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The Electricity Market Design in a Period of High Energy Prices

Europe is experiencing very high energy prices, due to the global economic recovery from the COVID-19 pandemic, as well as the conflict in Ukraine. These high energy prices have widespread consequences for a variety of markets, including the gas and electricity markets. Throughout Europe, both of these markets are experiencing record high prices and instability, which begs the question of if these markets are designed with purpose and everyday people in mind, or if it is time for the industry to re-think how things are being done, and go back to the drawing board, to develop a new modus operandi for Europe's energy ecosystem.

Is the energy ecosystem currently fit for purpose?

The energy ecosystem is a complex landscape, featuring several diverse markets and products, each with their own rules and modes of operation. There are separate rules for the wholesale and retail markets, for gas and electricity, as well as for all other energy products for sale and use in Europe. The recent fluctuation of energy prices has led to calls for the revision of the EU gas market, as well as the design of the EU electricity market. Both of which require immediate attention and action, which we will consider here.

Market instability is a natural moment for questions to arise about the overall framework that the energy sector operates in, and how it is designed. However, high prices do not necessarily mean that the market does not work and has not been designed to survive dramatic fluctuations. It simply signifies a strong moment for reflection and collective action if changes are needed.

Thus, very high energy prices are not just due to a failure in market design. They can also be the outcome of a failure of key market players to correctly predict how the market will evolve, and where investment is needed to correctly hedge against unexpected circumstances.

What is the state of Europe's gas market?

Europe is dependent on imported natural gas, and as a result is exposed to volatile pricing of both Russian pipeline gas, and liquified natural gas (LNG). The restrictions placed on gas transit through the Ukraine last autumn, as well as the recent suspension of the certification of the Nord Stream 2 pipeline, are responsible for driving Europe's seasonal gas storage to dangerously low levels. Of particular note, is the fact that Gazprom-owned storage facilities are substantially more depleted than normal, while levels at other storage sites are within a normal range¹. These Gazprom-owned storage sites, which have not been refilled over the summer, have been causing price hikes and instability since September 2021.

In response to the instability of pipeline gas levels in Europe, the continent is looking more to its LNG import capacity. The problem with this, is that LNG is inherently more expensive than pipeline gas and is part of a dynamic global market (similar to the global oil market), where LNG carriers can be redirected from one destination to another. For example, LNG can be moved from Asia to Europe, in response to small price differences. Therefore, global LNG prices depend on the global (especially Asian) economic recovery from the pandemic, as well as the increase in European demand.

To adequately respond to these issues in the longer term, the EU can introduce new requirements for Member States to have a minimum level of storage by the end of this summer. This could include requirements to set inventory levels for companies owning storage sites, to ensure that national or regional capacities are adequate by the beginning of each heating season. Doing so, can help mitigate the effect of unstable prices and inconsistent energy, as experienced in the winter of 2021.

Where does the electricity market need our attention?

An important feature of the design of the EU electricity market, is that wholesale prices are based on the short-run marginal costs of power generation plants, which are closely associated with fuel costs. When fossil fuel prices rise, particularly natural gas, electricity prices also rise. In

contrast, renewable power generation requires zero fuel, and has very low operational costs (OPEX). Despite this, even with an increased use of renewable electricity sources with low OPEX, only the high OPEX fossil fuels set the price level for Europe's electricity market.

High power prices are the result of market design failure, because of anchoring market pricing against the cost of fossil fuels. Power generation is characterised by substantial investments in generation and network assets, which should be set in the long term to drive the total system cost. However, wholesale power prices remain determined by the marginal price unit. This marginal price can be substantially higher than the average production cost for extended periods, but with a prioritisation of renewables and the goal to lower the amount of fossil fuels used, this market design feature will become more and more difficult to justify.

Looking forward: What can we do?

Revisions to the market design in several areas, will likely become inevitable as the transition to renewable energy and development continues. It is illogical to have investments in CAPEX-intensive renewables supported by a wholesale price set by the marginal cost of fossil fuel-based assets. This will become more and more apparent, as Europe moves toward net-zero in all areas of the energy ecosystem, meaning that design of the market framework, will need to evolve to manage large-scale intermittent wind and solar power generation. This also means that the storage assets and demand management practices required of these energy sources, will need to be re-worked. These dimensions are currently absent from energy price drivers, and need to be actioned, to not only support the supply side of market development. In this sense, the current electricity market design is not 'Fit for 55', and certainly is not fit for net zero emissions.

Thus, changes to the design of the energy ecosystem are an urgent priority, as they are needed to support the market transition to renewables and net zero. This transition is occurring faster in the power generation sector than in the rest of the ecosystem, with close to zero emissions expected in the power sector around 2035².

¹ <https://www.bruegel.org/2021/12/how-serious-is-europes-natural-gas-storage-shortfall/> Blog post by Georg Zachmann et al., December 2021

² <https://www.2035report.com/electricity/> "2035 – The Report", by the Goldman School of Public Policy, University of California Berkeley, June 2020

With the move to embrace net zero, sudden variations in demand for natural gas will become more frequent. Even if the overall demand for gas declines, these variations will keep shaking the whole power generation sector and will make the transition unstable. Similarly, we should expect prolonged periods when wind and solar output are significantly below or above average. This signifies a need for weather condition clauses to be included in the design of a more modern electricity market.

To support the necessary changes to the energy ecosystem as a whole, The National Regulatory Authorities (NRAs) need to be given more power to closely monitor energy markets, to protect small and medium-sized enterprises (SMEs) and households. This is because, they cannot be expected to follow daily market developments or enquire about the financial health of energy retailers.

A tight interplay between offer and demand in power markets can provide opportunities for monopoly-like behaviour by historical power generators with a large stake in the market. This is an area where NRAs can help regulate the market and prevent unfair competition, without direct intervention.



Key takeaways for action

The EU markets for electricity and gas took several decades to develop, and they remain a work in progress to a certain extent. Market design features should certainly not be changed in response to a short-term crisis. However, the crisis has highlighted some of the features of our current market design which are not optimised to guide us through the transition to a net-zero emissions society. Market designs will need to evolve.

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