

EU Policies to Combat the Energy Crisis

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Abstract: The European Union is facing a complex geopolitical crisis, which represents a threat to its energy security. Having this in mind, EU must redouble its efforts to become energy independent, focusing on renewable energy. In the following paper, we intend to analyze the measures that the Union wants to take in order to combat the energy crisis. Therefore, it will be analyzed the situation of nuclear energy and natural gas in the EU, given that these were the two technologies with the greatest contribution to electricity generation. At the same time, in the paper we will examine the REPowerEU plan, which the Commission wants to develop, in order to support sources of electricity supply, improve energy efficiency and to make the switch to renewable energy faster. The purpose of these actions is to gradually eliminate gas imports from the Russian Federation and also the EU's dependence on fossil fuels and would function as an insurance against the shocks of prices. Also, at the end of the paper, we will expose small-scale energy solutions that can be applied in residential areas but also large-scale solutions that can significantly contribute to reducing dependence on fossil fuels.

Key-words: energy crisis, renewable energy sources (RES), policies, climate change

JEL Classification: Q28, Q48, Q54

1. Introduction

Although the economy of the European Union has slowly started to recover from the pandemic, new and old crises are looming. The EU needs to be aware of the energy price situation, which is mainly due to market gas instability rather than carbon prices, and stable cooperation between governments and institutions is needed to find common solutions to support families and businesses affected by price increases.

In this situation, and also in addition to the inflation of energy prices, EU is currently facing a complex geopolitical crisis, which is not only a threat to the energy transition strategy, but also to the essence of its energy security. A society that does not have access to reliable energy is in danger in terms of social and economic progress, and this concern affects the whole Europe, not only EU. In order not to erase the Energy Union, it is very important to propose a common EU solution to this problem in order to stay away from the elaboration of a series of uncoordinated national measures (Starace et al., 2022).

High dependence on gas imports is one of the EU's biggest problems. Member States depend on gas in different ways, but the interconnectedness of gas markets is now leading to overdependence in some Euro Zone countries. The long-term goal of the EU should be independence from fossil fuels.

But in the short-medium term, the European Union needs to get a certain degree of independence and to keep away from disruptions from only one supplier, as evidenced by the current rise in energy prices: recent gas shortages have led to higher prices, driving up prices for electricity on the market last fall and winter. The EU may have the temptation to take short-term measures to deal with the energy price crisis and deal with geopolitical risks.

But a return to oil, gas or even coal is not the right answer to guarantee the energy independence of the EU in the medium and long term. On the contrary, with the threat of a climate emergency, the urgency of the

transition to a zero emissions Union is becoming more urgent. In this context, the EU's energy transition must also become an economic and security issue that can sustain the European economy for years to come.

2. The causes of the energy crisis

Europe has to redouble its efforts in order to achieve energy independence by concentrating on RES. The current energy crisis has been mainly caused by the growing global natural gas demand and China's massive imports of LNG. It has also been exacerbated by Ukraine war, which has major implications for the energy security. Russia is undoubtedly one of the key players in the world energy market, along with Saudi Arabia and the United States. The invasion of Ukraine further demonstrated Europe's dependence on Russian gas and showed that diversification of energy supply is crucial for energy security.

Currently, the political problem for Europe is the supply of an adequate amount of energy at a price that can be afforded by all citizens, while RES are not sufficient to meet demand. An uninterrupted power supply must be provided for everyone at an affordable price, especially for the most vulnerable in society. This implies a front against speculative pressure of market actors, both at European level, with harmonized policies, and at national level, to achieve a balance between gas and electricity prices (Koundouri, 2022).

In the last five years, nuclear energy and natural gas have been the two resources that have contributed the most to electricity production. In 2021, 27% of the EU's electricity came from nuclear power plants and 17% from natural gas. That is why European leaders, in their efforts to ensure adequate energy resources while keeping costs low for consumers, have seen in these energy resources an alternative to low-cost energy, using existing infrastructure and existing knowledge. On December 31st 2021, the European Commission sent to the governments of the Member States an additional draft of the EU classification, which included nuclear energy and natural gas, granting them a consultation margin of four months. But these technologies are not "clean". Natural gas has a significant impact on the environment, exacerbating the effects of climate change, while nuclear power produces toxic waste that is dangerous to the ecosystem and health.

The EU taxonomy is a list of economic activities that are in line with six environmental objectives, namely: limit climate change, adapt to climate change, use and protect marine and water resources, transition to a cyclical economy, prevent and reduce pollution, protection and restoration of biodiversity and ecosystems. It is a valuable sustainable fundraising tool to help companies demonstrate the viability of their projects based on specific criteria, such as climate change mitigation and adaptation, marine protection, cyclical economics, pollution prevention and the protection of biodiversity. Including the nuclear energy and natural gas in the EU taxonomy has certain conditions towards the compliance with modern technical standards, demolishing installations and their replacement by RES in the future. However, in addition to the technical difficulties, they have high costs. Nuclear power plants will be considered sustainable only if they meet the latest technical standards, have received a construction permit for 2045, and the owners are obliged to finance the storage costs of the final radioactive materials, as well as the costs of demolishing the nuclear power plant. Sustainable labeling can only be extended for another two decades if plans are in place for the safe management of nuclear waste, but this is costly and difficult.

There are two options for natural gas, direct emissions must not exceed 270gr CO₂/kWh for energy production and annual emissions from power plants must not exceed 550kg CO₂/kW on average for the next 20 years, which supposes a reduction of the period of operation for production of the station on an annual basis. In order to obtain the license, new natural gas installations must demonstrate that it is not possible to produce electricity using RES, the plant replaces a high-emitting plant and the reduction in emissions/kWh is at least 55% and also the plant can produce low-carbon and renewable fuels at the same time, at least 30%, 55% and 100% starting in 2026, 2030 and 2036. In addition, there must be a formal plan for the country's coal phase-out.

From a financial point of view, given these long-term figures, it would be preferable if Europe accelerated the promotion of renewable energies, rather than labeling the use of nuclear energy and gas as "sustainable" activities, even if only on a temporary basis. It will have many benefits. In the first place, with existing technologies, the unitary cost for energy production from RES are lower compared to the costs for fossil fuel and nuclear energy production. This will offset the initial cost of RES installations in the long run. Secondly, RES would help achieve climate neutrality by 2050, a goal needed to address the catastrophic effects of climate change, while natural gas and nuclear power make things more difficult. In addition, the use of RES would make Europe autonomous from the point of view of the energy supply. The current energy crisis and the important role of

countries like Russia, China and India in shaping the energy market show how important independence is in the face of geopolitical pressure.

Research can make a decisive contribution to the energy transition through the appropriate transformations. It can offer effective ways to divert polluting energy systems towards zero emission systems through the development of renewable energy sources such as solar power, wind, battery storage, hydrogen, electric vehicles and more. However, the transition to sustainability, along with the elimination of fossil fuel energy production, requires other transformative steps in areas such as the circular economy, electricity transmission, improving the energy efficiency of buildings, the implementation of nature-based solutions to preserve more carbon dioxide in the soil or taking measures to adapt to changing climatic conditions.

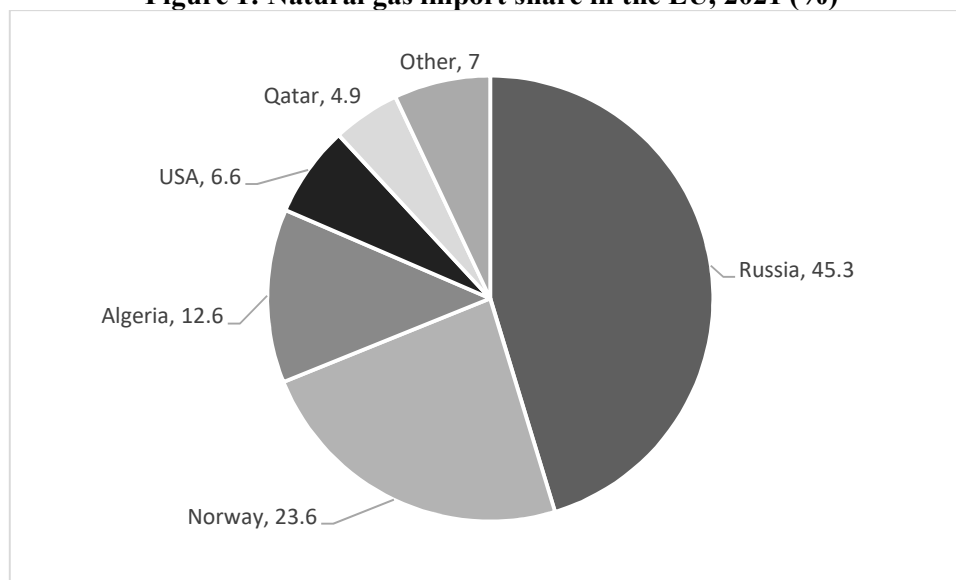
For the EU, in addition to political decisions at the central level, Member States must decide on the energy mix and the balance between energy security, energy price stability and their commitments to climate neutrality. The Green Deal is a cornerstone of carbon independence for economies. The clean and renewable energy industry must be supported by common recovery and sustainability mechanisms and be part of the economic recovery of the Member States.

In the EU, the societies are interconnected and the economic policies is unique. That is why there must be actions that protect our societies and support the national economies. In an issue as important as the energy crisis, there should not be considered the level of preparedness for the response at the Government level. No country can deal with such a crisis on its own. Rather, a common response is needed through a common strategy for energy security in the EU. Time is running out, the goal is elusive, and delay will cost lives and billions of euros each year in infrastructure damage and economic disruption. The Green Deal and its policies may be the best guarantee for the economy to become a carbon free one.

3. REPower EU

Since the Russian invasion of Ukraine, the need for a rapid transition to clean energy has never been louder and clearer. The EU imports 90% of its gas consumption, with Russia supplying more than 40% of the EU's total gas consumption (Figure 1). Russia also accounts for 27% of the EU's oil imports and 46% of its coal imports.

Figure 1: Natural gas import share in the EU, 2021 (%)



Source: Authors according to the European Commission database, 2022.

The EU must be prepared for each scenario. The Union could become independent of Russian gas long before the end of the decade. The sooner and more decisively EU diversifies its supply sources, accelerates the application of green energy technologies and reduces energy demand, the sooner it can replace Russian gas.

Constantly high energy prices are likely to lead to increased poverty and affect the competitiveness of companies. Energy-intensive industries, in particular, have faced higher production costs. High energy prices translate into higher prices for other goods, especially food. The combination of rising energy and transportation

prices and rising food prices would exacerbate pressure on low-income households where the risk of poverty is high (EC, 2022). To deal with the current emergency, the Commission will examine all possible urgent measures to limit the effect of the dispersion of gas prices on electricity prices, such as temporary maximum prices. The Commission will urgently consult with all actors and propose options. The Commission reaffirms the possibility of regulating prices and implementing transfer mechanisms to help protect consumers and European economy. The legal framework of the electricity market, in particular Article 5 of the Electricity Directive (2019/944), allows Member States, under the current exceptional circumstances, to set retail prices for households and micro-representatives. The EU's state aid rules give Member States the opportunity to provide short-term support to businesses and farmers affected by high energy prices and help reduce their exposure to energy price volatility through medium and long term.

Phasing out EU's dependence on fossil fuels imported from Russia could be achieved well before 2030. To this end, the Commission proposed a REPowerEU plan that would increase the sustainability of the EU's two-pillar energy system, diversify gas supply and reduce the dependence to fossil fuels faster. Full implementation of the proposals under the „Fit for 55” legislative package would reduce the EU gas consumption by 30% in 2030, equivalent to 100 billion cm.

The principle of "energy efficiency first" is more relevant than ever and must be applied in all sectors and policies, with consumer response measures complementing those on the supply side. Under the current circumstances, the co-legislators may also consider setting more ambitious targets than those set out in the "Fit for 55" legislative package proposals, setting higher or faster targets for renewable energy and energy efficiency. The Commission proposed a REPowerEU plan based on the identification, in dialogue with Member States, of the most appropriate projects and reforms, at national, regional and EU level. This is based on the National Energy and Climate Plans and their updates, existing Recovery and Sustainability Plans (SRPs), Cohesion Policy Programs and all other relevant plans, as well as climate sustainability needs.

An unprecedented supply of liquefied natural gas to the EU in January 2022 ensured gas supply security last winter. The EU could import 50 billion cm more LNG per year (eg Qatar, USA, Egypt and West Africa). By diversifying pipe import sources (eg Azerbaijan, Algeria, Norway), another 10 billion cm could be delivered annually, which would no longer be imported from Russia. Doubling the target of the „Fit for 55” legislative package on biomethane would lead to a production of 35 billion cm per year by 2030. To this end, the CAP Strategic Plans drawn up by Member States should focus financing on biomethane produced from sustainable biomass sources, including, in particular, agricultural waste and residues, and also household garbage.

The Commission will prioritize the assessment of the need for measures and investments in hydrogen-ready gas infrastructure and interconnections in order to remove barriers to the full use of the EU's liquefied natural gas capacity. An additional 15 million tonnes (mt) of renewable hydrogen, on top of the 5.6 million tonnes (mt) provided by the „Fit for 55” legislative package, could replace annually 25-50 billion cm by 2030 of gas imported from Russia. This figure would consist of an additional 10 mt of hydrogen imported from various sources and an additional 5 mt of hydrogen produced in Europe, exceeding the targets set in the EU Hydrogen Strategy and maximizing local hydrogen production. EC will develop the regulatory framework to promote the European hydrogen market and support the development of integrated gas and hydrogen infrastructures as well as hydrogen storage facilities. The Commission will give priority to the evaluation of state aid notifications for hydrogen projects and will commit to complete the evaluation of the first hydrogen projects of common European interest within 6 weeks of the notification to the Member States. The overall goal should be to allow the evaluation to be completed by the summer.

„Fit for 55” legislative package envisaged doubling the EU's photovoltaic and wind capacity by 2025 and tripling it by 2030, reducing annual gas consumption by 170 billion cm in 2030. By accelerating the installation of solar PV systems on roofs that would produce up to 15 TWh this year, the EU could save an additional 2.5 billion cm of gas. The Commission will present a communication on solar energy in June to help unlock the potential of solar energy as a major source of renewable energy in the EU. The Commission will contribute to the further development of the value chain for solar and wind power and heat pumps, while boosting the EU's competitiveness and addressing its strategic dependencies. If necessary to attract sufficient private investment, measures will include channeling EU funds to next-generation technologies and mobilizing support from InvestEU or Member States. Particular attention would be given to accelerating investment in retraining and upskilling the workforce, key elements in support of the transformation.

The Member States and the industry should continue to supervise the supply of critical and other raw materials, to promote strategic partnerships for security of supply and to consider taking other measures, such as strategic stocks where necessary. Doubling the projected annual rate of heat pump installation in the first half of

this period would lead to the annual deployment of 10 million heat pumps in the EU over the next five years. That would save 12 billion cm for every 10 million cm of heat pumps installed in homes.

The REPowerEU plan could accelerate the deployment of innovative and cost-effective hydrogen-based renewable electricity solutions in industrial sectors. The Commission would pre-implement the Innovation Fund to support the transition to electrification and hydrogen, including through a pan-European system of carbon contracts, as well as to increase the EU's capacity to produce innovative equipment with zero or low carbon emissions, as electrolyzers, technologies for the production of solar/wind energy and other technologies.

A necessary condition for accelerating the implementation of projects for RES is the simplification and shortening of the permitting process. Prolonged administrative procedures have been identified as one of the main obstacles to investment in RES and related infrastructure. The Commission requires Member States to ensure that the planning, construction and operation of renewable energy plants, their connection to the grid and the interconnected grid itself are considered to be in the public interest and that they meet the requirements for the most favorable procedure available in its planning and authorization procedures. Member States must quickly map, evaluate and ensure that suitable land and seas are available for renewable energy projects, in line with their national energy and climate plans, their contribution to the revised 2030 renewable energy target and other factors, including the availability of resources, network infrastructure and the objectives of the EU biodiversity strategy.

The Commission will also provide guidance on when and how regulatory sandboxes will be needed to enable the testing of innovative technologies, products or services to promote coexistence between the use of renewable energy sources and the protection of the environment. The guidelines will focus on setting limits on regulatory sandboxes, such as time, territory, and ongoing regulatory oversight, to minimize potential risks.

This year, EC and the EIB group will establish the most appropriate financing mechanisms to encourage the development of electricity purchase contracts in Europe, which is already possible within InvestEU. This will include facilitating better access to power purchase contracts for new buyers such as SMEs.

4. Clean energy solutions for reducing the energy dependence

Due to the difficult situation confronting EU, the Member States are looking for alternative clean energy solutions and reducing their dependence on fossil fuels. Given the war in Ukraine, reducing imported natural gas from Russia and achieving "strategic autonomy" has become a crucial goal. While big industries and strategic infrastructures need a long-term plan to establish a sustainable clean energy supply chain and massive reorientation of investments, there are already some big and small solutions that could help countries meet their emissions targets and eliminate energy imports in the short term.

In this section, we will present small-scale energy solutions that can be applied in residential areas, but also large-scale solutions that require more investments. All of these companies are European start-ups, some are at an early stage and others have already received significant investments. Given Russia's threat to cut off gas supplies, the EU is already in an energy crisis. Governments, but also ordinary citizens, must take action now and choose clean solutions that benefit both the environment and ultimately allow them to be energy independent.

In the EU there are a few start-ups which are inventing clean energy solutions that can support the limitation of the potential effects of the energy crisis. Some solutions that will be exhibited can be easily installed in residential buildings, others will require much more generous space. They all have the same target: clean energy without harming the environment (Du Besse, 2022).

Cyklone Tidal Energy decided to harness the power of waves to generate clean energy. According to Volker founder Osterlitz, offshore wind turbines will be damaged very quickly by natural elements. Therefore, Cyklone Tidal Energy believes that it would be much more efficient to use this kinetic energy from ocean waves to generate cheap power. According to the company, the energy generated by the Cyklone Tidal Energy turbines placed in the sea can produce energy at a low price (it would cost only 1 cent/kWh, compared to the price of diesel of 5 cents/kWh).

Enapter is a technology company based in Italy, with offices in Germany, Thailand and Russia. The company developed electrolyzers that allow the production of green hydrogen. The electrolysis created by Enapter is modular and has a plug-and-play design and is already used for energy storage, mobility, heat, industry and fuel supply.

Enpal is a German startup that is launching an innovative scheme that allows homeowners to rent solar panels from the company instead of buying them. Since the cost of solar panels is a barrier for people interested

in installing them, Enpal can enable more people to access clean energy. The lease agreement between the client and Enpal includes meeting, maintenance and insurance. Consumers pay the rent for 20 years and after the period they can buy the panels for only 1 euro. Last year, Enpal received an investment of 250 million euros. They have more than 10,000 customers in Germany. Unfortunately, Enpal operates only in Germany, but there is great potential in this sector.

Grove Energy. With the growth of the electric vehicle market, it is becoming increasingly important to find clean energy solutions to charge these vehicles. Grove Energy's solution is an independent, decentralized network of small hydrogen-powered charging stations. They will be able to produce up to 2x22 kWh of electricity, allowing electric vehicles to be charged overnight.

Kraftblock. In some situations, the problem is not in the production of energy, but in making it smart and preventing the energy used from being wasted. Only about 60% of the energy in industrial products is used for the product itself. A percentage of 40% is represented by waste. Kraftblock technology allows the heat of the industrial process to be recycled, stored and converted into energy at the right time. There are some industries that require a lot of heat to function. Thanks to Kraftblock, the heat can be reused or converted into electricity. With Kraftblock technology, large factories can play an important role in preventing the energy crisis.

Mowea offers a unique modular design to harness the wind energy. It combines standardized micro wind turbines into a single wind power system. The system can be built according to customer needs and can be fully integrated with existing infrastructures. The company's greatest strength is represented by the viability of the installation. Its microturbines can be placed anywhere, even in confined spaces. An example is the Vantage Towers in Germany that has installed Mowea microturbines in 52 of its radio towers, and the turbines cover two-thirds of the power consumption at medium wind speeds.

Phelas. One of the important issues related to renewable energies is their periodicity. To solve this problem, Phelas built liquid energy reservoirs from the air for solar and wind power. Phelas system is based on the concept of liquid air storage: during the charging process, the air is cooled to cryogenic temperatures and liquefied. When power is needed, the cryogenic liquid heats up and evaporates. The strong growth in volume and pressure is used to generate electricity. Phelas could be crucial for storing additional energy from solar or wind power and reusing it when needed, and energy conservation is one of the key solutions to avoiding energy crises.

Windcity offers an alternative clean energy solution that could also be installed on rooftops. It is a wind turbine with an unconventional design, which allows greater acceleration with low speed winds compared to conventional wind turbines. Windcity wind turbines are made specifically for urban and suburban areas where sales flows do not generate enough energy for a conventional wind turbine. Windcity turbines can generate clean energy by rotating with vehicle flows. The Italian company wants to apply this type of technology to watercourses. The unconventional design of wind turbines could also be integrated with solar panels to enable large-scale rooftop energy solutions.

Wind My Roof. Another solution to produce energy from wind sources for roofs is WindBox, manufactured by the French company Wind My Roof. This innovative solution allows the wind to blow into a module placed on the roof, where there is perfect exposure to the wind. WindBox can also have solar panels on top: the energy produced in this mix from the sun and wind has a very low carbon footprint.

X-Wind wants to challenge traditional wind turbines with its innovative kites, which are powered by high-altitude winds that drag power units located on the dedicated circular rail tracks. The X-Wind system is completely zero emissions, safe for animals and the landscape, while all that is visible are kites flying, instead of huge turbines.

5. Conclusions

The present energy crisis has led to an increased number of interventions in the energy market, but not in the gas market, even if gas prices are the main driver of electricity prices and certainly the selling prices of natural gas are not in line with the real costs. These interventions are aimed at trying to make quick profits on the part of electricity producers. They are often based on some misconceptions (Starace et al., 2022).

For example, they suggested that high spot prices could generate revenue for non-gas generators and vertically integrated companies. But they ignored the fact that a lot of energy does not receive the spot price or the daily price, because most electricity is sold in advance to consumers through supply contracts. The European Commission proposed guarantees and restrictions on the application of measures at the level of the Member States. But this may not be enough, and decisions must be implemented at the EU level. Indeed, these

uncoordinated market interventions distort and ultimately destroy the integrated electricity market, which is based on the formation of a common price rule for the entire European Union.

There are several specific measures that could be taken to keep prices low. With regard to structural measures, liquidity futures markets and long-term price signals need to be developed and play an important role in helping to minimize risks and facilitate investments. But the European Commission is currently considering options to temporarily limit the effect of gas prices on electricity. Experts believe that an EU-wide cap on gas prices is needed to return to the pre-crisis price. However, the real solution to the current price crisis will not be to change poorly made changes in the design of the electricity market or to generate additional income that does not exist. Structuring solutions should make it possible to speed up the implementation of flexible and zero-emission technologies. This is the only way to eliminate dependence on gas.

The zero emission European Union is a difficult process, and 2050 is just an investment cycle away. This energy crisis is the impetus to speed up the EU's energy transition. This process is irreversible. For example, technologies based on renewable energy sources must be implemented at a faster pace, guaranteeing licenses and procedures throughout the Union.

Under the REPowerEU plan, an additional 35 TWh could be generated through renewable energy projects by next year, reducing natural gas use by more than 6 billion cubic meters. This would also guarantee the special benefit of household electricity bills. Gas boilers should be gradually replaced with high-efficiency heat pumps and the development of a European clean heat industry should be supported. According to Franz Timmermans, the Union must double its percentage of heat pumps in the next five years, saving 20 billion cm of gas per year by 2026 and more than 60 billion cm per year by 2030 with 50 million heat pumps installed in the UE.

The equivalent of 25% of current EU gas imports from Russia could be saved by 2030 through the renovation and electrification of residential buildings in the EU, according to the European Climate Foundation. Interconnections and electrical infrastructure should be promoted to guarantee the flexibility and reliability of the system and to optimize the use of current resources. A Union that uses zero-carbon technologies, electrifies domestic heating and transportation, and diversifies fuels for heavy industry, is a more sustainable and independent Union.

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