Non-paper on Emergency Electricity Market Interventions

1. Introduction

Gas and electricity prices have reached record levels in 2021 and hit all-time highs following the Russian invasion of Ukraine. Energy prices are expected to remain high for the rest of 2022 and until 2024-2025, albeit to a lesser extent. This forecast factors in the uncertainty in the market due to the current geopolitical tensions and the war in Ukraine. Further disruptions of Russian gas supplies to the EU in the forthcoming weeks or months may result in again higher levels of gas prices.

In the meeting of 23 and 24 June, the European Council invited the Commission "*to pursue its efforts as a matter of urgency with a view to securing energy supply at affordable prices*".[1] In May, the European Council had also invited the Commission to: "*pursue work on the optimisation of the functioning of the European electricity market - including the effect of gas prices on it- so that it is better prepared to withstand future excessive price volatility, delivers affordable electricity and fully fits a decarbonised energy system, while preserving the integrity of the Single Market, maintaining incentives for the green transition, preserving the security of supply and avoiding disproportionate budgetary costs."*

In response to the European Council's request, this note presents a first package of measures to optimise the functioning of European electricity markets and to lower the impact of gas prices on the prices paid by consumers. This package pursues the same objectives as the more longer-term market design reform to be covered in the upcoming impact assessment. It however focuses on and anticipates market design elements which can be changed and implemented quickly so as to deliver an immediate benefit in the current crisis situation.

This **non-paper provides a preliminary assessment** of options for EU initiatives tackling energy prices, security of supply and sustainability. It should not be considered a Commission policy note. As such, the non-paper has not been subject to inter-service consultation or review by the Secretariat-General or the Legal Service, nor has it obtained political validation of the Executive Vice President for the European Green Deal or of the Commissioner for Energy.

2. Current challenges in electricity markets: prices and security of supply

Alongside possible gas supply disruptions, the EU is also experiencing an electricity market crisis. Member States across Europe have experienced a surge in electricity prices linked to rising gas prices, given that gas is currently the marginal price setting fuel. At the same time, electricity generation in the EU has been significantly lower in the last months due to the shortfall of French nuclear given reactor maintenance and safety issues,[2] the

---

1 2022-06-2324-euco-conclusions-en.pdf (europa.eu)

2 In July 2022 the output of French nuclear was at 25 GW, or 40% of total capacity and 15 GW less than in late July last year. Currently, 29 of the 56 nuclear power plants currently produce no electricity or far too little.

scarcity of European hydropower generation,[3] and the closure of three German nuclear power stations at the end of 2021 as well as the foreseen closure of the remaining nuclear power stations at the end of this year, and low levels of Rhine and other rivers affecting the transport of coal.

In parallel, record-breaking temperatures this summer have pushed up energy demand for cooling and have added pressure on electricity generation. The extreme weather conditions have thus contributed to energy scarcity and high energy prices, constituting a burden for consumers and industry and dampening the economic recovery. As a result, gas-fired electricity generation stays persistently high (above the last 5-year's average), despite being at the margin and putting significant additional pressure on gas markets.

Additional upward pressures put on energy and food commodity prices are feeding global inflationary pressures, eroding the purchasing power of households and the economy as a whole. According to the Summer 2022 Economic Forecast, inflation until June has hit record highs as energy and food prices continued growing and price pressures broadened to services and other goods. In the euro area, inflation grew strongly in the second quarter of 2022, from 7.4% in March (y-o-y) to a new all-time high of 8.9% in July. In the EU, the increase was even more pronounced, with inflation jumping a full percentage point, from 7.8% in March to 9.8% in July. Annex II provides more details of the current energy markets and economic situation.

This economic context requires a rapid and coordinated EU-wide response to mitigate the risk of Member States adopting heterogeneous national measures which may endanger security of supply at European level and undermine the functioning of the internal energy market. We would therefore propose an integrated and interdependent package of market interventions.

Whilst the measures presented below can help to mitigate the effect of the crisis, in particular as regards certain consumer categories, they will not bring energy prices back to pre-crisis levels or remove the significant effects of the crisis on both inflation and the European economy as a whole. Given the economic fundamentals effecting energy markets at the moment, we do not see any type of market intervention that would have such an effect in the short term.

3. Short-term emergency interventions tackling electricity demand and high electricity prices

The proposed package of measures is based on a screening and analysis of different types of market interventions and measures which are currently being discussed amongst stakeholders and decisionmakers. These interventions range from the full suspension of European wholesale markets, the imposition of absolute price caps on the electricity price, the Europeanisation of the measure currently applied on the Iberian Peninsula, the Europeanisation of the measure currently applied in Greece, a subsidy to neutralise the price effect of the EU ETS on electricity prices, to mandatory interventions into retail

[3] Energy production from run-of-river plants until the beginning of July was lower than the 2015-2021 average for many European countries, notably in Italy (-5039 GWh compared to the average), France (-3930 GWh) and Portugal (-2244 GWh). The same decrease is true for hydropower reservoir levels, affecting countries such as Norway, Spain, Romania, Montenegro and Bulgaria, among others.

prices. Based on this analysis, most of these options would not be suitable as they would lead to an increase in demand for electricity and gas and would entail a risk to security of electricity supply (see Annex I).

Taking into consideration these factors, we consider that the proposed package of market interventions should consist of three interdependent components:

a.) The first component would be inspired by the mandatory demand reduction for gas foreseen in the EU "Save gas for a safe winter" Plan and would focus on achieving a similar type of **demand reduction also as regards electricity**.
b.) The second type of intervention would introduce a **price limit for inframarginal electricity generation technologies**, which have lower operating costs than gas-fired power plants, with the aim of making the commercial returns of these technologies independent of the marginal electricity price.
c.) The inframarginal price cap would provide Member States with financial resources to finance retail price interventions. In this respect, the package would provide **greater legal certainty** for Member States' efforts to protect certain consumer types from the impact **of high electricity prices via regulated tariffs**.

The desired effect can only be achieved through a combination of these components, where the demand reduction helps to mitigate the price pressure and the revenues from the inframarginal cap help to finance consumer facing interventions.

1. Coordinated Demand Reduction

This measure aims at a coordinated reduction in EU electricity demand. The main objective of such a demand reduction is to reduce overall consumption as well as consumption during peak hours and to lower clearing prices in electricity markets. Such a demand reduction would also have positive effects as regards preserving security of supply.

The electricity demand reduction measure can be designed so as not to undermine the EU electrification objectives (e.g. heat pumps, electric vehicles) which is key to reduce EU dependence on fossil fuels and ensure long-term strategic autonomy of Europe as this leads to limiting the magnitude of this energy crisis and preventing future energy crisis.

The main instruments to be used to achieve this demand reduction could be similar to the demand reduction tenders implemented by some Member States in the gas sector: Member States would request particular consumer categories (e.g., industrial, or aggregated retail consumers) to submit bids on the amount of financial compensation they would need to cut consumption in pre-established circumstances. The tenders would be for a certain amount of electricity and would determine the lowest price for reducing consumption by that amount.

Regarding final consumers (e.g. households), the demand reduction could be incentivised by remunerating consumers for decreasing their consumption (e.g. on a month-to-month basis, on a year-to-year basis). This approach would allow also targeting consumers who do not have smart meters or flexibility devices installed.

Contrary to the situation for gas, it would not suffice to achieve efficiently a reduction of consumption by a certain overall amount. The price of electricity varies significantly during the day and periods of scarcity, and excess of supply may alternate on an hourly basis. In order to achieve the intended price reduction effect, the demand reduction would

hence in particular have to intervene in situations when electricity is scarce, and prices are high.

This does of course not exclude that permanent reductions of electricity consumption through structural energy efficiency improvement measures can be encouraged or required in some cases. Many Member States introduced recently measures that will lower electricity consumption overall, not only in the peak hours[4]. The compensation measures could as well be linked with structural energy efficiency improvements and energy saving obligation schemes enabled through smart technologies and more energy efficient appliances, services or industrial processes, in line with the overall Fit for 55 energy efficiency targets[5]. Finally, as stated in the EU 'Save Energy' Communication[6], significant energy savings driven by consumers' voluntary choices are important and can be achieved relatively quickly.

A demand reduction organised via market-based tenders comes at a cost for public budgets as it requires compensation. The extent of these costs is dependent on the amount of demand reduction in question and how frequently it is activated. However, this cost for the public budget would not necessarily be higher than the cost of price intervention on the supply side and would at the same time be aligned with the EU's sustainability objectives and policy goal of incentivising demand side response.

The effects of demand reduction on wholesale electricity prices will be highly dependent on the budget used for such schemes. To eliminate entirely the price effect of gas fired power generation at a given hour, the demand reduction efforts would need to offset completely the gas power generation.

Demand reduction in electricity is also relevant in a context where gas supplies may be severely constraint for consumers. In the absence of a corresponding demand limitation in electricity, there is a risk that consumers switch from using gas to using electricity (e.g., electric heaters), thus worsening the security of supply situation in the electricity sector.

Another constraint is that a demand reduction via market-based instruments requires a certain amount of preparation on the side of Member States. In addition, the full potential might require further investments into the digitalisation of distribution grids and the roll-out of demand response solutions for retail customers.

Depending on how such tenders are conducted, the relevant compensation may qualify as State aid, requiring prior approval by DG COMP.

2. Price cap for inframarginal technologies for the benefit of consumers

This measure would function by setting a price cap specifically for inframarginal (i.e. cheaper) technologies. Implementation can either be mandatory for all Member States or

[4] E.g. the requirement for keeping the doors closed of the air-conditioned commercial premises, the decision for switching off public lighting after a certain hour, the requirement for replacing the open commercial refrigerators with the refrigerators with doors, the decision of lowering heating and/or increasing cooling set temperatures in the public/administrative.

[5] For example, this could be achieved by turning the financial compensation into a voucher with a premium of 10 to 20% to be used as public guarantee or non-repayable grants to trigger investments into structural energy efficiency improvements (and reduce overall peak load electricity consumption).

[6] COM(2022) 240 final

optional (see section on instruments). The cap could most easily be applied to the organised day-ahead market.

This measure aims at reducing the impact which the price of the margin setting technology in the electricity market (often gas-fired power plants) has on the revenues of other generators with lower marginal costs such as most of renewables (except some types of hydropower, biomass or biogas), nuclear, and lignite (jointly referred to as "inframarginal plants"). The limitation of the revenues for the relevant generators of inframarginal plants would lead to extra financial benefits for Member States. They would be obliged to share the resulting revenues with electricity consumers with a view to lowering their electricity bills. This measure could therefore be linked to the measure on demand reduction if Member States use the resulting revenues to incentivise consumers to do so.

The introduction of such a cap would not be compatible with parallel excess profit taxation schemes, which would have to be abolished.

The amount of revenues collected by the Member States is related to the amount of electricity generated from inframarginal technologies. This will vary depending on the energy mix and the design of RES support schemes of each Member State. The impact of this measure will differ across the EU.

3. Consumer support measures

One of the main advantages of the cap on inframarginal revenues referred to above would be to provide Member States with additional revenues to finance measures which directly lower tariffs for selected consumers (direct income support, regulated tariffs and reductions from levies charged on the electricity bill[7]).

To provide guidance to Member States on designing such measures, the Commission has already clarified what is possible in terms of national measures and it also clarified the possible scope for regulated tariffs under existing rules and has indicated that it would, in the current crisis setting and on a time-limited basis, not object to the introduction of regulated retail tariffs covering also small and medium-sized enterprises and also applicable to gas[8]. This to some extent goes further than the current wording of the Electricity Directive. At the same time, less than half of the Member States use regulated tariffs to some degree, while direct income support remains the most used instrument across the EU to support households including the most vulnerable in the current crisis. Any initiative in the area of consumer support linked to the demand reduction would need to cover a wide range of support measures for consumers to reflect very different approaches across the EU to consumer support.

It may be useful in this context to provide a greater degree of legal certainty for the extensions of regulated tariff as part of the same instrument building up on the May communication. As part of a legislative initiative, it would for example be possible to provide a clear deviation from the provisions on regulated tariffs so as to make it possible for Member States to cover also SMEs and to design regulated tariffs in such a way that they are not cost-reflective. Extension of regulated tariffs to SMEs was already introduced

---

[7] Direct income support remains the most used instrument across the EU to support households including the most vulnerable in the current crisis, while half of the Member States use regulated tariffs to some extent

[8] COM(2022) 236 final

in some Member States (HU, IT, SK, RO), hence SMEs in these Member States who would be targeted by the measure. At the same time, all Member States are taking measures to support end-consumers in the current context and there is no evidence that price regulation is more effective than direct support, on the contrary.

This would have to be combined with a proviso that market parties required to sell electricity below cost receive adequate compensation and that all market parties are equally able to offer such regulated tariffs to their customers and receive the corresponding compensation.

Retail price regulation remains an interventionist policy measure that risks distorting liberalised retail markets while direct income support remains more widely used across the EU and easier to administer with more direct effect. In addition, the introduction of retail tariffs below cost are costly for Member States. We therefore do not recommend obliging Member States to introduce regulated tariffs but would suggest that any intervention is this field is left optional thus respecting Member States varied approaches to support measures.

4. Options for the intervention

The package of interventions above could be introduced using different policy instruments, notably:

1. *Commission Communication/Recommendation to Member States*

The first option would be to introduce the above interventions via a Commission Communication. Such a Communication would not create legal obligations on Member States. It would recommend to Member States to create the relevant tools to reduce electricity demand, to introduce the inframarginal price cap and would reiterate the extension of the Member States possibilities as regards retail market interventions. The recommendation would spell out how these measures should be designed to achieve a certain degree of standardisation in the interventions of Member States.

2. *Legislation under Article 122 TFEU explicitly allowing Member States to introduce the relevant interventions (but not obliging them to do so)*

The second option would be to issue legislation under Article 122 TFEU which would explicitly set the parameters for the introduction of such interventions, but without going as far as to make their introduction legally mandatory on Member States. The main benefit of this intermediate option compared to the first option above would be to ensure a coherent application of these market interventions in those Member States introducing such measures. This option would also provide a greater degree of legal certainty for Member States. This benefit would be particularly important as regards the possibility to extend retail tariff regulation to SMEs and to design them in non-cost reflective manner, which contrasts with the current wording of the Electricity Directive.

3. *Legislation under Article 122 TFEU mandating all Member States to introduce the relevant interventions*

The third option would be legislation under Article 122 TFEU which creates an obligation on Member States to introduce certain interventions. We see the suitability of this possibility for demand reduction measures and for the inframarginal cap, in particular as

regards an obligation on Member States to channel the revenues obtained from the inframarginal caps to mitigate the consumers' prices.[9]

This would allow for uniform application of the relevant measures across the EU but would also require Member States which to date have not considered any market intervention, to implement these measures. Member States who have opted for different measures with similar objectives (e.g. excess profit taxation), would have to modify these existing measures in accordance with the agreed EU solution.

Although a uniform application across all Member States would have the advantage of treating inframarginal plants and consumers in all Member States equally, we do not consider such an application across the entire EU essential for these measures to function.

Under this option, it would also be particularly important to clearly establish the trigger for the onset of the legal obligation on Member States and the end date, when the relevant obligation ceases to apply.

It is possible to differentiate between different elements of the package and to implement some of the components in a more binding manner than others.

5. Next Steps/Conclusion

Similar to the situation concerning possible gas market interventions, the next step would be to organise a technical seminar with Member States' experts on the components of the package and their implementation in September. This would be necessary to finetune their design and to determine the next steps. A set of relevant questions and issues on these emergency intervention measures could be shared with them in advance or as a follow-up to this meeting.

Signature

[9] Given the significant cost of retail market interventions and in particular regulated tariffs for consumers, we do not consider that such interventions should not be made mandatory on Member States.

ANNEX I

Interventions for possible EU follow-up

Coordinated demand reduction measures for electricity A recommendation/obligation for Member States to reach a static target of overall demand reduction and to reduce peak demand in electricity in certain circumstances in the form of a dynamic target. These demand reduction measures can take different forms, most importantly a.) the introduction of tender schemes under which particular consumer categories offer to stop and/or shift consumption from moments of peak load or b.) the introduction of demand reduction objectives for certain consumer categories.	
Policy objective	Coordinated demand reduction in electricity to mitigate high prices, with positive effects on electricity security of supply during the crisis (similar to gas demand reduction proposal). Move from a situation of subsidised demand (e.g. via administrative price caps) to a situation of subsidised demand reduction.
Impact on consumer prices	A coordinated demand reduction would affect overall consumption of electricity and peak demand and hence directly lower consumer prices. Some customers, namely households and essential social services such as hospitals and schools, should be incentivized to reduce overall consumption and to shift consumption away from peaks where possible.
Impact on gas consumption	If properly designed, a coordinated demand reduction in electricity should also lead to lower EU gas consumption for electricity generation. Smart demand-side flexibility technologies and services that lower demand in a time-dependent way when electricity is produced by gas, at peak times, will be incentivized.
Impact on security of electricity supply	Would indirectly have positive impact on security of supply in electricity by lowering need for peak power.
Impact on the integrity of the single market	If properly designed, a demand reduction should not affect the proper functioning of the internal market.
Suitability for swift implementation	It can be implemented rather quickly at EU level. National implementation would require introducing the necessary demand reduction schemes. Depending on design of the schemes, State aid clearance may be needed.
Budgetary cost	Financial incentives or compensations to market participants affected would be needed. The cost would depend on the design of the measure (number of participants, level of compensation)
Risk of subsidised electricity exports outside the EU?	The measure would not trigger an export of subsidized electricity to non-EU countries such as UK and Switzerland.
Impact on decarbonisation	Reducing overall demand and peak demand will directly contribute to the achievement of the EU's decarbonisation objectives.
Conclusion	Possible follow-up as part of winter package.

Price cap for inframarginal technologies Cap on electricity price earned by inframarginal generators (e.g. renewables, including certain types of hydropower, nuclear) to ensure that they do not earn revenues significantly in excess of their costs. The price cap can be extended to support schemes in case such schemes would otherwise lead to revenues above the cap. The measure would intervene after the clearing of the day-ahead market auction.	
Policy objective	To prevent that low carbon electricity producers generate the high marginal electricity price determined by the very high cost of natural gas.
Impact on consumer prices	The measure would lead to revenues for the public budget. It can, and would have to, be designed in a such a way that Member States are obliged to pass the resulting benefit entirely on to energy consumers. The impact of the measure would vary between Member States as it is a function of the share of inframarginal generation (see Annex III) as well as of the design of the existing RES support measures. The measure may also affect the trading behaviour of market participants, who may seek to avoid limitations to their revenues by shifting their trading activities from the organised day-ahead towards bilateral trade, where the electricity in question will have a higher market value than the revenue cap. This would limit the benefits of such intervention.
Impact on gas consumption	No increase in gas consumption is expected as a result of the measure.
Impact on security of electricity supply	The measure should not have a significant detrimental effect on security of supply but would have to be designed carefully so as to avoid capacity withholding by generators or blocking potential new entry technologies. The amount of the cap is particularly relevant in this respect.
Impact on integrity of the single market	The measure should in principle not significantly affect cross border flows. To avoid competition distortions between generators a uniform inframarginal price cap would be preferable. The measure produces tension with the principle which prohibits retroactive changes to RES support schemes and can penalise market participants which have invested in commercial hedging against very high prices.
Suitability for swift implementation	Challenging for Member States to agree upon, especially in a short time, at which level to set out the EU-wide cap on revenues, which generation technologies are targeted.
Budgetary cost	No costs for the EU or Member States' budget.
Risk of subsidised electricity exports outside the EU	No increased exports of electricity to third countries as the cap is applied ex post to avoid that the efficient dispatch and cross-border trade are affected by it.
Impact on decarbonisation	Capping inframarginal prices can lead to a situation where investors do not believe in their ability to recoup investment costs in periods of high electricity prices. This can increase the need for public support. Risk can be mitigated by setting the cap at a level that still provide incentives to invest in decarbonised technologies.
Conclusion	Possible element of winter package. The measure can be calibrated and range from a simple recommendation for Member State to a mandatory intervention for all Member States with a uniform inframarginal price cap.

– **Interventions which have been analysed but for which EU-follow up is not recommended**

Full market suspension The measure would involve a full suspension of the wholesale electricity markets. This would stop cross border trade and the functioning of wholesale markets. Generators would be directed by national TSO to produce electricity will ex-post cost compensation.	
Policy objective	Directly controlling the generation dispatch to ensure the continuous operation of the electricity system.
Impact on consumer prices	The measure would lead to situation where prices would be a function of the costs of individual generators. But any price reduction effect due to competition between generators and due to cross border trade, which is significant, would be a loss. In jurisdictions where such a measure was used temporary this was not aimed at reducing consumer prices but preserving security of supply in face of a risk of market collapse.
Impact on gas consumption	The resulting lower wholesale price decrease will increase electricity consumption (price elasticity effect). It could increase fossil fuel use, the EU's dependence on imports and increase security of supply concerns, unless generators withhold their capacity.
Impact on security of electricity security	The suspension of cross-border trade would have very significant risks for security of supply as virtually all EU Member States depends on cross border flows to meet the electricity needs of their consumers.
Integrity of the Single Market and	Market suspension would stop the central clearing algorithm (Euphemia) and would completely halt cross-border trade or restrict it to very limited uncoordinated exchanges on a bilateral basis.
Suitability for swift implementation	Very challenging given that Member States would have to agree the operation of the system in an emergency mode.
Budgetary cost	Can entail significant budgetary cost due to the need for ex-post compensation of all generators.
Risk of subsidised electricity exports outside the EU	Not clear how EU would respect internal commitments vis-à-vis cross border trade of electricity.
Impact on decarbonisation	Decarbonisation effect which results from EU ETS and competition between different technologies would be lost.
Conclusion	This option is strongly discouraged as it bears very serious security of supply risks, stops the internal market for electricity entirely and harm decarbonisation efforts. The benefits for consumers prices are not clear.

Absolute ceiling on the wholesale price of electricity Capping electricity prices in the market. Prohibiting offers for the sale of electricity above a predefined level.	
Policy objective	To reduce prices for consumers by establishing an absolute price limit.

Impact on consumer prices	If the price cap can be upheld, it would lead to lower electricity prices. But it bears a very high risk of generators withdrawing capacity from the market if their costs are above the cap, leading to a collapse of the measure.
Impact on gas consumption	If the lower price can be upheld, it would trigger an increase in electricity consumption (price elasticity effect). It could increase fossil fuel use, the EU's dependence on imports and increase security of supply concerns. Storage, demand side flexibility would not be triggered as they are more expensive technologies.
Integrity of the Single Market and impact on security of electricity security	Cross-border flows would be halted due to lack of market-based dispatch signals which would lead to serious security of supply risks. Ill-designed price cap (as in Australia) can lead to capacity withdrawal and a risk of blackouts which could result in the full market suspension (see above).
Suitability for swift implementation	Challenging for Member States to agree upon, especially in a short time as several key parameters would need to be defined (e.g. level of a price cap/ subsidies, who/how finances the measure)
Budgetary cost	Significant compensation for the difference between the market price and the price cap needed. This cost would be harder to sustain for Member States with more limited fiscal space.
Risk of subsidised electricity exports outside the EU	Significantly increased exports of subsidized electricity to third countries.
Impact on decarbonisation	Depending on the level of a price cap, unsubsidised renewables projects would be discouraged as market revenues would be lower.
Conclusion	This option should be avoided as it would significantly increase the risk of security of supply in an already challenging situation. The measure would hold cross border flows based of price differentials and hence severely disrupt the functioning of the internal market. As shown by the Australian example, a price cap can lead to unexpected withdrawal of capacity and risk of a blackout.

EU-wide introduction of Iberian measure A uniform support payment to fossil fuel power plants (gas-fired power plants and coal-fired power plants).	
Policy objective	To shield fossil fuel generators from the effect of the current price spikes on international commodities markets, which would allow them to offer their electricity cheaper than it is currently the case.
Impact on consumer prices	Influences the bidding behaviour of fossil power plants in the EU and is likely to trigger a reduction of the cost of electricity sold by these plants and thus of the marginal price in the wholesale market. This in turn should lead to lower retail prices. In the specific setting of the Iberian Peninsula, the introduction of the measure appears to have generated a net benefit (i.e. a reduction of the electricity price which is higher than the cost for consumers). The Portuguese authorities quantify this net effect, which fluctuates strongly from day to day

	depending on RES generation, at around 16.5%.[10] This net benefit is due to inframarginal effect and is also targeted by the inframarginal cap option.
Impact on gas consumption	Wholesale price decrease will increase electricity consumption (price elasticity effect). The measure is expected to increase power generation within the EU power significantly by about 25 TWh, compared to a scenario without the measure. The measure would result in an estimated increase of EU gas consumption for power generation by 45 bcm. This extra gas consumption would represent 10% of the total EU gas consumption and would more than the double the EU gas consumption for power generation. These figures are based on a year with average nuclear and hydropower availability and may be impacted by the current situations as regards these two technologies. The effects on electricity and gas consumption will depend on the level of the subsidies to fossil fuel power plants. The above estimates are based on an assumption of subsidies to fossil fuel prices at the same level of the Iberian measure which sets a cap on gas price at 40 EUR/MWh. If the subsidised price is significantly higher (i.e. around 100-150€/MWh), this would also decrease the amount of extra gas used for electricity generation. In case of the EU-wide introduction of the Iberian measure, the impact on increased gas consumption will also depend on the availability of the spare gas generation capacity in other Member States (low availabilities of hydropower and nuclear) and the amount of interconnection capacity between Member States.
Impact on integrity of the Single Market and impact on security of electricity security	The measure will increase electricity demand that would need to be met by additional generation. If this is not possible due to the limited availability of gas, this may cause risks to security of supply. The demand would need to be curtailed by the system operator through difficult administrative decisions.
Suitability for swift implementation	Challenging for Member States to agree upon, especially in a short time, key parameters of the measure.
Budgetary cost	The overall cost of the measure will be strongly influenced by the variability of gas prices as well as by the level at which the price cap will be set. According to the available data, the gross cost of the Iberian mechanism amounted to approximately EUR 150 mio in the first week of its application (based on TTF price at 120 eur/MWh) at that time. The gross cost of the Europeanisation of this measure would cost approximately EUR 209 Bio with gas price = 300 eur/MWh (EUR 173 Bio subsidies for gas-fired power plants and EUR 35 Bio subsidies for coal-fired power plants), and to EUR 89 bn with gas price = 120 eur/MWh.
Risk of subsidised electricity exports outside the EU	Significant increased net exports of subsidized electricity to countries like Switzerland and the UK. The model estimates an increase in electricity exports (in net terms) to non-EU countries of around 32.000 GWh or + 35%. Exports to non-EU countries are likely to decrease if a higher gas price cap is applied.
Impact on decarbonisation	Would imply significant subsidies for fossil fuel-based generation (gas and coal). Would hinder efforts to decrease fossil fuel use.

[10] Mecanismo Ibérico (dgeg.gov.pt)

Conclusion	We do not recommend this option. While the Iberian mechanism has delivered some net reduction of power prices for Iberian consumers and could achieve such a reduction also on an EU level, this is largely due to the same inframarginal effect that is targeted also by other measures such as the inframarginal cap. By design, the measure would use public resources and incentivises the use of gas for power generation. We expect that the measure would lead to a very significant increase in the use of gas for power generation (the size of this effect would depend on how generous the relevant subsidies are). This increase in gas consumption would be concentrated in Member States with a large gas-fired power fleet, some of which would at the same time be strongly impacted by a possible disruption to the supply of Russian gas during the coming winter.

EU-wide introduction of Greek measure Reintroduction of cost-plus price regulation for all electricity generators. Regulated prices differ per technology and revenues used to provide financial support to energy consumers	
Policy objective	To re-regulate all electricity generators and pay them on a cost-plus basis instead of on the basis of the market price for electricity.
Impact on consumer prices	The measure would not reduce the day-ahead wholesale market price. The regulation would intervene ex-post. Generated revenues can be used to provide direct relief to energy consumers most suffering from the high prices (e.g. through vouchers to households, and financial support to businesses).
Impact on gas consumption	No expected increase in gas consumption.
Impact on integrity of the Single Market and impact on security of electricity security	The measure would have a strong impact on the functioning of the internal market as it would remove any price-based competition between generators. As all generators would be regulated based on their costs, also inefficient cost structures would be paid for.
Suitability for swift implementation	Very challenging. To revert to the cost-plus regulation national regulators needs very detailed information about the different plants. This information is in many cases not available and cannot be obtained in short delay.
Budgetary cost	No direct budgetary costs.
Risk of subsidised electricity exports outside the EU	The measure is unlikely to trigger increased exports to third countries.
Impact on decarbonisation	The measure is likely to significantly impact investor certainty, which may mean support may be needed for all future electricity generation. This regulatory risk will be reflected in higher costs of capital and lower renewables deployment in future. The risk is particularly high when all revenues above the costs are clawed-back as it is the case here. The measure is likely to disincentivize the conclusion of long-term PPAs and national hedging strategies.
Conclusion	This option should not be recommended given that it would entirely remove price-based competition between different generation technologies,

	remunerate generators for inefficient operations and disincentivize investments in new more cost-effective technologies.

Subsidy based on incurred cost of ETS A subsidy corresponding to the EU ETS cost component of power generation costs to temporarily neutralise the effects of the EU ETS on wholesale power prices	
Policy objective	To lower the cost of marginal and inframarginal electricity generation, resulting in lower overall electricity costs.
Impact on consumer prices	Creates a cost reduction for the production of electricity from fossil sources. Hence leads to lower overall electricity costs in periods where the relevant technologies are margin setting. This in turn should lead to correspondingly lower retail prices.
Impact on gas consumption	Could help a gas-to-coal switch to the extent that this switch has not already taken place in many Member States.
Impact on security of electricity security	Artificially lowering wholesale electricity prices will increase electricity demand. The additional demand would need to be met by additional generation in a situation where the system is already under significant stress.
Impact on integrity of single market	The measure will affect cross border flows because fossil electricity becomes cheaper vis-à-vis non fossil alternatives. It would however not lead to restrictions of cross border trade.
Suitability for swift implementation	It can be implemented rather quickly.
Budgetary cost	At current ETS price of 80 Eur/ton, the measure would cost around EUR 69 Bio, with strong divergence among Member States. The cost of the measure would have to be borne directly from the EU or national budgets. The amount would mirror the revenues of Member States from the sale of corresponding ETS certificates.
Risk of subsidised electricity exports outside the EU	As the measure would significantly lower electricity prices, it would trigger the export of subsidised electricity to countries outside the EU such as the UK and Switzerland.
Impact on decarbonisation	It will lead to increased electricity generation from fossil fuels such as coal and gas and will impact the achievement of the Green Deal decarbonisation goals. The measure would temporarily neutralise the effect of the ETS specifically for electricity generation.
Conclusion	This option should not be recommended as it would lower electricity prices but would undermine efforts to reduce electricity demand and would be opposed to the EUs decarbonisation efforts.

An obligation to introduce regulated retail prices for certain consumer categories during the current period of high and volatile energy prices.	
Policy objective	Would aim to reduce energy cost of certain consumer categories and protect them from the impact of high energy prices during the crisis.

Impact on consumer prices	Effective at moderating the impact of high electricity prices for end users.
Impact on gas consumption	Any regulated tariff which shields consumers from the true cost of their consumption and hence increases electricity consumption (price elasticity effect), leading to a corresponding increase of gas consumption.
Impact on security of electricity supply	The measure will increase electricity demand that would need to be met by additional generation. If this is not possible due to the limited availability of gas, this may cause risks to security of supply. The demand would need to be curtailed by the system operator through difficult administrative decisions.
Impact on integrity of the Single Market	As the price cap is introduced at retail level, it would not affect the functioning of wholesale markets and cross border flows. Depending on how such regulated tariffs are implemented they can have a detrimental effect on retail competition, e.g. if the regulated tariffs are only offered by the dominant supplier. The measure can have negative effect on retail competition, unless tariffs are above cost and include on and off-peak regulated prices.
Suitability for swift implementation	Some Member States have been able to implement retail tariffs relatively swiftly. But others do not have the regulatory setup for such tariffs already in place.
Budgetary cost	Compensation needed to energy suppliers for providing the offers at regulated cost can be very significant.
Risk of subsidised electricity exports outside the EU?	No increased exports of subsidized electricity to non-EU countries such as UK and Switzerland.
Impact on decarbonisation	Indirect impact on decarbonisation objectives as regulated tariffs counteract any demand reduction incentives provided by the market.
Conclusion	The Commission has already significantly widened the possibility for regulated tariffs in the May Communication. Regulated tariffs risk to counteract any demand reduction efforts to avert security of supply risks during the crisis, unless regulated tariffs are set above the cost and include different on and off-peak prices. A 122 TFEU instrument could be used to provide legal certainty for the extensions to regulated retail tariffs already announced by the Commission.

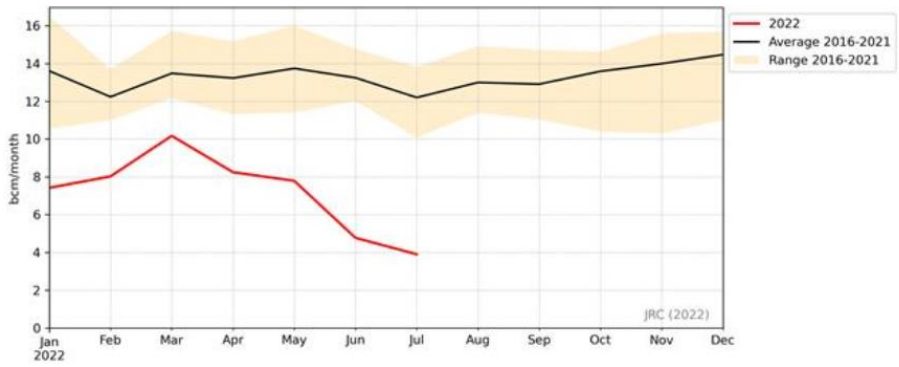
ANNEX II

Background for Emergency Interventions in Electricity Markets

Based on the political steer provided by the European Council[1], any market intervention would also have to be *"preserving the integrity of the Single Market, maintaining incentives for the green transition, preserving the security of supply and avoiding disproportionate budgetary costs".*

– Gas supply crisis

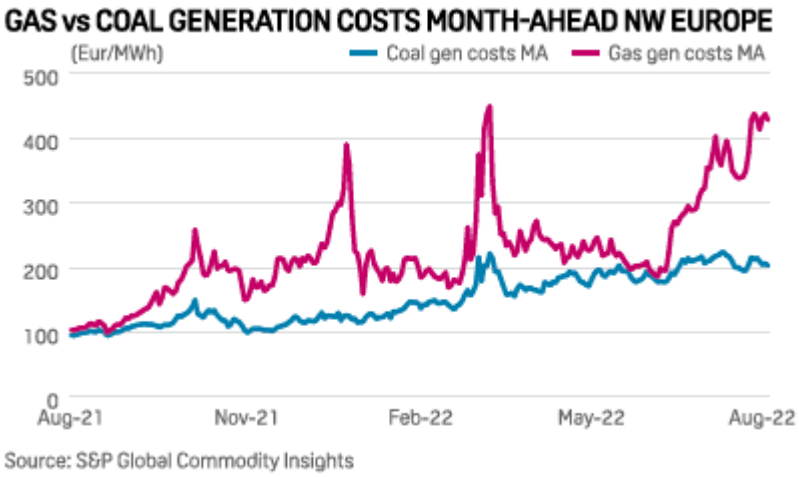
Since last year, Russian gas supplies to the EU have been declining markedly in a deliberate attempt to weaponize energy. Overall, in June 2022 gas flows from Russia to the EU were less than 30% of the average of 2016-2021. The EU has faced a series of sudden, unwarranted, and unilateral actions by Russia to reduce or stop deliveries to European customers, disrupting economic activity and driving prices upwards. Pipeline flows of gas from Russia across Belarus have stopped and have steadily decreased through Ukraine. Supply to the Baltic States, to Poland, to Bulgaria, to Finland has also stopped. Supply to several countries, including Poland, Germany, Austria, Denmark, Slovakia, the Netherlands and Italy has been reduced. Since mid-June 2022, flows through Nord Stream 1, one of the largest import routes to the EU, have been cut by 60%.



(Graph: Flows from Russian gas in 2022 compared with previous years.)

The impact of international sanctions to Russia and the fear of supply disruption have contributed for electricity prices to reach historical levels in the first quarter of 2022. The European Power Benchmark averaged 201 €/MWh in this period – 281% higher than in the first quarter of 2021. High wholesale electricity prices are putting pressure on retail prices, impacting both households and industry sectors with rising energy bills.

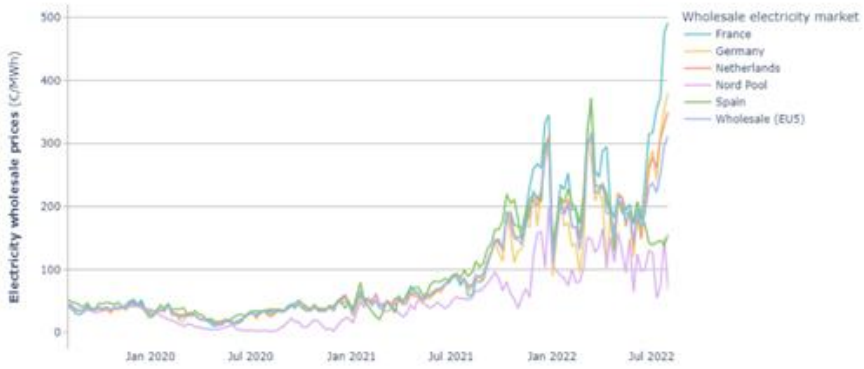
High commodity prices (mainly gas, but also coal) and lower availability of some conventional power plants put extra pressure to wholesale electricity markets.



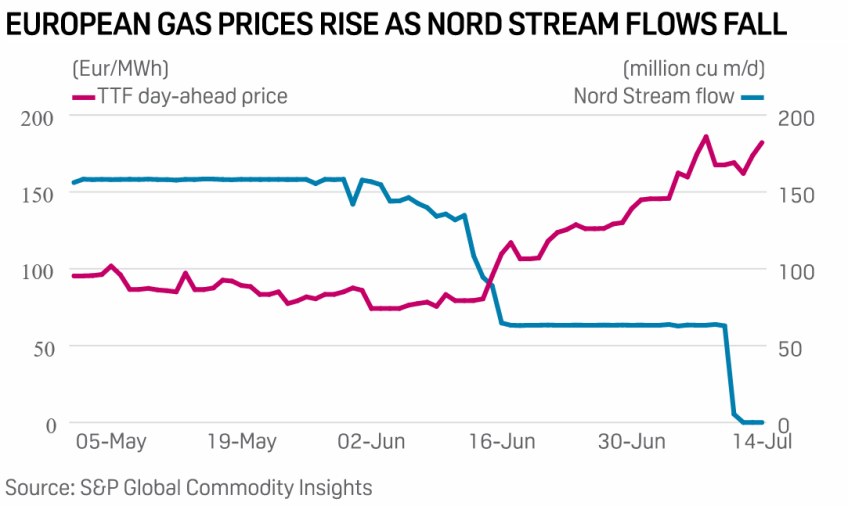
The southern and Nordic region experienced dry weather conditions reducing hydropower output, which combined with the tightness of the continental European markets, resulted in a steep increase in prices. Nuclear generation remained under pressure due to unplanned outages in France and scheduled closure of capacity in Germany.

The graph below depicts weekly average wholesale electricity prices EU5 (weighted average of prices of main EU electricity markets (DE, ES, FR, NL).

The graph below depicts on weekly average wholesale electricity prices on Nordpool market (NO, DK, FI, SE, EE, LT, LV).



Russian supply uncertainty has led to pushing European gas prices to the record highs.



– **Capacity availability constraints**

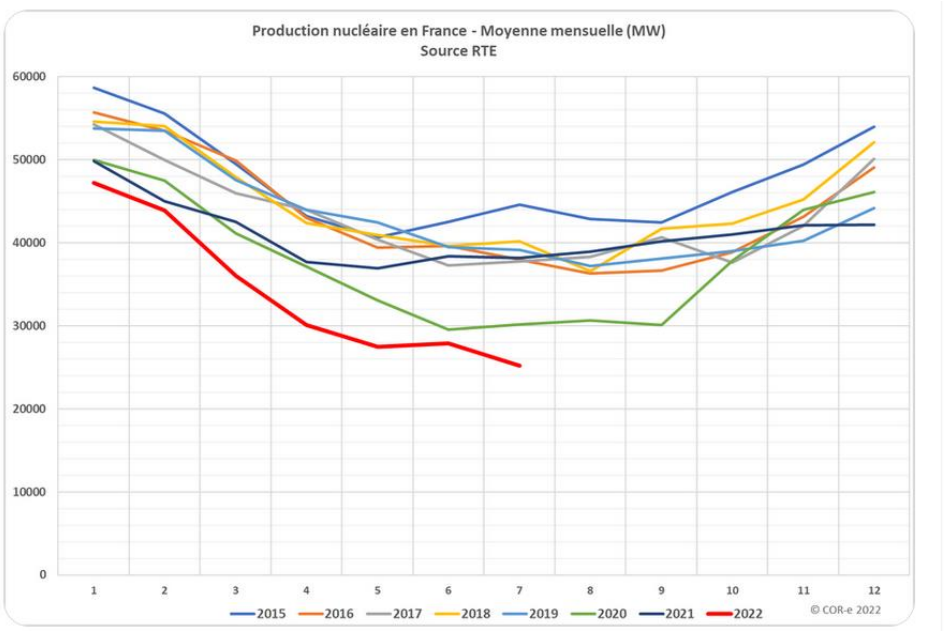
As well as gas supply issues the EU is also experiencing a parallel electricity market crisis. Central Western Europe, Great Britain and the Iberian Peninsula, among others, experienced a surge in prices linked to rising gas prices dragging up power prices across Europe given gas is the marginal price setting fuel. Record-breaking temperatures this summer have pushed up energy demand for cooling and added pressure on electricity generation. However, energy generation in the EU has been significantly lower due to the shortfall of French nuclear and southern European hydropower generation which led to extremely high electricity prices. The extreme weather conditions contributed to energy scarcity and high energy prices, constituting a burden for consumers and dampening the economic recovery. Renewable power generation has decreased due to lower wind generation on hot days. This generation deficit will be mostly compensated by gas, and that puts significant additional pressure on gas markets.

These constraints have already translated into alarming high-prices episodes. On the day-ahead trading session of 17 August 2022, the Baltic states' electricity markets skyrocketed and cleared at the price cap (4000€/MWh) for the hour 17:00 -18:00 CET. Some preliminary analysis seems to show that this situation was mainly caused by some

transmission lines unavailability, and that three hours of this day could have reached these dizzying prices without the activation of 50MW peak load capacity reserves.

Lower nuclear output

The gas supply crisis has been exacerbated in particular by low availability of French nuclear plants given reactor maintenance and safety issues. In July 2022 the output of French nuclear was at 25 GW, or 40% of total capacity and 15 GW less than in late July last year. Currently, 29 of the 56 nuclear power plants currently produce no electricity or far too little.



The corrosion problems have added to scheduled maintenance shutdowns at some of its 56 reactors. In June, seasonal output restrictions due to rising temperatures on rivers are increasing the pressure on the fleet. River water is used to cool nuclear reactors, with the heated water discharged back into rivers. However, heated water discharge is forbidden due to potential damaging of the environment.

The closure of three nuclear power plants in Germany resulted in lower generation (-16 TWh for H1/2022 vs H1/2021), while the planned closure of the last three nuclear power plants would lead to a loss of another 16 TWh.

Belgium is also struggling with a crisis of nuclear energy, since the Doel power plant had to be disconnected from the grid repeatedly due to technical problems. The Finnish 1600 MW Olkiluoto-3 (OL3) nuclear unit has faced another delay due to technical mishaps and after months of maintenance it has resumed trial operation phase only at the beginning of August raising hopes that it will enter regular service later this year.

As a result, France is becoming an importer of power increasingly on a net basis, pulling in supply from neighbouring countries when these countries are themselves under specific stress due to the higher gas prices.

Reduced hydropower generation

Energy production from run-of-river plants until the beginning of July was lower than the 2015-2021 average for many European countries, notably in Italy (-5039 GWh compared to the average), France (-3930 GWh) and Portugal (-2244 GWh). The same decrease is

true for hydropower reservoir levels, affecting countries such as Norway, Spain, Romania, Montenegro and Bulgaria, among others.

Due to the low state of water reservoirs in Norwegian hydroelectric plants, Norway, one of Europe's leading exporters of electricity that sends around a fifth of its output to its neighbours, considers curbing curb electricity exports to Europe when the water level in the reservoirs falls below the seasonal average. Norway argues that it is necessary to prioritise refilling its reservoirs in order to avoid domestic shortages this winter. Such curbs are allowed only if an emergency situation is declared.

In summary, drought conditions and water scarcity are affecting energy production, which combined with the tightness of the continental European markets, resulted in a steep increase in prices.

Coal availability

The phase-out of coal and nuclear capacity is increasing the sensitivity of power prices to the developments of the gas market. In spite of the high prices of energy commodities (mainly gas, but also coal) fossil fuel generation increased in Q1 2022 due to low nuclear and hydro output. In July 2022, some member states (Austria, Germany, Italy and the Netherlands) have announced plans to temporarily increase coal-fired power generation, with the aim of saving gas and boosting gas storage filling in the summer.

However, as no coal imports from Russia are permitted starting from August 10 the coal supplies to the EU will be affected. Whilst Indonesia, South Africa and Colombia are all potential suppliers, EU countries will face extremely high prices due to the particularly high-calorific type of coal normally used across the EU. Coal prices on the API2 Rotterdam hub (a European benchmark) reached $380 per ton last week, i.e. a more than fourfold increase on this time last year.

More than half of the higher-quality coal used for individual households' heating in Poland used to be sourced from Russia. Due to declining local production Poland may face coal shortages and that many households will struggle to afford heating this autumn and winter.

In addition, the lack of water mentioned in the previous section is also negatively affecting the thermoelectric power production operations across countries. High temperatures and low rainfall in Germany have reduced the level of the river Rhine, forcing barges to part-load with many commodities, restricting coal supply to power plants.

Baltics' system synchronization with Russia

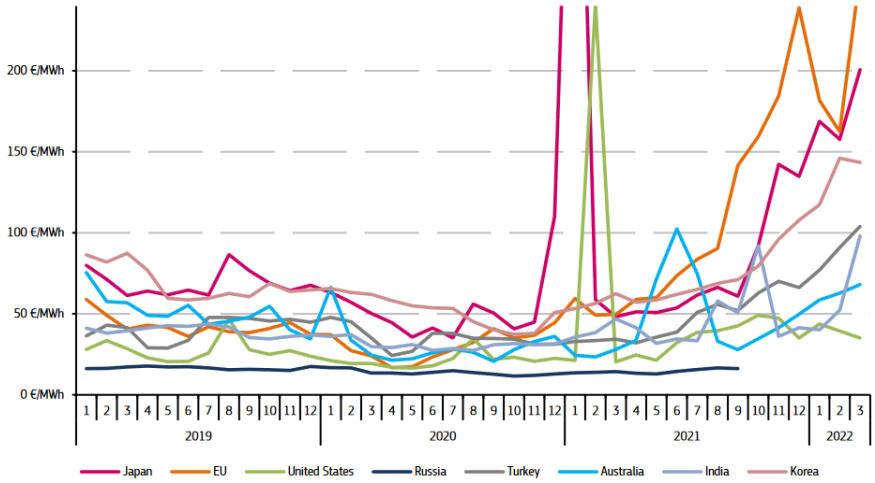
The Baltic states' electricity system is part of the unified Russian electricity system. While the desynchronization of the Baltic States from the BRELL grid shared with Belarus and Russia and synchronizing with continental Europe through Poland is ongoing it is expected that the synchronization of the Baltic States' power system with the Continental European Network will be completed only by 2025. Therefore, there is an increased risk of blackouts and additional costs to manage the system if Russia were to desynchronize its electricity system from the Baltic states.

– **Macroeconomic impact on the EU economy**

Additional upward pressures put on energy and food commodity prices are feeding global inflationary pressures, eroding the purchasing power of households and triggering a faster monetary policy response than previously assumed.

Most markets saw prices rising as a result of the already tight global markets, exacerbated by the global impact on commodities by the Russian war in Ukraine, however European wholesale prices were the highest of the major economies. Europe's international trade balance has fallen into a deficit, which was mainly influenced by the cost of energy production.

Figure 25 – Monthly average wholesale electricity prices in international markets (D-A markets)



Source: European Power Benchmark, JPEX (Japan), AEMO (Australia), JCS ATS (the latest data for Russia is not available), Energy Exchange Istanbul (Turkey) and the average of selected PJM West, ERCOT, MISO Illinois and CAISO regional wholesale hubs in the United States. BloombergNEF (India and Korea).

For the euro area, GDP growth is estimated at 2.8% for 2022 (from 4.3%) and 2.3% for 2023 (from 2%). The reduction in 2022 results mainly from high inflation led by high energy prices, supply chain disruptions and reliance on Russian fossil fuels, particularly in the manufacturing sector.

According to the Summer 2022 Economic Forecast, inflation until June has hit record highs as energy and food prices continued growing and price pressures broadened to services and other goods. In the euro area, inflation grew strongly in the second quarter of 2022, from 7.4% in March (y-o-y) to a new all-time high of 8.9% in July. In the EU, the increase was even more pronounced, with inflation jumping a full percentage point, from 7.8% in March to 9.8% in July.

EU-wide, retail prices have been rising since the end of 2020 and have started a steep climb since September 2021 which is still continuing. Inflation pressures have intensified throughout the year, due to rising wholesale prices, which have been driven largely due to high gas prices and energy commodities in general.

This economic situation could lead to industrial demand destruction due to both high prices and energy rationing and to loss of European industrial competitiveness given extreme energy input costs. Higher commodity prices will result in increased supply chain and logistical costs, thereby increasing import expenses. For example, nitrogen producers are looking to import more ammonia due to current gas costs and fertilizers prices. For commodity trading houses, higher purchasing prices will require capital and credit from financial institutions to bridge gaps in the supply chain.

According to the survey of 3,500 companies from all sectors and regions in Germany, nearly a quarter of the companies forced to reduce production have already done so, and another one-quarter are in the process of scaling back production due to sky-high energy

prices. 32% of energy-intensive companies plan to or have already started to reduce production and even halt entire production lines.

Annex III

Average generation of inframarginal technologies per Member State in 2022

(including wind, solar, nuclear, run-of-river hydropower and lignite-fired generation)