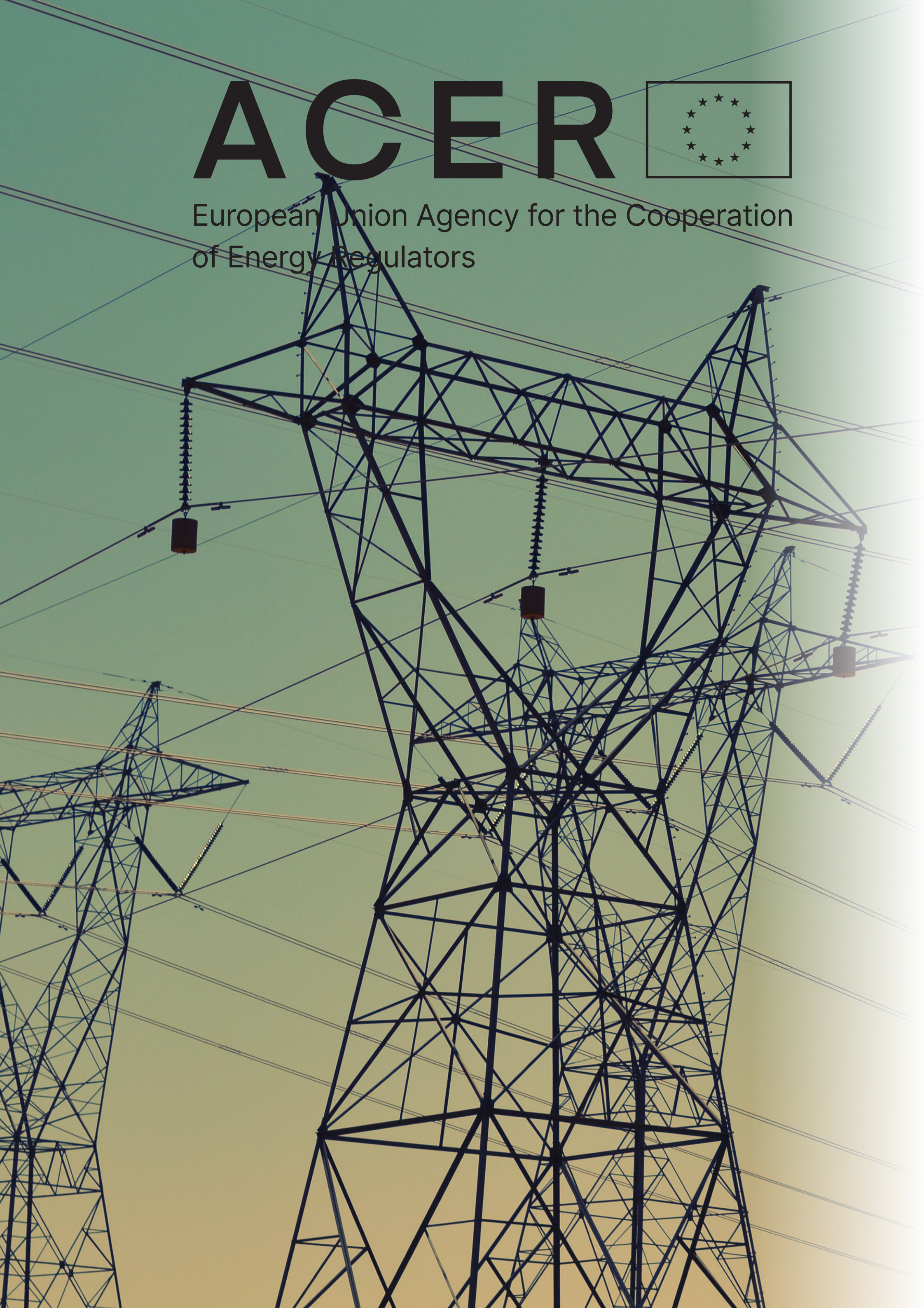

ACER

European Union Agency for the Cooperation of Energy Regulators

ACER's Preliminary Assessment of Europe's high energy prices and the current wholesale electricity market design

Main energy price drivers, outlook and key market characteristics

November 2021

PART 1

ACER's response to the task rendered by the European Commission in its 'Toolbox' Communication of 13 October 2021

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1. Introduction

Europe's energy prices have reached unprecedented heights, drawing significant political attention at both national and EU level. Citizens and businesses face the economic impacts and broader economic variables may also be affected, e.g. rates of inflation and economic recovery trajectories. The current situation has triggered calls for assessing the main drivers, dynamics and likely forward outlook for energy prices in Europe as well as the possible implications for the EU wholesale electricity market design.

The European Commission, in its 'toolbox' Communication of 13 October 2021[1], tasked the EU Agency for the Cooperation of Energy Regulator (ACER) with conducting an assessment of the benefits and drawbacks of the current wholesale electricity market design by April 2022 and a preliminary assessment by mid November 2021.

2. Structure of this Preliminary Assessment

This preliminary assessment is comprised of two parts, Part 1 (a preliminary overarching assessment) and Part 2 (ACER's note published on 13 October on the high energy prices, hereafter the 'ACER Note'). To recap, ACER's Note provides a data-driven analysis of the drivers of the current record-high energy prices. In brief, the main driver is the soaring gas price driven by global demand and supply dynamics for liquefied natural gas (LNG) as a result of the global economic recovery from the Covid pandemic. Other factors such as Europe's lower-than-average gas storage stocks; limited additional pipeline gas imports to the EU; rising Emissions Trading System (ETS) allowance prices; and weather patterns in Europe (both for generation and demand) play a secondary role. ACER's Note in October also looked at the resulting impact on electricity prices. It concluded with a few select policy considerations including possible measures to alleviate price pressures on vulnerable consumers; the current wholesale electricity market design in light of increasing volumes of low marginal cost generation; certain gas supply intervention options; and challenges around price volatility going forward.

This preliminary assessment (Part 1) offers some additional elements to complement the analysis already presented by ACER in October:

- providing some key factors for the relatively uneven electricity price impacts across Member States, and how countries with high gas dependency and low interconnectivity were more exposed to high electricity prices (see Section 3.2);
- looking at how the move towards more spot pricing of gas in Europe (rather than long-term contracts) has yielded significant benefits over the past decade and how this relates to price volatility issues going forward (see Sections 3.3 and 3.4);
- including key characteristics of the current electricity market design, adding ACER's initial perspective on certain price volatility issues, and (in light of the current political debates) on alternative market design approaches including the notion of possibly decoupling electricity market outcomes from gas price dynamics through price caps or technology-dependent average prices (see Section 4 below);
- adding the latest data and analysis from ACER's market monitoring of related dynamics in the European electricity market (see Section 4 below); and
- providing an outline of ACER's upcoming April 2022 assessment (see Section 5 below), which will include an analysis of:
  - the benefits and drawbacks of the current wholesale electricity market design;
  - the issue of sufficient revenue certainty in electricity markets in view of the massive investment needs up ahead; and
  - options for cushioning or shielding end-consumers from perceived excessive levels of price volatility that impact affordability.

[1] The European Commission's Communication, 'Tackling rising energy prices: a toolbox for action and support' (COM(2021)660 final), presents a 'toolbox' of measures for Member States to address the price hikes through targeted, national short-term relief measures that help the most vulnerable without endangering the operation of the energy markets.

3. Energy price drivers, differing impacts on Member States and possible market manipulation

3.1 The correlation between gas and electricity prices in Europe is not new

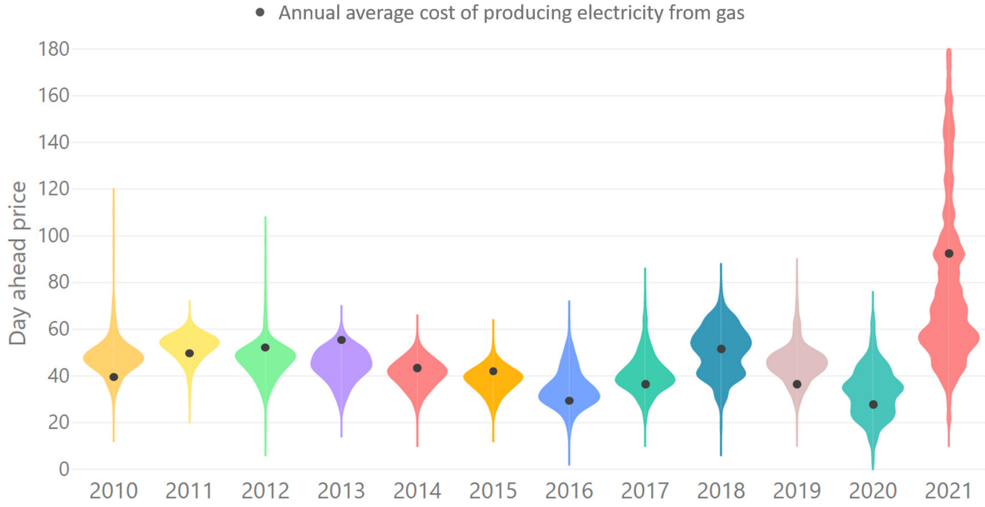
The causes of Europe's current high energy prices have been described in ACER's October Note (Part 2 below). The main conclusion is that high global gas prices, with LNG as the primary price-setter, constitute the key driver of the current high electricity and gas prices impacting Europe.

This interdependence of gas and electricity prices in Europe in the current context of unusually high electricity prices has led to political discussions on the broader relationship between gas markets and electricity markets going forward. As such, it may be instructive to look at the degree of correlation between electricity and gas prices in recent years, so as to ascertain whether the relatively strong dependence currently witnessed is an inherent characteristic of EU electricity markets or rather more of a new phenomenon.

Figure 1 shows electricity day-ahead prices together with the cost of producing electricity from gas since 2010. For each year, the figure displays a 'violin' plot representing the distribution function of day-ahead prices across Europe. In essence the height of the 'violin' represents the range of prices observed in a given year, while the width of the 'violin' represents the (relative) frequency of occurrence of a given price level. The black dot represents the annual average cost of producing electricity with gas.

Overall Figure 1 suggests that gas prices have driven EU electricity wholesale prices in recent years to a significant extent including, importantly, when gas prices dropped significantly in 2020.

Figure 1: Electricity day-ahead prices distribution compared to the cost of producing electricity with gas in Europe (2010–2021) (EUR/MWh)



Source: ACER calculations based on ENTSO-E and Platts data

Note: For the electricity prices distribution functions, daily average day-ahead prices per bidding zones were used. In case of more than one bidding zone in a country, an average of bidding zones was used. The annual average cost of producing electricity with gas was estimated by considering the variable costs, including CO_2 emission costs, of a theoretical combined-cycle gas turbine plant with a thermal efficiency of 50%, based on the TTF gas day-ahead prices. To ease readability, the y-axis is truncated at 180 EUR/MWh, although there were a relevant number of observations above this threshold, particularly in 2021.

3.2 High gas dependency and low electricity interconnectivity increases a country's exposure to high electricity prices

The correlation between electricity and gas prices depicted in Figure 1 above reflects generation investment decisions and related technology choices made over the past decades. Ultimately, when the cost of producing electricity with gas is 'high' and cheaper alternatives are not sufficient to meet electricity demand, then the electricity price is often set at the cost of producing electricity with (high-priced) gas. To the extent that gas continues to be the (marginal) price setter in some countries even when gas prices are extraordinarily high, this drives electricity prices in the Member States concerned significantly upwards. This said, more broadly, having gas-fired generation in Europe's electricity mix has yielded considerable economic and environmental benefits over the years. Relying on gas has allowed electricity wholesale prices to be at competitive levels for several years and CO_2 emissions to decrease.

Notwithstanding the broader correlation with (relatively uniform) gas prices across Europe, electricity prices have differed significantly across Member States. These price differentials are the result of mainly two factors: first, the level of gas dependency to cover that particular Member State's electricity demand and second, to some degree (though the extent varies), that Member State's level of electricity interconnection with neighbouring countries compared to national demand. In general, the higher the gas dependency and the lower the level of interconnection compared to national demand, the higher the wholesale price of electricity in a given Member State. To this, one can add an additional factor which is more geographical: well-interconnected Member States that are closer to those countries with the cheapest energy sources benefit the most from cross-border exchanges.

To illustrate this, Figure 2 and Table 1 below group countries into three different categories, showing these two main drivers for the wholesale electricity price differences observed (in the period chosen, September 2021).

Group 1 is those countries with the highest electricity prices. These are countries with the highest dependency on gas (with more than a third of their electricity demand in September 2021 covered by gas) and limited interconnection levels (particularly in the case of Ireland and Spain where only 1% and 4% respectively of the electricity demand was covered by imports).

Group 2 is those countries with average electricity prices between 120 EUR/MWh and 150 EUR/MWh. These countries are, on average, moderately dependent on gas and/or well interconnected. Their average reliance on gas was lower than for group 1, yet still remained significant (totalling approximately 14% of the demand). Within this group, countries can be clustered into two sub-groups:

i) Countries that rely highly or moderately on gas, but that are well interconnected with other countries that provide cheaper sources of electricity; this was the case for the Netherlands, Hungary, Romania and the three Baltic countries.

ii) The other countries in this group rely only moderately or to a smaller extent on gas for power generation. Some of the countries within this sub-group namely France, Bulgaria, Denmark and the Czech Republic exported relevant amounts of electricity volumes, representing respectively 18%, 45%, 9% and 25% of their demand, which helped lower prices in neighbouring countries.

There are two outliers in this second group of countries, namely Greece and Estonia. For Greece, power prices were not as high as countries in group 1 despite Greece being highly dependent on gas (51% of demand) and with limited (net) imports in the period in question. However, recent data suggests this to be a temporary exception as average Greek electricity prices (around 200 EUR/MWh) were among the highest in Europe in October 2021 (i.e. Greece would have been in the first group if this month had been chosen for the analysis)[2].

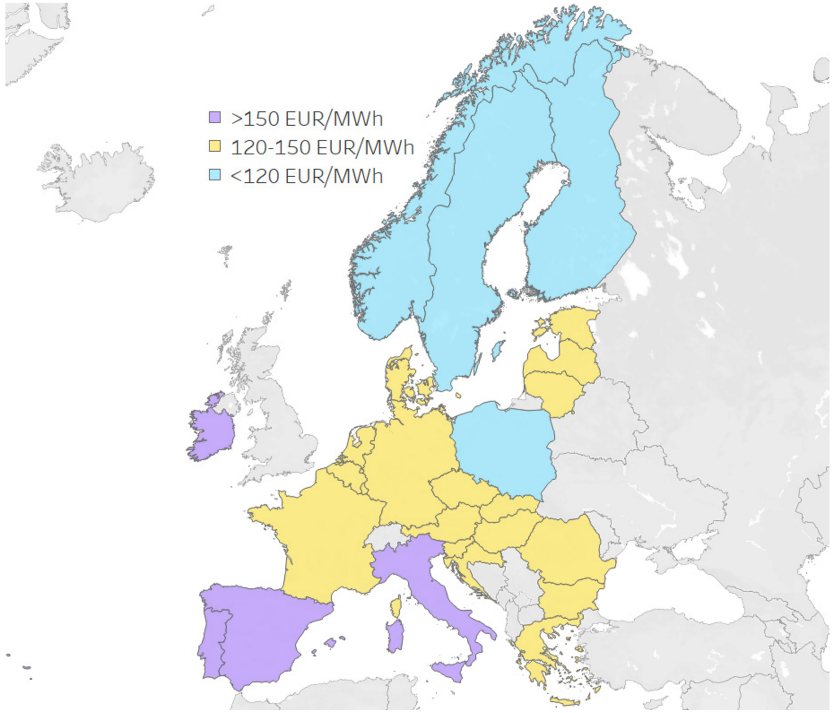
[2] The reference price for gas used in Greece is based mainly on month-ahead contracts and can therefore lag about a month behind day-ahead contract references used in other European Member States. Hence, the same time lag may apply in the impact observed on electricity prices.

The other outlier in the group is Estonia as it does not produce electricity from gas; however it produces a significant share (56%) of its demand for electricity from other fossil fuels, mainly oil shale. The costs of producing electricity with oil shale also rose, largely due to the CO_2 emission costs (oil shale combustion is considerably more carbon intensive than burning natural gas), which explains why Estonia is in group 2 despite not using gas.

Group 3 are those countries with the lowest average power prices in the period in question. This group of countries has the lowest dependency on gas (on average 3% coverage during the period), utilising instead other generation sources such as coal (in the case of Poland) or renewables (in the case of the Nordics). At the same time, electricity prices in these countries were considerably higher than in preceding years, illustrating that these countries were not fully shielded from the impact of high gas prices. In the case of Poland, part of this higher price effect is due to its reliance on coal generation which is affected by currently higher coal prices and ETS-related costs (coal combustion being more carbon intensive than burning natural gas). In the case of the Nordic countries, price increases can partly be explained by the flexibility of the hydropower reservoirs in the region becoming more valuable (as a low-cost generation resource, the price of hydro generation naturally gravitates upwards towards overall market prices).

Overall, this analysis confirms that the level of Member State reliance on gas for power generation is the main factor explaining price differentials across countries. A related insight is that increased market integration allowed smoothening of price rises, particularly across well-interconnected areas. As such, this would indicate the importance of maximising the amount of cross-zonal interconnection capacity available for cross-border electricity trade, not only for efficiency and broader societal welfare but also for shouldering considerable price shocks going forward.

Figure 2: Countries and their exposure to high electricity prices in September 2021



Source: ACER calculations based on ENTSO-E data.

Note: The grouping and associated colouring follow country borders, noting however that Ireland and Northern Ireland constitute a single energy market. Cyprus and Malta are not considered in the figure since they do not have liquid wholesale electricity markets.

Table 1: Average day-ahead electricity prices (EUR/MWh) and average gas generation as a percentage of electricity demand in Europe (%): September 2021

	Main characteristics of the Member States pertaining to the group	Average day-ahead prices (EUR/MWh)	Electricity demand covered with gas (%)
Group 1	Highly gas-dependent and/or limited interconnected countries	167	34
Group 2	Moderately gas-dependent and/or well interconnected countries	132	14
Group 3	Limited gas-dependent countries	89	3

Source: ACER calculation based on ENTSO-E data

3.3 Hub-based pricing and the shift away from oil-indexed long-term gas contracts has yielded significant benefits

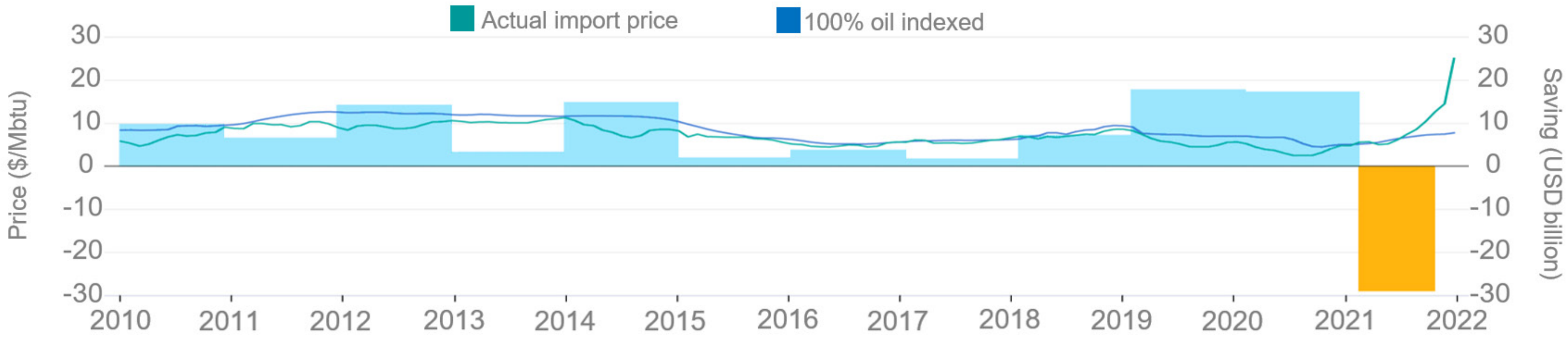
Gas prices have often been a key driver of electricity prices in Europe in recent years with differences across countries being partly attributable to the level of gas generation in the electricity mix. Hence, it is no surprise that the substantial changes in gas contracting approaches in Europe (i.e. moving away from oil-indexes into hub-price indexes in long-term supply contracts plus gradually increasing the gas volumes directly purchased on gas hubs) over the last decade have received increased attention of late.

More specifically, some have questioned whether the deliberate EU move towards gas hub-based competition (where prices reflect many buyers and seller in gas market hubs) may have resulted in undesirable and/or unnecessary levels of price volatility. This is not a simple issue to easily confirm or dismiss.

By way of background, since 2010, the development of increasingly liquid and competitive organised gas trading hubs has allowed both gas producers and consumers to gradually abandon the bilateral contracting of gas on a long-term oil-indexed basis, instead using hub-price indexes or even contracting gas volumes directly on spot and forward markets[3].

ACER's monitoring efforts[4], as well as analysis by others like the International Energy Agency, illustrate that oil-indexed gas contracts have been more expensive than hub-indexed contracts over the last decade. This is worth noting as the extraordinarily high energy prices in 2021 might intuitively suggest otherwise and could lead to calls for a return to long-term contracting across the board.

Figure 3: Difference in natural EU gas import costs under actual import prices vs 100% oil-indexed prices and economic impacts of the hub-price shift (2010–2021)



Source: International Energy Agency (IEA)

[3] According to the International Gas Union, this has lead to a share of hub-price based imports of more than 80% on average across Europe today, which is a percentage circa three times higher than in 2010, though still with some differences among regions.

[4] For the average gas sourcing costs across EU Member States see e.g. paragraphs 190-195 of the Gas Wholesale Volume of the ACER-CEER Annual Report on the Results of Monitoring the Internal Electricity and Gas Wholesale Markets in 2020 (hereafter the '2020 Market Monitoring Report' or '2020 MMR').

Importantly, the IEA estimates[5] that the shift to hub-based (and thus more flexible spot) gas pricing has saved Europe $70 billion in lower gas import bills over the past decade, substantially outweighing losses (of $30 billion) in 2021, than if Europe had continued with oil-indexation, as illustrated in Figure 3 above.

Figure 3 compares, since 2010, the average gas sourcing price levels of actual EU gas imports (green line) against the theoretical gas price resulting from a fully oil-indexed long-term supply contract (blue line). The predominant blue areas illustrate the savings achieved via the increasing use of gas hub-pricing references, both in long-term supply gas contracts and in direct hub gas purchases. The hub-pricing shift has made EU gas imports cheaper than those that would have resulted from fully oil-indexed prices. However, the orange area for the year 2021 indicates that, under the unprecedented circumstances of 2021, the price of oil-indexed contracts would have become significantly cheaper than hub-based imports. Still, 2021 has been an exceptional year. The cumulative savings across the decade substantially outweigh the losses incurred in these last months.

3.4 The energy transition will lead to changing gas demand patterns across Europe

With the clean energy transition, gas demand and supply patterns are likely to change, too. On the demand side, total consumption is expected to decrease throughout the coming decades (noting that renewable gases may become a viable option to meet gaseous demand in the long run)[6]. Furthermore, as the rate of intermittent renewable electricity increases, supply patterns from gas-fired power plants will be increasingly driven by the need to meet peak and/or seasonally contingent demand[7].

Overall, supply will need to become more flexible in order to accommodate this combination of lower average demand with shorter periods of higher peak consumption. Demand that is more variable will require supply to become more flexible, thus indicating that gas prices are likely to become more volatile – or, put differently, become more responsive to prompt market fundamentals. As such, one would expect the relevance of long-term gas supply contracts to decrease over time, albeit not necessarily disappear, in favour of the flexibility provided by direct transactions on trading hubs. That said, a certain amount of gas is likely still to be acquired under bilateral long-term supply contracts in order to meet preferences and needs of market players.

3.5 How long is the current price outlook likely to last?

Forward markets reflect market expectations on how energy prices will evolve in the future. Figure 4 shows the forward curves for the TTF in the Netherlands and JKM Nymex markets, which are benchmarks for European gas trading and Asian LNG trading respectively. The current market outlook is that the high gas prices are transitory and should fall significantly in April 2022. Figure 5 shows the forward curve for electricity traded on the German EEX market, which serves as a reference for European electricity markets. A drop in electricity prices is also expected to occur around April 2022.

Figures 4 and 5 confirm that the current outlook is consistent with the market outlook published in ACER's October Note, albeit with forward prices continuously shifting as a function of market fundamentals. Similarly, it should be noted that Europe remains vulnerable to demand surges linked to weather patterns (as a harsh or mild winter significantly impacts demand for gas).

[5] International Energy Agency (IEA) Commentary of 22 October 2021: 'Despite short-term pain, the EU's liberalised gas markets have brought long-term financial gains'.

[6] For example, the referential modelling tool used by the European Commission to project the EU energy system evolution (and its related greenhouse gas emissions), PRIMES, estimates that gaseous energy demand could drop by up to 30% in the 2020 to 2050 period. The model simulates the impact of macro-economic, fuel price, existing policy and technology trends and serves as input to the Commission to determine relevant policy decisions.

[7] The IEA estimates that even if gas use for power generation will drop by 10% in 2030 relative to 2020 on annual average, the gas demand for peak weekly gas-fired generation will be 15% higher (IEA ibid).

Figure 4: **Gas forward curve**

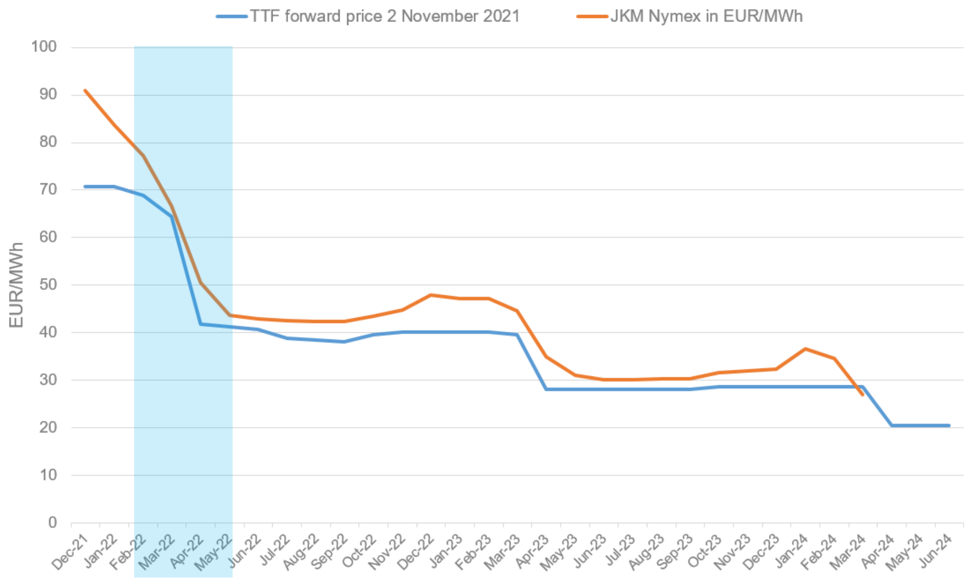
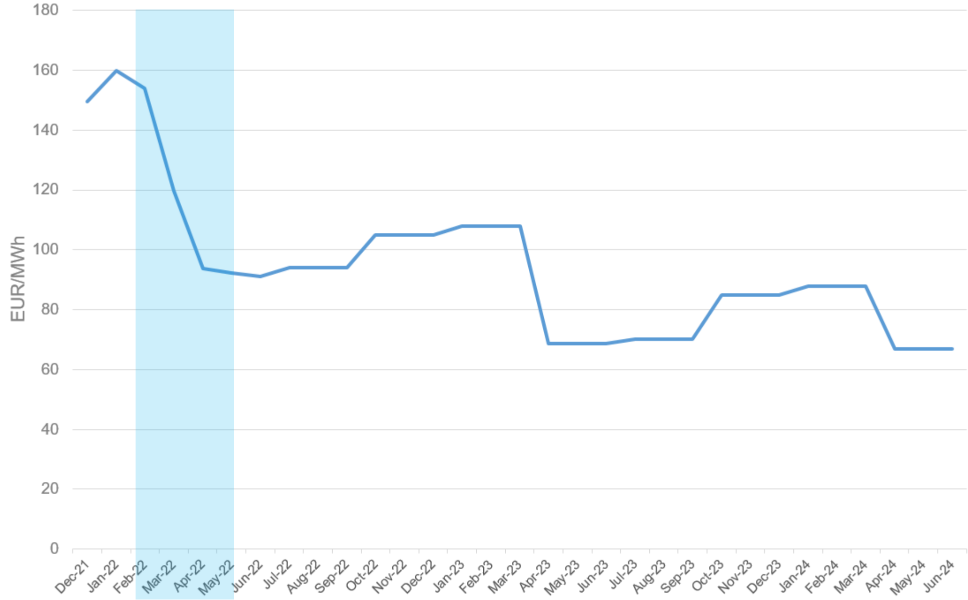


Figure 5: **Electricity forward curve**



Source of figures 4 and 6: Platts European Electricity daily

3.6 ACER detected no obvious wholesale market manipulation so far

Europe has a robust framework, REMIT[8], to detect and prevent energy market manipulation and insider trading. Market manipulation and its effects may occur across borders, between electricity and gas markets and across financial and commodity markets, including the emission allowances markets. Under REMIT, ACER carries out EU-wide wholesale energy market surveillance whilst the national regulatory authorities (NRAs) for energy investigate and enforce potential instances of market abuse.

As was also stated in ACER's Note in October, based on the information and data available to ACER, currently there is no obvious indication nor evidence of systematic manipulative behaviour or insider trading under REMIT likely to affect the current high-energy price situation. Surveillance is ongoing.

There has been considerable debate about possible manipulative behaviour on emission allowances markets. This falls outside of REMIT and is thus not within ACER's mandate. The European Council (21-22 October) invited the European Commission to study the functioning of the gas and electricity markets as well as the EU ETS with the help of the European Securities and Markets Authority (ESMA) and to report thereon, after which the European Commission will assess whether certain trading behaviours require further regulatory action. ACER is in close contact with ESMA, building on the current close collaboration between the two EU agencies. The European Commission also committed to investigate possible anti-competitive behaviour in the energy market in their aforementioned 'toolbox' Communication in October.

[8] REMIT is a dedicated EU-wide framework, since 2011, securing the integrity of wholesale gas and power markets under Regulation (EU) No. 1227/2011: Regulation on Wholesale Energy Market Integrity and Transparency.

4. European wholesale electricity market design: Key characteristics of relevance for the current political debate

4.1 Some characteristics of electricity important for an integrated wholesale market design at European level

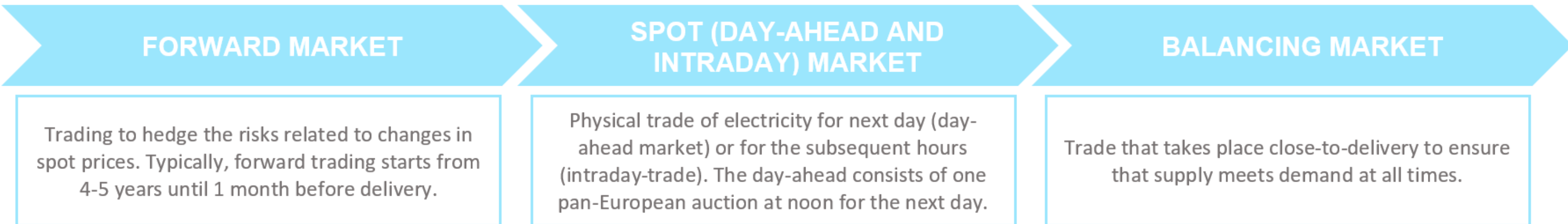
Electricity has certain characteristics that are important in designing a market that seeks to integrate national markets into a single European electricity market. First, it cannot be stored easily. Hence, it requires adequate transmission capacity to transport, instantaneously, electricity from where it is produced to where it is consumed. Much effort has been made over the past 20 years to put common EU rules in place, e.g. to manage network congestion and to facilitate efficient power flows across Europe. A second characteristic is the need for different electricity markets in different time frames (e.g. the forward market, the spot market etc. see Figure 6 below), with each needing to be sufficiently 'liquid' to function well ('liquid' implying a sufficient amount of buyers and sellers regularly making transactions in that market).

Overall, performance in the wholesale electricity market largely depends on how efficiently the European grid is used and on how the wholesale market performs in all timeframes. When and where this is achieved, the benefits are multi-fold such as using resources more efficiently across Europe, having more relevant investment signals e.g. for new power generation (and hence a better match between investments and future needs), an improved security of supply situation, and enhanced integration of renewable generation resources.

The output of renewable sources such as wind and solar generation can vary considerably over short periods. This variability challenges the stability of the electricity system. The challenge increases with larger shares of variable sources connected to the electricity grid. Increasing cross-border trade of electricity mitigates instability as it enables Member States to gain access to more diversified generation portfolios in other Member States. In turn, competition increases, prices lower and the renewable generation gains access to a bigger market, lowering offtake risk for the generator. Given the alternative to cross-border trade as a measure to balance supply and demand would often be reliance on fossil fuel generation as a backup resource, the benefits of cross-border trade also extend to enabling more efficient decarbonisation efforts in the shorter term.

Overall, any EU market design model will need to consider the special characteristics of electricity as a commodity, the different needs of market participants and the different policy objectives set for the EU, including how such objectives are met efficiently and at lower cost.

Figure 6: Sequence of exiting electricity markets in the EU



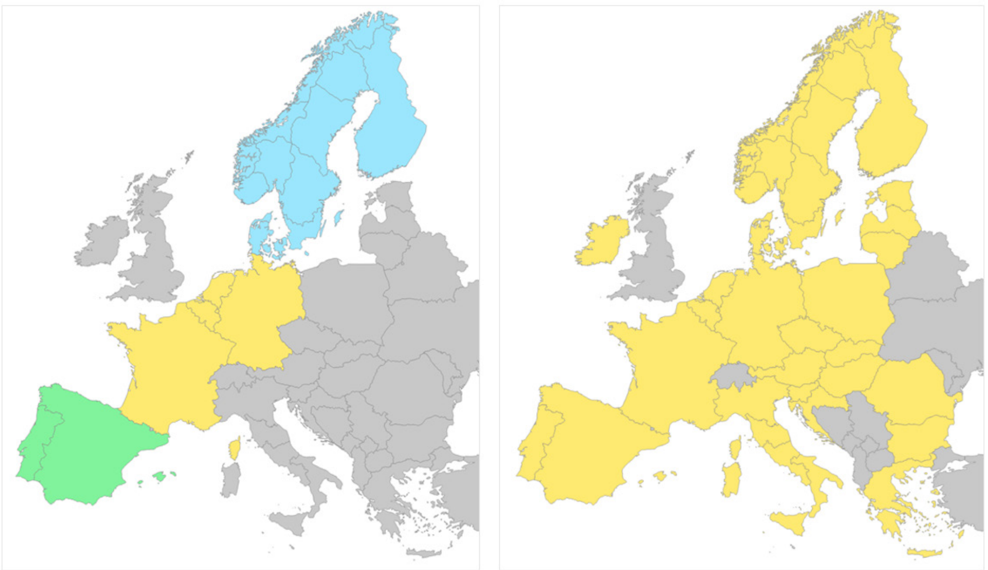
Source: ACER elaboration

4.2 'Pay-as-clear' market design enables recuperation of higher capital costs and helps smooth volatility

A key feature of the EU electricity market is that prices and trades of electricity are determined through a coordinated process to set prices known as ‘market coupling’. Figure 7 below shows the evolution of market coupling over the last decade, including the most recent incorporation of the Bulgarian borders[9].

The integration of Europe’s national markets via market coupling decreases price volatility and optimises the use of resources across Europe. A reduction in unwanted price volatility can benefit those customers who find it hard to adjust their consumption in response to price hikes. Market coupling has kept EU electricity prices lower on average for the EU as a whole, than would otherwise be the case.

Figure 7: Evolution of day-ahead market coupling (2010–2021)



Source: ACER elaboration

[9] See details on the geographical scope of market coupling and the milestones expected for 2022 at https://www.nemo-committee.eu/sdac.

The EU electricity market is based on a marginal price method (also known as a 'pay-as-clear' market). The key feature of the market is that the price is set by the marginal cost (i.e. the cost of producing one more MWh of electricity). Producers are put on the market in merit order starting with the least costly up to the most expensive power plant. The last plant needed to meet the demand within the time frame in question sets the price and all producers are paid the same price (provided their bid comes under the final clearing price). The basic characteristics and workings of Europe’s 'pay-as-clear' wholesale market design are explained further in ACER's October Note (see Part 2).

A key feature of the 'pay-as-clear' model is that all electricity producers (including renewables, demand-side response, and storage) in the same market area (bidding zone) are incentivised to bid their true costs in order to be in the merit order and get dispatched; this is in contrast to speculative bidding of the likely final price outcome. For technologies with higher capital costs and lower operational costs (high-CAPEX, low-OPEX), the 'pay-as-clear' model enables recuperation of their higher capital costs. In the absence of this, such investments would likely not be financially viable.

In addition, in the context of increasing shares of intermittent renewable generation, the variability of the generation patterns is likely to lead to an increase in price volatility rather than lowering it. Here, a key feature of the current market design is that precisely because it is technology neutral and treats all electricity the same (whether it is from fossil fuels or renewables or ‘offerings’ via reduced demand) the current market design incentivises and facilitates emerging technologies and business models that can smooth volatility (e.g. demand side response, large or small-scale storage, energy communities or a combination through aggregation). Were it not for higher prices that needed ‘smoothing’, such innovative offerings might not emerge.

These features of the current market design do not in and of themselves prove that the framework is fully future-proof. As such, certain issues may well warrant further attention (see further below in Section 5).

4.3 Alternative market design approaches (e.g. price caps or technology dependent average prices) may risk jeopardising some of the benefits from EU energy market integration

As the current market design is based on a technology-neutral merit order, low marginal-cost technologies (e.g. nuclear, wind, hydro and solar) will almost always run barring instances of rather low demand. Fossil fuel generation (e.g. coal and gas plants) are usually the most expensive plants in terms of variable costs. Under the ETS, coal and gas costs also include the cost of CO_2 certificates, thus adding an important price signal to electricity pricing.

The current high energy price environment has led to calls in some quarters to re-examine some of the current framework's fundamentals, ranging from potentially capping the price of electricity produced from gas to applying an average electricity price as a sort of ceiling (e.g. with reference to the estimated needs for 'infra-marginal' revenue for particular renewable technologies), as illustrated in Figure 8 below.

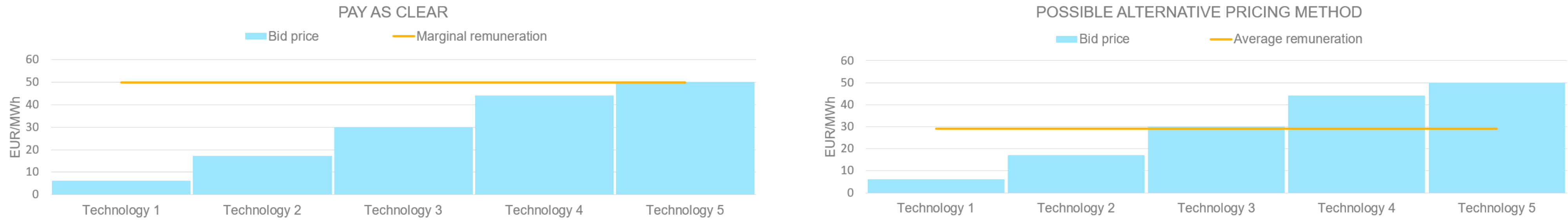
Such elements represent a significant deviation from the current electricity market approach in Europe. As such, they require careful consideration so as not to inadvertently impact the ability of the framework to drive desired EU-wide changes (such as cost-efficient decarbonisation) over the medium and longer term.

At the outset, such approaches risk endangering the security of supply over the medium and potentially also the shorter term. This is because by applying a price cap or an average-price informed ceiling, some of the current participants in the market are likely to be unable to recover their full costs over time, thus warranting market exit decisions. Similarly, such measures risk discouraging new entrants (whether new generation or new demand-responsive offerings) that could have met system needs in a cost-efficient way.

If one adds to this the likelihood of several Member States seeing increasing shares of intermittent renewable generation in their electricity mix going forward, the volatility of wholesale prices in certain time intervals is likely to increase rather than decrease. This volatility reflects increasing flexibility needs of the energy system (or put differently, the needs to 'smooth volatility'). Such needs will require some sort of price signal in order to be met. Removing these price signals may discourage market entry, in particular of flexibility providers, which could in turn lead to a costlier integration of intermittent generation in the long-run.

As mentioned above, there is a link here to the move in Europe towards increased spot pricing of gas as opposed to long-term gas contracting (whether oil-indexed or not). Such flexible spot pricing is a more relevant corollary of an electricity system with increasing shares of intermittent generation; and this is precisely because of the increase in system flexibility needs.

Figure 8: **Illustration of the current electricity wholesale pricing method and a possible alternative**



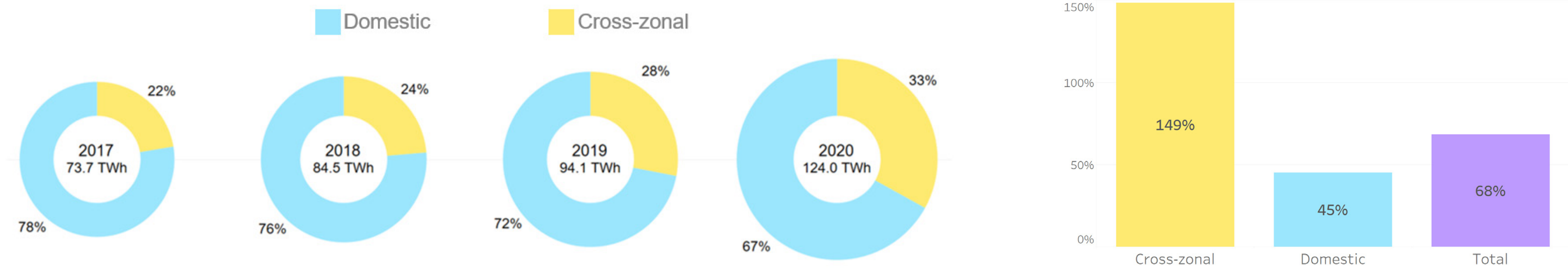
Source: ACER elaboration

At the same time, this corollary highlights questions of whether there are sufficient hedging and/or other 'supply insurance' means available for those selling or consuming gas on the wholesale market. Related to this, questions may arise as to whether end-consumers such as households are sufficiently shielded should retail suppliers go out of business (e.g. because of the latter's lack of hedging or low levels of collateral). Such elements will be examined in ACER's upcoming April assessment (see also Section 5 below).

Finally, irrespective of political preferences, in applying certain price caps or technology-dependent average prices, there is a risk of fragmentation of a relatively well-integrated European electricity market. If each market area (bidding zone) were to apply its own 'fair price' concept, the consequences could be significant, both for decarbonising the European economy at lower cost and for maintaining supply security and system resilience going forward (as price and system shocks risk being less mitigated via contributions from neighbouring areas).

Herein lies the 'mirror image' of some of the current benefits of the European electricity market, namely those elements which Europe may stand to lose in the pursuit of different approaches.

Figure 9: Evolution of the continuous intraday-traded volumes, and its breakdown into cross-zonal and intra-zonal trades (2017–2020) (% and TWh) (left) and the relative increase (2017–2020) (right)



Source: ACER calculation based on NEMOs data.

4.4 ACER's latest findings show that continued energy market integration could bring significant benefits over the next decade

The newly published ACER-CEER Market Monitoring Report (MMR)[10] sheds light on what currently works well in the European electricity market and what should further improve, thus requiring increased attention.

ACER's monitoring report shows that one of the most impactful achievements in the past years has been the integration of short-term electricity markets through market coupling (see Section 4.2 and Figure 7). Due to market coupling, the integration of day-ahead markets, which are the main reference for trading electricity close to real time, progressed significantly over the last decade. In fact, day-ahead market coupling across the entire EU is now close to completion.

Similarly, the year 2020 saw further progress in the integration of EU intraday markets; an important achievement as such markets are instrumental for large-scale integration of renewable resources, not least to manage their intermittency and variability. Figure 9 below shows the substantial increase of (continuous) intraday trading in Europe since 2017; cross-zonal intraday trades increased by around 150% following the go-live of single intraday market coupling in 2017.

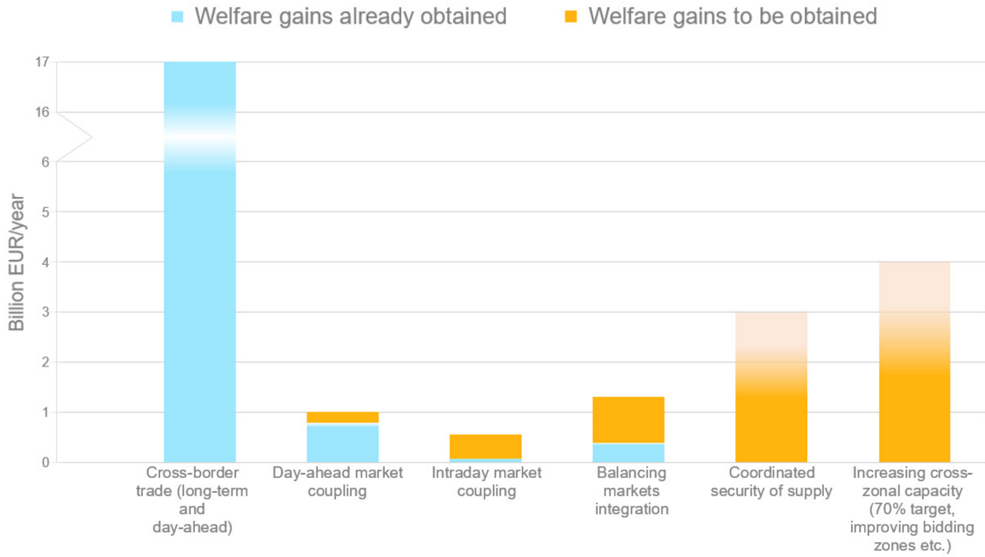
[10] See the Wholesale Electricity Market Volume of the 2020 MMR.

Together, day-ahead and intraday market coupling deliver more than 1 billion Euros of benefits to end-consumers per year[11]. The integration of balancing markets across the EU is also progressing, ensuring (once complete) that energy supply always meets demand at the lowest possible cost. Integrating balancing markets is expected to yield more than 1.3 billion Euros of benefits to end-consumers per year[12].

That said, there is significant scope for further improving energy market integration in Europe. In its monitoring, ACER finds for example that the amount of interconnection capacity made available for trade with neighbours needs to increase significantly (in line with the binding '70% target')[13]. Sufficient cross-zonal capacity is crucial both for efficient market functioning and for smoothing price peaks, as shown in Section 3.1. In addition, in its Market Monitoring Report 2020, ACER shows the results of its first study on barriers to market entry and price formation across the different Member States, finding significant barriers to this effect. Removing such barriers would allow more market players to compete on an equal footing (including for example demand-side response), likely bringing substantial benefits.

As a summary, Figure 10 displays the quantitative benefits already reaped from the integration of European electricity markets and the potential benefits yet to be obtained through further improvement. Continued and strengthened efforts in the identified areas could deliver more than 300 billion Euros in benefits from EU energy market integration for the next decade. The efforts and benefits outlined rest on the current market design fundamentals. As such, deviating significantly from the current market design may put at risk the benefits already obtained as well as those currently being pursued.

Figure 10: Social welfare benefits* already obtained and to be obtained from various actions intended to increase EU markets integration



Source: ACER Market Monitoring Report, various editions, available here.

*Note: *Gross benefits. The faded colour for some categories indicates that the welfare gains rely on third-party estimates and/or are subject to uncertainty.*

[11] See paragraph 288 of the Wholesale Electricity Market Volume of the 2013 MMR.

[12] See footnote 136 and paragraph 582 of the Wholesale Electricity Market Volume of the 2014 MMR.

[13] The Clean Energy Package requires that at least 70% of physical capacity of critical network elements is made available for cross-zonal trade.

5. ACER's upcoming assessment in April: Initial outline and focus areas

The overall objective of ACER's assessment due in April 2022 is to examine the functioning of the current wholesale electricity market design, to address its benefits and drawbacks and, if deemed relevant, to offer possible considerations for its adjustment and/or measures to complement it.

As such, the point of departure of the April assessment is the current 'pay-as-clear' electricity market model in Europe as described above. In addition, given the likely evolution of Europe's electricity markets in the years ahead, there would seem to be at least two broader issues relevant for further analysis.

First, Europe's electricity system is likely to transition towards increasing shares of low marginal cost generation whether from nuclear, wind, solar or other sources. This is because of the increasing electrification needs, generally accepted as a key vehicle for delivering on Europe's decarbonisation objectives. This transition implies significant investment in new electricity generation across Europe.

As such, this raises the question whether the current wholesale electricity market design, focused in particular on short-term optimisation and cost-efficiency, is able to fully accommodate the investment signals needed for incentivising generation and demand-responsive investment at scale. Hence, it is important to consider the prerequisites for such efficient investment in the medium and longer term.

ACER's April assessment will seek to shed light on such aspects, analysing the potential benefits and drawbacks in e.g. enhanced hedging instruments, more liquid forward markets, contract-for-difference and/or increased facilitation of long-term solutions for underpinning sufficient revenue certainty in electricity generation.

Second, as elaborated above, the evolution of Europe's electricity system implies that price volatility is likely to remain an inherent feature of the electricity market going forward. In order to mitigate price volatility (be it high prices, fluctuating prices or negative prices), more flexible solutions will be needed. There are several means to address such flexibility needs, e.g. by facilitating demand response, storage, energy community interaction, increased interconnection between countries, and facilitating trading closer to real time; all presupposing in some way or another that the flexibility (or 'smoothing') needs in question are met by an appropriate price signal. As such, the role of appropriate price signalling, reflecting system needs at specific time intervals and locations, remains key.

At the same time, the current high energy price situation has drawn attention towards measures cushioning or shielding end-consumers from perceived excessive levels of price volatility that impact affordability.

Here, it is important to note that many wholesale market participants (whether traders, retail suppliers or energy-intensive companies etc.) are sophisticated portfolio managers as regards their energy price exposure. These entities use hedging strategies to buy energy over different timeframes to smooth out fluctuations in their energy costs. As such, a pertinent question for these entities is whether the currently available hedging instruments are sufficient to meet their needs or whether further market reform might be warranted.

Such issues around adequate hedging and sufficiently liquid forward markets are more indirect for smaller end-consumers, including households, who rarely pursue such strategies themselves. Here, the pertinent question is more whether end-consumers are sufficiently protected e.g. through supplier-of-last-resort arrangements should retail suppliers go out of business (e.g. because of the latter's lack of hedging or low levels of collateral impacting the retailer's ability to shoulder price fluctuations).
There are other issues of potential relevance for ensuring that end-consumers are fully informed of and potentially shielded from perceived excessive levels of price volatility that impact affordability. One such issue concerns the approach to dynamic

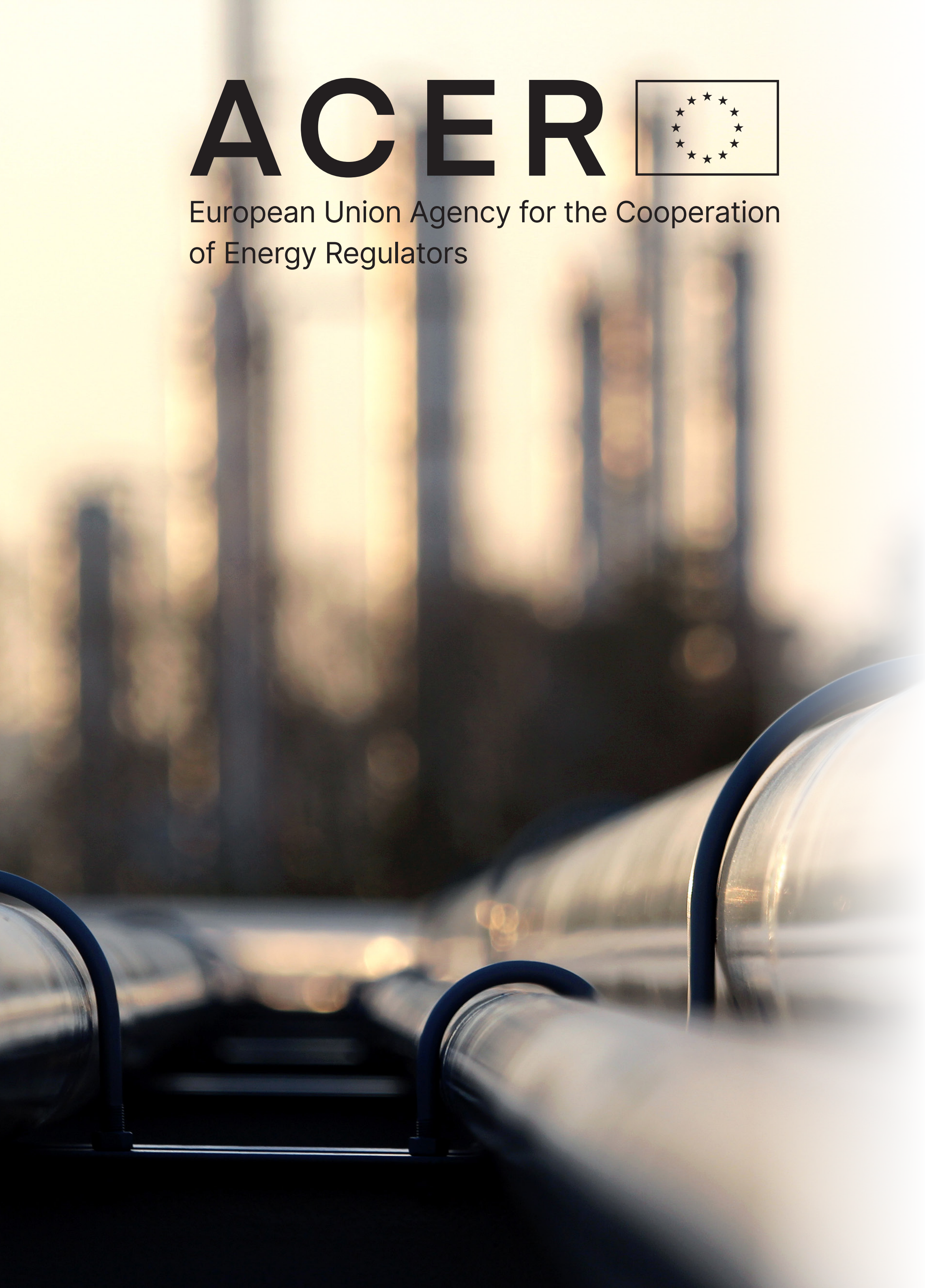
price contracting; a contractual measure which can bring substantial savings when wholesale prices go down (as they did in 2020) but bring higher energy bills when wholesale prices go up. Here, having dependable energy contracts with low risk, potentially as the default contractual option, seems relevant to consider.

Another element relates to the aforementioned links between wholesale gas and wholesale electricity prices in Europe. These linkages raise questions as to the potential benefits in more aligned principles within the EU e.g. on gas storage requirements. There are multiple ways to encourage gas storage, with some approaches however risking significant distortions across Member States and/or negatively impacting liquidity. Hence, there is merit in looking further at relative benefits and drawbacks of approaches that meet perceived ‘insurance needs’ of the system while safeguarding the benefits of an integrated European energy market.

ACER intends to analyse these issues further in its upcoming April assessment.

ACER

European Union Agency for the Cooperation of Energy Regulators



HIGH ENERGY PRICES

October 2021

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Executive Summary

The backdrop to this note

Energy commodity prices have reached unprecedented high levels across Europe. Gas prices in October 2021 are 400% more expensive than in April 2021. Power prices have increased by 200% (driven mainly by the increase in gas prices). Unsurprisingly, the current high energy prices are topping the EU political agenda. Governments are interested in identifying the key drivers and in determining if it is a temporary shock or a permanent shift. The answers to these issues will help inform their policy response. This note by the EU Agency for the Cooperation of Energy Regulators (ACER) provides a factual analysis of Europe's energy price developments.

Why are energy prices so high and how long will it last?

While various factors have contributed to the high energy prices in Europe, the main driver is the surge in the price of natural gas. This price surge has been mainly caused by a tight global LNG market. Forward markets expect a significant drop in wholesale prices for gas and electricity in spring 2022. A key variable in the very near term is the upcoming winter and its implications for gas demand.

Policy considerations – short term and longer term

The European Commission has prepared a 'toolbox' of measures that national governments can use to respond to price hikes without endangering the functioning of EU wholesale markets. This note by ACER touches on a few select policy considerations related to this response, namely:

- disproportionate effects of high prices on vulnerable consumers and the possibility for Member States to mitigate this in the short term without unduly distorting fundamental market signals;
- the functioning and rationale of the current EU electricity market design vis-à-vis the current high prices;
- certain issues related to gas supply going forward such as possible joint purchasing of strategic gas reserves as well as possible obligations for gas storage; and
- longer term transition trajectories and the link to holistic policy.

Today's energy price squeeze is a reminder of Europe's still high-dependency on imported fossil gas and the inherent volatility of global commodity markets. It is also a reminder that a well-designed energy transition pathway going forward will rely on holistic policy that targets demand just as much as supply, focusing on both the short-term and the long-term. As such, Europe's transition pathway will likely need to be a more 'managed transition' in the years ahead with both government and regulatory monitoring playing a significant role.

1. Introduction

This note, by the EU Agency for the Cooperation of Energy Regulators (ACER), provides data and insights on the recent high energy prices. It explains the drivers of why energy prices have hit unprecedented highs and the impact on price levels across Europe. It also provides an outlook of market expectations for the next six months and it takes a look at certain market behaviours. Finally, it provides a few brief policy considerations (both short and long term), namely some of the short-term relief measures that can protect energy poor and vulnerable customers without unduly distorting fundamental market signals; perspectives on the current EU energy market design; perspectives on gas storage obligations as well as centralised gas purchasing of strategic reserves; and the needs for a more 'managed energy transition' going forward.

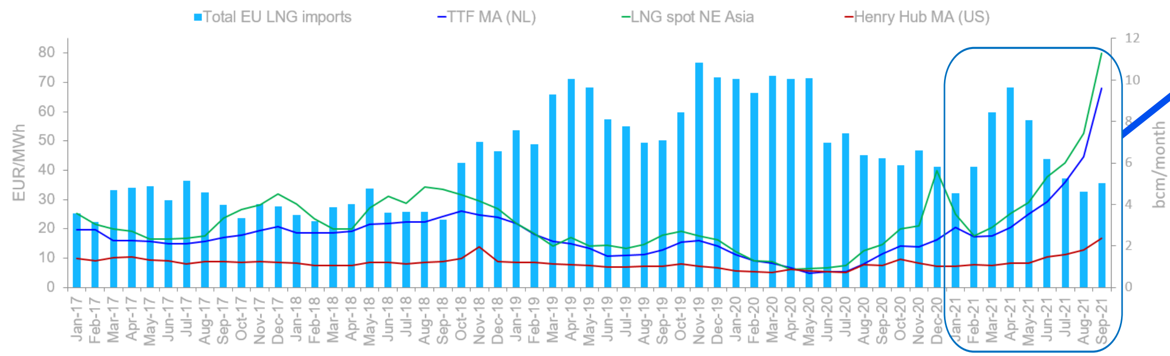
2. Price levels and drivers

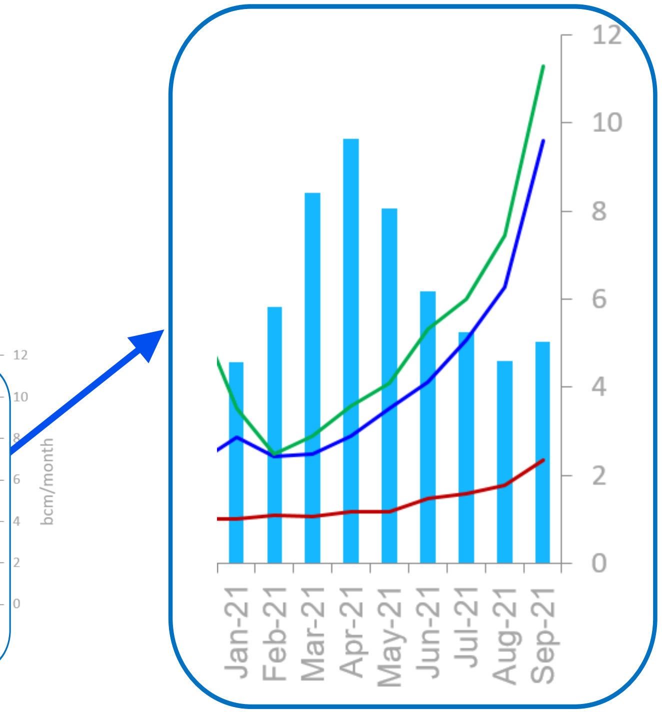
EU gas and electricity prices have increased rapidly and reached unprecedented levels. Gas prices in early October were 400% more expensive than in April 2021, driven significantly by global supply and demand dynamics. Electricity prices have increased by 200% over the same period, driven mainly by the gas prices.

2.1 High prices in global LNG and European dependency on imports

The main driver of the high energy prices in Europe is the global gas price surge, due to significant increase in demand (which in turn is driven by rapid economic recovery and certain weather patterns) combined with tight supply. North-East Asian and South American liquefied natural gas (LNG) demand has grown significantly, putting upward pressure on global prices and leaving less gas available for import into Europe, traditionally the global LNG 'swing market'. LNG imports into the EU declined by -20% year-on-year (YoY) until September 2021. As LNG is the marginal price setter in many EU gas markets, this placed upward pressure on the prices offered by competing pipeline suppliers. Figure 1 below shows spiking prices in Asia in winter 2020 and a strong correlation between European and Asian LNG prices.

Figure 1: **Comparison of international wholesale prices spreads vs EU plus UK LNG imports: 2017 to September 2021 – EUR/MWh and bcm/month**



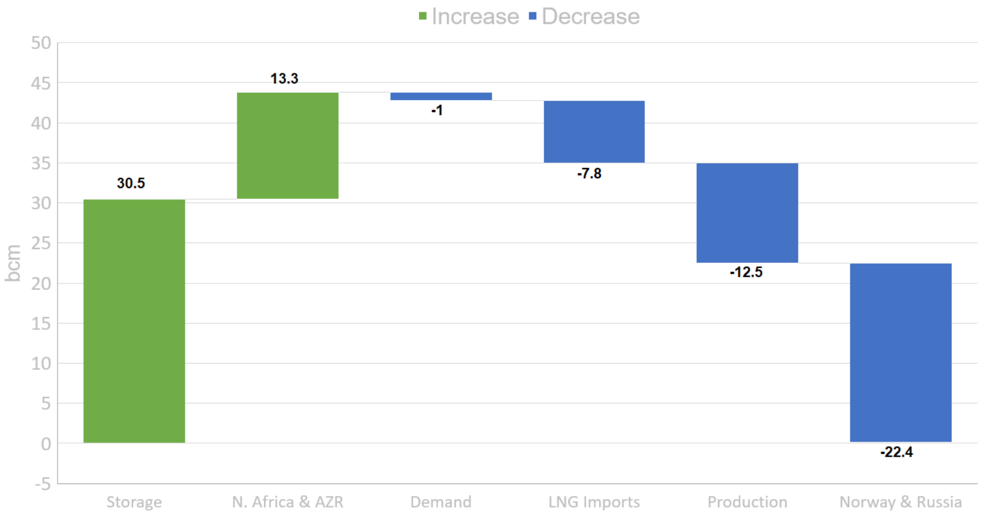


Source: ACER based on ICIS Heren and GIE

2.2 Secondary factors and historically low storage

While global gas prices are the main driver of energy price increases, a mix of secondary factors also contributed in Europe: coal and carbon price increases; high demand (triggered by the economic recovery) and weather patterns (cold winter, unusually hot summer); low renewable generation (e.g. lower wind generation and hydro impacted by drought); declining domestic gas production (-10% YoY) and some gas supply constraints due to maintenance and less investment in new production. While analysts expected the higher price to attract more pipeline supplies, aggregated gas pipeline imports remained steady. So far, the shortfall experienced (with Europe having had 10% less gas supplied) was picked up by gas storage, see Figure 2 below. This in turn has affected the current, relatively low level of gas storage stocks in Europe.

Figure 2: Comparison of the changes in gas supply to the EU, 2019 vs 2021: bcm in the January to August period and winter gas consumption

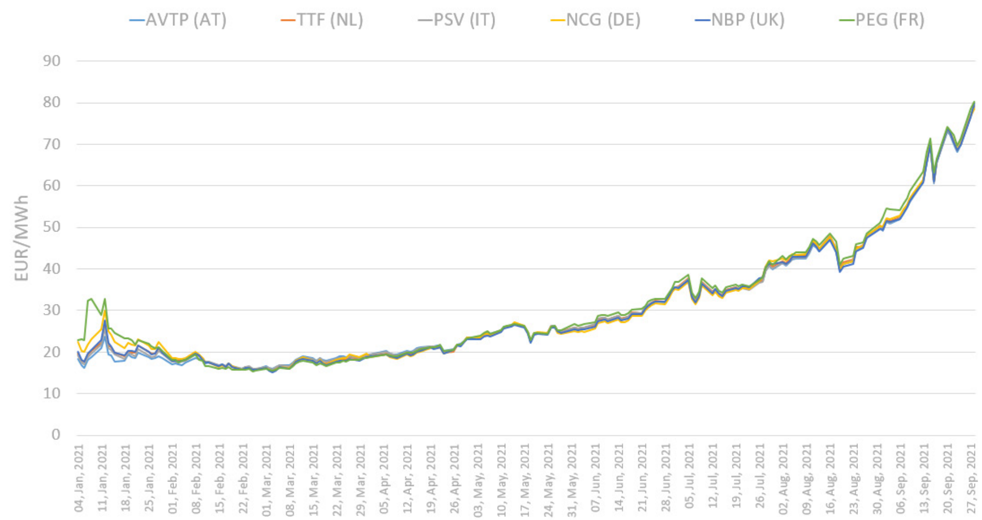


Source: Oxford Institute of Energy Studies based on ENTSOG, GIE and Kpler

2.3 Uniform impacts across European wholesale gas

As mentioned, markets in Europe have been significantly impacted by the global gas prices. Figure 3 below shows the gas front month contracts from January to September 2021 at selected gas hubs in Europe. The figure illustrates that price convergence between EU gas hubs has remained very strong, with spreads below 1 EUR/MWh in most cases. This shows the high level of gas market integration in Europe. Had European gas markets been less integrated, parts of the EU would have paid significantly higher prices for their gas.

Figure 3: Gas front month contracts from January to September 2021 – EUR/MWh



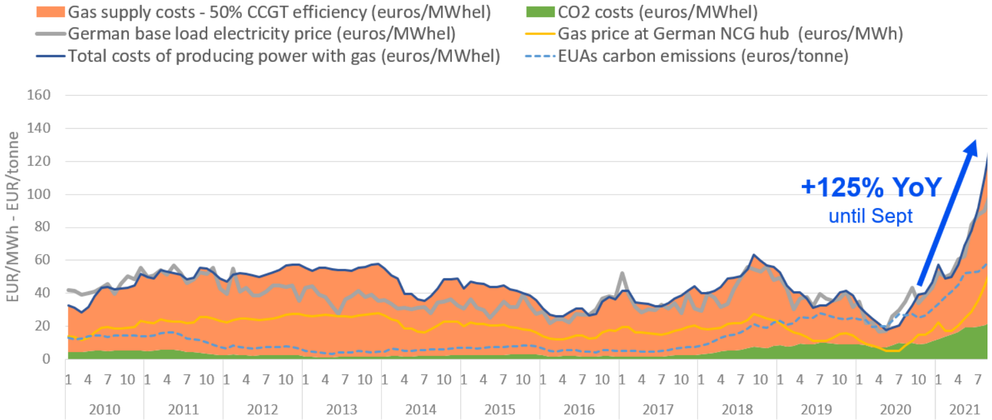
Source: ACER based on Reuters

2.4 Electricity wholesale prices also significantly affected, but less uniformly across Europe

As far as the impact on electricity prices are concerned, Figure 4 below shows the price evolution for electricity, gas and carbon since 2010 in Germany (the most liquid electricity market in Europe). Electricity baseload contract closely followed the cost increase in gas-fired electricity generation, which is a function of both natural gas and carbon prices. The latter has also experienced a strong price increase, though significantly lower than the price of gas (+90% since the end of 2020). This is due to the reduction[1] in the number of auctioned emission allowances as well as the increasing hedging activity of utilities and financial players.

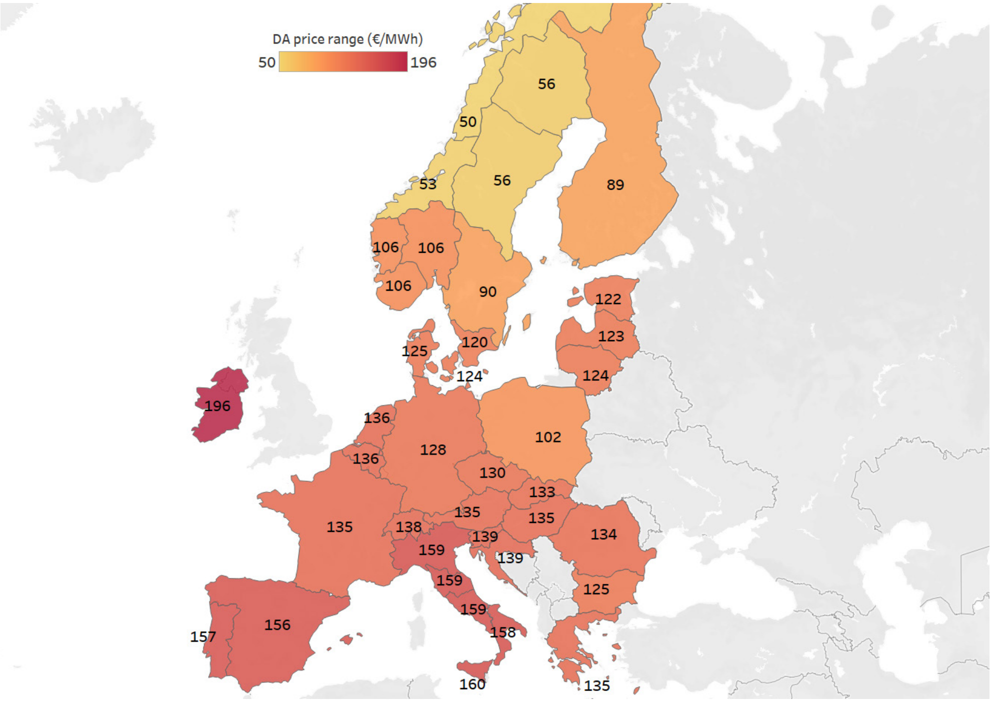
Unlike European gas markets where the price rises were quite uniform, the wholesale electricity price rise differed significantly from one Member State to another (see Figure 5 below showing day-ahead market prices). In short, markets dependent on gas for a larger portion of their electricity generation (Southern European markets and the Single Electricity Market (SEM) for the island of Ireland) have experienced higher electricity prices. The level of interconnectivity also plays a role in this more uneven picture of electricity prices across Europe.

Figure 4: **Price development for baseload electricity in Germany, gas, carbon and average short-run marginal costs of gas power plants (2010 – 2021)**



Source: ACER based on ICIS Heren

Figure 5: **Average electricity prices for bidding zones in Europe: September 2021 (EUR/MWh)**



Source: ACER based on ENTSO-E

[1] Sectors covered by the EU Emissions Trading System (EU ETS) must reduce their emissions by 43% compared to 2005 levels (see Revision for phase 4 in the EU ETS).

3. Near term outlook

This section discusses near term price expectations by examining some of the drivers that will determine electricity and gas price formation in the months to come. It also offers a look into certain market behaviours, underlining that no evidence of systematic manipulative behaviour has been detected (to date) as a cause of the high energy prices, but the surveillance is ongoing.

3.1 Possible market manipulation attempts covered by the REMIT framework?

An important issue when addressing unusual and/or unexpected market developments is whether there are signs of market manipulation, potentially contributing to such developments. Currently, based on the information and data available to ACER, there is no obvious indication nor evidence of systematic manipulative behaviour or insider trading under REMIT[2] causing the high energy prices. Furthermore, given the global fundamental drivers of current high prices in Europe as outlined above, it is unlikely that any specific and repetitive market trading behaviour would have a significant impact on such high prices. ACER's market surveillance efforts alongside those of national regulators under REMIT are ongoing[3].

3.2 Market behaviour by Russia?

As mentioned above, pipeline imports to the EU have remained steady. Gazprom is the biggest supplier of gas to the European market, having approximately 35% market share. Hence, there have been discussions on why the current high European prices have not triggered an increase in deliveries from Gazprom.

On one hand, according to publicly available information, Gazprom has delivered its contractual gas commitments. It is expected that Gazprom deliveries will have increased by 5% YoY by the end of the year. On the other hand, there is significant transport capacity currently not booked which would allow for increased Gazprom supplies to Europe, thus adding to questions as to why this has not happened.

Some factors point to certain restraints facing Russian supply of gas. There is higher domestic consumption in Russia (+12% YoY, including doubled storage injections to refill depleted storage stocks) and additional exports to other markets such as Turkey (+10 bcm), China (+3 bcm) but also via LNG (+3%, all until August). Summer maintenance works at the Nord Stream and Yamal pipelines (also deferred maintenance and outages occurred on North Sea platforms) as well as variable spare production capacity is likely to have affected the total available Russian flows. Another issue concerns the market strategy of Gazprom in a situation, as said, where current prices are attractive for suppliers, perhaps targeting more price than volume or market share. Finally, Gazprom's reluctance to acquire short-term transmission capacity to increase or even maintain its flows across Ukraine and Poland has led to discussions on potential linkages to the possible entry into operation of the Nord Stream 2 pipeline.

3.3 Market expectations – how long will it last?

While ACER is not in a position to forecast market prices, information on future price expectations is available from market participant trading. Forward curves for gas and electricity wholesale contracts delivered in the mid-term future (see Figures 6 and 7 on the next page) indicate that short-term prices are expected to fall back significantly after the coming winter. A trend towards further 'normalisation' is anticipated for the next two years. In short, the market expectation is that the current energy price surge is temporary in nature.

[2] REMIT is a dedicated EU-wide framework, since 2011, securing the integrity of wholesale gas and power markets under Regulation (EU) No. 1227/2011: Regulation on Wholesale Energy Market Integrity and Transparency.

[3] Emission allowances (EUAs) within the EU Emissions trading system (ETS) recently faced significant price increases (in particular in the first five months of 2021). Increasing EUA prices are designed to add to the production costs of fossil fuel power plants in the EU. Hence, this contributes to higher electricity prices whenever renewable and nuclear production alone are not alone able to meet electricity demand. Currently, emission allowances are classified as financial products supervised by financial regulators, and out of the scope of the REMIT monitoring scheme.

Figure 6: **Electricity forward curve**

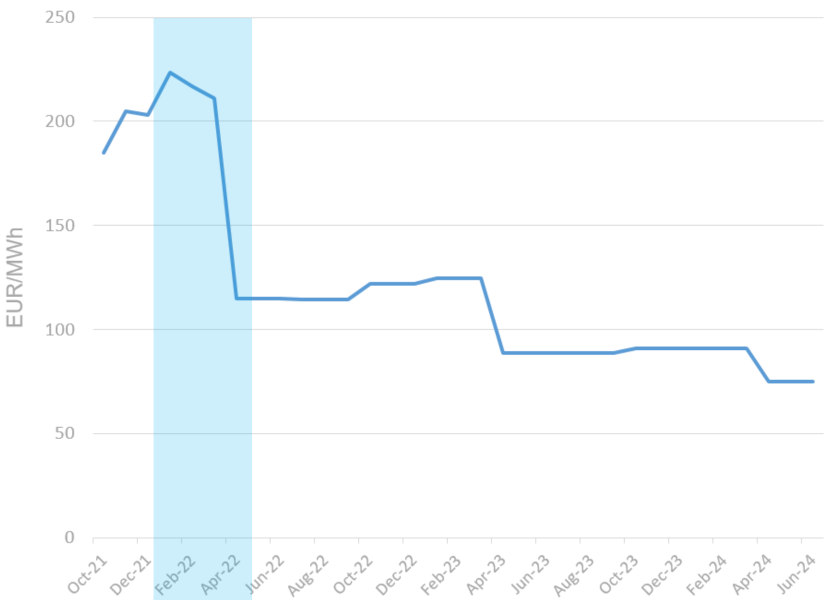
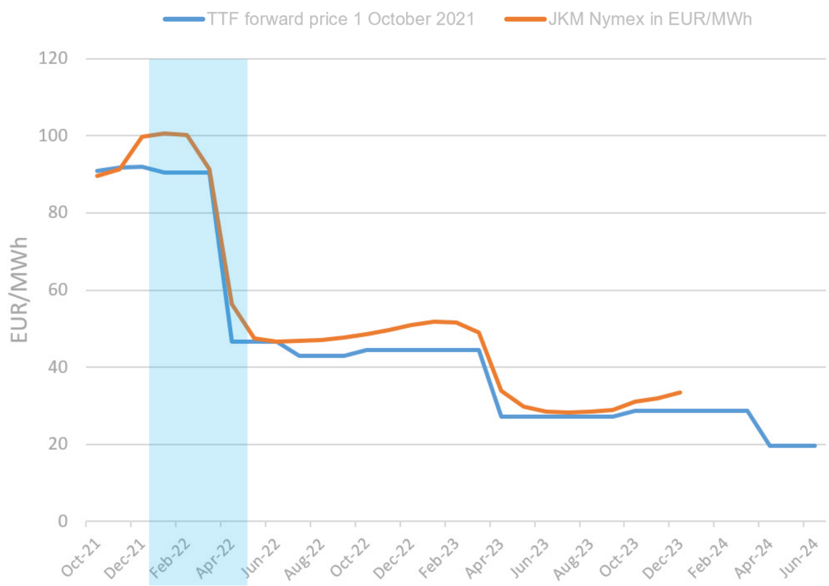


Figure 7: **Gas forward curve**



Source of figures 6 and 7: ACER calculation based on ICIS Heren and Refinitiv data

3.4 Winter is a key variable for gas demand

As current gas supply is unusually tight, attention naturally turns to a key variable for near-term demand in the form of the upcoming winter season in Europe. Here, weather-driven consumption (where households account for 40% of gas and 30% of overall electricity use) as well as levels of economic activity will be key for price developments as the events of 2021 show. A colder than average 2021/2022 winter season could push gas demand further up, whilst at the same time limiting some renewable electricity generation, thereby resulting in potentially higher prices than anticipated today. Demand from industry will be shaped by a number of factors, one of which is the profitability of continued production in light of higher energy (and other commodity) input prices. So far, however, the post-COVID-19 economic growth seems rather robust.

On the supply side, over the last year underground gas storage withdrawals have played a crucial role to rebalance EU supply portfolios (as mentioned above). However, combined with reduced LNG injections in spring, operators depleted storage levels to volumes lower than observed in previous years. In October 2021, EU underground stocks are on average at 76% of capacity (behind this average figure stand, however, significant differences in storage access regimes around the EU[4].)

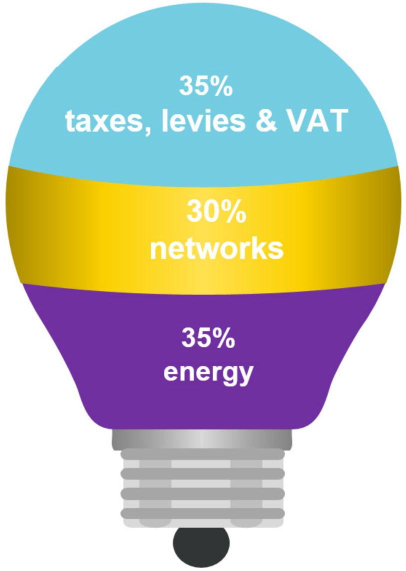
A tight supply scenario in the coming winter, recalling here that spot LNG deliveries into the EU will be influenced by global demand and supply dynamics, coupled with present day low gas storage stocks would imply upward pressure on prices. Put briefly, if LNG and pipeline imports do not increase compared to current levels, stocks may be tight to face a similar winter to 2020/21, and short to face the 'worst scenario' in terms of winter temperatures.

[4] To name a few examples: Storage is around 55% in Austria or the Netherlands, with a negotiated access regime, compared to around 90% in Italy, France or Poland which have set regulated access conditions.

4. Select policy considerations

The current undersupply in global gas markets and resulting global gas price surge is significantly affecting European gas and electricity consumers. Higher than usual market prices are not per se a sign of malfunctioning markets, in particular when they follow underlying market fundamentals. Rather, the markets function so as to draw attention to these underlying fundamentals, raising questions as to whether policy action should be taken to address them (one example being the currently significant reliance on gas imports into the EU).

That said, persistently high energy prices naturally raise a number of concerns for governments, e.g. affordability for end-consumers and especially vulnerable consumers, as well as competitiveness of industry, inflationary pressures and wider macroeconomic implications for the economic recovery. Here, we highlight a few important policy considerations, both short-term and longer-term.



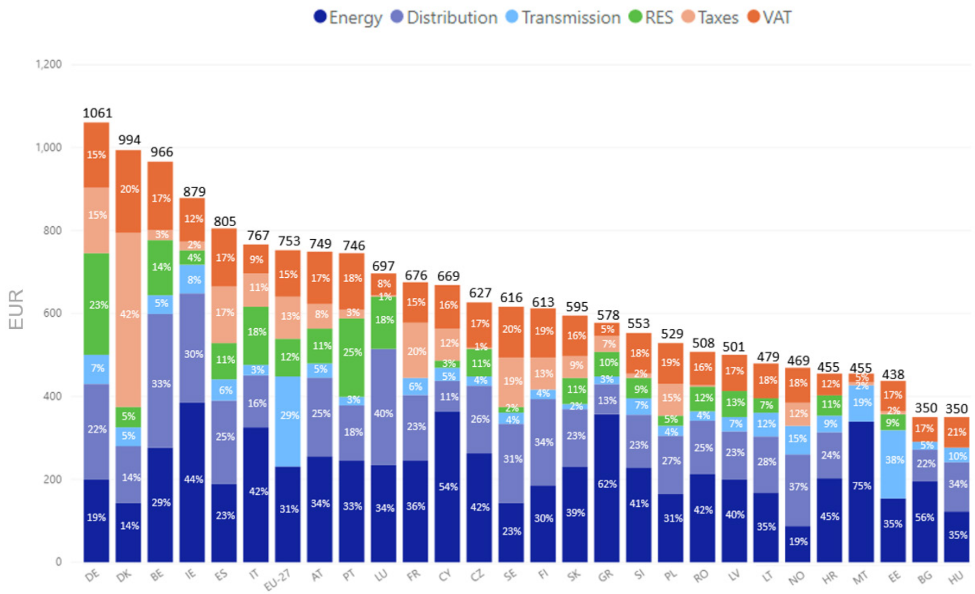
With taxes and levies making up a considerable part of the typical household electricity bill in the EU, governments may want to consider reductions or targeted exemptions of taxes and levies. From a regulatory perspective, such measures would have maximum impact if they target particularly vulnerable consumer groups.

4.1 Short-term relief to protect the vulnerable and the European Commission's Toolbox

Energy price increases will disproportionately affect vulnerable consumers and those on lower incomes, thus raising issues of equity. The timing and impact on consumers depends on their contract for energy services (e.g. whether these are flexible, dynamic or fixed price contracts). Eventually, however, suppliers are likely to pass on cost increases to consumers (be it immediately or later on).

The typical bill sheds some light on where government policy interventions could be e.g. reducing **taxes and levies**. The cost breakdown of the household bill is roughly one-third energy, one-third network charges, and one-third taxes and levies (although with significant variations between Member States as Figure 8 shows). Hence, the approaches in different Member States will likely vary.

Figure 8: **Average EU electricity bill breakdown 2020 (%, EUR/MWh)**



Source: Eurostat Band DC – 2,500-5,000kWh consumption per annum

Another option is to enact **social policy measures** outside of the energy domain like e.g. dedicated financial transfers. Such measures can be targeted to those groups deemed most in need and avoid the risk of inadvertently tampering with desired price signals over the medium-term. In addition, dedicated consumer protection measures (e.g. **disconnection safeguards**) could be considered.

Energy efficiency and specific consumer action can also assist in reducing energy bills. Quite a number of consumers in Europe are still with their traditional supplier 'inherited' from the period before the liberalisation of retail energy markets. This may expose such consumers to a 'loyalty penalty', resulting in them paying more for their energy. As outlined in European Commission Quarterly Report (Q4) on European Electricity Markets 2020[5], **consumers can save by switching supplier**. Comparison tool websites also help consumers find an alternative supplier at a lower price.

A frequently debated measure is the use of **price regulation or targeted price restrictions**. Importantly, price regulation, in particular at the electricity wholesale market level, is not allowed under EU legislation. While price interventions (e.g. caps on prices, bids or revenues) may appease some concerns in the short-term, they risk jeopardising broader objectives such as further innovation in market offerings, competition and trust in wholesale markets. This in turn risks leading to lower participation from potentially competitive suppliers as well as demands for higher-risk premiums. And these in turn may further aggravate those high prices which were the political impetus behind those same interventions in the first instance.

The European Commission has prepared **a 'toolbox' of measures** that national governments can use to protect the vulnerable without endangering the well-functioning EU wholesale markets. In ACER's view, protective measures that aim to provide short-term relief should seek to refrain from interfering with the operation of energy markets where these markets are designed to make the best use of existing resources and appropriately signal supply scarcity. Such markets incentivise other providers to come in and meet demand, potentially via different and more competitive offerings. A fundamental dilemma during situations of unusually high prices is that whilst the political focus naturally is on protecting the most vulnerable, the role and value of price signals should not disappear. On the contrary, such signals contribute to drive desired behaviour (e.g. towards new investment and/or increased efficiency efforts). In the absence of such signals, it is likely that choices will be driven towards less-desired behaviour.

4.2 Medium to long-term measures

Wholesale market design is often questioned when prices rise above certain levels. ACER is of the view that an efficient and long-term sustainable energy market design is a key pillar for realising Europe's vision of a competitive and climate neutral economy.

4.2.1 Electricity 'pay as clear' markets

A key feature of the EU electricity wholesale market is that prices and exchanges of electricity across market areas (so-called bidding zones[6]) are determined through a process known as market coupling. This keeps electricity costs down for consumers across the EU and allows Member States to rely on neighbours at times of scarcity, supporting security of electricity supply.

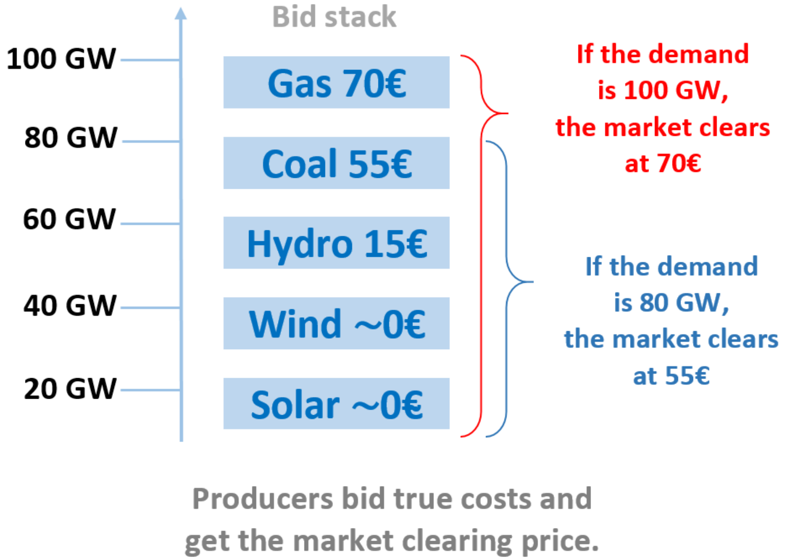
The EU electricity market is based on a marginal pricing method (also known as a 'pay-as-clear' market). All electricity producers (including renewables, demand-side response and technologies such as storage) in the same bidding zone are incentivised to bid their true costs (so they are dispatched the maximum amount of time) and are all paid the same price for their electricity, provided their bid comes under the final clearing price.

[5] https://ec.europa.eu/energy/sites/default/files/quarterly_report_on_european_electricity_markets_q4_2020.pdf

[6] The geographical boundaries of EU bidding zones are typically the borders of the Member State, with a few exceptions.

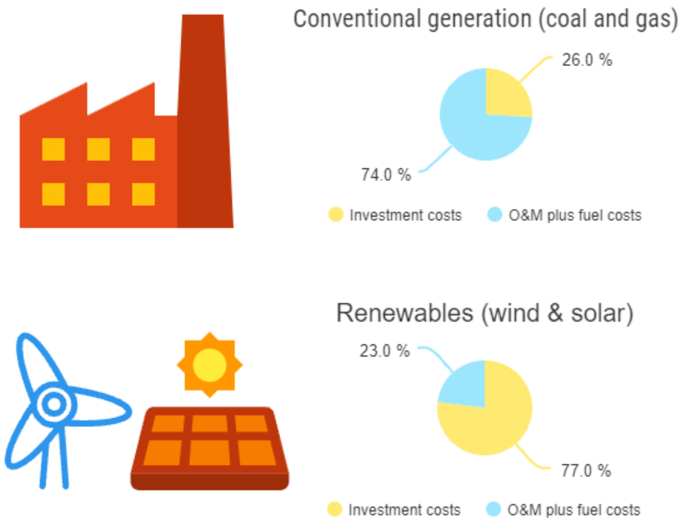
Figure 9 illustrates the pay-as-clear model.

Figure 9: **Marginal pricing: Pay-as-clear**



Source: ACER

Figure 10: **Illustrative breakdown of costs for conventional and renewable generation technologies**



Source: ACER based on the IEA

The divergent breakdown of the costs incurred by generation technologies is one of the factors to be kept in mind when considering the appropriateness of the current market design vis-à-vis current high prices, and in particular the perception of 'unfair profits' possibly being made.

First, a common feature of most low-carbon technologies, including renewable generation, is that they have relatively low marginal cost but significant upfront capital investment cost (often referred to as 'high CAPEX, low OPEX' technologies). Figure 10 gives an indication of the difference, here comparing one type of gas thermal generation with solar PV generation.

As a result, 'high CAPEX, low OPEX' technologies will need to recuperate their higher capital costs via (first) being accepted in the merit order (which would normally happen in the absence of very low demand given their low marginal cost); and (second) the clearing price being significantly above such marginal costs for a significant number of hours during the year. In the absence of that, such investments will likely not be financially viable without significant subsidy support – and if so, it is likely such investments will no longer be made.

Second, as in other major jurisdictions around the world, the EU's 2050 trajectory will likely entail a significant increase in overall electricity generation as this is a cost-efficient means to decarbonise multiple sectors of the economy. Substantial shares of this increase in generation is likely to be renewable technologies, of which a substantial share will be intermittent renewables like e.g. wind and solar generation.

Recent IEA analysis shows that the flexibility needs of the electricity system as a result will increase at a higer rate than the overall increase in generation, see Figure 11.

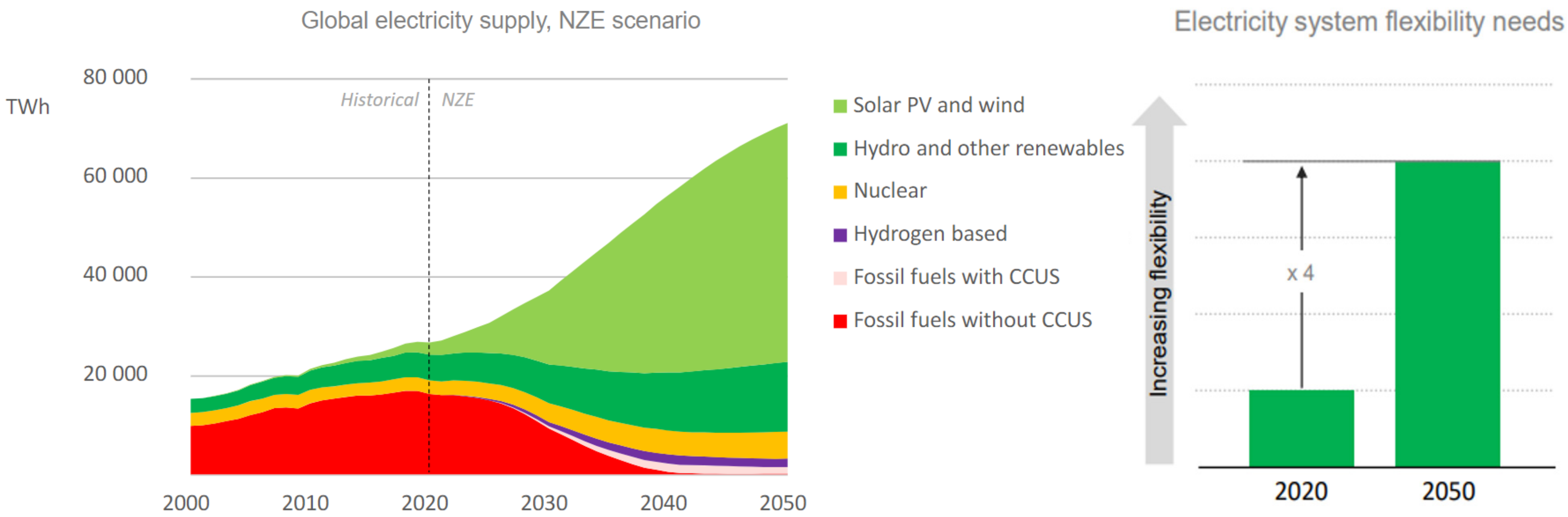
In turn, this means that the future electricity system is likely to remain inherently volatile, with prices varying significantly as a function of generation availability. As a result, there is a need to incentivise those providers and technologies that can 'smooth' this volatility (be it batteries, larger-scale storage, aggregated demand-response providers like electric vehicle fleets, energy communities etc.).

These factors combined would seem to imply that any future market design needs to be able to (a) remunerate technologies above their marginal costs, sometimes quite significantly so, and (b) incentivise the alleviation or smoothing of volatility in the market. The 'pay-as-clear' model allows for both of these elements.

The aforementioned considerations do not necessary imply that the current market design for all intent and purposes is 'future-proof'. By way of perspective, up until recently most discussions about an evolving electricity market design revolved around the question of whether a market dominated by low-marginal cost generation would be able to 'make enough money' for those present in the market. This seems to contrast with some of current discussions, seemingly more focused on whether generators are 'making too much money'.

From ACER's perspective, certain fundamental questions around future electricity market design persist and are pertinent. However, these questions revolve more around the former question (making enough money) than the latter (making too much money).

Figure 11: Outlook for global electricity generation and associated flexibility needs towards a 2050 net zero trajectory



Source: Net Zero by 2050: a Pathway for the Electricity Sector, IEA May 2021

4.2.2 Expand gas storage obligations and/or centralise purchasing of strategic gas reserves?

With global gas supply and demand dynamics being the key driver of the current high prices, political attention has, not surprisingly, turned to possible measures relevant for gas supply security going forward. Discussions have focused on options like expanding obligations for gas storage in Member States or centralised gas purchasing of strategic reserves.

Regarding gas storage obligations, as outlined earlier, Member States have so far adopted different approaches. While storage obligations tend to result in higher stock levels, they can also reduce the efficiency of supply and restrict hub-trading activity, which could lead to higher final prices. Therefore, proposals to expand gas storage obligations across the EU, notwithstanding certain supply security benefits, deserve appropriate analysis.

As regards ideas for centralised purchasing of strategic reserves, it is not immediately clear that pooling of such purchasing power would have much impact on the price of gas supplies. For starters, current circumstances constitute a 'seller's market'. As such, any collective buying proposition from European companies would need to be attractive vis-à-vis, say, major demand markets in Asia that are currently driving prices upwards. Similarly, the dominant gas pipeline suppliers to Europe do not seem to be reacting heavily to the current high-price environment by significantly enhancing their supply. Hence, it is an open question whether pooling purchasing power would have a material effect.

Centralised gas purchasing strategies have resonated in the past, as a proposal to limit the bargaining power of gas producers. For example, various Central and Eastern European Member States expressed in 2015 interest to jointly negotiate contracts with Russia, in the context of price and transit disputes. Consortiums have also been formed to back new production and transportation investments (e.g. various Member States and companies expressed interest to develop the eventually non-concluded Nabucco pipeline, to bring gas from the Caspian region into the EU). These collective voluntary actions did not materialise in view of the practical difficulties faced, but also because the analysis identified that - even if they could partly assist a more efficient negotiation - the initiatives could restrict competition, reduce transparency or withdraw liquidity from hubs. Alternative measures such as the further harmonisation of market rules, grid reinforcement and promotion of hub competition were deemed more effective.

4.2.3 A comprehensive energy transition will need to be a well-managed one, targeting both demand and supply

Energy markets play a central role in driving broader decarbonisation objectives as these markets provide the primary price signals to drive desired behaviour such as e.g. greater efficiency efforts or decisions on new investment. Such markets are important to ensure that choices made in the coming years are efficient, lowering overall system transition cost; a factor which in turn is likely to prove key for overall affordability longer-term.

The current high price situation, resulting in particular from global supply and demand dynamics, has shown that faced with a sudden and unexpected supply glut, demand to a significant extent has failed to respond (a phenomenon economists often refer to as 'inelastic' demand). This rather simple fact shows that a well-designed energy transition pathway going forward will need to rely on holistic policy that targets demand just as much as supply and focuses on both the short-term and the long-term.

This type of focus suggest that energy transition pathways are likely to become more of a 'managed energy transition' going forward. If so, consistent government and regulatory monitoring will play an increasingly important role.

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