The Long Covid of Energy Markets and Prices

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Abstract

The 2021 energy crisis comes at an inconvenient time for the green transition agenda and can affect disposable income, unemployment and inflation. This paper discusses the likely effects and implications for energy networks and policy. The economic principles behind the crisis may seem intractable, but they are familiar. A combination of known factors caused the crisis. Europe is dependent on gas imports and a shortage of supplies contributed to the rising gas and electricity prices. The low-price elasticity of energy demand and supply makes them susceptible to price volatility even with modest quantity shocks. Higher CO2 abatement costs have forced some firms to rely on natural gas, which in turn drives up the gas prices. The liberalized energy markets did not cause the 2021 energy crisis. However, neither did they did prevent or fix the crisis. There are useful questions and lessons about governance and market design to be learned. The crisis brought forward the need to revisit some measures and policies including a more robust transition management, new transmission capacity, more storage, balance of contract types, and network regulation models.

Keyword: Natural gas; Carbon price; Economic recovery; Integrated energy markets

JEL classification: Q30; Q41; R11

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1 Introduction

The 2021 price rise in natural gas and electricity came at a time when demand for energy is rising, as North America, Europe and Asia prepare for a cold winter and experience a post-pandemic economic recovery. The surge in demand for energy was not matched with increased supplies, and the importing regions compete with one another in the global energy market. There are, however, some regional difference in how the crises presented itself in different regions.

In Europe, energy prices rose sharply in the second half of 2021, jeopardizing economic growth, placing pressure on global supply chains, and threatening to distort the green transition. Natural gas prices moved significantly higher than in spring of 2020 (Crellin, 2021). For instance, the Europe´s leading benchmark price for natural gas, the Dutch Title Transfer Facility, rose from €17.7/MWh on February 1st to €93.6/MWh on October 1st (ICE, 2021).

This prompted some electricity producers to switch to coal, as natural gas prices increased faster using than coal prices (Alvarez and Molnar, 2021). Consequently, prices for CO2 permits under the EU Emissions Trading Scheme (EUETS) also rose and traded at around €65 per tonne for the first time in early October (ICE, 2021). Nevertheless, burning coal became more profitable in the short term. Given the relative price of coal and gas, the high CO2 price does not seem to have been sufficient to prevent a return to coal (Almeida et al., 2021).

A number of factors lie behind the surge in energy prices in Europe and other regions of the world. This paper explores the likely causes and effects of the recent energy price increases with a focus on the implications for energy delivery networks. Section 2 describes the context leading up to the 2021 energy crisis. Section 3 discusses the economic and implications of energy price rises. Section 4 is conclusions and some policy implications.

2 The Context

The crisis presents the energy sector, global economy, and energy policy makers with an unexpected challenge. The economic consequences of a global energy supply shortage will likely worsen as the 2021 winter arrives. Many countries compete for the constrained resources and need to prepare for higher prices (Reed, 2021). Some industries are shutting or slowing down production and consumer prices for gas and electricity are setting new records. In countries that cannot afford the high energy prices, the economy could slow-down and consumers might experience more frequent and longer blackouts.

The escalating energy crisis is reflected in the electricity, gas, and carbon markets while some contextual factors are reshaping the correlations between them. As Europe's demand for gas for winter heating and post-coronavirus economic recovery grows, supplies of liquefied natural gas (LNG) and pipeline gas imports have declined and are unlikely to increase in the short run. Shortage of external supply have contributed to soaring gas and electricity prices in Europe.

Another factor widening the supply-demand imbalance is the increasing cost of carbon abatement. As energy-intensive industries need to become cleaner, in the absence of viable

alternatives, some have turned to the use of natural gas. Meanwhile the short-term schedules of supply and demand for gas are price inelastic, which has played a key role in shaping the previous energy crisis. Figure 1 illustrates the sharp increase in all major energy price indicators.

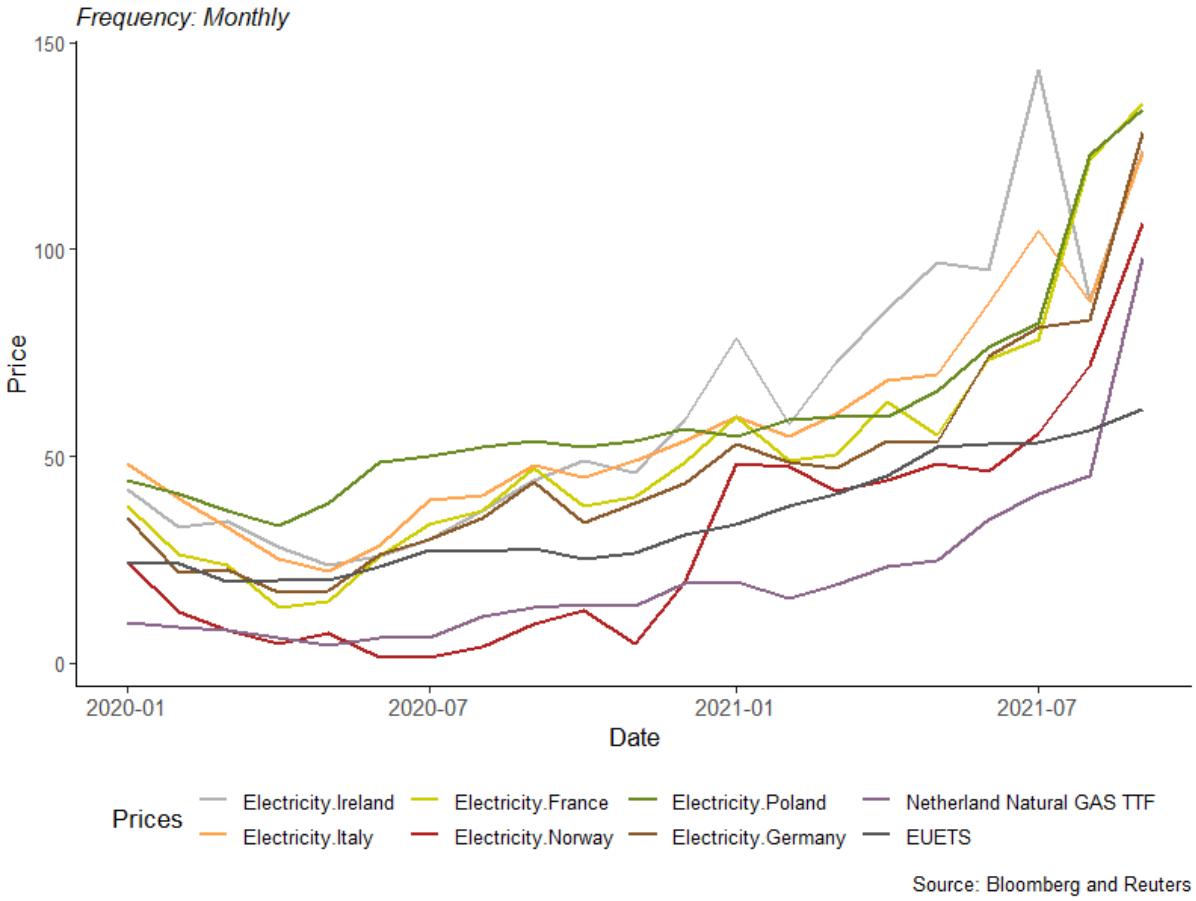

Figure 1: Major energy and carbon prices

2.1 Natural Gas

The strong economic recovery increased gas prices in different regions of the world albeit combined with different reasons. Global gas supplies grew by around 5% during 2020, well below the growth rates of previous years, partly due to reductions in gas supplies from supplying exporting countries. Natural gas is a transitional energy resource and acts as a bridge between emission-heavy coal and renewable energy. As such, gas has become one of the most important fuels for power generation in developed countries, and vital for decarbonisation. In Latin America, the low hydropower output added to demand for gas power. Many countries are trying to outbid one another for supplies as exporters (e.g., Russia) move to keep more natural gas home (Fulwood and Sharples, 2021) or have low storage levels. In China, environmental regulation constrained access to coal power. In India, low coal reserves increased the demand for gas. In the US, availability of shale gas has cushioned the rise in gas price relative to Europe.

In Europe lower than normal wind levels increased the demand for gas power. As the second largest source of primary energy, natural gas in the EU accounted for 25% of the total energy consumption in 2020. Europe's proven gas reserves are only 3.2 trillion cubic metres, i.e. 1.7%

of the world's total. In 2020, the EU imported 85% of its total gas consumption of 380 Bcm with 115 Bcm as LNG and 211 Bcm via pipelines. (BP Statistical Review, 2021). Russia is the main source of gas imports to Europe, accounting for 48% of the total imports while Norway and North Africa accounted for 20-25% and 14%, respectively (Eurostat, 2021).

There was also a decline of 19.3 Bcm in European pipeline imports from Russia compared to January-August 2019 (a total import of 118.3 Bcm). Meanwhile, the amount of LNG coming to Europe was decreasing (BP, 2021). Tight supplies of natural gas in the global market put an import-dependent Europe at a major disadvantage. Meanwhile, Europe´s domestic gas production has declined over the last decade (BP, 2021). In the Netherlands, the EU's leading producer, gas production has been reduced due to the risk of earthquakes (Elliot, 2021). The concern over a possible future bottleneck, which drives the market price of energy even higher, is therefore growing.

2.2 Electricity

Global shortages in natural gas supplies have been a major source of increase in energy electricity. For instance, China has experienced power shortages in the industrial and household sectors in several provinces (Hoskins, 2021). This could lead to a reduction in economic output, and in turn to global repercussions as prices for commodities, such as steel, rise and supply chains struggle (Stapczynski, 2021).

Europe´s reliance on gas imports is important for electricity prices and supplies especially at a time when electrification of economy is a key aspect of the green transition. More than one-fifth of Europe's electricity is generated from natural gas. Natural gas is viewed by many as a transition fuel in the run up to full-scale development and integration of green energy alternatives. As gas supplies were constrained, the UK brought back online some coal power plants to make up for the strong demand and low wind levels. At the same time, the shortage of gas supplies in Europe coincided with lower-than-average levels of wind and reduced availability of water in Norwegian reservoirs, the latter regarded by some as the battery of Europe.

Some believe that higher electricity prices would reduce consumption and carbon prices. However, this was not the case in the 2001 energy crisis in the EU as demand for energy surged after Covid-19. Higher energy consumption leads to higher power generation and carbon price. Alberola et al. (2008) and Boersen and Scholtens (2014) found a positive correlation between electricity and carbon prices. Switching from coal to gas for power generation can affect carbon prices. Bunn and Fezzi (2007) find that under Phase I of the EU ETS, carbon and gas prices were important drivers of electricity price.

The low price-elasticity of energy demand and supply make them prone to strong price volatility from even modest demand and supply shocks. Moreover, environmental policies and energy efficiency regulations have, in some markets, for instance in China, reduced the elasticity of substitution and inter-fuel competition between fossil fuels, i.e. the ease with which they can substitute each other.

2.3 Carbon Price

An emission trading system (ETS) is an organised market designed to achieve specific policy goals. It has sparked much discussion, and a plethora of research has demonstrated that carbon markets are inextricably linked to macroeconomic factors and the dynamics of fossil energy markets. In principle, the driving factors of the supply and demand in an ETS are: (i) economic growth and government constraints; (ii) international climate change agreements; (iii) regulatory change and arbitrageurs; and (iv) market fundamentals, such as energy prices and weather. Among these factors, economic development and government constraints influence carbon price volatility, confirmed by recent studies (Benz and Trück, 2009; Mansanet-Bataller et al., 2007; Lyu, 2021).

In May 2006, the EU reported an allowances surplus, causing a drop in both spot and futures markets. A prohibition on carrying over unused units into Phase II impacted the price of carbon, causing a plunge on both spot and future markets. (Jiang et al., 2009). The 2008 financial crisis resulted in higher-than-expected reduction in carbon emissions. As a result, there were large amounts of permits and credits available, which reduced the price of carbon throughout EU ETS's Phase II. Conrad et al. (2012) argue that policy announcements and regulation decisions of the European Commissions have a strong impact on carbon prices in EU ETS. Hammoudeh et al. (2014) find that higher gas prices in the US affect carbon prices under EU ETS positively when they are higher.

Phase IV of the EU ETS has restricted allocation of permits in accordance with the EU Green Deal (European Commission, 2020). A single cap for stationary installation set for 2021 at 1,572 MtCO2e, with a linear cap reduction factor of 2.2% per year, applies to stationary sources and the aviation sector (ICAP, 2021). There has been a steady increase in New Zealand and California's carbon prices. China's national carbon trading scheme has operated since June 2021 and is becoming the world's largest carbon market in terms of trading volume. It is a stated policy for China, to achieve carbon neutrality by 2026, and the total cap will be tightened over time.

The high price of carbon in 2021 was driven by a tight gas market. Substitution will occur if the price of the natural gas rises enough to make back-stop technologies economically attractive. The increased carbon abatement costs compel energy businesses to increase their dependence on natural gas, which in turn drives natural gas prices higher. As a result, rising gas prices incentivise energy intensive enterprises, and power producers, to switch back from gas to coal. The carbon-heavy enterprises, eglobalecially power companies, are likely to pass on much of the increased carbon price to their customers (Zachmann and von Hirschhausen 2008).

3 Implications and Risks

The balance of objectives of the European integrated energy market has gradually shifted from improving economic efficiency of the sector towards achieving environmental and social objectives in a cost-effective manner. The energy crisis is significant in the sense that it affects all pillars of the economy-sustainability-equity trilogy. The rise in gas and electricity prices

has come at an inconvenient time for the green transition agenda as countries are aiming to decarbonize and electrify their economies.

Energy price shocks, leading to general price increases, have a negative effect on the economy, which may be viewed in three levels, from the micro to the macro: High prices reduce the disposable income of consumers. As a result, more households are forced into fuel poverty as their energy costs rise. Higher cost of goods place pressure on general price levels, fueling inflation. The cost of production of goods will rise, reducing the profits of the firms. In addition, higher energy costs raise the entry barriers to gas and electricity markets, causing small energy suppliers to collapse. In the UK, during 2021, several small retail energy companies have left the market.

Energy is used both for final consumption and as input factor in the manufacture and provision of goods and services. Therefore, price shocks affect most economic activities. Specifically, with higher costs and lower profit margins, unemployment can rise. This may result in supply-demand imbalances, which combined with stretched supply chains challenge green growth and transition.

Finally, the inflationary effect of energy and other prices can have significant financial implications for the energy sector. One of the remedies suggested for green recovery following the Covid pandemic has been to take advantage of low interest rates by investing in green energy and infrastructures. To the extent that higher inflation is followed by higher interest rates, this can increase the cost of financing renewables as these are comparatively capital intensive relative to fossil fuel energy. This will be happening at a time when higher levels of investments in renewable energy are being prescribed to accelerate the green transition.

Accelerated investments in renewable energy can help alleviate such shocks. However, renewable resources tend to be away from population centers and will therefore need more power lines linking the supply and demand centres over long distances. Public acceptance of network infrastructure will be an important consideration in the years to come as the energy industry is becoming increasingly visible to them.

Large amounts of renewables need to be backed up with long term storage in the form of molecules or electrons. Working out the type of gas and color of the hydrogen during the transition will be a challenge for the green transition. Also, the roles of short- versus long-term gas and power contracts should be revisited with increased weight placed on security of supply. In addition, managing the role of energy networks during the transition and their investments will require innovative regulatory models.

4 Conclusion and policy implications

Energy crises are, almost by definition, the occurrence of unexpected events. While energy systems are well-prepared to handle most known risks and shocks, it is often the unanticipated combinations of them that present a crisis. The 2021 energy crisis is not very different. The economic explanation of the current energy crisis is fundamentally a familiar one and not unexpected. Only this time the sequence and combination of well-known factors are, as in any crisis, different.

A negative shift in the demand schedule at the height of Covid caused lower energy prices. This led to a slower pace of investments in the sector, in particular in fossil fuels as long-term economic and political prospects of this industry in green transition seemed uncertain. Once the strong post-Covid economic recovery shifted the price inelastic demand schedule forward, the inelastic supply could not respond.

More efforts towards energy sector integration and better use of digital solutions can increase the resilience of the energy markets. However, this will not be a substitute for reliable supplies of energy. Likewise, electricity interconnections are useful for short- and long-term trades and efficient use of assets, but these will be of limited use when whole regions are simultaneously affected by supply shortages.

In the short term, support schemes for vulnerable consumers aimed at reducing fuel poverty can alleviate the problems caused by the crisis. Some have also argued for more direct government support to protect vulnerable consumers, including reduction in energy taxes. Some countries such as UK increased the retail electricity price cap and France has introduced one to protect consumers. However, as the California energy crisis of 200 taught us, over time, fixing retail electricity prices is risky and incompatible with free wholesale spot markets.

Beyond the need for immediate action, the best remedies are in long term solutions. The 2021 long Covid of the energy markets exposed some weaknesses of the energy sectors that had developed over time. The liberalized energy markets did not cause the 2021 energy crisis. However, they did not prevent or fix the crisis either. There are useful questions to ask about the governance, regulation, and market design to be learned from this event.

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