Analysis of policy measures to support household customers in times of high electricity prices (Full Version)

How to support household customers without slowing the energy transition?

Prepared for:

Agora Energiewende

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COMPASS LEXECON

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Project Scope

Electricity prices have seen a dramatic increase in the past year in Europe, and most countries have enacted at least some policy measures in retail and/or wholesale markets.

In the context of the intensifying discussion in Germany, Agora Energiewende has commissioned Compass Lexecon to analyse the:

- development of wholesale and retail electricity **prices** in selected EU countries and Germany;
- different policy **objectives** underlying electricity market interventions;
- **policy interventions** (henceforth: **measures**) implemented or discussed by policy makers across Europe and internationally, in power and – as comparison - related markets like oil and gas;
- **pros and cons of different policy interventions**, with a view to policy objectives and the German context.

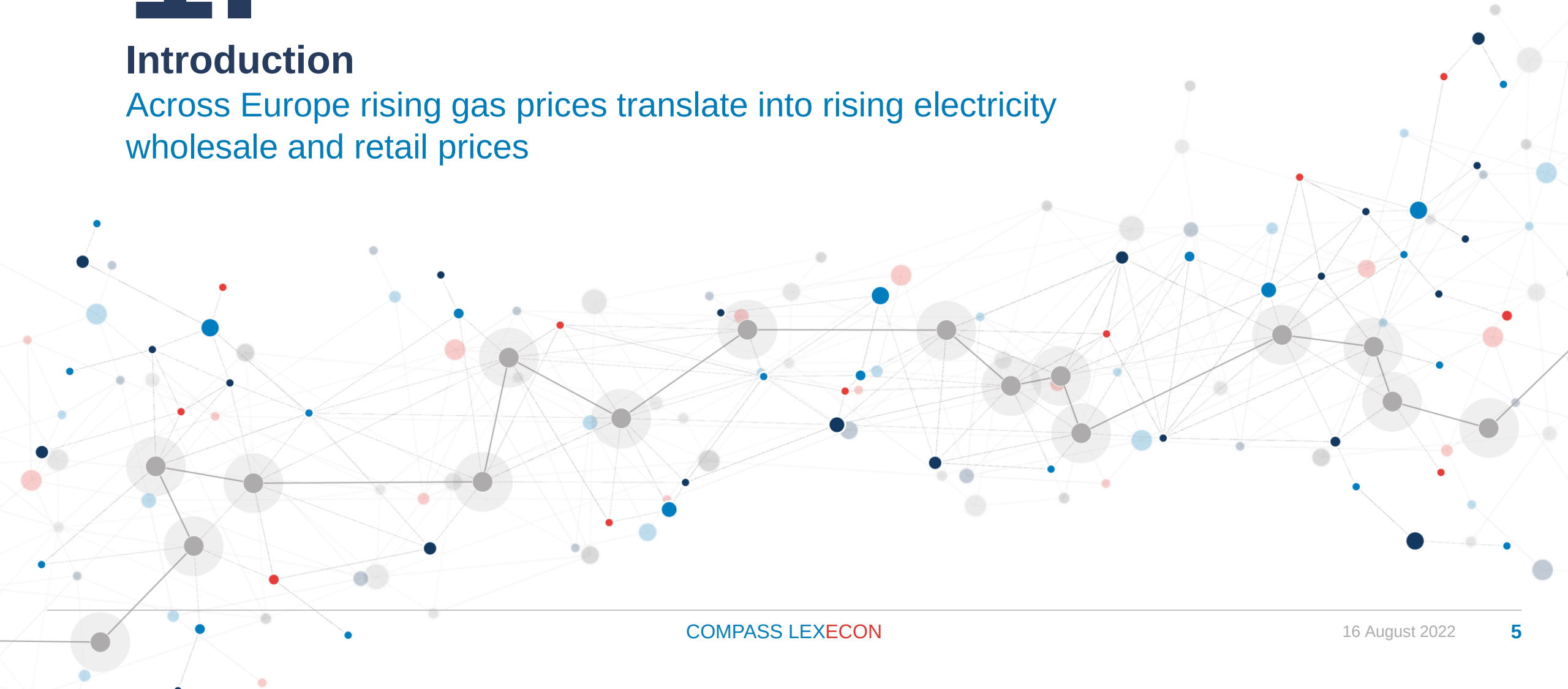
Given the current focus of the debate, in addition to standard criteria of good economic policy, a specific focus is put on the:

- ability of measures to quickly **relief** the pressure from (vulnerable) **household customers**; and
- **Impact of measures on the energy transition**.

1.

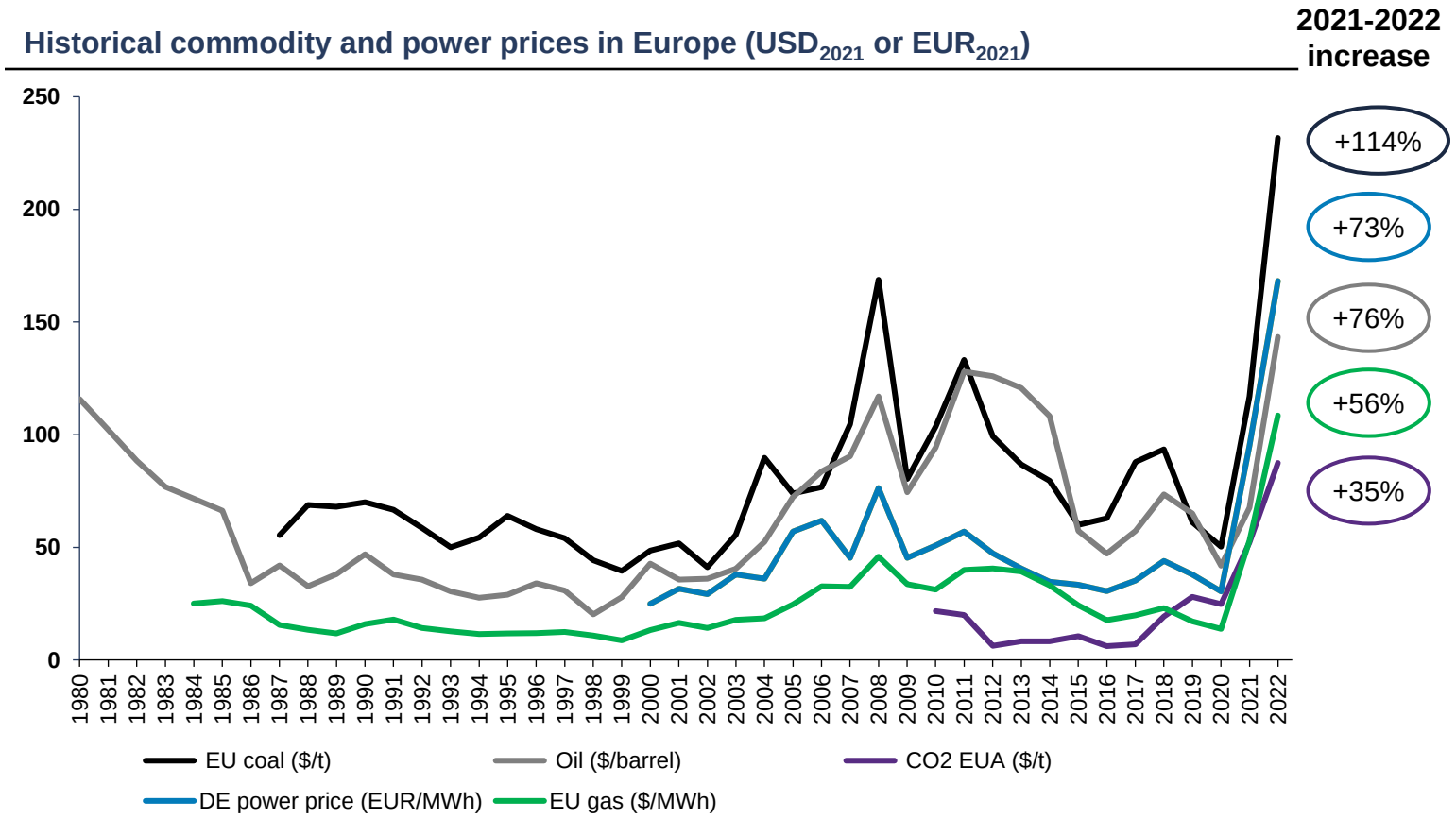
Introduction

Across Europe rising gas prices translate into rising electricity wholesale and retail prices



Commodities and EU wholesale power prices have reached uncharted territories in 2022 but the commodity price increase predates the Russian invasion of Ukraine.

- **Oil:** The post-Covid economic rebound and sanctions against Russia have contributed to a supply shortage in the EU.
- **Gas:** EU gas prices have reached levels driving some demand destruction, factoring the probability of a supply disruption following Russia's invasion of Ukrainian 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.



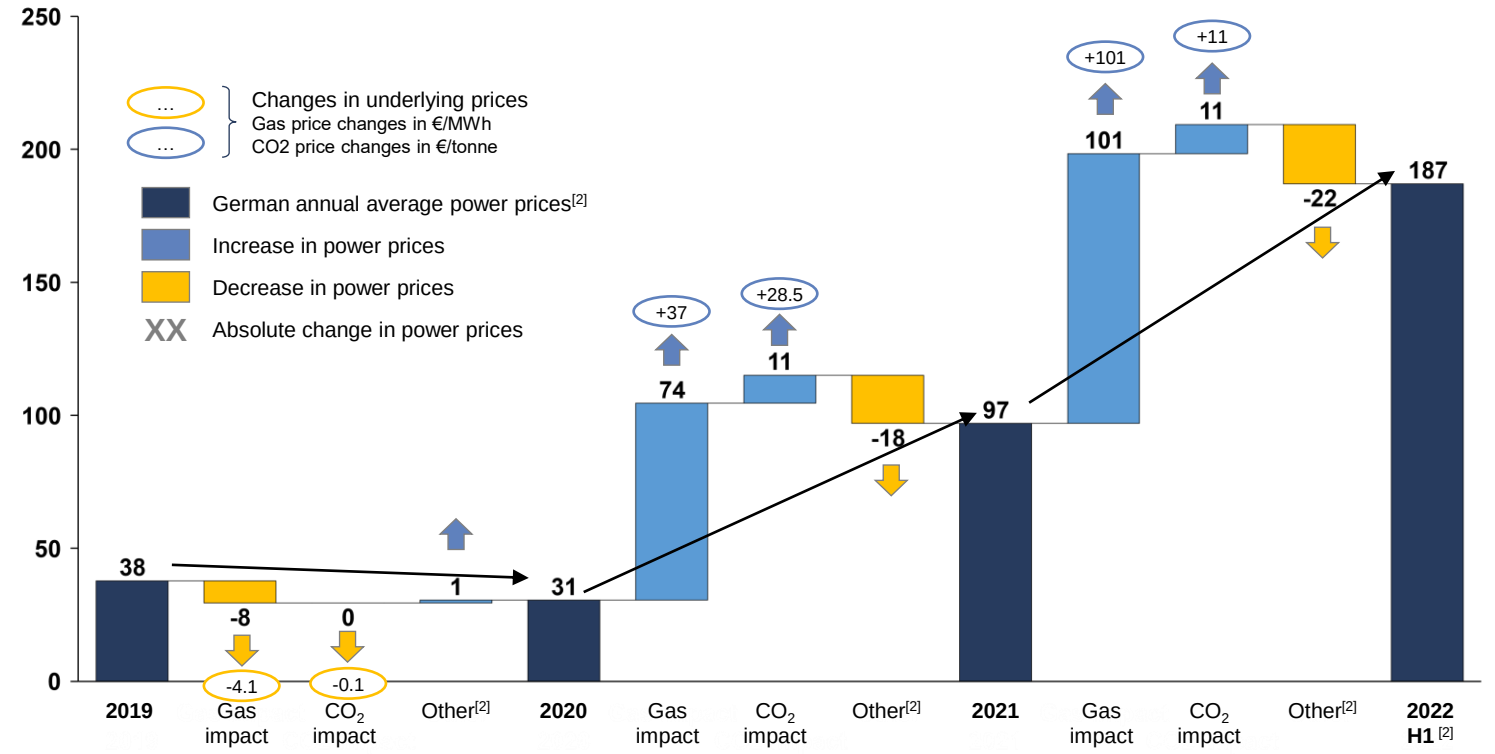
Notes: CO2 corresponds to EU-ETS price; EU gas corresponds to the average German import price: 1986-1990 German Federal Statistical Office, 1991-2020 German Federal Office of Economics and Export Control (BAFA); EU coal corresponds to IHS Northwest Europe prices for 1987-2000 are the average of the monthly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

Source: Compass Lexecon analysis based on BP Statistical outlook, Energy Market Price

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.
- Gas prices have increased materially following Ukraine invasion, leading to soaring power prices.

High-level estimate of the impact of gas and CO_2 prices[1] on German power prices (EUR/MWh)



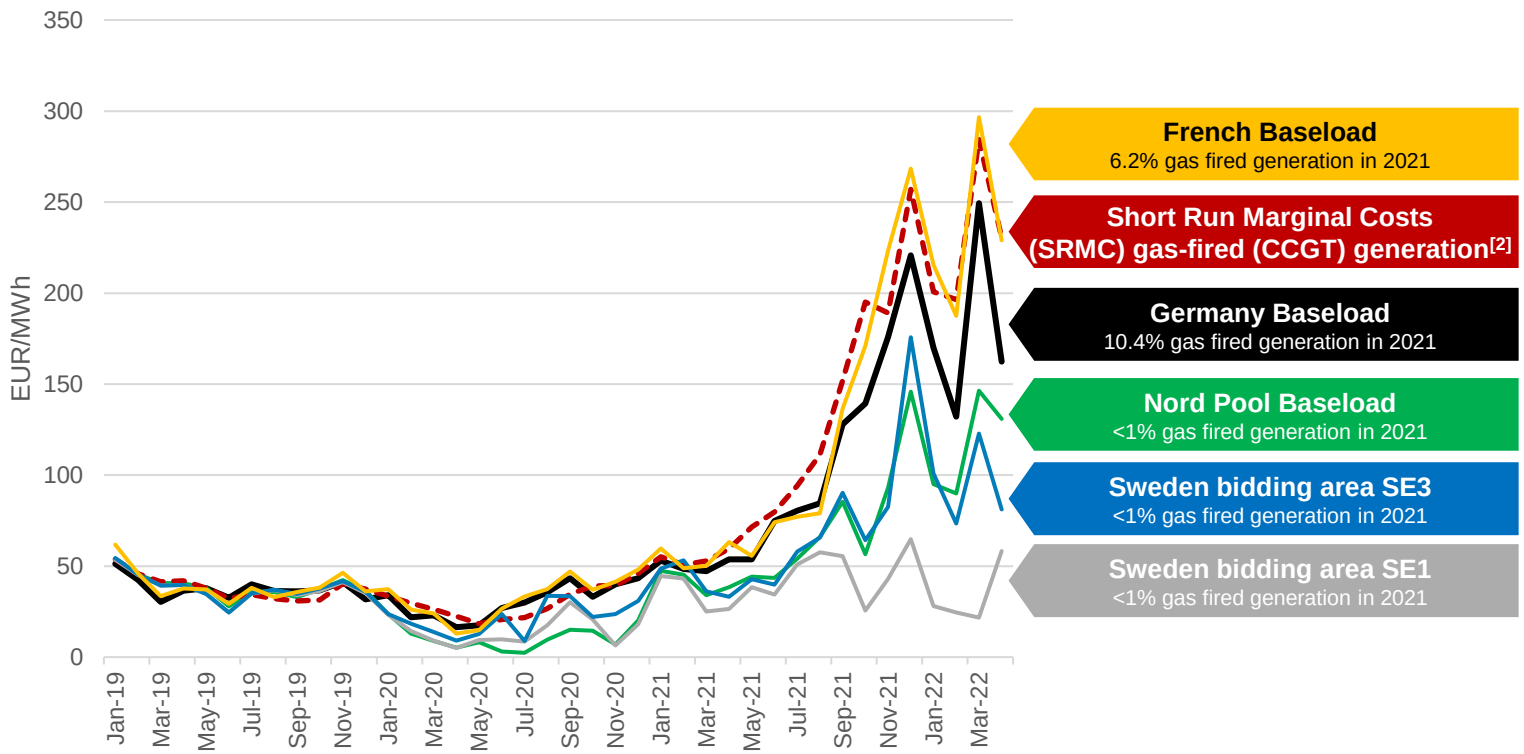
Abbreviations *H1 .. First Half year*
Notes: *[1] Decomposition analysis based on the assumption that a gas plant is marginal, breaking-down its short-run marginal costs (SRMC) between a gas component and a CO2 component, [2] 2022 data covering the first half year only, [3] including the fact that gas plants were not always the marginal plant as assumed by this high-level analysis.*
Source: *Compass Lexecon analysis based on Energy Market Price*

…although a decoupling between power prices and gas prices is gradually materialising as renewables develop in some price zones in Europe

- 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 (SE1 and SE2[1]) have been much less affected by the cost increase of thermal plants.

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



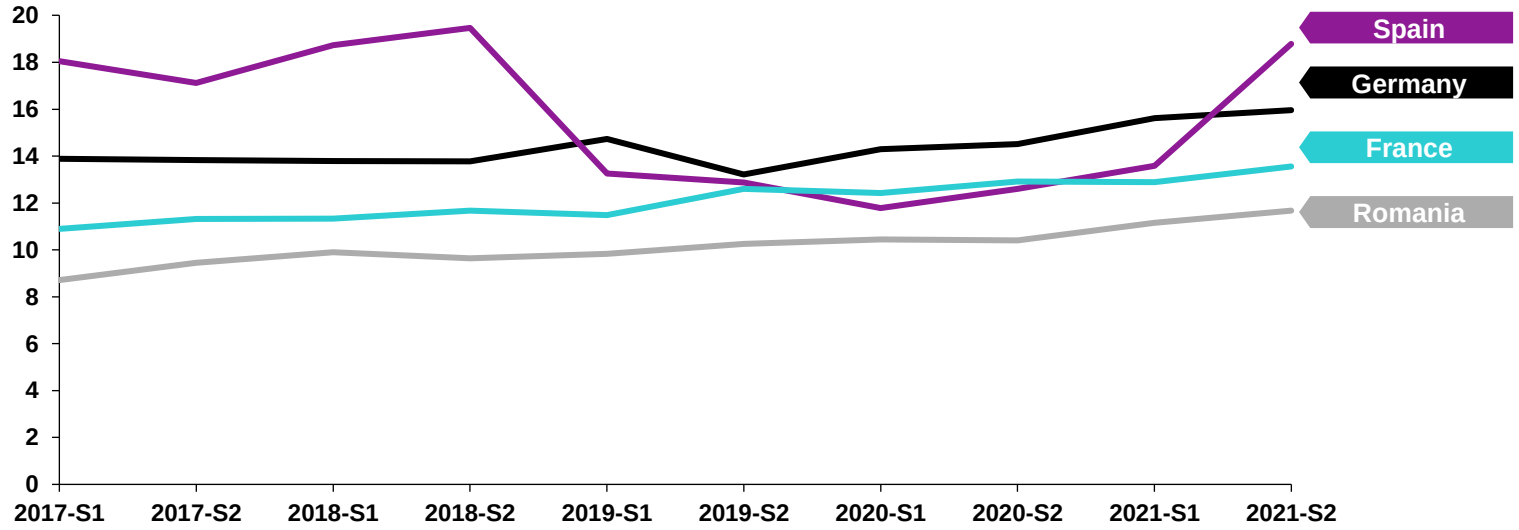
Abbreviations: CCGT … Combined-cycle gas turbine
Note: [1] not shown in the graph to the right, [2] SRMC calculation assumes a power plant (CCGT) efficiency of 50% relative to the gross calorific value
Source: Compass Lexecon analysis based on Energy Market Price

Retail prices in Europe have been driven up by wholesale price increases…

Pass through from wholesale to retail household prices resulted in a strong increase but with different patterns depending on hedging and tariff structure

- Different retail price formation principles across Europe lead to different speeds for wholesale market price changes to pass through to retail prices
- Depending on the pass-through speed and magnitude – and subsequent retail price changes – in some countries (e.g. Spain) pressure for policy intervention already built-up late last year

Evolution of selected EU retail household[1] prices excluding taxes and levies [EUR/MWh]



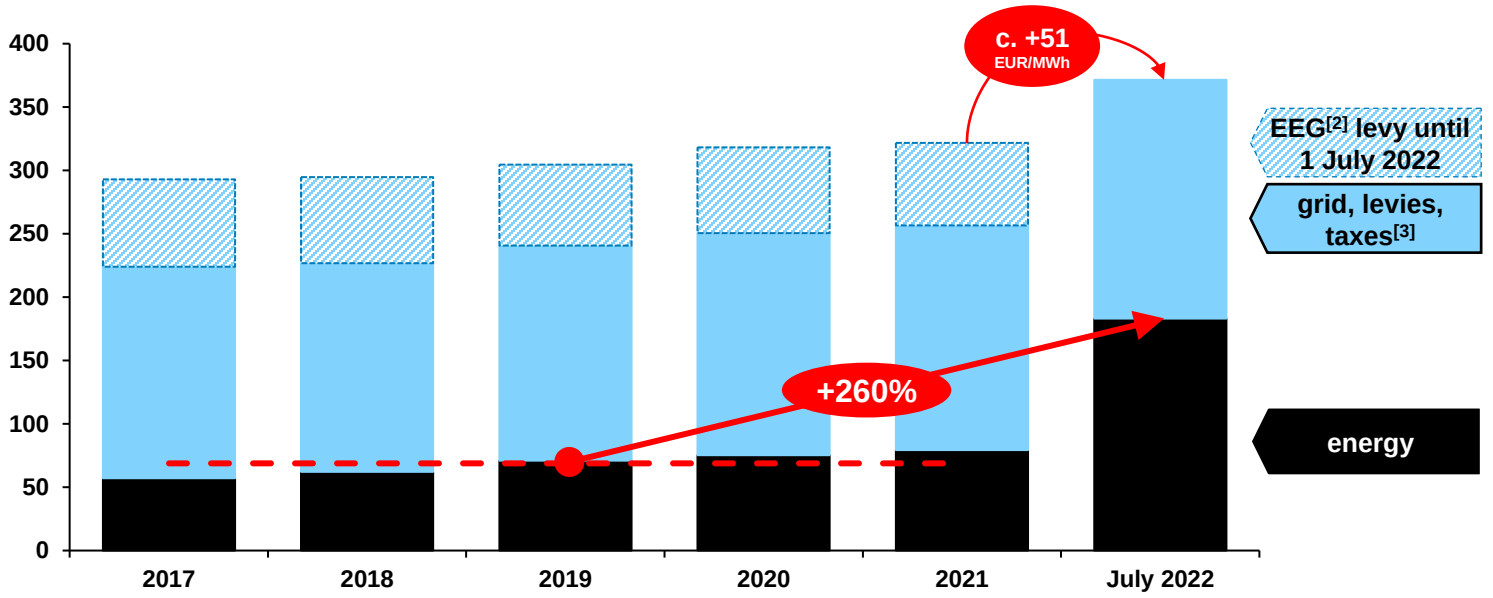
Notes: [1] annual consumption between 2,500 and 5,000 kWh
Source: Compass Lexecon analysis based on Eurostat

Retail prices in Germany also increased with some delay

Pass through speed in Germany is lower, therefore retail electricity price increase has only recently materialized

- By now (mid-2022) significant retail electricity price increases can be seen also in Germany
- These increases are partly off-set by the (as of now only temporary) retirement of the EEG levy mid-2022

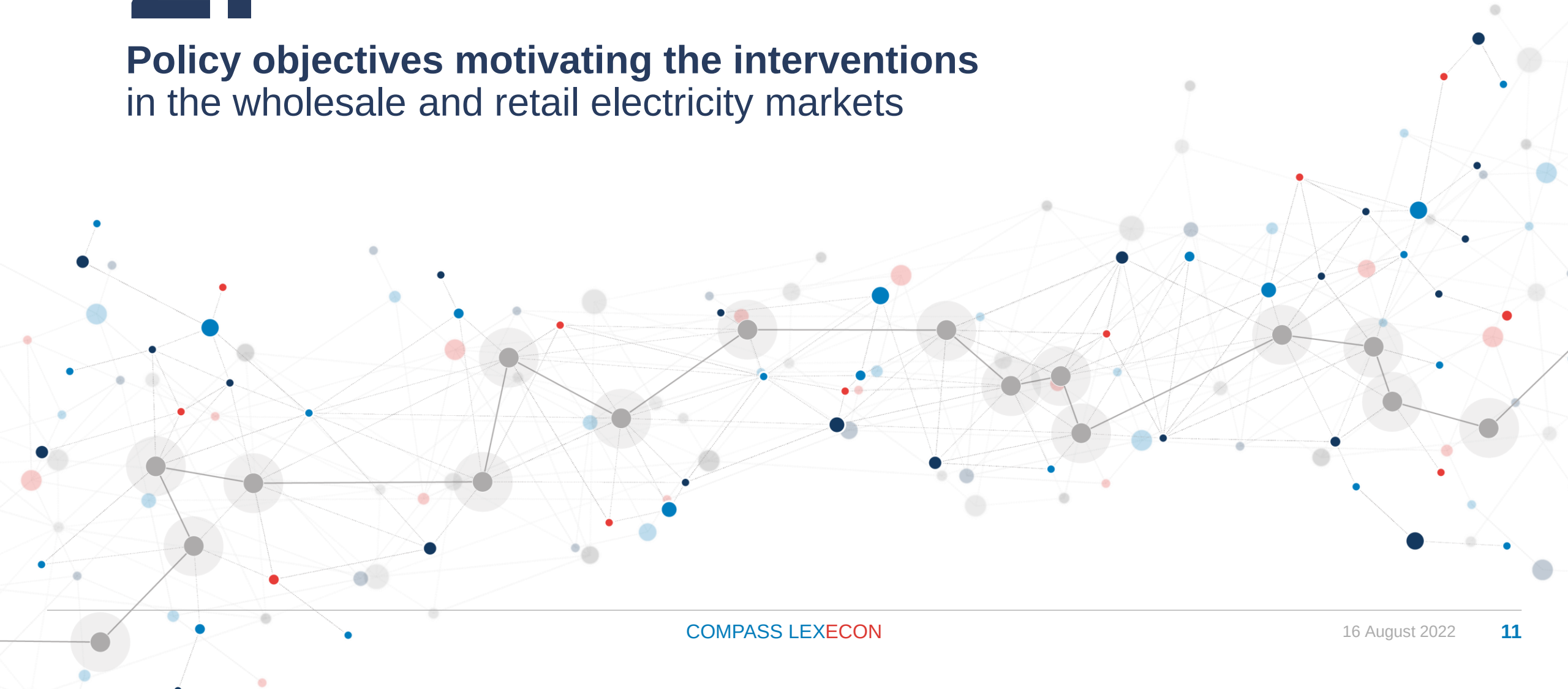
Evolution of German retail household[1] prices – all components [EUR/MWh]



Notes: [1] annual consumption of 3,500 kWh, [2] incl. VAT, [3] excl. the EEG levy
Source: Compass Lexecon analysis based on BDEW

2.

Policy objectives motivating the interventions in the wholesale and retail electricity markets



Policy interventions in the electricity market address a range of policy objectives

Policy objectives/rationales for intervention	Recent political discussion
I. Provide relief for the affordability crisis and address equity concerns	*"Finland is not alone in trying to compensate increasing energy costs. More than 20 European countries have taken action."* **Finnish Finance Minister, Saarikko, 2021** *"The financial and social burden has become unbearable," In such a difficult backdrop, the government extends support for energy consumers in July."* **Energy Minister, Skrekas, 2022**
II. Reduce inflationary pressures and broader macro-economic effects	*"The government is pulling out all the stops to control inflation – triggered by high gas and electricity prices – and put it below 10%."* **Spanish Minister of Finance, Montero, 2022**
III. Address equity concerns in the light of (perceived) excess profits	*"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**
IV. Support the decoupling of domestic electricity prices from international commodity price volatility	*"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." "We're working with the Commission to have an authorisation to decouple our energy market and thus stop this price increase."* **Spanish Ministers of Economy and Energy, Calviño and Ribera, 2021** *"On this issue, Europe – until now at least – is not showing itself to be up to the task" "Effective from July, the government will introduce a new system which disconnect the international price increases in natural gas from electricity bills".* **Greece Prime Minister, Mitsotakis, 2022**
V. Support the decarbonisation transition	*"[it is necessary to] accelerate […] projects with renewable sources, namely from solar and wind energy, allowing to save water [energy] and achieving greater autonomy in relation to fossil fuels."* ***Portuguese Minister for the Environment and Climate Action, Cordeiro, 2022***

Short-term ↓ Long-term

Source: Compass Lexecon analysis

Scope of analysis

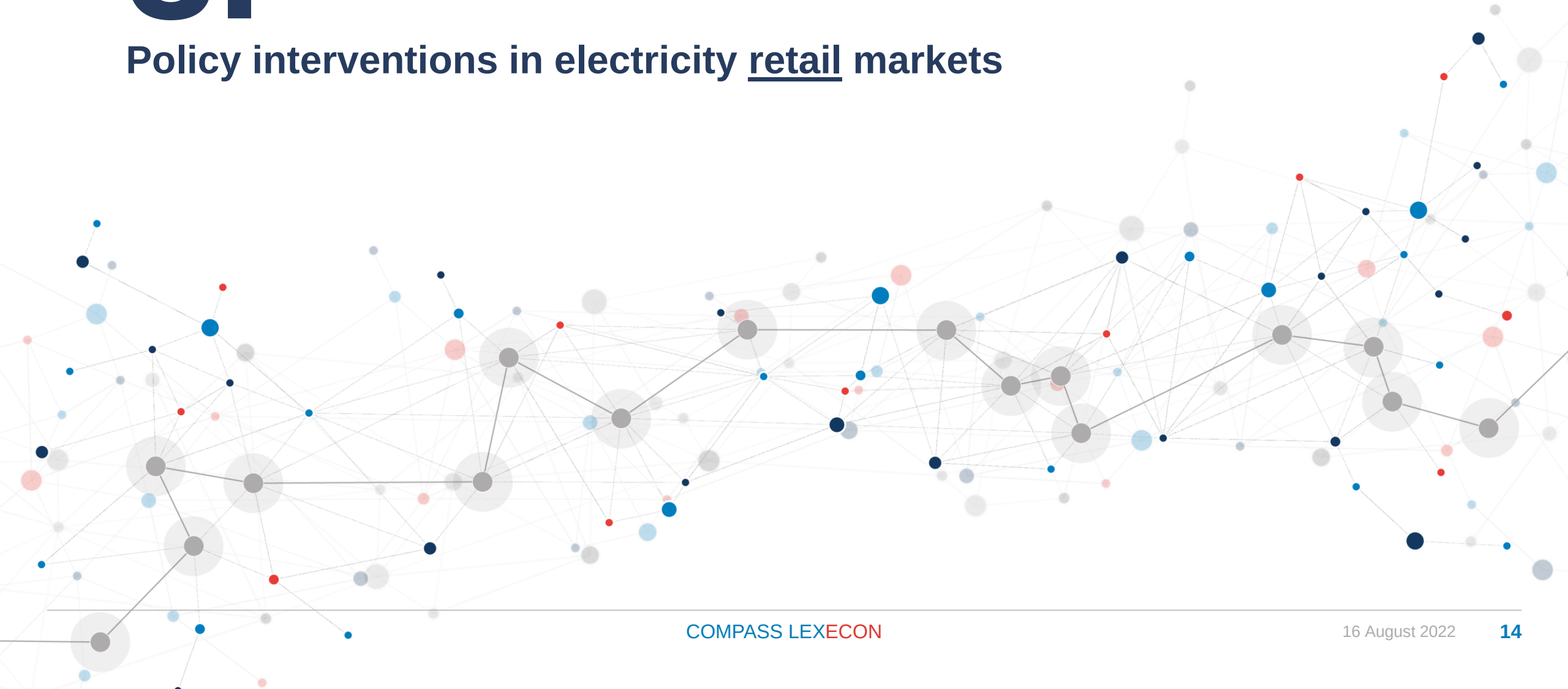
The analysis of this study focusses on measures that leave the wholesale & retail markets in place[1] and focus on households (retail measures) and/or have a short-term effect (wholesale & retail measures)

	Short-term measures More likely to provide immediate relief to the affordability crisis → **analysed in detail in this study**	**Long-term measures** needing ▪ a long time for implementation or ▪ a long time to actually provide relief → **not analysed further**
1. Retail market interventions	**A. Direct support for energy costs to households**	
	B. Retail tax reliefs	
	C. Reductions / exemptions for network tariffs or levies	
	D. Retail price regulation	Investment support for ongoing electrification
2. Wholesale market interventions	**A. Cap on wholesale electricity price**	Mandatory or incentivised forward contracting for retail suppliers
	B. Cap on fuel price, fuel use, or fuel subsidy	Introduction of reliability options
	C. Single buyer model / buyer platform model (aggregator)	Establishment of a European gas purchasing platform
	D. Claw-back on windfall profits of inframarginal generators	Taking up competition measures (e.g. under REMIT)

Abbreviations: REMIT … EU Regulation on Wholesale Energy Market Integrity and Transparency
Notes: [1] non-market based measures like rationing were therefore not analysed
Source: Alignment between Agora Energiewende and Compass Lexecon

3.

Policy interventions in electricity retail markets

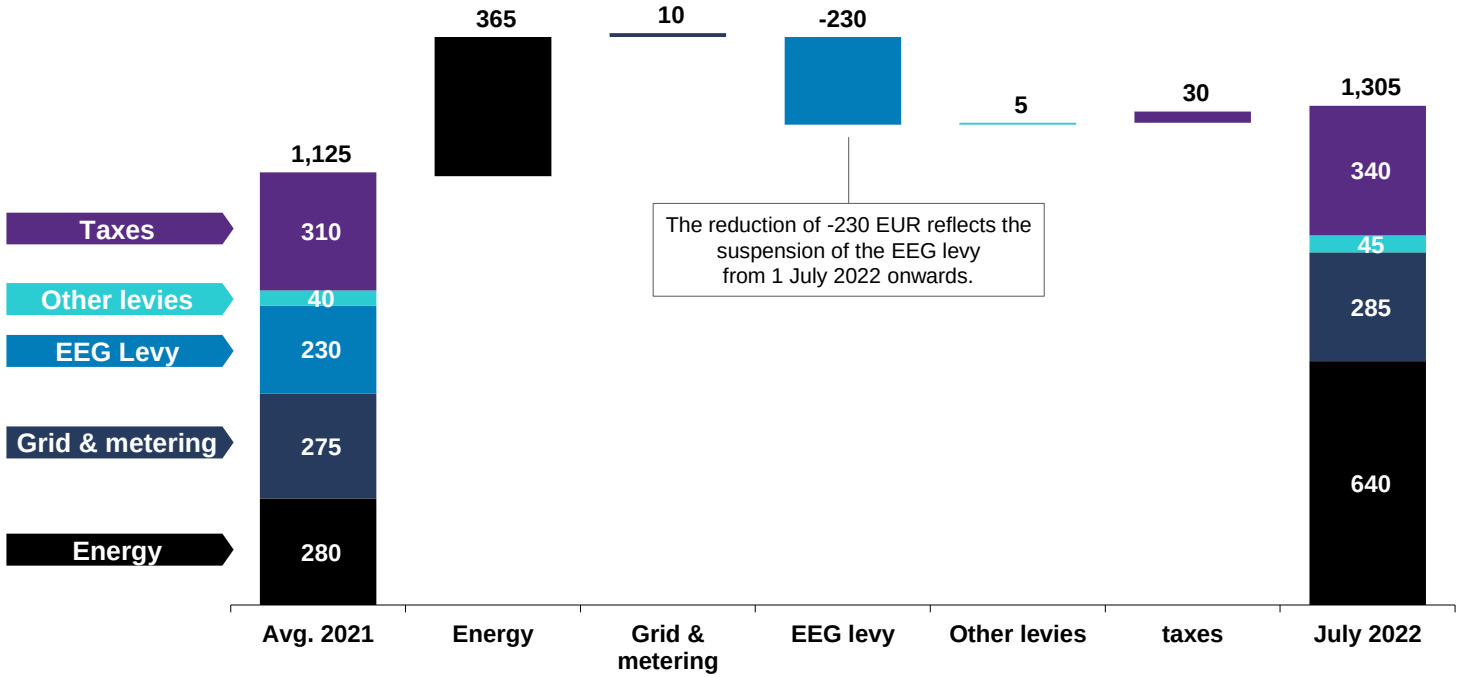


Setting the scene: Evolution of German household electricity bills

Retail price rises will be partly off-set by the abolishment of the EEG levy in mid-2022

- The energy component of retail electricity prices has risen significantly already up until July 2022
- Price rises so far have been partly compensated by the a reduction und subsequent abolishment (from 1 July 2022 onwards) of the EEG levy
  - Going forward the renewable support will be covered entirely from the national budget.

Composition of a typical annual German household electricity bill[1, 2] and evolvement between 2021 (annual average) and July 2022 [EUR/a]



Abbreviations: *RES … renewable energy sources*
Note: *[1] for annual consumption of 3,500 kWh, [2] all values and sums rounded to full 5 EUR/a – rounded sums might deviate from sums of rounded values*
Source: *Compass Lexecon analysis based on BDEW*

1. Policy interventions in electricity retail markets can be clustered into four groups

1A. Direct support for energy costs to (vulnerable) households and public end-customers[1]	▪ Direct financial assistance provided to households and public sector end-customers by government to compensate for high energy prices. ▪ This support can be either a lump-sum payment or partial reimbursements of energy costs actually incurred. ▪ The support might be provided to all end-users or only on a means-tested basis to those meeting pre-defined criteria of being 'vulnerable'.
1B. Retail tax reliefs	▪ (Temporary) reductions of or exemptions from general (VAT) or sector specific (excise tax) taxes for the consumption of electricity by (selected) end-users.

1C. Reductions / exemptions for network tariffs or other levies	▪ (Temporary) reduction of or exemptions from
	  ▪ electricity network tariffs covering DSO and/or TSO network costs or
	  ▪ other system levies covering costs for e.g. renewable subsidies.

1D. Retail price regulation	▪ Pricing rules relative to wholesale electricity prices or maximum prices set for retail electricity in order to increase its affordability for household consumers and set by government or regulatory authorities.

Note: [1] e.g. schools or hospitals
Abbreviations: DSO … distribution system operators, EV … electric vehicles, PV … photovoltaics, TSO … transmission system operator, VAT … value added tax
Source: Compass Lexecon analysis based on Emissions-EU ETS.com, OECD, Law Insider – dictionary

EU member states have recently implemented various electricity retail market interventions

Tax reliefs and direct support to end-users are the most widely implemented measures

	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SI	SK	ES	SE	UK
1A. Direct support for energy costs to (vulnerable) households and public end-customers[1]	●	●		●	●	●	●	●		●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●
1B. Retail tax reliefs	●	●			●	●				●				●	●					●	●	●	●	●	●	●		
1C. Reductions / exemptions from network tariffs or levies	●							●			●				●	●						●			●	●		●
1D. Retail price regulation			●					●		●							●		●				●		●			●

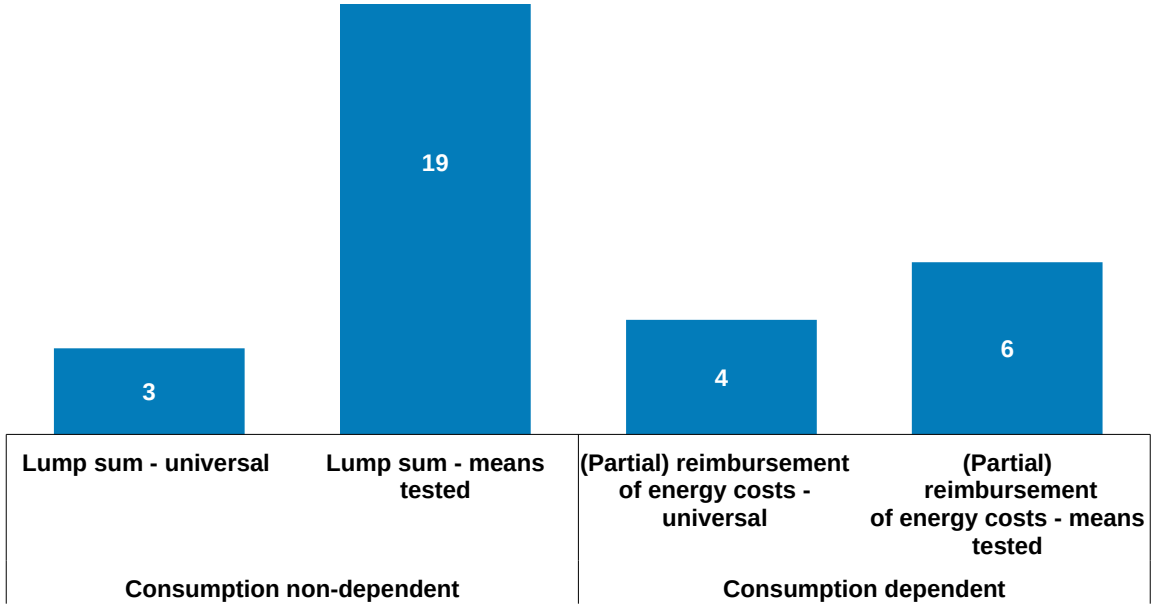
Notes: Status as of 19 September 2022 for 1A and as of 9 June 2022 for 1B to 1D. In scope are only measures that were enacted as a reaction to the energy price rises in the second half of 2021.
[1] this includes e.g. hospitals or schools
Source: Compass Lexecon analysis based on Bruegel, Dennik N, Enel, Times of Malta, Urso

1A. Direct support to households[1] has been introduced in 22 EU member states & the UK

A variety of direct support instruments encompassing one-off vouchers or grants as well as ongoing partial reimbursements of energy costs have been introduced, generally targeting vulnerable households

- 22 EU member states[2] and the UK have introduced direct support to households and public sector electricity consumers (e.g. schools, hospitals, etc.) to help them cope with increased energy costs.
- These measures are either targeting
  - All end-users ("universal"),
  - Or only vulnerable end-users ("means-tested")
- The most common supporting measures include:
  - **Lump-sum support (e.g. direct payments, vouchers, or grants)**
    - These generally do not impede price signals for energy efficiency
  - **(Partial) reimbursement of energy costs**
    - These may dampen price signals for energy conservation if they are not focused on a limited/specific consumption
- The value of **lump-sum support ranges from 100-800 EUR per household** while **discounts on electricity bills average at 30%**
  - The one-time support measures disburse an ex-ante specified budget.
  - Also for partial reimbursements of energy costs budgets are typically specified ex-ante – in the light of the energy price evolution, these budgets were expanded in several member states over time.

Overview of direct support instruments targeting households introduced in EU member states[3] & the UK



Notes: [1] and public sector end-consumers, [2] some countries have introduced multiple types of direct support instruments, [3] not including all measures identified (e.g. tax deductibility of energy costs or the introduction of instalment payments).

Source: Compass Lexecon analysis as of 19 September 2022 based on Bruegel, Dennik N, Enel, Times of Malta, Urso, LRT

1A. At least six types direct support measures for households were enacted in Europe

Direct support to households against high energy prices is implemented in almost all EU member states – in the majority as means-tested lump-sum transfers.

		AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SI	SK	ES	SE	UK
1A	Direct support for energy costs to (vulnerable) households and public end-customers	●	●		●	●	●	●	●		●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●
1A.1	Lump sum – universal	●													●														●
1A.2	Lump sum – means tested	●	●		●	●	●	●	●		●	●	●			●	●		●		●	●	●	●	●				●
1A.3	(Partial) reimbursement of energy costs – universal					●							●										●					●	
1A.4	(Partial) reimbursement of energy costs – means tested		●										●			●		●						●			●		
1A.5	(Partial) tax deductibility of energy costs														●														
1A.6	Instalment payment for electricity bills															●													

Source: Compass Lexecon analysis as of 19 September 2022 based on Bruegel, Dennik N, Enel, Times of Malta, Urso, LRT

1A. Already enacted direct support measures for German households

Direct support[1] already enacted sums up to c. EUR 20bn – equivalent to c. 480 EUR on average per household.

Package	Direct support measure	Relief per person per year	Total value of relief package for 2022	Average[2] per German household
		EUR	*EUR*	*EUR*
First relief package (February 2022)	"Means tested" heating support	230 to 270	c. **9 bn**[1]	—
	Income tax break – entry rate	up to 84		
	Income tax break – marginal rate	Up to 50		
	Extended COVID response measures	Up to 600		
	other measures	n.r.		
Second relief package (April/Mai 2022)	Universal lump-sum payment	300	> **10.4bn**	
	Child bonus	100		
	Means tested support	100 to 200		
	Total enacted measures so far		**> 19.4bn**	**480**

This direct support compares to a leeway of c. **635 EUR per year**[3] from setting to zero **electricity related taxes, electricity grid tariffs or & remaining levies** (→ details see on later slides).

Note: [1] excluding the temporary retirement of the renewable energy levy (EEG levy), [2] This analysis aims to give a first rough estimate of average direct support in Germany. It is important to note, however, that the value of support varies greatly between households of different incomes – and various measures explicitly target the most vulnerable households, [3] 2021 figures; per household per year

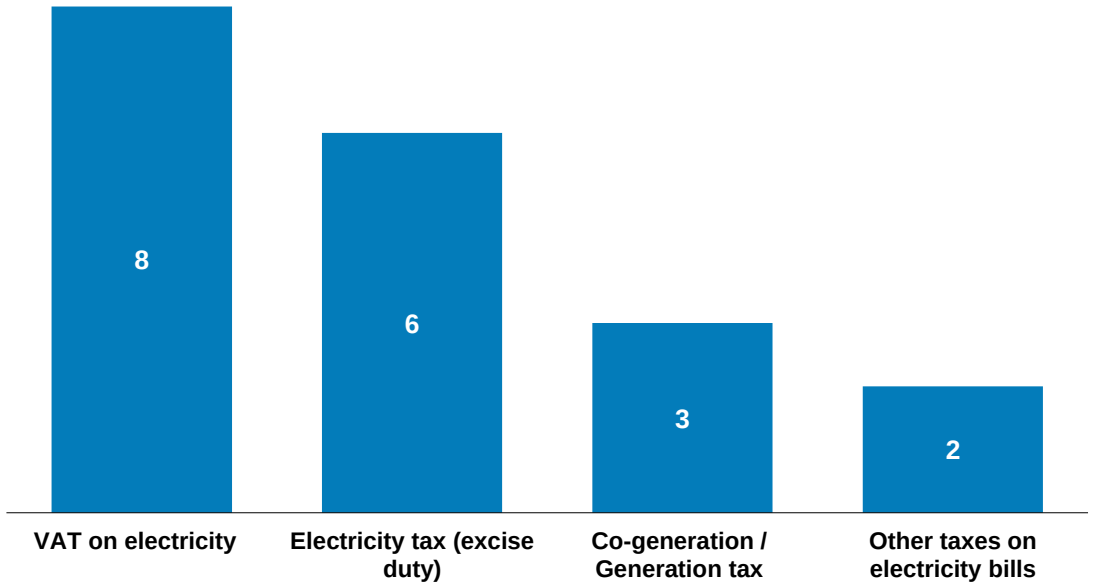
Source: Compass Lexecon analysis based on Bundesfinanzministerium, Handelsblatt, MDR, Destatis

1B. EU member states have implemented different types of electricity-related tax reliefs

Temporary suspension or reduction of VAT on electricity is the most common tax intervention

- 14 EU member states have enacted suspensions or reductions in electricity-related taxes to counter the 2021/22 energy price rises.
- These tax reliefs apply either universally or to selected end-user groups, (e.g. vulnerable households)
- The most common tax reductions include:
  - **VAT** suspension or a reduction (usually to 5-10%) with universal application to households or other vulnerable groups
  - **Electricity tax or equivalent excise duty on electricity** suspension or reduction for households
  - **Temporary suspension of (co-)generation taxes** for households, and/or other vulnerable

Number of EU member states having implemented tax reductions[1]



Notes: [1] Some member states have implemented multiple tax reductions.
Source: Compass Lexecon analysis as of 9 June 2022 based on Bruegel, Dennik N, Enel, Times of Malta, Urso

1B. Four different types of retail tax reliefs have been implemented across Europe

Exemption from/reduction of VAT on electricity and electricity tax have been the most popular among the electricity-related tax reliefs introduced be EU MS vis-à-vis the increase of energy prices

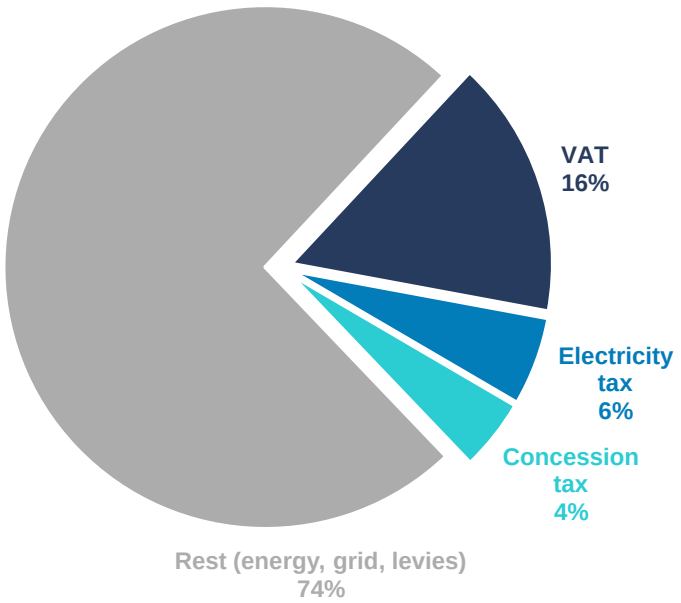
	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SI	SK	ES	SE	UK
1B Tax reliefs	●	●			●	●				●				●	●					●	●	●	●	●	●	●		
1B.1 VAT on electricity		●			●	●														●	●		●		●	●		
1B.2 Electricity tax (or excise duty)	●									●				●	●					●				●				
1B.3 Co-generation / generation tax																							●	●		●		
1B.4 Other taxes on electricity bills		●																				●						

Source: Compass Lexecon analysis as of 9 June 2022 based on Bruegel, Dennik N, Enel, Times of Malta, Urso

1B. Leeway for tax reliefs for German households

Taxes make up c. 27% of typical German household electricity cost in 2022 – equivalent to c. 340 EUR per year

Composition of a typical German household electricity bill[1]



Value added tax (VAT) (national tax)

- Specific amount: **19% of all other components**[2] (energy, grid, levies, electricity tax)
- Annual burden for a **typical household** (c. 3,500 kWh/a): **c. 210 EUR/a** as of April 2022
- Total revenues from households (estimate[4] for 2020): **c. EUR 6 bn**

Electricity tax (national tax)

- Specific amount: **20.5 EUR/MWh** (excl. VAT) or c. 24.4 EUR/MWh incl. VAT[3]
- Annual burden for a **typical household**: **c. 70 EUR/a** (excl. VAT)
- Total revenues from households (2020): **c. EUR 2.6bn** (excl. VAT)

Concession tax (municipal tax with wide variation across Germany and end-users)

- Specific amount: **c. 17 EUR/MWh** (on average, excl. VAT)[3]
- Annual burden for an **average household**: **c. 60 EUR/a** (excl. VAT)
- Total revenues from households (estimate[4] for 2020): **c. EUR 2bn** (excl. VAT)

Note: [1] for annual consumption of 3,500 kWh, as of July 2022 (i.e. excluding the abolished EEG levy), [2] the 19% of the other components are equal to 16% of the total bill including the VAT itself, [3] households have to pay VAT also for the concession and electricity tax share, [4] rough estimate as there is no data available – thereof about EUR 800m of VAT on the (now abolished) EEG levy.

Source: Compass Lexecon analysis based on BDEW, BNetzA, Destatis, BMWK

1C. Reduction of network tariffs and levies have been enacted in eight EU MS & the UK

Temporary reductions of network tariffs are not primarily targeting household end-users

- Eight EU member states and the UK have recently enacted network tariff and levy reductions or suspensions
- **Grid fee reductions / suspensions primarily target businesses**. Only in some countries these reductions are applied universally to both households and private businesses
- Tariff reductions can focus on
  - **Fixed tariff components** – thereby providing relief while not impeding energy conservation incentives, or
  - **Variable tariff components** – potentially reducing incentives for energy efficiency
- **Revenue shortfalls are generally compensated by subsidies from state budget** (sometimes financed by introduction or increase of other taxes)
- Types of network tariff reductions enacted in EU MS are the following:
  - **Electricity transmission tariff**
  - **Electricity distribution tariff**
  - **Tariff for network operation**
  - **Tariff for system services**
  - **Tariff for access to networks for industrials**
- In addition, two EU MS has temporarily suspended or reduced the **green electricity levy**

Note: Abbreviations: RES…Renewable Electricity Sources
Source: Compass Lexecon analysis as of 9 June 2022 based on Bruegel, Dennik N, Enel, Times of Malta, Urso

1C. Six types of network tariff and levy adjustments have been enacted across Europe

Reduction in tariff for electricity transmission and/or distribution networks is the most common among tariff reduction measures implemented by EU MS & the UK

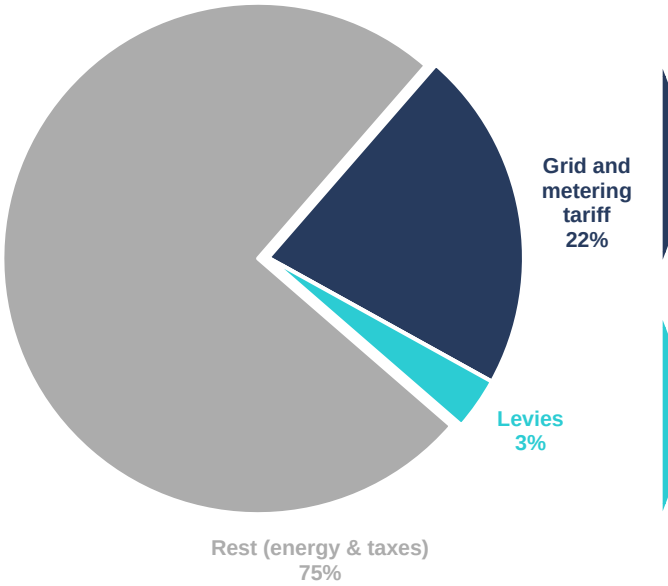
	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SI	SK	ES	SE	UK
1C Reductions / exemptions from network tariffs or levies	●							●			●				●	●						●			●	●		●
1C.1 Tariff for electricity transmission and/or distribution networks								●								●									●	●		
1C.2 Tariff for system operations																									●			
1C.3 Tariff for system services															●										●			
1C.4 Network access tariff																						●						
1C.5 Suspension / reduction of the green electricity levy	●										●																	
1C.6 Tariff for existing customer similar to that of new customer																												●

Source: Compass Lexecon analysis as of 9 June 2022 based on Bruegel, Dennik N, Enel, Times of Malta, Urso

1C. Leeway for tariffs or levies relief for German households

Grid fees and levies make up c. 25% of typical German household electricity cost in July 2022 – equivalent to c. 325 EUR per year

Composition of a typical German household electricity bill[1]



Grid and metering tariff (varying widely across network operator and end-user properties)

- Specific amount for an average household (c. 3,500 kWh/a): **c. 80 EUR/MWh** (excl. VAT)
- Annual burden for an **average household**: **c. 280 EUR/a** as of April 2022
  - c. **60 EUR/a thereof are a fixed fee** (i.e. non consumption based)

Levies (excl. the abolished EEG levy)

- Specific amount: **c. 12.37 EUR/MWh** (excl. VAT)
- Annual burden for an **average household**: **c. 40 EUR/a** (excl. VAT)
- Total revenues from households (estimate): **c. EUR 1.6bn** (excl. VAT)[2]

Abbreviations: HY … half year
Note: [1] for annual consumption of 3,500, as of July 2022, [2] estimate based on 2022 levies but 2020 household consumption volumes.
Source: Compass Lexecon analysis based on BDEW, BNetzA, Destatis, BMWK

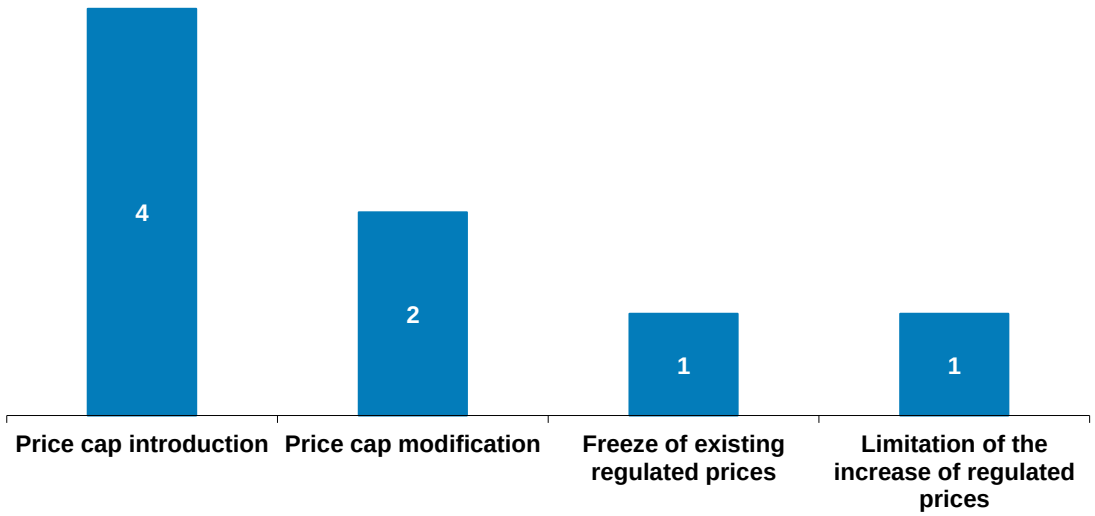
1D. Retail electricity price regulatory measures have been enacted across Europe

While four European states newly introduced retail price regulation, the other states with existing regulation adapted it in the light of current price rises

- Seven EU MS & the UK have recently enacted regulatory measures targeting retail electricity prices.
- These regulatory interventions **primarily target household electricity prices**.
- The regulatory interventions fall in four broad categories:
  - **Introduction of electricity price caps**, applicable either universally or only on household electricity prices
  - **Modification of existing electricity price caps**
  - **Freeze of already existing regulated prices at the current level**
  - **Limitation of increases of already regulated prices**

- **Losses associated with the introduction of the price caps** in all of the four countries (Estonia, Lithuania, Romania and Malta) **are covered from the state budget.**

Number of EU member states having implemented or changed measures to regulate retail electricity prices[1]



Notes: [1] Introduction of a electricity cap in the Czech Republic is currently under discussions, but have not been enacted yet, therefore it is not counted among the above EU MS.
Source: Compass Lexecon analysis based as of 9 June 2022 on Bruegel, Dennik N, Enel, Times of Malta, Urso, LRT

1D. Four types of retail price regulatory measures were recently introduced in Europe[(1)]

Price cap introduction is the most common retail price measure introduced by EU MS & the UK to address the impact of rising electricity prices

	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SI	SK	ES	SE	UK
1D Retail price regulation			●					●		●							●		●				●		●			●
1D.1 Price cap introduction								●									●		●				●					
1D.2 Price cap modification																									●			●
1D.3 Freeze of existing regulated prices			●																									
1D.4 Limitation of the increase of regulated prices										●																		

Retail price regulation measures already existed prior to the energy crisis in several European countries:

United Kingdom

- The price cap, introduced by the UK regulator Ofgem in 2019, sets the maximum amount that suppliers are permitted to charge per kWh of electricity each year and it is reviewed every six months

France: regulated sale tariffs

- Offered by the incumbent operators (EDF and the 162 local distribution companies) based on a methodology defined by CRE that allows contestability by alternative suppliers (serving c. 30% of demand) – therefore in effect the regulated tariff acts as a price cap

Bulgaria:

- The regulated segment represents about 40% of the country's electricity consumption
- The electricity retail price is set by the Energy and Water Regulatory Commission – in the light of currently raising electricity and broader energy prices it's power to raise tariffs is restrained by law.

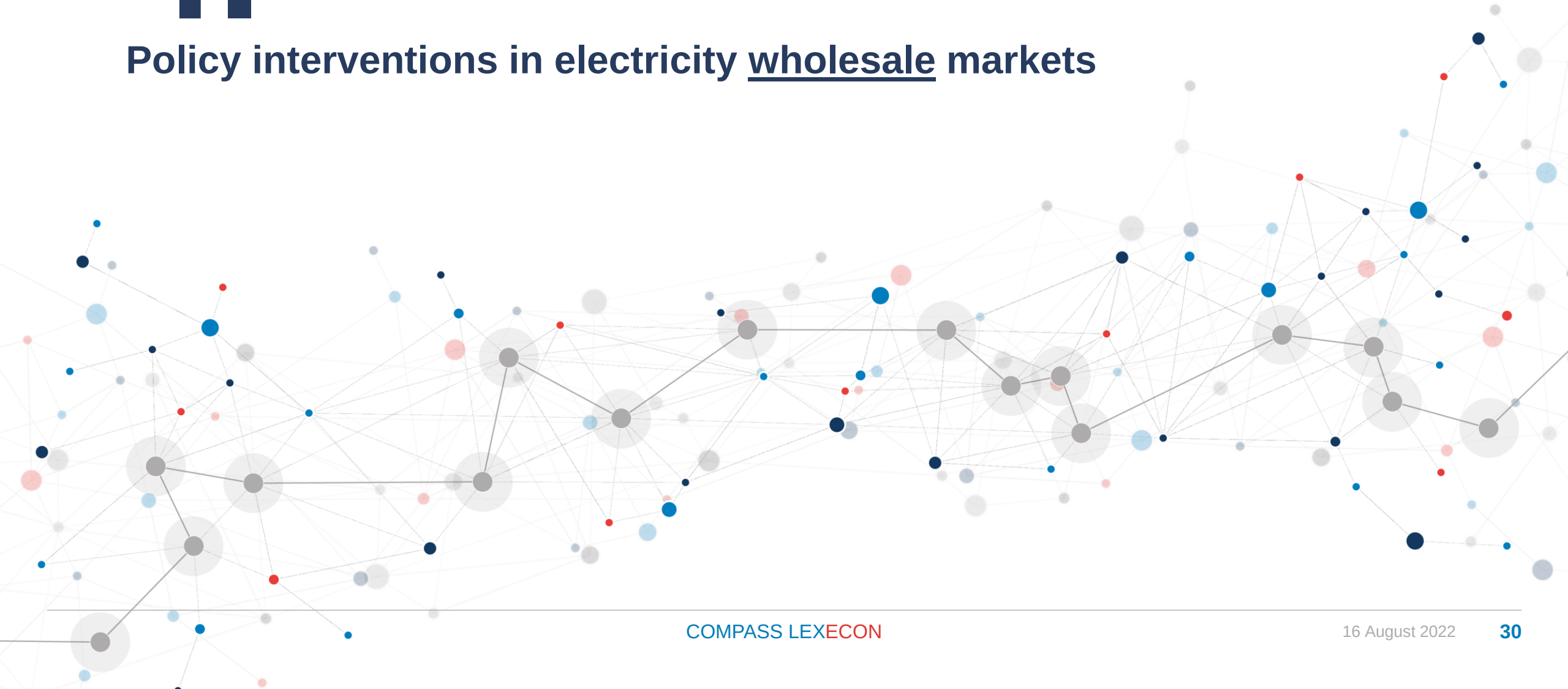
Slovakia:

- Electricity supply to households (considered as vulnerable customers) by suppliers with a "universal service' obligation are subject to retail price regulation
- The Office for the Regulation of Network Industries approves (or declines) proposals for regulated prices

Notes: [1] Includes only countries that have newly introduced electricity price caps or have carried out any modification thereof in order to decrease the impact of high electricity prices.
Source: Compass Lexecon analysis based as of 9 June 2022 on Bruegel, Dennik N, Enel, Times of Malta, Urso, LRT

4.

Policy interventions in electricity wholesale markets



Short-term policy interventions in electricity wholesale markets can be clustered into four groups – we provide case studies for all of those

A. Cap on wholesale electricity price	▪ Maximum electricity price set at a predefined level and applicable on the entire wholesale market ▪ Can be tied to monitoring of margins of generators to prevent excessive profits ▪ On a wholesale level, price caps exist in Texas and Australia	
B. Cap on fuel price, fuel use, or fuel subsidy (for fossil generators)	▪ Fossil-fuel generators, mostly gas-generation, is subsidised in order to induce a reduction of their wholesale market bids ▪ This measure attempts to work on the source of the problem, high gas prices ▪ This measure has been implemented on the Spanish/Portuguese wholesale electricity market	
C. Negotiated contracts for electricity	▪ In France and Slovakia, the government has induced national energy companies to sell part of their electricity generation to customers at a negotiated cost below market prices ▪ The EC has proposed to implement a central buyer model for gas purchasing, which would see a European public institution purchase gas for Europe to reduce costs	
D. Claw-back on windfall profits of inframarginal generators	▪ Temporary fiscal measure on economic rents, actually an “income tax”, where plants have to return “excess income” obtained in the electricity market (for example, compared to what they would have obtained if the gas price would have been capped) ▪ Spain implemented a claw back which excluded the financial effect of forward sales. Because electricity may have been sold forward, the amount of rent a generator earns on wholesale markets often cannot be estimated reliably. We also present a case study from the UK oil and gas industry, which illustrates how income that forms the basis for a profit tax can also be assessed on the basis of accounting figures. Italy bases the windfall tax on gross-margins from the VAT estimation and as such also uses accounting figures.	

Source: Compass Lexecon analysis

2A. Cap on wholesale electricity price

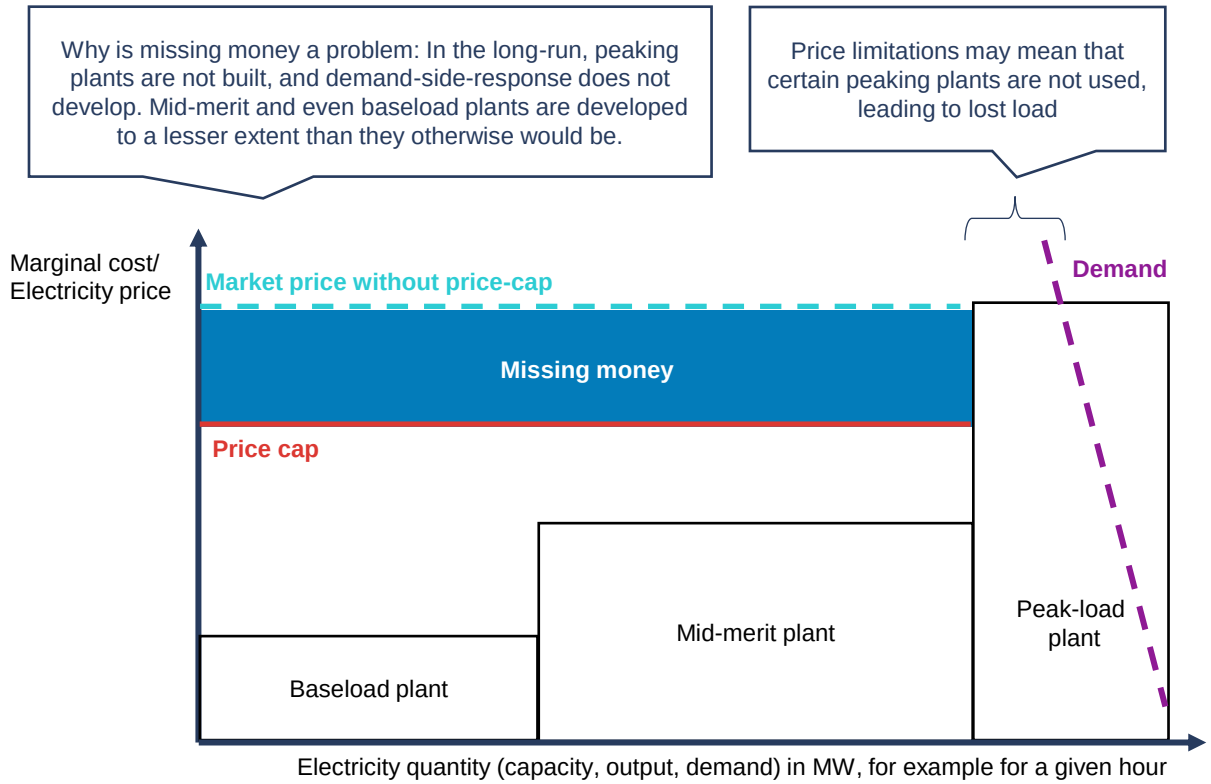
Overview

Description of measure

- Wholesale **electricity prices are capped** at a predefined level – as a permanent measure or for a temporary period based on predetermined set of activation conditions

Advantages and limitations

- Capping the wholesale electricity price below the Value of Lost Load (VOLL) will reduce average wholesale prices and this will likely feed through to lower end-user prices
- Prices will no longer reflect the actual scarcity value/production costs of electricity, which is the basis of the Energy Only market model.*
- This means several adjustment mechanisms that the market usually provides, go missing. In particular, there is a dispatch distortion, a demand distortion, a cross-border-trade distortion and an investment distortion (described in more detail below)
- Peak-load plants or resources might be unwilling to run/activate, if their costs are above the price cap. This may lead to lost load.
- A price cap would create the so-called missing money problem for all generators, and so investments would be lower than needed (or optimal). This would have to be compensated for by a capacity remuneration mechanism (CRM)
- In some countries price caps are used as a structural measure to prevent market power exercise and/or to prevent excessive profits.**
- It is generally a challenge to define the level of the price cap and/or the conditions for its implementation if it is not permanent (see next page)



Comment: The investment distortion could be removed by introducing capacity remuneration mechanisms. See e.g. Compass Lexecon, DLA Piper 2019, section 5 for further discussion.

*Germany has been advocating an electricity only market: Ein Strommarkt für die Energiewende: Ergebnispapier des Bundesministeriums für Wirtschaft und Energie (Weißbuch): https://www.bmwk.de/Redaktion/DE/Publikationen/Energie/weissbuch.pdf%3F__blob%3DpublicationFile%26v%3D33

** Buehler, Stefan and Burger, Anton and Ferstl, Robert, The Investment Effects of Price Caps under Imperfect Competition: A Note (2010). Economics Letters 106(2), 2010, 92-94, Available at SSRN: https://ssrn.com/abstract=1263293

2A. Temporary cap on wholesale electricity price

Case studies from Australia and the USA

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) are examples of price caps below value of lost load
- Both markets foresee a normal market clearing, with regular price signals - including price spikes - up to the point where sustained high prices have reached the mechanism's pre-defined threshold
- Price caps that are announce in advance and anticipated by market players do not undermine the trust in the stability of the regulatory system
- The investment distortion would have to be removed by a capacity remuneration System (CRM). Actually, in both markets shown on the right, capacity remuneration systems are discussed now
- Since these caps interfere in the representation of scarcity through prices, the various distortions (dispatch distortion, demand distortion, cross-border trade distortion) remain a challenge

*"In order for measures such as these to offer high degrees of regulatory stability, they should be **implemented in a clear and transparent way**, **well in advance** of those high energy price periods which they are designed to mitigate against."*
ACER: Final assessment on EU Wholesale Power Market Design

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.

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.

Source: Compass Lexecon analysis based on ACER and Australian Energy Market Operator (2019: Guide to administered pricing)

2B. Cap on fuel price, fuel use, or fuel subsidy (for fossil generators)
Overview

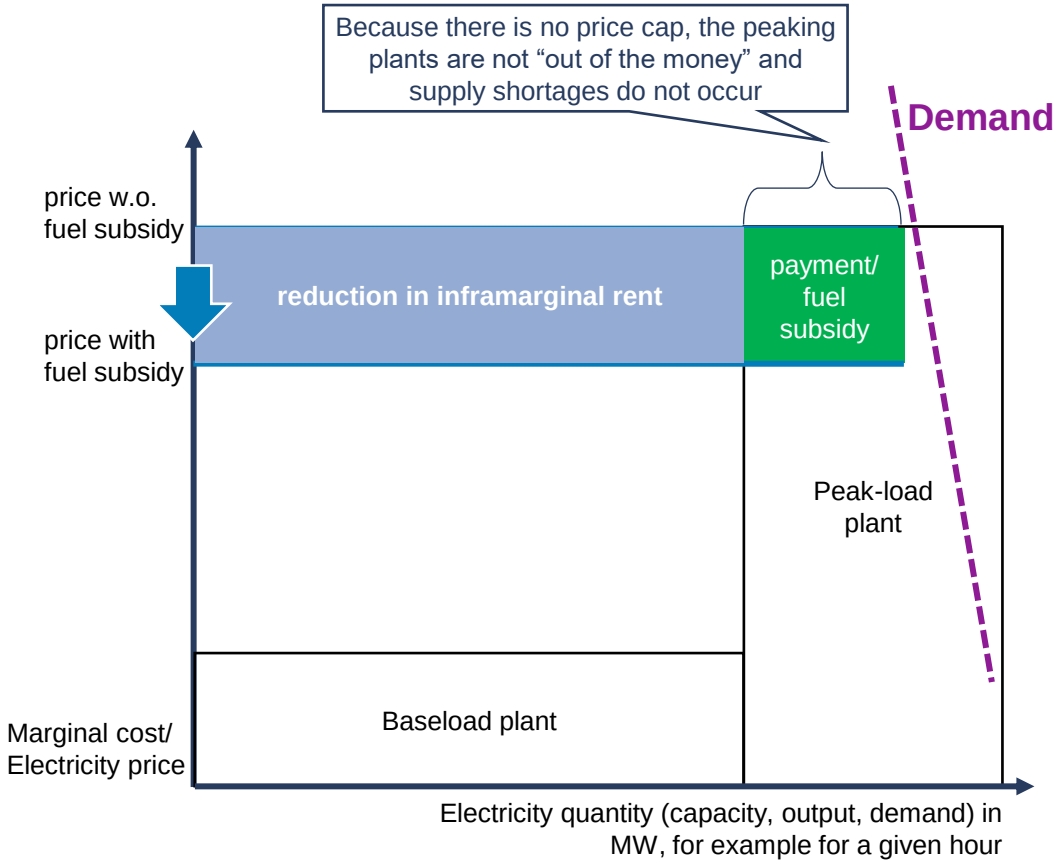
Description of measure

- **Subsidisation of marginal fossil-fuel based generators**, most notably gas-fired generation, so that they reduce their bids in the electricity wholesale market
- That way, bids from marginal fossil-fuel plants on the market are **artificially reduced**

Advantages and limitations

- Similar to an electricity price cap, this lowers wholesale market prices and reduces inframarginal rents earned by the whole merit order
- Retail prices and inflationary pressures are likely reduced (this is conditional on a functioning market, as a recent debate of a fuel subsidy in Germany shows[1])
- This measure is very similar to a price cap, with the distinction that peak-load generators will generate in peak hours, because their costs are being covered by a subsidy
- Because the wholesale price is not at the level that reflects the true cost of electricity in hours where the payment is made, the various distortions (dispatch, demand, investment and cross-border) occur
- Since Germany is very interconnected, a coordination with neighbouring countries would be advisable, in order to avoid subsidies benefitting neighbouring countries

Comment: A European purchasing platform that manages to lower the gas price would have a similar effect, but without the distortions, because the price reduction would not be artificial.



Note: [1] see e.g. Handelsblatt
Source: Compass Lexecon analysis

2B. Cap on fuel price, fuel use, or fuel subsidy (for fossil generators)

Case study from Spain and Portugal

Application period	▪ June 2022 to May 2023 (applicable for 12 months from its approval by the European Commission)
Generation concerned	▪ The mechanism covers the following facilities: – **CCGTs** – **Coal-fired** power plants – **CHP** using fossil fuel if not under incentive scheme ▪ Power plants only receive compensation for energy sold in electricity markets (day-ahead, intraday and ancillary services)
Compensation mechanism	▪ Power plants receive a payment for electricity sold, reducing their cost and bids to the market ▪ The payment is calculated according to the following formula: **Payment = (Weighted average gas price on day-ahead gas market – Gas Reference Price) / 0.55** ▪ The Reference Price of gas will be 40 €/MWh for 6 months, and increase subsequently by 5 €/MWh every month to 70 €/MWh in the last month of application ▪ If the weighted average gas price is lower than the reference price, the payment will be zero
Cost allocation	▪ Consumers will bear the cost of the mechanisms (with some exemptions). There will be two different settlements: – The Iberian market operator (OMIE) will settle the cost arising from payments to day-ahead and intraday schedules – The Spanish and Portuguese (REE and REN) TSOs will settle the cost in balancing markets arising from ancillary services schedules ▪ Retailers will be exempted from payments in the OMIE settlement for energy covered by hedging instruments entered into before 26 April 2022
Legal Basis	▪ Royal Decree-Law (RDL) 10/2022 of 13 May 2022, link
Reception/ Challenges	▪ EU Commission validation has been cleared in 2nd week of June, link

Comment: Spain and Portugal have a highly integrated common wholesale market and form one price zone. As such, they introduced this measure in tandem.

Source: Compass Lexecon analysis based on Spanish Government

2A. and 2B. Analysis of distortions

Dispatch distortion, demand distortion, investment distortion and cross-border distortion

Dispatch distortion

- 2A (price caps)
  - Plants with generation costs higher than the wholesale electricity price cap would **run at a loss** if required to produce (**or not run at all**)
  - When price caps are hit, electricity prices are the same for many hours, which would make generation technologies and demand **indifferent about when to produce or consume,** which creates additional costs and can create **security of supply issues**
  - **Reducing price spreads** between hours (via the price cap) directly interferes with the dispatch of **storage.** Dispatchable non-fossil fuel-based technologies, such as hydro plants, lose opportunity-cost signal or "wait" (storing energy) until intervention ends
- 2B (fuel subsidies)
  - Challenge to **calibrate technology-specific subsidies** such that efficient dispatch signals remain in place but marginal costs are decreased

Investment distortion

- Due to missing money*, plants could retire (or **not be built** in the first place) which could **compromise security of supply.**

Demand distortion

- **Demand-side-response is not sufficiently remunerated.** Price caps increase the consumption of scarce resources.
- **Artificially reducing end users' prices** (wholesale and indirectly retail prices) requires an accompanying **rationing policy**, because removing the scarcity signal motivates users to **increase consumption.**

Cross-border-trade distortion

- If introduced at national level only, price caps/fuel subsidies would **distort the efficient flow of electricity between neighbouring markets** and incentivise flows from countries with the artificially decreased prices to those without it
- Since Germany is very interconnected, these measures would have to be combined with export restrictions in hours where the price cap is binding, or other measures to avoid distorting import-export flows

Source: Compass Lexecon analysis

*Notes: *The 'missing money problem' arises in liberalised wholesale electricity markets when electricity prices do not correspond to the value of the investment in resources (typically generation capacity) needed for reliable electricity provision. For example, where remuneration mechanisms operate outside of the energy market (e.g. FITs for renewable generation) this can reduce market prices such that other plants that are remunerated primarily from energy market revenues are not able to recover their fixed costs (i.e. the 'missing money').*

2C. Negotiated contracts for electricity

An option for intervention mentioned by the EU Commission[2]

Description of measure

- **Negotiated contracts on behalf of consumers** with new projects and / or existing generators (for example, nuclear plants in France)
- This can be done to manage market power. The pooling of demand should create countervailing buyer power, to balance a strong market position of a vendor. The forward-sales also reduce potential market power on short-term markets
- Electricity or gas purchased through the platform are then sold on to the members of the buyer platform / the beneficiaries of the single buyer model
- The Commission states that a single buyer *"would buy electricity on favourable commercial terms and make it available to certain consumer categories below market price"* [2]
- In the words of the Commission: *"Another way to shield household consumers, in particular the poor and vulnerable, (but also companies) would be for Member States to use an "aggregator model", under which a State-controlled entity purchases electricity on the market and makes it available to certain consumer categories – directly or through suppliers – at prices below current market prices based for example on a strike price."* [2]

Advantages and limitations

- Because electricity / gas are not priced at market prices, there likely is a demand distortion. This will likely lead to further distortions:

  "Such a solution would also create demand distortions and, consequently, dispatch and cross-border trade distortions. Yet, these can be expected to be less severe than under the introduction of compensation for fossil fuel-fired generators or a price cap in the electricity wholesale market." [1]

- Some damage to the trust investors / companies have in the stability of the regulatory framework is possible:

  "It is not obvious why privately-owned generators would accept selling electricity under the market price to a third party other than being threatened that another more harmful intervention (at least for their business) would be introduced if they did not commit to doing so." [1]

Implications / Examples

- In practice, negotiated contracts on the electricity market below expected market prices have been introduced with publicly owned generators. **Examples** include the ARENH mechanism implemented in **France** since 2011, and **Slovakia** between 2023 and 2024 (see below).
- A European joint gas purchasing platform is proposed in REPowerEU (see below)

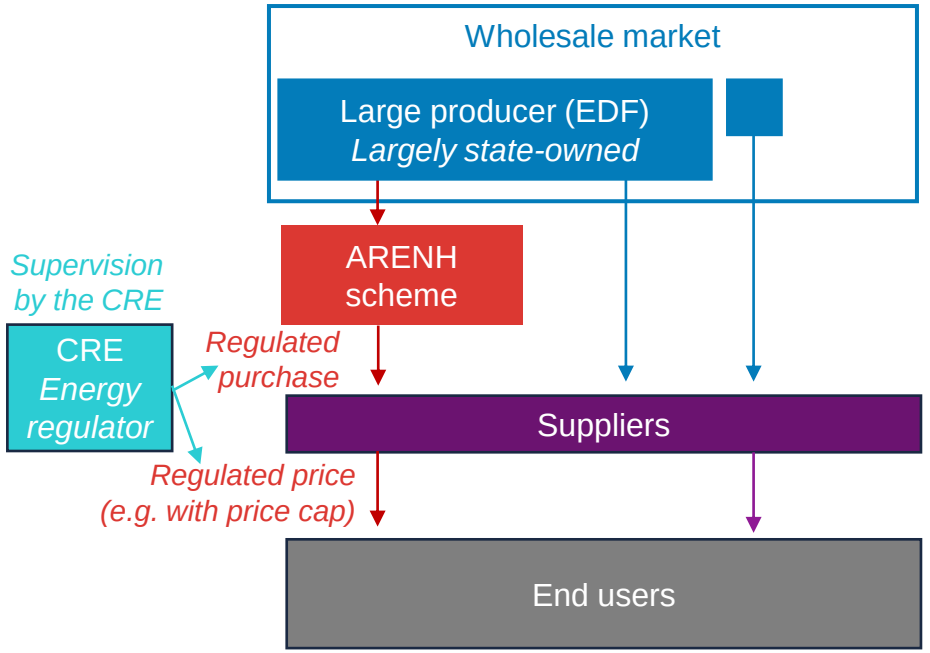
Source: Compass Lexecon analysis based on: [1] Battle et. al., 2022. Power price crisis in the EU 2.0+, Desperate times call for desperate measures and [2] European Commission, 2022. Communication on security of supply and affordable energy prices

2C. Further description of negotiated contracts

Case study of France

Legal / regulatory obligation to sell at lower price than market price

- By granting regulated access to 'historic' (e.g. dating from pre-liberalisation times) nuclear capacities the **ARENH** scheme allows 'alternative' (or 'non-historic') energy suppliers to have access to about a quarter of EDF's nuclear electricity production at a **fixed price that is equal for all**.
- The mechanism is based on the **NOME Law** (law no. 2010-1488 of December 7, 2010), in force since 1st July 2011 for a period of 15 years.
- Since 2011, EDF has to provide 100TWh/y (120TWh in 2022) of energy from "historical nuclear plants" at a price fixed by the regulator (42€/MWh since 2012, 46.5€/MWh for the extra 20 TWh in 2022) to alternative suppliers.
- **Suppliers will have to pass on this advantage** to consumers under close **supervision by the energy regulator.**
- The rationale for this was to make sure consumers benefit from "cheap" nuclear power and facilitate retail market entry, despite the strong upstream market position of EDF. Currently, the ARENH mechanism is also used to control retail prices. This works, because most residential consumers still benefit from an EDF regulated tariff whose formula includes the ARENH price, and because many retail suppliers index their tariffs to the regulated tariff. Since the relatively cheap ARENH energy enters the formula, retail prices are kept low compared to what they would be on the basis of pure wholesale prices.

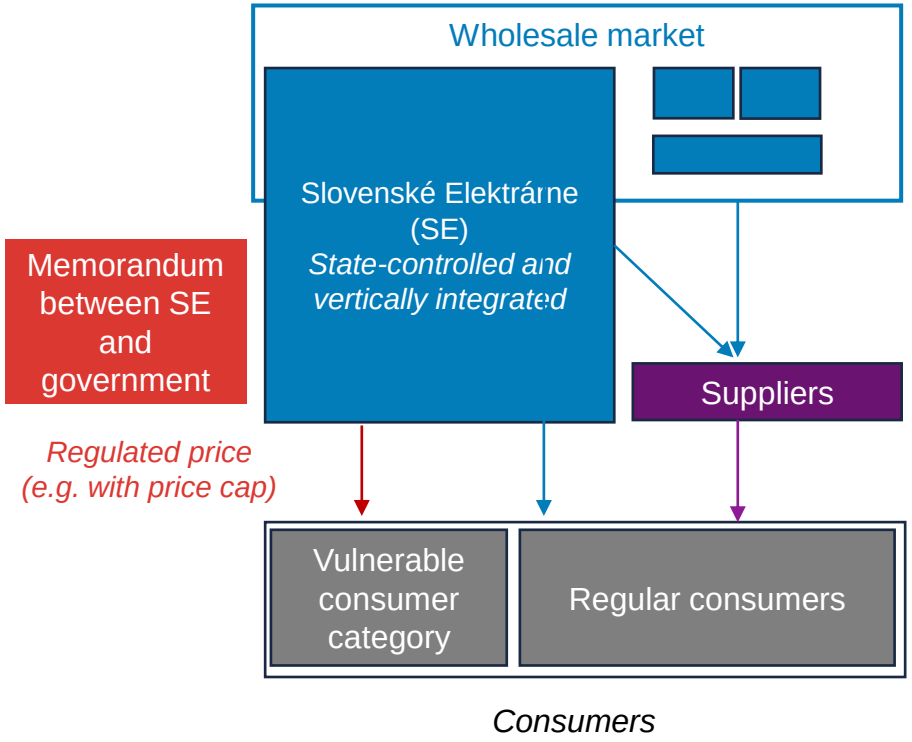


Source: Compass Lexecon analysis based on CRE

2C. Further description of negotiated contracts
Case study of Slovakia

Aggregator models - Slovakia

- The Slovakian government agreed with Slovenské Elektrárne (SE) not to introduce the originally considered windfall tax bill on nuclear power, and instead introduced **a retail price cap mechanism.**
- The agreement is based on a **Memorandum*** which states that for 2022-2024, SE has to provide **6.15TWh/y at 61.21€/MWh until 2024** to a **selected group of customers**.
- The agreed annual volume covers the entire electricity **consumption of households** (around 5.6 TWh/year) and the remainder should be used to supply cheaper electricity to **hospitals**, **social services homes** and **schools.**
- The **total value of the transfer** will amount to approximately EUR 850 million.
- The Ministry of Finance and the Ministry of Economy have also **committed to provide a stable tax and regulatory landscape** due to the agreement (not to take any initiative between 2022 and 2025 to introduce, increase or tighten any new tax, levy, fee, specific payment or regulation that could financially jeopardise Slovenské Elektrárne).

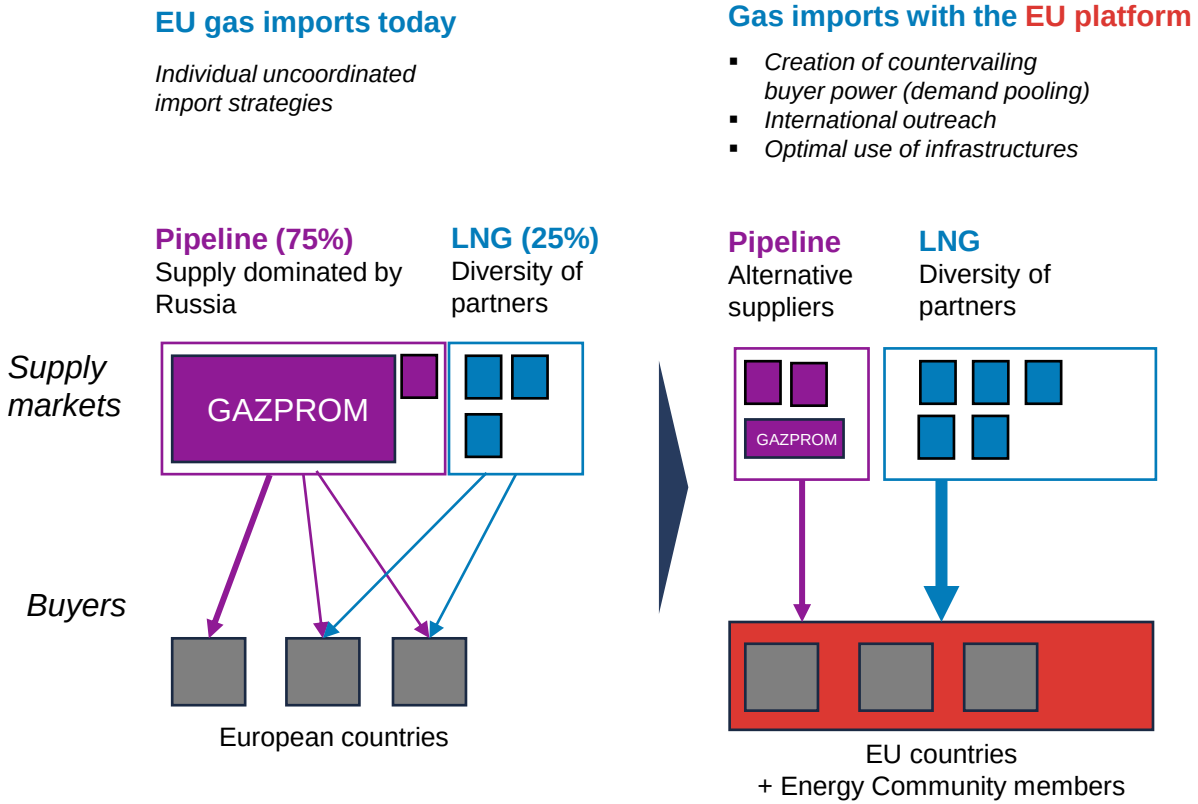


Source: Compass Lexecon analysis based on SEAS

Digression: Further description of a public buyer platform

Envisaged European gas purchasing platform

- **Goal**: The European gas purchasing platform has been brought forward as a way to address multiple objectives:
  - Achieve some demand pooling, which could create countervailing buyer power on the global gas market
  - Be an effective emergency tool to safeguard gas supply in case Russian flows stop
  - Help with the diversification of gas imports to reduce costs
- **Idea**: LNG supply has generally higher prices, with demand heavily dominated by Asia. Pooling should help to attract suppliers. Platform should also help to coordinate the import flows across Europe
- **3 areas of intervention of gas purchasing platform**: demand pooling to create countervailing buyer power, international outreach to gas partners and markets, and efficient use of EU gas infrastructures
- **Advantages and disadvantages:** The achieved lower gas price would be beneficial, and a lock-in effect into fossil gas could be avoided through an additional tax.



Source: Compass Lexecon analysis based on: Bruegel: How to make the EU Energy Platform an effective emergency tool, European Parliament: EU gas storage and LNG capacity as responses to the war in Ukraine and European Commission: First meeting of EU Energy Purchase Platform to secure supply of gas, LNG and hydrogen, Bloomberg: https://www.bloomberg.com/news/articles/2022-06-27/g-7-to-tell-ministers-to-explore-price-cap-on-russian-gas

2E. Claw-back on windfall profits of inframarginal generators

Overview

What is it

- In periods of high electricity prices, generators with comparatively low marginal costs have **comparatively high inframarginal rents**
- Windfall taxes are a fiscal measure on perceived "high" inframarginal rents, with the aim of **transferring those rents to the government** (see next page)
- The Commission, in its communication from March 8*, says that windfall profits should not be retroactive, should be technologically neutral, allow electricity producers to cover their costs, and not alter long-term market and carbon prices. It should also be temporary, as the communication of March 8* states: "the duration of the tax should be also clearly limited in time, not going beyond 30 June 2022."

Advantages and limitations

- Contrary to the measures described above, a windfall tax would **not directly affect the electricity market**. As such, the described distortions (dispatch, demand, investment and cross-border) can be avoided (unless there are second-order effects)
- To mitigate the impact on end user bills, the **revenues generated by windfall profit taxes** may be used to finance lumpsum vouchers or other support to end users deemed to need support
- Windfall taxes may, however, still be a **retroactive measure** that could compromise the trust investors and companies have in the institutional stability of a country
- As the Spanish example shows, forward-sales of electricity may mean that the above mentioned "high" inframarginal rents do not actually accrue with the generator, but the market participant that the electricity has been forward-sold to. This is a clear implementation challenge for a windfall profit tax

Implications / Examples

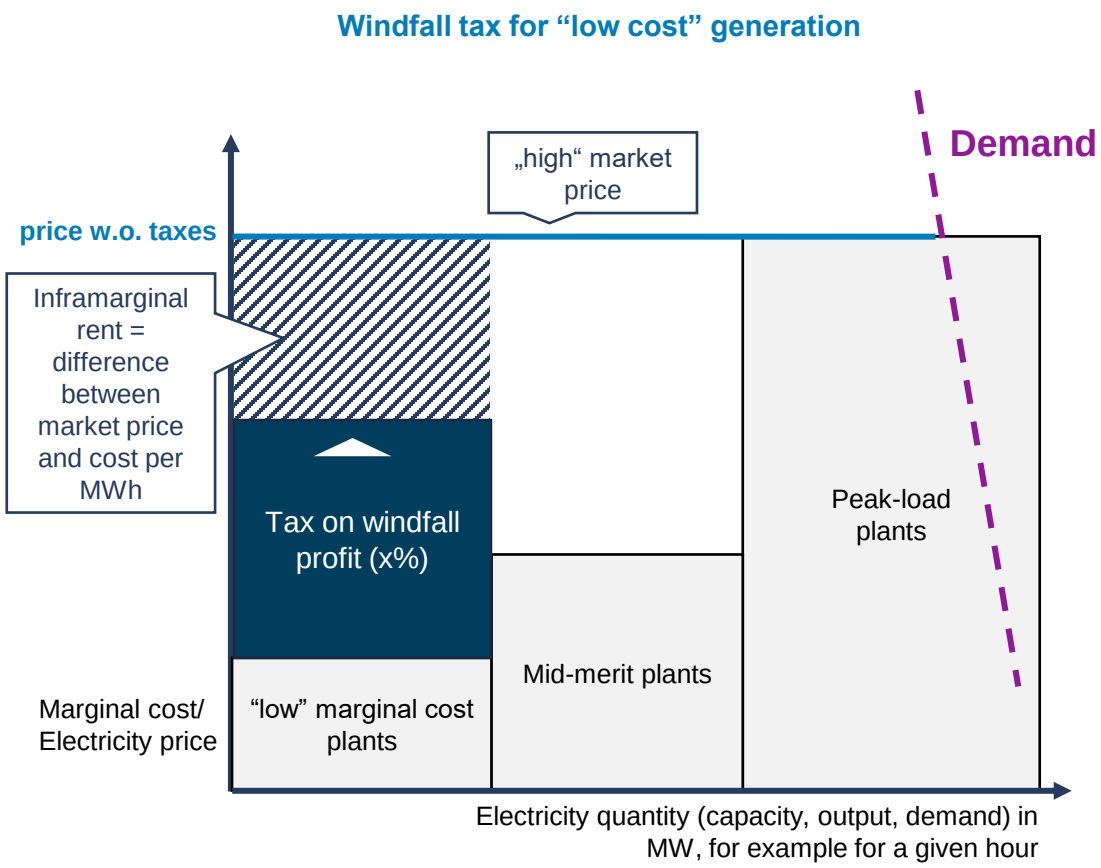
- **Spain** (for certain non-CO_2-emitting generators) **and the UK** (for oil- and gas extraction companies) introduced a tax on alleged windfall profits (see below).

Source: Compass Lexecon analysis based on European Commission: REPowerEU: Joint European Action for more affordable, secure and sustainable energy.

Digression: Some reflections on potential windfall taxes

Tax on electricity generation with “low” marginal costs – illustration of principle

- The figure on the right illustrates the basic idea of a windfall tax on generators with relatively “low” marginal costs and relatively “high” inframarginal rents
- Part of the inframarginal rent is taxed, and as such transferred from the generator to the government
- Market prices, and thereby dispatch, demand and cross-border flows are normally not directly affected
- High inframarginal rents typically attract political interest, and lead to discussions on windfall taxes. However, windfall profits may be well-justified, if they constitute a fair return on a risky investment, that may also have been (or may be in other years) loss-making. In order to assess this, an estimation of a fair return would have to be conducted on a case-by-case basis.



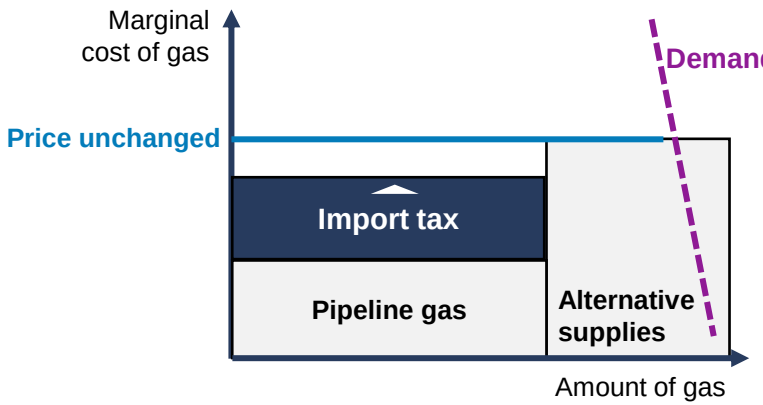
Source: Compass Lexecon analysis

Digression: Some reflections on potential windfall taxes

Gas/hard coal import tax – when it makes sense and when not

- If the European gas price is set by alternative suppliers, for example by LNG capacities, it might be possible to put an import tax on cheaper gas imports - for example pipeline gas delivered by Gazprom - without raising the European gas retail price
- The tax would have to be absorbed by the taxed pipeline gas supplier
- This measure would have to be analysed in more detail, in order to understand better the strategic options of the pipeline gas supplier. Who could, for example, respond with further supply reductions
- A similar logic applies for coal imports

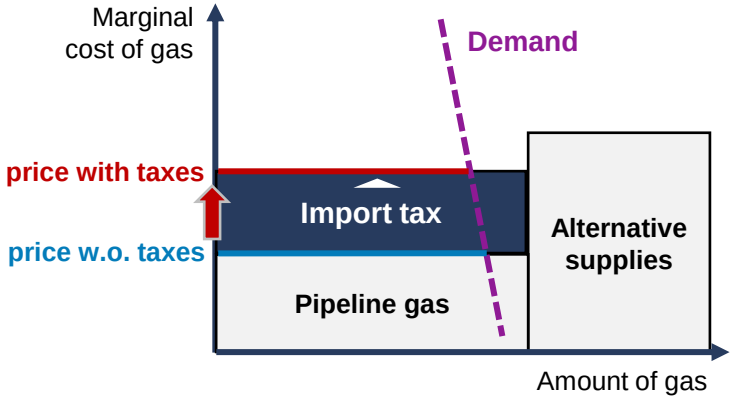
Gas/hard coal import tax Case 1: alternative suppliers set price



Case 1: prices remain the same, and tax generates revenue to finance other measures

- If the taxed gas supplier is actually price-setting, the tax would simply be passed on to European gas users, including gas plants
- This would increase the marginal costs of peaking plants even more, and have knock-on effects on electricity wholesale and retail prices, further fuelling inflationary pressures
- A similar logic applies for coal imports

Gas/hard coal import tax Case 2: pipeline gas sets price



Case 2: tax generates revenue to finance other measures, but gas price is increased

Source: Compass Lexecon analysis

2E. Claw-back on windfall profits of inframarginal generators

Case study on **Spain** (1/2)

Application period	**15/09/2021** to **30/06/2022**
Generation concerned	▪ Non CO_2 emitting power plants (mainly **Hydro**, **Nuclear**, **Wind** and **Solar** power plants) ▪ The mechanism **excludes the following facilities**: – facilities under a regulated remuneration scheme (i.e. **subsidised renewable assets**) – facilities in the electricity systems outside mainland Spain (**islands** and **African enclaves**); and – facilities with net power **equal to or less than 10 MW** ▪ The mechanism **excludes production covered by fixed price hedging contracts** (inc. retail contracts) that have been (i) entered into before 29 March 2022 (if the hedging price associated is fixed for a term >= 1 year), or (ii) entered from 29 March, but have a price equal or below 67 €/MWh.
Taxation mechanism	Power plants should reimburse monthly part of the "windfall profits" according to the following formula: **Amount to be paid = Energy generated x (Average gas spot price in the month – 20) x α / FMIG** ▪ FMIG (Average Gas Price Pass-Through) = CCGT efficiency (55%) / share of hours when CCGTs set the Day-Ahead price (or when there was a CCGT bid within 10% range of the marginal price) – Effectively this establishes an electricity price threshold of c. 100 EUR/MWh. ▪ The α factor aims to make the measure proportional, and it is set at 0.9 Provisions for hedging contracts: ▪ Provision for forward contracts or hedges constituted intragroup: the final price charged to the consumer by the group´s supply company will be taken into account and the fixed hedging price exempt from reduction will be €67/MWh but increased by an average marketing margin for the sector ▪ For hedging contracts entered after 29 march and a price >= 67MWh, the mechanism will operate in respect of the difference between €67/MWh and the higher contracted price

Source: Compass Lexecon analysis based on WFW A, and WFW B

2E. Claw-back on windfall profits of inframarginal generators

Case study on **Spain** (2/2)

Revenue utilisation	Revenues are used to finance reductions in system charges (benefiting mainly households)
Legal Basis	Royal Decree-Law (RDL) 17/2021 of 14 September 2021 (as amended by RDL 23/2021 and RDL 6/2022), link
Reception/ Challenges	N/A
Impact on affected generators	▪ The measure is mainly affecting the four largest Spanish vertically integrated utilities that own nuclear and most hydro plants (Iberdrola, Endesa, Naturgy and EDP) ▪ These utilities have avoided paying the windfall tax to a great extent, because of the exemption on energy covered by hedging instruments (that include intra-company contracts with their retail branch) ▪ However, the tax has affected the price at which their retail affiliated companies sell to end users (see below)
Impact on retail	▪ The affected utilities can evade the windfall tax by signing intra-company **fixed price hedging contracts** (between their generation and retail branch), as long as they pass through the contract price to their final customers ▪ Consequently, these utilities have been signing retail contracts below market prices ▪ There have been some (minor) complains by independent retailers, arguing this contracts imply unfair competition
Impact on government revenue	▪ The tax has raised significant less revenue than the Government originally expected. This revenue shortfall is due to the exemption on hedged quantities ▪ The Government expected this revenue would pay for the reduction in electricity system charges approved in September 2021. ▪ The Government has recently modified the renewable energy support scheme to make-up the revenue shortfall, bringing forward reductions in subsidies expected only for 2023
Impact on wholesale market	▪ The tax can potentially distort generation dispatch, as generators internalize the tax in their bids (the tax rate is a fixed €/MWh figure for all hour in a month, so the hourly market price could be below variable costs plus the tax rate ▪ Since the inception of this tax, hourly market prices have been systematically above the tax rate, so the distortion would have been small (tax would mainly affect dispatch in case of market prices below tax amount)

Source: Compass Lexecon analysis based on WFW A, and WFW B

2E. Claw-back on windfall profits – Example from UK Oil & Gas

Case study on **UK**

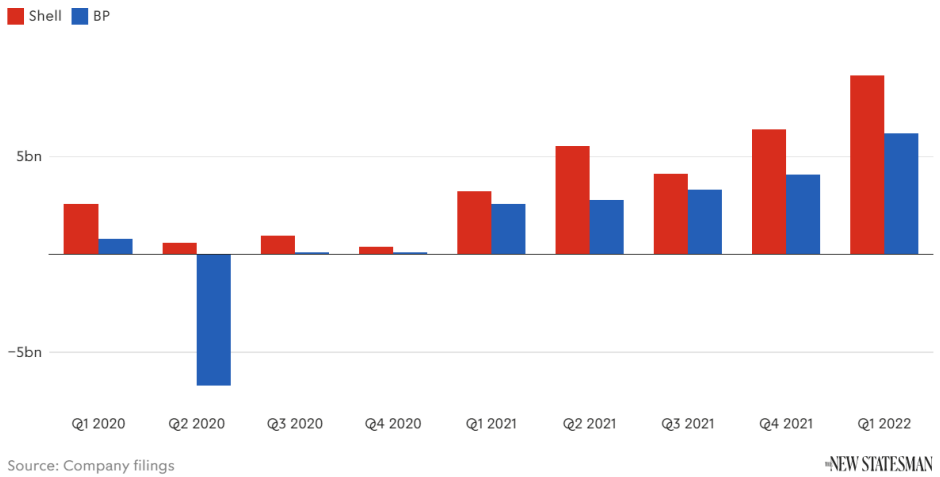
- As the Spanish example demonstrates, because electricity may have been sold forward, the amount of **rent** a generator earns on wholesale markets often **cannot be estimated reliably** on the basis of wholesale market data. So we also present a case study from the UK oil and gas industry, which illustrates how **income** that forms the basis for a profit tax can also be **assessed on the basis of accounting figures**
- UK North Sea oil and gas producers, such as Shell and BP, have a **special taxation regime of 40% of profits**. This is made up of a 30% Corporation Tax and 10% Supplementary Charge. It compares to a tax rate of 19% for typical corporate profits
- Revenues from oil and gas taxation **have been near zero in recent years** – due to falling production and deductions for decommissioning expenditure. But sharply **higher prices have led to soaring profits** for large producers - $9.1 bn for Shell in Q1 2022
- Following political pressure, the **UK government introduced a windfall tax on oil and gas producers** (the Energy Profits Levy) in May 2022
- The Energy Profits Levy functions as an additional 25% tax on the profits of oil and gas producers – increasing effective tax rates to 65%

Important features of the Levy are that:

- Previous losses and decommissioning expenditure cannot be offset against the levy (unlike with normal corporate taxes), but it includes an investment allowance to encourage more investment in UK oil and gas extraction – for every £1 a company invests, it will receive 91p in relief
- It is expected to expire by December 2025 – and perhaps earlier if oil and gas prices fall
- It does not apply to electricity generators – the government says that there are “extraordinary profits” in parts of the electricity generation sector, and that it “will urgently evaluate the scale of these extraordinary profits and the appropriate steps to take”
- The UK government expects the tax to raise £5 billion in its first 12 months – increasing tax receipts from oil and gas producers from about £8bn to about £13bn
- Tax receipts will contribute to a package of measures (expected to cost £15 billion in total) to help households deal with high energy prices, including grants to all energy consumers and means-tested payments to pensioners and benefits claimants

Oil and gas producer profits have increased since the start of 2021

Profits for Shell and BP from Q1 2020 to Q1 2022 ($bn)



Source: Company filings

NEW STATESMAN

Source: Compass Lexecon analysis based on Office for Budget Responsibility: Oil and gas revenues and Newstatesman.com, Shell and BP profits reach a record high (graph)

2E. Claw-back on windfall profits of inframarginal generators

Case study on **Italy** (1/2)

Application period	**22/03/2022** to **30/11/2022**
Generation concerned	▪ Companies that carry out the **following activities** in Italy: – **production of electricity**, methane gas or extraction of natural gas – **sale of electricity**, methane gas and natural gas – production, distribution, and trade of oil products – Companies **importing electricity**, natural gas, methane gas or oil products for subsequent sale. ▪ The tax **does not apply** to companies organising and managing **platforms for the exchange** of electricity, gas, environmental certificates and fuels. ▪ **No exemptions** for companies in the renewables sector.
Taxation mechanism	▪ Energy companies have to pay **by November a 25% one-off levy** introduced by the Italian government. – The tax is not deductible for income tax purposes – 40% of the total amount is due on 30 June 2022 and the remaining 60% is due on 30 November 2022. ▪ The Italian windfall tax applies to the **difference between**: – **The added value** (to be determined in accordance with Italian VAT rules) **for the period from 1 October 2021 to 30 April 2022;** and – **The added value for the period from 1 October 2020 to 30 April 2021** (the Incremental Added Value). – If this difference is lower than zero, it is assumed equal to zero for computation purposes. ▪ The levy applies to profit margins (=added value) that increased by more than 5 M€, with the 5M being more than a 10% increase in profit margins / added value.
Revenue utilisation	▪ Proceeds are used to finance the reduction of energy prices for enterprises and consumers.

Source: Compass Lexecon analysis based on Freshfields Bruckhaus Deringer briefing and PricewaterhouseCoopers blog

2E. Claw-back on windfall profits of inframarginal generators

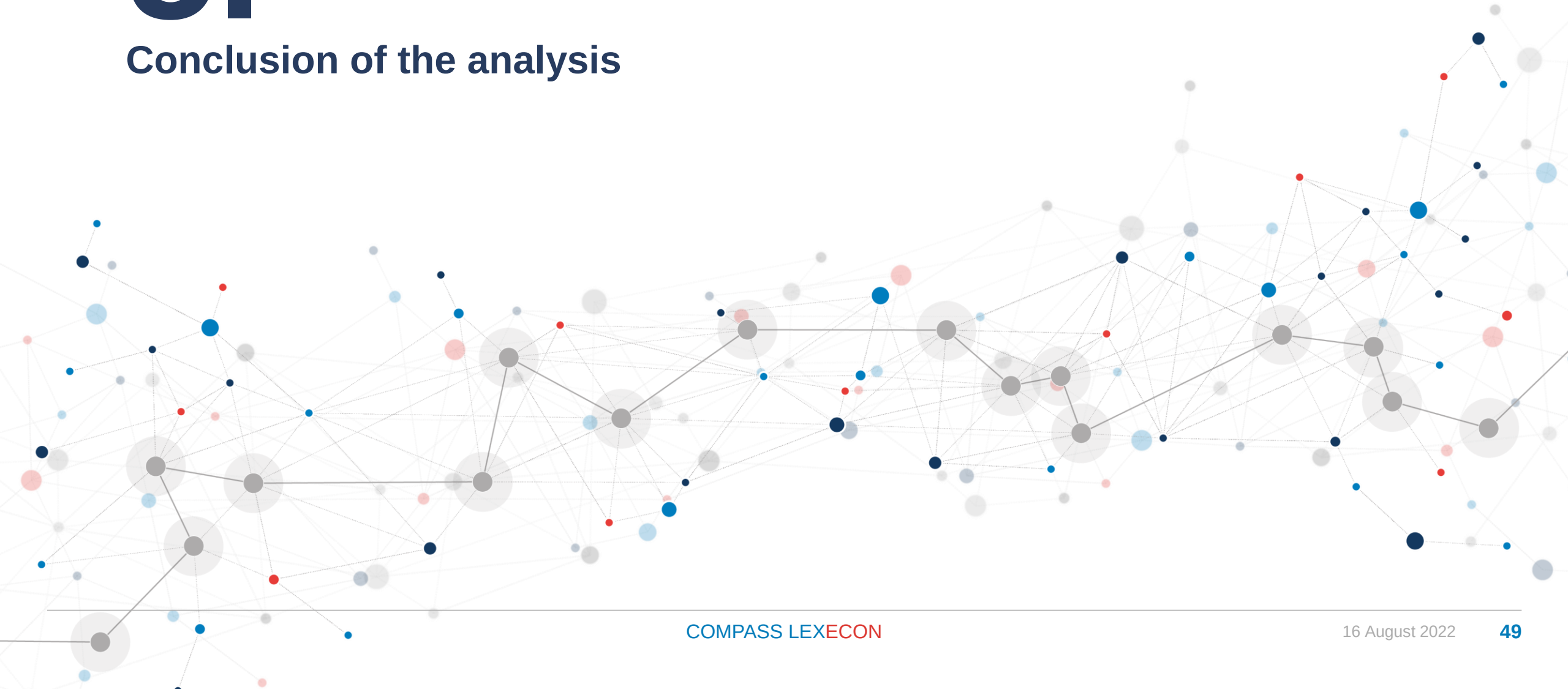
Case study on **Italy** (2/2)

Legal Basis	▪ Decree-Law No. 21 of 21 March 2022 ("*Taglia-Prezzi Decree*"), Article 37. ▪ This was later converted (with amendments from Article 55 of the Decree Law No. 50/2022) into Law No. 51 of 20 May 2022.
Reception/ Challenges brought forward by various parties	▪ The way in which the extra profit is determined raises concerns regarding the compatibility of the levy with the constitutional principles applicable to tax matters and, in particular, with Articles 3 (social equality amongst citizens) and 53 (fairness and equity of taxes, progressive taxes) of the constitution. The tax is retroactive to a certain degree, as it relates to periods where tax debtors should have the right to rely on the amount of taxation. ▪ The tax base may not exclusively capture the windfall profits generated by the spikes in energy and oil prices, since the incremental added value could be influenced by a variety of factors (including M&A activities) not connected to price fluctuations. ▪ The tax is based on revenue measures normally used for VAT estimation. As such, it may be easier to calculate and less susceptible to cases where the financial benefit associated with the price fluctuations was passed to financial counterparties, compared to the Spanish windfall tax. ▪ The levy also applies to renewable energy producers, which were already obliged to hand-back to the Gestore dei Servizi Energetici ("GSE") the revenues from the sale of energy exceeding a certain threshold (*Sostegni-ter* Decree-Law No. 4/2022). Economically, this could be seen as yet another Italian windfall tax, solely focussing on certain renewable generators. – The period when extra profits under the *Taglia-Prezzi Decree* are computed overlaps with the period impacted by the *Sostegni-ter Decree* between February 2022 and April 2022. It is unclear whether the balance would be net of the *Sostegni-ter Decree*, i.e. whether the electricity reference price stipulated in the *Sostegni-ter Decree* would be the applicable price from which to compute the electricity producers' profits for the calculation called for by the *Taglia-Prezzi Decree*, or if the market price (hourly zonal price) would apply. – There is no statutory provision yet on this issue and it is not know yet what measures will the financial authorities implement.

Source: Compass Lexecon analysis based on Freshfields Bruckhaus Deringer briefing and PricewaterhouseCoopers blog

5.

Conclusion of the analysis



Assessment of market interventions across two dimensions

Interventions

1. Retail market interventions	A. Direct support for energy costs to (vulnerable) households and public end-customers
	B. Retail tax reliefs
	C. Reductions / exemptions for network tariffs or other levies
	D. Retail price regulation
2. Wholesale market interventions	A. Cap on wholesale electricity price
	B. Cap on fuel price, fuel use, or fuel subsidy (for fossil generators)
	C. Negotiated contract / buyer platform model
	D. Claw-back on windfall profits of inframarginal generators

Analysis Dimensions

Policy objectives/rationales for intervention…	
I	Provide relief for the imminent affordability crisis
II	Reduce inflationary pressures and broader macro-economic effects
III	Address equity concerns in the light of (perceived) excess profits
IV	Support decoupling of domestic electricity prices from international commodity prices
V	Support the decarbonisation transition

Economic effects …	
i.	on short-term market efficiency (“dispatch”)
ii.	on long-term dynamic market efficiency (“invest”)
iii.	on (retail) competition
iv.	on (retail) market liquidity
v.	beyond the electricity system

Source: Compass Lexecon analysis

Framework for the assessment of economic effects

The measures discussed can have various – potentially distortive – economic effects.

i.	**Effects on short-term market efficiency ("dispatch")**	▪ Is the (short-run) efficiency of allocation of fuels to the electricity sector and electricity to end-users impacted? – On wholesale markets: are the cost-efficient dispatch **between electricity generators** and/or the cross-border electricity flows impacted? – On retail markets: is efficient use of electricity (as well as the efficient offering of demand response) impacted
ii.	**Effects on long-term dynamic market efficiency ("invest")**	▪ (How) is the efficiency of (long-term) allocation of capital to and within the electricity sector impacted? ▪ Are investments and **investment incentives** distorted in the medium- to long-run? – This concerns investments in generation, transmission/distribution and consumption assets – Investment incentives for **RES-expansion** or other decarbonisation measures could be impacted too, which are of particular importance
iii.	**Effects on competition**	▪ Can free and **unhindered competition** between market participants be maintained or is it distorted by the measures? – On wholesale markets **between electricity generators** – On retail markets **between retail suppliers** of electricity to end-users
iv.	**Effects on market liquidity**	▪ Will the measures **reduce the (diversity of) supply for electricity** on wholesale or retail markets – On wholesale markets, liquidity would decline, if generators are exiting (or not entering) the market as a reaction to a measure – On retail markets, liquidity would decline, if measures incentivise retail suppliers to stop supplying (new) end-users
v.	**Effects beyond the electricity system**	▪ Is the **national budget** impacted from either reducing revenues or increasing spending? ▪ Is **inflation** spurred further ?

Source: Compass Lexecon analysis

Assessment of potential retail measures achieving policy objectives

Policy objectives ► / ▼ Retail measures	I. Provide relief for the imminent affordability crisis	II. Reduce inflationary pressures and broader macro-economic effects	III. Address equity concerns in the light of (perceived) excess profits	IV. Support price decoupling between domestic electricity & international commodities	V. Support the decarbonisation transition	
					V.a by incentivising electrification	V.b by incentivising energy efficiency
1A. Direct support for energy costs to (vulnerable) households and public end-customers	Direct support increases households' disposable income	Cash transfers might increase general inflation	Allows for direct redistribution to (if means-tested: most impacted) end-users	No direct effect	No direct effect	No direct effect
1B. Retail tax reliefs	Tax cuts reduce households' energy costs	Tax cuts reduce energy prices and resulting inflation	Allows for redistribution to end-users (but no targeted support for most vulnerable end-users)	No direct effect	Supports electrification (but brings back incentives pre-crisis level only)	Reduces energy efficiency incentives (but brings them back to pre-crisis level only)
1C. Reductions / exemptions for network tariffs or other levies	Cuts of tariffs or levies reduce households' energy costs	Cuts of tariffs or levies reduce energy prices and resulting inflation	Allows for direct redistribution to end-users (but no targeted support for the most vulnerable)	No direct effect	Supports electrification (but brings back incentives pre-crisis level only)	Reduces energy efficiency incentives (but brings them back to pre-crisis level only)
1D. Retail price regulation	Caps on energy prices reduce households' energy costs	Caps on energy prices reduce resulting inflation	Allows for direct relief for (if means-tested: most impacted) end-users	Leads to an "administrative" but not economic decoupling	Supports electrification (but brings back incentives pre-crisis level only)	Reduces energy efficiency incentives (but brings them back to pre-crisis level only)

Key: In line with objective | No direct effect | Not in line with objective

Source: Compass Lexecon analysis

Economic & implementation assessment of potential retail measures

Economic criteria ► / ▼ Retail measures	Economic side effects … i. on short-term market efficiency ("dispatch")	ii. on long-term dynamic market efficiency ("invest")	iii. on (retail) competition	iv. on (retail) market liquidity	v. beyond the electricity system (gov. revenues)	Overview of implementation options (selection)	Implementation considerations (particularly for the German context)
1A. Direct support for energy costs to (vulnerable) households etc.	No direct effect	No direct effect	No direct effect	No direct effect	Distorts state expenses compared to baseline and increasing inflationary pressure	▪ Lump-sum payments ▪ Partial energy expense re-imbursements ▪ Across the board vs. means tested support	− Disbursements and particularly means testing might be bureaucratic
1B. Retail tax reliefs	Tax reductions reduce distortions for DSR from taxes themselves	Tax reductions reduce distortions from taxes themselves	No direct effect	No direct effect	Distorts state revenues compared to baseline	▪ VAT ▪ Excise taxes ▪ Across the board vs. end-user group specific	+ Leeway for reductions of electricity related taxes: c. 325 EUR/a/typ. HH[1] − Means testing possible?
1C. Reductions / exemptions for network tariffs or other levies	Distorts incentives for DSR	Distorts incentives for energy savings, efficiency investments and efficient grid expansion	No direct effect	No direct effect	Distorts state expenses compared to baseline	▪ Reduction of fixed vs. variable components ▪ Across the board vs. end-user group specific	+ Leeway for reductions of grid fees and other levies: c. 325 EUR/a/typ. HH[1] − Means testing possible?
1D. Retail price regulation	Distorts incentives for DSR	Distorts incentives for energy savings and efficiency investments	Distorts retail competition	Reduces retail market attractivity potentially leading to suppliers' exit	No direct effect	▪ Fixed tariff ▪ Wholesale indexation ▪ Fixed caps ▪ Indexed caps	Administrative challenges: − Correct determination of supplier compensation − Multitude of suppliers

Key: Increasing efficiency (vs. baseline) | No direct effect | Reducing efficiency (vs. baseline)

Abbreviations: DSR … demand side response, HH … household, VAT … value added tax
Source: Compass Lexecon analysis

Assessment of potential wholesale measures achieving policy objectives

Policy objectives ► / ▼ Wholesale measures		I. Provide relief for the imminent affordability crisis	II. Reduce inflationary pressures and broader macro-economic effects	III. Address equity concerns in the light of (perceived) excess profits	IV. Support price decoupling between domestic electricity and international commodities	V. Support the decarbonisation transition	
						V.a by incentivising electrification	V.b by incentivising energy efficiency
2A. Cap on wholesale electricity price		Capped and hence lower wholesale prices feed through to lower retail prices	Capped and hence lower wholesale prices feed through to lower retail prices	Reduces inframarginal rents but does not generate state revenues	Leads to an "administrative" but not economic decoupling	Reduces investment incentive for all capacities, also RES, DSR and storage Increases incentives to electrify processes	Downward distorted electricity price decreases incentive for energy efficiency
2B. Cap on fuel price, fuel use, or fuel subsidy (for fossil generators)		Capped and hence lower wholesale prices feed through to lower retail prices	Capped and hence lower wholesale prices feed through to lower retail prices	Reduces inframarginal rents but at cost for the state budget	Leads to an "administrative" but not economic decoupling	Reduces investment incentive for all capacities, also RES, DSR and storage Increases incentive to electrify processes	Downward distorted electricity price decreases incentive for energy efficiency
2C. Negotiated contract for electricity		Lower purchase prices feed through to lower retail prices	Lower purchase prices feed through to lower retail prices	Reduces inframarginal rents shifting costs to companies	No direct effect	No direct effect (market price remains unchanged)	No direct effect (market price remains unchanged)
2E. Claw-back on "windfall" profits …	.. From Electricity	Electricity prices remain unchanged	Electricity prices remain unchanged	Reduces inframarginal rents and generates state revenues	No direct effect	Clawback might harm investor trust	No direct effect
	… from Gas / coal	Government revenues could be redistributed			Depending on situation on gas/coal markets, input costs of generation may increase	Reduces prices reduce incentive for RES investments	No direct effect

Key: In line with objective | No direct effect | Not in line with objective

Abbreviations: DSR … demand side response, RES … renewable energy sources
Source: Compass Lexecon analysis

Economic & implementation assessment of potential wholesale measures

Economic criteria ► / ▼ Wholesale measures		Economic side effects … i. on short-term market efficiency ("dispatch")	ii. on long-term dynamic market efficiency ("invest")	iii. on (wholesale) competition	iv. on (wholesale) market liquidity	v. beyond the electricity system (gov. revenues)	Overview of implementation options (selection)	Implementation considerations (particularly for the German context)
2A. Cap on wholesale electricity price		Introduces dispatch-, demand- and cross-border flows-distortions by weakening price signals	May lead to missing money problem (investment distortion)	Distorts competition	Reduces wholesale market attractivity by potentially leading to suppliers' exit	No direct impact, but likely knock-on effects	▪ Temporary relief valve	Germany's strong interconnectedness with neighbouring markets leads to the risk of significant unintended and inefficient cross-border-flow → modelling assessment required
2B. Cap on fuel price, fuel use, or fuel subsidy (for fossil generators)		Introduces (at least) demand- and cross-border flows-distortions	May lead to missing money problem (investment distortion)	Distorts competition	Increases short term liquidity (players kept on market) but decreases it in long-term (→ negative effect on investments)	Increases state expenses, if subsidy is borne by state budget	▪ Temporary price adjustment mechanism	
2C. Negotiated contract for electricity		No direct impact	May decrease investments in energy efficiency and DSR for recipients of support	Distorts competition unless introduced to counter-balance market power	Likely reduces liquidity, because it decreases number of counterparties and transactions	No direct impact, but likely knock-on effects	▪ Single buyer platform	Unlike in France or Slovakia, there are no large government-owned generating companies in Germany
2E. Claw-back on "windfall" profits …	.. from Electricity	No direct impact	Depending on level of price cap, it may reduce companies trust for new investments	No direct impact	No direct impact	Increases tax revenues (which can be used to redistribute to customers)	▪ Tax on electricity production from lignite, coal, RES and hydro	Potentially bureaucratic issue: profit estimation (Technology-neutral or technology- specific)
	… from gas / coal	No direct impact	Depends on which market participant is taxed	No direct impact	No direct impact	Increases tax revenues (which can be used to redistribute to customers)	▪ Tax on imported gas or coal from Russia ▪ Tax on pipeline import gas ▪ Increased network tariff at selected import points	▪ For gas: how to exclude marginal sources (LNG) from taxation? ▪ Compliance with international rules WTO?

Key: Increasing efficiency (vs. baseline) | No direct effect | Reducing efficiency (vs. baseline)

Source: Compass Lexecon analysis

Conclusions

All discussed measures introduce distortions and thus entail a trade-off between market efficiency and other policy objectives; best practice design principles can limit distortions.

- This study looked at various implemented or discussed, market-based measures[1] to **provide immediate / short term relief against rising electricity prices** – particularly for household end-users.
- The study has performed both an **assessment** of these measures **against stated policy objectives** and of their **economic impact** (qualitatively).
- **All analysed measures** – while meeting policy targets to varying degree – **come with drawbacks** by introducing economic distortions.
- Selecting measures therefore needs to **balance trade-offs** between market efficiency and policy objectives including: providing **end-user relief;** not threatening the **long-term objective of energy system decarbonisation; and meeting macro-economic targets**
- Finally, a careful **impact assessment** before implementation and **following best practise principles** is necessary to avoid unintended consequences and limit distortions (see to the right).

Alignment with long-term targets	Measures should be in line with long-term targets for the energy system transformation (above all the energy transition) – i.e. no destroy mechanisms, incentives or trust required to achieve these targets
Clear	Measure must be clearly specified in all aspects
Predictable	Measure must be non-retroactive and should have been predictable by a reasonably informed investor
Targeted	Unintended consequences should be limited
Funded	The funding of measures should be specified and secured from their inception
Reversible	The measure should be reversible
Transitional	A clear end of the applicability of measures implemented for a crisis situation should be foreseen from the start (in the form of an applicability period or a set of conditions)
Preserving price signals	Price signals should be preserved wherever possible (e.g. via ex-post payments, lump sums rather than variable remunerations) to ensure efficient resource usage and efficient system development / expansion (allocative efficiency)

Notes: [1] i.e. excluding administrative measures like e.g. rationing
Source: Compass Lexecon analysis

LOCATIONS

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