



COUNTRY REPORT SPAIN

David Ribó Pérez

Energy Without Russia

The Consequences of the Ukraine war and the
EU Sanctions on the Energy Sector in Europe

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Energy Without Russia: The Case of Spain

The Consequences of the Ukraine War and the EU Sanctions
on the Energy Sector in Europe

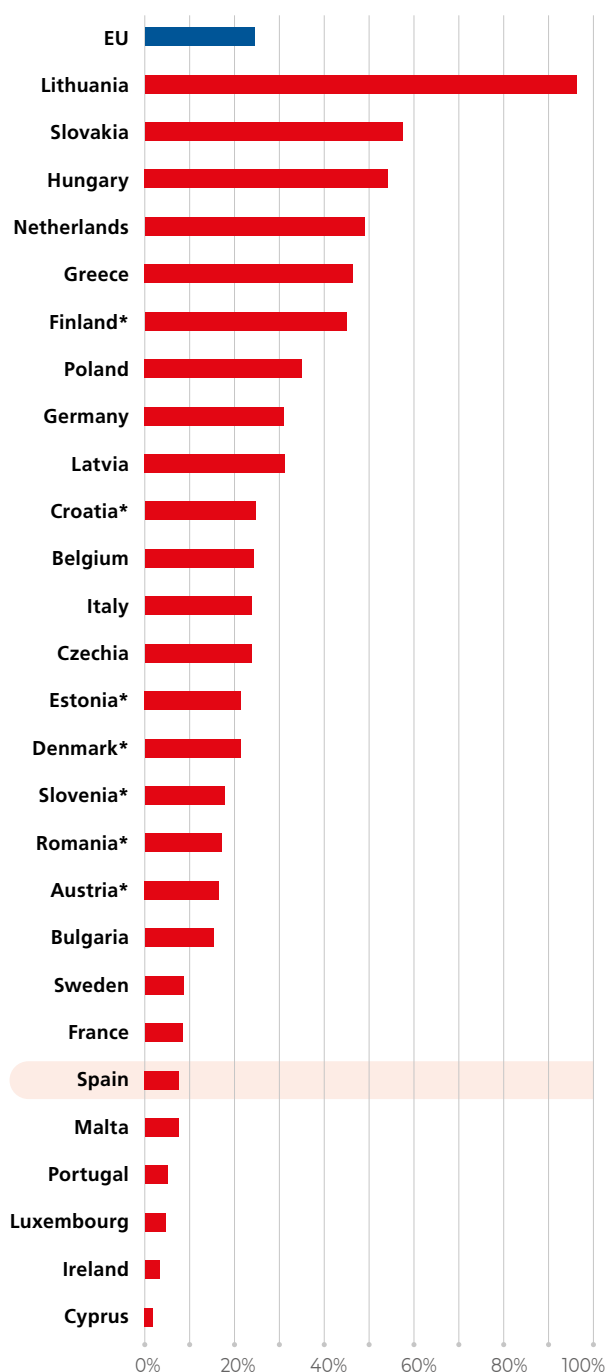
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INTRODUCTION

The year 2022 shook the European energy system. The Russian invasion of Ukraine disrupted energy flows, particularly the supply of Russian gas to Europe. Pipelines that carried the majority of European gas imports were closed, causing prices to soar to historic highs. European countries were forced to adapt to the new situation in a matter of months. Countries like Germany, which relied heavily on pipeline gas transport, were forced to build new infrastructure, such as regasification stations, in under a year's time. Other European countries shifted away from Russian imports to alternative sources such as Qatar and the United States. In response, the EU launched a coordinated European initiative called REPowerEU, aimed at transitioning away from gas, accelerating the shift to renewables, and increasing energy security (EC, 2022).

Figure 1

Imports from Russia in gross available energy, EU, 2020



Source: Eurostat, Including estimates for non-reported data for countries with*

1

STATUS QUO UP UNTIL THE WAR

Spain, however, was in a different situation. Located in the southwestern corner of Europe, its insular location made the Iberian peninsula an energy island with large energy infrastructure facilities and low ties with the Russian supplies. Spain was not as dependent on Russia for its energy supply, and the energy crisis affected the country mainly in economic terms; there was never a fear of energy shortages. However, the Spanish infrastructure and the lack of European sanctions on Russian gas ended up generating a larger amount of Russian gas imports that were afterwards mostly exported to other EU countries.

According to Eurostat, the overall energy imports from Russia accounted in 2020 for 7.5 per cent compared to an EU average of 24.4 per cent, more than 3 times higher. Gas imports in particular accounted for 10.5 per cent of gas compared with 41.1 per cent in the EU countries overall. While oil and coal accounted by 8.8 per cent and 43.2 per cent respectively, coal accounts for only a residual share in the energy mix (Eurostat, 2023).

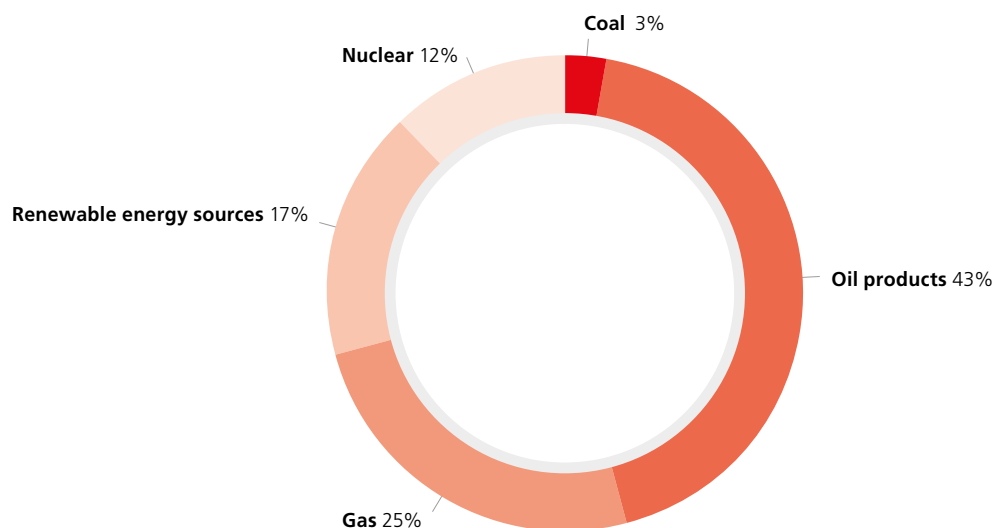
The definition of the Iberian peninsula, and therefore Spain, is that of an energy island related to an energy transport infrastructure that only exists between France and Spain, with connections accounting for just 3 per cent of electricity and

two gas pipelines. These connections have not met the expected objectives set for 2020 (10 per cent) and are far from the 15 per cent goal set for 2030. For this reason, Spain had a lower dependency on Russian fuels and the largest regasification capacity in Europe. In addition, it shares a gas market, Mercado Ibérico del Gas (MIBGAS), which is a trading hub with Portugal. Furthermore, Spain has two pipelines that directly connect to the Algerian gas hub in Hassi R'Mel – one directly from Algeria and another that connects via Morocco. Spain also has a milder climate compared to northern European countries, with household demand for heating representing 40 per cent of the total household demand, while the European Union (EU) average is 62 per cent (Eurostat, 2021).

This combination of diversified infrastructure and low dependence on Russian gas meant that Spain was never at risk of a gas shortage. However, the stress on the gas market brought several consequences, particularly the sudden rise in electricity prices, which led to increasing inflation.

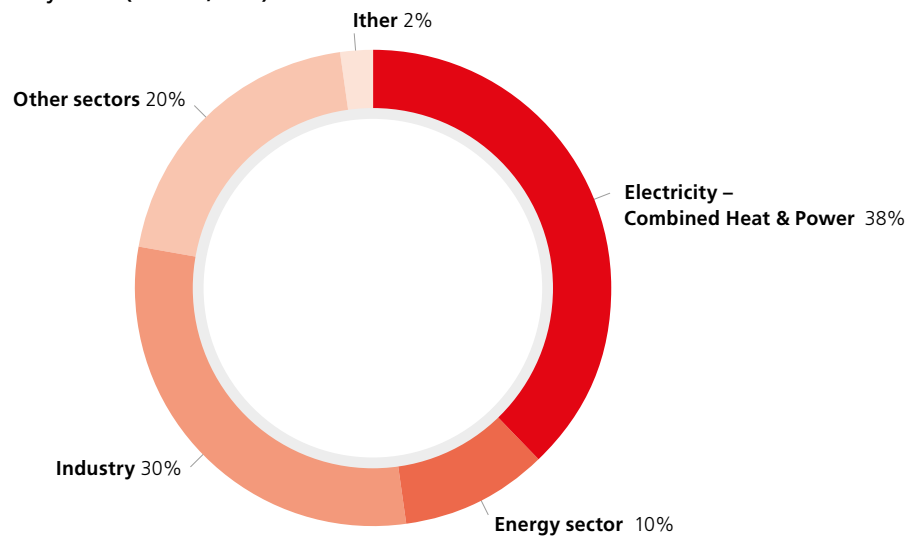
Spain's energy mix heavily relies on fossil fuels, with oil products and natural gas accounting for 43 per cent and 25 per cent, respectively, of the country's total primary energy consumption of 1366.82 TWh in 2021. The majority of

Figure 2
Share of the total primary energy consumption by source



Source: MITECO (2022)

Figure 3
Share of the gas consumption by sector (MITECO, 2022)



Source: MITECO (2022)

these fuels are imported, making Spain heavily dependent on foreign energy sources. In fact, the country imports 70.1 per cent of its total primary energy (MITECO, 2022). However, Spain's dependence on fossil fuels has been declining due to the increasing production of renewable energy, which accounted for 16.5 per cent of the energy mix in 2021. Wind and biomass were the two largest sources of renewable energy, while solar PV saw the largest annual growth. In 2021, final energy consumption in Spain was divided between the transport sector (38 per cent), industry (36 per cent), and other sectors (26 per cent), including households, services, and agriculture, showing a total energy consumption per capita of 111.23 GJ (MITECO, 2022).

Gas is primarily used for electricity production, industry, and other sectors, such as households and services. While it represents an important part of the electricity mix and industry, gas has almost no presence in the transport sector (Table 2). Therefore, the energy shock of 2022 heavily impacted the electricity and industry sectors.

Spain imported 415,569 GWh of gas in 2021, with Algeria being the predominant supplier, accounting for 42.8 per cent of total imports. Spanish companies, especially Naturgy, have long-term contracts with the state-run Algerian company Sonatrach. The rest of the imports came in the form of Liquefied Natural Gas (LNG) through various regasification stations in Spanish ports. LNG imports mainly came from Nigeria (11.5 per cent), the US (14.4 per cent), Russia (8.9 per cent), and Qatar (6.3 per cent). Russian imports represented a low percentage compared to the European Union due to the absence of pipeline connections (CORES, 2022b).

In 2021, Spain's oil supply mix was more diverse, with Nigeria (18.3 per cent), Mexico (13.6 per cent), and Libya (11.2 per cent) being the most important countries of origin. Meanwhile, imports from Russia only accounted for 4.6 per cent, making it the seventh largest country of origin for Spanish oil imports (CORES, 2022a).

However, at the end of the year, a major shift occurred in Spain's energy relation with Algeria due to ongoing geopolitical tensions between Algeria and Morocco and Spain's international position. Spain changed its official stance related to the situation in Western Sahara and accepted a solution based on the autonomy of Western Sahara inside Morocco under United Nations principles. This changed its relationship with Algeria, which had been one of the main defenders of an independent Western Sahara. As a result, Algeria decided not to renew a 25-year contract that ended on 1 November, which meant the closure of the pipeline connecting Algeria with Spain through Morocco and stopping all gas exports to Morocco. Despite the change in Spain's relationship with Algeria, the contracted gas supply is still being sent through LNG thanks to the regasification infrastructure existing in Spain and the directly connected pipeline.

Spain developed its gas infrastructure based on a low connection capacity through pipelines with the rest of Europe during the late 1980s and 1990s. There are two supply pipelines connecting to the Algerian gas hub in Hassi R'Mel. The first is the Magreb Europe pipeline, which connects Morocco and Spain through the Gibraltar Strait and the second is the Medgaz pipeline, which connects the northwestern coast of Algeria with southern Spain. The Magreb Europe pipeline is currently not in use, but it has a total yearly capacity of 12 bcm/year. The Medgaz pipeline has a total capacity of 10.5 bcm/year (GECF, 2021).

Spain has developed the largest regasification capacity in Europe, amounting to 61.9 bcm/year, with an additional terminal of 7 bcm/year that is currently not operational (King & Spalding, 2018). These facilities are situated along the Spanish coastline in Barcelona (Catalonia), Sagunto (Comunitat Valenciana), Cartagena (Murcia), Huelva (Andalucía), Mugar dos (Galicia), El Musel (Asturias), and Bilbao (Basque Country). Despite being one of the largest gas consumers in Europe, Spain's regasification plants have historically operated at a low capacity due to their combined large capacity and the availability of cheaper gas through pipelines.

The Spanish gas system is integrated with Portugal's, and both countries have their own gas trading hub, MIBGAS, which is distinct from the Dutch Title Transfer Facility (TTF) gas market. Connections to the rest of Europe are currently limited to two pipelines that link Spain to France near the Atlantic coast. These connections, located in Irun and Larrau, have a capacity of 5 and 5.3 bcm, respectively. A proposed third connection, Midcat, with a capacity of 9 bcm, was considered by the French, Portuguese, and Spanish governments; however, the project was ultimately not constructed due to French opposition arguing that it would be against the EU policy of reducing fossil fuels and would involve a long construction period. Other parts of the energy infrastructure with France, such as electricity interconnections, have also encountered difficulties in their development.

The electricity sector is the largest consumer of gas in Spain. However, the power system has made significant progress in decarbonisation, with 69.5 per cent of the total generation being fossil-free and 48.4 per cent coming from renewable energy sources in 2021 (REE, 2022). The objective, drawn in the Integrated National Energy and Climate Plan (PNIEC) of the Ministry of Ecological Transition (MITECO) is to reach a level of 74 per cent of electricity generated to come from renewable energy sources in 2030 (Aguadra et al., 2023; MITECO, 2020b). The average emissions factor for electricity in Spain is 0.14 tCO₂/MWh. Nonetheless, 27.51 per cent of the total generation comes from gas sources, including Combined Cycle Gas Turbines and Combined Heat and Power (REE, 2022). Spain and Portugal have a unified electricity system with minimal connection constraints and a shared electricity market Mercado Ibérico de Electricidad (MIBEL). Historically, Spain has been a net importer of electricity, with most of its imports coming from the French system and its large nuclear fleet. Similar to gas consumption, electricity consumption in Spain is concentrated in the industrial, residential, and service sectors.

2

SHORT-TERM IMPACTS AND RESPONSE TO THE ENERGY CRISIS

The energy shock resulting from the Ukraine invasion by Russia, followed by sanctions and European plans, had a significant impact on the Spanish energy mix and economy. Gas prices started to rise in the summer of 2021 and reached all-time records in 2022, causing a heavy impact on the Spanish economy. The increase in gas prices led to an increase in Spanish inflation, particularly through the electricity retail tariffs. The implementation of the Iberian gas cap in mid-June reduced electricity prices and consequently inflation levels.

In 2022, Spain became an exporting energy hub due to its gas infrastructure, the French nuclear crisis, and the rapid penetration of renewables in the power system. However, the year also showed a structural change in gas imports. Although the total imports decreased only by 0.5 per cent, the closure of one of the two pipelines led to a 50.6 per cent reduction in pipeline imports and a 40.2 per cent increase in LNG imports. Despite the overall drop in gas consumption in Spain, exports to neighbouring countries such as France, Italy, and the Netherlands increased by 160 per cent, 634 per cent, and 215.9 per cent, respectively. Exports to France occurred through the two existing pipelines, while exports to Italy and the Netherlands occurred through LNG.

The change in gas imports by country was significant, with the US replacing Algeria as the top gas importer. Imports from the US increased its exports to Spain by 112.6 per cent, while Algerian imports decreased by 40.2 per cent. On a yearly average, the US accounted for 28.9 per cent and Algeria for 23.9 per cent of the imports. Surprisingly, Russian gas imports increased during 2022 by 54.8 per cent, reaching a total share of imports of 12.6 per cent. The absence of sanctions on Russian gas and the regasification capacity of Spain allowed the Bilbao regasification station (the closest to the Baltic sea) to operate almost at full capacity, importing almost 30 per cent of Spanish gas in 2022. The increase in gas imports was caused by the absence of sanctions, the lower cost of gas in comparison with other LNG imports, the reduction of Algerian pipeline gas imports, the large regasification capacity of Spain, and the new role played by Spain as an intermediate point of other European countries' imports as France and Italy. In sum, the increased Russian imports had a commercial (lower cost) and European (increase exports to EU countries) aspect. In contrast, in

terms of oil, Russian imports decreased from 4.6 per cent to 1.1 per cent due to the European sanctions on Russian oil (CORES, 2023a, 2023b).

The invasion of Ukraine resulted in a significant shock to gas prices, which in turn had an impact on electricity prices due to the pay-as-cleared wholesale electricity market design. The increased cost of natural gas led to reduced consumption, particularly in gas-intensive industries such as the tile, paper, and glass sectors. To support these industries, the Spanish government implemented financial assistance programmes. Overall, gas consumption decreased by 10.8 per cent in 2022 (Eurostat, 2023), but with the exclusion of gas consumption for electricity exports, the gas consumption reduction amounts to 21 per cent (MITECO, 2023).

The gas shock had a significant impact on the electricity sector, particularly on the prices seen by households. In Spain, regulated electricity tariffs are designed to incentivise flexible consumption by translating the hourly wholesale price to small consumers. Therefore, the increases in wholesale electricity prices immediately affected households, and not only large consumers as in other European countries. This had a significant impact on inflation, which rose to 10.8 per cent in July 2022, mainly due to electricity and food prices (INE, 2022). To address this issue, Spain and Portugal negotiated the Iberian Mechanism at the European level. This mechanism artificially capped gas prices in the electricity wholesale market (and afterwards compensated for them) (Hidalgo-Pérez et al., 2022) es decir, sobre el precio de venta del pequeño consumidor (PVPC). The mechanism effectively reduced wholesale MIBEL market prices, which in turn benefited both large and small consumers.

In terms of electricity production in 2022, Spain's ongoing drought had a significant impact on hydroelectric production, resulting in a marked decrease. Despite maximum wind and solar production, the combination of increased generation for export and low hydro production resulted in an increased reliance on gas generation. Exports reached a historical high, with a 71.4 per cent increase compared to 2021, and France shifted from being a net exporter to a net importer from Spain. Two main factors drove exports to France: corrosion problems in the French nuclear fleet, and the price differential between Iberian and French electricity prices due to the Iberian Mechanism (REE, 2023a).

In addition to the Iberian Mechanism, the Spanish government implemented several measures to reduce taxes and tariffs, including a reduction in the electricity VAT, electricity tax, and electricity policy support tariff, which amounted to 80 per cent of the initial taxes and 55 per cent of the tariffs (Gobierno España, 2022). The government also reduced gas taxes, implemented a price cap on the gas tariff, and decreased the price of gasoline and diesel by 20 cts€/L. To support vulnerable consumers, the government implemented additional reductions and increased the number of potential beneficiaries for both electricity and gas. The government provided €625 million in aid to electro-intensive and gas-intensive industries. Finally, the government encouraged the deployment of renewable energy sources with a new legislative package (RD 20-2022), which opened the door for a quicker environmental evaluation procedure if certain conditions were met by the project pursuant to European agreements. While most projects will still go through the common process, opening the door to reduced environmental evaluations gained the approval of the opposition of environmental NGOs and Civil platforms. Overall, these measures had a positive impact, and inflation levels at the beginning of 2023 were among the lowest in the European Union (Eurostat, 2023).

3

LONG-TERM ACTIONS AND CONSEQUENCES

After the crisis, the Spanish government approved an Energy Security Plan aimed at reducing energy dependence and accelerating the transition to renewable energy sources. The plan has six main pillars: energy savings and efficiency, acceleration of the ecological transition, protection for vulnerable consumers, fiscal measures, energy autonomy, and solidarity with other EU countries (Gobierno España, 2022). The plan is in line with several long-term actions that were already in place.

Saving actions concentrate on the industrial, commercial, residential and public sectors. In order to reduce the final energy consumption, electrification processes are also seen as key. In this sense, both the electrification of heat and mobility are fostered in these sectors. However, Spain is still lagging behind in heat pump installation, buildings refurbishment, and electric vehicles penetration compared to other European countries. In terms of heat pumps, Spain still has a low penetration of these technologies in households compared to other European countries. Moreover, during 2022 and the energy crisis, Europe saw a surge in heat pump installations of 38 per cent compared to 2021, but this increase was only 24 per cent in Spain (Carbon Brief, 2023). Regarding private transport, only 3.8 per cent of the cars bought in Spain in 2022 were electric, a percentage far lower than in other countries of the EU such as the Netherlands (23.5 per cent) or Denmark (20.8 per cent) or neighbouring countries as France (13.3 per cent) or Portugal (11.4 per cent) (ACEA, 2023).

The increase in energy autonomy is in line with some of the European recovery funds after the Covid-19 crisis. These funds have strategic lines named PERTEs and two of them in particular are related to the development of Electric Vehicles Industry (VEC) and the PERTE ERHA (Renewable Energy and Hydrogen industry). These public funding efforts aim to develop new industrial facilities relating to car and battery manufacturing, renewable energy value chains, and green hydrogen production. The ERHA aims to mobilise almost €7 billion of public investment and €9.5 billion of private investment (Gobierno España, 2021). A special effort is foreseen in the fabrication of Solar Panels and Hydrogen. And in addition, specific roadmaps have been established for offshore wind with 1 to 3 GW planned for 2030 (MITECO, 2021b) (not as developed as in other countries due to a more difficult marine orography) and the energy storage roadmap (MITECO, 2021a).

In energy production terms, the acceleration of the ecological transition focuses on an upgrade of the Energy Plan for 2030 with increased renewable ambitions during the first semester of 2023. Over the last years there has been a boost in investment in renewables and a renewed interest after a decade of low investments. Due to its geographical situation and the solar resource, Solar PV investments are more competitive in Spain, and Spain is installing more Solar PVs than foreseen in the PNIEC. Nowadays, Spain is the country in the world with the highest Solar PV penetration in the system (IEA, 2023), ahead of countries such as Chile. This seems to be a trend that will intensify in the following years, with many projects already approved and in the construction pipeline. In contrast, wind capacity is lagging behind in respect to the objectives. The phase-out of nuclear remains as it was prior to the energy crisis with a foreseen objective of reducing by half the nuclear fleet by 2030 and closing all the reactors by 2035.

The renewables deployment objectives will also require an increase in the transmission and distribution capacities of the electricity grid that will require special efforts and a more flexible and ambitious planning of the grid. It is expected that the penetration of renewables will decrease the energy dependency, which will be in line with an increase in energy autonomy and strategic renewable industrial policies. As a matter of solidarity, Spain plans to increase its interconnection capacity with France in both terms of electricity and hydrogen.

Green hydrogen is a major debate in the Spanish context and has recently gathered much attention after the crisis. The Spanish government also published a roadmap for this renewable gas in 2020 with an objective of achieving 10 per cent of the European capacity in 2030, 4 GW of electrolyzers (MITECO, 2020a). The idea is to produce hydrogen to decarbonise the current difficult-to-decarbonise industries such as the chemical, steel, and ceramic industries, and to use it as energy for heavy transport and export part of the production to Europe. In this sense, Enagas (gas TSO) has planned the backbone of a hydrogen system, which includes a hydrogen pipeline that connects Barcelona with Marseille and is expected to have a capacity of 2 MTones of H₂ per year. The pipeline known as H2Med is supported by the European Commission but it is still under debate between the Spanish and French governments. The first envisions a pipeline only for green hydrogen (produced with re-

newable energy sources) and the second provides for the possibility of also transporting pink hydrogen (produced with nuclear electricity).

In general, Spain has a hydrogen strategy and has planned a future infrastructure that aims to cover the main industrial clusters existing in Spain. The infrastructure plan covers the two clusters in the north of Spain, a hydrogen pipeline following the Ebro river and two parallel north-south pipelines, one on the Mediterranean coast and a second one connecting the western part of Andalucía with the north of Spain.

4

CONCLUSIONS

Spain has never been heavily reliant on Russian fuel imports, and its geographically diversified gas infrastructure has allowed it to avoid any supply disruptions and the fear of this occurring. Despite this, Spain increased its LNG imports from Russia in 2022 due to its regasification capacity, the lower price of Russian LNG, and the absence of European sanctions to gas and gas exports surging, particularly to France and Italy. However, the increase in gas prices had a significant impact on the Spanish economy, particularly in terms of electricity prices, which resulted in higher inflation. In response, the Spanish government implemented various measures – including the Iberian Mechanism – to control electricity prices and inflation. While these measures did reduce gas usage, the reduction was not as significant as in other European countries.

The Russian invasion of Ukraine has had a significant impact on Spain's energy system and accelerated its transition. While the invasion did not fundamentally alter Spain's overall strategy, it did reinforce the country's existing objectives. One notable change has been a decrease in the use of natural gas as a transitional fuel. There has also been a shift in public opinion, with a growing acceptance of renewable energy's volatility compared to fossil fuels. The use of hydrogen is becoming an increasingly popular topic, but efforts to electrify energy demand – particularly in heat and transportation – have been slower. This could lead to issues in the near future, as an oversupply of renewable electricity may result in very low electricity prices during certain periods of the year, potentially causing a decline in investment in renewable energy infrastructure.

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