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Who should be charged? Principles for fair allocation of electricity system costs

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Executive summary

THE HIGH COSTS in the European Union of supplying electricity can only be structurally reduced through decarbonisation and deeper European electricity system integration. In the short-term, policymakers have few choices. They can redistribute system costs by shifting components from one consumer to another. Another immediate distributional option would be to reduce energy taxation, implicitly shifting costs to the taxpayer.

MEANWHILE, DECISION-MAKING PROCESSES that translate electricity system costs into final consumer prices are fragmented. Rules on the short-term production, transmission and consumption of electricity are determined at EU level. National regulators and governments determine how the fixed costs of the system are recovered from consumers, while national policymakers also set energy taxes.

THIS POLICY BRIEF sets out options for shifting the fixed costs of the electricity system between consumers, for changing energy taxation to reduce prices and for evaluating systemic trade-offs between system cost and other characteristics, such as sustainability and reliability. We also estimate the quantitative effects of shifting costs between consumers and reducing taxes on electricity.

WE SET OUT four principles for pricing electricity fairly. Policy interventions in the electricity system should not seek to achieve broader economic objectives at the expense of energy-policy goals. Consumer prices should incentivise efficient system operation. Carbon emissions should be priced in. The fixed costs of the electricity system should be primarily recovered from inelastic consumption.

EUROPEAN POLICYMAKERS SHOULD develop transparent analytical tools to assess the distributional effects of electricity-policy interventions. Lessons should be learned from the energy crisis, during which EU and national policies attempted to shield consumers from price impacts, and these lessons should form the basis of ongoing efforts to reduce prices. EU guidelines for electricity cost recovery should be established, following fundamental economic principles, and could form a policy toolbox for national governments to reduce energy prices. Finally, the long-term strategic goal of deeper physical and institutional integration of European electricity markets should be pursued to structurally reduce electricity prices.

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1 The electricity affordability problem

European households and companies pay higher electricity prices than in most other industrialised economies (Trinomics, 2024). Expensive electricity undermines the industrial competitiveness of energy-intensive industry in the European Union, while households pay more for essential energy services. Decarbonising electricity production and electrifying large shares of heating and transport energy demand is essential to reducing fossil-fuel consumption. However, electricity must be affordable enough for consumers to electrify their increasingly elastic energy consumption through heat pumps and electric vehicles. Therefore, high electricity prices could delay Europe's long-term strategic goal of net-zero greenhouse gas emissions.

High electricity prices could delay Europe's long-term strategic goal of net-zero greenhouse gas emissions

In the long run, prices can be reduced through deeper physical and institutional integration of the European electricity sector, faster decarbonisation and more demand-side flexibility (Zachmann *et al*, 2024). However, in the short-term, achieving significant structural reductions in the cost of supplying electricity is difficult, especially because Europe has become increasingly dependent on expensive liquified natural gas (LNG) imports (Heussaff, 2024). High gas costs pass through into electricity prices because of the use of gas for electricity generation. Decoupling of gas from electricity pricing might not happen until after 2030 (Gasparella *et al*, 2023).

Though it is hard to quickly reduce electricity prices, the costs can be redistributed, for example to benefit energy-intensive industries at the expense of households. Energy taxes can be reduced or electricity costs paid using public money but this could impact on other urgent non-energy spending needs. All short-term policy measures to reduce electricity prices for specific consumers thus involve unavoidable distributional effects and policy trade-offs.

At EU level, these difficulties have been recognised and the European Commission issued in February 2025 an Action Plan for Affordable Energy (European Commission, 2025). The Action Plan's diagnosis of the affordability problem is correct, pointing to Europe's reliance on imported fossil fuels combined with incomplete integration of the electricity system. The plan sets out eight measures, from short-term cost redistribution to structural measures to reduce supply costs, market monitoring and long-term electricity system integration.

The Action Plan provides a timeline for the introduction of policies and measures, many of which reiterate or expand on already-known proposals. Long-term electricity supply contracts, discussed in detail during the EU electricity market reform process that concluded in 2024[1], are emphasised as the solution to decouple final consumer bills from volatile gas prices. A European grid package will be put forward at the beginning of 2026, while greater electricity system flexibility and permitting reform are also envisaged.

Here however, we focus on the distributional issues related to three short-term policy interventions proposed in the Action Plan[2]. First, the Action Plan states that network charges should be designed to encourage efficient electricity consumption while fairly distributing costs, and suggests the Commission could make proposals to make such design requirements binding.

Second, a revision of the EU Energy Taxation Directive (2003/96/EC) was already proposed in July 2021 as part of the European Green Deal. This aimed to align energy taxation with energy and climate objectives by shifting the tax burden away from electricity and onto polluting fuels but progress on the revision has stalled. The Action Plan reminded EU gov-

1 See Council of the EU press release of 21 May 2024, 'Electricity market reform: Council signs off on updated rules', https://www.consilium.europa.eu/en/press/press-releases/2024/05/21/electricity-market-reform-council-signs-off-on-updated-rules/.

2 Heussaff and Zachmann (2024) explored the implications of using long-term state-backed contracts for clean electricity supply. The economic policy issues with electricity grid investment were discussed in Heussaff and Zachmann (2025). Heussaff (2024) detailed the benefits of electricity system flexibility for affordability.

ernments that they can bring non-energy taxes on electricity to much lower levels, without waiting for the energy taxation reform to conclude[3].

Third, the final short-term measure in the Action Plan is to encourage more competition in retail electricity markets[4]. Final electricity consumers can switch their electricity supplier regularly, in theory encouraging competition among suppliers to provide the best offer, but switching rates remain low in many countries (ACER and CEER, 2024). The Commission plans a 'citizens' energy package' in the second quarter of 2025 that will provide guidance to EU countries on how to encourage more switching.

In section 2, we break down electricity cost components, highlighting the legal basis for policymaking that affects each component. Section 3 provides a qualitative framework for considering the distributional issues and policy trade-offs in the electricity sector. In section 4, we estimate short-term policy trade-offs based on empirical data. Section 5 sets out policy recommendations for electricity cost distribution related to the issues raised in the Commission Action Plan.

2 Electricity costs: components and decision-makers

2.1 Electricity cost components

Final electricity bills include the short-term variable costs of generating electricity, levies to recover the capital costs of electricity-generation technology, charges to recover network costs and non-energy taxes[5]. Currently, the variable and operational costs of electricity generation make up the largest share of bills. The costs of electricity generation from fossil fuels are dominated by short-term variable costs driven by fuel purchases and power-plant operation, while for electricity from renewables, costs are determined by the capital costs of installing the assets. Variable electricity generation costs will fall with more renewables in the electricity mix.

Conversely, the share of fixed costs in the total cost of the electricity system will rise as the capital costs of electricity networks, renewable generation, backup generation and technologies providing flexibility[6] become central. Network costs are recovered directly through charges on final consumer bills. Renewable costs are typically borne by the state through auctioned long-term contracts and are ultimately recovered from consumers through levies on electricity consumption. Schemes to support backup generation (so-called capacity mechanisms) and flexibility (flexibility support schemes) in most cases involve the state recovering costs from consumers.

Taxes to finance non-energy spending – including excise duties and value-added tax – are also an important component of final consumer bills. Excise duties are charged on different energy carriers at different rates depending on their energy component. Currently, the Energy Taxation Directive requires EU countries to levy an equal minimum excise duty on electricity and fossil fuels such as gas, but many countries tax electricity at higher rates. In terms of rates,

3 Some taxes on energy are used to fund other parts of the energy system, such as support for renewables, while 'non-energy taxes' on energy are used to finance the general budget. Such taxes include excise duties and value-added tax (VAT).

4 Retail electricity markets are the interface between final consumers signing long-term contracts with electricity suppliers. Suppliers trade with electricity producers in the wholesale markets on behalf of their final consumers.

5 See Heussaff (2024) for a more detailed breakdown of electricity cost components.

6 Flexibility in the electricity sector refers to being able to adjust power generation rapidly or demand to respond to system conditions, for example through energy storage or demand-side response.

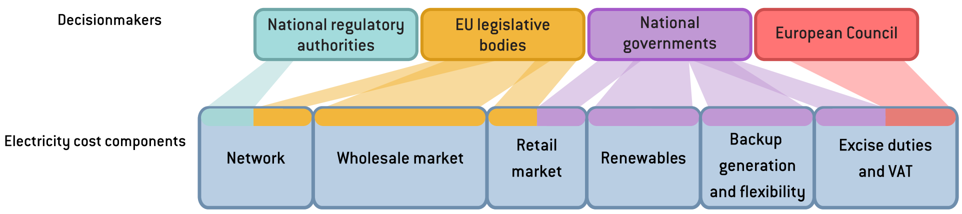
there are large differences between countries, especially for electricity. Excise duty rates tend to be higher in Western countries, especially for non-businesses. For excise duties on gas, the east-west divide is also present, but the difference between non-business and business consumers is less stark[7].

Non-business consumers pay double the minimum tax rates for electricity and gas (European Commission, 2024). VAT also can be used as a policy lever, as was done in many EU countries during the 2022 energy crisis when VAT rates were reduced temporarily to alleviate the pressure from consumers. Energy taxes (excluding VAT) are a major source of tax revenue, accounting for 3.8 percent of total tax revenues (equivalent to 1.56 percent of GDP) in the EU in 2022 (Trinomics, 2024). In Bulgaria, the EU country most dependent on energy taxes, they accounted for 14.4 percent of all tax revenue.

2.2 Who decides the rules for each cost component?

Different entities determine how electricity system cost components translate into final consumer prices, depending on the component (Figure 1). Two EU laws are critically important. The Electricity Market Regulation (EMR)[8] sets the rules for the integrated EU wholesale electricity markets, including technical details on the formation of wholesale market prices. The Electricity Market Directive[9] sets out the principles for retail electricity markets, which further influence the energy supply costs paid by final consumers. EU policymakers have direct authority over wholesale energy markets, and an important but more limited role in the design of EU retail electricity markets.

Figure 1: Sketch of the EU legislative authority for each electricity cost component



Source: Bruegel.

The EMR also sets out the principles for network tariff methodologies. National regulatory authorities (NRAs) are constrained by these principles when determining the exact relationship between electricity network investments and cost recovery from consumers through network charges. The EMR also includes principles on distribution to either producers or consumers of the *revenues* from long-term state-backed contracts for renewably generated electricity, but rules regarding the recovery of *costs* are lacking (Heussaff and Zachmann, 2024). Capacity mechanisms – schemes to support backup generation capacity – are covered by the EMR and are subject to state-aid approval, but, similarly to renewables, the EMR primarily covers support to electricity producers, not cost recovery from final consumers.

Finally, the EU Energy Taxation Directive sets minimum excise duty rates for all energy products related to heating, transport and electricity. However, national governments are free to tax at higher levels. Similarly, the VAT Directive (2006/112/EC) sets the standard VAT rate at a minimum of 15 percent. However, the directive allows for flexibility in setting rates, allowing countries to apply reduced rates to the supply of natural gas, electricity and district heating, as long as no risk of distortion of competition arises from reductions. Beyond this, there are numerous country-specific exemptions. This includes the freedom to apply a super-reduced

7 See: https://ec.europa.eu/taxation_customs/tedb/#/home.

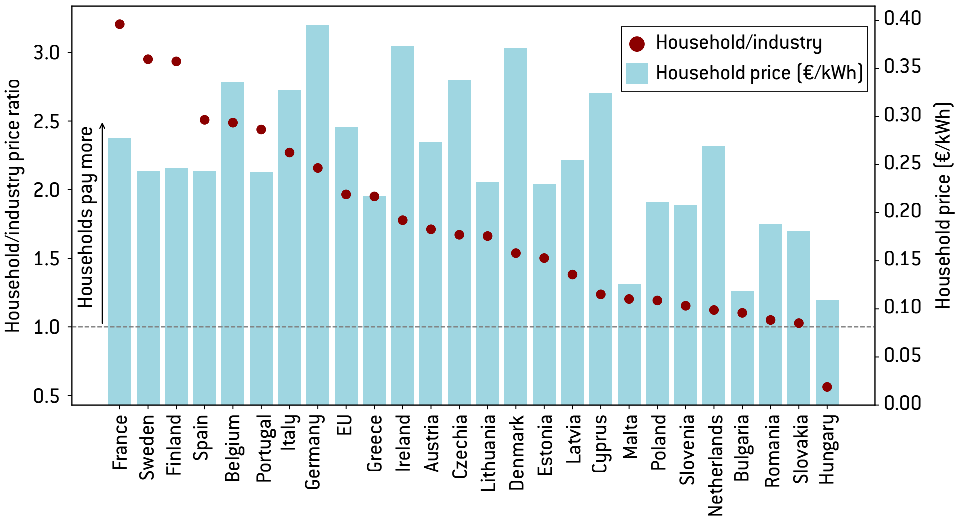
8 Regulation (EU) 2019/943, amended by Regulation (EU) 2024/1747.

9 Directive (EU) 2019/944, amended by Directive (EU) 2024/1711.

rate of under 5 percent to electricity (Trinomics, 2024). Furthermore, most non-household consumers pass on electricity VAT costs to their final customers.

European countries have made various decisions in terms of allocating these costs and distributional choices. Almost all EU countries place a greater relative burden on households than on industrial consumers of electricity (Figure 2). This may be beneficial for competitiveness but potentially stresses households and increases political opposition to the green transition.

Figure 2: EU household/industry price ratio and final household electricity prices, first half of 2024



Source: Bruegel based on Eurostat. Note: from the Eurostat database, consumption band DC was selected for households and the consumption band IF was selected for industry. Croatia and Luxembourg are not shown.

3 Distributional issues and policy trade-offs

The Action Plan for Affordable Energy (European Commission, 2025) highlights the urgent need to reduce energy costs, yet policy choices can, both intentionally and unintentionally, affect how the total cost of the electricity system is distributed across consumers. All short-term policy options to intervene in electricity costs involve changes to energy taxation or redistribution between consumer types. More structural changes will take effect gradually, with their impacts being seen by or beyond 2030.

In this section, we present a qualitative framework for considering the distributional effects and system trade-offs associated with electricity policy choices (Table 1 and sections 3.1 to 3.3). However, we emphasise that, because of limitations in publicly available data and tools, a precise quantitative evaluation of the distributional effects of policy interventions is difficult.

Table 1: Framework for assessing distributional effects and system trade-offs from electricity policy

Policy choice	Winners	Losers	Time to implement
Taxation and price interventions			
Reducing excise duties and/or VAT	Electricity consumers who pay less tax	Taxpayers facing other tax increases or future taxpayers if shortfalls are covered through debt	Short-term
Windfall profit taxation	Tax revenues could boost the national budget or be redistributed to compensate consumers	Energy companies and investors would see lower returns, while their investment capacity would be reduced	Short-term
Electricity market price interventions	Electricity consumers whose prices are reduced would gain in the short-term	Electricity producers would earn less profit, affecting their incentives to invest; operational efficiency could be affected if demand response signals are muted	Short-term
Redistributing fixed costs			
Network costs	Network tariff design can mean that certain consumers, often energy-intensive consumers, pay disproportionately less of the network cost relative to their consumption	Household consumers often pay larger shares of network costs than business and industry consumers	Short-to-medium-term
Renewable generation costs	Long-term fixed-price contracts for renewables provide a hedge for producers and consumers against price volatility	Fixed-price contracts risk locking in high prices; depending on policy design, certain consumers, often households, pay a disproportionate share of the costs	Short-to-medium-term
Backup generation and flexibility costs	Unfair cost allocation may benefit certain consumers	Other consumers could pay a disproportionate share of the costs, while support for fossil-fuel generation may be locked-in, undermining climate targets	Short-to-medium-term
Efficiency increasing measures			
Enhanced system flexibility	Benefits responsive consumers and flexibility and storage providers by remunerating their services	Returns for incumbent firms and peak capacity providers are reduced	Medium-term
Expanded cross-border interconnection	Benefits consumers in electricity importing (high-cost) areas and producers in exporting (low-cost) areas	Disadvantages consumers in exporting countries (low-cost) and producers in importing (high-cost) countries	Long-term
System trade-offs			
Weakened sustainability incentives through lower carbon prices	Electricity consumers would benefit from lower prices in the short term	Climate targets would be undermined and renewable producers would lose out	Short-term
Lower reliability in exchange for lower system cost	Electricity consumers would benefit from lower prices during reliable supply periods	Consumers facing unstable supply are disadvantaged, hampering consumer confidence	Medium-term

Source: Bruegel.

3.1 Taxation reform and price interventions

Energy taxes could be reduced almost immediately. There is scope for this because excise duties and VAT levels in many EU countries are above the EU minimum rates (Trinomics, 2024). Of course, lower energy taxes will result in losses of tax revenue, which may be resisted by finance ministries. Revising energy taxation rules at the EU level requires unanimity in the European Council, making such changes politically difficult. Taxation can also be used to redistribute some profits from energy producers to consumers, as was attempted during the energy crisis through windfall profit taxation and wholesale market price interventions.

3.1.1 Reducing excise duties and/or VAT

The European Commission proposed in 2021 to revise the Energy Taxation Directive to encourage a shift in taxation in favour of electricity over fossil fuels by amending the minimum tax rates, but the final rate in each country would still be at the national government's discretion (provided it respects the minimum rates). Reducing electricity taxes could benefit electricity consumers by reducing their energy costs. It could potentially accelerate decarbonisation by stimulating electrification. However, tax reductions are not guaranteed to entirely benefit the final consumer, as electricity producers and retailers could exercise market power to raise their prices.

The loss of electricity tax revenue would need to be made up elsewhere in the tax system. Higher tax rates on fossil fuels may exacerbate energy poverty in countries in which households rely on fossil fuels for essential energy services like heating, and are likely to face strong social opposition (especially given the soon-to-be-introduced EU emissions trading system for heating fuels, see section 6). The shortfall from reduced electricity taxation could also be covered by an increase in public debt.

If companies unexpectedly earn windfall profits through unforeseen external circumstances, special taxation can redistribute gains enjoyed by energy producers to impacted energy consumers. This approach was implemented for the fossil fuel sector during the energy crisis (the so-called 'solidarity contribution'). However, such taxation can reduce the incentives for energy investment, if not designed carefully (Nicolay *et al*, 2023).

3.1.2 Price interventions

Pricing in both wholesale and retail electricity markets can be changed through policy interventions. For example, prices might be capped at a certain level, benefitting consumers in the short term. During the energy crisis, the price of gas used for electricity generation was capped in the Spanish and Portuguese wholesale electricity markets through what became known as the 'Iberian exception'. However, such interventions have broader operational and investment effects. The Iberian exception succeeded in reducing wholesale prices, some of which translated into final consumer prices, but, during a gas supply crisis, it also increased domestic consumption and exports of electricity produced in gas-fired power stations (Corbeau *et al*, 2023). At retail market level, 18 EU countries have some form of electricity price intervention (ACER and CEER, 2024). Extensive public price intervention can lead to market distortions, reducing incentives for energy efficiency, investment in renewables and competition among suppliers.

3.2 Redistributing fixed costs

Fixed costs will increase with the transition to a clean electricity system. Many of these costs, including of the network, renewables, backup generation and flexibility, will be largely mediated through states, creating new distributional challenges.

3.2.1 Network costs

Electricity network costs are already not shared evenly across consumers. In 2023, the average European household paid more than twice as much for network costs per unit of electricity than non-household consumers. Some price discrimination may be justified on the grounds that some households are connected at the extremes of the distribution network, making it more expensive to serve them electricity, while some industrial consumers are connected directly to the transmission grid[10].

Reforming the design of network charges, as proposed in the Commission's action plan, could have additional distributional effects. Governments may wish to further tip the scales in favour of non-household consumers, particularly energy-intensive industries, by placing more of the network cost onto household consumers.

There is also a risk of distributional effects between households. In many countries, network costs are charged primarily based on how much electricity households consume. However, higher-income households are increasingly installing rooftop solar photovoltaics and batteries, leading to less consumption of electricity from the wider network. Consequently, such consumers pay less in network costs. As the costs of the network are largely fixed, this shortfall must be recovered from other, often lower-income, consumers. A solution to this distributional issue could be to shift network costs away from volumetric charges to charges based on electricity consumers' peak demand, thereby better reflecting the fixed costs of serving them electricity (Azarova *et al*, 2018).

3.2.2 Renewables costs

In most European countries, the fixed costs of renewable electricity production, such as through long-term, competitively auctioned, state-backed contracts for difference (CfDs), are typically recovered through levies on electricity consumption. Such long-term contracts provide a steady, forecastable revenue stream for renewable projects, helping them to secure financing. The contracts can also provide a hedge for final consumers against price volatility, but also run the risk of locking in high prices.

There are no well-defined EU-level rules about how the costs of state-backed contracts for difference should be recovered from consumers

Concerningly, given the risk of internal-market distortions, there are no well-defined EU-level rules about how the costs of such state-backed contracts should be recovered from consumers. The current approach already exempts large energy consumers from paying these costs (Heussaff and Zachmann, 2024). As more renewables are deployed and supported with such contracts, the distributional issues related to their cost recovery will become more pressing.

3.2.3 Backup-capacity costs

As variable renewables increase in the electricity system, more secure, dependable backup generation and flexibility will be needed. Many European countries[11] support such backup generation through so-called capacity mechanisms. Design of these mechanisms varies by country and entails distributional considerations (a discussion of this is beyond the scope of this paper).

Capacity mechanisms are becoming more widespread in European electricity systems, with Germany, Spain, Greece and the Baltic countries considering such schemes (Aurora, 2025). However, cost recovery principles are yet to be developed at European level, posing the risk of detrimental distributional effects.

3.3 System trade-offs

3.3.1 Efficiency-increasing measures

Improving electricity-system flexibility can enhance efficiency, but will also create winners and losers. Prompting consumers to respond to system conditions could be done quickly with existing technologies and has the potential to reduce overall system costs. Consumers

10 The transmission grid is the high voltage electricity network layer transporting electricity from power generation facilities to population centres, while the distribution grid is the medium-to-low voltage layer that directly serves households and businesses.

11 The United Kingdom, France, Ireland, Poland, Italy and Belgium each have a capacity mechanism.

who can flexibly react to time-varying price signals, for example enabled by smart meters, can reduce their electricity costs, while other consumers with less elastic demand may see higher costs. Incumbent electricity generators that based their business models on providing electricity mainly in peak hours could see reduced returns.

Increased cross-border interconnection brings welfare gains at European level, but has distributional effects between countries. All else being equal, additional interconnection between two countries will see prices rise in the lower-cost country and prices fall in the higher-cost country. Consumers in the high-cost areas and importing countries benefit from these lower prices, and producers in low-cost areas will likely increase their profitability. Conversely, the low-cost consumers will pay higher prices. Fairly distributing the gains from this infrastructure is a huge challenge on the path toward deeper European electricity system integration (Heussaff and Zachmann, 2025).

3.3.2 Sustainability and reliability

Policymakers might also consider reducing the sustainability or reliability of the electricity system to reduce costs for consumers. On the sustainability front, governments already compensate certain energy-intensive industries for the higher electricity costs they face as a result of carbon pricing under the EU emissions trading system (ETS). For households, the start in 2027 of an ETS for buildings and road transport (ETS2) will add costs for households that consume carbon-intensive energy. The ETS2 will place a levy on fossil fuels used for heating and road transport proportional to their carbon dioxide emissions, making fossil fuels relatively more expensive than electricity and increasing incentives for electrification.

Postponing this would have many risks, including undermining progress towards EU's climate targets, reducing incentives for clean-technology investments and harming firms and citizens who have already made investments in such technologies. However, the cost increases raise concerns about the financial impact on low-income households, which are likely disproportionately burdened. Effective redistribution of the revenues from this scheme is essential to protect vulnerable citizens (Jüngling *et al*, 2025).

Similarly, the reliability of electricity supply could be compromised to save costs. Consumers might benefit in the hours in which electricity is available, but electricity instability poses great risks for critical infrastructure and could undermine the confidence of large energy consumers that might invest in such systems. Climate change is also making electricity infrastructure more vulnerable, emphasising the importance of grid reliability.

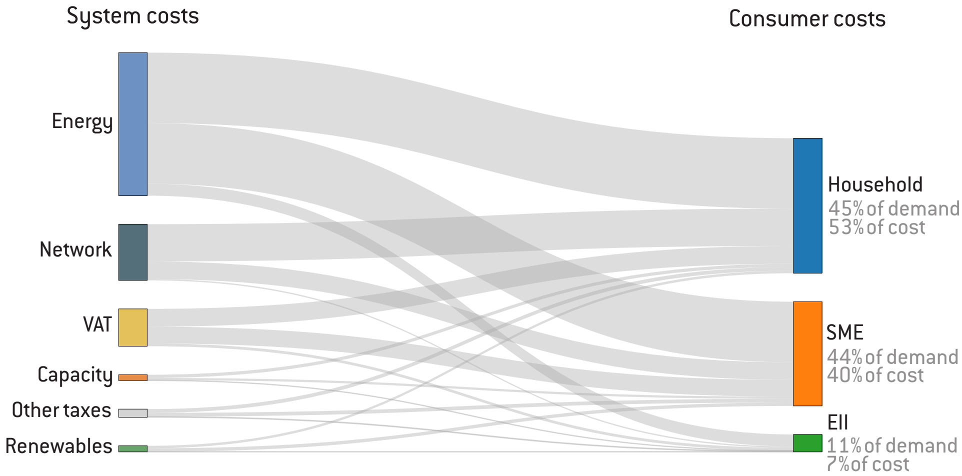
4 Estimating short-term distributional effects

Insufficient data and modelling tools are general problems for assessments of the European energy sector (McWilliams *et al*, 2025). Precise, consistent data is lacking on the prices paid by different consumer types for different electricity cost components, the electricity consumption of different consumers and the cost-distribution approaches taken in European countries. This makes it hard to discern exactly the effects of further cost redistribution, for example from the measures discussed in section 3. To understand the dynamic effects of these distributional policy interventions in terms of operational and investment efficiency, a transparent, sophisticated electricity market model would be required. To our knowledge, this tool has not yet been developed.

Recognising these shortcomings, we nevertheless present estimates of the distributional effects of short-term policy measures, based on the best available real-world data from Eurostat on electricity prices and consumption by consumer type in the five largest EU countries (see the annex for data sources and methodology). Our analysis does not account for dynamic effects such as changes in demand with falling prices and the likely future increase in consumer elasticity in the electricity sector with more deployment of technologies such as heat pumps and electric vehicles. Nor does it account for the significant differences between electricity consumers.

The cost components of electricity, including supplying energy, costs of building the network, costs of other system components such as renewables, backup capacity and non-energy taxes, are distributed across different consumer types. Figure 3 illustrates this cost distribution, based on data for France, Germany, Italy, Poland and Spain. We include only households, small and medium-sized enterprises (SMEs) and energy-intensive industry (EII).

Figure 3: Electricity system costs distributed across consumer types



Source: Bruegel based on Eurostat.

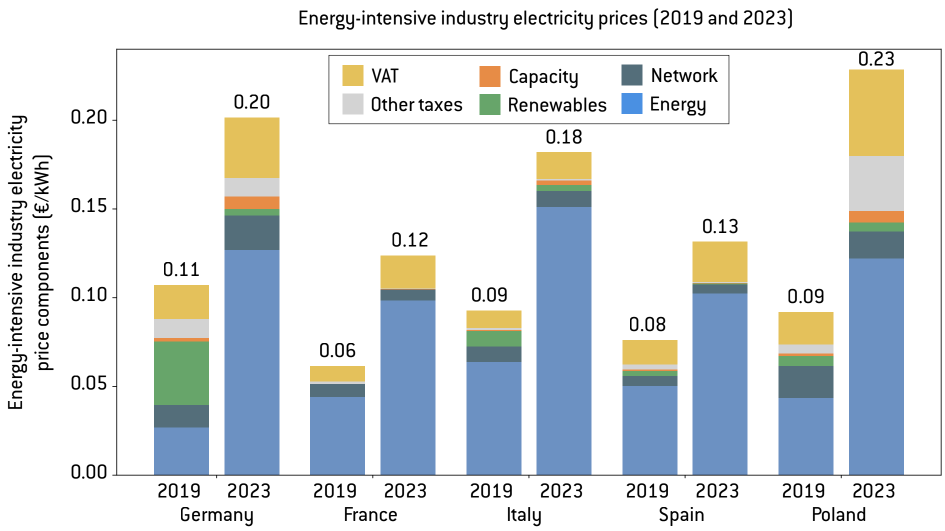
For illustration, we evaluate the impacts of two types of short-term policy to reduce electricity prices: shifting costs between consumers (section 4.1) and reducing energy taxation (section 4.2).

4.1 Option 1: Shifting costs between consumers

Since 2019, before the European energy crisis, electricity prices paid by energy-intensive industry have more than doubled in some European countries (Figure 4), primarily as a consequence of higher gas prices (Heussaff, 2024).

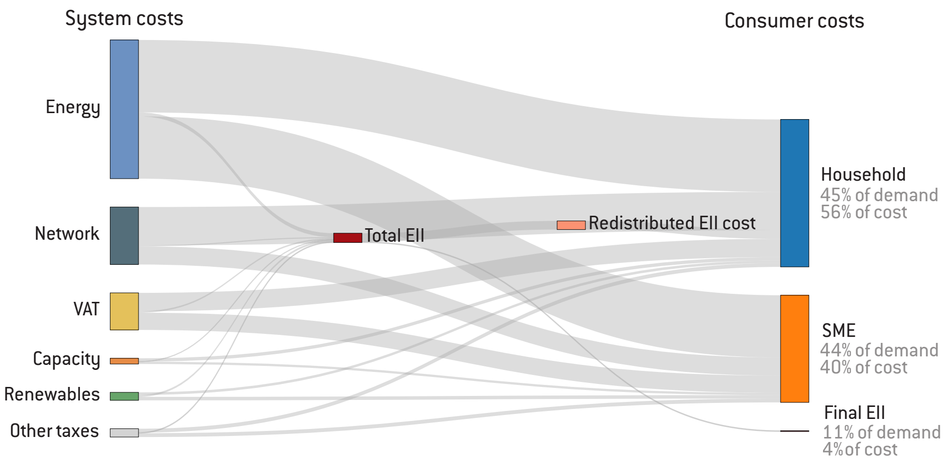
To alleviate cost pressures on large energy users, some costs could be shifted to other consumers. Figure 5 illustrates how energy-intensive industry costs could be reduced to 2019 levels by shifting costs to households, for example, by exempting energy-intensive industry from paying a share of network tariffs or from paying the costs of backup capacity or renewables. This would reduce the energy-intensive industry electricity cost burden from 7 percent to 4 percent of total costs charged to consumers, while the household share would rise from 53 percent to 56 percent (with electricity demand shares remaining the same at 45 percent for households and 11 percent for energy-intensive industry).

Figure 4: European energy-intensive industry electricity prices, 2019 vs. 2023



Source: Bruegel based on Eurostat. Note: energy-intensive industry is defined as non-household electricity consumers that use more than 70,000 MWh of electricity annually. State support and allowances are not included.

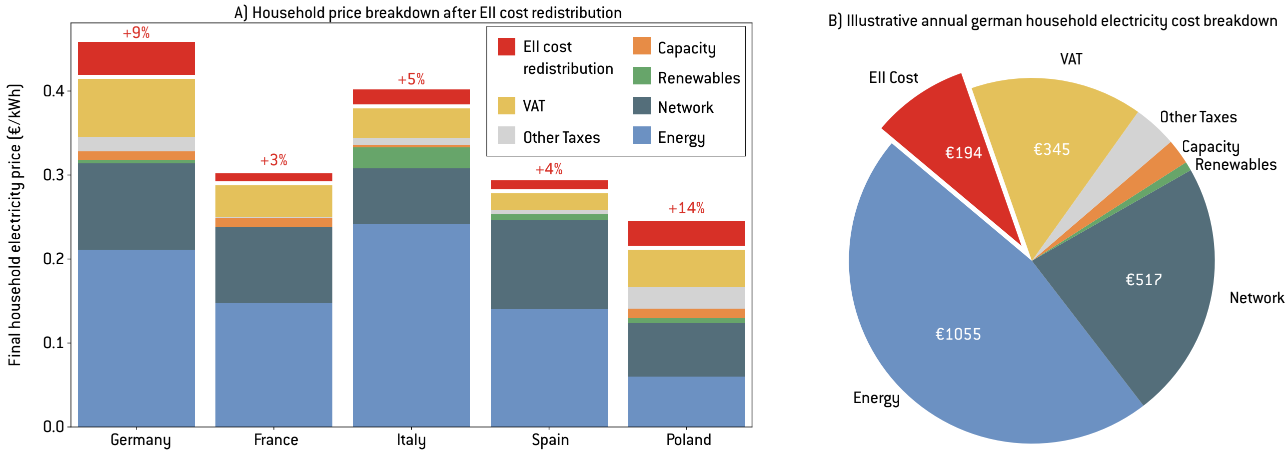
Figure 5: Redistributing energy-intensive industry electricity costs to households



Source: Bruegel based on Eurostat. Note: EII = energy-intensive industry.

Household electricity demand is significantly higher than energy-intensive industry demand, meaning that households can absorb the costs of compensating industry without seeing a proportional price increase. In our illustrations, while energy-intensive industry electricity prices would be nearly halved in some countries, the price increase for households would be no more than 14 percent. However, the impact varies by country (Figure 6). In Germany and Poland, where energy-intensive industry share of electricity demand is larger than in the other countries, household prices could increase by up to 9 percent to 14 percent, following the cost redistribution. To reduce electricity prices for energy-intensive industry to 2019 levels could add an estimated €200 to a German household's annual electricity bill (Figure 6).

Figure 6: Household electricity price and cost increase after energy-intensive industry cost redistribution



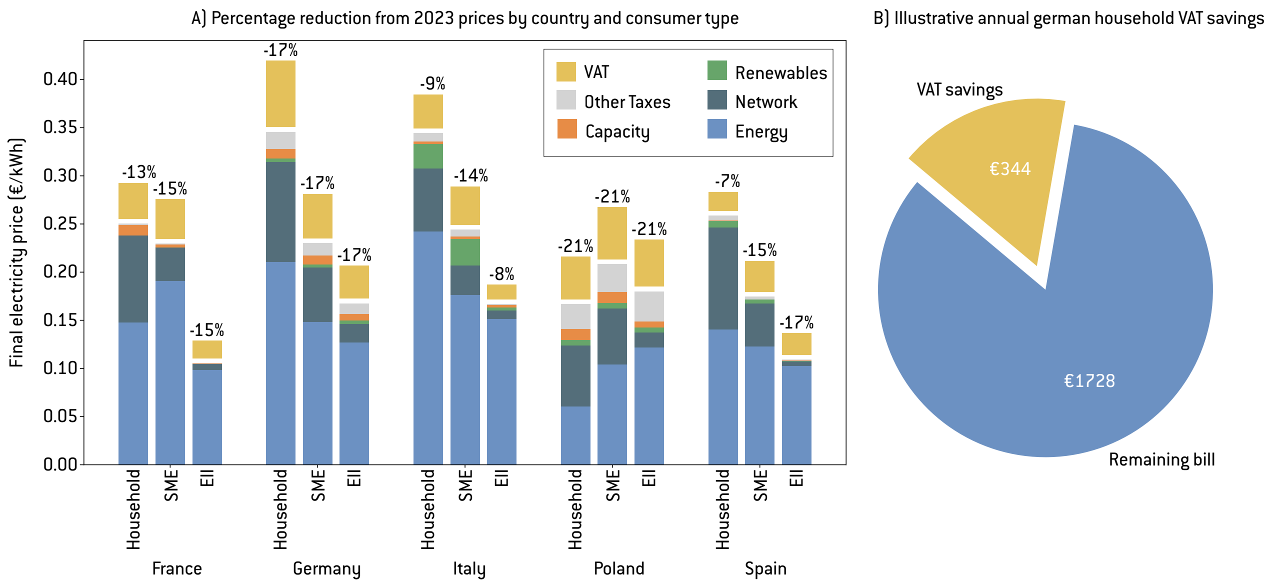
Source: Bruegel based on Eurostat. Note: German household costs assume 5,000 kWh of annual electricity consumption.

4.2 Option 2: Reduce energy taxation

Removing non-energy taxes from final electricity bills could provide large savings for all consumers in the short-term, although the benefits could be limited by producers and retailers exercising market power to keep prices high, or by increased consumption due to demand elasticity. For the purpose of illustrating the trade-off between electricity consumers and taxpayers, we assess the effect of removing only VAT from electricity bills. Our illustrations assume that these savings are fully passed through to consumers and that there is no demand increase.

Depending on the country and consumer type, removing VAT could reduce electricity bills by up to 21 percent (Figure 7, Panel A). German households would see their prices fall by 17 percent, implying an annual saving of nearly €350 (Figure 7, Panel B).

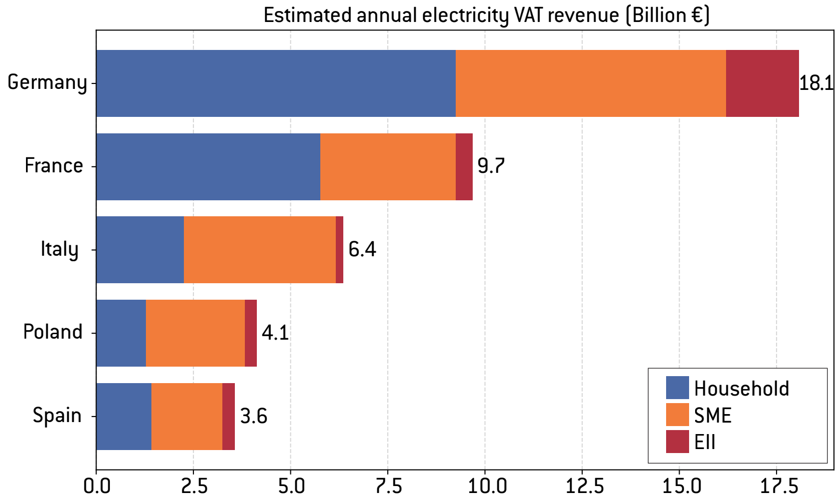
Figure 7: Removing VAT from the electricity system



Source: Bruegel based on Eurostat. Note: German household savings assumes 5,000 kWh of annual electricity consumption.

However, removing VAT from electricity would create large shortfall in national budgets. The tax revenues from electricity VAT amount to tens of billions of euros each year in the EU (Figure 8). Given the fiscal constraints in many European countries, entirely removing VAT is unfeasible, especially without increasing other taxes, either on other energy carriers or through general taxation.

Figure 8: Estimated tax revenue from VAT on electricity



Source: Bruegel based on Eurostat.

5 Principles and policy recommendations

Any strategy to manage electricity costs during the energy transition must address trade-offs between households and industry, between taxpayers and against other spending needs. European competitiveness suffers if energy-intensive industries must pay high and rising energy prices, yet excessive public support for industrial consumers could lock-in carbon-intensive and inefficient business practices, hampering the strategic goal of an internationally competitive, low-carbon European industrial sector. If industrial electricity costs are shifted disproportionately to households, cost-of-living pressures and energy poverty may worsen. Furthermore, faced with expensive electricity, household consumers are less likely to invest to progress the green transition, such as in heat pumps and electric vehicles. Timing is critical. Electricity must be affordable enough in the coming years to stimulate the electricity demand growth that will allow the fixed costs of the system to be spread across a wider base in the future. The addition of ETS2 costs to household budgets in 2027 will make it even more important to iron out distortions and inefficiencies in consumer electricity pricing.

Shielding consumers from high prices also means increasing the role of the state in financing the energy system. This may involve increasing the share of risks and costs shifted to national budgets (CfDs, grid investments, capacity mechanisms) to manage the transition to a clean system. Another option would be to subsidise network costs and use fiscal means to shield consumers, as was done during the energy crisis. The state could also shift costs to future consumers, for example by setting up a fund to pay for some fixed costs in the coming years and then recovering the costs from consumers later (Heussaff and Zachmann, 2025).

5.1 Electricity pricing principles

When revising energy taxes, reforming network tariff methodologies or designing levies to recover the costs of renewables, backup generation capacity and flexible technologies, policymakers should respect four principles to identify the optimal price paid by electricity consumers.

Principle 1: Wider economic objectives should not compromise energy-policy goals

Electricity markets are not the ideal vehicle for simultaneously achieving industrial-policy and social-policy goals while ensuring electricity decarbonisation, security and affordability. Electricity markets should be designed to send price signals to consumers that reflect the costs incurred to serve them electricity, while incentivising efficient system operation and investment in electrification. Meanwhile, the fiscal apparatus can address social problems such as energy poverty, and dedicated instruments can support certain industrial sectors. The price of electricity compared to fossil-fuel alternatives is a critical determinant of the economic case for electrification in heating and transport and so pricing should, while reflecting costs, ensure that electrification is attractive for final consumers. Reducing electricity taxes relative to fossil fuels would help to achieve this.

However, lowering electricity costs for final consumers below the full long-term cost of supply poses significant risks. These long-term costs include capital and variable generation costs, storage technologies, and network infrastructure. Under-pricing them may incentivise unsustainable consumption that would require ongoing state subsidies or cross-subsidisation from other consumers.

Principle 2: Prices should incentivise efficient system operation

More variability on the supply side with increased penetration of renewables will increase the system value of flexible consumption. Final prices that reflect system conditions can encourage such flexibility. Therefore, electricity-price interventions should preserve short-term price signals and ensure that consumers have the incentives for demand-side response, increasing their consumption during periods of supply abundance and reducing demand during hours of scarcity.

Principle 3: Negative externalities should be priced[12]

The EU ETS accounts for the global negative externality of greenhouse gas emissions by adding a cost to electricity production based on its carbon-dioxide emissions. This cost is passed through via the energy supply component of final electricity bills. From 2027, ETS2 will add a similar cost to fuels used for heating and transport, providing an additional signal for consumers to encourage the shift to clean electricity.

Principle 4: The fixed costs of the electricity system should be recovered primarily from inelastic consumption[13]

Historically, electricity demand has been relatively inelastic, as essential energy services like lighting and cooling increased proportionally with income. However, as electricity systems decarbonise and integrate more flexible demand – such as electric vehicle charging, heat pump usage and industrial demand response programmes – demand elasticity will increase. This shift implies that some fixed costs and non-energy taxes should be recovered through flat charges rather than variable consumption charges.

Following these principles would have three main outcomes:

- First, household electricity consumers would not cross-subsidise industrial consumers to the extent that household consumers have reduced incentives for electrification;

12 Pricing negative externalities is called a Pigouvian tax.

13 In line with the Ramsey rule, an economic principle that states that, to avoid deadweight loss from demand reduction, price markups (like taxes) should be placed on more inelastic goods.

- Second, while some electricity-system fixed costs could be recovered from consumers through flat charges, it is essential to have a blended price for consumers that varies over time to reflect changing system conditions;
- Third, commitments to carbon pricing should be maintained to capture the costs of greenhouse gas emissions.

5.2 Policy recommendations

The following policy recommendations are in line with the principles set out in section 5.1 and would aid the design of electricity market and energy taxation rules to ensure fair electricity-system cost allocation during the energy transition.

Develop transparent analytical tools

The electricity sector is complex, making it challenging to assess the winners and losers from any policy measure without deep and comprehensive analysis. The lack of consistent, accessible data and analytical tools compounds this challenge. As a priority, the European Commission should develop a transparent, public electricity-market modelling tool. This model could be used for the impact assessments that should accompany policy proposals. Researchers and the private sector could also make use of the tool to assess proposed policy measures *ex ante*, and, after policy implementation, to compare model outputs against real-world results.

Learn from the energy crisis

The energy-market interventions to protect consumers from the acute impacts of price spikes during the gas-supply shock to Europe were a natural policy experiment. Between September 2021 and June 2023, EU countries plus the United Kingdom and Norway earmarked €651 billion to shield consumers from the impact of high energy prices (Sgaravatti *et al*, 2021).

However, not all interventions were an efficient use of public resources. Some increased energy demand during a supply crisis (eg the Iberian exception, see section 3.1.2 and Corbeau *et al*, 2023) while others likely failed to target support to the most vulnerable consumers. A full evaluation of the consumer protection policy measures implemented during the energy crisis should be carried out at EU level (for example, by the Agency for the Cooperation of Energy Regulators, ACER). Lessons from this can ensure that future reforms to electricity pricing are implemented in a way that preserves short-term operational signals and that targets the consumers most in need.

EU guidelines on electricity cost recovery and pricing

Institutional arrangements in the European electricity sector mean that different decision-makers at national and European level determine the rules on how electricity-system costs are translated into final consumer prices. Fragmented decision-making risks conflicting policies, for example between the revenue generated from energy taxation and the goal of electricity affordability.

EU-level guidelines for electricity cost recovery should be developed, setting out for each electricity cost component principles for fair cost recovery through pricing that preserves operation and investment efficiency. The guidelines should go beyond the legally binding EU-level rules on network tariffs mentioned in the Action Plan for Affordable Energy (European Commission, 2025), to include all network cost components. The Action Plan noted that plans for deeper EU electricity-market integration will be issued in early 2026. The guidelines on electricity pricing could form part of this plan.

Ideally, the guidelines would neatly tie together the many legislative strands woven into the electricity system, including energy taxation, network tariff methodology, cross-border infrastructure cost-sharing and real-time pricing. The electricity sectors of EU countries are too different for strict EU-level rules on all electricity cost components and some flexibility should be preserved. However, the fragmented *status quo* undoubtedly requires harmonisation and simplification. The principles outlined in section 5.1 could form an initial framework for EU guidelines on electricity cost recovery during the green transition.

Provide an 'electricity-price reduction policy toolbox' for national governments

In the early stages of the energy crisis, the European Commission set out the options for national governments in tackling rising energy prices (European Commission, 2021). This guidance should be updated and reissued, providing EU countries with a list of policy options for reducing prices. Options available to national governments could include reducing energy taxation to the legal minimum, reforming network tariffs to better reflect system costs, encouraging increased retail competition and consumer switching and establishing mechanisms to distribute the costs of large capital investments in electricity infrastructure over time (Heussaff and Zachmann, 2025).

Deeper physical and institutional electricity-system integration will bring down consumer prices in the long-run

The priority for structurally reducing the cost of supplying electricity to European consumers is deeper integration of European electricity markets on both an institutional level, including through EU-level system planning and more harmonised market rules, and on a physical basis, with more cross-border electricity infrastructure to allow the trade in electricity (Zachmann *et al*, 2024). In the long-run, this European approach can, on average, reduce prices for all European consumers, making electricity more affordable for both industrial and household consumers.

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Annex: estimation methodology

The estimates in section 4 were developed using the following Eurostat data:

- Price by component ('Energy and supply', 'Network costs', 'Renewable taxes', 'Capacity taxes', 'Nuclear taxes', 'Value added tax (VAT)', 'Environmental taxes', 'Other') and by consumption band (e.g. how much electricity consumed each year) for household consumers (Eurostat code *nrg_pc_204*) and non-household consumers (Eurostat code nrg_pc_205)
- Annual electricity consumption by sector, including households, industry, commercial and public services and transport (Eurostat code *nrg_cb_e*)
- Share of electricity consumed by household consumption band (*nrg_pc_204_v*) and non-household consumption band (*nrg_pc_205_v*)

Only data for Germany, France, Spain, Italy and Poland was included in the analysis. A set of simplified consumer categories was first defined. 'Household' encompasses all consumption bands of the household category in Eurostat. 'SME' is the non-household consumptions bands IA, IB, IC, ID, and IE, which mean electricity customers consuming less than 70,000 MWh per year. Energy-intensive industry ('EII') are the consumption bands IF and IG, meaning electricity customers consuming above 70,000 MWh per year.

The prices (and the price for the sub-components) for each representative consumer category were determined by taking the mean across the included consumer bands. Allowances provided by the state were not included in the analysis. Nuclear taxes and capacity taxes were folded into the 'Capacity taxes' cost component.

The electricity demand of the 'Household' consumer type was set equal to the annual consumption of the household sector in the *nrg_cb_e* dataset. The share of electricity consumed by each non-household consumption bands, provided by the Eurostat dataset *nrg_pc_205_v*, was multipled by the annual consumption of the industry sector in the *nrg_cb_e* dataset to arrive at an estimate of the volume of electricity consumed by each consumption band. The constituent bands of the 'SME' category and the 'EII' category were summed to arrive at the total annual electricity consumption of each category.

The annual cost paid by each consumer category for each component of the electricity system was then calculated by multiplying the component price by the annual electricity consumption.