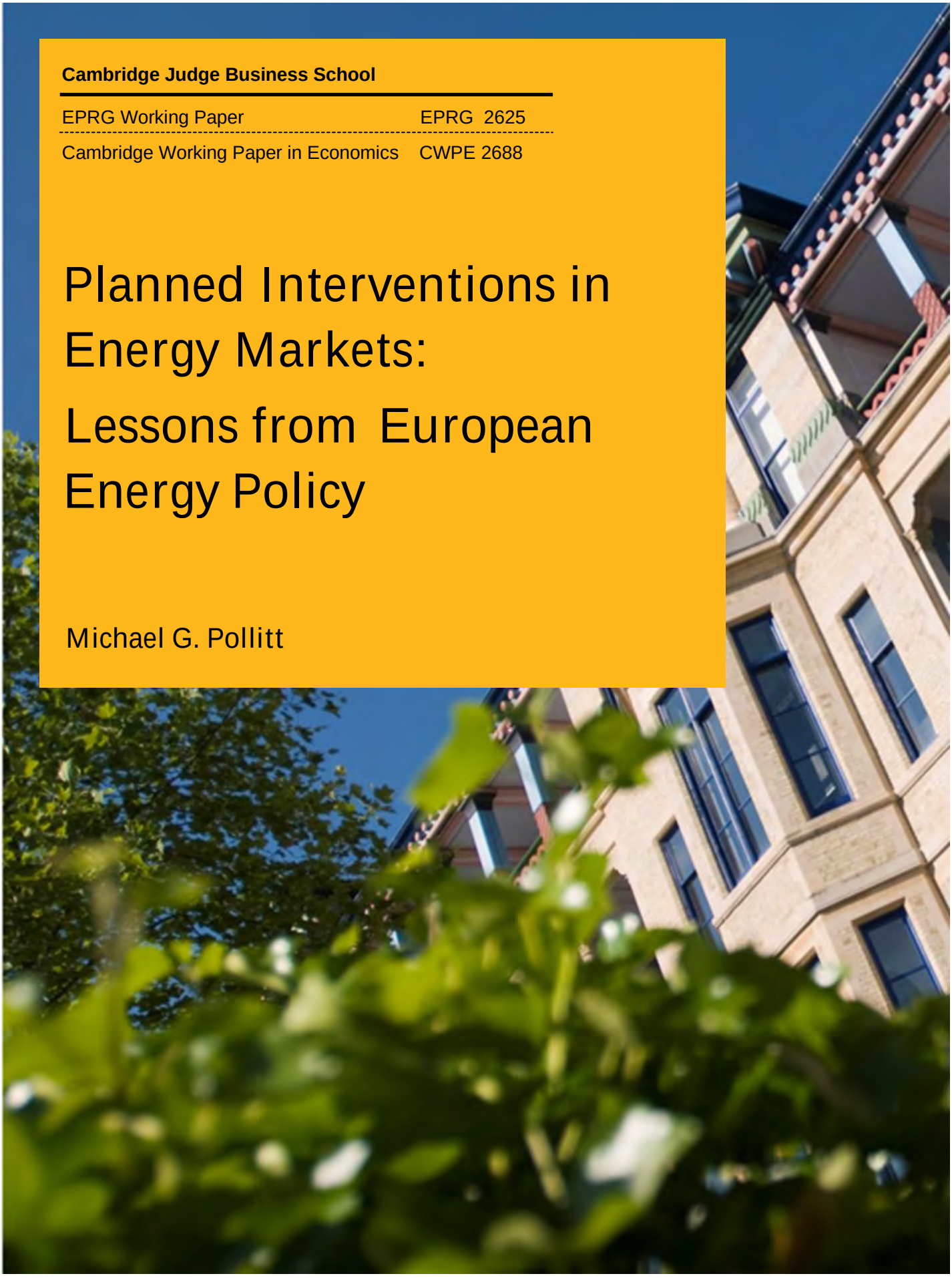


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Planned Interventions in Energy Markets: Lessons from European Energy Policy

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Abstract :

The issue of when and how to intervene in energy markets in the face of large negative shocks to energy supply is one that has been exercising the European Union, individual European governments and European companies over recent years. This is the topic this paper seeks to address.

The 2021-23 European energy price shock saw historically unprecedented rises in both wholesale electricity and gas prices, following 25 years of attempts to build single European integrated energy markets. Europe – at the political and corporate level - was largely unprepared for the size of this market induced price shock when it hit. This paper looks at the lessons that were learned about how to handle future large rises in the wholesale price of electricity and gas and the extent to which these are being tested in the 2026 energy crisis, arising from the war induced closure of the Strait of Hormuz to shipping, effecting both oil, gas and fossil products.

The paper explores the likely benefits and costs of pre-defined trigger points for partially defined government interventions in energy prices, in the light of evolving European energy policy. We discuss how flexible pre-commitments to intervene in a certain way might offer more protection to investors and more reassurance to consumers than the sorts of arbitrary interventions we have seen in the past. We suggest that the policy community – which includes corporations and their trade bodies - should work together to build resilience ahead of future energy crises.

Keywords : energy price crisis, rationing, excess profit taxes

JEL Classification : L94

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Planned interventions in markets? Lessons from European Energy Policy

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1. Introduction

The issue of when and how to intervene in energy markets in the face of large negative shocks to energy supply is one that has been exercising the European Union (EU), individual European governments and European companies since 2021. This is the topic that this paper seeks to address.

Our inspiration is the reaction to the European energy crisis of 2021 to 2023, which saw both electricity and gas prices in Europe reach unprecedented levels. This crisis subsided but, recently, the crisis in the Strait of Hormuz, which began in February 2026 has significantly raised global oil and liquified natural gas (LNG) prices and raised the prices of certain fossil products such as jet fuel, diesel and urea. This crisis has provided an opportunity to stress test, in Europe, some of the resilience measures put in place due to the earlier crisis. A key issue we seek to explore is the extent to which it is possible to be prepared for future crises and in doing so avoid arbitrary and destabilising policy interventions which undermine the normal, and effective, workings of energy markets.

Our perspective is that corporate actors need to be aware of the policy environment in which they operate. This is particularly true of the oil, gas and electricity companies that are directly affected by policy interventions triggered by energy price crises, but also of large energy consuming companies for whom the nature of the government response to crises

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will affect the prices they pay for energy. For corporate actors there is both a short-term crisis impact of policy and a long-term effect of government policy settings on their incentives to invest to self-insure against future energy price effects. The energy sector is one where private incentives, often operating at the global level, interact strongly with the political reality that governments must be seen to act in an energy price crisis.

We begin with a discussion of the European energy crisis of 2021-23 and a comparison with the 2026 crisis, so far, in section 2. In section 3 we explain the role of scarcity pricing and why intervention is (sometimes) necessary. We then go on to consider why it might be good to have a pre-announced rules for what is to be done in a crisis in section 4. Section 5 offers some concluding comments.

2. The European Energy Crisis of 2021-23 compared to 2026 (so far)

The 2021-23 European energy price shock saw historically unprecedented rises in both wholesale electricity and gas, following 25 years of attempts to build single European integrated energy markets. Europe – both politically and corporately - was largely unprepared for the size of this market induced price shock when it hit. The bankruptcy rate sharply increased in 2022 for all companies in many European countries, in part due to the impact of the crisis.[2] For the energy trading and retailing sector, there were a significant number of bankruptcies across Europe, which would have been much worse if there had not been government intervention. Major government interventions occurred[3]: Uniper was nationalised in Germany in late 2022 at a cost of 34.5bn Euros; Gazprom Germania, which owned critical gas storage infrastructure in Germany was nationalised at a cost of 9-10bn Euros; EdF, which had been 84% state owned, was returned to 100% state ownership; Fortum in Finland received large state financing[4]; Bulb Energy, was the largest rescued UK energy supplier, among 28 that ceased trading over the initial crisis period[5].

The price shock was initiated by a faster than expected recovery from COVID-19 in energy demand, weather related reductions in hydro and nuclear production and, most significantly, the loss of most Russian pipeline natural gas exports into the EU, following the

[2] See Alteres (2023).

[3] See Bruegel Dataset (2023).

[4] https://www.helsinkitimes.fi/finland/finland-news/domestic/22165-finland-whips-up-over-2bn-loan-for-fortum-through-solidium.html

[5] NAO (2022).

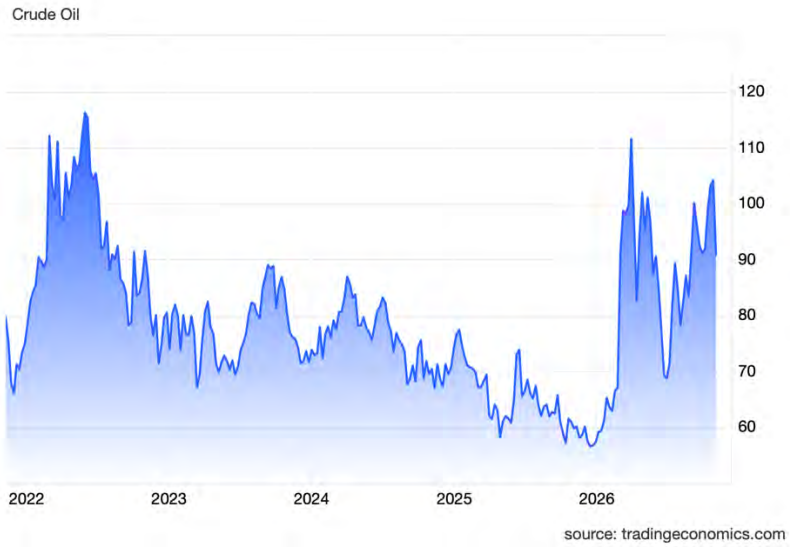
Russia-Ukraine war which began in February 2022 (Pollitt et al., 2024). Compared to between 2021 and 2023 the EU lost Russian gas equal to around 25% of its total gas supply. However by mid-2023, the crisis subsided as European demand was permanently reduced – due to demand destruction and additional low carbon electricity production - and LNG import facilities increased, allowing Europe to fully access global markets.

A notable feature of the 2021-23 European energy crisis was the linkage between gas and electricity markets. Rises in gas prices translated into rises in wholesale electricity prices due to the fact that gas prices set electricity prices for much of the time. This was because gas is the fuel most used in the price-setting plants in the electricity market. This meant that as European wholesale gas prices soared, so did European wholesale electricity prices. The crisis was centred on Europe, but its global impact was significant. Europe's loss of Russian gas is roughly equivalent to all of Qatar's LNG exports in 2025, which itself was 19% of world LNG[6]. However, even this was limited by the fact that European gas prices were decoupled to some extent from prices in the rest of the world by the fact the LNG imports were limited by the availability of LNG import capacity.

The 2026 energy crisis has affected European energy system differently. This crisis began with the commencement of the US-Israel war with Iran on 28 February 2026, which has led to a significant reduction in the amount of oil, LNG and fossil fuel products transiting through the Strait of Hormuz. This has induced a global supply shock, raising oil prices at the world level (see Figure 1) and, of some oil products, by even more (e.g. Jet fuel see Figure 2). Interestingly the effect on oil prices of the two crises looks broadly similar (comparing February 2022 and February 2026). However, the relative impact on the global gas market has been less than the global impact of the reduction of Russian gas exports into the EU. This has muted the effect on wholesale European gas prices, which have 'only' nearly trebled since the war started (see Figure 3). There has been an impact on electricity prices, but this has depended on renewable electricity output. This has seen central European wholesale electricity prices 'only' double since the war began (see Figure 4).

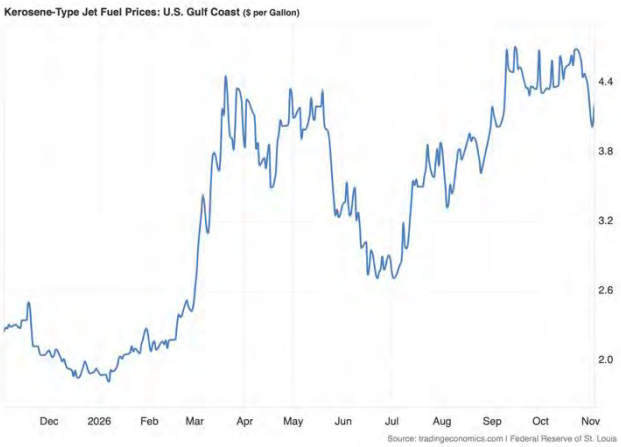
[6] https://thepeninsulaqatar.com/article/30/07/2026/qatar-strengthens-lng-leadership-as-exports-reach-record-high-in-2025

Figure 1: Weekly Oil price in USD per barrel



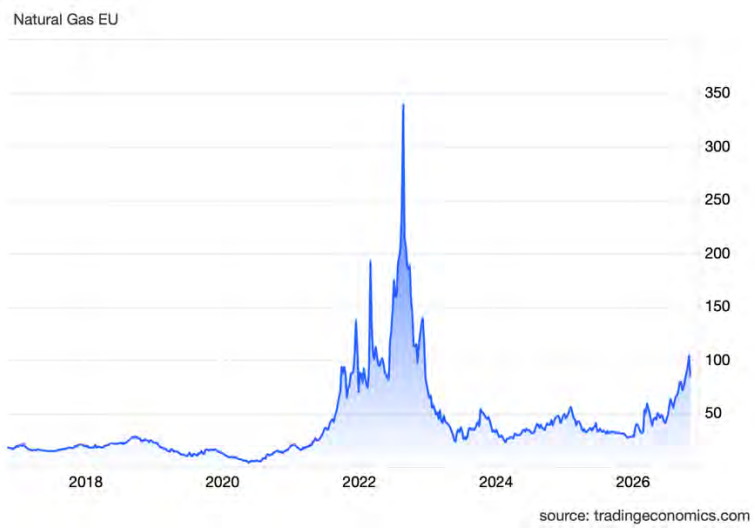
Note: The price immediately before the crisis was 67.02 USD per barrel. The highest price after was 111.54 USD per barrel (+54%).

Figure 2: Daily Price of Jet Fuel



Note: Jet fuel has peaked at $4.68, from $2.428 on the day before war started (+93%).

Figure 3: Weekly Natural Gas Price TTF Euro per MWh[7]



Note: The price was 31.959 Euro / MWh in the week before the war started in Feb 2026.

The weekly price has peaked at 103.94 Euro / MWh since.

Figure 4: Weekly German electricity price Euro per MWh



Note: The price was 80.59 Euro / MWh just before the 2026 crisis,

the highest price since was 241.19 Euro / MWh.

[7] Inflation is 30.07% between 2018 and October 2026 in Euro area.

https://www.inflationtool.com/euro/2018-to-present-value?year2=2026&frequency=yearly

So far, European energy markets have been much less badly affected in 2026 than they were in 2022. This is partly because they were not as physically dependent on exports through the Strait of Hormuz as they were on pipeline gas from Russia and because the policies put in place since 2022 have reduced demand and diversified sources of supply. It is also true that the global nature of the shock means that the whole world has mitigated the impact with global demand reductions and increases in global supply. Russian pipeline gas supply to the EU fell from around 150 bcm (or 37.5% of demand) in 2021 to 62 bcm in 2022. This represented a loss of more than 20% of pre-war EU market supply. By contrast the current impact on the global oil market of the disruption in the Strait of Hormuz is currently estimated to be around 6% of global oil production.[8] This is because although the primary loss via the Strait is up to 20m barrels per day, there has been partial diversion of Saudi Arabian and UAE oil to pipelines and increases in production elsewhere, bringing the net loss down to 5.8m barrels per day, though these pipelines have recently been attacked. For natural gas, the loss is 18-20% of global LNG (or 35 bcm in the second quarter of 2026) from the Strait of Hormuz, but global LNG production is likely down 3% in 2026, due to rises elsewhere (notably the US and Russia).[9] Meanwhile, the price of refined products has risen sharply above the price of crude oil, due to a global shortage of useable refinery capacity. The Federal Reserve Bank of Dallas[10] estimated in October 2026 that the amount of global refinery capacity that is offline – partly due to conflict in the Strait of Hormuz and Ukrainian attacks on Russian capacity - is as high as 10%.

A notable difference for Europe has been the impact on final energy prices, particularly for households. The 2022 crisis resulted in record household prices for both electricity and gas across Europe, with some countries recording the largest ever single year rise in real electricity and gas prices (see Pollitt, 2024, on the UK). This was accompanied by massive fiscal intervention to support both household and industrial electricity bills. Bruegel Dataset (2023) notes that announced energy policy support packages amounted to €651 billion.[11] By contrast, Bruegel Dataset (2026) notes that total fiscal support in the current crisis amounts to around €12 billion.

So far, it seems, the impact of the 2026 crisis is much less on Europe than the 2021-23 crisis in spite of early predictions to the contrary (see Cornago and Springford, 2026; Keliauskaitė

[8] https://www.iea.org/reports/oil-market-report-october-2026

[9] https://www.iea.org/events/global-gas-security-review-and-q4-gas-market-report

[10] https://www.dallasfed.org/research/economics/2026/1008

[11] https://www.eit.europa.eu/sites/default/files/electricity-regulation-report.pdf

et al., 2026). This may be because of the run-down of strategic stocks and the ongoing expectation in futures markets that the war will end soon. Indeed, Carnago and Springford (2026) say that 2026 crisis could be equivalent to 2022 for Europe if it is prolonged. However, one of the lessons from 2022 is that even though the Russia-Ukraine war disruption has continued, very high energy prices have not.

The EU (and European governments and companies) did learn good number of lessons in 2021-23 energy crisis.

First, any crisis which arises from a shortage of supply of particular energy products needs to target a demand reduction in those products. Thus measures to reduce gas demand (and demand for electricity produced from gas) was a useful policy measure. When it comes to the European market, such demand reducing measures are best coordinated across countries, to prevent some Member State countries free-riding on the demand reduction efforts of others. The EU as a whole did successfully reduce demand for gas. There were notable exceptions, e.g. the Iberian Exception discussed section 4. European firms did significantly adjust to higher energy prices with a combination of increased energy efficiency and reduced output.[12]

Second, any energy crisis involves some new information about the likely return to future investments and the uncertainty associated with current energy use patterns, likely incentivising new investments. The 2021-23 crisis radically readjusted expectations of the reliability of gas supply from Russia (which had previously been regarded as very reliable by many in Europe). This promoted new investment in LNG import facilities and brought forward the 2022 RePowerEU package[13] of measures which envisaged significance reductions in EU gas use (and Russian energy dependency) by 2030 and replacement by alternative gases and low carbon electrification. German manufacturing firms did invest in alternative energy suppliers, and there was a notable surge in commercial and industrial solar PV investment in 2023[14].

Third, energy crises create windfall profits for some energy producers which should be fairly taxed in the face of rising consumer bills. The EU introduced two special arrangements for windfall energy profits for 2022 and 2023 under Council of the European Union (2022a) Regulation (EU) 2022/1854. The first was a revenue cap (of 180 Euros / MWh) was introduced on "inframarginal" electricity generators (including wind, solar and nuclear

[12] For example, see Horbach and Rammer (2024) on Germany and Alpino et al. (2024) on Italy.

[13] https://commission.europa.eu/topics/energy/repowereu_en

[14] Solar Power Europe (2025).

generators)[15]. The second was a "solidarity contribution" (windfall profits tax) on fossil fuel companies, defined as being in the 'crude petroleum, natural gas, coal and refinery sectors'. Excess taxable profits were defined as 'Only profits made in 2022 and/or 2023 above a 20 % increase of the average taxable profits generated in the four fiscal years starting on or after 1 January 2018 should be subject to the solidarity contribution.' The special tax rate was 33% or higher. While the coordinated EU windfall tax measures were temporary and have expired, several European countries did continue with their specific measures.[16] The European Commission (2025) estimated that 26bn Euros was collected via the solidarity contribution for 2022 and 2023.

Fourth, faced with a large number of arbitrary national interventions in electricity and gas retail markets (see Bruegel Dataset, 2023), the EU sought to define both when countries could intervene in the normal operation of retail markets AND the form such intervention could take in new electricity and gas directives. This definition of an electricity price crisis appears for electricity in the 14 March 2023 proposals for electricity market redesign. By contrast the gas price crisis definition appears to have been added later.[17] These two definitions are the outcome of the legislative process in the European Union in which legislation is initiated by the European Commission and then debated, amended, reconciled and approved by the European Parliament (directly representing European Union citizens) and the European Council (representing European Union governments). This was motivated by the fact that inflation, the international situation (with Russia) and energy supply were the three most important issues for European citizens in the Winter of 2022/23.[18]

Thus under the Electricity Directive (EU) 2024/1711 the European Council can (European Parliament and Council, 2024a, Article 66a): 'declare a regional or Union-wide electricity price crisis, if the following conditions are met:

(a)

the existence of very high average prices in wholesale electricity markets of at least two and a half times the average price during the previous five years, and at least 180 EUR/MWh which is expected to continue for at least six months, the calculation of the average price during the previous five years not taking into account those periods where a regional or Union-wide electricity price crisis was declared;
(b)

[15] The full list from the Regulation of inframarginal producers was: '(a) wind energy; (b) solar energy (solar thermal and solar photovoltaic); (c) geothermal energy; (d) hydropower without reservoir; (e) biomass fuel (solid or gaseous biomass fuels), excluding biomethane; (f) waste; (g) nuclear energy; (h) lignite; (i) crude petroleum products; (j) peat.'

[16] Czech Republic, Spain and Hungary within the EU. Outside the EU, the UK has extended its Energy Profits Levy on oil and gas producers to 2030. See https://taxfoundation.org/wp-content/uploads/2024/09/What-European-Countries-Are-Doing-about-Oil-and-Gas-Windfall-Profits-Taxes.pdf

[17] It is not defined in the December 2023 version of the proposed Directive, see https://www.europarl.europa.eu/RegData/commissions/itre/inag/2023/12-20/ITRE_AG(2023)757967_EN.pdf

[18] See Standard Eurobarometer 98 at https://europa.eu/eurobarometer/surveys/detail/2872

sharp increases in electricity retail prices in the range of 70 % occur which are expected to continue for at least three months.'

The crisis is allowed to be declared for up to one year.

Once declared,
'Member States may, for the duration of the validity of that decision, apply temporary targeted public interventions in price setting for the supply of electricity to small enterprises and medium-sized enterprises. Such public interventions shall…be limited to at most 70 % of the beneficiary's consumption during the same period of the previous year and retain an incentive for demand reduction…'

'Member States may for the duration of the validity of that decision…exceptionally and temporarily set a price for the supply of electricity which is below cost provided that the following conditions are fulfilled…the price set for household customers only applies, at most, to 80 % of median household consumption and retains an incentive for demand reduction'

The intention being that competition between retailers continues, retailers are fully compensated for the costs of such government intervention, that all retailers offer the subsidised electricity on the same basis and there is no distortion of the European internal market.

Similar arrangements have been but in place in the Gas Directive (EU) 2024/1788 (European Parliament and Council, 2024b, Article 5). The European Council can 'declare a regional or Union-wide natural gas price crisis, if the following conditions are met:
(a)
the existence of very high average prices in wholesale natural gas markets of at least two-and-a-half times the average price during the previous five years, and at least 180 EUR/MWh, which is expected to continue for at least six months, subject to the calculation of the average price during the previous five years not taking into account periods during which a regional or Union-wide natural gas price crisis was declared;

(b)
sharp increases in natural gas retail prices in the range of 70 % occur which are expected to continue for at least three months.'

The crisis can be declared for a period of up to one year.

Once declared, the rules for 'temporary targeted public interventions' are the same as for electricity, with interventions limited to 70% of demand for SMEs and 80% of demand for households, with provisions for the interventions not to distort competition between retailers nor to undermine the operation of the European internal market.

What is so interesting about this last lesson is that it gives a clear definition of the size of the crisis impact on wholesale markets and consequent impact on retail markets that is deemed significant enough for an intervention in retail markets. This is a useful starting point,

because energy price fluctuations are normal. It also specifies that a price crisis can only be declared if it is expected to continue for more than six months. So far, rises in wholesale electricity and gas prices have not reached the crisis threshold nor have the retail price impacts been large enough. A 160 Euro / MWh rise in the German price of wholesale electricity translates to about a 40% rise in the price of retail electricity[19] and a 72 Euro / MWh rise in the wholesale gas prices in the Netherlands translates to 42% rise in the price of retail gas[20].

Even more interesting than the definition of a crisis, is the pre-specified nature of allowed interventions. These maintain the market prices for marginal consumption and hence provide strong incentives for demand reduction. This mirrors a key lesson from the crisis that poorly targeted subsidies which often subsidised 100% of consumption reducing the impact on consumption and reducing incentives to invest in alternative sources of supply. It was possible to intervene in a smart way which both met distributional objectives and maintained incentives for efficient use of energy. A nice behavioural side effect of this policy is that it creates a focal point for demand reduction targets during future crises: businesses should aim to reduce demand by 30% and households by 20%.

In line with the fact that 2026 is not yet (as of October 2026) an electricity or gas 'price crisis' the EU's response to the recent crisis has been muted. The European Commission's crisis response package has proposed a 'Fuel Observatory' 'to track EU production, imports, exports and stock levels of transport fuels. This will enable swift identification of potential shortages and, in the case of emergency stock releases, ensure a balanced fuel distribution.'[21] Indeed the European Commission's website currently states: 'The security of energy supply remains stable in the EU.'[22]

3.The role of market pricing in energy and why intervention is (sometimes) necessary

In this section, we discuss when and why governments might be necessary to intervene in energy markets, rather than leave energy companies and their consumers alone. We start with how letting markets determine energy prices is generally a good idea. Next, we explore how long-run targets for energy demand reduction and supply diversification have value. If governments are to intervene, demand reduction measures are a good first response policy measure in an energy crisis. We go on to explore when and why rationing might be

[19] Figure 3 and Band DC Household Electricity Prices 2025-S2. Source: Eurostat.

[20] Figure 4 and Band D2 Household Gas Prices 2025-S2. Source: Eurostat.

[21] https://commission.europa.eu/topics/energy/eu-action-address-energy-crisis_en

[22] https://commission.europa.eu/topics/energy/eu-action-address-energy-crisis_en Accessed 20 October 2026.

necessary in deeper energy crises. We then consider with why using high energy prices to respond to a supply crisis might be subject to wider macroeconomic considerations. We finish with a discussion of how companies might view government pre-commitments to intervene in specific ways.

Market prices in energy

Markets in energy are usually great: they can help solve energy security, exploit least cost resources and, when combined with externality pricing, deliver environmental improvements. The markets for crude oil and natural gas are among the largest and most resilient (to shocks) in the world. Markets in energy can operate over multiple time frames (from years ahead to intra-day) and in theory offer a large degree of price hedging, against short term volatility, should consumers wish to purchase this.

Market prices in wholesale energy markets are important in the both the short run and the long run. In the short run they do signal the instantaneous cost of energy which is important for matching supply and demand. Short-run price signals are also important for encouraging fuel-substitution. Other energy sources do exist in the short-run (e.g. coal rather than gas for electricity) and can be accessed at higher cost. Supressing energy prices has longer-run consequences in that it reduces the long-run supply of energy, especially energy from domestic sources which are usually higher cost in Europe. This is true of increased profits taxes where high tax rates may reduce the after-tax returns to new oil and gas fields to the point that marginally profitable investments do not go ahead.

Pre-commitments not to intervene to suppress prices in wholesale markets has the impact of increasing long-run supply and of strengthening collective demand response – one of the key features of the permitted interventions under the Electricity and Gas Directives. The maintenance of collective market arrangements can be thought of as a form of mutual insurance, where supply shocks are collectively responded to by the whole of the integrated market. Indeed, one of the key lessons of the 2021-23 European energy crisis is that the Russian gas shock would have been so much worse for the countries directly dependent on Russian gas if they had not been part of the single European Gas and Electricity markets, which caused the supply shock to be spread over the entirety of Europe. If Germany had been unable to mitigate the first order loss of Russian pipeline gas, its GDP might have fallen by up 8% (Krebs, 2022) instead of the actual fall of 0.9% in 2023[23].

[23] Source: Trading Economics.

The idea that international energy markets rather than energy self-sufficiency are a better insurance policy is articulated in Yergin (2006). Global gas markets were responsible for helping Japan recover from the Fukushima Nuclear Crisis in 2011, which led to the loss of all its nuclear power output[24]. The advantages of interconnection fundamental to the single European electricity market are documented in Mezősi et al. (2015), Do et al. (2020) and Ravazzolo et al. (2025). Standard examples, of when this has proved particularly valuable is during nuclear outages in France or low hydro-power years in Norway, where interconnection to the rest of Europe has allowed normally exporting countries to import substantial amounts of power and avoid major electricity shortages. The ACER (2022) review of the operation of the EU electricity market recommended deepening of the current single electricity market. High energy prices in Europe have encouraged reductions in fossil fuel use (especially in electricity)[25] since 2022 and the diversification of fossil fuel supplies[26]. German utilities, in particular, have responded to market incentives in redirecting their gas purchases to Norway and the US (as well as Qatar). The German state, via an emergency infrastructure building programme and a state backed company, built five LNG import facilities in 18 months.[27]

Long-run targets have value

EU energy policy has long involved the setting of ambitious targets for: energy efficiency improvements, increases in renewable energy and decarbonisation. These targets and the policies which promote them have been significant in driving investment and in reducing the unit cost of low carbon technologies for both the EU and the world, by exploiting the learning benefits of strategic rollouts of wind, solar and grid battery technologies on a massive scale. These have been justified partly on the need to reduce the dependence of the EU on imported fossil fuels.[28] This long-run targeting has been very valuable in helping to maintain a trajectory towards less exposure to foreign fossil fuel supply shocks.

The 2021-23 crisis led the EU to raise its energy-efficiency ambition. The European Parliament and Council (2023a) Energy Efficiency Directive (2023/1791) set a binding EU target to reduce final energy consumption by 11.7% by 2030 (relative to 2020 projections)

[24] https://ourworldindata.org/data-insights/japan-closed-nearly-all-of-its-nuclear-plants-after-fukushima-but-some-are-coming-back-online

[25] See https://ec.europa.eu/eurostat/statistics-explained/SEPDF/cache/1216.pdf

[26] See https://ec.europa.eu/eurostat/statistics-explained/SEPDF/cache/46126.pdf

[27] https://oilgasstoragenews.com/deutsche-regas/

[28] See for example, https://climate.ec.europa.eu/areas-action/climate-strategies-targets/2040-climate-target_en

and significantly strengthened annual energy-saving obligations. The previous target was 9% and non-binding.

Both the renewable energy target was increased as part of the RePowerEU package. The renewable energy target was increased from 32% of energy in 2030 to 42.5% as part of the revised European Parliament and Council (2023b) Renewable Energy Directive (2023/2413). The decarbonisation target was raised maintained at a target 55% reduction in Greenhouse Gas emissions by 2030 (relative to 1990). These targets continue to underpin policies which promote investment in low carbon technologies such as government procurement auctions for new wind and solar projects.[29]

Temporary demand reduction measures

If governments are to intervene in an energy crisis, a good first intervention is encouragement to demand reduction. The good thing about this measure is that it is usually cheaper than any measure involving alternative investments or price subsidies. It also has the positive externality of reducing wholesale energy prices because underlying demand has fallen. This means that rich consumers who voluntarily reduce consumption – rather than remaining price inelastic - produce a positive price externality for poor consumers, and individuals who reduce demand produce a positive externality for businesses. This is better than simply relying on market prices alone which exaggerate the impact of poor households and energy intensive businesses due to the inertia of rich consumers or low energy intensity businesses.

Energy demand is often subject split incentives, where those who make the consumption decisions are not the same as the bill payers (in residential and commercial buildings). Thus, behavioural economics suggests that temporary messages to users can be effective in promoting demand reductions. For example, New Zealand ran a successful national 'Target 10' advertising campaign which targeted a 10% reduction in electricity consumption over a few weeks in order to reduce electricity use in the face of low rainfall in a hydro-electricity dominated power system (IEA, 2005).

In 2022 the Council of the European Union (2022b) passed Regulation (EU) 2022/1369 which mandated co-ordinated demand-reduction of gas demand across the EU. Article 3 called for Voluntary demand reduction where:

'Member States shall use their best efforts to reduce their gas consumption in the period from 1 August 2022 to 31 March 2023 at least by 15 % compared to their average gas

[29] https://union-renewables-development-platform.ec.europa.eu/auctions/explore-auctions?f%5B0%5D=status%3Aupcoming

consumption in the period from 1 August to 31 March during the five consecutive years preceding the date of entry into force of this Regulation' (8th August, 2022).

The EU did successfully achieve a significant reduction in EU gas demand over the 2022-23 winter, with a reported 17.7% reduction in gas demand against the overall target.[30] These were supported by national advertising campaigns to reduce energy. For example the German government ran a '80 Million together for the Energy Transition' campaign starting on 10 June 2022[31] and the French government ran an 'Every Action Counts' campaign on 10 October 2022[32]. Belgian high street retailers – such as Carrefour and Ikea- switched off shop lighting and advertising in order to save energy and successfully gained positive advertising for themselves and for energy saving more broadly[33]. In the UK, the energy retailer Octopus energy successfully advertised an 'Energy Savings Sessions' product in 2022 – which was taken up by 200,000 customers.[34] This allowed them pass on a – Demand Flexibility Service - price signal they were receiving from the system operator.

Rationing

Sometimes high prices and demand reduction targets do not achieve acceptable outcomes for society. This could be the case in examples of extreme reductions in supply which would otherwise lead to very high prices. In such cases governments might find in more socially acceptable to physically ration available supplies. Energy rationing has been rare in developed countries in peace time. One of the few documented examples of electricity rationing in the entire post-war rationing period is in Los Angeles in 1973 following the first oil crisis (see Acton and Mowill, 1976).

The general preference for price rationing is because it does allocate energy to its highest-value use. Voluntary rationing usefully combines this with personal preferences for energy saving and pro-social behaviour. Compulsory rationing however leads to excess demand and queuing, which have their own inefficiencies. Queues are costly and arbitrary in terms of predicted time to be in them and hence the total cost of acquiring energy. They can also unfairly penalise poorer consumers who might struggle be in the queue at the right time. Excess demand may be associated with increased environmental externalities and undermining of long-term incentives. Rationing may give too much to some users who do not need or value the energy use (leading to costly and unfair informal second-hand

[30] https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230419-1

[31] https://static.eurofound.europa.eu/covid19db/cases/DE-2022-24_3899.html

[32] https://www.info.gouv.fr/grand-dossier/reduire-notre-consommation-denergie

[33] https://www.brusselstimes.com/311538/belgian-businesses-look-to-advertising-for-energy-savings

[34] https://octopus.energy/press/flex-appeal-hundreds-of-thousands-of-octopus-energy-customers-join-second-saving-session/

markets). However, as Knittel (2014) points out, in extremis, citizens do seem to prefer rationing to exceptionally high prices, even though it is visible costly.

While Europe came close to natural gas rationing in 2022 it was not ultimately necessary. China was subject to power shortages in 2021 which resulted in temporary shutdowns of some industrial factories and some rolling power cuts. This happened because of high coal prices and price caps on wholesale power prices which meant that some coal fired power plants shut down (Wu et al., 2022). South Africa has been an ongoing electricity supply crisis due to suppressed power prices and underinvestment in power generation capacity, leading to scheduled disconnections of consumers (e.g. Eberhard, 2011). In 2022 Sri Lanka experienced direct rationing of gasoline in a severe macro-economic crisis, with an international payments crisis. Fuel was rationed via a QR-code system which allocated weekly fuel allowances.[35] Similarly, Pakistan in 2022 was forced to respond to high fuel import costs by reducing working hours and having scheduled disconnections of electricity.[36]

Some countries have introduced rationing following the 2026 energy crisis. For instance, Sri Lanka reimposed gasoline rationing.[37] Even in Europe there have been some isolated examples of rationing with Slovenia limiting daily fuel purchases.[38]

Historically, government rationing was used successfully during World War II. The UK introduced rationing of domestic coal via coupons within days of the start of the War (Shin and Trentmann, 2019). This did successfully reduce domestic coal consumption for heating. There was also rationing of domestic use of gasoline. These measures did limit the necessary retail price rises in these commodities and help control war time inflation (see Pollitt, 2024).

Wider macroeconomic considerations

One of the lessons that the 2021-23 European energy crisis raised was whether energy policy could always be viewed simply in micro-economic terms. In the 1970s and 1980s oil price inflation contributed significantly to general inflation and leading to wage-price spirals

[35] https://ceypetco.gov.lk/2022/07/16/ministry-of-power-and-energy-launches-national-fuel-pass-to-streamline-fuel-distribution/

[36] https://www.reuters.com/world/asia-pacific/facing-severe-energy-crisis-pakistan-reverts-five-day-work-week-2022-06-07/

[37] https://news.lk/current-affairs/qr-code-fuel-system-to-be-implemented-from-today

[38] https://www.brusselstimes.com/2037901/slovenia-imposes-fuel-limits-after-neighbouring-countrys-drivers-hunt-for-cheap-fuel

and stagflation (inflation without growth). In Europe the same thing happened again to a lesser extent following the 2022 price hikes for gas (and electricity).

The evidence – from the IMF and the European Central Bank - seems to be that the energy price caps imposed by European governments in the 2021-23 crisis did significantly reduce short run inflation, albeit that their long effects on inflation were much more modest (Dao et al., 2024). Lower short run inflation may have reduced the risk of a deeper and more prolonged wage-price spiral.

Fiscal support also mitigated the negative GDP impact of higher energy prices. However, the crisis did have important negative macroeconomic effects via the external terms of trade effect, where higher import prices did reduce the real value of European income (Battistini et al., 2023) which could not be mitigated by internal fiscal transfers. While lower inflation was a short-run benefit it came at significant fiscal cost. The long-run fiscal burden imposed on European economies was estimated by the European Central Bank to be of the order of 2-4% of GDP[39] and may have additionally pushed up the interest rate on all government debt.

How companies might view government responses to crises

Economists often don't like the idea of governments arbitrarily intervening in the operation of the market during an energy crisis because of the long-run effect on investment incentives. Such intervention is inherently a politically motivated response to a short-run economic problem. One of the characteristics of an advanced economy is that we avoid such short-run policy interventions in return for longer run stability of prices and investment. Indeed, monetary and fiscal policy is largely premised on pre-commitments to price stability (backed by the political independence of the Central Bank) and automatic stabilisation of GDP via counter-cyclical fiscal expenditures.

However, this raises the issue of whether it is better to pre-announce government interventions in the energy market in the same way as we pre-announce commitments to keep inflation down via an independent central bank or government expenditure up via automatic social welfare payments conditional on income. Investors can adjust and governments can observe what the effects of pre-announcement are. Investors might prefer

[39]The ECB estimates 1.9% of GDP in the Euro Area in 2022 and 1.8% in 2023. Given that energy prices fell after this estimate the final burden may be less. https://www.ecb.europa.eu/press/economic-bulletin/focus/2023/html/ecb.ebbox202302_09~37755e445d.en.html

known interventions to arbitrary ones and hence be more likely to invest (at lower expected rates of return) in sectors where the interventions are pre-specified than in ones where the only observations available are past arbitrary interventions. This is particularly true across the European market where pan-European companies worry about different arbitrary interventions across Member States, and worse, the possibility that poorly designed interventions (such as the Iberian Exception, discussed below) will be copied.

Another advantage of pre-announcing super-taxes on profits or price-capping policies is that companies have much higher discount rates on future revenue than governments and they will value the expected loss in profit under extreme high returns much less than citizens operating at lower social discount rates value the capping of extremely high prices. This creates the opportunity for a mutual gain to society by agreeing in advance to transfer excess corporate profits to taxpayers, where the same discounted future dollar is valued less by the corporation than by the taxpayer. The issue is whether this can be done in such a way that the inherent inefficiencies in transfers from the private to public sectors don't reverse the net gains from this potentially beneficial transfer.

The view that energy super-taxes should be well-designed and predictable is endorsed by the comments of some of the recipients of these taxes during the 2021-23 crisis. The CEO of Total Energies objected to the imposition of the unexpected EU 'solidarity contribution' tax which he claimed would undermine his company's incentive to invest in new oil and gas production in the EU. He objected to the fact that a one-off contribution did not adjust for prior year losses.[40] Similarly, the UK Chair of Shell objected to the additional windfall tax imposed by the UK government on North Sea oil and gas companies. His concern was that the tax should naturally fall away when fuel prices fell and that it should include generous investment allowances on new investment so as not to prevent these occurring.[41] By contrast, UK electricity utility SSE said that it did not object to the 45% windfall tax on electricity generators as long as it was well designed.[42]

4. Why it might be good to have a pre-announced rule book for what is to be done in a crisis

[40] https://www.reuters.com/business/energy/totalenergies-expects-pay-30-billion-terms-taxes-production-taxes-worldwide-this-2022-09-21/

[41] https://www.reuters.com/business/energy/shell-evaluate-25-bln-pound-british-investments-after-windfall-tax-2022-11-21/

[42] https://www.reuters.com/world/uk/uks-hunt-increases-energy-windfall-tax-2022-11-17/

In this section we discuss the extent to which governments can pre-specify effective interventions in energy crises. We do this by looking at examples of arbitrary price interventions; lessons from electricity market design where the design often does specify maximum energy market prices; lessons from strategic energy reserves; and from pre-specified energy profit tax regimes.

Arbitrary price interventions in energy markets

We consider a number of well-documented arbitrary interventions in energy markets, which have lessons as to whether they could have been anticipated or something better could have been done.

First, the California Electricity Crisis (2000-01) was a classic case where the wholesale electricity price went up by a factor of ten from its normal level in a situation where most retail electricity prices were capped (see Joskow, 2001; Borenstein, 2002; Sweeney, 2002) as a result of rising demand and reductions in supply (exacerbated by anti-competitive restrictions on generation). This resulted in rolling blackouts and the bankruptcy of the major utility Pacific Gas and Electric, who were forced to buy in the short-run power market, and the suspension of the power market. The California crisis was quite similar in magnitude to the European power crisis in 2021-23 (as pointed out in Pollitt et al., 2024). The market was poorly designed as the utilities were not allowed to sign sufficient long-term generation contracts. An arbitrary crisis intervention happened afterwards with the government of California signing expensive longer-term contracts in 2002. These rapidly showed large losses as the crisis quickly subsided.

Second, the Iberian Exception (IE) is an arbitrary intervention during the 2021-23 European energy crisis which the European Commission approved as an exceptional intervention in the operation of the wholesale power market. This took the form of fixing the price of gas sold to gas-fired generators in Spain and Portugal, such that when these plants set the price in the wholesale power market the price would be reduced below what it would otherwise be. Lou et al. (2026) found that it did lower wholesale prices, but it also substantially increased demand from gas fired power plants for gas (by 25%) and reversed interconnector flows, leading to subsidised exports of gas fired generation to France and Morocco. This policy was implemented because the poor design of the default household electricity tariff which directly linked the price of retail electricity to that in wholesale power market. The IE was a poorly designed policy that increased gas demand in a gas supply crisis.[43]

Third, the failure of the electricity market in Texas (ERCOT) during the winter storm Uri in February 2021 is example of a market where more intervention was required not less (see Busby et al., 2021). This is a fascinating case to contrast with California (and Iberia). Here

[43] Unbelievably, the European Commission recently agreed in principle to a similar 'Italian Exception' in the current crisis. See: https://www.argusmedia.com/en/news-and-insights/latest-market-news/2892677-italy-reaches-deal-with-eu-on-gas-cap-for-power-output

wholesale and retail prices were not effectively capped (the price cap in the power market was $9000 / MWh, i.e. the value of lost load). Retailers were free to contract long term and consumers were free to contract short term (and be exposed to wholesale prices). A large snowstorm caused the disconnection of large amounts of generation at a time of peak demand, causing blackouts and very high prices. The issue here was the failure of the system to sufficiently prepare for such events with interconnection to other systems (ERCOT has very limited interconnection to other states) and to weatherise equipment for winter storms as opposed to summer heat. This case illustrates how a lack of intervention can lead to both high prices and an unreliable grid.

Electricity market design and pre-specified price caps

An important observation about wholesale electricity markets is that they are rarely designed without some form of price-cap built into them. This is because there is always a maximum bid that is allowed. The existence of a maximum price can be justified by the existence of a maximum willingness to pay for electricity which is specified by household users (who might be assumed to value it most) and who cannot privately insure with back-up facilities or dedicated third-party security contracts. There is also the practical limitation that most market platforms limit the number of digits that can be entered into their software (e.g. $9999 might be a maximum). However many markets limit the maximum bid below the value of lost load, or use capacity payments to reduce bids in the energy market.

Once the maximum price is specified this then has market design implications for how to maintain supply and demand balance. The system operator can resort to both physical and economic measures to maintain reliability. This could involve having an emergency plan for planned curtailment and load shedding, often involving declaring a certain stage of emergency and a hierarchy of which loads will be disconnected first (or last). The system operator may also sign interruptible contracts with certain loads.

System operators can also operate with lower energy prices if they sign capacity market contracts which allow then to call up additional capacity at short notice during a predicted stress event. Capacity markets normally pay for capacity to be available 1-4 years ahead via monthly capacity payments. Thus, lower energy prices can be combined with higher capacity market prices. Bids to provide capacity are solicited in a capacity auction. The process involves the system operator estimating the required peak capacity 1-4 years ahead and specifying a demand curve for capacity around a base capacity level and anchored at the price of new gas-fired generation capacity. This demand curve is then combined with the stacked bids in the capacity auction (which gives a capacity supply curve) to work out a market clearing capacity price. The capacity market rules may further limit certain capacity bidders (like nuclear generators) to maximum bid prices, or indeed specify that certain government supported capacity (e.g. renewable generators) cannot receive additional capacity payments. This will mean their estimated peak generation will be netted off the capacity demand curve. There may be a maximum bid for all bidders. In the latest Great Britain capacity market auction for 2029-30, the demand curve is anchored at around 40

GW, with anchor price of £49 per kW per year, with a maximum allowed bid of £75 per kW per year.[44]

Strategic oil and gas reserves

A standard way to prepare for an energy price shock is to invest in strategic physical reserves of energy. The most famous of these is the US Strategic Petroleum Reserve (SPR), which contains up to 700m barrels of oil[45]. In the context of the 2026 crisis resulting in a net loss of supply of 6m barrels of oil per day, this represents 115 days of lost net global supply or 35 days of its own domestic consumption of around 20m barrels per day. Japan has by contrast around 200 days of domestic consumption in both public and private reserves. Global reserves fell 509m barrels to end of September 2026, or by about 2.4m barrels per day.[46] This suggests that the global loss of supply would have been significantly worse without the reduction in reserves.

The academic evidence on whether large releases from the strategic oil reserve concludes they do have an impact, but it is small over the longer term. Kilian and Zhou (2020) found that the 1990-1 release of the around 22m barrels from the US SPR following Iraq's invasion of Kuwait reduced the real price of oil by about $2 per barrel after 7 months. Clayton (2012) found that the release by the IEA of 60m barrels of oil following the collapse of Libyan oil did have a significant short-term effect and signalled a wider intention of oil consuming countries to respond, hence the effect may have been increased beyond its quantitative significance. This might be important in dampening price expectations in any given crisis. The US Treasury (2022) estimated that the release of 240m barrels of oil in 2022 by the US and the rest of the IEA resulted in gasoline prices being $0.17-0.42 lower per gallon in the US (or up to $17.64 per barrel).[47] This is a decent short run impact in the face of large observed rise in price driven by the crisis, which was $40-50 dollars (see Figure 1).

Overall, strategic oil reserves do reduce oil prices, somewhat. They reassure markets that governments can respond, they help smooth temporary supply shocks, they potentially reduce the probability of panic buying and hence they smooth macroeconomic fluctuations. However, they are costly to maintain (the interest carrying cost alone is significant), the releases (or non-releases) can be politically motivated and it is not clear what the optimal amount of reserves is given that the private sector could hold reserves which might be crowded out by subsidised strategic reserves.

[44] https://www.gov.uk/government/publications/capacity-market-auction-parameters-letter-from-desnz-to-neso-february-2026/final-auction-parameters-t-1-and-t-4-capacity-market-auctions

[45] https://www.energy.gov/hgeo/opr/strategic-petroleum-reserve

[46] https://www.iea.org/news/iea-member-countries-to-carry-out-largest-ever-oil-stock-release-amid-market-disruptions-from-middle-east-conflict

[47] https://home.treasury.gov/news/press-releases/jy0887

EU member states are required to hold 90 days of net imports or 61 days of inland consumption (whichever is higher) under Council of the European Union (2009) Directive 2009/119/EC. The release of these stocks is coordinated by the EU and with the International Energy Agency.[48] This requirement amounts to about 800m barrels of oil.

The EU has no equivalent gas reserves. Gas is subject to commercial storage and diversification of supply and to cross-border solidarity arrangements. However in 2022 the EU did introduce mandatory requirements (European Parliament and Council, 2022, Regulation (EU) 2022/1032) to fill underground gas storage before the winter. This also enhanced monitoring of EU storage levels. In 2025, this regulation (European Parliament and Council (2025) Regulation (EU) 2025/1733) was strengthened to phase-out Russian gas imports. The current winter storage target level target is 90% of capacity reached between 1 October and 1 December 2026.[49] This is the equivalent of requiring a certain level of gas reserves across the EU and does give confidence that gas heating demands in the coming winter can be met assuming the filling proceeds on trend.

The reality of global oil and gas supply shocks suggest that requirements on oil and gas companies to hold reserves are a sensible insurance policy for national economies, as the 2026 crisis is proving so far. Oil and gas price rises have been limited and strategic stocks of oil have been reducing prices. However, futures prices for oil don't forsee prices returning to pre-war levels until 2031, partly because of the restocking of reserves that will occur.[50] Futures prices for European gas, currently expect prices to return to pre-war levels by Autumn 2028.[51]

Pre-specified energy profit taxation regimes

It is tempting in a crisis to introduce new taxes on energy companies who are seen to be making windfall profits. At a theoretical level, this should not be necessary. It is quite easy to simulate what will happen to local energy company profits if wholesale energy prices hit certain levels and hence it is possible to design a tax regime which anticipates this.

[48] https://energy.ec.europa.eu/topics/energy-security/security-oil-supply_en

[49] https://energy.ec.europa.eu/topics/energy-security/gas-storage_en

[50] See https://www.ice.com/products/219/brent-crude-futures/ (Accessed 20 October 2026).

[51] See https://www.ice.com/products/27996665/Dutch-TTF-Natural-Gas-Futures/ (Accessed 20 October 2026).

Indeed, this is a standard problem for oil producing countries which face fluctuating oil prices. Thus, the best example of flexible tax regimes where the tax paid varies with the price of energy is found in the fiscal regime for petroleum where governments use resource-rent taxes or excess-profit taxes rather than arbitrary one-off windfall levies. We discuss some good examples of long-lived petroleum production taxes.

First, the UK's Petroleum Revenue Tax (PRT) was designed to capture windfall oil and gas rents when profitability was very high. It was introduced in 1975 and applied a defined formula to calculate the tax due (and applied to companies such as BP and Shell, operating in the North Sea). However, the underlying rate was varied by primary tax legislation. What makes this a rent tax is that all expenses are deductible from taxable revenue. Second, Norway also applies a special petroleum tax (e.g. to Equinor) in addition to corporation tax which operates in a similar way to the PRT. The effective tax rate on taxable profits is currently 78%. Third, Australia has a Petroleum Resource Rent Tax (PRRT) which explicitly taxes rents and is fixed prior to the profits occurring. For a discussion of how excess profit taxes should be designed see Hebous and Prihardini (2022). Four, Alaska (where ConocoPhillips and ExxonMobil are the biggest taxpayers) did have petroleum tax where the tax rates rose with oil prices and profitability. For the period 2007-2013, the additional tax surcharge increased automatically as profits per barrel rose by 0.4 percentage points for each $1 of profit above $30/barrel initially, with lower growth rates about higher thresholds, to reach a maximum of 75% profit tax.[52]

The experience of the 2021-23 crisis in introducing differing arbitrary short-run profits taxes on oil, gas and low carbon electricity producers suggests that a tax regime for the capture of energy crisis profits could be pre-announced. This would eliminate tax surprises, reduce political risk, provide investor certainty and constitute an additional automatic crisis response, as noted by Hebous and Prihardini (2022). It would also meet the legitimate concerns of companies such as Total Energies and Shell about the imposition, during a crisis, of poorly designed windfall taxes.

5. Concluding comments

The 2021-23 European energy crisis had profound consequences for the EU and provoked a large amount of policy learning on the part of EU institutions, EU member state governments and European companies. Wholesale electricity and natural gas prices reached unprecedented levels and there was a fiscally costly intervention in retail energy markets. So far, the 2026 Strait of Hormuz energy crisis has not been as significant for the EU, partly because of a successful diversification of gas supplies, reductions in energy consumption and increases in non-fossil fuel energy. However the future situation remains uncertain.

[52] https://www.jdsupra.com/post/contentViewerEmbed.aspx?fid=1aa5429b-71d0-45d0-b611-9001c28a0d65

Across wider Europe some countries clearly handled aspects of the 2021-23 crisis more successfully than others. Germany avoided a potential macroeconomic meltdown by quickly reducing gas demand and diversifying gas supplies, even at the same time as having to nationalise major parts of its gas supply chain, due to the risky national and private sector bet it had made on the security of pipeline gas from Russia. Spain implemented an ill-advised subsidy to gas for power consumption (discussed above), while the UK subsidised all domestic electricity and gas consumption (as did France for electricity)[53] at the same time as failing to incentivise additional investment in new fossil fuels or demand reduction. Many energy consuming companies – such as energy intensive manufacturers - were forced to adjust to much higher energy prices and some energy retailers – such as Octopus Energy - did innovate in the face of strong incentives to do so.

We observed that the most interesting EU policies to come out of the 2021-23 crisis was the precise definition of what would trigger a future 'energy price crisis' in both electricity and gas markets and, associated with this, the form that any crisis intervention in retail energy prices could take.

This led us to discuss the basis for the government intervening in the operation of energy markets under increasingly extreme supply shocks. Such intervention could range from setting long run targets to reduce exposure to supply shocks to increasingly hands on short run attempts to manage the available quantity of energy.

Corporations should help governments plan for energy supply shocks by encouraging them to think through the implications for the operation of the economy in the face of extreme price fluctuations. Both the Russia supply shock and the Strait of Hormuz shock were not 'Black Swan' events (Taleb, 2007). They were entirely predictable potential scenarios for European companies. Therefore, the highly engaged policy communities of Europe, which include energy intensive industries and energy companies, can and should work together on responsible crisis planning to build resilience ahead of future energy crises.

Both recent crises suggest that there is more scope to prepare energy policies in advance to avoid the need for policy making in the midst of a crisis. Electricity markets offer good examples of how up-front market design can avoid prolonged price-spikes. The maintenance of adequate medium run reserves – many of them held by the private sector - has also proved valuable in both oil and gas markets. There also seems to be more thinking to be

[53] See von der Fehr et al. (2022).

done on pre-announcing special energy profit tax regimes for gas and electricity, learning from oil production taxes, to meet the legitimate concerns of energy companies about the need to avoid poorly designed one-off taxes which undermine incentives to invest.

A key lesson from the last five years of European Union energy policy is that it is possible for society to both prepare for external energy price shocks and to learn from them. If we assume the next five years proves to be as eventful as the last, the European Commission, EU member state governments and European companies should both double down on the current energy policy trajectory and consider their crisis management policies and strategies further in the light of the learning from both the 2021-23 and 2026- crises. Companies and public institutions in other jurisdictions, inside and outside Europe, continue to have much to learn from a close observation of the outworking of EU energy policy.

Use of AI Statement

Co-Pilot was used to help find, query and summarise references. All the text and errors are my own.

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