ACER

European Union Agency for the Cooperation of Energy Regulators

Assessment of emergency measures in electricity markets

2023 Market Monitoring Report

14 July 2023

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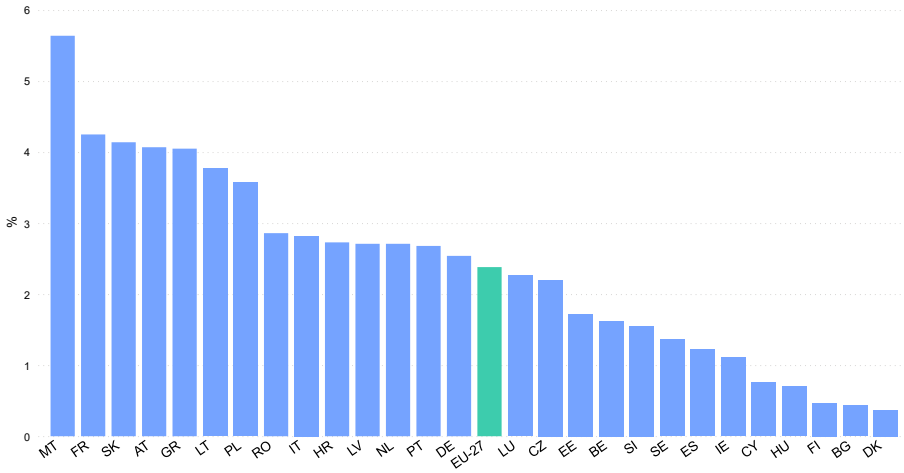
EXECUTIVE SUMMARY

1 In 2022, the European Union faced an energy crisis of such proportions that Member States urgently adopted measures to shield consumers from the effect of the crisis. Indeed, wholesale electricity prices peaked due to gas supply scarcity, but emergency measures mitigated the increase in retail prices. The budgetary effort was significant, and these measures met their short-term objective, as shown in Figure 1 and Figure 2.

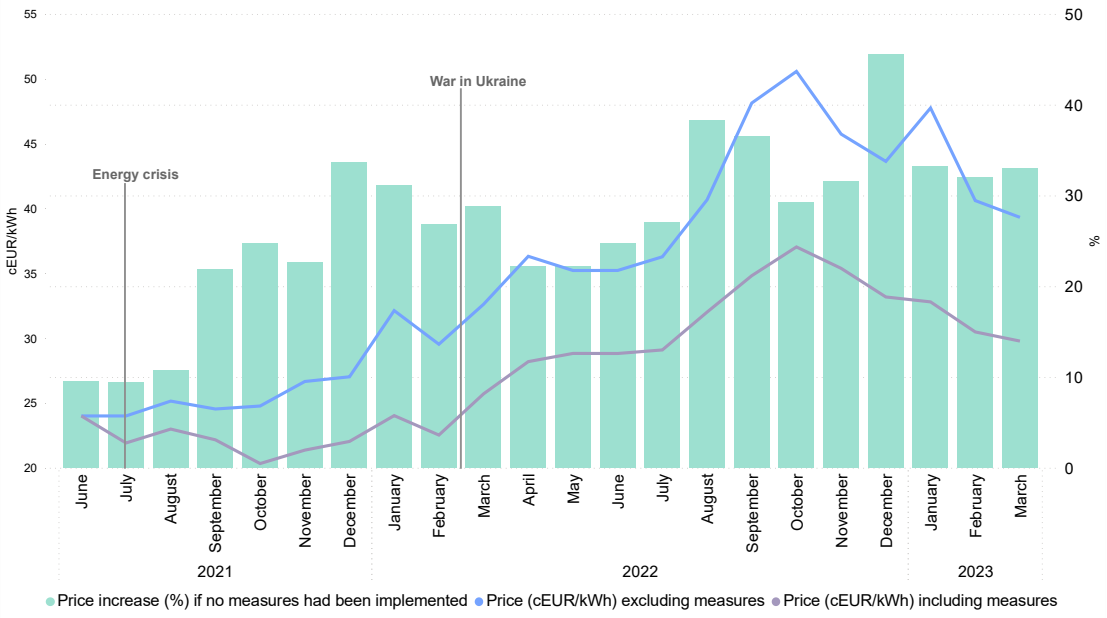
Wholesale electricity prices peaked due to gas supply scarcity, but emergency measures mitigated the increase in retail prices.

Figure 1: Fiscal cost of household support measures – EU-27, 2022 and 2023 (% of GDP)



Source: IMF.

Figure 2: Effect of emergency measures on retail prices – EU-27, June 2021 – April 2023 (% and cEUR/kWh)

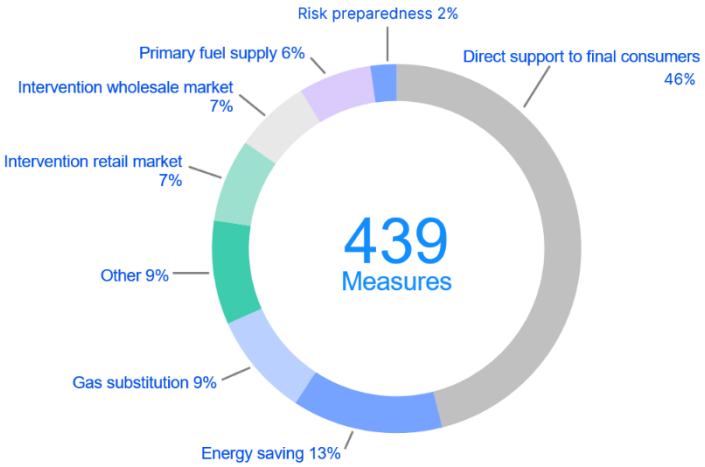


Source: VaasaETT.

2 As part of its monitoring obligations, ACER must 'identify any barriers to the completion of the internal markets for electricity and natural gas'. The current report aims to provide an overview of trade-offs faced by European Member States when implementing emergency measures in the context of the 2022 energy crisis, in line with this obligation. Member States had to swiftly respond to complex issues during the crisis, sometimes lacking a comprehensive overview of potential short- and long-term implications of choices made. This report's objective is not to assign blame but rather to assist decision-makers in making informed choices in similar situations in the future.

3 The report builds on the list of emergency measures published by ACER in March 2023. Merits and drawbacks of each type of measure are assessed against the main desired outcomes of such measures. Measures ideally positively impact end consumers, promote energy efficiency, support energy transition and investment signals, favour market integration, and ensure security of supply at a minimum cost.

Figure 3: Categories of 2022 emergency measures referenced by ACER



4 The report is mostly qualitative with quantitative highlights. The quantitative analysis focuses on the market trends in 2022, specifically from June onwards, when Member States implemented many emergency measures in response to peaking wholesale day-ahead prices.

Emergency situations call for trade-offs and compromises, some approaches outperforming others

5 Table 1 presents the outcome of the qualitative review. Obviously, the emergency measures were mainly implemented to ensure affordable energy for end consumers, which was the immediate concern to address. Most measures in the table succeeded in this.

Emergency measures always entail trade-offs between affordability, security of supply, efficiency, and energy transition, requiring careful consideration of costs, objectives, and side-effects.

6 Emergency measures always entail trade-offs between affordability for end users, security of supply, efficiency, and energy transition, requiring careful consideration of costs, objectives, and side-effects. The table reveals interdependencies, merits, and drawbacks of each class of measures. Overall, energy saving, and risk preparedness are 'no-regret' measures, while measures targeting end consumers and affordability through direct support or market intervention may hamper all other goals. Primary fuel supply substitution, including gas substitution, may have long-term negative effects on the energy transition.

Table 1: Conclusions of the qualitative analysis of the contribution of measures to the achievement of regulatory goals

Measures / Regulatory goal	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to final consumers	Intervention retail market	Intervention wholesale market
End consumers	NA	+	+	NA	+	+	+
Efficiency and demand response	/	/	+	/	-	-*	-*
Energy transition and investment signals	-	-*	+	+	-	-	-
Market integration	/	/	/	/	/	-	-
Security of supply	+	+	+	+	-	-	-
Cost	See upcoming ACER report	€	€	€	€€€€€	€€€	€€

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal. The values are qualitative and relative and should therefore not be interpreted through an arithmetic sum. (*) marks the most negative of possible outcomes, depending on the characteristics of measures within the category considered. Assessments are detailed in the following sections. The last row provides a comparative assessment of the cost of the measure, from comparatively less costly (€) to the costliest (€€€€€).

Balancing choices during a crisis: Prioritising energy savings and risk preparedness

7 Any emergency necessarily calls for trade-offs and compromises, however, some approaches outperform others. During a crisis, certain long-term goals may need to be suspended to accommodate temporary solutions. Ideally, such solutions maximise short-term benefits while minimising longer-term negative consequences.

8 While additional factors and measures must be taken into consideration to mitigate the impact of the energy crisis on both citizens and various economic sectors, energy savings and risk preparedness have demonstrated their primary significance in managing crises, especially in terms of ensuring a secure supply.

Energy savings and risk preparedness are no-regret options, which justifies prioritising them, with additional measures considered as necessary complements.

9 Energy savings and risk preparedness are no-regret options, which justifies prioritising them, with additional measures considered as necessary complements. Obviously, the emergency measures were mainly implemented to ensure affordable energy for end consumers, which was the immediate concern to address. Most measures in the table succeeded in this.

2022's energy price surge caused EU demand drop, locally shaped by emergency measures

10 Day-ahead prices increased consistently over the EU in 2022, with some exceptions. There was a significant increase in the day-ahead prices in the EU in 2022, with peak prices in the second half of the year. Some Member States' that intervened on the price setting limited the price increase.

Overall demand dropped as reaction to high prices, with variations between Member States, partly due to the application of different emergency measures.

11 Overall demand dropped as reaction to high prices, with variations between Member States, partly due to the application of different emergency measures. Over the year 2022, loads were generally lower than forecast. These observations are consistent with price increases, restraining demand. Most of the Member States that saw a lower increase in day-ahead electricity prices, also saw a comparatively lower deviation from their forecasted load in the second half of 2022. This points to the logical coincidence of higher prices having a dampening effect on demand.

Figure 4: Electricity – Comparison of observed load against forecasted load – EU-27/EEA (Norway)[1], June – December 2022 (%)

Source: ACER calculations based on data from ENTSO-E transparency platform.

Note: In some Member States the ARIMA estimation used for the load forecast presents great differences compared to TSO estimations by end 2021, and therefore conclusions should be taken carefully.

In 2023, the persistence of downward sticky retail prices necessitates a comprehensive examination of retailers' behaviour

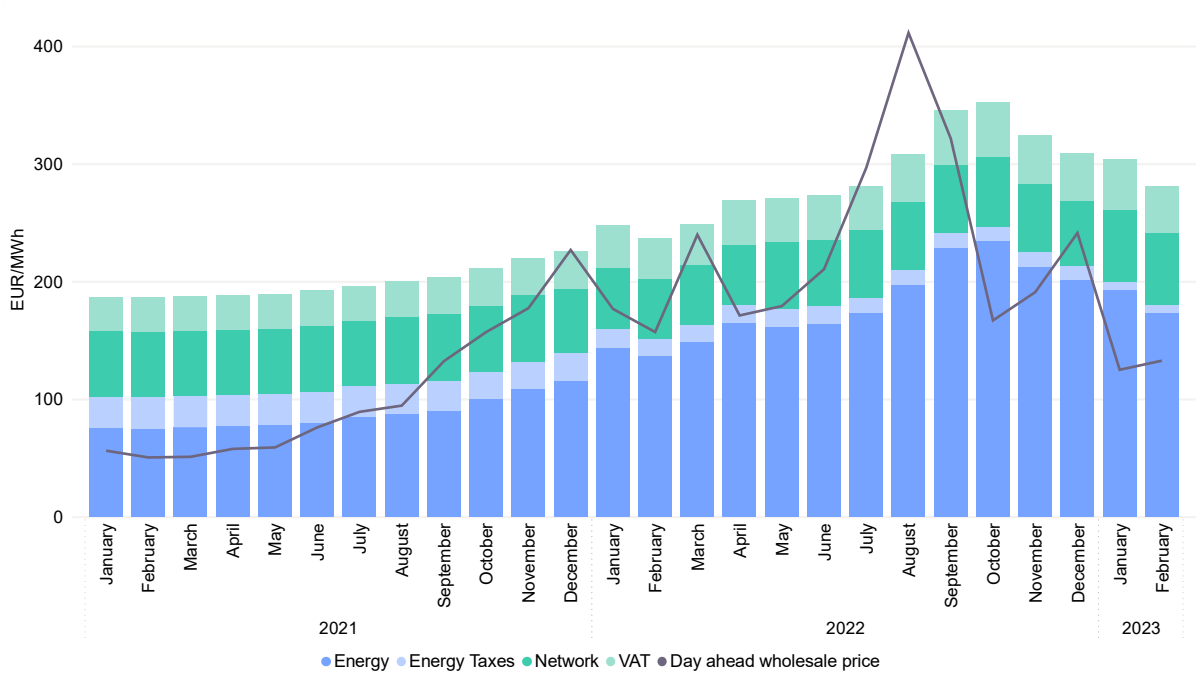
12 Retail electricity prices across the EU-27 peaked in October 2022 following increases in wholesale electricity costs. However, pricing trends significantly varied across Member States. Most of them recorded the highest retail prices between July and November 2022. In most Member States, retail electricity prices rose significantly in response to wholesale price increases. Unusually, day-ahead prices rose above retail prices between July and September 2022. Increases in retail prices were likely dampened by forward hedging and the implementation of emergency measures. Despite the recent wholesale electricity price reductions, end-user prices are falling at slower rates across the EU-27. Member States may benefit from taking a closer look at retailer behaviour and contract clauses imposed on end consumers[2].

Despite the recent wholesale electricity price reductions, end-user prices are falling at slower rates across the EU-27.

[1] Through the European Economic Area ('EEA') agreement, Norway implements most EU energy legislation and is a member of the internal energy market.

[2] See for example the annual report of the French energy ombudsman, identifying bad practices by retailers impacting end users and suggested remedies.

Figure 5: Average day-ahead wholesale and retail electricity price evolution – EU-27, January 2021 – April 2023 (EUR/MWh)



Source: ENTSO-E transparency platform, VaasaETT.

Note: The stacked bars represent the price paid by end users (total), as well as components of this price (energy, network, taxes).

In the short term, emergency measures had no impact on wholesale market integration, yet they played a role in artificially redirecting electricity flows across borders – with one Member State's actions thus impacting other Member States

13 In 2022, market integration projects continued as in previous years. The energy crisis or emergency measures did not seem to have any significant impact on the implementation or launch of market integration projects.

14 In some cases, however, non-aligned measures between Member States artificially increased price divergence and altered cross-border trading patterns. Indeed, observed variations in the use of cross-border capacity resulted from local changes in exchange patterns, corresponding to changing drivers of wholesale prices or shortages. For instance, price difference between capped prices in Spain and uncapped prices in France, facing scarcity, favoured exports from Spain to France. This illustrates the knock-on effects of emergency measures outside the area where they apply while confirming the essential role of cross-border capacity in ensuring the resilience of the system. Transmission capacity played a strong role in shielding against more extreme spikes, to some extent mitigating otherwise extreme price volatility, yet did not prevent considerable price differences between Member States[3].

Measures that are not well aligned between Member States can exacerbate price divergence and change cross-border trading patterns.

Transmission capacity played a strong role in shielding against more extreme spikes, to some extent mitigating otherwise extreme price volatility, yet did not prevent considerable price differences between Member States.

[3] See also ACER's Final Assessment of the EU Wholesale Electricity Market Design, 29 April 2022.

Measures for support to consumers should be temporary, targeted, and tailored to avoid long-term distortionary effects

15 Measures to support end consumers, either directly or through market intervention, have a budgetary impact. In 2022, governments intervened by utilizing costly strategies, such as allocating funds from national budgets and granting tax exemptions to shield consumers from high prices. Where untargeted subsidies were pursued, these tended to benefit all households, despite the fact that high electricity prices disproportionately affected households with lower income. Due to their budgetary impact and possible side effects, emergency measures ideally are temporary, in place for as long as they are necessary and not more[4]. Moreoever, inevitably there will be trade-offs between broad support and the opportunity to support more generously specific groups of more vulnerable consumers, via more targeted approaches.

Due to their financial impact and possible side effects, emergency measures ideally are temporary, in place for as long as they are necessary and not more.

In an interdependent system, coordination trumps fragmentation

16 The energy crisis in 2022 revealed that there is no unique solution that could be applied to all EU Member States. However, non-coordinated approaches can affect the resilience of the electricity system, also in neighbouring countries. In 2022, the past and ongoing effort in terms of EU energy market integration played a crucial role in mitigating otherwise worrisome issues at the national or local level, thereby ensuring security of supply across the EU. Going forward, coordination and collaboration on approaches to emergency measures seems pertinent in order to avoid unintended, or even counterproductive, effects 'across the border'. All in all, coordination of security of supply, and the maximisation of cross-border capacity available for electricity flows, will ensure that EU energy market integration can play its full role in helping Member States steer through such crises.[5]

Coordination and collaboration across Member States on emergency measures seems pertinent to avoid unintended, or even counterproductive, effects 'across the border'.

Market integration allows for mitigation of price shocks and increases security of supply.

17 During the crisis last year, Member States thankfully did not resort to emergency measures imposing export or import restrictions on electricity flows[6]. The absence of such actions provides an important insight and a valuable lesson in ACER's view for cooperation on EU energy market integration going forward. Indeed, all the efforts and numerous achievements made over the last ten years in terms of energy market integration, exemplified through cross-border flows facilitated both by increased interconnection and enhanced cross-border capacities made available for trade, allows for mitigating price shocks, and enhances security of supply.[7] Considering all the challenges linked to the energy transition trajectory ahead for the EU, where volatility is likely to increase rather than decrease, the key role of enhanced EU market integration and cooperation should be kept in mind.

[4] For example, the specific measures following the Council Regulation 2022/1854 on an emergency intervention to address high energy prices have set end dates.

[5] See footnote 3 above.

[6] See ACER's press release of 25 October 2022.

[7] See also ACER's Cross-zonal capacities and the (70%) margin available for cross-zonal electricity trade (MACZT), 2022 Market Monitoring Report.

1. Goal and context

18 As part of its monitoring obligations, ACER must *'identify any barriers to the completion of the internal markets for electricity and natural gas'.*[8] In line with these obligations, the current report aims to provide an overview of high-level merits and drawbacks of emergency measures implemented by EU Member States in the context of the 2022 energy crisis.

19 In 2021, gas prices rose due to a combination of factors, including an increase in global demand for energy as the world economy recovered from the COVID-19 pandemic, unfavourable weather hampering renewable and hydro generation and an uncertainty of natural gas supply from Russia. In 2022, the Russian invasion of Ukraine further led to a significant increase in energy prices, leading to higher costs for consumers and businesses alike. Consequently, European Member States have implemented emergency measures to protect consumers and the economy from the impact of high energy prices. Emergency laws were introduced, and the European Commission worked on tackling the energy crisis.[9]

20 In October 2021, the European Commission's toolbox set out measures that Member States could introduce in line with the legislative framework. After the Russian invasion of Ukraine, Member States introduced measures to mitigate security of supply risks, and the REPowerEU plan set out actions for Europe to become energy independent from Russian fossil fuels. The 'Council Regulation on an emergency intervention to address high energy prices', published in October 2022, lists various measures for Member States to implement in response to the energy crisis.

21 In March 2023, ACER published a list of emergency measures[10]. The current report tries to assess the effectiveness of the measures in achieving their goals. During a crisis, the measures taken logically try to solve immediate issues, in this case, mainly around security of supply and affordability. This report aims to add the *ex-post* reflection on other important criteria, also considering long-term goals. The assessment therefore focuses on five key criteria: affordability, security of supply, compatibility with the energy transition, promotion of efficiency and demand response, as well as contribution to market integration.

22 The first criterion, affordability, aims to ensure that energy remains accessible and affordable for all consumers and businesses. The second criterion is promotion of efficiency and demand response, which aims to reduce energy waste and encourage consumers to reduce their energy consumption or shift their energy use to off-peak hours. The third criterion is compatibility with the energy transition, which examines whether emergency measures align with long-term decarbonisation objectives. The fourth criterion, contribution to market integration, aims to ensure that emergency measures do not disrupt the functioning of energy markets and do not distort competition. The last criterion, security of supply, seeks to ensure that energy supply remains reliable and resilient, even during times of crisis. Finally, as part of the assessment, ACER conducts a qualitative, comparative evaluation of the costs of the emergency measures.

23 Emergency measures are interdependent. Measures that aim to address one issue affect other areas. The methodology for assessing the effectiveness and proportionality of the measures involves assessing each measure independently first, before highlighting interdependencies when aggregating the results.

[8] Article 15.2 of Regulation (EU) 2019/942.

[9] For a complete overview, see Action and measures on energy prices.

[10] See ACER's news: ACER's inventory of 400+ energy emergency measures seeks to aid policy makers going forward.

24 Given the difficulties encountered in the quantitative assessment based on the inventory of measures[11], ACER opted to focus on a qualitative assessment based on the principles behind the measures and a quantitative assessment based on market indicators. This approach allows for a more comprehensive evaluation of the energy emergency measures across the EU, considering the varying degrees of reporting and the complex nature of the emergency measures.

25 ACER's assessment of emergency energy measures in the EU aims to provide clear information and help policymakers prepare for future energy crises. It can also assist Member States in reviewing their current emergency measures in line with decreasing energy prices. The lessons learnt since the summer of 2021 could help Member States determine where and when to direct future energy support measures to those in need.

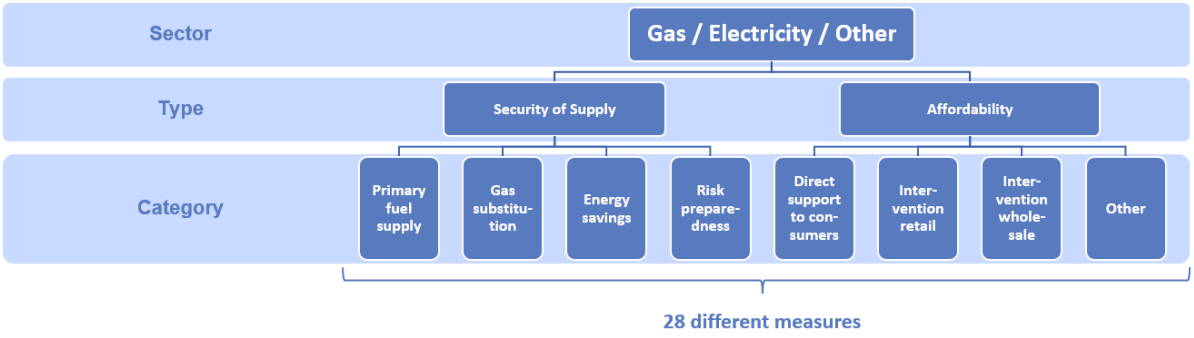
[11] Despite efforts to collect data, ACER acknowledges that the quality of the information is not flawless. ACER was not able to fill in all the gaps in the data, resulting in incomplete information on the measures. Specifically, data on the duration of measures and the associated costs are lacking.

2. What the ACER emergency measure inventory illustrates

26 To assess the effectiveness and proportionality of the emergency measures, ACER relied on a comprehensive inventory of measures published in March 2023[12]. The inventory collected data on over 400 measures implemented by Member States between July 2021 and February 2023. The European Commission provided information collected directly from Member States. ACER further relied on publicly available information and most notably from the Bruegel energy think tank[13]. National regulators validated and supplemented the data.

27 ACER's inventory categorized measures for electricity and gas by primary purpose ('Sector'). Measures were grouped into two types ('Type'): those targeting security of supply and those targeting affordability. Furthermore, ACER created eight categories for the measures ('Category'). Finally, the inventory defines whether a measure applies to a subset of consumers. Overall, 28 different measures were identified ('Measure'). Figure 6 represents the grouping of categories according to whether they relate to Security of Supply or to Affordability.

Figure 6: Categorisation of EU emergency measures



Source: ACER.[14]

Figure 7: Overview of categories of emergency measures referenced per Member State – EU-27/EEA (Norway), July 2021 – February 2023

Types of measures	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK
Primary fuel supply																												
Gas substitution																												
Energy saving																												
Risk preparedness																												
Direct support to final consumers																												
Intervention wholesale market																												
Intervention retail market																												
Other																												

Source: ACER.

28 Figure 7 and Figure 8 show that Member States applied different categories of measures. Member States only have in common that they all applied 'direct support to final consumers'. Denmark and Norway adopted measures belonging to only two categories: energy savings and direct support to

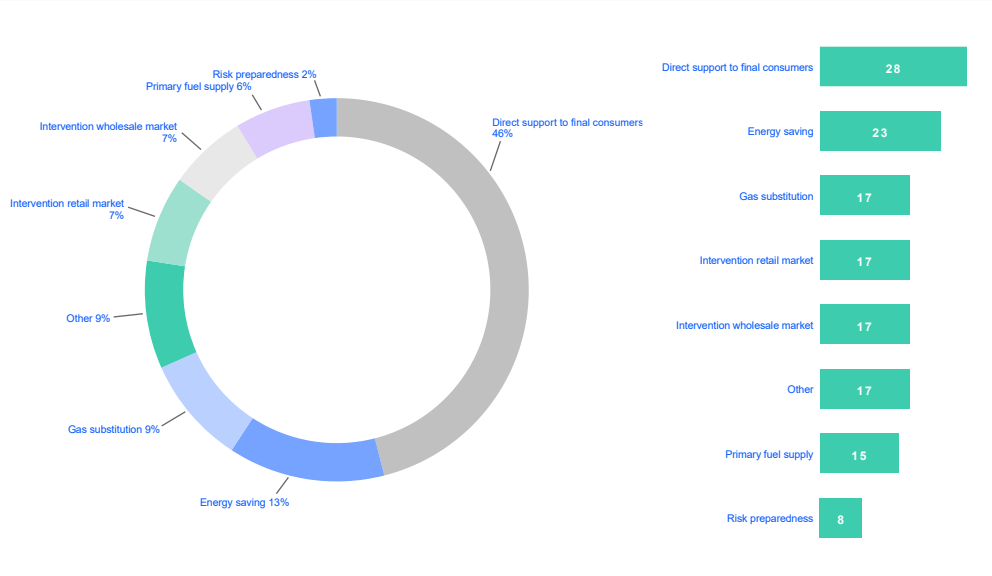
[12] See footnote 10 above.

[13] National fiscal policy responses to the energy crisis (bruegel.org). The information from Bruegel was retrieved from the version containing information until November 2022.

[14] Wholesale Electricity Market Monitoring 2022 High-level Analysis of Energy Emergency Measures.

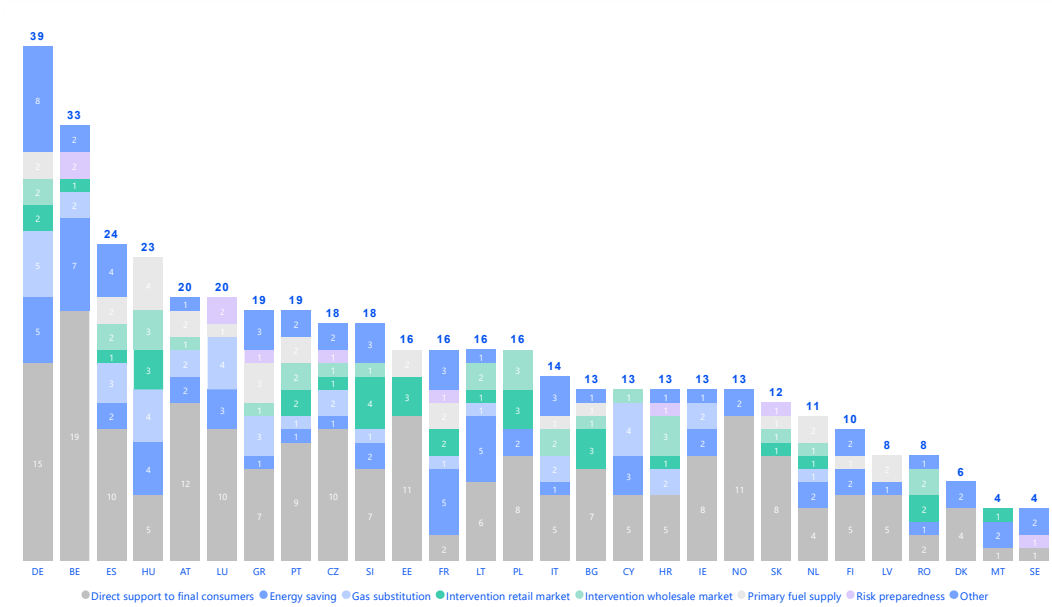
final consumers. On the other hand, Czechia, France, Germany, Greece, Portugal, and Spain adopted measures belonging to seven distinct categories.

Figure 8: Categories of emergency measures referenced by ACER (left), and the number of countries having adopted at least one measure belonging to a given category (right), EU-27/EEA (Norway), July 2021 – February 2023 (% and number of countries, respectively)



Source: ACER.

Figure 9: Emergency measures referenced by ACER per Member State in the EU-27/EEA (Norway), July 2021 – February 2023 (number of measures)



Source: ACER.

29 Figure 9 displays the number of emergency measures reported by each Member State and Norway. The data reveals a notable disparity between countries, even among those with comparable markets. Reasons for the discrepancy may be that emergency measures were adopted and reported as packages or not all measures were reported. The discrepancies can also simply be attributed to diverging approaches between Member States.

3. Impact on retail end-consumers

3.1. In the short term, emergency measures shield end consumers from price shocks

30 The analysis assesses the impact of emergency measures on end consumers, focusing on those emergency measures targeting specifically retail markets.

Table 2: Overview of the impact of emergency measures on end consumers

	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to end consumers	Intervention retail market	Intervention wholesale market
Impact on end consumers - affordability	NA	+	+	NA	+	+	+

Note: For a complete assessment, conclusions reached in this section should be considered in combination with conclusions from other sections. Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

31 All measures that reduce energy bills, have a positive impact on the short-term affordability for end consumers. These measures include interventions in retail and wholesale markets, as well as direct support to final consumers.

32 In theory, measures increasing transparency towards end consumers, energy saving, and energy efficiency campaigns may in certain instances contribute to demand reduction. They target a reduction in consumption to reduce bills, while supporting or not hampering price formation.[15] The rapid increase in the deployment of heat pumps during 2022, with an increase of almost 40% compared to 2021,[16] is a good example of measures supporting energy saving regarding gas demand for heating. Such measures, often involve subsidies and information campaigns for heat pumps. The installation of heat pumps, in the long run, are likely to result in a reduction of energy bills.

33 The detailed assessment is available in Annex 1: Impact on end consumers.

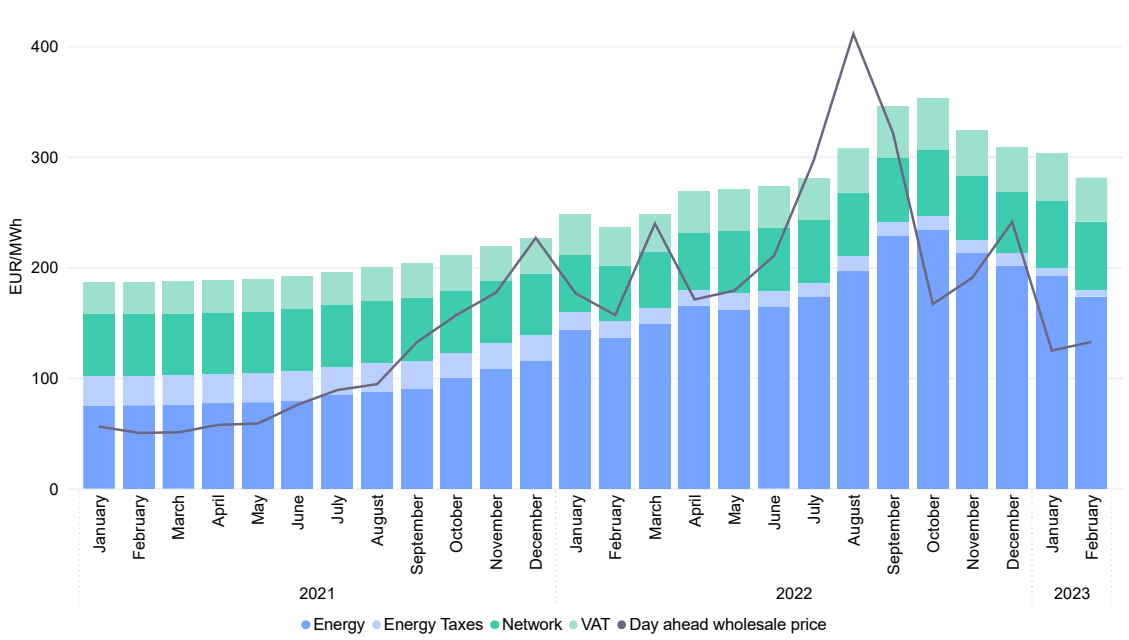
3.2. The evolution of retail prices differs between Member States

34 The energy crisis had a profound impact on the ability of some energy consumers to manage their energy bills. As can be seen in Figure 10 from supplier offers, retail electricity prices across the EU-27 peaked in October 2022 following reductions in wholesale electricity costs. However, pricing trends varied across the Member States significantly. Since January 2021, most Member States recorded the highest retail prices between July and November 2022 with highest prices in Denmark (0.74 EUR/kWh), Italy (0.69 EUR/kWh), and Belgium (0.59 EUR/kWh). In most Member States, retail electricity prices rose significantly in response to wholesale price increases. However, in contrast to most, Bulgaria, Croatia, Slovakia, Poland, Malta, Luxembourg, and Hungary, showed a "flatter" trend in comparison to the EU-27. A detailed assessment is available on Impact on end consumers.

[15] See also Chapter 5.

[16] See https://www.iea.org/commentaries/global-heat-pump-sales-continue-double-digit-growth.

Figure 10: Average day-ahead wholesale and retail electricity price evolution – EU-27/EEA (Norway), January 2021 – April 2023 (EUR/MWh)

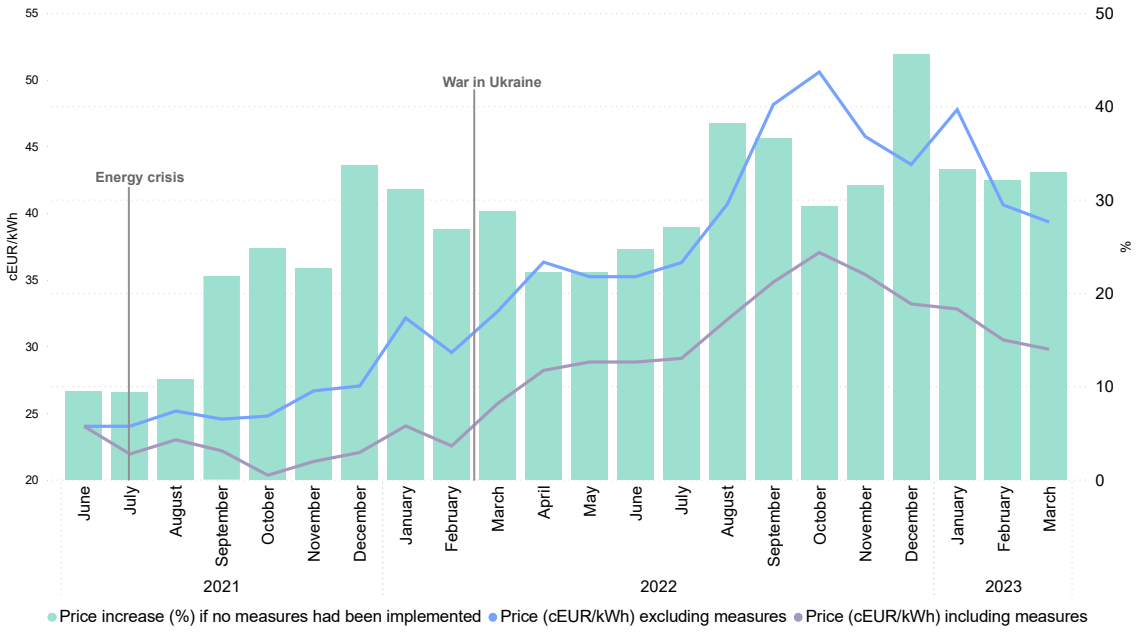


Source: ENTSO-E transparency platform, VaasaETT.

Note: The stacked bars represent the price paid by end users (total) as well as components of this price (energy, network, taxes).

35 Unusually, day-ahead prices rose above retail prices between July and September 2022. Increases in retail prices were likely dampened by forward hedging and the implementation of emergency measures, as detailed in Figure 11.

Figure 11: Effect of emergency measures on retail prices – EU-27, June 2021 – April 2023 (% and cEUR/kWh)

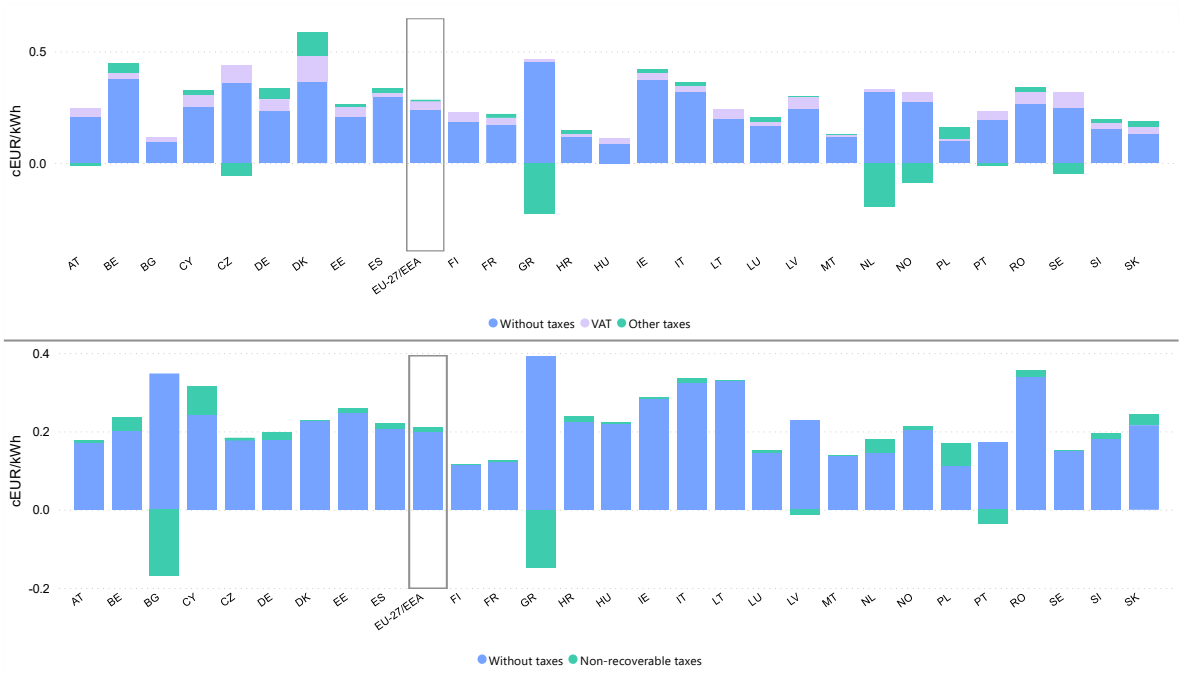


Source: VaasaETT.

36 Figure 12 shows the price for householders and non-householders for the second half of 2022 with highest prices recorded in Demark, Belgium, and Ireland (households) and Romania, Italy, and Lithuania (non-households). The lowest household prices observed align with the implementation/extension of retail price regulation or the limiting of retail electricity prices in the Member States of Austria, Bulgaria, Hungary, Malta, Poland, Slovakia, and Slovenia.

37 Such interventions were also applied in Belgium, Czechia, Germany, and Romania. While the implementation was understandably needed in response to the energy crisis, unsustainably low energy prices may have negative consequences in the future. Such unsustainable and non-targeted application may likely hinder the incentive for consumers to reduce their energy demand during a period of energy resource shortage.[17]

Figure 12: Changes in electricity prices for household (top) and non-household (bottom) consumers – EU-27/EEA (Norway), Semester 2 2022 vs. Semester 2 2021 (cEUR/kWh)

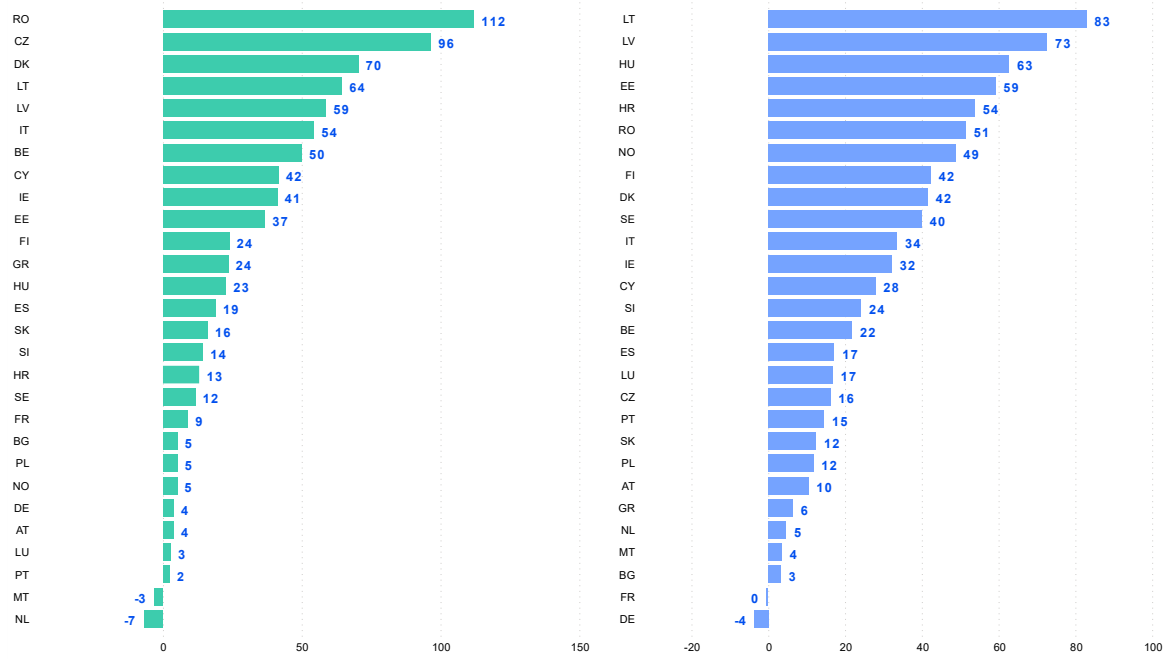


Source: Eurostat.

38 Figure 13 shows the change in retail electricity prices between the second half of 2021 and the second half of 2022 for both households and non-households. Largest price changes were observed in Romania, Czechia, and Denmark for households. In contrast, lowest price increases were observed in Portugal, Luxembourg, Austria, and Germany with price decreases observed in Malta and the Netherlands.

[17] See also Chapter 4.

Figure 13: Changes in electricity retail prices in households (left) and non-households (right) – EU-27/EEA (Norway), Semester 2 2021 vs. Semester 2 2022 (%)



Source: Eurostat.

39 For non-household consumers, the largest price increases were observed in Lithuania, Latvia, and Hungary. The lowest increases were observed in Bulgaria, Malta, and the Netherlands with decreases recorded in both Germany and France. Such decreases reflect the impact of the financial assistance packages provided.

40 As outlined above, in general, retail electricity prices peaked between July 2022 and November 2022 in most Member States. Exceptions to these peaks are observed in Portugal (Apr 2022), Spain (Mar 2022) while prices peaked later in Bulgaria (Jul – Apr 22), Cyprus (Mar 2023), Lithuania (Jan 2023), and Slovakia (Apr 2023). A review of retail electricity offers available to household consumers between the peak price observed since January 2021[18] and April 2023 is shown in Table 3 below. Most of the Member States observe price decreases over that period. Highest decreases are observed in Denmark, Estonia, and Finland.[19] No price decreases are observed in Bulgaria, Malta, and Poland where retail price interventions are being applied and prices are significantly lower than in other Member States. Despite the recent wholesale electricity price reductions, prices are falling at slower rates for household consumers in some Member States (Bulgaria, Malta, Slovakia Poland, Croatia, Luxembourg, Lithuania, Cyprus, Ireland, France, Greece, and Hungary.

41 Member States could benefit from taking a closer look at behaviours of retailers, and contract clauses imposed on end consumers. For example, the annual report of the French energy ombudsman identifies bad practices by retailers impacting end users and suggests remedies.

[18] Data were collected for over the period January 2021 to April 2023.

[19] The Netherlands is not included due to a significant negative energy tax applied – See Annex 3.

Table 3: Peak retail price change between January 2021 and April 2023

Country	Retail price changes between retail price peak and April 2023
Bulgaria (BG)	0%
Malta (MT)	0%
Slovakia (SK)	0%
Poland (PL)	0%
Croatia (HR)	-3%
Luxembourg (LU)	-3%
Lithuania (LT)	-4%
Cyprus (CY)	-5%
Ireland (IE)	-6%
France (FR)	-7%
Greece (GR)	-8%
Hungary (HU)	-10%
Czechia (CZ)	-22%
Romania (RO)	-23%
Slovenia (SI)	-25%
EU-27	-25%
Portugal (PT)	-29%
Germany (DE)	-30%
Austria (AT)	-32%
Latvia (LV)	-38%
Italy (IT)	-39%
Sweden (SE)	-40%
Belgium (BE)	-41%
Spain (ES)	-47%
Finland (FI)	-49%
Netherlands (NL)	-52%
Estonia (EE)	-55%
Denmark (DK)	-66%

Source: ACER calculations based on offer data provided by VaasaETT.

4. Impact on efficiency and demand response

42 The analysis assesses the impact of emergency measures over energy efficiency[20] overall, and demand response, targeting energy efficiency at peak times. The detailed assessment is available in Annex 2: Efficiency and demand response.

Table 4: Overview of the impact of emergency measures on efficiency and demand response

	Primary fuel supply	Gas substitution	Energy saving	Risk prepare-dness	Direct support to final consumers	Intervention retail market		Intervention wholesale market	
						Ex ante	Ex post	Ex ante	Ex post
Efficiency and Demand Response	/	/	+	/	-	-	/	-	/

Note: For a complete assessment, conclusions reached in this section should be considered in combination with conclusions from other sections. Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

43 Measures aiming to phase out the use of gas for electricity generation, or to support risk preparedness do not affect the overall energy efficiency of the system nor demand response.

44 Measures targeting energy savings contribute to the overall energy efficiency of the system.

45 Finally, ex ante measures supporting demand by direct support or market intervention trigger overall energy inefficiency and hamper the development of demand response, by distorting or neutralising market signals. Ex post measures (windfall profit taxes) can be considered neutral in the short run but the uncertainty it brings along could in the longer run lead to a slowing down of investments and thereby negatively impact overall efficiency and the availability of demand response.

46 The following highlights correlations of the implementation of measures with certain trends on day-ahead prices and load. The analyses illustrate the impact emergency measures can have on efficiency and demand response.

4.1. Day-ahead prices increased consistently over the EU in 2022, with some exceptions

47 There was a significant increase in the day-ahead prices in the EU in 2022, with peak prices in the second half of the year. Figure 14 shows the evolution of average day-ahead prices per month for selected EU Member States in 2022. Even though different in actual values, most Member States followed a similar price evolution trend as indicated by the EU average for 2022 (dotted blue line). The prices peaked in August with a maximum monthly average of 534 EUR/ MWh in Italy[21].

[20] Expressed as the reduction of the amount of energy required to meet given consumers' needs.

[21] The average values are computed based on the "Prezzo Unico Nazionale" (PUN).

Figure 14: Evolution of the average monthly day-ahead price for selected Member States, 2022 (EUR/MWh)

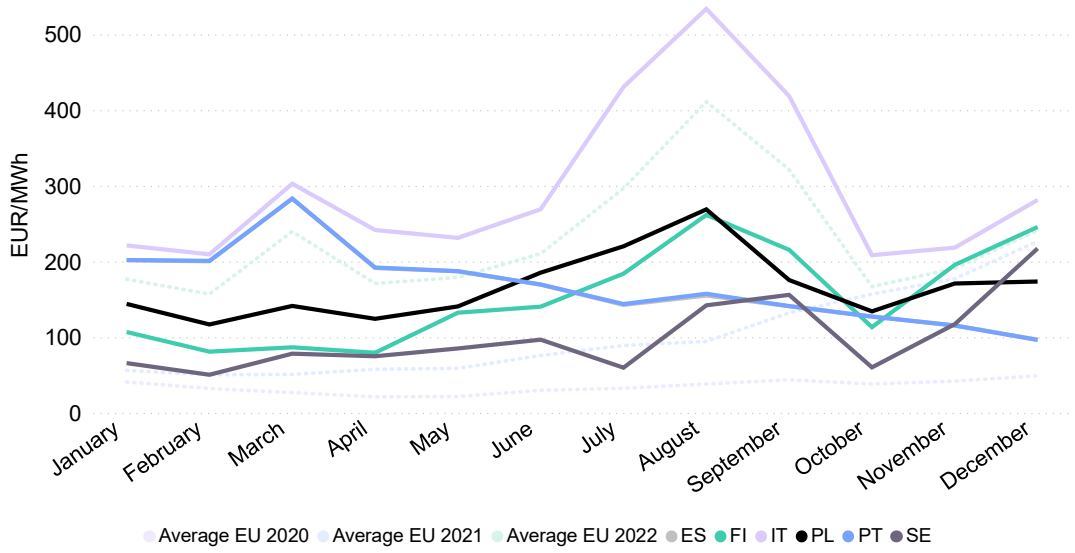
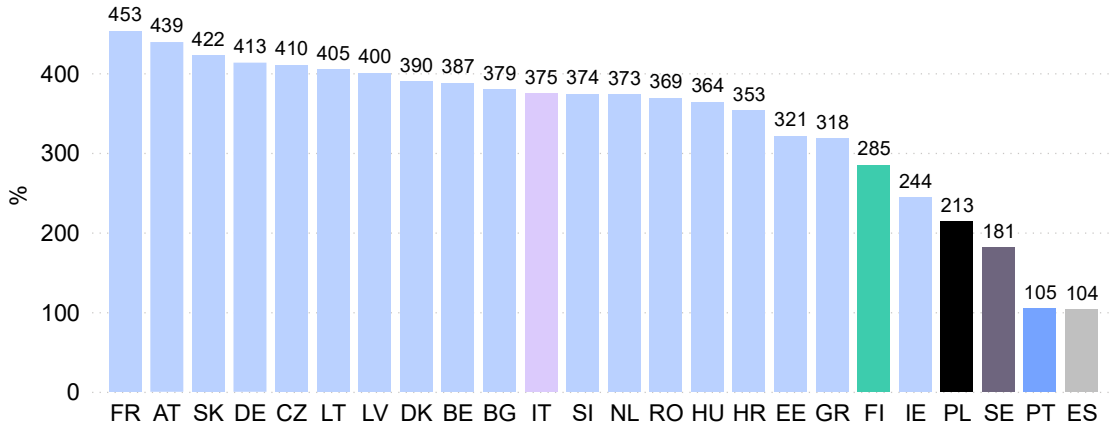


Figure 15: Average day-ahead price increase – EU-27, June and December 2022 vs. June and December 2017 – 2021 (%)



Source: ENTSO-E Transparency Pla tform and REMIT.

Note: The data for Luxemburg coincides with the German data as they belong to one bidding zone. Cyprus and Malta are not shown, because they did not provide the data. The period between June and December has been singled out because it coincides with the introduction of important measures, such as price caps, and with the occurrence of remarkably high prices.

48 The monthly average price evolution during 2022 in some Member States, highlighted in Figure 14, was significantly lower than in other Member States or diverged from the observed pattern. Figure 15 additionally shows the increase of day-ahead prices between June and December in comparison to the average of previous years, which ranged from about 100 to 450%. The significant lower increases observed in Portugal, Spain, and Poland were coinciding with price caps in these Member States. Sweden and Finland did not introduce a price cap but had lower price levels; the Nordic power system traditionally benefits from hydroelectricity, and more recently from significant wind-power generation.[22] The comparatively lower price increase in Ireland results due to higher average price in previous years.

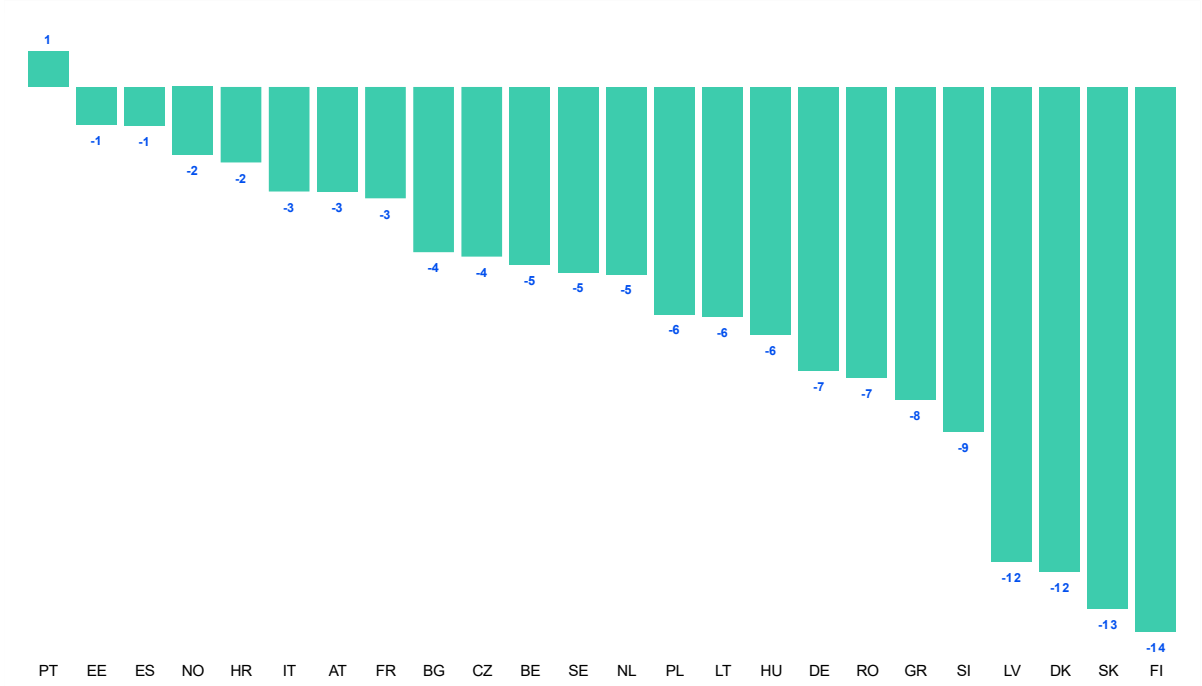
[22] See also ACER's Key Developments volume of the wholesale electricity market monitoring.

4.2. Load decreased due to high prices but not to the same extent in every Member State

49 Over the year 2022, loads were generally lower than forecasted. These observations are consistent with previously unseen price increases, restraining demand. Figure 16 illustrates the difference between Member States in how much their effective loads diverged from the forecasted loads. According to Figure 16, in 2022, the load was lower than expected for the second half of the year in all EU Member States but Portugal. Other Member States, such as Estonia and Spain, also remain close to the forecasted load. Finland, Slovakia, and Denmark, on the other hand, saw the largest deviation from their forecasted load.

50 Most of the Member States that saw a lower increase in day-ahead electricity prices, as presented in Figure 15, also saw a comparatively lower deviation from their forecasted load in the second half of 2022. This points to the logical coincidence of higher prices having a dampening effect on demand.

Figure 16: Comparison of observed load against forecasted load – EU-27/EEA (Norway), June and December 2022 (%)



Source: ACER calculations based on data from ENTSO-E transparency platform.

Note: The figure aims to provide a comparison between Member States, showing the difference (in percent) of their observed load against the forecasted load—considering the average difference over the months of June through December in 2022. The analysis is based on the monthly total load data from the ENTSO-E transparency platform for the years of 2017 through 2022. Using the data of the years 2017 through 2021, an Auto-Regressive Integrated Moving Average (ARIMA) model was trained to estimate the total load for each month in 2022 per Member State—learning monthly patterns from previous years. For each Member State the difference between the forecasted and the observed total load per month is calculated. Subsequently, we take the average over the percentage deviation of the included months. By using the percentage deviation, we account for the individual differences in the total load among the Member States. Cyprus and Malta were excluded due to inconsistent or incomplete data on the transparency platform. The data for Luxemburg coincides with the German data as they belong to one bidding zone. In some Member States this ARIMA estimation presents great differences compared to TSO estimations by end 2021, and therefore conclusions should be taken carefully.

5. Impact on energy transition and investment signals

51 REPowerEU clearly states that ending EU's fossil fuel reliance on third countries requires a massive speed-up of the green transition and investments in renewables. Early signals from 2022 show this speed-up did not fully materialise.

Table 5: Effect of various measures on energy transition

	Primary fuel supply	Gas substitution			Energy saving	Risk prepare-dness	Direct support to final consumers	Intervention retail market	Intervention wholesale market
		In favour of RES	Neutral*	In favour of fossil fuels					
Energy transition	-	+	/	-	+	+	-	-	-

*Note: *Neutral means that the measure equally affects (or does not affect) the use of RES and fossil fuels to produce electricity. For a complete assessment, conclusions reached in this section should be considered in combination with conclusions from other sections. Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.*

52 Emergency measures differently affect the energy transition.

53 Measures that aim to reduce the reliance on fossil fuels, directly or indirectly support energy transition. Such measures include targeting gas reduction to the benefit of renewable energy sources and promoting energy efficiency. Denmark's Green Fund, launched in 2022, is an example of a measure supporting the energy transition[23].

54 Conversely, measures that indirectly result in an increase in fossil fuels, by subsiding fossil fuels or demand, are counterproductive. Indeed, switching from gas to oil or coal generation electricity production influences total energy efficiency of electricity production. Interventions on retail and wholesale markets may deter investments. Such interventions indirectly subsidise demand and therefore decrease the benefits of making certain investments to shield consumers in the future.

55 The detailed assessment is available in Annex 3: Energy transition and investment signal. The following sections illustrate the above with concrete examples.

56 The following sections consist of:

- an overview of the most interventionist measures and how they negatively affect the energy transition;
- a focus on the effects of revenue caps;
- a case study on the effect of Romanian emergency measures on trading.

[23] See paragraph 106106106.

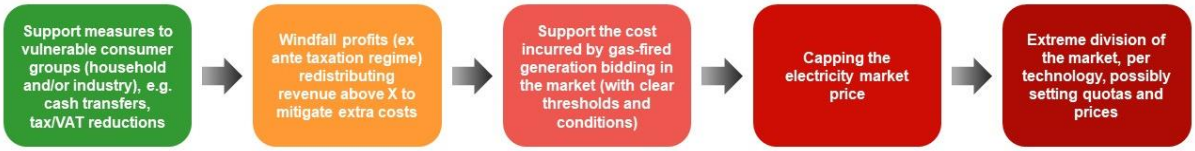
5.1. More interventionist measures slow down the energy transition

57 The measures that result in an intervention in the wholesale market have been commented in:

- the 'RePowerEU: Joint European action for more affordable, secure and sustainable energy' Communication and its follow-up communication of 23 March 2022;[24]
- ACER's Final Assessment of the EU Wholesale Electricity Market Design.

58 As a rule of thumb, ACER considers that the more interventionist the approach, the higher the potential to distort the market, especially in the medium- to long-term. ACER categorises possible emergency measures as depicted in Figure 17.

Figure 17: Spectrum of possible structural-interventionist emergency measures relevant for the EU electricity market (non-exhaustive) [25]



59 In general, as with all options that reduce consumer costs, interventions on wholesale markets could increase energy use in general and fossil fuel use compared to a scenario without interventions. This hampers energy efficiency and increases CO_2 emissions. In addition, as revenues from such limitations need to be channelled back to electricity consumers in one way or another, they indirectly dampen the signal to consumers for demand response.[26]

60 Furthermore, regarding price and investment signal, such distortions imply that wrong investment choices are likely to be made vis-à-vis future needs and/or that much-needed innovations to address changing system needs are less likely to happen. Additionally, measures that are more interventionist may dampen private sector investment and influence perceptions of political risk. The uncertainty around such measures by itself can slow down the energy transition.

61 Regarding price and revenue caps, in the short term, there is a possibility that such measures would limit the incentives of the producers to maximise the generation during scarcity hours. Over time, unsubsidised renewables projects would be discouraged as market revenues would be lower, and because consumers would have reduced incentives to sign long-term power purchase contracts with renewables, as the price caps reduce their need to hedge high prices. This could compromise the delivery of national and European decarbonisation targets.

62 In practice, some of the investment needs as projected by REPowerEU and as expected[27] did not materialise in 2022 because of high prices. Indeed, reporting on orders for wind turbines in 2022

[24] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:108:FIN and https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1936.

[25] Source: ACER's Final Assessment of the EU Wholesale Electricity Market Design.

[26] See Chapter 3.

[27] On the expectation to see high prices attract investments, see for example statements in: International Energy Agency, World Energy Investment 2022. https://www.iea.org/reports/world-energy-investment-2022.

showed a year-on-year drop of total wind turbine orders in Europe by 47%.[28] WindEurope partly attributes this to investors turning their attention to other markets due to 2022's emergency measures, thereby resulting in a slower investment pace than needed for reaching EU targets.

5.2. Revenue caps have been applied differently in different Member States

63 The 'Council Regulation on an emergency intervention to address high energy prices' proposes various measures that Member States can take in response to the energy crisis. One of such measures, presented in Article 6 of said Regulation, is the possibility of introducing revenue caps. While such revenue caps did not directly affect wholesale electricity prices, they did affect market revenues for certain technologies.

64 Several Member States introduced such caps. Revenue caps became applicable as early as 1 January 2022, in Spain. Additionally, Spain and Portugal agreed with the implementation of Production cost adjustment mechanism for the reduction of the electricity wholesale price in the Iberian market ("The Iberian price cap", a cap on the price of natural gas for electricity generation), approved by the EC[29], for the period between 15 June 2022 and 31 May 2023. Most Member States that introduced a cap implemented the measures on 1 December 2022, while many Member States did not introduce a cap in 2022 at all. Early reports collected from National Regulatory Authorities by ACER show caps were reached in about 50% to 80% of the time. The numbers depend on the technology the caps apply to and the level at which the cap was set. While the 'Regulation on an emergency intervention to address high energy prices' sets the cap at 180 EUR/MWh, some Member States have adopted distinct levels[30] or different caps for different electricity generation technologies[31].

65 Article 12 of the 'Regulation foresees the possibility for Member States, under certain conditions, to *exceptionally and temporarily set a price for the supply of electricity which is below cost*. Since such measures do affect the price signal, it can be expected that the behaviour of the consumers exposed to the regulated prices would change. In Member States that adopted such regulated prices, the information ACER collected from National Regulatory Authorities shows that the amount of energy sold under the cap as percentage of total electricity produced ranged from 6.4 to 95.4 %. As with the revenue cap, the level of the regulated price varied between the Member States that applied it.

5.3. Romanian emergency measures show how uncertainty impacts trading

66 The pace of the energy crisis increased over summer 2022, prompting governments to respond swiftly with an urgent focus on protecting consumers and mitigating potential side effects. The uncertainty surrounding the future trajectory of prices created a challenging legislative environment. Governments sometimes adopted an iterative strategy, adjusting initially implemented measures, to mitigate unintended consequences. This regulatory ambiguity led to some market uncertainty, as illustrated by the Romanian example.

[28] WindEurope, 2023, Wind Turbine Orders Monitoring. 2022 Statistics. https://windeurope.org/intelligence-platform/product/wind-turbine-orders-monitoring-2022/#interactive-data.

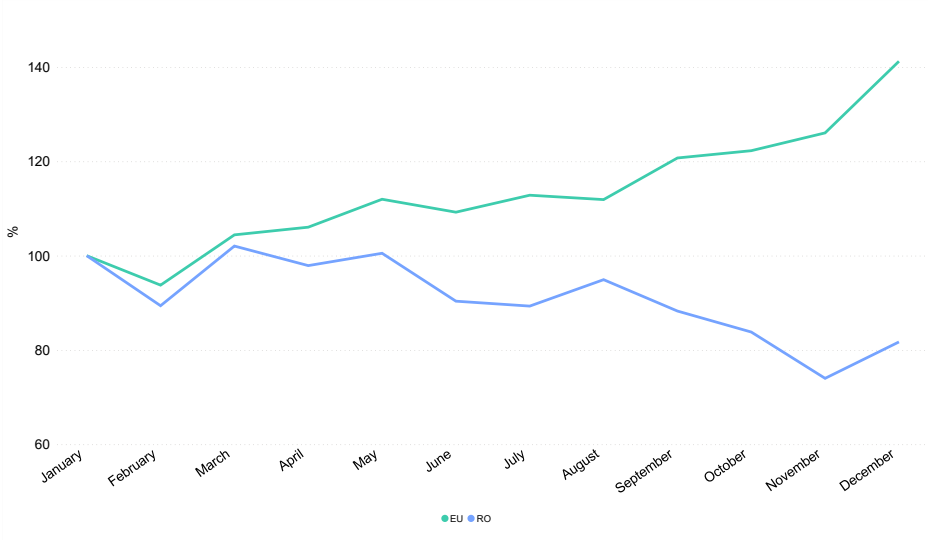
[29] Under the Decision SA.102454 (Spain) and SA.102569 (Portugal), available on DGCOMP website.

[30] For example, Czechia introduced caps ranging from 70 EUR/MWh to 240 EUR/MWh, depending on technology.

[31] The different technologies to which the cap can apply are defined as wind energy, solar energy, geothermal energy, hydropower without reservoir, biomass fuel, waste, nuclear energy, lignite, crude petroleum products, peat. Some Member States that have introduced the caps have indeed differentiated them according to the underlying technology.

67 Figure 18 shows that the number of trades increased in the EU over 2022 by almost 50%, while Figure 19 reveals that the traded volumes dropped by about 25% between January and December 2022. The traded volume in the EU shows a drop between July and October 2022, only to pick up again in November and especially December 2022. The timing of the drop coincides with the timing of most of the discussions on emergency measures that were taking place within Member States.

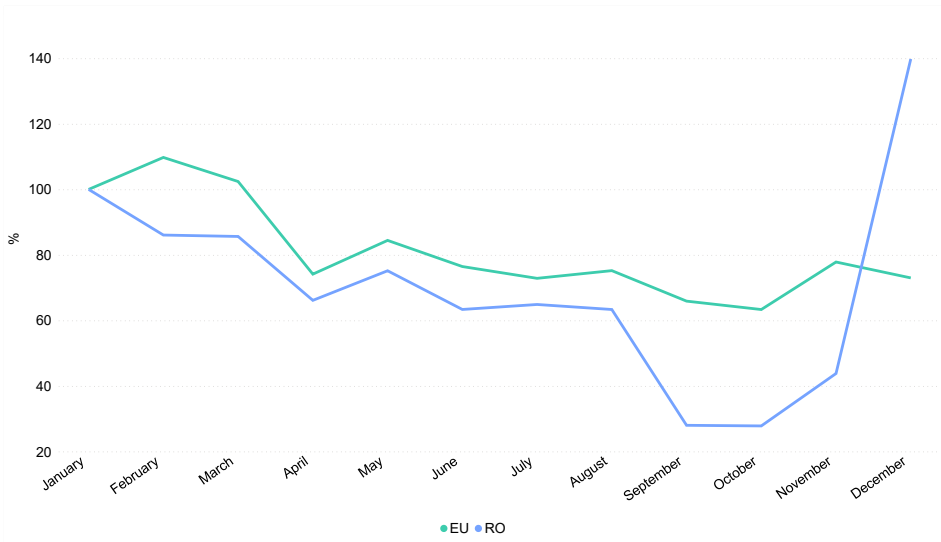
Figure 18: Evolution of relative number of trades – EU-27 and Romania, 2022 (%)



Note: The traded volumes have been normalised, with January 2022 as the reference, to illustrate relative changes.

68 During the period between September and November 2022, Romania experienced a significant drop in the number and volumes of trades. Traded volumes halved from August to September and October 2022. The Romanian government's 'Emergency Ordinance no. 119/2022 (GEO 119)' entered into force on 1 September 2022. A law for the approval and amendment of the ordinance followed on 13 December 2022. The slowing down of trading activity coincides with the time between the ordinance's entry into force and the time when some of its provisions were removed when drafted into law on 13 December 2022.

Figure 19: Evolution of relative traded volume – EU-27 and Romania, 2022 (%)



Note: The traded volumes have been normalised, with January 2022 as the reference, to illustrate relative changes.

69 The ordinance amended already existing price caps for consumers, imposed obligations to certain suppliers and producers and foresaw contributions to the *Energy Transition Fund*. The original formulation of the ordinance foresaw, among other sources of contribution, a tax rate of 100% to electricity exports. This formulation was later removed from the law that was published on 13 December 2022. Other provisions foreseen in the ordinance, such as caps on the final billed retail price invoiced to final electricity and gas consumers and a 98% tax on the gross monthly revenue of electricity and natural gas traders, remained in the law text[32].

70 The difference between the EU average and Romania's trading activity could be attributed to the relative uncertainty the Romanian measures created on the market.

71 Trading reflects changes in supply and demand fundamentals in electricity prices, thereby facilitating efficient market decisions. Considering this factor when formulating and revising measures can contribute to a smoother recovery from the crisis, allowing the markets to respond more swiftly to improvements in conditions.

[32] Information related to both categories of final consumers (household & non-household) who benefit from the capped electricity invoiced price, as well as details related to the support scheme, are available in the Government's Emergency Ordinance no. 27/2022, with subsequent amendments and completions.

6. Impact on market integration

72 During the crisis, Member States logically prioritised short-term considerations over pre-established long-term regulatory goals. While market integration fell under the latter category, it remained relevant as it contributed to the resilience of the EU network throughout the crisis. For instance, cross-border exchange capabilities helped mitigate local scarcity. Similarly, facilitating trading contributed to a swifter recovery when conditions improved.

73 This section evaluates market integration in the context of the implementation of emergency measures in 2022. First a qualitative assessment highlights interactions between emergency measures and important market indicators such as price convergence, cross-border capacity, and commercial exchanges. Second, the section presents the evolution of these indicators in 2022.

74 ACER will publish a report in October 2023, providing a comprehensive overview of market integration evolution in 2022.

6.1. Market interventions can hamper market integration

75 ACER's past monitoring reports leverage the efficient use of electricity interconnectors and overall welfare gains as indicators for market integration, for example applied to market coupling in day-ahead. Price convergence and the availability and use of commercial interconnection capacity are indicators linked to this.

Table 6: Effect of various measures on market integration

	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to final consumers	Intervention retail market	Intervention wholesale market
Market integration	/	/	/	/	/	-	-

Note: For a complete assessment, conclusions reached in this section should be considered in combination with conclusions from other sections. Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

76 Table 6 reveals that more interventionist measures, such as those intervening in the retail and wholesale markets, slow down market integration. Indeed, market integration is considered a more long-term effort, whereas emergency measures were all meant to be temporary and have short-term effects, mainly in terms of reduction of electricity bills. Within these interventions in markets, *ex ante* interventions such as price caps are assessed to negatively affect market integration more than *ex post* measures such as windfall profit taxation. Indeed, the latter does not affect the price in the short run. The overview of the assessment is available in Annex 4: Electricity market integration.

77 In 2022, market integration projects continued as in previous years. The energy crisis or emergency measures did not seem to have any significant impact on the launch of market integration projects, such as the go-live of CORE flow-based and balancing platforms MARI[33] and PICASSO[34].

78 When emergency measures affect prices, they have an impact on market integration. When measures are not aligned well between Member States, measures can exacerbate price divergence and change cross-border trading patterns. In specific circumstances, such as the export

[33] Manually Activated Reserves Initiative.

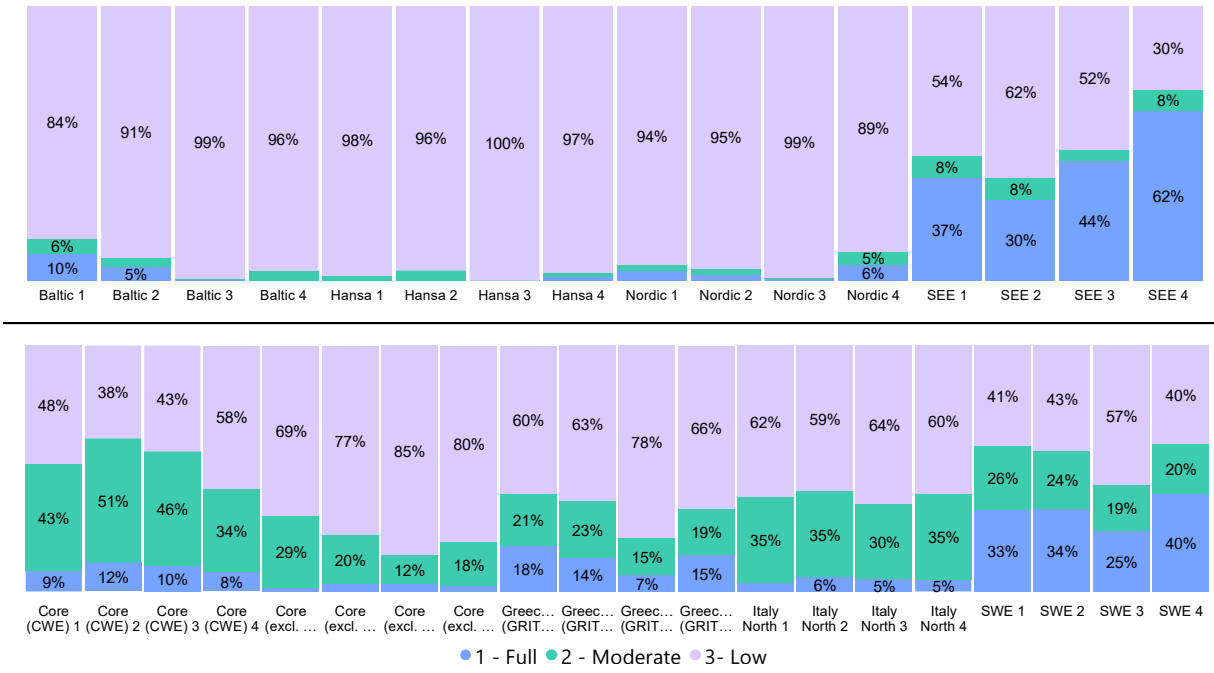
[34] Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation.

from Spain to France since summer 2022, cross-border exchanges can also increase. However, in terms of welfare, this constitutes a rather uncoordinated redistribution of benefits through interventions between Member States, rather than a true change in welfare. In terms of efficient use of electricity interconnectors, straightforward conclusions on market integration cannot be drawn when prices in both zones are established differently. Indeed, as the efficient use of electricity interconnectors is measured by exchanges taking place from a low-priced zone to a higher-priced zone, a price cap in one price zone will influence the direction of the exchanges. Specific measures aimed at increasing interconnection capacity and supporting suppliers, traders, and producers contribute to market integration.

6.2. Market integration indicators in 2022

79 The combination of the energy crisis and the measures taken against it caused significant disparities in energy prices across regions in 2022, leading to decreases in absolute price convergence. Although available transmission capacity did not prevent decreasing price convergence, it did shield against more extreme price spikes[35].

Figure 20: Day-ahead price convergence in Europe by region and per quarter – EU-27/EEA (Norway), 2022 (% of hours)



Source: ACER calculations based on ENTSO-E data.

Note: Full price convergence: <1 EUR/MWh difference. Moderate price convergence 1-10 EUR/MWh difference. Low price convergence: >10 EUR/MWh difference. The number of bidding zones varies among regions (Capacity Calculation Regions); full price convergence is more complex to achieve in regions with a higher number of zones.

80 Figure 20 shows the lowest convergence was generally observed in the third quarter of 2022, corresponding to the peak in prices and the introduction of several of the reported emergency measures.

81 When looking into cross-border capacities, no correlation can be drawn between emergency measures and the available cross-border capacity and its use over 2022. No measure seemed to be aimed specifically at 'optimising' the use of cross-border capacity. Observed variations

[35] See also ACER's Final Assessment of the EU Wholesale Electricity Market Design.

correspond to local changes in flow patterns, corresponding to documented scarcity situations (e.g., unavailability of the nuclear power generation in France) or to changing drivers of wholesale prices for those Member States that implemented wholesale market price interventions.

6.3. Case study: Evolution of cross-border flows and commercial capacity at the Spanish borders

82 Emergency measures were adopted in response to both pan-European but also local considerations, such as locally available production means. Measures were considered and applied nationally, at times inducing cross-border discrepancies. At the same time, cross-border exchanges played a crucial role in mitigating local scarcities and ensuring the resilience of the European networks. For example, exchanges between France and Spain helped mitigating limitations in French production. At the same time, in June 2022, Spain and Portugal introduced a natural gas price cap for electricity generation[36]. This led to diverging prices between neighbouring Member States Spain and France. This creates an interesting case to assess the effects on cross-border capacities, flows and exchanges.

83 Two conclusions can be drawn by the analysis of exchanges between Spain and France in 2022.

84 First, the price difference between capped prices in Spain and uncapped prices in France, which was facing scarcity, resulted in increased exports from Spain to France, confirming the essential role of cross-border capacity in ensuring the resilience of the system. This illustrates the knock-on effects of emergency measures outside the area where they apply.

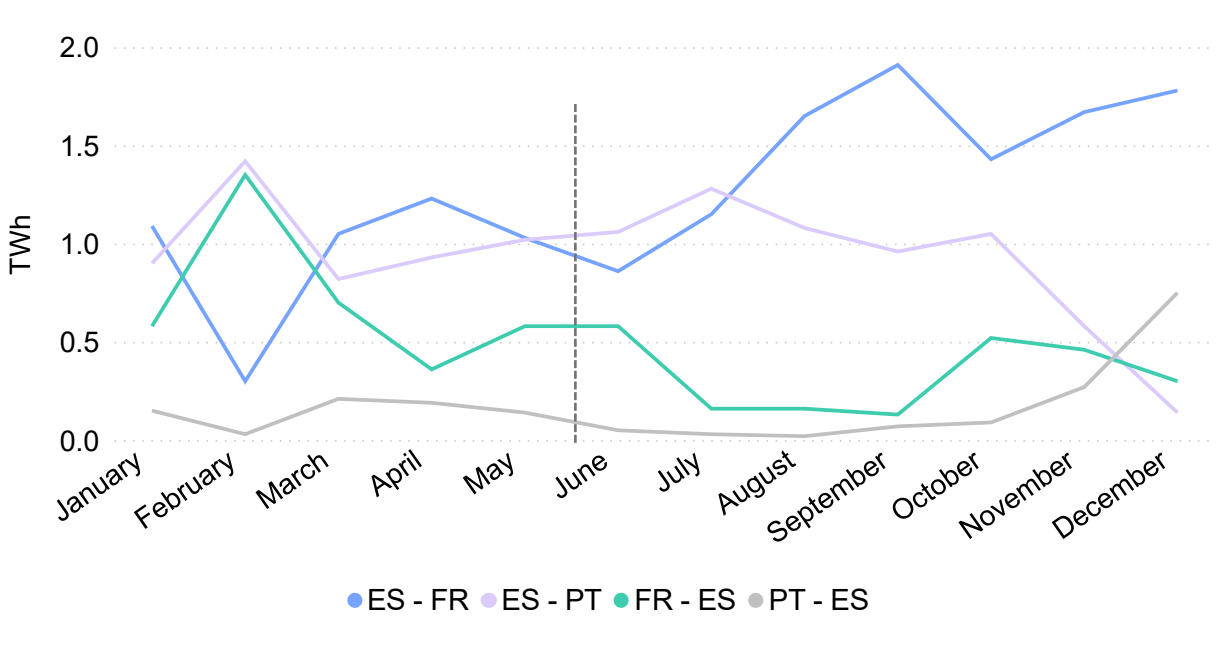
85 Second, market players seem to anticipate the prolongation of emergency measures beyond the official deadline, despite changes in the context that justified their adoption. As observed in Romania[37], regulatory uncertainty affects trading strategy, and in particular, the ability of market participants to assess hedging opportunities.

86 Figure 21 shows the average of the monthly commercial exchanges between France, Spain, and Portugal in 2022 with the latter two having the same price cap implemented in June 2022 as indicated by the dashed vertical grey line, leading to significantly lower day-ahead prices than France starting from June 2022 and consequently enhanced trade from Spain to France. The average increase in traded volume from Spain to France amounted to 340 % in the period between June and December 2022 in comparison to average commercial exchanges in the same month in the years 2017 – 2021.

[36] The ‘Iberian price cap’, see paragraph 64 above.

[37] See section 5.3.

Figure 21: Evolution of total monthly commercial exchange on the borders of Spain, 2022 (TWh)



Source: ENTSO-E Transparency platform.

87 An analysis of the net transfer capacity between France and Spain reveals a drop directly after the implementation of the price cap in Spain. The capacity reverts to previous values afterwards. On average, the decline was below 4 %. There was no lasting limitation of transfer capacity between Spain and France[38]. The electricity flows from Spain to France increased on average by 316% between June and December 2022 in comparison to the average flows in the same month in the years 2017–2021.

88 The above analysis shows that emergency measures did not negatively affect cross-border capacity. Contrary to what some feared,[39] emergency measures did finally not lead to export or import restrictions. If anything, existing market integration mitigated some of the effects of the energy crisis. This includes the softening of price spikes through continued cross-border trading.

89 When looking at the temporary aspect of a certain measure, in this case the Iberian price cap, it is also interesting to look at the effects announced measures had on market expectations. Indeed, the market might not always trade in line with what is expected according to the official start or end dates of certain mechanisms.

90 The Iberian price cap was originally intended to last until the end of May 2023. In January 2023, the Spanish government asked the European Commission to extend the measure until the end of 2024. The European Commission issued a green light for the measure to stay until the end of 2023.

91 Nonetheless, the premium to which the German forward and future contracts[40] traded compared to similar Spanish products never reflected on any of the announced end dates. Indeed, Figure 22 reveals that once a certain price difference between Spanish and German long-term products

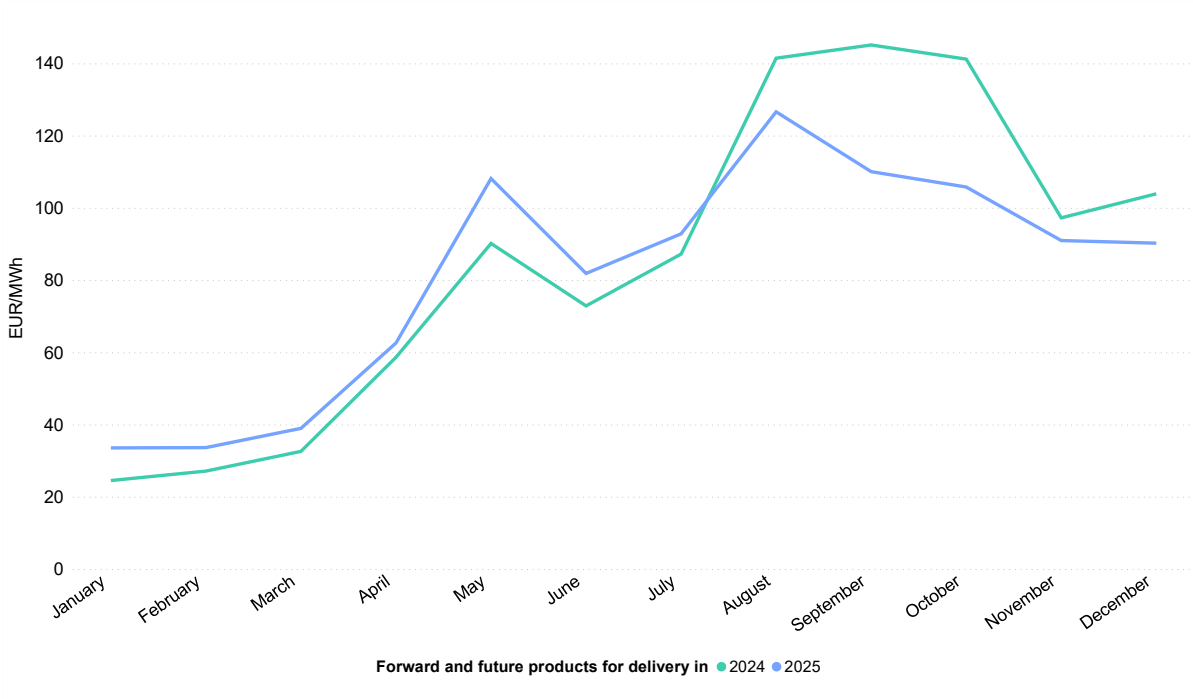
[38] A reduction of the NTC from Spain to France was observed since May 2022, corresponding to planned outages on the interconnexion, in cooperation between RTE and REE. In particular, the outage of the 400 kV Argia-Cantegrit line expanded from 16 May 2022 to 5 August 2022 and was officially announced in November 2021 by the TSOs.

[39] See for example ACER's press release in October 2022.

[40] German futures and forwards are the most liquid long-term market in Europe and serve as a good comparison point.

settled in around the summer of 2022, it never declined. For example, the German yearly products for delivery in 2025 were trading at a very stable premium during the entire second half of 2022. This suggests that market participants believed some form of Iberian price cap would remain in effect until the end of 2025.

Figure 22: Evolution of price difference of yearly contracts for delivery in 2024 and 2025 over the trading year 2022, Germany compared to Spain (EUR/MWh)



Source: ACER.

92 The above shows that the impact on trading forward and future products or on hedging opportunities are difficult to assess given market participants are unsure about the longevity of measures impacting the forward prices.

7. Impact on security of supply

93 This section assesses the impact of emergency measures on security of supply. Security of supply and affordability were the main objectives of the emergency measures. They can be conflicting: affordability triggers demand, which in turn affects supply. Furthermore, security of supply, in interconnected networks, has a cross-border dimension: a change in the situation in one Member State will have a knock-on effect on neighbouring Member States.[41] Cross-border coordination of security of supply will ensure the full benefits of market integration during crises.

Table 7: Overview of the impact of emergency measures on end consumers

	Security of supply				Affordability		
	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to final consumers	Intervention retail market	Intervention wholesale market
Impact on security of supply	+	+	+	+	-	-	-

Note: For a complete assessment, conclusions reached in this section should be considered in combination with conclusions from other sections. Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

94 The inventory published in March[42] distinguishes between measures targeting security of supply, and affordability measures. All measures of the first category have positive impacts in terms of security of supply. Member States responded directly to the threat of disruption of natural gas supply by increasing gas reserves, diversifying supply routes, and utilising alternative resources.

95 Certain measures are temporary and limited to the specific crisis conditions[43]. If available in the long run, such measures could become part of Member States' action plans' toolkit for future supply crises. The toolkit could clarify conditions for their use.

96 The impact of measures targeting affordability on security of supply is less straightforward. Such measures contribute to sustained demand levels, hence running counter to energy saving and energy efficiency efforts. The impact of such measures should be limited if they are targeted only to specific categories of consumers or linked with energy consumption levels to promote energy savings. However, the initial analysis of the inventory shows that many measures were not targeted.

97 As highlighted in Section 4 measures such as subsidies to reduce retail prices, have an adverse effect on consumers' response. Such measures trigger an increased use of resources, which in a time of scarcity may have consequences for security of supply. The cross-border effects of such measures should also be considered. Persistent demand levels in one Member State may influence the availability and utilisation of resources of neighbouring Member States.

98 Wholesale market intervention measures, such as price caps and taxes, do not directly impact short-term security of supply[44]. However, they can alter investor business models, increase

[41] See section 6.3 above.

[42] See footnote 10 above.

[43] For example, priority in the dispatching non-gas fired generation, temporal removal of emission limits or the bailout of energy companies.

[44] No measures were so severe as to lead players to exit markets.

regulatory risks, and hinder long-term investments, thereby negatively affecting or increasing the cost of long-term security of supply.

99 At the same time, interventions that alter the wholesale prices may have some diverse effects on security of supply of certain areas. In an interconnected market such as the European one, these types of measures may affect cross-border flows and hence increase the utilisation of scarce resources in the area where the measures lead to a reduced price (while at the same time contribute to the satisfaction of demand in the areas with higher prices, enhancing security of supply as a whole). These effects should be carefully examined and anticipated when relying on these types of measures. Coordination between Member States may mitigate any security of supply risk related to such interdependencies.

100 Measures targeting affordability may influence price convergence when they locally distort prices. This is the case for ex ante interventions in retail and wholesale markets setting a limit on prices.

Annex 5: Security of supply details the analysis of the impact of measures on security of supply.

8. Comparative costs of emergency measures

Table 8: Effect of various measures on energy transition

	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to final consumers	Intervention retail market	Intervention wholesale market
Cost	See upcoming ACER report[45]	€	€	€	€€€€€	€€€	€€

Note: For a complete assessment, conclusions reached in this section should be considered in combination with conclusions from other sections. Comparative costs of measures rank from "€" (lowest costs) to "€€€€€" (highest costs).

101 The below assessment is based on International Energy Agency (IEA)[46], Bruegel[47] and International Monetary Fund (IMF)[48] information.[49]

102 The cost estimates used in the current report range between about 305 billion EUR[50] and 646 billion EUR[51]. Despite the significant broad range in estimates, reports show that spending on emergency measures varied widely between Member States. This is true not only in amounts spent, be it in absolute values or in percentage of GDP, but also in the repartition of cost per emergency measure. For example, the IMF calculated that the fiscal costs of household support measures in 2022 and 2023 varied between 5.56% and 0.37% of GDP for EU Member States.[52] Less than a quarter (23%) of these household support costs were caused by targeted measures.[53]

[45] 'Study on the impact of the measures included in the EU and National Gas Storage Regulations for ACER', expected in September 2022.

[46] IEA (2023), Fossil Fuels Consumption Subsidies 2022, IEA, Paris https://www.iea.org/reports/fossil-fuels-consumption-subsidies-2022, License: CC BY 4.0.

[47] Sgaravatti, G., S. Tagliapietra, C. Trasi and G. Zachmann (2021) 'National policies to shield consumers from rising energy prices', Bruegel Datasets, first published 4 November 2021, available at https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices (Bruegel dataset).

[48] Nicolas Arregui et al., 'Targeted, Implementable, and Practical Energy Relief Measures for Households in Europe'. available at https://www.imf.org/en/Publications/WP/Issues/2022/12/17/Targeted-Implementable-and-Practical-Energy-Relief-Measures-for-Households-in-Europe-526980.

[49] It is difficult to make a complete and sound assessment of the costs of emergency measures. Firstly, because the numbers are not always published transparently and often rely on the interpretation of news on the measures. Secondly, because the costs are not always borne by the same entities. For example, certain emergency measures, such as imposing a price cap without reimbursement of any differences, are directly affecting market participants, and are not counted as costs borne by the government.

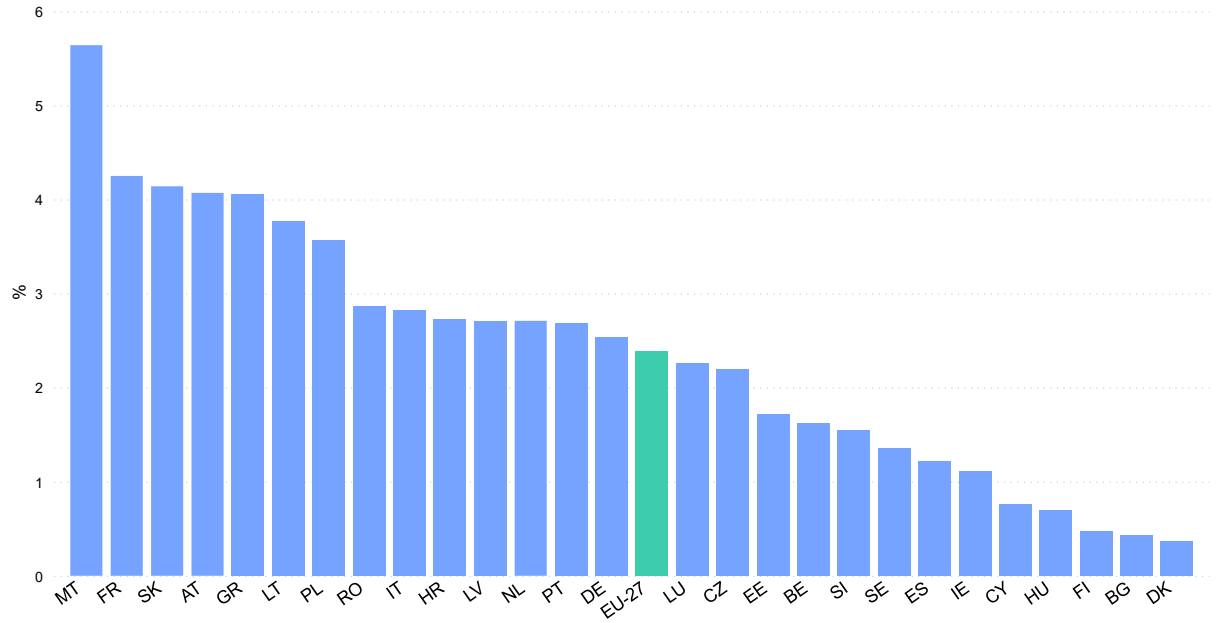
[50] IEA (2023), Fossil Fuels Consumption Subsidies 2022, IEA, Paris https://www.iea.org/reports/fossil-fuels-consumption-subsidies-2022, License: CC BY 4.0.

[51] Bruegel dataset.

[52] Nicolas Arregui et al., 'Targeted, Implementable, and Practical Energy Relief Measures for Households in Europe'.

[53] Based on IMF data for household costs and Eurostat for GDP data.

Figure 23: Fiscal cost of household support measures – EU-27, 2022 and 2023 (% of GDP)



Source: IMF.

103 A more detailed look at the available cost data[54] shows that by far most money was spent on the categories of 'direct support to final consumers', along with 'interventions in retail markets'.[55] It is difficult to clearly attribute costs between the two categories since details on how certain emergency measures are implemented are not always described in detail.[56] The main driver for this cost repartition is the mere number of measures channelling direct support to final consumers, along with an often wide range of consumers (often all households in a Member State) benefitting from the measure.

104 The next most important emergency measure in terms of cost relates to 'interventions in the wholesale market'. Although wholesale market interventions were not numerous, they usually came out relatively costly when implemented.

105 Member States that implemented some sort of price cap and paid for the price difference between the price without and with the cap have a high percentage of cost attributed to 'intervention in wholesale market intervention'. This is because such measures are relatively costly to achieve.

106 Some Member States also clearly show the intention to speed up investments that decrease dependency on gas through their emergency measures. One example of this is the Green fund, announced by Denmark in June 2022. This Green fund, for which the Danish government set aside

[54] The following assessments are consistent for both referenced data sources, the Bruegel dataset, and the IEA report.

[55] The available data suggest between 60 and 70% of all costs can be attributed to ''direct support to final consumers' and 'interventions in retail markets'.

[56] For example, a lump sum payment to reduce an energy bill are considered 'direct support to final consumers', while a reduction on the energy bill for each kWh consumed, such as through a typical measure of lowering VAT on energy bills, is considered 'interventions in retail markets'. In large packages of emergency measures, it is not always straightforward to distinguish between both.

53.5 billion DKK[57], is to further speed up the green transition and contribute to independence from fossil fuels.

107 Lastly, while there are few emergency measures pertaining to state guarantees, loans, and bailouts, it is noteworthy that governments have allocated a substantial sum of money to address potential expenses associated with them.

108 Costs on the primary fuel supply are left out of the current assessment. An upcoming ACER study will go into more details in September 2023.

[57] This amounts to around 7.2 billion EUR.

9. Conclusion and recommendations

9.1. Emergency situations call for trade-offs and compromises, some approaches outperforming others

109 Table 9 summarises the conclusions of all analyses in the report.

110 In the context of the 2022 crisis, all Member States reacted to the crisis with a variety of measures, aiming to reduce the use of natural gas (fuel substitution), increase energy efficiency, and improve risk preparedness. The focus of most emergency measures, referenced by ACER, logically targeted short-term energy affordability for end consumers. Security of supply and long-term relief came second. While a crisis does tend to put on hold certain long-term goals, such as energy transition or market integration, they also offer an opportunity to evolve. Ultimately the goal is to address the challenges imposed by decarbonisation needs and by the needs to ensure security of supply at affordable conditions.

Table 9: Conclusions of the qualitative analysis of the contribution of measures to the achievement of regulatory goals

Measures / Regulatory goal	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to final consumers	Intervention retail market	Intervention wholesale market
End consumers	NA	+	+	NA	+	+	+
Efficiency and demand response	/	/	+	/	-	-*	-*
Energy transition and investment signals	-	-*	+	+	-	-	-
Market integration	/	/	/	/	/	-	-
Security of supply	+	+	+	+	-	-	-
Cost	See upcoming ACER report	€	€	€	€€€€	€€€	€€

Note: Each cell clarifies if the measure contributes (+), is neutral (/), or hampers (-) the achievement of a given goal. (*) marks the most negative of outcomes, depending on characteristics of measures within the category considered, and detailed in the following sections. The last row provides a comparative assessment of the cost of the measure, from comparatively less costly (€) to the costliest (€€€€).

111 Measures, targeting security of supply, aimed at reducing the influence of natural gas in the electricity generation mix, either by reducing consumption (energy savings) or by using alternative fuels for marginal generation. Such measures contributed to the affordability of electricity for end consumers by containing or reducing peak prices. Further affordability measures included a direct

support to final consumers, or interventions on the markets to influence price formation and relieve end consumers from high prices.

112 Emergency measures successfully achieved their intended goals but contradicted long-term objectives, such as energy transition and market integration. A proper balance between short-term efficiency and long-term stability of investments, for the sake of consumers, will remain important for future energy crises. Such balance can be achieved by improving hedging strategies and the operation of long-term markets for electricity.

113 Few measures targeted specifically energy transition, including demand response or market integration; the effect of emergency measures on these two regulatory goals was mostly neutral to potentially negative.

114 Additionally, some of these measures conflicted with each other. For instance, shielding all consumers from peak prices discouraged efficient consumption, resulted in sustained demand, and jeopardized security of supply. Non-targeted affordability measures resulted in high costs that would need to be recovered in the future.

115 Measures vary in cost and efficiency, in the short- and long-run. Some combinations of measures are more desirable than others, nationally and across Member States. Given the predefined set of regulatory and political goals, as identified in the report, there is no first best. A portfolio of different tools at disposal to Member States, with their pros and cons, and sufficiently large and flexible to take into consideration different national needs, seems unavoidable considering the simultaneous presence of different targets.

116 Overall, emergency measures always entail trade-offs between affordability, efficiency, security of supply, and energy transition. In general, to minimize costs, measures are ideally limited in time, and accurately targeted. In particular, the analysis reveals that regarding wholesale market interventions, windfall profit tax has the least impact (still does on energy transition and price signal). In retail market interventions, targeted measures, for example at vulnerable consumers, have least distortions and are least costly.

9.2. Recommendations for the future

117 Circumstances in 2022 were exceptional, requiring immediate action based on incomplete information. Naturally, not all consequences of such actions were anticipated. The focus is not on blame but on learning from the crisis and improving preparedness for future similar situations. To that end, ACER first listed and referenced emergency measures. As a second step, ACER presents the following main recommendations:

- **Measures for support to consumers should be *temporary, targeted, and tailored* to avoid long-term distortionary effects**

118 Measures to support end consumers, either directly or through market intervention, have a budgetary impact. In 2022, governments intervened by utilizing costly strategies such as allocating funds from national budgets and granting tax exemptions to shield consumers from high prices. Untargeted subsidies benefited all households, although high electricity prices disproportionately affected households with lower income. Due to their financial impact and possible side effects, emergency measures ideally preserve incentives for energy savings, be of a temporary nature[58],

[58] See European Commission report: Emergency energy measures facilitated market improvement (regarding the proposal not to prolong the measures from Council Regulation 2022/1854 on an emergency intervention to address high energy prices) and recommendations from the European Commission the 2023 European Semester: Spring package: *'All Member States should wind down the energy support measures in force by the end of 2023. Should renewed energy price increases require the implementation*

and remain in place only for as long as they are considered necessary, without exceeding that duration.

119 Many point to the need to be more targeted to be able to support where the need is most acute.[59] To target measures at those most in need, an essential element will be the consistent definition and application of the concept of 'vulnerable consumer'.

- **Balancing choices during a crisis: prioritising energy savings and risk preparedness**

120 During a crisis, certain long-term goals may need to be suspended, to accommodate temporary solutions. Ideally, such solutions negative consequences.

121 While additional factors and measures must be taken into consideration to mitigate the impact of the energy crisis on both citizens and various economic sectors, energy savings and risk preparedness have demonstrated their primary significance in managing crises, especially in terms of ensuring a secure supply.

122 Energy-saving campaigns, supported by transparent communication with consumers, as well as long-term investments in efficient energy consumption, offer benefits in both the short and long run.

123 Energy savings and risk preparedness are no-regret options, which justifies prioritising them, with additional measures considered as necessary complements.

- **In an interdependent system, coordination trumps fragmentation**

124 The energy crisis in 2022 revealed that there is no unique and perfect solution that could be applied to all EU Member States. Nevertheless, some approaches outperform others.

125 Multiple aspects of the energy crisis are interlinked. Exchanges that are no more market-based but rather determined by measures-driven prices might induce barriers to electricity markets and losses of economic welfare.

126 Further, in an interconnected network, there is no 'strictly national measure'. Situations in one Member State impact neighbours via market integration. Targeting prices in one Member State affects demand, generation, and security of supply, which, in turn, has a knock-on effect on neighbouring Member States.

127 Non-coordinated approaches can affect the resilience of integrated European networks. In 2022, cross-border capacity played a crucial role in mitigating local issues. Going forward, a certain level of coordination and collaboration in the application of emergency measures seems relevant to mitigate the risk of market fragmentation. Coordination of security of supply, and the maximisation of cross-border capacity will contribute to the overall resilience of the European networks and markets[60].

of support measures, they should be targeted at protecting vulnerable households and firms, fiscally affordable, and should preserve incentives for energy savings.'

[59] See for example Eurogroup's Press release of 5 December 2022 or a speech by ECB's President on 18 November 2022.

[60] See ACER's Final Assessment of the EU Wholesale Electricity Market Design, 29 April 2022.

10. Annex 1: Impact on end consumers

128 The analysis assesses the impact of emergency measures on end consumers, focusing on those emergency measures targeting specifically retail markets. The analysis focuses on the effect of emergency measures on **affordability**, namely how the measure ensures that energy remains accessible and affordable for all consumers and businesses.

129 The following qualitative assessment, as well as all qualitative assessments in this report, adhere to the following methodology. This methodology associates specific goals with a list of dimensions that must be considered to achieve the goals identified in section 1.. We assess the different categories of measures[61] against these dimensions. If a category of measures facilitates a goal through a dimension, it scores 1; if it is neutral, it scores 0; if it hampers the goal, it scores -1. After evaluating all the dimensions, we calculate the average score per dimension per category of measures.

Table 10: Overview of the impact of emergency measures on end-consumers

	Primary fuel supply	Gas substitution	Energy saving	Risk preparedness	Direct support to end consumers	Interventions retail market	Interventions wholesale market
Affordability	NA	+	+	NA	+	+	+

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

130 The effect on demand, the price signal for end users, and efficiency, are considered in the following chapters. The impact of measures in the category 'Primary fuel supply' and 'Risk preparedness' is assessed elsewhere in the report: their effect on retail end consumers is indirect.

Table 11: Overview of the impact of measures aiming at gas substitution on end consumers

Category	Type of measure	Affordability
Gas substitution	Accelerate RES deployment	+
Gas substitution	Redispatching; priority for non-gas units	NA
Gas substitution	Remove emissions & other constraints for coal/lignite/oil	NA
Gas substitution	Reopening/extending/expanding coal/lignite/oil/nuclear plants	NA
Gas substitution	Gas to oil switching for power/district heating plants	+

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

131 Similarly, the impact of measures aiming at gas substitution at wholesale level is assessed elsewhere. Retail consumers are positively affected by RES deployment and gas to oil switching, as the reliance of other primary sources than gas overall lowers peak electricity prices when natural gas prices drive electricity prices.

[61] The categories of measures used in the inventory published in March – see Footnote 10.

Table 12: Overview of the impact of measures promoting energy efficiency on end consumers

Category	Type of measure	Affordability
Energy saving	Energy efficiency programmes	+
Energy saving	Energy savings campaign	+
Energy saving	Voluntary shedding tender/product	NA

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

132 Energy efficiency programmes and savings campaigns positively influence efficiency and demand, with an overall reduction in base and peak demand. In turn, the programmes positively influence affordability, reducing the bill both directly and indirectly, by reducing individual consumption and contributing to reducing market prices.

Table 13: Overview of the impact of measures directly supporting end-consumers

Category	Type of measure	Affordability
Direct support to end consumers	Direct assistance to consumers (i.e., voucher, coupon, social policy, subsidy, ...)	+
Direct support to end consumers	Government loan/grant	+
Direct support to end consumers	Protection from disconnections	/
Direct support to end consumers	Reduction in taxes/levies/system charges on energy bills	+

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

133 The impact of direct support to consumers positively influences affordability by reducing end consumers' bills. Such measures support demand, which may prove counterproductive when facing supply issues.

Table 14: Overview of the impact of retail market interventions on end consumers

Category	Type of measure	Affordability
Intervention retail market	Postpone liberalisation of retail market	+
Intervention retail market	Price limit at retail level	+
Intervention retail market	Regulated retail prices	+

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

134 Interventions on retail markets share the objective of controlling price increases. They decorrelate wholesale from retail prices. Such measures positively affect affordability in the short term by reducing end consumers' bills[62]. However, they erase price signals, and incentive to consume less energy, more efficiently. To the extent that they contribute to sticky retail prices once wholesale

[62] See paragraph 36.

prices decrease, their overall efficiency remains to be assessed[63]. The same assessment is applied here to measures consisting as 'postponing the liberalisation of retail markets' as measures referenced by ACER in Poland and Lithuania that fall under that category consist in prolonging regulated tariffs[64].

Table 15: Overview of the impact of various measures on end consumers

Category	Type of measure	Affordability
Other	Transparency/information measures	/
Other	Amend the suppliers of last resort framework	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

135 Measures increasing transparency directly contribute to price formation.

[63] See Figure 5.

[64] See the inventory of emergency measures published by ACER in March 2023. See footnote 10.

11. Annex 2: Efficiency and demand response

136 The analysis assesses the impact of the different types of emergency measures, grouped per category, on overall energy efficiency and demand response, targeting energy efficiency at peak times when the highest number of consumers are using the electricity grid.

137 Energy efficiency should be understood as the reduction of the amount of energy required to meet given consumers' needs.

138 Regarding demand response, the analysis focuses on the effect emergency measures have on[65]:

- **The legal framework in place**, namely how the measure affects access of demand response offers to markets and their eligibility as system operation services; how the measure contributes to defining clear roles and responsibilities of market actors that may provide demand response; and how the measure may promote transparency over market data, levelling the playing field with other market actors.
- **The procurement of demand response**, namely how the measure affects market-based procurement of demand response for any system operation service; how the measure affects restrictions for demand response services in the prequalification, product design and market architecture compared to other types of market participants in any market or for any system operation service.
- **Competition in the retail markets,** namely how the measure affects market concentration and supports a dynamic retail market with a high number of entries/exits and switching rates.
- **The price signal for end users,** via end-user price interventions, the development of smart meters and interoperability, time-differentiated and dynamic pricing, or the importance of the energy component in retail price contracts.

Table 16: Overview of the impact of measures targeting primary fuel supply on efficiency and demand response

Category of emergency measure	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Primary fuel supply	Increase fuel production/stocks (other than gas)	/	/	/	/	/
	Increase gas storage/LNG capacity	/	/	/	/	/
	Increase stored gas levels (e.g., storage obligations)	/	/	/	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

139 Emergency measures that focus on primary fuel supply do not affect the efficiency of electricity or gas consumption, nor do they impact demand response. These measures aim to prevent a

[65] These aspects were shortlisted based on ACER's assessments of barriers to demand response. See previous editions of ACER's electricity market monitoring report.

shortage of primary fuel supply for electricity production. They do not target demand intentionally. While some side effects were observed[66], they are not directly relevant for this assessment.

Table 17: Overview of the impact of measures targeting gas substitution on efficiency and demand response

Category of emergency measure	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Gas substitution	Accelerate RES deployment	/	/	/	/	/
	Redispatching; priority for non-gas units	/	/	/	/	/
	Remove emissions & other constraints for coal/lignite/oil	/	/	/	/	/
	Reopening/extending/expanding coal/lignite/oil/nuclear plants	/	/	/	/	/
	Gas to oil switching for power/district heating plants	/	/	/	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

140 For similar reasons, measures in the category "Gas substitution" do not affect overall efficiency nor demand response. They aim to replace gas with another primary fuel. They do not target demand intentionally.

Table 18: Overview of the impact of measures targeting energy savings on efficiency and demand response

Category	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end-users
Energy saving	Energy efficiency programmes	+	/	/	/	/
	Energy savings campaign	+	/	/	/	/
	Voluntary shedding tender/product	+	/	/	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

141 The measures categorized as "energy saving" do not have an impact on demand response, but they do help improve overall energy efficiency, since they target demand and aim to ensure that less energy is consumed to provide similar services.

[66] For example, natural gas storage obligations contributed to higher natural gas prices, and, in turn, higher electricity prices.

Table 19: Overview of the impact of measures targeting risk preparedness on efficiency and demand response

Category	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Risk preparedness	Update electricity load shedding rules	/	/	/	/	/
	Update gas shedding plans	/	/	/	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

142 The measures which aim to enhance risk preparedness, are considered neutral since they are intended to be used as a last resort, after all other market-based solutions have been exhausted.

Table 20: Overview of the impact of measures targeting direct support to end consumers on efficiency and demand response

Category	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Direct support to final consumers	Direct assistance to consumers (i.e., voucher, coupon, social policy, subsidy, ...)	-	/	/	/	-
	Government loan/grant	-	/	/	/	-
	Protection from disconnections	/	/	/	/	/
	Tax/levy/system charge reduction on energy bills	-	/	/	/	+

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

143 Measures in the category 'Direct support to final consumer' consisting of subsidising consumers' energy consumption (via direct assistance or grants) have the following impact on demand response:

- They do not affect the legal framework nor competitive pressure in retail markets;
- They do not affect the procurement of demand response;
- They indirectly distort the price signal to end users by dissociating energy market costs from the costs borne by end users.

144 Protection from disconnections could entail a wide range of practical measures, including demand response. In the absence of sufficient details, we consider it neutral.

145 Finally, a reduction in the non-energy component of the energy bill indirectly increases the energy component in retail price contracts, positively affecting the price signal for end users.

146 The considered measures, except 'protection from disconnections', are considered to negatively impact the energy efficiency by making energy consumption less costly.

Table 21: Overview of the impact of interventions on retail markets on efficiency and demand response

Category	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Intervention retail market	Postpone liberalisation of retail market	-	-	-	-	-
	Price limit at retail level	-	-	-	-	-
	Regulated retail prices	-	-	-	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

147 Measures in the category 'Intervention retail market' are ex ante interventions and have a homogenous impact on demand response, as they hamper its development:

- Retail market interventions create a legal framework that systematically eliminates price signals from the functioning of the market;
- As a result, interventions in the retail market discourage the use of market-based demand response procurement and hinder competition in retail markets.

148 Through the price reducing impact, retail market interventions will also negatively affect energy efficiency.

Table 22: Overview of the impact of interventions on wholesale markets on efficiency and demand response

Category	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Intervention wholesale market	Market revenue cap	-	-	-	-	-
	Windfall profit tax	/	/	/	/	/
	Price/Bid limit at wholesale level	-	-	-	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

149 Measures in the category 'Intervention wholesale market' apply ex ante (market revenue caps, price/bid limit at wholesale level) or retroactively (windfall profit tax). Ex ante interventions have similar effects, for similar reasons. Ex post measures do not directly affect the functioning of the short-term market and are therefore neutral with regards to energy efficiency and demand response.

Table 23: Overview of the impact of various measures on efficiency and demand response

Category	Type of measure	Energy efficiency	Proper legal framework	Market-based and non-restrictive procurement of demand response	Competitive pressure in retail markets	Price signals for end users
Other	Interconnection capacity	/	+	/	+	+
	Nationalisation of energy suppliers	/	/	/	/	/
	Support suppliers, traders, producers	/	/	/	/	/
	Transparency/information measures	/	+	/	/	/
	Amend the suppliers of last resort framework	/	/	/	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

150 Measures aiming at increasing interconnection capacity facilitate market access and competition at wholesale level, and arguably, in turn, at retail level. The nationalisation of suppliers or support of suppliers, traders, and producers, if non-discriminatory, are neutral.

151 Finally, measures in favour of transparency and information regarding market data level the playing fields for market actors that may provide demand response.

12. Annex 3: Energy transition and investment signal

152 To analyse the effect of emergency measures on the energy transition and investment signals, the following dimensions are considered: energy efficiency, renewable energy, energy taxation, CO_2 emissions, price/investment signal. The first four dimensions are derived from the contents of the EU's "Fit for 55" package[67]:

- **Energy efficiency** is the use of less energy to perform the same task or produce the same result. The Fit for 55 package aims to reduce final energy consumption at the EU level by 11.7% in 2030, compared to projections made in 2020.
- **Renewable energy:** the Fit for 55 package sets a goal of at least 40% of renewable energy sources in the overall energy mix by 2030. This goal covers production and implies an initial investment in renewable production. This second aspect is made explicit in the analysis of **price/Investment signal for renewable energy.**
- **Energy taxation** in the context of the Fit for 55 package aims to align the taxation of energy products and electricity with the EU's energy, environment, and climate policies.
- **CO_2 emissions:** the Fit for 55 package sets binding annual greenhouse gas emissions targets for Member States, with the goal of reaching 40% reduction by 2030 compared to 2005.

Table 24: Overview of the impact of measures targeting primary fuel supply on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Primary fuel supply	Increase fuel production/stocks (other than gas)	/	-	/	-	-
Primary fuel supply	Increase gas storage/ LNG capacity	/	-	/	-	-
Primary fuel supply	Increase stored gas levels (e.g., storage obligations)	/	-	/	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

153 Measures in the 'Primary fuel supply' category have a homogenous impact:

- They do not affect energy efficiency nor energy taxation.
- They have indirectly caused a decrease in investment in renewable energy and CO_2 emissions by keeping natural gas as a strategic resource. For the same reason, they have a negative effect on investment signals in resource replacement, for example, gas-fired power plants.

[67] https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/.

Table 25: Overview of the impact of measures targeting gas substitution on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Gas substitution	Accelerate RES deployment	/	+	/	+	+
Gas substitution	Redispatching; priority for non-gas units	/	/	/	/	/
Gas substitution	Remove emissions & other constraints for coal/lignite/oil	/	-	/	-	-
Gas substitution	Reopening/extending/expanding coal/lignite/oil/nuclear plants	/	-	/	-	-
Gas substitution	Gas to oil switching for power/district heating plants	/	/	/	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

154 Measures in the 'Gas substitution' category have differing impacts:

- Measures promoting other fossil fuels do not affect energy efficiency nor energy taxation. However, they do affect other dimensions negatively: they increase CO_2 emissions; indirectly they slow down the use of and the investment in renewable energy by prolonging the use of fossil fuels.
- Measures accelerating RES deployment have the opposite effect.
- Measures promoting alternatives to gas (without further bias) are considered neutral since they do not promote an alternative energy source.

Table 26: Overview of the impact of measures targeting energy savings on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Energy saving	Energy efficiency programmes	+	-	-	+	-
Energy saving	Energy savings campaign	+	-	-	+	-
Energy saving	Voluntary shedding tender/product	+	-	-	+	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

155 Measures in the 'Energy saving' category have a homogenous impact:

- They support energy efficiency by reducing overall consumption.
- This, in turn, reduces CO_2 emissions.

Table 27: Overview of the impact of measures targeting risk preparedness on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Risk preparedness	Update electricity load shedding rules	/	/	/	+	/
Risk preparedness	Update gas shedding plans	/	/	/	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

156 Measures in the 'Risk preparedness' category have a homogenous impact, like 'Energy savings'.

Table 28: Overview of the impact of measures targeting direct support to final consumers on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Direct support to end consumers	Direct assistance to consumers (i.e., voucher, coupon, social policy, subsidy, …)	-	-	-	-	-
Direct support to end consumers	Government loan/grant	-	-	-	-	-
Direct support to end consumers	Protection from disconnections	/	/	/	/	/
Direct support to end consumers	Tax/levy/system charge reduction on energy bills	-	-	-	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

157 Measures in the 'Direct support to final consumers' category have a homogenous, negative impact on energy transition:

- Subsidising consumers supports energy consumption and CO_2 emissions.
- It neutralizes energy taxation.
- It reduces the incentives to invest in renewable energy sources by maintaining the status quo.

Table 29: Overview of the impact of interventions on retail markets on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Intervention retail market	Postpone liberalisation of retail market	-	-	-	-	-
Intervention retail market	Price limit at retail level	-	-	-	-	-
Intervention retail market	Regulated retail prices	-	-	-	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

158 Measures in the 'Intervention retail market' category have a homogenous, negative impact on energy transition, indirectly like 'Direct support to final consumers' as they deter price signals.

Table 30: Overview of the impact of interventions on wholesale markets on energy transition and investment signals

Category	Type of measure	Energy efficiency	Renewable energy	Energy taxation	CO_2 emissions	Price/ Investment signal for RES
Intervention wholesale market	Market revenue cap	-	-	-	-	-
Intervention wholesale market	Windfall profit tax	-	-	-	-	-
Intervention wholesale market	Price/Bid limit at wholesale level	-	-	-	-	-

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

159 The measures that result in an intervention in the wholesale market overall have a negative impact on the energy transition and on the price signals on the market.

13. Annex 4: Electricity market integration

160 The analysis assesses the impact of the different types of emergency measures, grouped per category, on overall market integration. The analysis focuses on the effect of the following emergency measures[68]:

- Price convergence indicates the extent to which electricity prices in European Union Member States have aligned across markets.
- Levels of cross-border capacity are a structural indicator of markets interconnection; sufficient interconnection is a necessary enabler of cross-border trade.
- The use of cross-border capacity reveals the extent of cross-border trade, and optimisations.

Table 31: Overview of the impact of measures targeting security of supply on electricity market integration

Category	Type of measures	Price convergence	Cross-border capacity	Use of cross-border capacity
Primary fuel supply	All	/	/	/
Gas substitution	All	/	/	/
Energy savings	All	/	/	/
Risk preparedness	All	/	/	/
Other	Interconnection capacity	+	+	+
	Nationalisation of energy suppliers	/	/	/
	Support suppliers, traders, producers	+	+	+

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

161 Most measures targeting security of supply do not target and have no direct influence on market integration. Measures affecting the primary energy source do not affect the level of cross-border capacity nor its use. Price convergence may be indirectly affected by local variations in production and demand, as well as price levels; however, these are not direct consequences of emergency measures.

162 Measures that may have a direct impact on market integration are:

- Measures supporting market participants (suppliers, traders, producers), supporting liquidity in electricity markets.
- Measures targeting interconnection capacity directly.

[68] These aspects were shortlisted based on ACER's assessments of barriers to demand response. See previous editions of ACER's electricity market monitoring report.

Table 32: Overview of the impact of measures targeting affordability on electricity market integration

Category	Type of measure	Price convergence	Cross-border capacity	Use of cross-border capacity
Direct support to end consumers	Direct assistance to consumers (i.e., voucher, coupon, social policy, subsidy, ...)	/	/	/
	Government loan/grant	/	/	/
	Protection from disconnections	/	/	/
	Tax/levy/system charge reduction on energy bills	/	/	/
Interventions in retail markets	Postpone liberalisation of retail market	-	/	/
	Price limit at retail level	-	/	/
	Regulated retail prices	-	/	/
Interventions in wholesale market	Market revenue cap	-	/	/
	Windfall profit tax	/	/	/
	Price/Bid limit at wholesale level	-	/	/

Note: Each cell clarifies if the measure contributes (+), is neutral (/) or hampers (-) the achievement of a given goal; "NA" (not applicable) marks the absence of direct link between the measure and the goal.

163 Measures targeting affordability may influence price convergence when they locally distort prices. This is the case for ex ante interventions in retail and wholesale markets setting a limit on prices.

14. Annex 5: Security of supply

164 This Annex assesses the measures' impact on supply security through qualitative scoring: very positive (++), positive (+), neutral (0), negative (-), very negative (--) and unknown (+/-)[69]. It assesses short- and long-term effects, describes the impact (demand reduction or supply increase), and notes potential side effects unrelated to security of supply.

[69] The granularity of the assessment is higher than for other sections. For comparison purposes, in the overall comparison '++' and '+' are combined as '+', while '-' and '- -' are combined as '–'.

Table 33: Detailed overview of the impact of emergency measures on security of supply

Category	Type of measure	Main effect of the measure	Assessment of short-term effects on SoS	Assessment of long-term effects on SoS	Potential side effects
Primary fuel supply	Increase fuel production/stocks (other than gas)	Increase generation capacity availability by increasing, e.g., lignite production or stocks.	++		If relevant to fossil fuels the measure underpins the climate objectives. Details of implementation matter.
	Increase gas storage/LNG capacity	Increase generation capacity availability.		++	Overestimating long term LNG capacity needs could lead to inefficient spending and potential lock-in into gas usage.
	Increase stored gas levels (e.g., storage obligations)	Increase generation capacity availability.	++	++	The cost of storage filling can be very high depending on implementation.[70]
Gas substitution	Accelerate RES deployment	Increase generation capacity and reduce primary fuel consumption.		++	A system with high-RES penetration increases the need for flexible resources. It may also lead to operational security issues[71]. Investment planning (networks/storage) is necessary.
	Redispatching; priority for non-gas units	Reduce gas consumption.	+		Potential market distortion depending on merit order.
	Remove emissions & other constraints for coal/lignite/oil	Increase available generation capacity and potentially reduce gas consumption.	+		Depending on utilisation, it can be detrimental to the environment and human health.
	Reopening/extending/expanding coal/lignite/oil/nuclear plants	Increase available generation capacity.	++		Depending on implementation it underpins the climate objectives.
	Gas to oil switching for power/district heating plants	Increase available generation capacity in case of gas scarcity.	+	+	It undermines climate objectives and increases pressure on the environment.

[70] See also the upcoming 'Study on the impact of the measures included in the EU and National Gas Storage Regulations for ACER', expected in September 2023.

[71] E.g. Greece, Slovakia.

Category	Type of measure	Main effect of the measure	Assessment of short-term effects on SoS	Assessment of long-term effects on SoS	Potential side effects
Energy saving	Energy efficiency programmes	Reduce total and peak energy demand.	++	++	If they include enhanced electrification (e.g., heat pumps vs. oil heating) they may increase electricity demand. Depending on the way electricity is generated (e.g., gas) it could introduce security of supply challenges.
	Energy savings campaign	Reduce total and peak energy demand. Potential long-term behavioural changes.	++	+	
	Voluntary shedding tender/product	Reduce peak energy demand.	+	+	Can potentially distort the market if not aligned with general market rules.
Risk preparedness	Update electricity load shedding rules	Increase preparedness efficiency and effectiveness.	+	+	
	Update gas shedding plans	Increase preparedness efficiency and effectiveness.	+	+	
Other measures linked to Security of supply	Increase/manage interconnection capacity	Increase availability of resources. Enables cross-country coordination.	+	+	For an exporting Member State it may lead to higher consumption of scarce fuels.
	Nationalisation of energy suppliers	Avoid supply disruptions caused by financial failures. Maintain availability of energy/electricity supply.	+		Expectation of bailout may lead to suboptimal or inappropriate business choices (e.g., in terms of hedging or long-term planning).
	Support suppliers, traders, producers	Avoid supply disruptions caused by financial failures. Maintain availability of energy/electricity supply.	+		Expectation of bailout may lead to suboptimal or inappropriate corporate choices (e.g., in terms of hedging or long-term planning).

Category	Type of measure	Main effect of the measure	Assessment of short-term effects on SoS	Assessment of long-term effects on SoS	Potential side effects
Direct support to end consumers	Direct assistance to consumers (i.e., voucher, coupon, social policy, subsidy, ...)	Reduces the impact of high prices on demand reduction. The effects are positive to the extent it reduces arrears and thus prevent supplier's bankruptcies.	+/-		
	Government loan/grant	If loans are targeting/coupled with energy efficiency or RES investments, then effects are positive in the short- and long-term. Also, the effects are positive to the extent it reduces arrears and thus prevent supplier's bankruptcies. If not linked to energy savings/efficiency it may reduce relevant efforts and maintain demand levels.	+/-	+/-	
	Protection from disconnections	From the consumers' point of view the measure ensures security of supply in times of high prices. In case of misuse, it may inflate demand.	+/-	+/-	If not targeted to vulnerable consumers, expectation of protection may lead to consumer behaviour posing financial risks to suppliers.
	Tax/levy/system charge reduction on energy bills	Distorts price signals and reduces their impact on demand reduction.	-	-	
Intervention retail market	Postpone liberalisation of retail market	Protects consumers from market risks, hence increasing their security of supply, but it does hinder price signals from having an impact on demand.	+/-	+/-	
	Price limit at retail level	Distorts price signals and reduces their impact on demand reduction.	-	-	
	Regulated retail prices	It hinders price signals from having an impact on demand.	-	-	
Intervention wholesale market	Market revenue cap	In the long run it may hinder market-based investments.	no direct effect to SoS	-	
	Windfall profit tax	In the long run it may hinder market-based investments.	no direct effect to SoS	-	
	Price/Bid limit at wholesale level	Distorts market signals and reduces their impact on demand reduction.	-	-	In coupled markets uneven implementation of such measures may lead to increase of exports due to price distortions and hence increase usage of resources, e.g., gas.

Category	Type of measure	Main effect of the measure	Assessment of short-term effects on SoS	Assessment of long-term effects on SoS	Potential side effects
Other measures linked to affordability	Transparency/information measures	Creates more informative and thus more reactive consumers.	+	+	
	Amend the suppliers of last resort framework	From the consumers' point of view the measure might increase their security of supply. Depending on implementation details it may lead to abusive consumer behaviour posing financial risks to suppliers.	+/-	+/-	

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