European energy prices – support mechanisms and market reform proposals

ECA Insight - deep dive

October 2022





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1. Introduction

Energy prices and drivers: gas price surge as the primary driver bleeding into the power sector – although prices have come down since late August, they remain high

- The main driver of the high energy prices in Europe has been a **gas price surge** that started in mid 2021. This was due to:
 - Global increase in demand in 2021 (driven by rapid economic recovery and certain weather patterns)
 - **Tight supply** due to Russian supply disruptions, European rebalancing of gas supply and European production slowdown or shut-in.
- Three phases:
 - Phase 1 ('the first price crunch') across Q2-Q3 2021 –scarce LNG imports and narrow pipeline flows
 - Phase 2 ('market-response from LNG'), Q4 2021 to Q1 2022 –high priced LNG replacing Russian pipeline supplies
 - Phase 3 ('war emergency') from late February 2022 Russian invasion of Ukraine an almost complete stop of Russian gas supplies.

- As **gas is the marginal price setter** in most European power markets, the gas crisis affected power prices one for one.
- A mix of secondary factors also contributed to high electricity prices:
 - coal and carbon price increases
 - high demand (triggered by the economic recovery) and weather patterns (cold winter, unusually hot summer)
 - low renewable generation (e.g. lower wind generation and hydro impacted by drought)
 - French nuclear shutdowns due to low water levels and security issues and reduced German and Belgian nuclear activity
 - Low water levels on the Rhine constraining coal supplies in Germany.



Germany electricity spot market prices EUR/MWh - past year 700 600 400 300 163.89

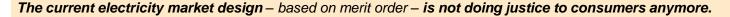
Source: https://tradingeconomics.com/germany/electricity-price

1. Introduction

The market redesign debate is not new – the energy crisis has revitalised it with a sense of urgency

European Commission president Ursula von der Leyen said in her 2022 State of the Union address (Sep '22):

"As we deal with this immediate crisis, we must also look forward.



They should reap the benefits of low-cost renewables.

So, we have to decouple the dominant influence of gas on the price of electricity. This is why we will do a deep and comprehensive reform of the electricity market."

The debate on the reform of the price formation mechanism and its adequacy with respect to energy systems dominated by RES is not a new one.

Following the rise in gas prices during Q4 2021, the European Commission required the Agency for the Cooperation of European Energy Regulators (ACER), to investigate the problem. ACER concluded that the **marginal pricing system remains the most effective mechanism**, as:

- > it allows to minimise the purchase costs of electricity;
- > provides adequate coverage of the investment costs of renewable electricity generation sources and nuclear power plants.

Despite the conclusions of ACER, the tight gas market situation triggered by Russia's invasion of Ukraine has revitalised the debate about whether marginal pricing is still fit for purpose. The debate about market design conflates several objectives:

- (i) **short term financial relief** to consumers in light of high prices;
- (ii) signaling to electorates that 'excess profits' are not acceptable; and
- (iii) decarbonisation objectives.

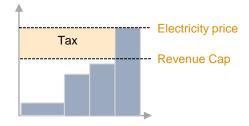
This has meant that market design proposals in Europe are closely interwoven with proposals of **financial support mechanisms** – we provide a summary of the main policies currently being implemented and debated.



Three main proposals across Europe regarding wholesale market intervention

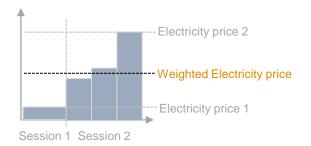
1 Cap on the infra-marginal producers' revenues

- Limit revenues of those generators not setting the marginal price through **taxation**.
- The fundamental functioning of the market remains unchanged and the wholesale price continues to be determined by the marginal generators.
- This is essentially a redistribution of rents from inframarginal generators to consumers through – in most cases – subsidies or other social support programmes.
- Italy introduced such a mechanism, which applies to PV and other RES generators. The price cap is set at around €60/MWh.
- The European Commission also included a measure in its proposal that sets a cap on the price that the infra-marginal power generating technologies can earn for each MWh sold.



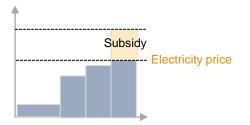
2 Two separate power exchanges

- Greece made a proposal during the EU Council of Energy Ministers in July 2022, for the establishment of two distinct and consecutive sessions of exchanges on the day ahead market.
- A first session would involve only power plants whose cost structure is characterised by high fixed costs and low variable costs.
- A second session would instead entail programmable generating technologies characterised by positive marginal costs such as coal and gas power plants.
- In this second session, operators would bid for the electricity generation necessary to meet the residual demand, i.e. the share of consumption which is not satisfied by the production sold in the first session.
- Consumers pay a weighted average price of electricity between the two markets



3 Gas price cap

- Spain and Portugal established a cap ("tope") on the cost that gas power plants may pay for the purchase of natural gas needed for electricity generation.
- Generators are compensated for the difference between the level of the cap and the wholesale gas price they face.
- This temporary measure was introduced in the Iberian market in June 2022 for a year to ensure gas generators submit lower bids into the power market, thus depressing prices.
- The cap is set at €40/MWh for the first six months of application of the measure.
- From the seventh month, the cap will be increased by €5/MWh every month until reaching the maximum value of €70/MWh.





The Greek proposal involves the creation of two separate power exchanges

Fundamental economic principles in the Greek proposal



- Remuneration based **on CfD (contracts for differences)** with prices reflecting **total levelized cost** is the suitable financial instrument for enabling nuclear, **renewables** and hydro investment and for bringing up to consumers the low-cost benefits.
- Remuneration reflecting scarcity and marginal costs is suitable for resources deployed on-demand to balance the system, provide ancillary services and complement the eventual non-availability of renewables.
- Greece's proposal involves two separate power exchanges, one for low-marginal cost generating assets and one for high-marginal cost assets.
- A first session would involve only power plants whose cost structure is characterised by high fixed costs and low variable costs, i.e. infra-marginal generating technologies.
- A second session would include programmable generating technologies characterised by positive marginal costs such as coal and gas power plants.
- In this second session, operators would bid for the electricity generation necessary to meet the residual demand.
- The profits for the power plants participating in the first session shall come from a **CfD** signed between electricity generators and public or private counterparties (such as final consumers, traders or aggregators).
- For power plants that are not able to find a counterpart in the market, so that a Cfd could be signed, a voluntary participation in a newly set up market is envisaged. Such a market is called the **green power pool** and would be managed by a public entity operating as a single buyer.
- Power plants participating in the second session of the market would continue to value their production according to the System Marginal Price mechanism.
- The equilibrium price for the electricity purchased and sold would be determined by the **weighted average of three values**:
- the average price paid for the contracts for difference in the first trading session;
- 2) the clearing price of the second trading session
- 3) the weighted average price, for the quantities traded on the green power pool.
- The goal of the Greek proposal seems to structurally abandon marginal pricing and transition towards average pricing (i.e. a pricing mechanism based on average generation costs, including both variable and fixed costs).

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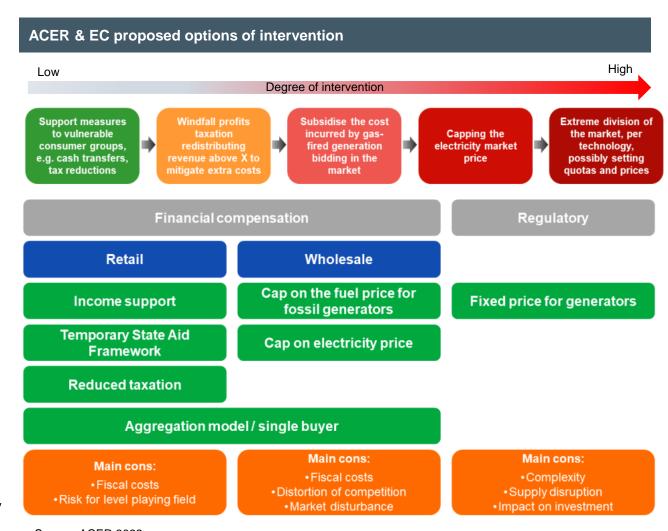
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European Commission's overview of short-term options to address high electricity prices

- In March 2022, the EC published a Communication on 'Security of supply and affordable energy prices: Options for immediate measures and preparing for next winter'.
- ACER was asked by the EC to assess these options and offered the following recommendations:
 - Keep the current electricity market design
 - Consider public intervention to establish hedging instruments against future price shocks (affordability options):
 - subject to a centralised auction for long-term options their execution depends on the average market price over a pre-defined period (e.g. a month). Only when the average price over the period exceeds the strike price, will the option be executed.
 - Such options maintain the exposure of consumers to shorter-term market signals but hedge them against sustained high prices.
 - Consider a 'temporary relief valve' for the future when wholesale prices rise unusually rapidly to high levels:
 - Member States could consider establishing ex-ante a temporary price limitation mechanism kicking in automatically under clearly specified conditions (e.g. unusually high electricity price rises in a short period of time)
 - This would pause the return to full price formation for a specified period of time (e.g. a few weeks or a month).
 - The measure would need to ensure significant revenue is earned by generators
 - It should also retain compensation for generators who can prove sourcing costs above the limitation ceiling



Source: ACER 2022



New proposal for tackling high energy prices by the Commission: 3 key measures starting 1 December 2022

Demand Reduction



The first response to tackle high prices is to **reduce demand**. To target the most expensive hours of electricity consumption, when gas-fired power generation has a significant impact on the price, the Commission proposed an obligation to reduce **electricity consumption by at least 5%** during selected peak price hours.

- Member States will be required to identify the 10% of hours with the highest expected price and reduce demand during those peak hours, with the aim to reduce overall electricity demand by at least 10% until 31 March 2023.
- They can choose the appropriate measures to achieve this demand reduction, which may include financial compensation.
- Increase energy efficiency

Revenue Cap for inframarginal producers



The second measure is a **temporary revenue cap on 'inframarginal' electricity producers**, i.e. technologies with lower costs, such as renewables, nuclear and lignite, which are providing electricity to the grid at a cost below the price level set by the more expensive 'marginal' producers.

These inframarginal producers have been making exceptional revenues, with relatively stable operational costs, as expensive gas power plants have driven up the wholesale electricity price they receive.

- Inframarginal revenue cap at €180 EUR/MWh (deemed sufficient to allow producers to cover investment and operational costs without impairing investment)
- Revenues above the cap will be collected by Member State governments and used to help energy consumers reduce their bills.
- Member States trading electricity are encouraged to conclude bilateral agreements to share part of the inframarginal revenues collected by the producing State for the benefit of end-users in the Member State with low electricity generation.

Solidary contributions

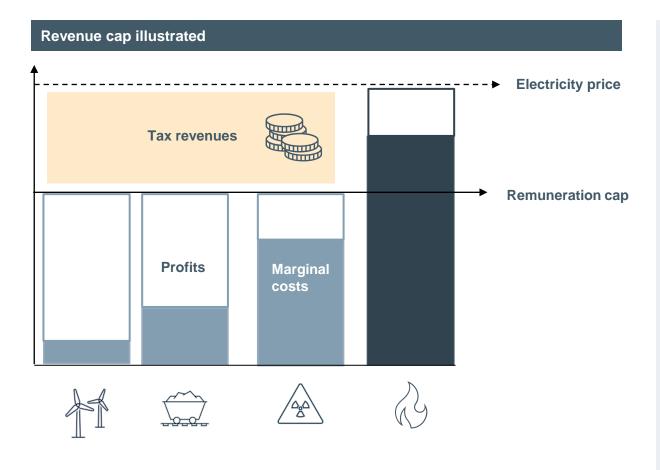


The third measure is a **temporary solidarity contribution on excess profits** generated from activities in the **oil**, **gas**, **coal and refinery sectors** which are not covered by the inframarginal revenue cap.

- Collected by Member States on 2022 profits which are above a 20% increase on the average profits of the previous three years.
- Redirected to energy consumers, in particular vulnerable households, hard-hit companies, and energy-intensive industries.
- Member States can also finance cross-border projects in line with the REPowerEU objectives or use part of the revenues for the common financing of measures protecting employment or promoting investments in renewables and energy efficiency.



Deep dive on remuneration cap on inframarginal producers



- The cap should not be set below the expectations of market participants as to the average level of electricity prices in the hours during which the demand for electricity was at its highest, before the invasion of Ukraine by Russia.
- The average market price expectations for peak hours were consistently and significantly below 180 EUR/MWh during the past decades, despite price differences across regions in the Union.
- Moreover, simulations based on observed prices over January through August 2022 show that a cap set at 180 EUR/MWh would have resulted in stabilising the average revenue around 150 EUR/MWh.
- This average revenue level is **consistently higher than the current levelised cost of energy (LCOE)** for the inframarginal technologies targeted by the application of the cap on revenues.
- As the cap will apply on the revenues per MWh of electricity produced, **price** formation in electricity wholesale markets will not be affected.
- The dispatch of power plants will continue to take place based on their level of efficiency, with those with lower marginal costs being dispatched first, and the cross-border trade of electricity will not be affected.
- The cap should apply to realised market revenues only. This is necessary to avoid targeting producers who do not actually benefit from the current high electricity prices due to having hedged their revenues against fluctuations in the wholesale electricity market at a price below the cap level.
- Hence, to the extent that existing or future contractual obligations, such as renewable PPAs or forward hedges, lead to market revenues from the production of electricity below the cap, they would not be caught by its application.

2. European Commission proposal

Unlike the broad consensus around the EC's three core measures, European Union leaders have struggled to bridge significant differences over a gas price cap

- So far, the Commission has not drafted a proposal regarding a gas price cap. However, amid growing pressure from EU capitals., including a letter sent to the Commission by a group of 15 countries urging it to set out a price cap on gas imports to the bloc, Ursula von der Leyen said that **EC has "started work" on a "temporary" measure to cap gas prices** across the EU.
- The discussions at EU level have revolved around three main options so far.

Subsidies for gas purchases

- One of the options considered is partly susbidising gas purchases.
- ► EU countries would select a **common "symbolic price"** for natural gas that utilities and industry can afford to pay on the wholesale market and then subsidise the rest of the bill.
- While this option doesn't involve tinkering with the bloc's trading exchanges or energy market rules, it is very expensive.
- In addition, without any clear rules at the border, it can create issues if subsidized EU-based companies **resell gas at higher prices** to neighboring third countries.
- Brussels has expressed openness to temporarily applying this model to the EU electricity market.

Rigid price cap

- The EU could set a hard ceiling on how much gas can be bought and sold for.
- If applied to all purchases, it would force companies to renegotiate their private supply contracts and would forbid real-time traders from bidding above the maximum price.
- The Commission is not in favour of this option, as competitors could easily outbid EU buyers by bidding just above the cap.
- In addition, a uniform price within the EU would complicate intra-bloc trading.

Italy-Belgium-Greece-Poland proposal

- A joint pitch from Italy, Belgium, Greece and Poland suggested a **fluctuating range of acceptable prices** for all EU wholesale gas transactions.
- This would be partly linked to the price of oil, as well as gas hub prices in the U.S. and Asia.
- Within the EU, that price would be allowed to move up or down by 5 percent (which Italy refers to as tetto forchetta, or "forked cap").
- This would allow gas to be traded and guided to regions on the Continent where it's most needed.
- It would also be coupled with some subsidized emergency full-price purchases to import more gas in case shortages look likely.
- The first meeting of EU heads of government on October 7th did not reach an agreement regarding the above options.
- A second meeting is scheduled for the end of October, with hope a final decision can be taken this month.



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'Tope al gas' – de facto decoupling of the price of electricity from gas

- In an attempt to redistribute the producer rents of inframarginal electricity generators to consumers, Spain and Portugal introduced an electricity wholesale market intervention known as the 'tope al gas' in mid-June.
- It combines a **cap on the price** at which gas-fired power plants sell their energy in the wholesale market **and compensation** for such plants, which covers the difference between the actual supply cost and the cap.
 - If the market price of natural gas exceeds the cap, thermal generators are subsidised to cover the difference between the fuel cost and the cap.
 - Example: if gas costs €100/MWh, thermoelectric producers will bid on the power exchange at a price consistent with the cap (i.e. as if gas costs only €40/MWh) and will be refunded the difference (€60/MWh).
 - The corresponding subsidy is financed by:
 - buyers on wholesale markets in proportion to the volumes purchased;
 - end customers who continue to buy electricity at regulated prices;
 - the higher revenues from the increased electricity exports to France as a result of the reduced Spanish electricity prices after the introduction of the cap.

Iberian price development comparison scenarios



Source: The Iberian electricity market intervention does not work for Europe | CEPR

- The mechanism is managing to contain the rise in electricity prices.
- However, it is also generating **negative externalities** that are driving the Iberian market to generate more energy from gas and more inefficiently (explained in the next slide).



3. Spain and Portugal

'Tope al gas' has created externalities – more exports to France and even greater dependence on gas plants

- Firstly, the mechanism has driven a large portion of gas fired CHP plants out of the market:
 - Up until September, they had been left out of the compensation system, so
 the spot price that was being paid by the market, moderated by the gas cap,
 was too low for their operations to be profitable.
 - As a result, electricity production at cogeneration plants in 2022 has gone from representing 15% of the total before the gas cap to just 9% after its introduction.

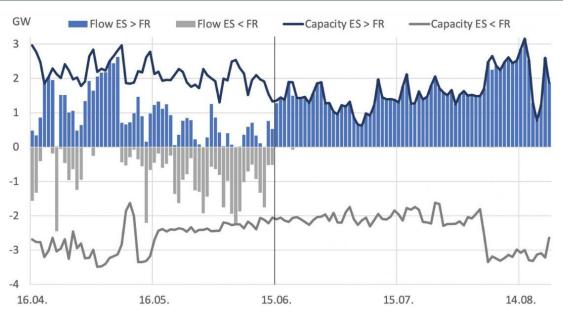
CHP generation **GWh** 2022 Pre-cap 15% 130 2021 2020 110 18% 17% 2022 of the energy Post-cap 90 generated 9% 70

Source: The gas cap in Spain under examination (caixabankresearch.com)

Secondly, exports of electricity to France have surged because of the price gap:

- Exports persistently reach the maximum levels allowed by the interconnection between the two countries, day after day.
- Since the gas cap was introduced, net exports to France have accounted for 4% of the total energy produced in Spain, whereas before the gas cap for 0.3% of the total.
- This is also resulting in incomes being transferred to the French electricity system, since the price at which that system is purchasing the energy is subsidised by consumers on the Iberian peninsula.

Spain-France power trade flows



Source: The Iberian electricity market intervention does not work for Europe | CEPR



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Germany and France are focusing efforts on end user support mechanisms funded through higher taxes

Germany

- In June 2022, a new package was rolled out by the government involving:
 - greater reliance on coal power plants substituting gas-fuelled ones;
 - gas auction model reducing short-term demand from industrial gas users at times where they can voluntarily cut or suspend use of gas temporarily. The unused gas is then shared across all industrial users at the cheapest price.
 - 3. lines of credit to gas storing companies;
 - 4. cost subsidy with no repayment obligation to energy- and trade-intensive companies that are particularly affected by increases in natural gas and electricity prices.
- In September 2022, the government announced an additional €65 billion to support households struggling with energy prices, including **a brake in the price for electricity used in basic consumption**.
- This will be funded by a **windfall profit tax for** wind, solar, biomass, coal and nuclear energy generators.
- A €68 billion package was also announced, offering loan guarantees to failing energy companies disrupted by the Russian supply cuts.
- In October 2022, the government decided to introduce a **gas price cap** (12 cents per kWh) on 80% of usage, and additional support measures for household and industrial users. Costs are estimated at €93 billion.



France

- Earlier in the year, the French government capped the increase in regulated power prices at 4%.
- It also forced state-run utility EDF to sell more electricity to rivals well below market rates.
- In September 2022, the following measures were announced:
- 1. capping the increase in gas and electricity prices at 15%;
- an average increase limit in bills of around €25 per month for households heating with gas;
- an average **increase limit in bills** of around € 20 per month for households heating with **electricity**;
- support of up to €200 provided for French people heating with oil or wood.
- According to government estimates, the measures is expected to cost €17.8 bn net (€1.8 bn for the energy bill support, €11 bn for the gas price cap, and €5 bn for the electricity price cap).



The UK and Netherlands opted for price caps and energy allowances

- The Energy Bills Support Scheme provides a £400 non-repayable discount to households to help with their energy bills over 6 months
- £66 in October and November and £67 in December, January, February and March 2023.
- A cap on the average unit price of electricity and gas was introduced.
- Dual-fuel customers on a standard variable tariff who pay by direct debit will now be charged a maximum average unit price of: 34p per kWh of electricity (currently 28p) and 10.3p per kWh of gas (currently 7p).
- The government says a typical household can expect to pay £2,500 a **year.** The cap is expected to be in place for two years.
- **Businesses** were previously excluded from the energy price cap. Under the government's energy bill relief scheme:
- wholesale energy prices will be capped for firms and organisations for six months from 1 October
- prices will be fixed at 21.1p per kWh for electricity and 7.5p per KWh for gas
- a review will be published in three months' time to identify "vulnerable" organisations needing support after March 2023.

Netherlands

- In March 2022, the government raised the **one-off energy allowance** for people on incomes around the level of social assistance to €800 (previously €200).
- At the same time, the government lowered the rate of value-added tax (VAT) on energy from 21% to 9%.
- It also cut the excise duty on petrol and diesel by 21% from 1 April 2022 until the end of the year.
- In September 2022, the government announced a price cap on electricity starting in January 2023.
- This will restrict the price of electricity to the average price from January 2022 for an average level of consumption.



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