

ELECTRICITY PRICES AND POLICY REPOSSES OF CANADA AND 3 EUROPEAN ECONOMIES

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Introduction

This year, Europe was plunged into a complex energy crisis. Consumer prices and electricity demands soared while supplies exceedingly depreciated post covid. At the same time, the present Ukraine-Russia war proved to be added shock to an already strained energy market.

For the last decades, as European policy makers aimed to favor more climate conscious practices, countries have been progressively veering away from nuclear and fossil fuel. With the current transition, production of renewable energy is at a rise while reliance on traditional sources is diminishing. All three countries examined in this report, for instance, present climate change and renewable energy goals in their energy policies. On one hand, France, traditionally an energy exporter, aims to cover 40% of its electricity production through renewable sources by 2030 and reduce energy consumption by 50% by 2050.¹ As for the United Kingdom, it plans on reaching net zero emission by 2050, with 100% production coming from net zero generation by the 2035. That is by mainly using sources such as: wind, solar, hydroelectric and bioenergy.² Finally, in July 2022, Germany passed an energy policy amendment which comprises the requirement to make 2% of its land available for wind power, with likewise the intent to reach a goal of nearly 100% climate neutral by 2035.³

Over the years, European climate policies have, accordingly, reduced gas production and usage, leading to lower supplies. Nonetheless, in 2021, countries endured the consequences of renewable energy sources scarcities and inconsistency, causing an upsurge of demand for gas and

¹ Ministère de la Transition écologique et de la Cohésion des territoires

² National Grid

³ Energie Partnestchaft

price inflations of up to 200%, and making the continent reliant on Russia's natural gas imports.⁴ In turn, this spike in gas demand has exacerbated the energy crisis even further. In 2021, 43% of natural gas and 29% of crude oil imports in Europe originated from Russia.⁵ Yet, the country, took the executive decision to cut access to its pipeline to Europe, as a war strategy, hence reducing export by 88%, and worsening the supply and demand imbalance.⁶

As Europeans are experiencing record high electricity price inflations, governments strive to reduce the shock effect and sustain their energy transition plans. The report will attempt to understand how European electricity rates have risen by observing the three abovementioned countries: France, the United Kingdom and Germany. Furthermore, it will delve into their market structure and policy responses to the current crisis.

Canada has fairly been shielded from the energy crisis; as unlike Europe, its electricity prices are not directly influenced by the rising price of natural gas. Therefore, the second part of this report will examine Canada's electricity market and discern the provenance of the price surge that emerged in the past summer. Finally, as all four countries market structure and policies are explored, the last part of the report will aim to establish what Canada can do to avoid an energy crisis akin to the one currently experienced in Europe.

Electricity Markets

France

In 2007, when France fully opened its electricity market to providers, two forms of services offer emerged: market offers and regulated rates. In the market offers, prices are freely fixed by

⁴ European Commission

⁵ Ferriani and Gazzani

⁶ BBC

alternatives or historical providers. Whereas the regulated rates are fixed by the government, generally based on historical providers' prices. With this, 60% of French electricity consumption derives from regulated rates, 31% from alternative providers and only 9% from historical providers, all sites comprise.⁷

In 2021, the country generated 522.9 TWh of electricity, of which 69% was from nuclear energy, (see Table 1) with 56 nuclear reactors counted within the borders. Although nuclear production has consistently dominated the market, making France the second leading country in its production last year, it is in decline since 2005. Nonetheless, the decarbonized share of production averaged 92% for the past 4 years, one of the most consistent rates in Europe.⁸

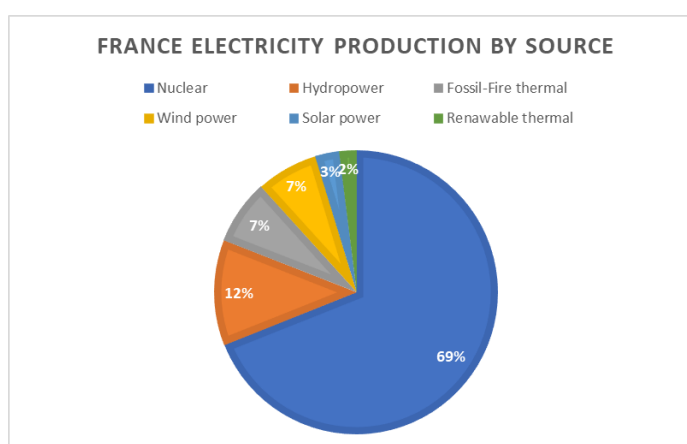


Table 1: France Electricity Production by Sources

France was the main electricity exporter in Europe, with a trade balance of 43.1 TWh, counting 87.1 TWh in export and 44 TWh in imports.⁹ Yet, its net export drastically dropped this year, because of low nuclear energy production. Some of its nuclear plants were obstructed in the

⁷ Commission de Régulation de l'Énergie

⁸ RTE

⁹ *ibid.*

past year, making the current used capacity at only 45%. In fact, of the 56 reactors, all owned by Électricité de France (EDF), the country's energy market monopoly, only 27 work at full capacity.¹⁰ France's electricity prices have, also, been soaring since 2021, due to high gas price, reducing the net export.

Low electricity production, led to high uncertainty and prices. The domestic electricity rate increased by 24.29% between August 2021 and January 2022 for residential consumers and by 23.64% for non-residential electricity consumers. For reference, the electricity price has not increased by more than 7% between semesters since June 2019.¹¹ The price of electricity in France has averaged at €62.94/MWh between 2004 and 2022 and has reached an all-time high of €743.84/MWh in 2022, according to Trading Economics (see Table 2).¹²

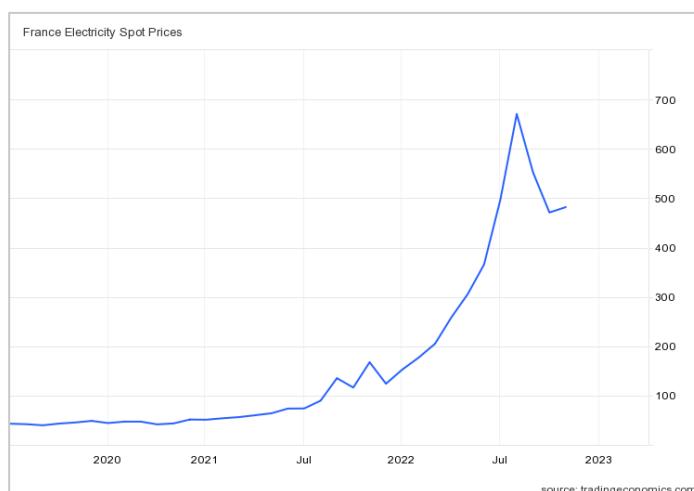


Table 2: France Electricity Spot Prices by Trading Economics

¹⁰ Selectra

¹¹ Commission de Régulation de l'Énergie

¹² Trading Economics

United Kingdom

By the year 1995, the British wholesale market was fully open to competition. Today, although 5 suppliers dominate the market, the country counts around 60 companies occupying it. Companies can either generate, transport, or sell energy, with some covering all three areas.¹³

In 2021, the United Kingdom's main method of electricity production was gas, which accounts for 39.8% of the sector. The table below shows that wind energy was a close second representing 25% of production. The level of renewable energy sources was the lowest amongst the three countries, at only 39.7% of the total production.¹⁴

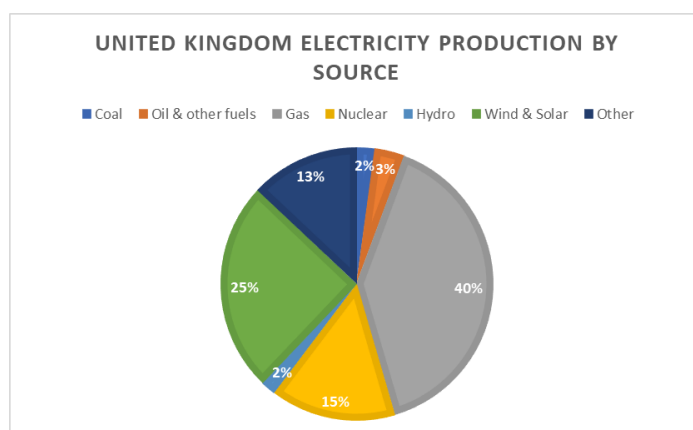


Table 3: United Kingdom Electricity Production by Sources

The country holds one of the lowest gas reserves in Europe, that is approximately 2% of its annual demand and more than half of its gas supply is imported.¹⁵ In 2021, 36% of its crude oil and 63% of its gas came from Norway. Additionally, 26% of the remaining gas import was liquified natural gas (LNG) of which 86% originating from Qatar, Russia, and the US.¹⁶ Yet, the UK is generally

¹³ Barett

¹⁴ National Statistics

¹⁵ Roberts

¹⁶ National Statistics

highly dependent on gas with 85% of household heat generated by gas boilers and 40% of the electricity in gas-fired power stations.¹⁷ However, because of low wind and power outages at some nuclear station, demand for gas along with prices escalated.

In the first quarter of 2022, the UK's consumer price index for domestic fuels increased by 21% compared to the previous quarter in the 2021.¹⁸ Electricity rates increased by 17%, and gas by 26%. According to trading economics, as electricity prices averaged at £49.37/MWh, they reached an all-time high in September 2021 at £782.48/MWh.¹⁹



Table 4: United Kingdom Electricity Spot Prices by Trading Economics

Germany

Germany holds a fully private electricity market, with over one thousand participants, making it Europe's largest market. In December 2020, the country counted 900 distribution system operators, were 89% of which were connected to fewer than 100 thousand customers. In 2021,

¹⁷ Evans

¹⁸ National Statistics

¹⁹ Trading Economics

domestically sourced energy represented only 29% of total consumption, while 54.7% of it was derived from renewable sources.²⁰ Conversely, 42% of the total German electricity produced originated from renewable energy sources. Out of the 3 countries, Germany presents the most varied energy source portfolio, with no source covering more than a fifth of the total production. In the 517.7 billion kWh produced, in 2021, 156.6 billion kWh was from coal and 111.5 billion kWh from wind (see Table 5).²¹

While Germany is the largest consumer of electricity in Europe, it remains heavily reliant on energy imports. In fact, in 2021 it reported over 95% of its gas originated from other countries, with Russia account for a large majority, thereby making it the world's largest natural gas importer.²² As Russia cut their gas export to Europe, and France saw its nuclear production plunge in the past year, Germany lost important sources of energy imports. In consequence, on January, 304 out of 1500 power and gas providers monitored by Reuters planned on increasing their prices by an average of over 50%.²³

²⁰ Scholz and Wessling

²¹ Destatis

²² Wettengel

²³ Rattay

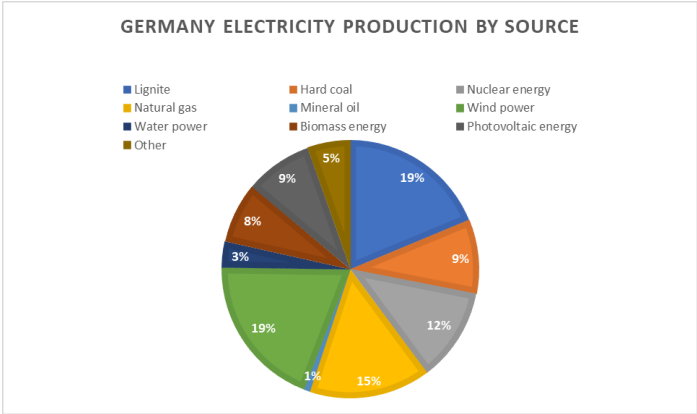


Table 5: Germany Electricity Production by Source

The rise of electricity prices in Germany is the highest in the European union as consumers prices have risen by an average of 63%. In August 2022, German electricity price reached an all-time high of €699.44/MWh despite an average rate of €51.89/MWh between 2000 and 2022 (see Table 6).²⁴

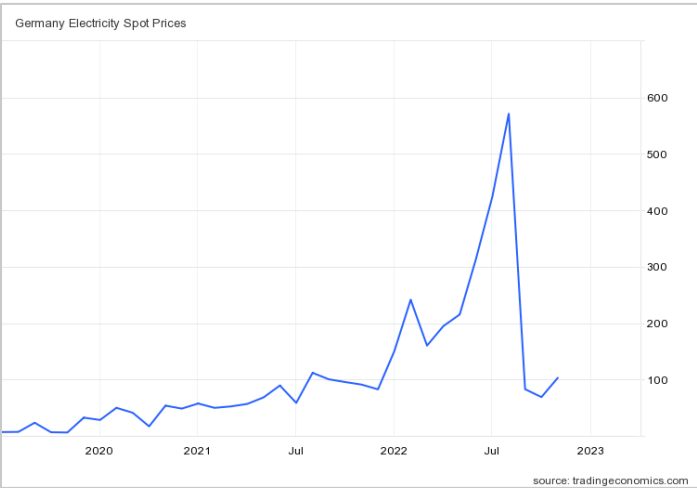


Table 6: Germany Electricity Spot Prices by Trading Economics

²⁴ Trading Economics

Policy Responses

Countries have had recourse to multiple policies to help reduce the weight on households, businesses, and providers. Most have reduced energy tax and set programs such as energy cap, funding packages and tariff shields to assist vulnerable groups and businesses.²⁵ Each country has also designed policies appropriate to their unique situations.

- In France²⁶:
 - An energy sobriety plan that will aim to reduce consumption by 10%, this includes a support for households to change their heating systems.
 - Increasing the volume of electricity sold by EDF, by 20%, to competitors. This will ensure a preferential purchase price for alternative providers.
 - A \$9.7 billion bid to fully nationalization EDF, by taking over the remaining 16% share not owned by the state.
 - A discount of 30 ¢/l until mid-November 2022 to all fuels, benefiting both private and professional consumers.
- In the United Kingdom²⁷:
 - An allocation of customers of failed providers to new companies, offering state loans to the new providers.
 - An Energy Security Bill that will aim at supporting 480,000 clean jobs, pushing innovation in the Energy sector and protecting consumers from price increases.

²⁵ Sgaravatti et al.

²⁶ Idem.

²⁷ Idem.

The bill also includes a business model for hydrogen and carbon capture usage and storage, the promotion of competition amongst providers, the protection of consumers from higher prices and more.

- In Germany²⁸:
 - Replacement of gas boilers with heat pumps, increasing the energy efficiency for new builds to KfW55 by next year, and an obligation to implement 65% renewables into the new heating systems.
 - A law has passed to reduce the German Renewable Energy Sources act (EEG) surcharge, which will help relieve households by an average of €300.
 - An increase in coal reliance in substitution to gas-fuelled power plants.
 - Considering nationalization of Uniper and other gas importing firms and oil refineries from Russia's orbit, meaning companies mostly owned by Russia or importing mainly oil from Russia will fall under the ownership of Germany's grid regulator BNetzA.

Electricity in Canada

Canadian Electricity Market

The electricity sector in Canada is regulated primarily at the provincial level. In other words, provinces have full jurisdiction over their generation, intra-provincial transmission, and distribution. Although primary sources of power can vary between provinces, Canada sources 60%

²⁸ Idem.

of its electricity from hydro energy. In addition, uranium and natural gas account for a quarter of Canada's energy production 15% and 11% respectively (see Table 7).

Canada is a net exporter of electricity, with the majority of the trade occurring between is the US and the provinces of Quebec, Ontario, Manitoba and B.C. In 2021, the country's net trade balance was 47.29 TWh. Additionally, all three territories are fully reliant on their production and due do the distance with other regions, they do not possess transmission lines to enable exports or imports.²⁹

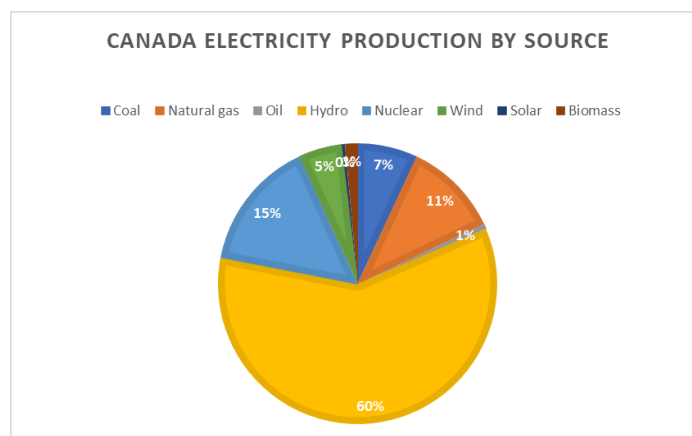


Table 7: Canada Electricity Production by Source³⁰

As the country sources 100% of its energy domestically, it has made it fully self-reliant regarding its electricity production.³¹ Table 8 shows that, for most regions, Canada's electric power selling price (Statistics Canada monthly series that measures the price variations of electricity sold by distributor to commercial and industrial users) have stayed consistent since January 2020. However, certain regions, by their energy sources, have had significantly higher prices:

²⁹ Canada Energy Regulator

³⁰ Statistics Canada

³¹ Canada Electricity Regulator

- Alberta has brought up the monthly price for the Prairie region, as it reached high rates in the summer, going up to \$196.4/MWh in August.³² In October 2019, the provinces price cap of 6.8 cents/kWh was removed as a part of a provincial budget proposal.³³ The high rates are mainly due to low supply and production, low levels of wind and fuel have been slowing the production of electricity in the province. In consequence, providers have been increasing their regulated rate option going up to 15 cents/kWh in June, that is 8.2 cents/kWh above the original price cap.³⁴
- In Ontario, rates reached a new peak this past summer, going up to \$143/MWh in July.³⁵ Accordingly, the Ontario Energy Board declared a drop in electricity rates as of November 1st. The Ontario Electricity Rebate will be dropping to 11.7%, decreasing bills by \$13.91 monthly for a consumption of 700 kWh.³⁶
- According to Canada energy regulator, in 2021, territories (not shown in the table) had the highest consumer rates, all resting at \$160/900 kWh and above from April to September. Nunavut was at the highest with \$527/900 kWh, due to its almost 100% reliance on petroleum, a costly and carbon reliable source and increase of \$263.5 from the previous semester.³⁷

³² Statistics Canada

³³ Kaiser

³⁴ Energyrates

³⁵ Statistics Canada

³⁶ Benett

³⁷ Canada Energy Regulator

Although most of the national price rise can be explained by internal factors, the increase in demand for North American LNG from Europe has also caused a spike in demand for Canadian gas.

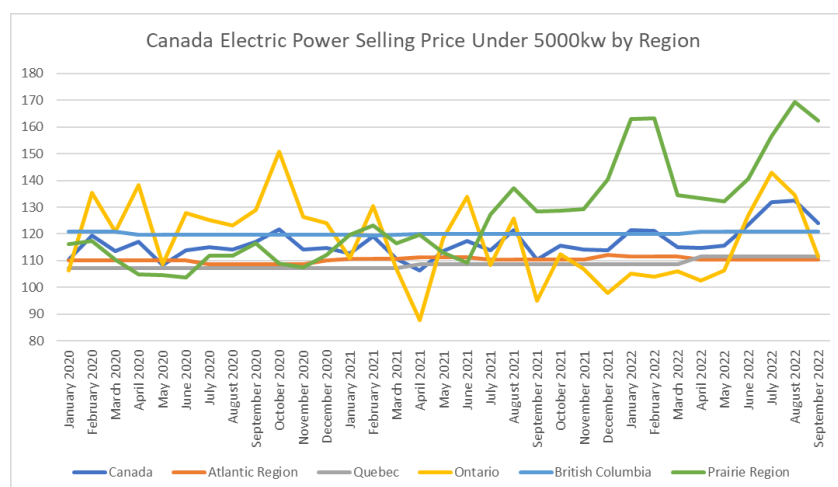


Table 8: Canada Electric Power Selling Price Under 5000 kW by region

Quebec still remains the province with the lowest electricity rate in the country, closely followed by Manitoba. Both regions are highly depending on hydro energy, namely covering 94% of Quebec's generation and 97% of Manitoba's, in 2019.³⁸ Being the cheapest and most reliable energy sources, hydroelectricity has helped these provinces maintain their prices and emissions at the lowest rates.

What can Canada learn from Europe?

To achieve 90% renewable energy source by 2030, the Canadian government has scaled down on oil and gas production. However, with the Canadian energy market being fully

³⁸ Ibid.

autonomous, we can learn from France that an unvaried source of energy can lead to sudden supply shock.

Electricity demand is constantly growing, therefore by transitioning to fully renewable energy market, it is crucial to ensure enough supply and production for future demand. As investors have taken notice of the energy transition, investment in oil and gas collapsed from \$51 billion in 2015 to \$24 billion in 2021.³⁹ Still, traditional gas and nuclear energy may remain necessary in the coming decades to: help ensure that emission-free sources are maximized and be used as alternative energy sources in case of low renewable supply.

Furthermore, Canada will need to continue to push innovation while also increasing grid capacities as the transition to renewable energy requires additional electricity capacity and storage. Electricity grid will require an added 5 GW to 7 GW of new installed capacities to sustain the transition. Hence, investing in innovative ideas to improve electricity distribution, and production while maintaining a decentralized market will reduce supply shocks and ensure a smoother transition.⁴⁰

Conclusion

The war between Ukraine and Russia has in fact been a major player in the European energy crisis, considering France, the United Kingdom and Germany saw their prices spike in this past year following the cut. However, rates began rising much sooner, as supply could not compensate for the post covid demand. In the case of the three countries evaluated in this report,

³⁹ Murphy et al.

⁴⁰ 'That can keep you up at night': Lessons for Canada from Europe's power crisis

we see that an overreliance on one source of energy and import has rendered them more susceptible to supply shocks. Low stock on other sources of energy as well as domestic production prevented them from reaching their full tank capacities. Thereby obligating them to resort to costly policies to maintain prices at viable levels.

Although, policies such as price caps and reduction of taxes are necessary to help consumers with inflating rates, the best course of actions is to create preventive policies in the form of better energy production and consumption. Namely, for countries to maintain affordable electricity and pursue their low emissions goals, it is contingent on their investment in varied and reliable source and infrastructure. Additionally, when domestic sources are limited, European countries have come to understand that diverse and reliable commercial partners are crucial. Canada has also proven the importance of decentralize electricity market and communities to produce their own electricity to prevent passing shock effects to other regions.

In sum, policymakers should intend on improving their renewable energy production and reinforce their energy generation approach to promote growth and avert potential crisis. Policies will vary across provinces and territories, as they will be definitive to each market. Nevertheless, they should all aim to improve Canadians present and future in energy.

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