BANCO DE ESPAÑA
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DIRECTORATE GENERAL ECONOMICS, STATISTICS AND RESEARCH – BANCO DE ESPAÑA

Chapter 1	The Spanish economy's resilience amid adversity and uncertainty
Chapter 2	Robust and sustainable growth and convergence with the euro area: challenges and opportunities
Chapter 3	The current episode of price pressures in the euro area, the monetary policy response and its effects
Chapter 4	Spain and the EU in the face of the energy crisis: near-term adjustments and challenges pending

CONTENTS

THE WAR IN UKRAINE HAS HIGHLIGHTED THE EXTRAORDINARY LEVEL OF VULNERABILITY OF THE ENERGY FRAMEWORK OF ALL THE EU MEMBER STATES

Energy mix in which fossil fuels still account for almost three-quarters of the energy consumed

Considerable import dependencies associated with this energy mix (practically all these fuels are imported)

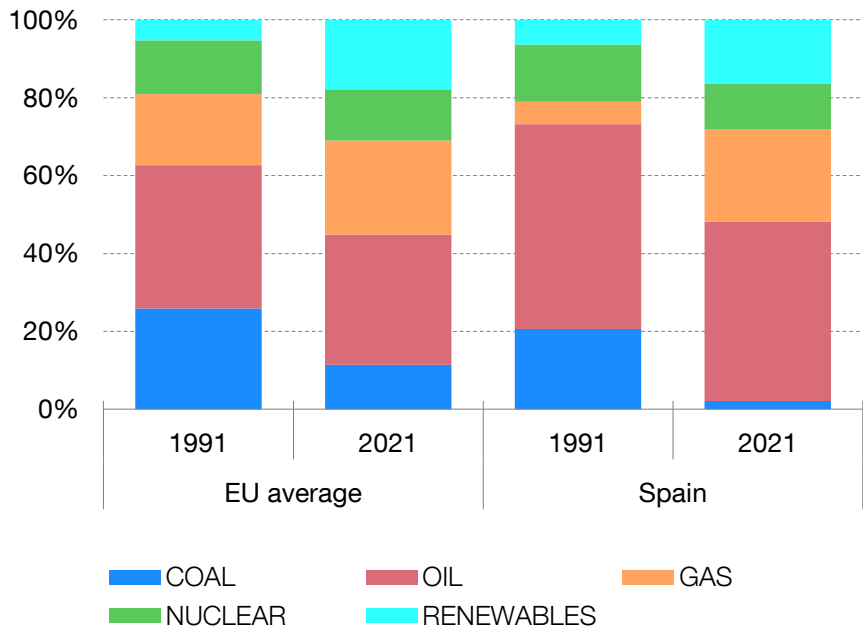
Lack of sufficient energy interconnection infrastructure within the EU (particularly incomplete in the electricity and natural gas segments)

Environment highly conducive to an adverse shock similar to the current one – where the volume of energy imports from some countries has dropped steeply and prices have risen sharply – having a highly negative and heterogeneous impact on the European economies, which, in addition, would be difficult for them to share or smooth

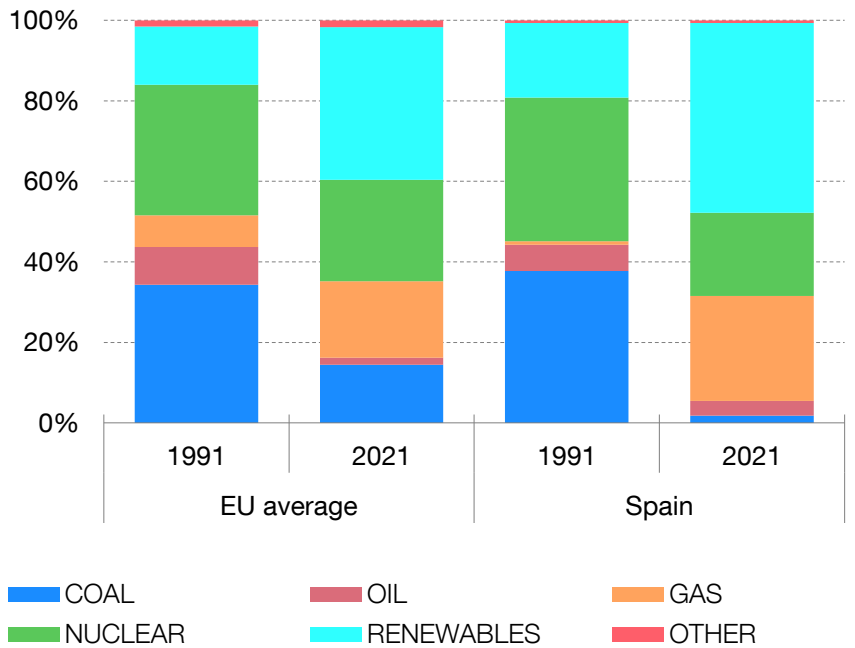
DESPITE RENEWABLE ENERGY SOURCES HAVING GAINED WEIGHT IN BOTH THE SPANISH AND THE EU ENERGY MIX IN RECENT DECADES, FOSSIL FUELS REMAIN THE MAIN SOURCE OF ENERGY

- Various factors have contributed to the energy transformation, including greater electricity generation from renewable sources, changes in the sectoral structure of economies and efficiency gains (Box)
- Before the start of the war in Ukraine, there were significant differences in energy mix across the main European countries, which reflected different national energy policy strategies, asymmetries in national productive systems and heterogeneity in countries' natural resources

PRIMARY ENERGY CONSUMPTION (a)



ELECTRICITY GENERATION BY SOURCE (b)

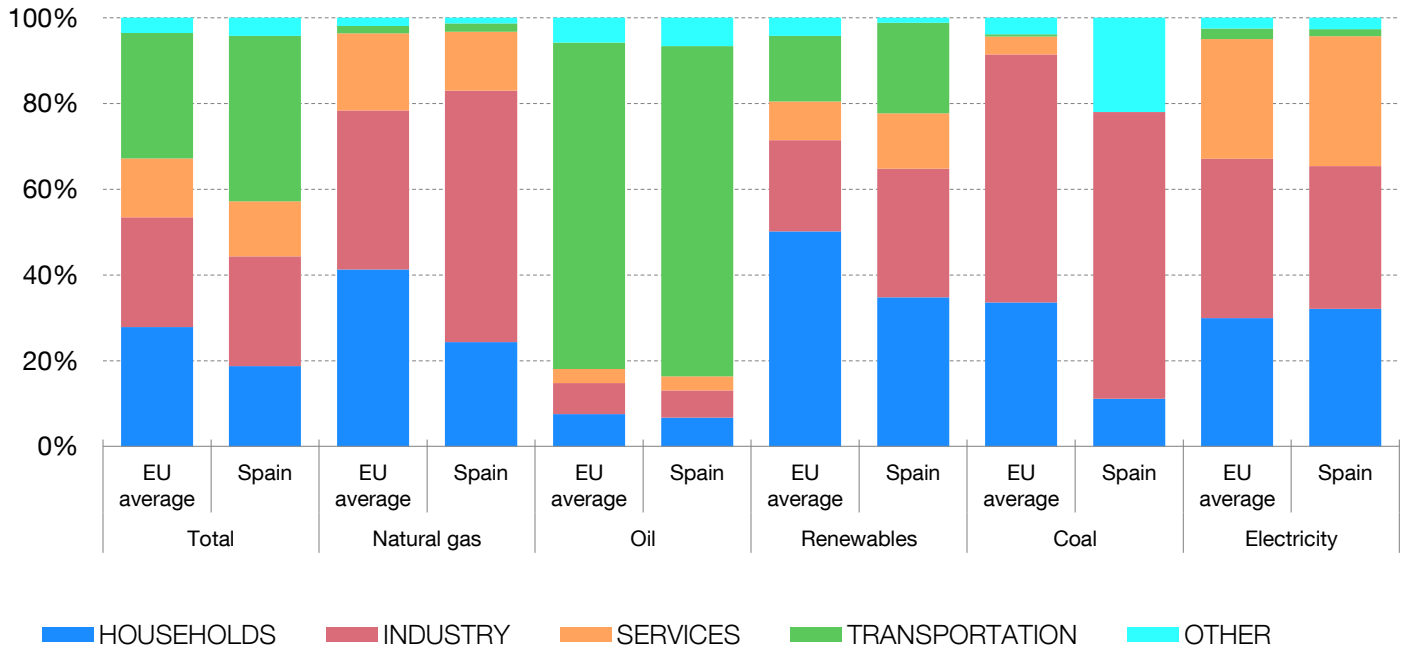


Source: Eurostat.
(a) Gross available primary consumption according to Eurostat's energy balance, which excludes secondary energy sources.
(b) Based on gross electricity generation, which includes the electricity sector's own consumption. "Oil" includes both the primary source and oil products. "Coal" includes coal and other solid fossil fuels according to the Eurostat classification. "Other" includes other sources, such as manufactured gases, peat products and non-renewable waste.

SPAIN STANDS OUT FOR ITS HIGHER USE OF OIL, MAINLY OWING TO THE SPANISH TRANSPORTATION SECTOR'S HIGH CONSUMPTION

- Natural gas consumption is similar in Spain and the EU, albeit with a very different composition (higher consumption for electricity generation and by industry, but lower by households)
- The same differences were also observed in renewable energy consumption

FINAL ENERGY CONSUMPTION BY SECTOR IN 2021 (a)

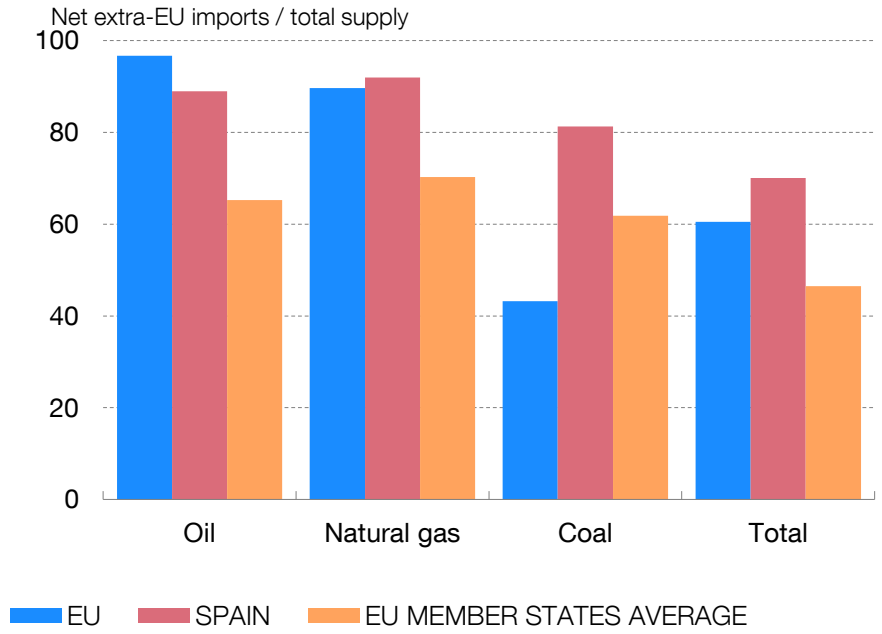


Source: Eurostat.
(a) Distribution based on economic agents' final consumption according to Eurostat's energy balances. The transportation sector includes different means of national transport, excluding international aviation and maritime transport. "Other" includes additional sectors, such as agriculture and fisheries. "Oil" includes both the primary source and oil products. "Coal" includes coal and other solid fossil fuels according to the Eurostat classification.

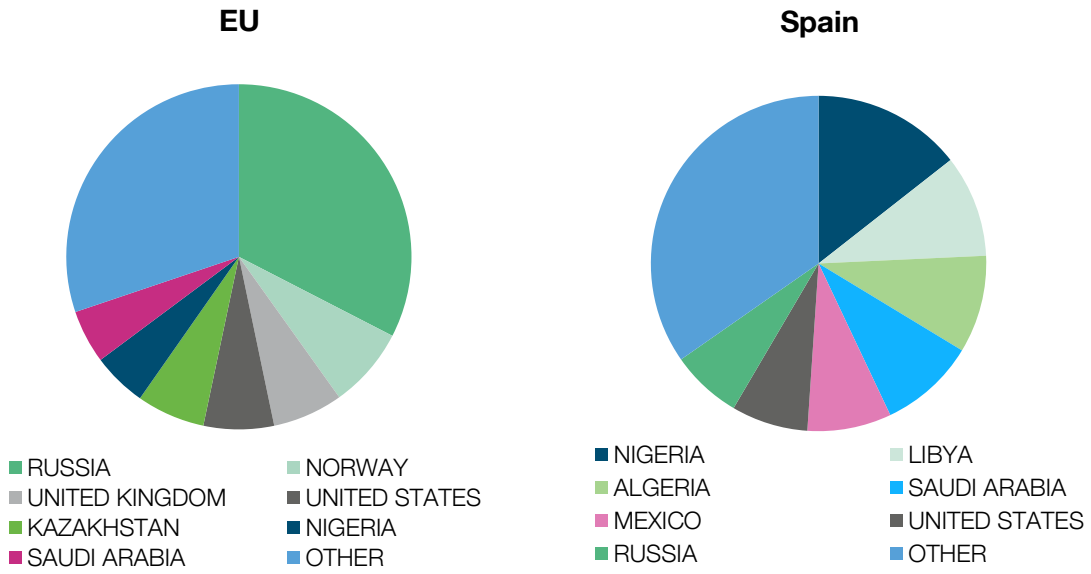
IN RECENT DECADES, SPAIN'S AND THE EU'S ENERGY IMPORT DEPENDENCY HAS INCREASED AND IT IS GREATER THAN THAT OF THE MAIN WORLD ECONOMIES

- Between 1990 and 2019 the EU's energy import dependency rose by 10 pp, to 60%, and these imports were also relatively concentrated. Europe is particularly vulnerable to oil, natural gas, uranium and anthracite trade disruptions (more details)
- Spain is more dependent than the EU on third countries for energy purchases, although its imports are more diversified among different suppliers

EU AND SPANISH ENERGY DEPENDENCE IN 2019 (a)



LARGEST SUPPLIERS OF ENERGY PRODUCTS IN 2019 (b)

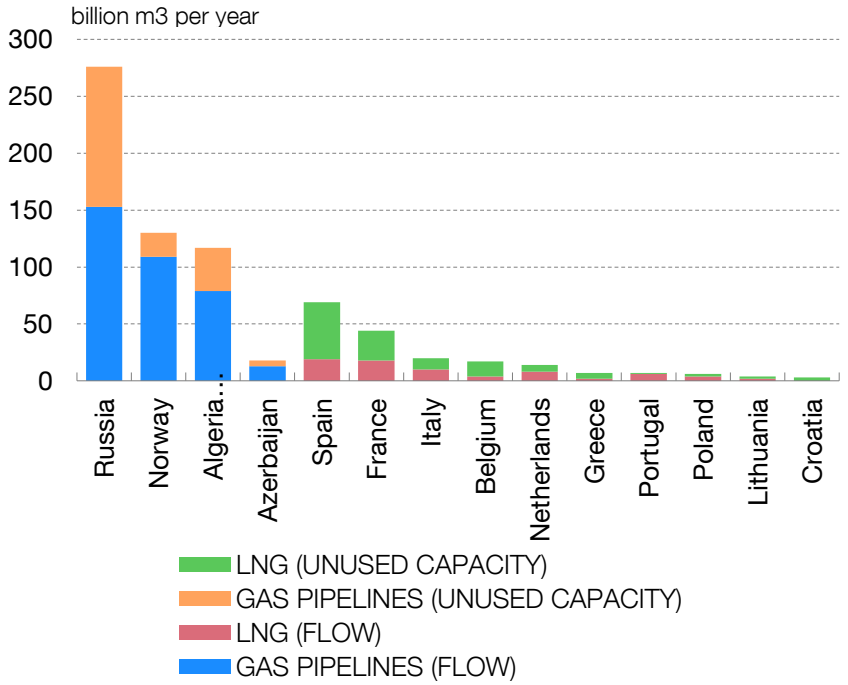


Sources: CEPII-BACI and Eurostat.
(a) EU: net imports from non-EU countries as a percentage of gross available energy. EU Member States average: imports from non-EU countries as a percentage of domestic production, total imports and stockbuilding. "Oil" includes both the primary source and oil products. "Coal" includes coal and other solid fossil fuels according to the Eurostat Standard International Energy Product Classification (SIEC).
(b) Value shares of energy imports (anthracite, coal, coke, peat, crude, oil products, natural gas, propane, butane, uranium and fuelwood). The shares of the different providers of gaseous natural gas are calculated drawing on the Eurostat NRG database (Balteanu and Viani, 2023).

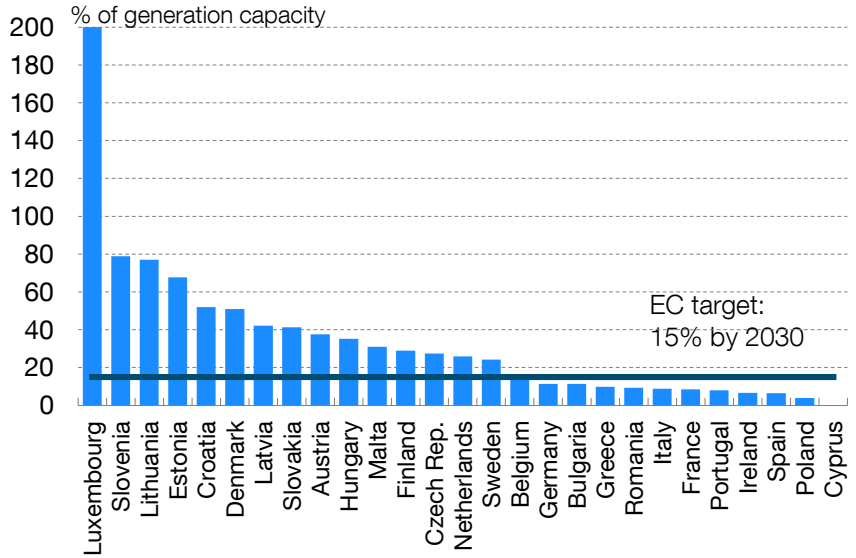
DESPITE THE EU HAVING PROMOTED THE STRENGTHENING OF ENERGY INTERCONNECTIONS BETWEEN THE DIFFERENT MEMBER STATES, THEY ARE STILL INCOMPLETE

- Integration of the natural gas market at European level is limited by the existing infrastructure, which is highly dependent on pipelines and Russia
- Moreover, cross-border electricity interconnection capacity is highly uneven across countries and particularly low in Spain

EU GAS IMPORTS AND UNUSED CAPACITY IN 2021



CROSS-BORDER CAPACITY RATIO (2020)

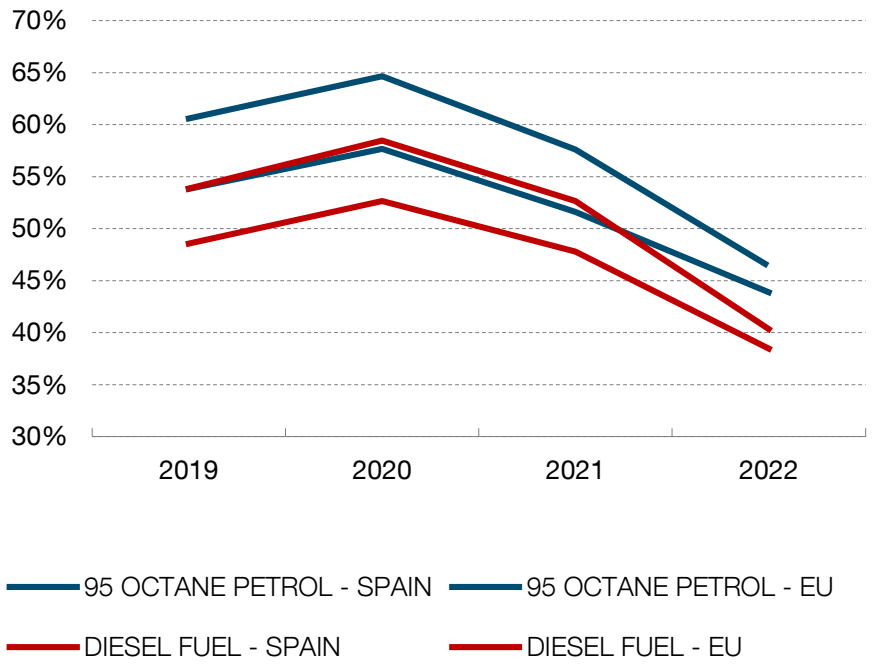


Sources: European Commission and IMF.

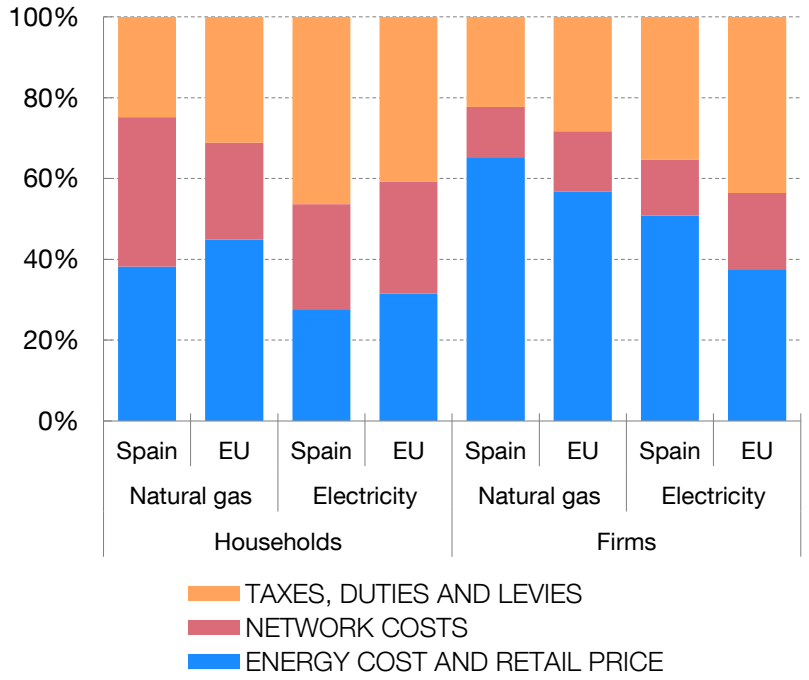
OTHER ASPECTS ALSO CONTRIBUTE TO EU ENERGY MARKETS BEHAVING PARTICULARLY HETEROGENEOUSLY ACROSS MEMBER STATES

- There are considerable cross-country differences in how changes in wholesale electricity prices are passed through to retail prices
- Moreover, taxes and other regulated charges account for a sizeable proportion of the energy prices paid by consumers, which varies considerably across the European economies: taxes and regulated charges account for a lower percentage of the energy bill – except for gas and electricity bills charged to households – in Spain than in the EU on average

SHARE OF TAXES IN VEHICLE FUEL PRICES



NATURAL GAS AND ELECTRICITY PRICE STRUCTURE (2019)



Source: Eurostat.

EUROPEAN AUTHORITIES HAVE RESPONDED RESOLUTELY AND EU ECONOMIES HAVE DEMONSTRATED CONSIDERABLE ADAPTABILITY IN RECENT QUARTERS

Diversification of energy supply sources (substituting a large part of imports from Russia)

Lower energy consumption in the EU as a whole

Favourable conjunctural factors (e.g. an unusually mild winter in Europe and China's lower gas imports)

Potentially highly disruptive scenarios (widespread supply cut-offs and a sharp contraction of economic activity) have been avoided. Yet it is still too early to assess the extent to which the significant capacity the European economies have demonstrated in adapting their energy demand in the short term and restructuring their energy procurement will last

A RESOLUTE MULTI-FACETED RESPONSE

European measures

Sanctions and restrictions

Speeding up the transition to clean energy

Diversifying energy sources

Energy saving

Investment and reforms

Boosting Member States' responsiveness

REPowerEU + adaptation of NGEU

GEC of the SGP active in 2023

State aid Temporary Framework

National measures

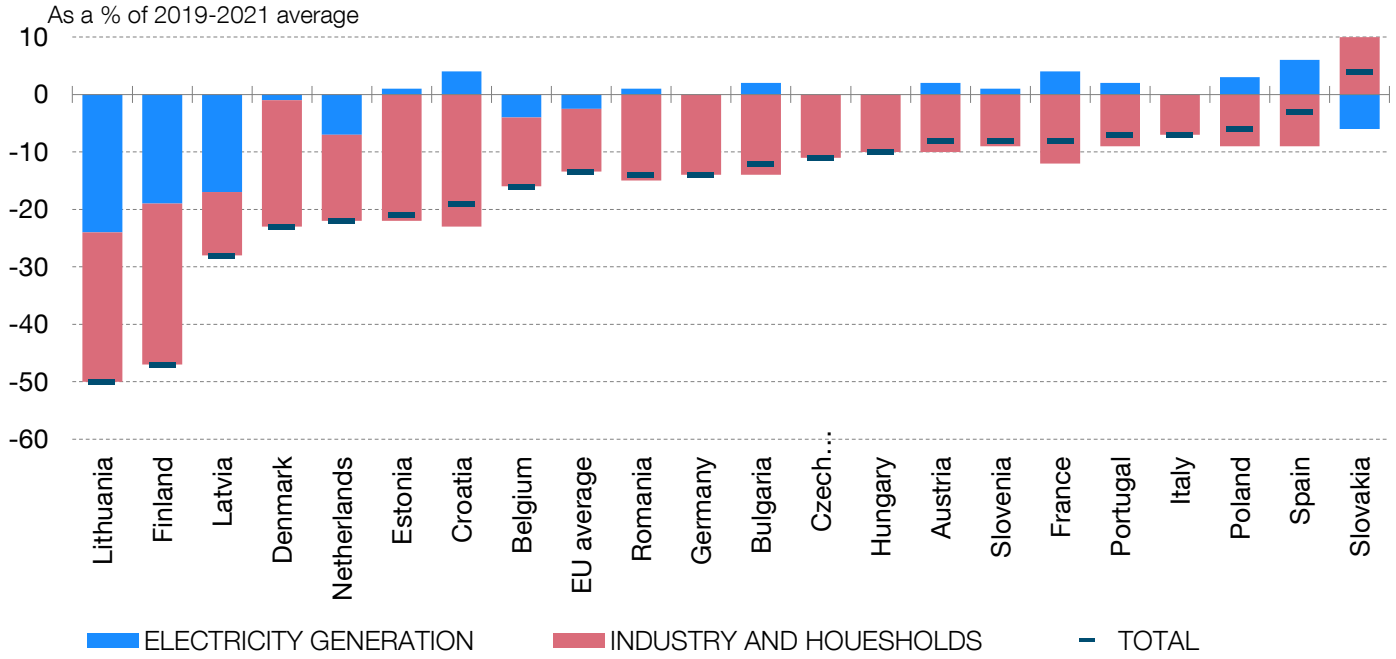
Price caps (energy/food)

Income support

THE EU HAS SHOWN SIGNIFICANT CAPACITY IN REDUCING ITS ENERGY IMPORTS FROM RUSSIA AND IN ADAPTING ITS ENERGY DEMAND IN THE SHORT TERM ...

- The wide range of measures rolled out by European and national authorities has been particularly conducive in this respect

CONSUMPTION OF NATURAL GAS IN 2022 VERSUS AVERAGE FOR 2019-2021 AND SECTORAL CONTRIBUTIONS (a)

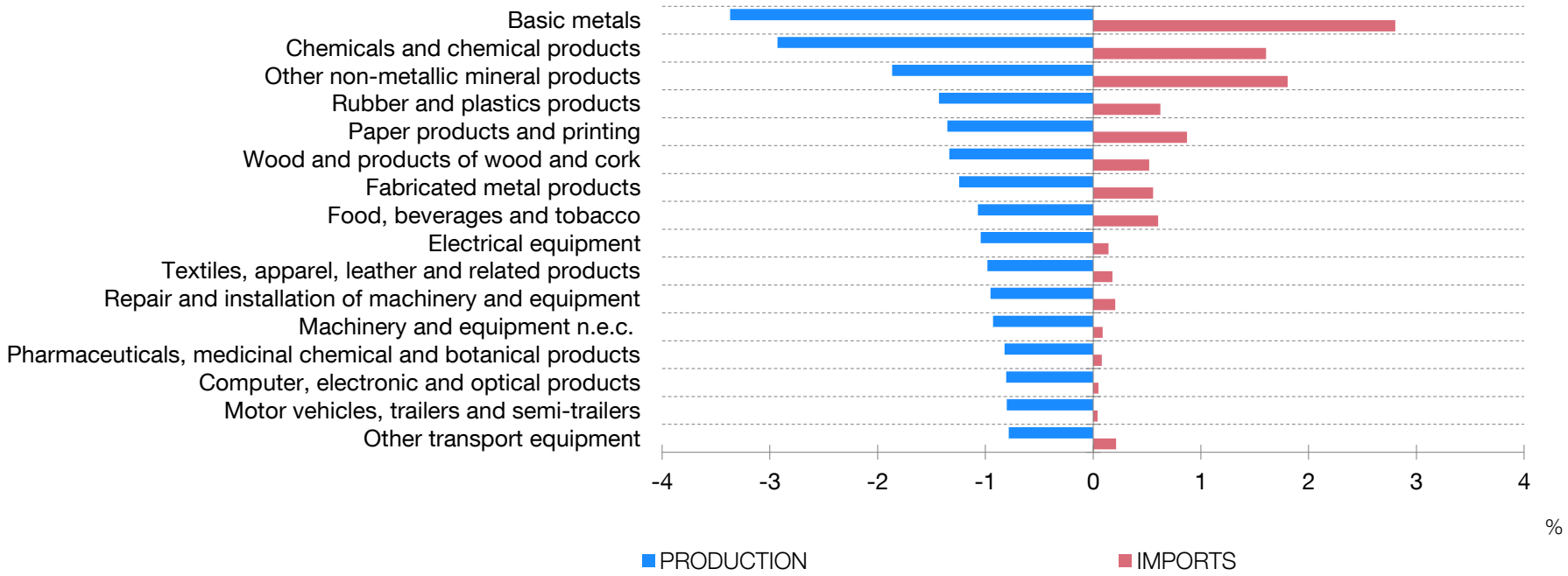


Source: Bruegel.
(a) Change in average annual consumption broken down into electricity generation and households and firms. For those countries (Lithuania and Slovakia) for which data for the full year are unavailable, the changes to November 2022 are depicted. “EU average” refers to the average of the 21 countries for which data for the full year are available.

... YET, WERE ENERGY COSTS TO REMAIN HIGH, THE EU WOULD ULTIMATELY BECOME LESS COMPETITIVE, WHICH WOULD AFFECT ITS INDUSTRIAL BASE

- During the current energy crisis, energy prices have risen much more sharply in the EU than in most of the world's main economies
- Were these developments to become entrenched, the EU would suffer a significant (and potentially structural) loss to its industrial base

CHANGE IN PRODUCTION AND SUBSTITUTION OF IMPORTS IN THE EU IN RESPONSE TO AN ENERGY PRICE SHOCK (a)



Source: Banco de España.
(a) A permanent 30% increase in the EU's energy costs compared with those of the rest of the world is considered. The simulations are implemented in a sectoral general equilibrium model that incorporates the imperfect substitution of factors of production (including energy).

THE CURRENT ENERGY CRISIS IS HAVING A HIGHLY UNEVEN IMPACT ON HOUSEHOLDS AND FIRMS

Factors behind this impact

Households' and firms' initial exposure to the rising cost of energy goods (greater for lower-income households and for the most energy-intensive and smaller firms)

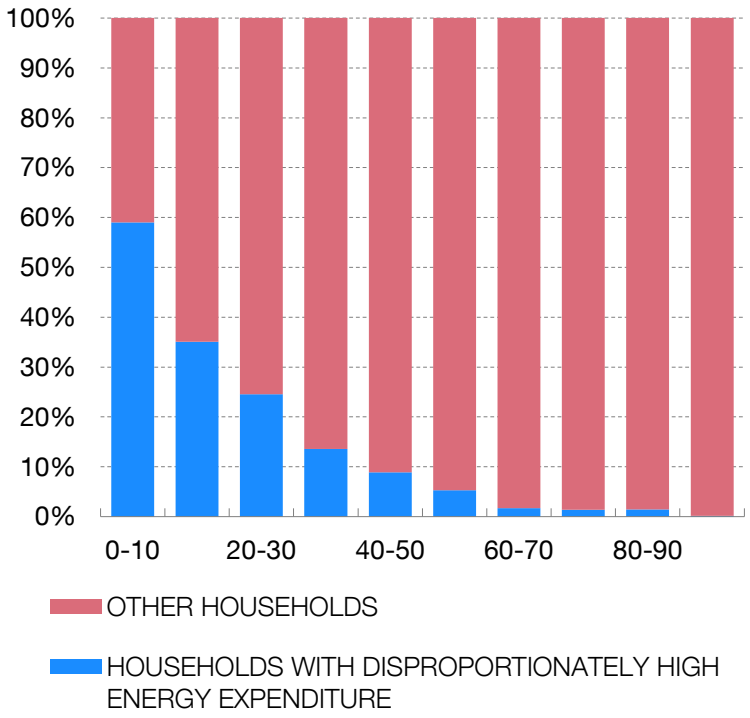
Ability to reduce consumption of energy goods (limited in the short term)

Effect of measures deployed by the authorities (most of which have been general measures, not targeted at the most vulnerable groups)

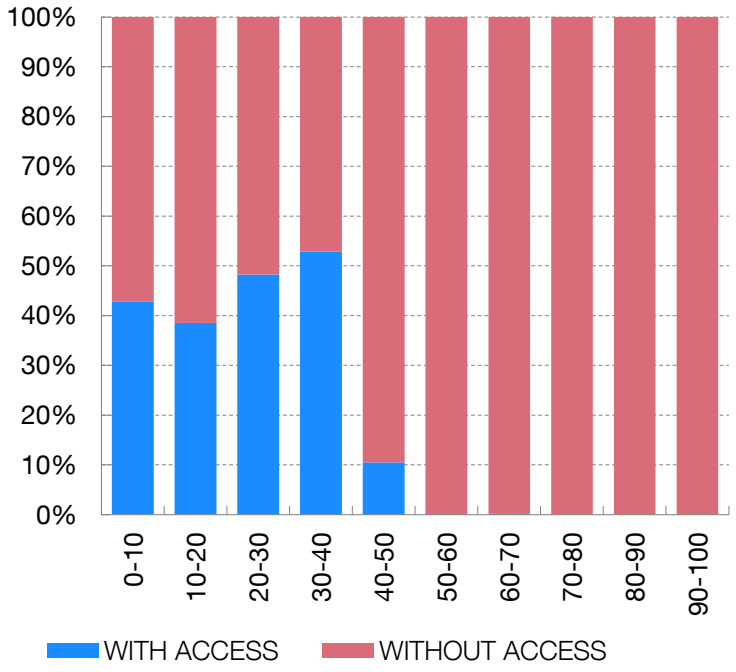
IMPACT OF THE ENERGY CRISIS ON SPANISH HOUSEHOLDS

- 15% of Spanish households have disproportionately high energy expenditure (a smaller percentage than in other European countries). These households are concentrated in the lower part of the income distribution
- €200 grant: Banco de España estimates suggest that this measure could benefit approximately 3.6 million Spanish households, around one-half of households found in the lowest 40% of the income distribution
- When designing these measures, it is advisable to supplement the information on income with that on the expenditure of the poorest households

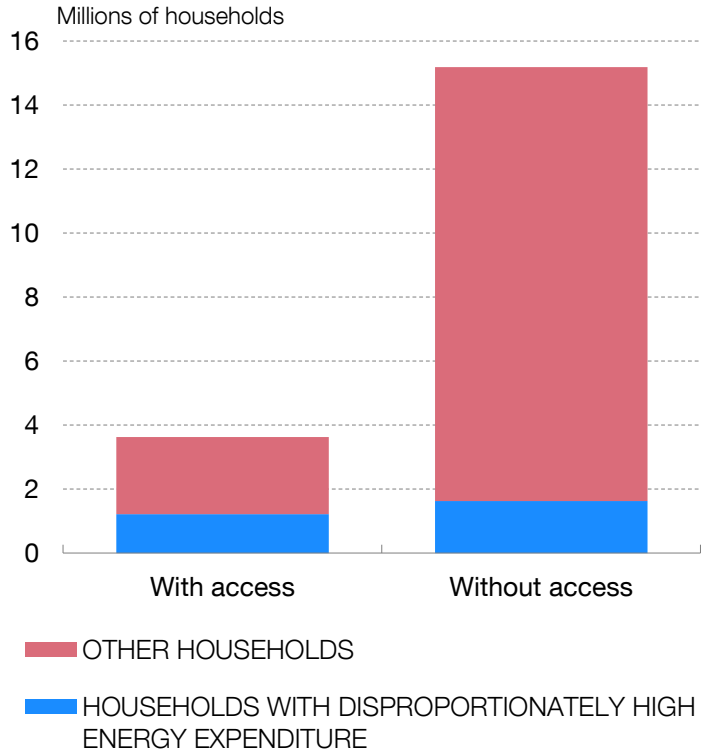
HOUSEHOLDS WITH DISPROPORTIONATELY HIGH ENERGY EXPENDITURE IN THE INCOME DISTRIBUTION



ACCESS TO THE €200 GRANT, BY INCOME DECILE



HOUSEHOLDS WITH DISPROPORTIONATELY HIGH ENERGY EXPENDITURE

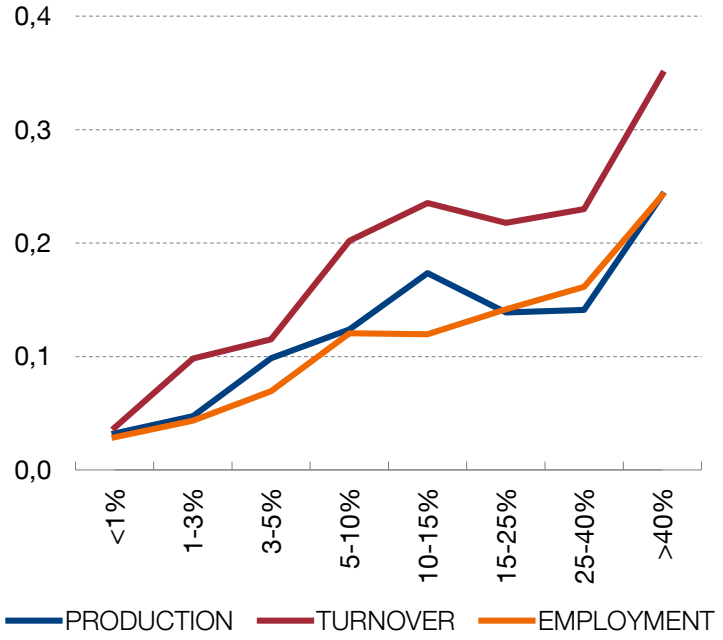


Source: Banco de España, drawing on the Spanish Survey of Household Finances 2020.

IMPACT OF THE ENERGY CRISIS ON SPANISH FIRMS

- The energy expenditure of firms is highly heterogeneous, both by sector of activity and by firm size. According to the EBAE, in 2022 the average increase in energy costs for Spanish firms was slightly above 30%
- To reduce their energy expenditure, firms primarily sought to renegotiate their supply contracts (46% of the firms surveyed) and to improve their energy efficiency (40%). They also invested in renewable energies (nearly 30%)
- The negative effect of the rise in energy costs was more pronounced on less productive and smaller firms

PROPORTION OF FIRMS REPORTING A NEGATIVE IMPACT BY WEIGHT OF ENERGY COSTS



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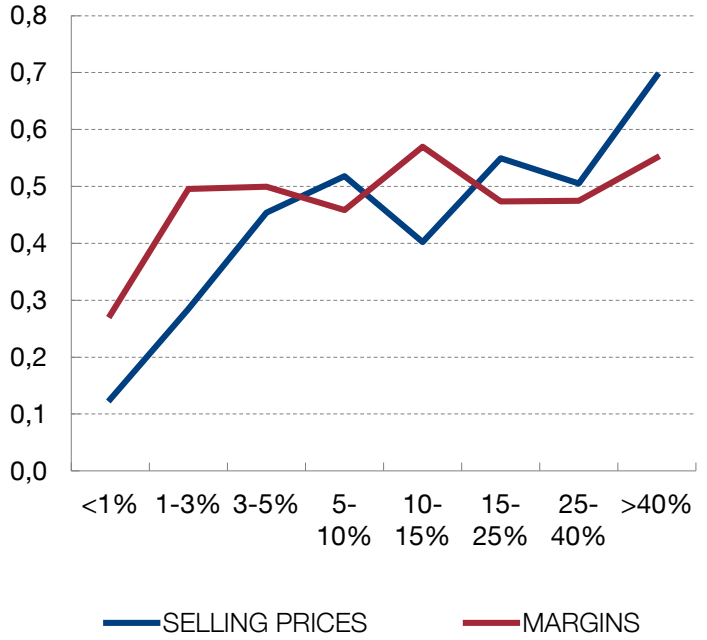
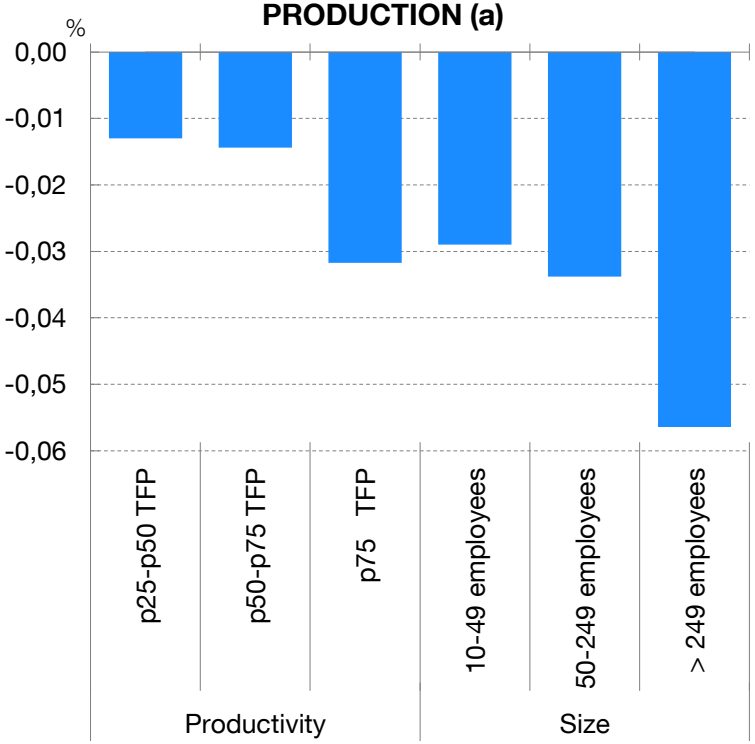


CHANGE IN THE PROBABILITY OF THE ENERGY SHOCK HAVING A NEGATIVE IMPACT ON PRODUCTION (a)



Source: EBAE, module on the impact of the energy crisis.
(a) On the estimated probability for a firm in the 25th percentile of productivity in its economic sector and with fewer than 10 employees. For this reference, the estimated probability of the energy shock having had a negative impact on production is 0.116. The regression controls for economic sector, firms' energy intensity, the increase in energy costs, the main energy source and the debt ratio.

THE CHALLENGES AHEAD

Correcting the structural shortcomings identified in the EU's energy framework is consistent with advancing – possibly even faster than initially envisaged – the European green transition towards a carbon neutral economy

Large-scale deployment of renewable energies and additional energy efficiency gains: technological challenges, potential new external dependencies and labour market challenges

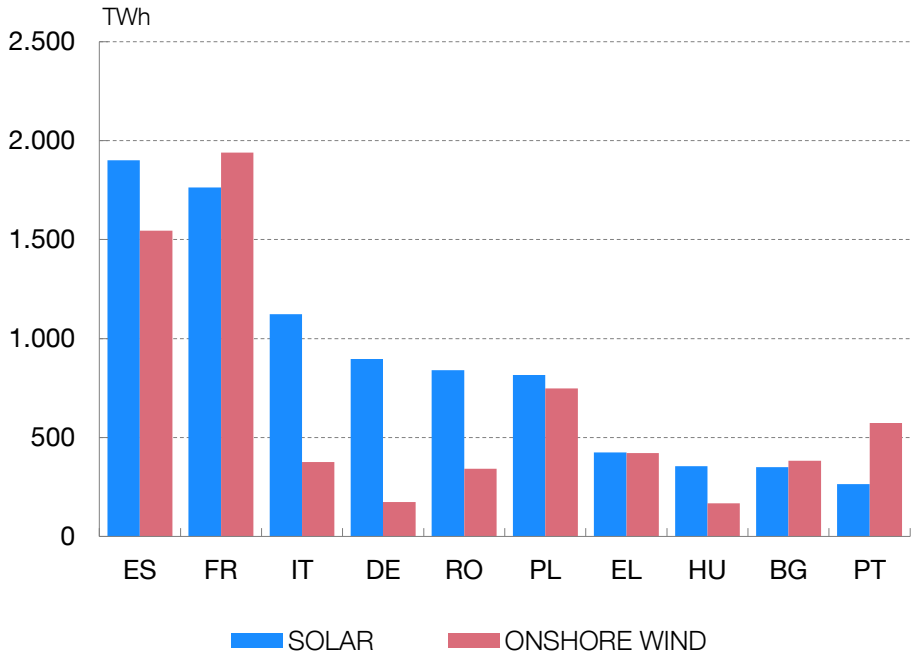
Further development of the EU's energy interconnection infrastructure. According to the European Commission, the completion of the European electricity infrastructure interconnection projects currently under way would reduce wholesale electricity prices by 2.5% on a permanent basis

The European policy response must be agile, provide certainty and ensure that the green transition does not lead to a structural loss of competitiveness for the productive system. Funding plays a key role

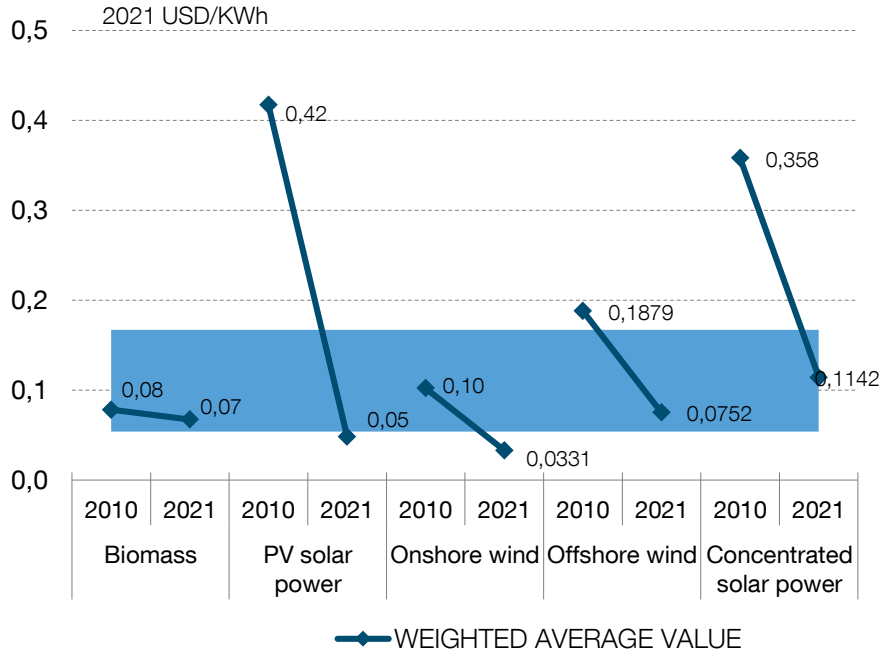
THE BOOST TO RENEWABLE ENERGIES IS A MAJOR OPPORTUNITY FOR THE SPANISH ECONOMY

- Spain has the second highest onshore wind power generation potential and the highest solar power generation potential, and ...
- ... is home to global leading firms in these sectors

RENEWABLE ENERGY POTENTIAL (a)



LEVELISED COST OF ELECTRICITY FROM RENEWABLE ENERGY GENERATION TECHNOLOGIES, 2010-2021 (b)



Sources: International Renewable Energy Agency and Joint Research Centre (ENSPRESO).
(a) The ENSPRESO dataset provides technical wind, solar and biomass potentials, based on geographical location scenarios. For wind, resource evaluation also considers setback distances and wind speed. For solar, potentials are derived from irradiation data and available area for solar applications.
(b) The levelised cost of electricity is a measure of the average cost of electricity generation for a generator over its lifetime. It is used to compare the costs of the different electricity generation methods.

TO PRESS AHEAD WITH THE ECONOMY'S ENERGY TRANSFORMATION, PUBLIC POLICIES MUST PLAY A LEADING ROLE

THE ROLE OF KEY PLAYERS IN THE FACE OF THE GREEN TRANSITION

GOVERNMENTS

- Increasing green taxation and boosting public investment
- Deploying compensatory measures to mitigate adverse effects on the most vulnerable groups
- Enhancing the regulation of economic activity, setting standards on environmental issues and efficiency gains
- Providing economic agents with certainty and a stable operational framework

FINANCIAL SECTOR

- Efficiently channelling the huge volume of funds that needs to be invested in the green transition
- Properly assessing its own and other economic agents' exposure to climate risks
- Developing and harmonising new financial instruments

CENTRAL BANKS

- Incorporating climate considerations into their monetary policy operational frameworks
- Monitoring the risks to financial stability posed by climate change and the green transition
- Enhancing the regulation and prudential supervision of climate risks

Source: Banco de España.

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THANK YOU FOR YOUR ATTENTION

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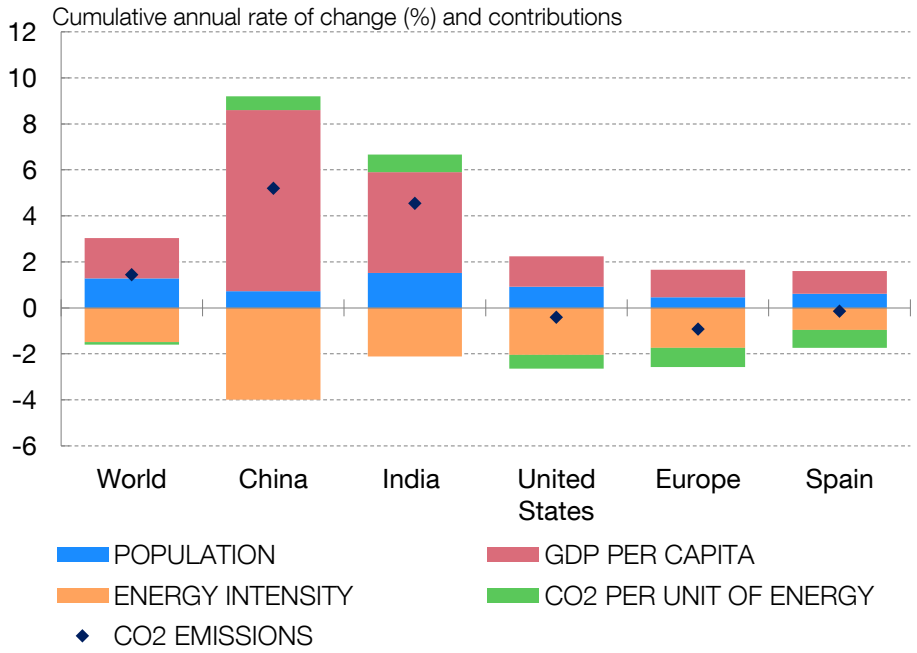
BOX: ENERGY INTENSITY AND CARBON INTENSITY IN SPAIN AND IN EUROPE (1/2)

- Between 1991 and 2020, in the EU and in Spain emission reductions were compatible with economic growth, driven by the decline in carbon intensity

$$CO_2 = \text{Population} \times \underbrace{\frac{GDP}{\text{Population}}}_{\text{Economic activity}} \times \underbrace{\frac{\text{Energy}}{GDP}}_{\text{Energy intensity}} \times \underbrace{\frac{CO_2}{\text{Energy}}}_{CO_2 \text{ per unit of energy}}$$

$$\frac{CO_2}{GDP} \rightarrow \text{Carbon intensity}$$

CONTRIBUTION TO CO_2 EMISSIONS GROWTH (1991-2020) (a)

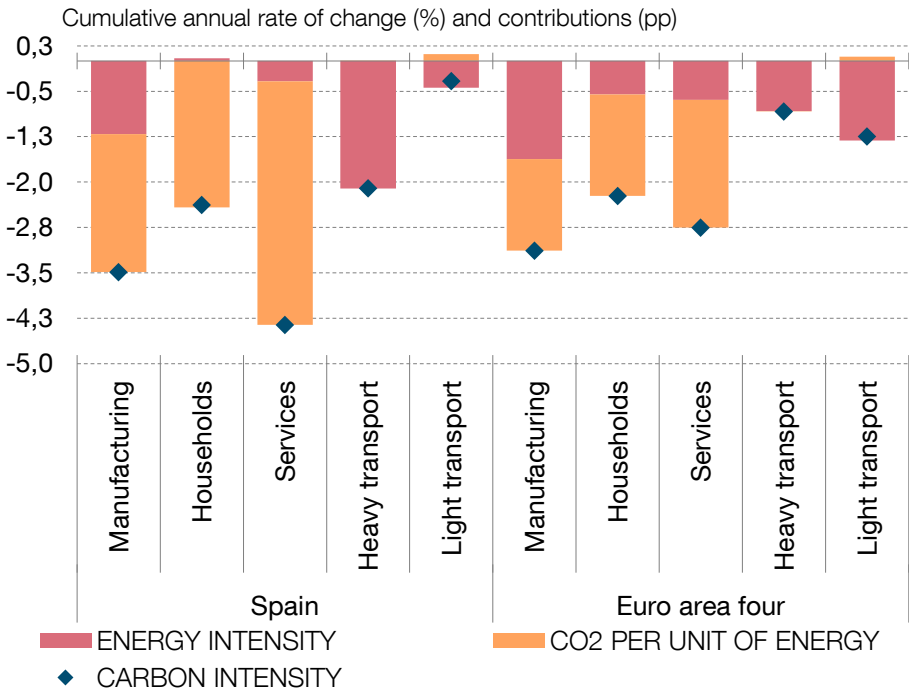


Source: International Energy Agency (Greenhouse Gas Emissions from Energy, 2022).
(a) The Europe aggregate refers to those EU countries that belong to the OECD.

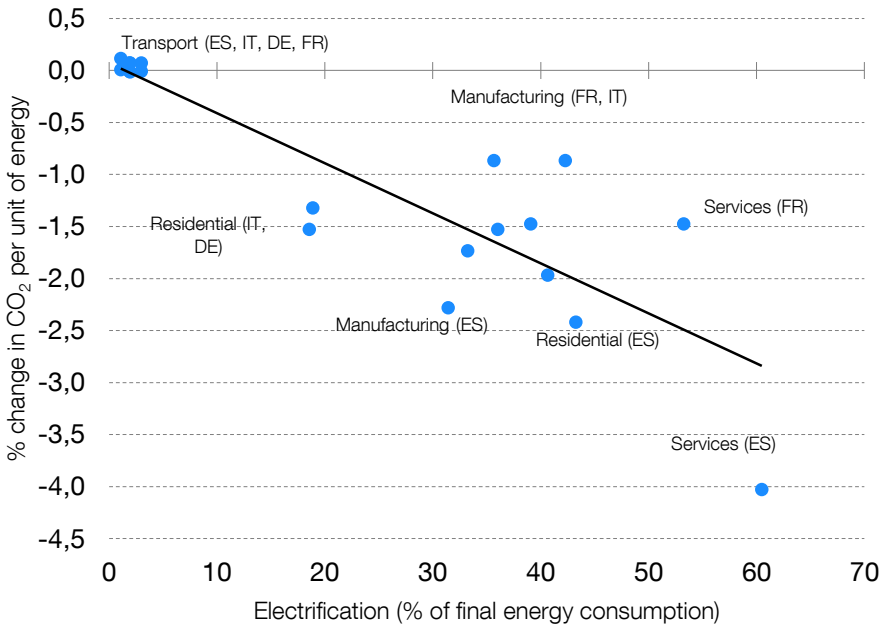
BOX: ENERGY INTENSITY AND CARBON INTENSITY IN SPAIN AND IN EUROPE (2/2)

- In recent decades carbon intensity fell in all the sectors considered
- The fall in carbon intensity in services and manufacturing was driven by the decarbonisation of their energy mix
- In transport, the reduction was more modest and stemmed from energy efficiency improvements. All of this is associated with the degree of electrification

CO_2 PER UNIT OF GDP (2000-2020) (a)



CO_2 PER UNIT OF ENERGY AND DEGREE OF ELECTRICIFICATION (b)



Sources: International Energy Agency (Energy Efficiency Indicators, 2022) and Eurostat.

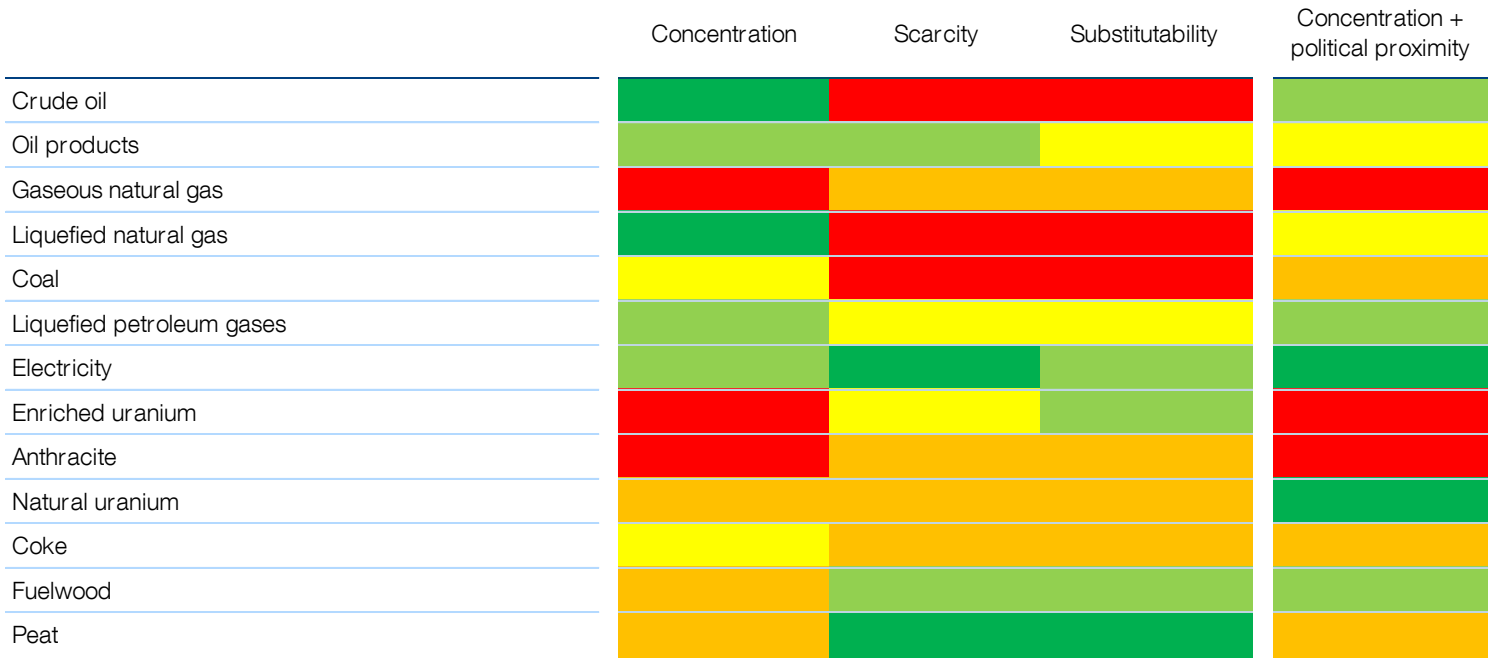
(a) In Italy, the carbon intensity data for the services sector are only available up to 2019. The euro area four aggregate is composed of Spain, Italy, France and Germany, weighted by their respective shares in the total emissions of the aggregate for 2019. The CO_2 indicator per unit of energy is based on final energy consumption data.

(b) Data on CO_2 emitted per unit of energy for the residential, manufacturing, services and transport (distinguishing between heavy and light transport) sectors in Spain, Italy, Germany and France, for the period 2000-2020, are used. For the degree of electrification, information on the final consumption of economic agents, obtained from Eurostat's energy balances for 2020, is used.

EUROPE IS PARTICULARLY VULNERABLE TO OIL, NATURAL GAS, URANIUM AND ANTHRACITE GLOBAL TRADE DISRUPTIONS

- The EU's vulnerability can be quantified by calculating dependency indicators that reflect the concentration of imports, the EU's scarce domestic production and the substitutability of external supply

VULNERABILITY OF THE EU'S ENERGY IMPORTS (2019) (a)



Sources: Banco de España, drawing on Eurostat, CEPII-BACI and Bailey, Strezhnev and Voeten (2017).
(a) The indicators of import concentration, scarcity and substitutability for each product are standardised by the mean and the standard deviation for the whole sample (z-score). The energy products are classified and colour-coded according to the quintile to which their z-scores belong; colours closer to red signal higher vulnerability. The last column shows the import concentration index in which each country's import shares are weighted with an indicator of "political proximity" to the EU, based on UN voting patterns and calculated following Bailey, Strezhnev and Voeten (2017). The products are ordered according to their share of European energy imports.