

RECENT CHANGES IN CO₂ EMISSIONS IN SPAIN

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In 2020, CO₂ emissions in Spain fell by 17.4%.¹ This reduction, which was also observed in the European Union (EU) and worldwide (with falls in emissions of 10.4% and 6.2%, respectively), was mainly due to the COVID-19 pandemic and the effects that the measures rolled out to contain it had on economic activity in general and on certain sectors (most notably transportation) in particular.

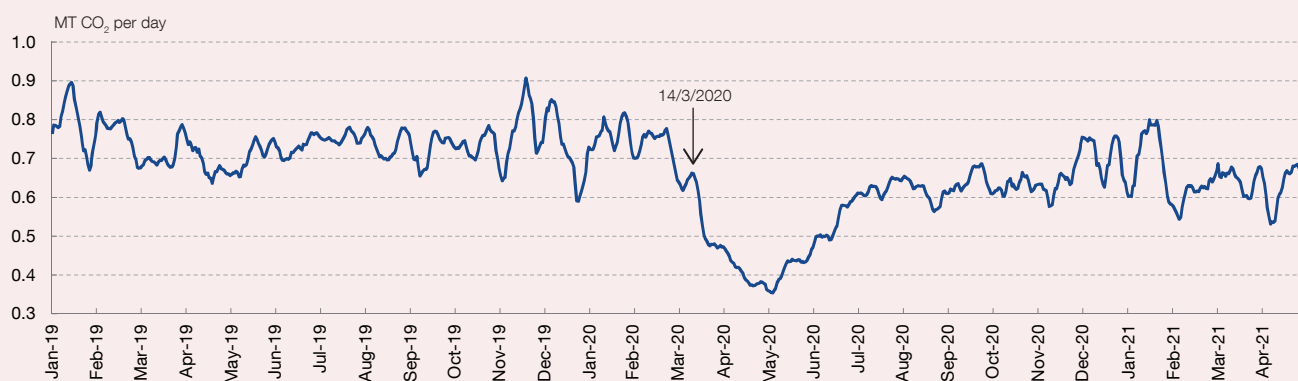
Indeed, most of the fall in CO₂ emissions in Spain arose in the second half of March and in April, after the first state of alert was declared on 14 March, with the introduction of the most stringent restrictions on people's movement and the activity of certain sectors (see Chart 1). Since then, the gradual easing of these confinement measures led to an equally gradual increase in emissions, although they have not yet returned to pre-crisis levels.

In addition, Chart 2 shows that in 2020 the largest reductions in CO₂ emissions occurred in international and domestic air transport. This was also the case in the EU-28 as a whole and is consistent with the sharp decline in activity recorded in this sector since the onset of the pandemic, mainly due to restrictions on movement and a voluntary reduction in travel. CO₂ emissions linked to the

land transport sector and industry also declined very significantly in the early stages of the pandemic (somewhat more sharply than in the EU in the case of land transport). However, unlike in the air transport sector, they have already returned to levels similar to those prior to the health crisis. In contrast to these developments, carbon dioxide emissions in the residential sector showed no noticeable year-on-year deviations in 2020, whereas energy sector emissions over virtually the entire year, including before the pandemic, were lower than in 2019, recording an annual average fall of 22%.

There is evidence, however, that not all of the decline in CO₂ emissions in 2020 was linked to the adverse effects on economic activity of the pandemic and the lockdown measures. For example, in the particular case of the Spanish electricity sector, which accounts for around 20% of the economy's total emissions, some studies suggest that a significant part of the decline in its emissions over 2020 was due to structural as well as transitory factors unrelated to the pandemic. Specifically, [Fabra et al \(2021\)](#)² have estimated the emissions that the Spanish electricity sector would have generated over the past year in a hypothetical scenario of no pandemic, using

Chart 1
CO₂ EMISSIONS IN SPAIN (a)
7-day moving average



SOURCE: Carbon Monitor.

a Includes the energy, industrial, residential and land and air transport sectors.

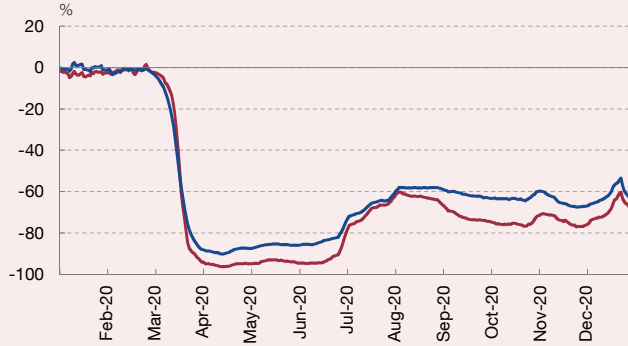
1 According to data provided by [Carbon Monitor](#) for the energy, industrial, residential and air and land transport sectors. Over the course of 2020, total emissions decreased by around 47 million tonnes.

2 See N. Fabra, A. Lacuesta and M. Souza (2020), "Degrowth versus Decoupling: Competing strategies for carbon abatement?", *EnergyEcoLab*, 109.

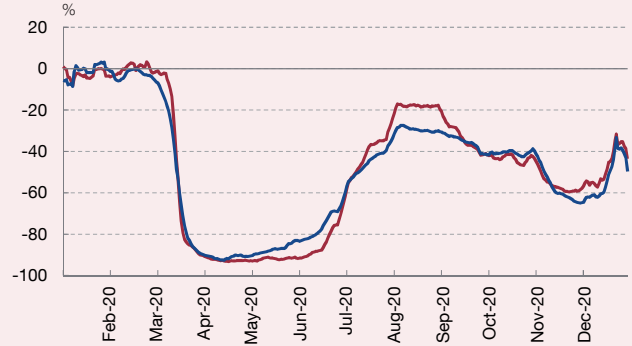
RECENT CHANGES IN CO₂ EMISSIONS IN SPAIN (cont'd)

Chart 2
CO₂ EMISSIONS THROUGHOUT 2020 IN SPAIN AND THE EU-28 (a)
Year-on-year 7-day moving average rates

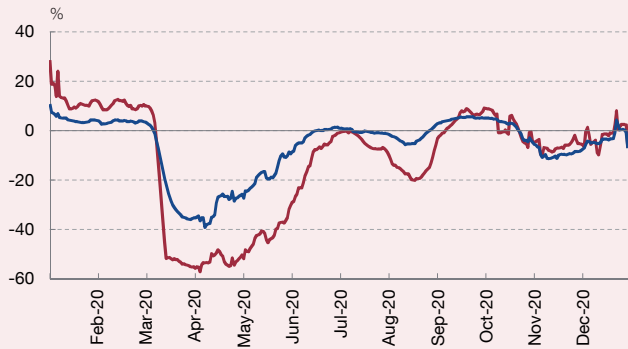
1 INTERNATIONAL AIR TRANSPORT



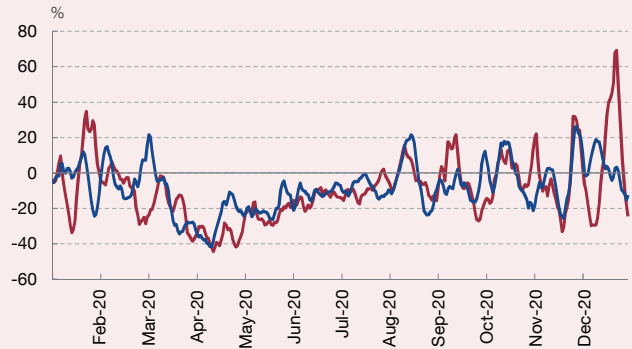
2 DOMESTIC AIR TRANSPORT



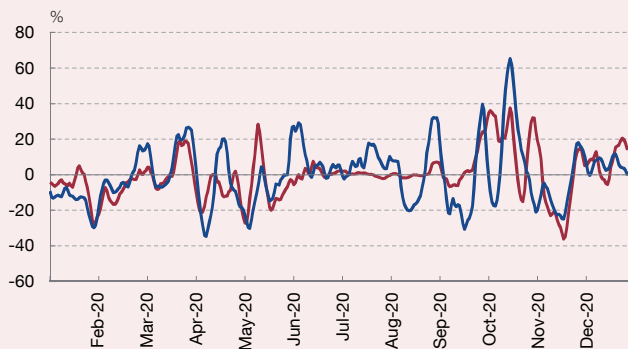
3 LAND TRANSPORT



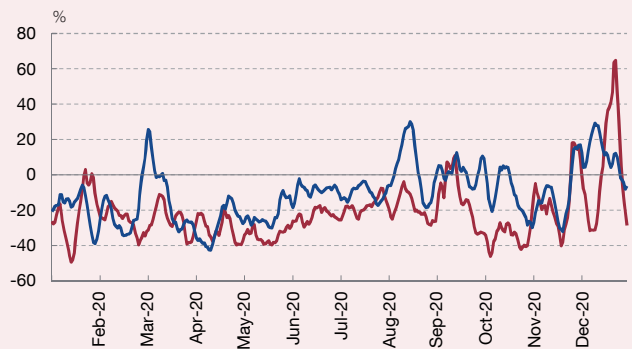
4 INDUSTRY



5 RESIDENTIAL SECTOR



6 ENERGY SECTOR



— SPAIN — EU-28

SOURCE: Carbon Monitor.

a The EU-28 includes the United Kingdom throughout the period.

RECENT CHANGES IN CO₂ EMISSIONS IN SPAIN (cont'd)

a model that includes most of the technical and institutional parameters of electricity market auctions. Specifically, the authors concluded that 64% of the reduction in this sector's CO₂ emissions in 2020 (equivalent to 17% of the decrease in emissions observed in the economy as a whole) appears to be unrelated to economic activity. Drivers behind this decline include the closure of coal-fired power plants and weather conditions in 2020, which was particularly wet and sunny compared with 2019, and increased investment in renewable energy, all of which altered the relative share of the different sources of electricity generation. Specifically, as a result of these factors, hydroelectric and photovoltaic power production, whose level of CO₂ emissions is relatively low, increased by 42% and 71%, respectively, in 2020.

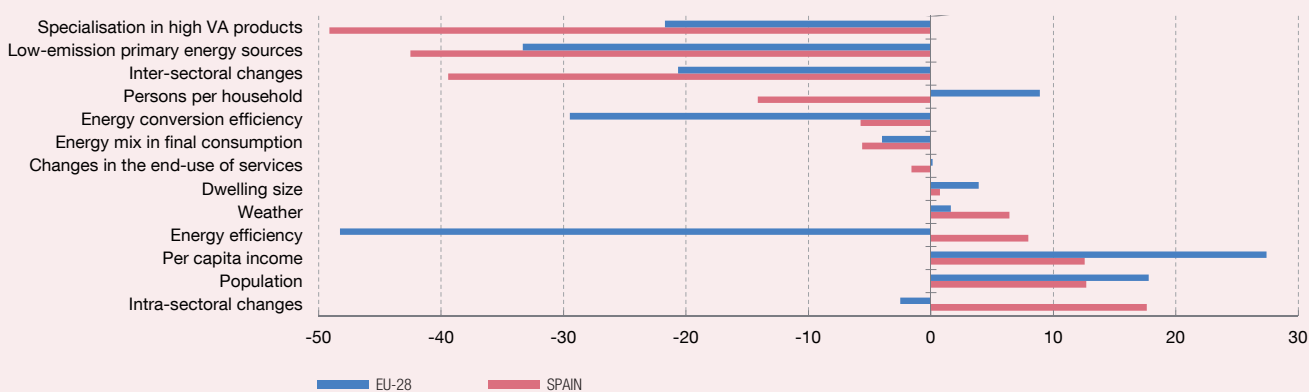
Looking ahead, in keeping with the EU's global leadership of the fight against climate change in recent years, Spain has just committed to attaining very ambitious goals over the coming decades in terms of reducing greenhouse gas emissions, developing renewable energy sources and increasing energy efficiency.³ Achieving these goals will foreseeably require very profound changes in agents' behaviour patterns and in the current growth model. Such

a structural transformation should be helped by the implementation over the coming years of the NGEU programme in Spain.

In any event, until the different climate-change public policies that will be implemented in the short and medium term are sufficiently defined, it may be useful to determine what other factors, aside from the COVID-19 pandemic, have influenced CO₂ emissions in Spain in recent decades. In this regard, Chart 3, based on Serrano-Puente (2021),⁴ indicates that the increase in the share of renewables in the energy mix between 2007 and 2018 was one of the factors that contributed the most to falling final energy consumption-related CO₂ emissions (a drop of 19%, compared with 11% in the EU-28). The changes in the sectoral composition of the Spanish economy between 2007 and 2018, in line with, for example, a greater tertiarisation of activity, also contributed significantly to this reduction.

Conversely, and unlike in the EU-28 between 2007 and 2018, the scant improvement in energy efficiency in Spain stands out. According to the evidence provided in the Ministry of Energy, Tourism and Digital Agenda's

Chart 3
STRUCTURAL FACTORS BEHIND THE DECREASE IN EMISSIONS BETWEEN 2007 AND 2018 (a)



SOURCE: Serrano-Puente (2021).

a Emissions in Spain fell by 19% between 2007 and 2018. In the chart, a bar of -10% (10%) for a given factor means that this factor has reduced (increased) total emissions by 1.9%.

³ See Ley 7/2021, de 20 de mayo, de cambio climático y transición energética (Climate Change and Energy Transition Law 7/2021 of 20 May 2021, only available in Spanish).

⁴ See D. Serrano-Puente (2021), "Are we moving toward an energy-efficient low-carbon economy? An input-output LMDI decomposition of CO₂ emissions for Spain and the EU28", *SERIEs*.

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2017-2020 National Energy Efficiency Action Plan, this would not necessarily be linked to technically inefficient equipment. Rather, it would in part be due to such equipment being somewhat underused in the decade following the global financial crisis. In this regard, in

periods of lower economic activity, the energy consumed by the different sectors would not decrease in proportion to activity, since, despite operating below its capacity, the fixed energy consumption of such equipment would continue to be relatively high.⁵

5 By way of illustration, consider a machine that consumes a significant amount of energy when starting up (fixed energy consumption) and a relatively small amount of energy for each unit of output produced. In this particular case, the energy consumption per unit of output will be higher (lower) in periods of low (high) output.