

# Price of Power: The Effect of Energy Crises on Renewable Power Production.

Pedro Henrique Dias Camara

Faculty of International Relations from Pontifical Catholic University of Minas Gerais, Belo Horizonte,  
Diascamara38@gmail.com

In 2022, Europe was faced with an unprecedented energy crisis after the Russian invasion of Ukraine. As such, oil and gas prices were on the rise, leading to higher than ever electricity prices. Some speculated that this would be an opportunity to increase the adoption of renewable energy production by reducing dependence on fossil fuels. Conversely, others feared that coal would take oil and gas' place in European energy production as a pragmatic solution to the high prices. This paper examined the effect of the crisis on power production to determine the role of renewables in moments of market instability. To that end this study analysed power production, energy subsidies, popular interest in renewables and decision makers stances on the subject. Thus, the research found that in the short term coal is used to replace previous energy sources, however, in the long term, renewables pose a way to reduce dependency on foreign imports in addition to their climate related benefits.

Energy crisis, Renewable power, Energy production, Energy market, Energy subsidies.

## 1. Introduction

Energy production in Europe has become a key issue in the continent, some analysts expect a rise in renewable power production, while others predict a rise in the usage of coal. In 2022, news of a Russian invasion of Ukraine prompted many western countries to sanction Russian exports, including the significant volume of oil and natural gas that supplied European energy markets [1]. As such, the price of oil and natural gas skyrocketed at the end of 2022, and with them, the price of energy in the continent. Because of this, Europe's dependency on imports for its electricity production was put on full display and since then the adoption of independent energy production has become integral to European decision makers since the crisis [2].

Additionally, the European Union has been vocal about its efforts to adopt sustainable energy production. Wind and solar power have been steadily rising in the last five years thanks to the continent's Green Deal. However, the energy crisis has put the future of power production in doubt. Some speculate that the energy crisis will lead to the rise of cheap fossil fuels, especially coal, to make up for the power scarcity. Others say that the crisis presents itself as an opportunity to part ways with fossil fuel based power production and adopt

renewables as the main source of energy in the continent.

The purpose of this paper is to use the 2022 European energy crisis to better understand how sudden electricity price spikes can affect the adoption of renewable energy production. To that end, we expect that a sudden rise in the cost of electricity sources can lead to a rise in the adoption of renewables as their use may lead to lower dependence on foreign exports, helping to reduce electricity market instability in the long term. As such, this paper will analyse the change in the European approach towards power production after the crisis by measuring subsidies funding energy production types, power production statistics, public interest and European decision makers' stance on the subject.

## 2. Methodology

This article seeks to understand the relationship between energy crises and the adoption of renewable electricity production. As such, it will be analysing the 2022 European energy crisis and its impact on the renewable energy agenda in the continent. To that end, it will compare electricity prices and state subsidies going towards renewable energy production. Additionally, it will analyse the

way power production trends change with the crisis. This paper will also inspect green party votes in european elections to measure the public awareness and interest in the subject during times of crises. Finally, it will analyse if and how government statements about renewables change during times of high energy prices.

2.1 Data sources

Firstly, it is important to map energy prices in the European market before and during the crisis. This data will be used to identify the start and end of the period of unusual pricing as well as serve as a qualitative measure of energy prices that can be used to compare to the other variables in this study. To this end, this paper uses the dataset provided by the Eurostat online database “Electricity prices for household consumers - bi-annual data (from 2007 onwards)”, as it includes the complete data for the period of interest, as well as in depth explanations for its methods and units [3].

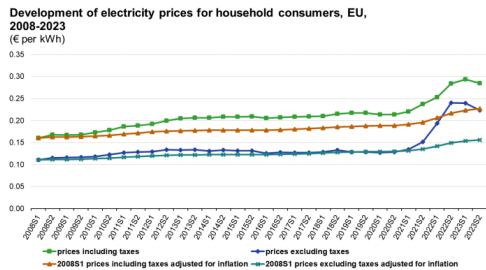


Fig. 1 Development of electricity prices for household consumers.

The figure above, provided by Eurostat, displays the average electricity price in Europe from the start of 2008 to the end of 2023 [3]. The energy itself is measured by kWh, while the prices are measured in Euros [3]. It is clear, then, that the period of 2021 saw a large spike in the cost of energy in the continent [3]. As such, for the purpose of analysis, this paper denotes this period from the first semester of 2022 to the second semester of 2023 as the crisis.

Regarding the comparison between electricity prices and government subsidies, this paper will be using data collected by the “Study on energy subsidies and other government interventions in the European Union – Final report – 2023 edition” to measure state subsidies [4]. Thus, it is important to define what subsidies are. For that, this paper uses the definition employed by the 2023 Report on Energy in the Subsidies EU, that being: “as government measures falling into one of the following four categories: (i) direct transfers of funds; (ii) government (tax) revenue that is otherwise foregone (not collected); (iii) governments providing goods and services or purchasing goods; and (iv) price and income support.” [4].

It is also interesting to measure the way that energy

generation itself was affected by the crisis. The data regarding power production is provided by Center on Global Energy Policy at Columbia University SIPA and was collected by the European Network of Transmission System Operators.

Additionally, it is imperative for the purposes of this paper to measure the public's opinion on the subject of renewable power production. This is so that it can assess the effect of the crisis on the population's interest in renewable energy. This analysis understands that public interest is a vital part of decision making in a political entity, including countries or blocs. As such, this paper quantifies public interest by the number of green party votes and seats in European elections. This measurement was selected as it reflects the number of voters that consider climate change a key priority.

Finally, this paper will analyse the stances taken by European decision makers in relation to dealing with the energy crisis as well as in relation to renewable power production. To that end, it will use speeches and released statements to assess the apparent commitment and approach to both questions.

3. Results

This article aimed to examine the way energy crises influence power production, particularly in reference to renewables. To that end, it chose to observe the 2022 European energy crisis caused by Russia's invasion of Ukraine. As such, the main goal of the research is to analyse whether a sudden spike in electricity prices would cause a fallback to cheap, but heavily polluting energy sources, or if it would pose an opportunity to reshape energy production towards green electricity.

3.1 Subsidies

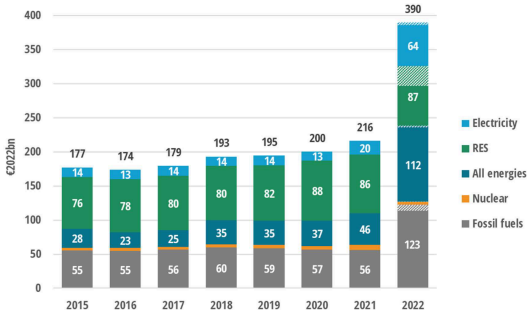


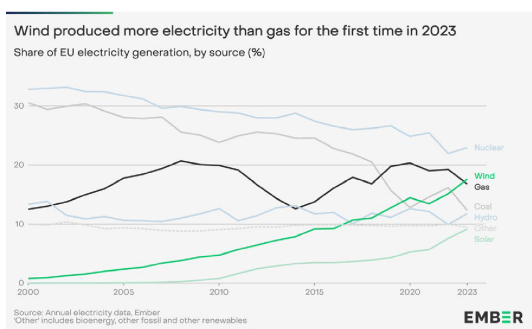
Fig. 2 Subsidies by main energy source in the EU27 (2015-2022).

It is noticeable that 2022 saw an unusually large increase in European energy subsidies when compared to the period of 2015-2021 as seen in the figure above, provided by Eurostat [4]. From 2015 to 2021, the total recorded energy subsidies went from EU177bn to EU216bn in 2021, in contrast, the total subsidies for 2022 were approximately EU390bn

[4]. These figures reflect the entirety of energy subsidies in the continent, however, for our purposes it is important to distinguish the ones towards green energy production and the ones towards fossil fuels. During the crisis one of the largest concerns was the increased adoption of coal power plants, as they provide an easy and cheap way to supply power. According to our data, funding for fossil fuel based energy remained steady from 2015 to 2021, going from EU55bn to EU56bn. However, 2022 saw it receive a large rise in funding, from EU56bn to EU123bn. In contrast, funding towards renewable energy sources grew steadily from 2015 to 2021, from EU76bn to EU86bn [4]. In 2022 this trend continued undisturbed, rising to EU87bn [4]. As such, it is apparent that the crisis did not affect state funding towards renewable energy, however, subsidies towards fossil fuels more than doubled.

### 3.2 Power production

Moreover, we must now examine how power production was affected during the period of crisis.



**Fig. 3** Share of EU electricity generation, by source (%).

Firstly, there is a noticeable decline in fossil fuel based production during the period of 2000 to 2021, in accordance with the figure provided by the Ember think tank [5]. This trend is interrupted in 2022, when there is a rise in coal fueled production, however, coal usage rapidly drops after 2022 [5]. During the same period, there is a continuous rise in solar and wind power [5]. The spike in coal power usage is noteworthy, as it happens at the same time as the crisis, starting in 2022 and declining in 2023.

### 3.3 Public interest

Additionally, we will now analyse the way that the crisis affected the public interest in the subject of renewable energy. Starting with the 2024 European Parliament election. It is important to note that energy prices were still abnormally high in 2024, as such, the subject was still relevant during the elections. In the outgoing parliament, elected in 2019, the green parties occupied a total of 74 seats [6]. In contrast, the total seats held by green parties after the 2024 elections was 53 [6]. This indicates that European voters may not have considered

renewable energy production a key factor during these elections.

However, we can narrow down the analysis to national elections during the second semester of 2022, as it should more accurately reflect the popular reaction to the crisis. Firstly, the 2022 Italian parliamentary elections. The Green and Left party formed an alliance that got 3.6% of the popular vote [7]. While that may not seem like much, it is an increase from the less than 1% from the previous election in 2018 [8]. Additionally, it is possible to examine the 2022 Swedish parliamentary election, where the Green party went from 4.4% to 5.1% of the popular vote [9]. These local election results indicate that during the period of the crisis, the subject of sustainability may have been more prominent in voters' minds, however, that would not last until the 2024 European election.

### 3.4 Decision makers stances

So far, this paper has examined the way that the energy crisis altered the way Europe adopts coal and renewable energy production. However, it is interesting to note the way that European decision makers deliberate about energy production, especially in relation to the energy crisis, to verify if renewable electricity is incorporated in their priorities.

The official site of the European Commission released an official statement regarding the bloc's actions to mitigate the energy crisis titled "EU Action to Address the Energy Crisis". The document highlights the many ways Europe is looking for new providers of liquid natural gas, as well as the policies that seek to reduce energy consumption and implement revenue caps on energy companies [10]. There is no section detailing the role of renewables in facing the crisis, this is in spite of the fact that the statement is labelled under the "European Green Deal" tag [10]. Under said tag there are claims that Europe seeks to negate its net emission of greenhouse gases by 2050, wants to be the first net-zero continent and many other promises of renewability and green energy production [11].

Additionally, European leaders have been vocal about the crisis and the role renewable energy has in the future of the European electricity market. For instance, French President Emmanuel Macron praised Europe's reaction to the energy crisis, highlighting the Green Deal and energy transition policies during a speech at Sorbonne [12]. Another official statement was made by the President of the European Commission Ursula Von Der Leyen, where she proposed five different measures to combat European reliance on Russian imports [13]. These points include the diversifying of oil imports as well as large investment towards renewables [13].

However, there are visible contradictions in the bloc's actions towards energy production. For

instance, REPowerEU is a project that seeks to build up European electricity generation so that it is less reliant on outside sources [14]. The project details increasing the funding towards liquid natural gas infrastructure, in spite of the bloc's promises to reach net-zero carbon emissions by 2050 and the new infrastructure projects [14].

### 3.5 Summary of findings

In summary, Europe's power production was heavily changed by the 2022 crisis. The immediate priority of the bloc was to limit the scope of the crisis by keeping energy prices down. During this initial response, fossil fuels, particularly coal, were used as quick and cheap electricity sources. In the following year, as prices were on the decline, the focus shifted back into renewable power production. It is important to note that the biggest priority after the crisis became building up energy independence in the bloc, minimising the reliance on imports. As such, fossil fuel usage was discouraged. Overall, the crisis encouraged the European Union to seek energy independence. To that end, renewable power production became a way to continue its previous commitment to sustainability as well as reducing reliance on Russian oil imports.

### 3.6 Possible problems

It is imperative to address the possible problems with the results presented here. Firstly, although the continent's commitment to renewable energy production seems to have risen as a result of the crisis, European subsidies towards fossil fuels are on the rise. As of 2024, only 6 out of 27 European Union members expressed the intent to phase out these subsidies [14].

Additionally, while Europe's experience with unreliable energy suppliers serves as an example for all countries in similar situations, not every nation has access to resources, human or material, for a large-scale adoption of green energy. As such, this paper notes that the results found here reflect the reality of a continent rich in personnel and capital, for places where those might not be as abundant, the reliance on fossil fuels would be harder to phase out. Still, it is important to note the advantages of renewable energy production when considering possible crises, particularly regarding the chance of fossil fuel market instability.

## 4. Discussion

In 2023, Europe had its warmest summer on record, with rising heat-related mortality rates, the issue of climate change has never been as dire. Authorities warn about the melting of alpine glaciers, rising sea temperature and progressively more days of extreme heat stress. Thus, it is important to understand the role of renewable energy production on the continent's future.

As such, it is imperative to highlight the implication

of the results found. Firstly, the ease of coal-based power production makes it an attractive way to produce electricity cheaply and quickly, thus, their rise in usage is an expected immediate impact of alarmingly high energy prices. However, their usage dwindles once prices start to fall. In the long term, renewables pose a power source that is not as easily disturbed by sudden supply shocks, becoming an alternative to avoid future crises.

## 5. Conclusion

The goal of this article is to determine the role of renewable energy production in energy crises. To that end, this paper examined subsidies directed towards energy production, power production, public interest in the issue of renewables and European decision makers' statements about energy production. In short, the analysis found that the measures taken to mitigate the crisis encompassed both fossil fuels and renewable energy. Moreover, the decision makers heavily emphasised the bloc's green deal. Furthermore, while public interest in renewable energy production seemed to have risen immediately after the start of the crisis, it did not stay high for long. Additionally, European power projects both aim for carbon neutrality and invest in future fossil fuel infrastructure. Notably, power production sources were heavily affected by the crisis, with an immediate spike in coal-based production. It is important to note that this increase was followed by a sharp decline in the following year.

In summary, the energy crisis in Europe reshaped the way the continent views power production. While the short term saw a rise in the adoption of fossil fuels, it seems like renewable energy is a large part of the bloc's plans for energy self-reliance in the future. As such, the response to rising energy prices may be subject to variation from the short term to the long term, especially when the crisis results in an overall plan to avoid another one in the future.

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