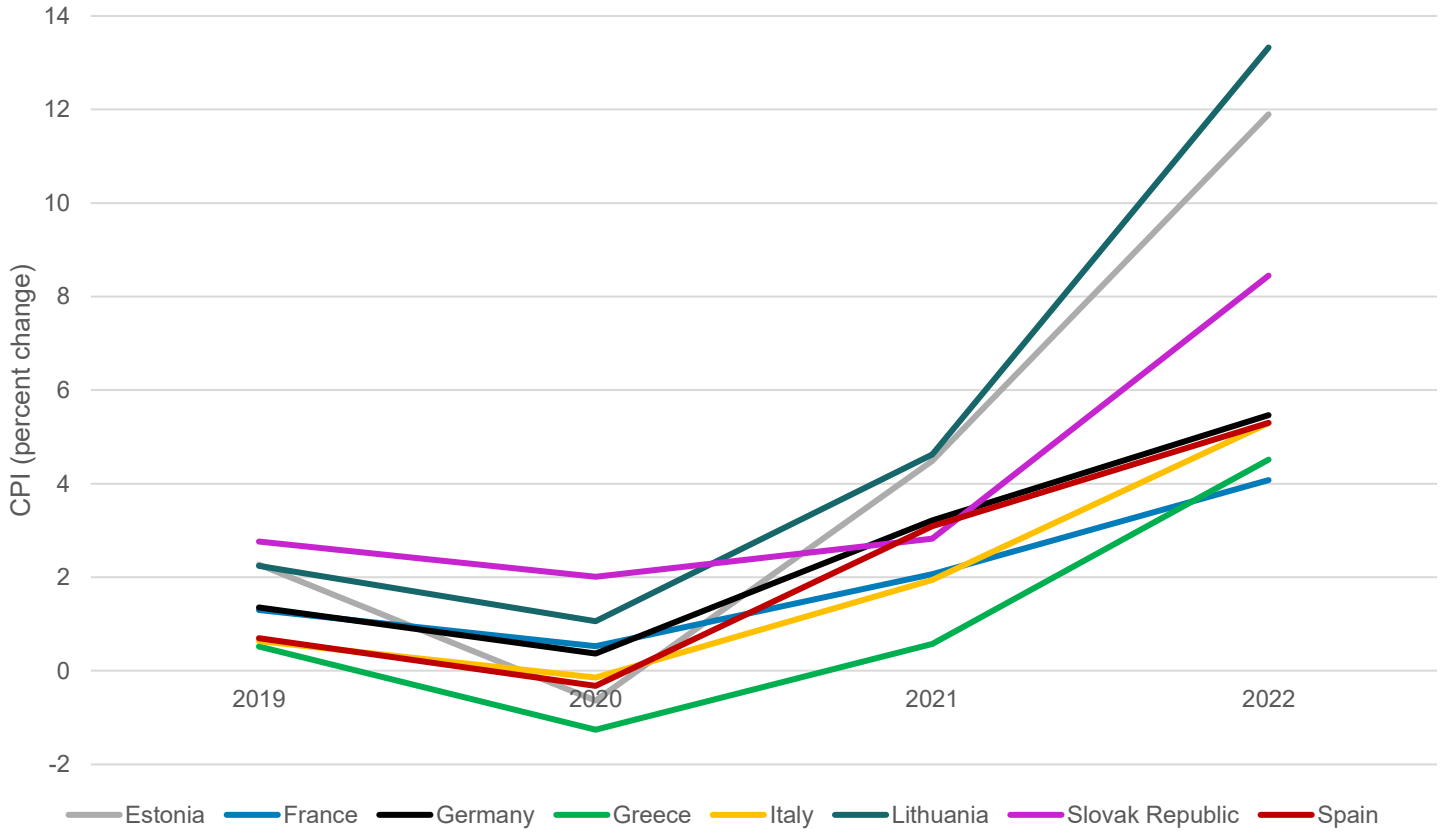
"Need to reform the wholesale electricity market… with today's market design, consumers are not participating in the benefits provided by a cheaper renewable generation mix… fossil fuel plants still set the price" - **Spanish Ministers of Economy and Energy, Calviño and Ribera, 2021**

Notes:
Source: Compass Lexecon analysis based on Bruegel

In recent months, the Ukraine war and inflationary pressures have contributed to a step change in government interventions across Europe

- Inflationary pressures that started to materialise in H1 2022 led to a change of approach in a number of EU countries and at the EU level towards the management of the energy prices
- In some countries, broad base policy responses to reduce the energy price increases have been motivated partly by a desire to dampen inflation

Inflation evolution in a selection of EU countries since 2019



Notes:
Source: IMF world economic outlook April 2022, Compass Lexecon analysis

Across the EU, policy interventions have multiplied in (1) retail markets, (2) wholesale markets as well as through (3) other types of measures

Retail market interventions

1. Tax relief
2. Network tariffs exemptions
3. Retail price cap / regulation
4. Direct support to end-users (vulnerable end-user / businesses)

Wholesale market interventions

1. Cap on wholesale electricity price: Relief valve concept
2. Cap on the fuel price for fossil generators
3. Forward contracting for retail suppliers and cost spreading over time Aggregation model / Single buyer
4. "Claw-back" taxes on (parts of) windfall profits + redistribution to consumers
5. Excluding some producers from wholesale markets + regulated price

Other measures

1. Reduction of subsidies
2. Changes to the EU ETS and/or support schemes

Notes:
Source: Compass Lexecon analysis

EU member states have enacted a variety of retail market interventions to support end-users

Retail market interventions in EU Member States

	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	NL	PL	PT	RO	SI	ES	SE
Tax reductions	●	●		●	●	●		●	●	●	●			●	●	●			●	●	●	●	●	●	●
Retail price regulation[1]		●	●			●		●					●				●			●		●		●	
Aid to vulnerable end-users	●	●		●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
Support to businesses	●		●			●		●	●			●			●					●			●	●	●

→ **All countries have already implemented at least one measure to address rising energy prices**

→ **However measures vary in approach, customers targeted and their impact on the market**

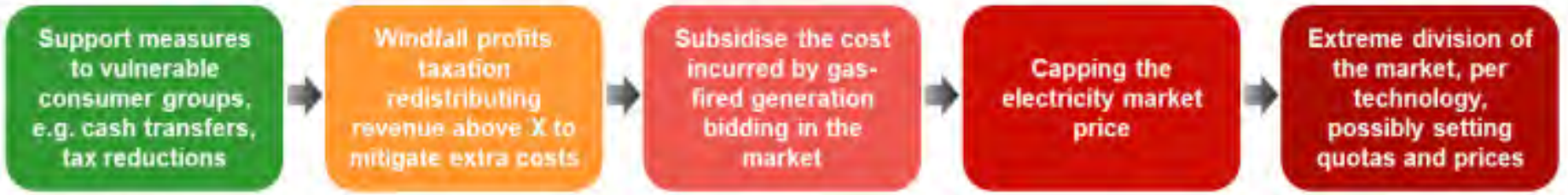
Notes: Status as of end of April 2022, analysis excluding Malta and Slovakia. Network tariffs exemptions were not analysed. [1] Retail price regulation mainly involves setting a cap on electricity and gas prices

Source: Compass Lexecon analysis based on Bruegel

The EC proposed initially a '*toolbox of exceptional short-term measures*' to limit unilateral interventions and their potential effects on the market

- In December 2021, the EC published its communication on **'*Tackling rising energy prices: a toolbox for action and support*'**
- In March 2022, the EC published its ***'RePowerEU: Joint European action for more affordable, secure and sustainable energy Communication'.***
- The EC is expected to further detail its REPowerEU plan and assess options to reform the electricity market design in May.

Figure 29: Spectrum of possible structural-interventionist measures relevant for the EU electricity market (non-exhaustive)



Source: ACER.

Note: the further a measure is depicted to the right, the deeper the level of intervention and/or alteration of the market framework in ACER's view.

Notes:

Source: Compass Lexecon analysis of the Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Tackling rising energy prices: a toolbox for action and support. COM/2021/660 final of 12.10.2021
European Commission Communication: 'Security of supply and affordable energy prices: Options for immediate measures and preparing for next winter', COM/2022/138 final of 23.03.2022

Assessment of potential drawbacks of the different types of interventions

		Approach for implementation	Potential Drawbacks
Retail market measures	Tax relief	Broad base	Fiscal cost potentially high, no targeting of most impacted consumers
	Network tariffs exemptions	Can be targeted on some consumer categories	Cost reallocation to other consumers, or may lead to a tariff deficit or threaten TSO/DSO cost recovery
	Retail price cap / regulation	Broad base	Potential distortion of competition, need for compensation of retailers, complexity of implementation
	Direct support to end-users	Can be targeted to support specific end-users	Budget / costs potentially high
Wholesale market measures	Price caps on wholesale power market	Broad base	Distortion of investment incentives. Complex to implement. Depending on implementation may trigger disputes as potential breach of “legitimate expectations”
	Price caps on wholesale gas market	Broad base	Possible distortion of (a) the power sector merit order, (b) incentives for investment, (c) short-term gas market supply/demand allocation and (d) gas supply diversification efforts. Complex to implement.
	Mandatory forward contracting for retail suppliers	Depending on the volume share to be forward contracted: small shares limit relieve for end-users, higher shares expose suppliers to volume risk in future periods (i.e. uncertainty about end-users to be supplied in future). Depending on implementation can affect competition and market dynamics.	
	Windfall taxes for generators	Can be targeted	If applied to existing contracts may trigger disputes as potential breach of “legitimate expectations” and/or discriminatory ; Possible distortion of competition (affecting investment) in wholesale market and retail power markets (e.g. impact on integrated producer/retail business models
	Excluding some producers from wholesale markets + regulated price	Can be targeted	Distortion of investment incentives for capacities, reduction of market competition and liquidity. If applied to existing contracts may trigger disputes as potential breach of “legitimate expectations” and/or discriminatory

Notes:
Source: Compass Lexecon analysis

In its recent assessment of EU wholesale electricity markets, ACER points out a number of market design issues and suggests some structural reforms

ACER stresses the resilience of the EU market and its continuous improvement and guards against badly designed / distortive interventions…

- *"the current electricity market design is not to blame for the current crisis" […] "the market rules in place have to some extent helped mitigate the current crisis"*
- *"ill-designed emergency measures or distorting price signals by interfering in market price formation may roll back EU market integration and overall competition, thereby endangering the benefits achieved up until now"*

ACER notes a number of market design issues and the need for reforms to drive investment

- **Management of crisis situations:** *"the current wholesale electricity market design ensures efficient and secure electricity supply under relatively 'normal' market conditions" "The electricity market design is, however, not designed for the 'emergency' situation that the EU currently finds itself in."*
- **Need for long-term contracting / hedging:** *"Long-term markets and improved hedging instruments need more attention to drive the massive investments needed up ahead" "Measures that exclude extreme risks from materialising, or mitigate the effects thereof if they do, can serve as insurance for certain groups of consumers. For example, a regulatory or other public entity may buy long-term hedging instruments on behalf of (groups of) consumers."*
- **Planning and coordination across Member States** *: "Member States should consider enhanced coordination of approaches to and plans for large-scale generation and grid infrastructure deployment, as a likely prerequisite for the efficient and accelerated roll-out of such investment."*

Notes:
Source: Compass Lexecon analysis of ACER's Preliminary Assessment of Europe's high energy prices and the current wholesale electricity market design. November 2021

Wholesale market price cap in exceptional circumstances – the “relief valve” concept

Application Example – Texas (USA)

The ERCOT ‘Peaker Net Margin’ measure calculates the accumulated profits over a year as a difference between the operating costs, defined by natural gas, and the real-time electricity price.

The threshold is set at three times the cost of new entry of new generation plants. When the threshold is reached, the maximum price on the market is temporarily lowered and then, according to certain criteria, automatically raised again later on ensuring full price formation.

Temporary Relief Valve Mechanisms

So-called ‘relief valve’ mechanisms such as ERCOT's ‘Peaker Net Margin’ (Texas, United States) or ‘Cumulative Pricing Threshold’ in the National Electricity Market (Australia) constitute examples of such a measure.

Both markets foresee a normal market clearing, with regular price signals, including from price spikes up to the point where sustained high prices have reached the mechanism’s pre-defined threshold.

Application Example – Australia (NEM)

The Australian National Electricity Market imposes a so-called ‘Administered Price Period’ when the sum of the spot prices for the previous seven days reaches the **‘Cumulative Pricing Threshold’ (CPT)** or when the sum of the ancillary service prices for a market ancillary service in the previous seven days exceeds six times the CPT.

In 2019-2020, the CPT was equivalent to an average spot price of 658.04 AUD/MWh. The administered price cap during the administered price period is set at 300 AUD/MWh. The ‘Administered Price Period’ ends when the cumulative price has fallen below the CPT.

Notes:
Source: Compass Lexecon analysis based on ACER

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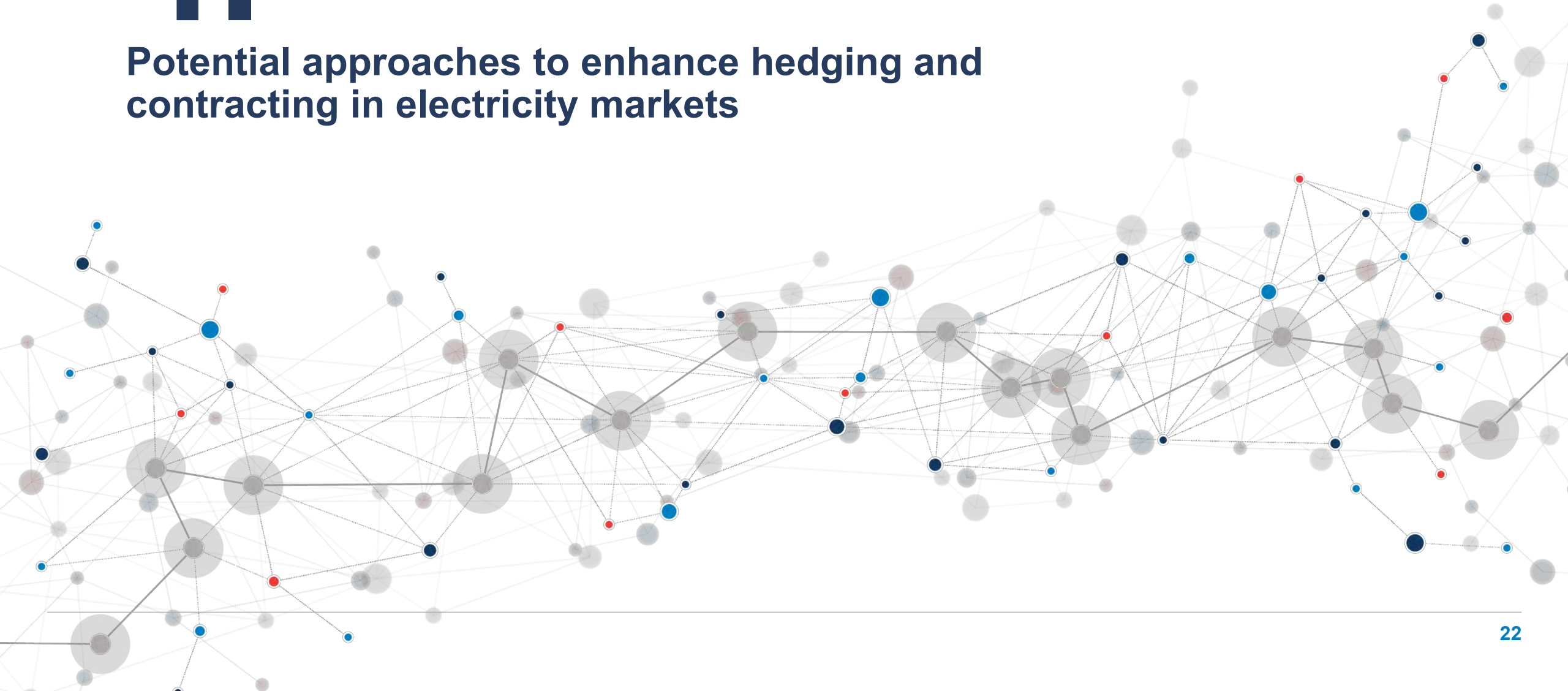
Potential approaches to enhance hedging and contracting in electricity markets



The need for enhanced hedging and contracting in electricity markets is not new, but the policy drivers for reform have changed

Old driver or market reform

New drivers

	Criteria	Justification
1	**Improve investment framework in power sector by addressing market failures / missing market**	➢ Address shortcomings of energy-only market, in particular 'missing market' for long-term contracts issue for hedging / triggering investment ➢ Provide stronger coordination for deployment of critical infrastructures
2	**Address affordability / competitiveness concerns associated with rising energy costs in transition**	➢ Adapt pricing approach to different types of consumers / usages to address affordability concerns whilst preserving efficient usage incentives ➢ Ensure that consumers benefit from rising share of low / fixed cost generation
3	**Ensure a 'whole system approach' in the context of electrification of other sectors**	➢ Address historical siloes between electricity / gas market design and pricing approaches, as well as new sources of energy (hydrogen clean gas, etc) ➢ Provide competitive and predictable electricity price to industry in context of electrification and international competition
4	**Foster fossil fuel independence and resilience ("decouple from gas price")**	➢ Decouple wholesale power prices from gas prices ➢ Ensure Europe is less vulnerable to commodity price cycles (imported fossil fuels) as it decarbonises

We can build on our existing set of markets and embed long-term hedging incentives/ obligations

Key framing principles for a "hybrid market" framework

- Build on existing markets to deliver short-term operation efficiency and overlay a structured framework to meet long-term policy objectives
- Identify the evolving system needs and ensure that the contribution of all resources is adequately rewarded
- Provide strong incentives / mandate forward contracting for the long-term system needs to provide credible commitment towards policy objectives

Planning of system needs

- Comprehensive and transparent approach to identify the evolving system needs
- Main dimensions: firm, flexible, variable energy, and interface with networks
- Ensure that the contribution of all resources to the system needs is adequately rewarded

Competition "for" the market though long-term contracts

- Tendering of long-term contracts
- Can be technology neutral or specific
- Puts competitive pressure where it matters: CAPEX
- Can be used to stimulate development of competitive market
- Ensures coordinated system development

Competition "in" the market

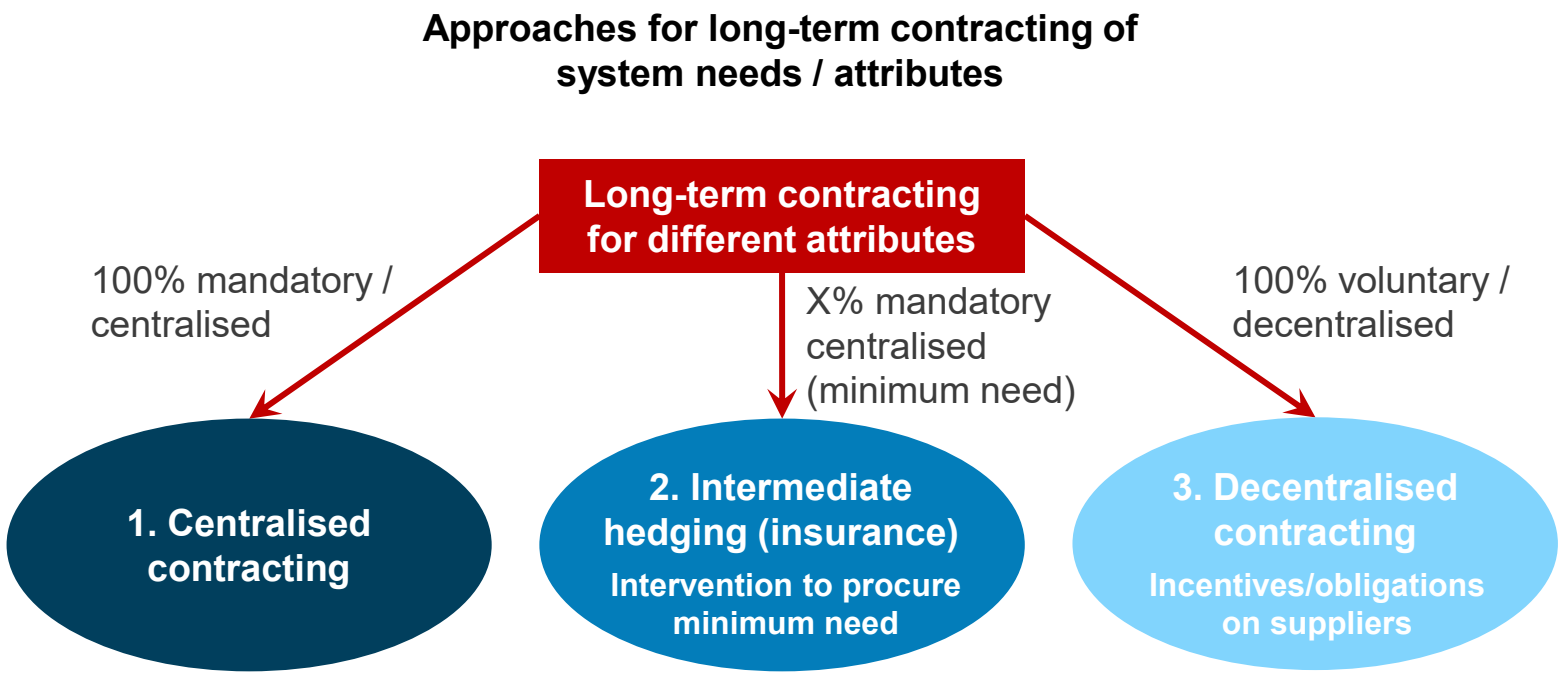
- Well integrated and liquid forward, day ahead and intraday markets
- Optimises short term dispatch and minimises costs for consumers
- Real-time price signals and removal of barriers to participation
- Supports retail competition and development of demand response

Investment (years ahead) → **Operations (days /hours ahead)**

Three key features of hybrid markets: planning of system needs, forward contracting and efficient interface with short-term markets

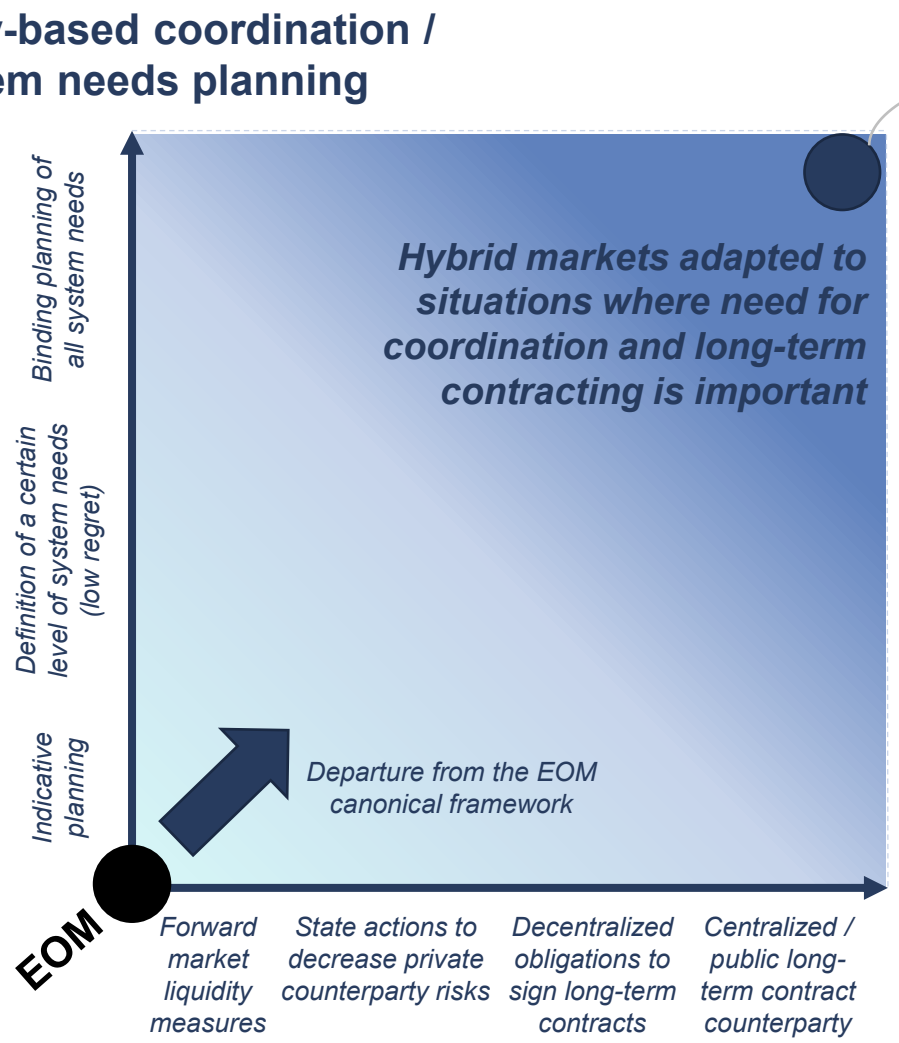
Investment framework stages	Key features of an efficient hybrid market investment framework
1 Planning & definition of system needs	▪ **Efficient coordination and holistic planning of the different system needs** (clean tech and for flexible/firm capacity), **across sectors** (power/gas/heat/mobility) **and Member States** ▪ **Neutrality of the planning agenc(ies), supported by sound regulatory and governance framework**
2 Contracting & hedging mechanisms	▪ **Long term contractual commitments** to hedge some of the policy, regulatory and market risks and facilitate investment ▪ **Increased coordination and consistency of the procurement mechanism with the planning process,** to make it more efficient and predictable
3 Efficient market interaction	▪ **Efficient interface** with wholesale and retail markets ▪ **Careful choice and design of products** to avoid distortions of short term market signals

Long-term contracting can be left to market participants or centralised – the key issues are the product definition and the extent of forward contracting coverage of system needs



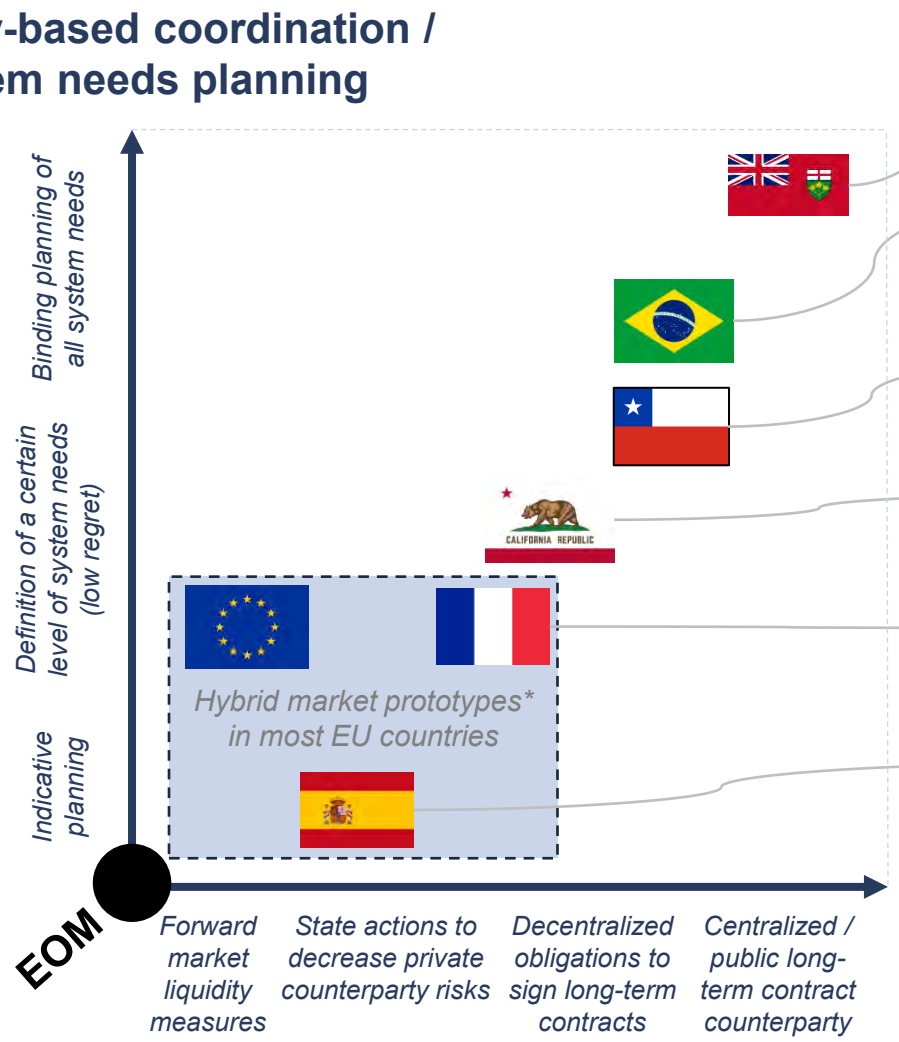
- **A key framing issue is who decides how much forward hedging is needed:**
  - Which attributes are contracted?
  - Which % of the needs should be contracted?
  - This depends on the system attributes considered (firmness, carbon intensity, etc)
  - This depends on the category of user
- **Financing can be differentiated between categories of consumers or socialised:**
  - Should some consumers only pay for energy?
  - Should decarbonisation / security of supply attributes (public goods) be financed by some consumers only (cross-subsidy) or socialised (State budget)?

A range of ‘hybrid market’ proposals have been put forward combing market mechanisms with planning and long-term contracting



There are different types of hybrid markets depending on local context and on which issues predominate

An initial typology of ‘hybrid markets’ depending on the extent of quantity coordination and long term contractual arrangements



Ontario/Canada:
Centralised procurement & centralised long-term counterparty combined with short-term competitive markets

Brazil:
Obligations for retailers and big industrial consumers to contract long-term with centralised procurement

Chile:
Obligations for retailers and big industrial consumers to contract long-term (joint/centralised long-term procurement for retailers, decentralized procurement for big industrials)

Proposal for California/USA (Wolak 2021):
Obligations for retailers to contract long-term

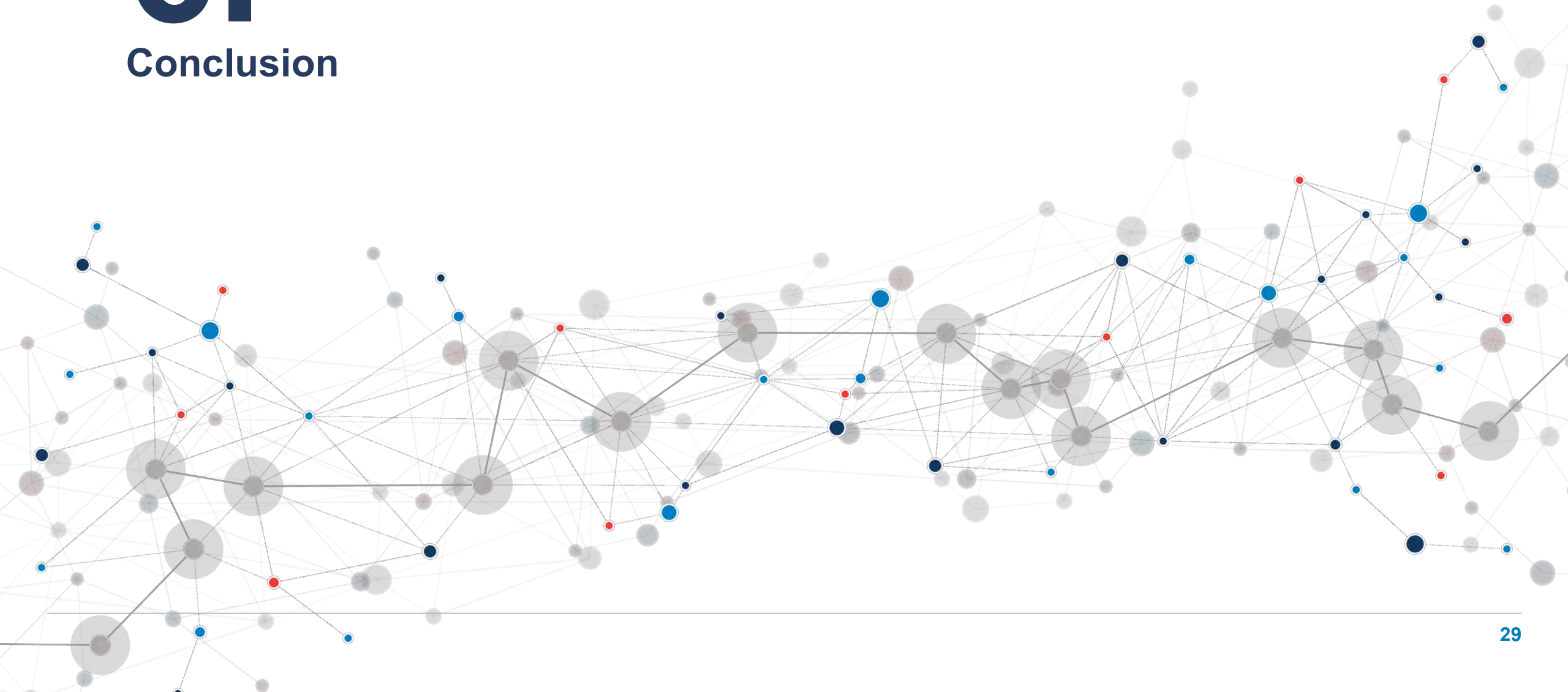
France:
Short-term mandatory planning of system needs (PPE) + long-term contract RES tenders + decentralised capacity obligations (CRM) + distributional schemes (e.g., ARENH)

Spain:
State-backed solvency guarantees for RES PPAs with electro-intensive consumers

**Prototypes: comprise hybrid design elements but added on top of one another without sufficient coordination or holistic approach from the start*

6.

Conclusion



Conclusion

- **EU power and gas markets have proven resilient in an extreme situation and demonstrate the value of an integrated approach**
  - Scarcity pricing has unleashed demand response and led many consumers to adjust their consumption / procurement strategy
- **Short-term policy interventions across Europe need to be carefully designed as they could have substantial distortive effects of the wholesale market and long-lasting effects**
  - Most efficient / least distortive approaches include targeted support to vulnerable customers, and there is a case for broad base measures to limit inflationary pressures
  - In some countries, prices caps or claw backs of generator profits have been introduced, leading to market distortions
- **This energy crisis will have important long-term legacy impact in shaping EU energy policy and market design**
  - Energy security and independence from imported fuels have risen to the top of the policy agenda
  - Concerns about affordability and competitiveness will need to be addressed through a review of pricing and cost allocation approaches
- **The crisis could catalyse support for structural market design changes with forward hedging /contracting**
  - Widespread recognition that long-term hedging / contracting should play a greater role
  - A range of ‘hybrid market’ proposals have been put forward, combing market mechanisms with planning and forward contracting

Thank you for your attention

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