INSTITUT ROUSSEAU

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Spain factsheet

ROAD TO NET ZERO

BRIDGING THE GREEN INVESTMENT GAP

January 2024

This document is an appendix of the Road to Net Zero report. For more details and EU-scale results, please refer to the full report. For more information about the methodology used, please refer to the Methodological Appendix.

Key takeaways

- **An additional €40 billion investment is needed by 2050 to decarbonise the Spanish economy, averaging around 3.2% of current GDP** yearly. It is the **second highest** in studied countries after Poland, mainly due to high needs in almost every sector.
- This extra-investment plan can be **partially financed by redirecting fossil fuel subsidies**, will be **offset by a sharp decrease in energy costs**, is **~50% less expensive than the EU Com plan** (thanks to more efficiency & sufficiency) and **~6 times less than the cost of inaction**.
- **Spain's public expenditure should more than double** from €20 to €50 billion per year. **This additional public investment of €30 billion per year amounts to around 2.3% of the current GDP**. Biggest needs for additional public support are in the **buildings, transport and agriculture sectors**.

TRANSPORT

Current level of public support needs to more than double. These extra-costs are to be directed at 44% on public transportation, specifically railway network extensions. **Also, a significant effort on promoting soft mobility is needed, with current investments for bike development set to be multiplied by more than 4.** Additionally, ecobonus is slated to be more than doubled to encourage the purchase of low-carbon vehicles.

BUILDINGS

In Spain, an alternative strategy to current government proposals is recommended (and considered), focusing on efficiently renovating the entire primary and vacant stock built before the 1980 regulation (comprising 13.5 and 7 million homes respectively).

AGRICULTURE

As in Poland, **additional public support and investment needs are high in Spain given its significant Utilised Agricultural Area and relatively lower current 'agro-environmental' public support.**

ENERGY PRODUCTION AND INFRASTRUCTURE

In relation to its GDP, **Spain faces a higher additional energy investment cost** compared to other Member States. Its transition relies not only on a lot of renewables but paired with renewable gases, which requires both a transformation of the gas system and more electricity production to produce these renewable gases domestically.

CARBON SINKS (LULUCF)

- Regeneration costs aside, **urgent human intervention is vital to ensure tree species adaptation** in a context of potent habitat shift by 2050.
- Even in a context of dominantly private forest ownership, the massive investments must be funnelled in public expenses to support long term-low profit measures.

CROSS-SECTOR/R&D

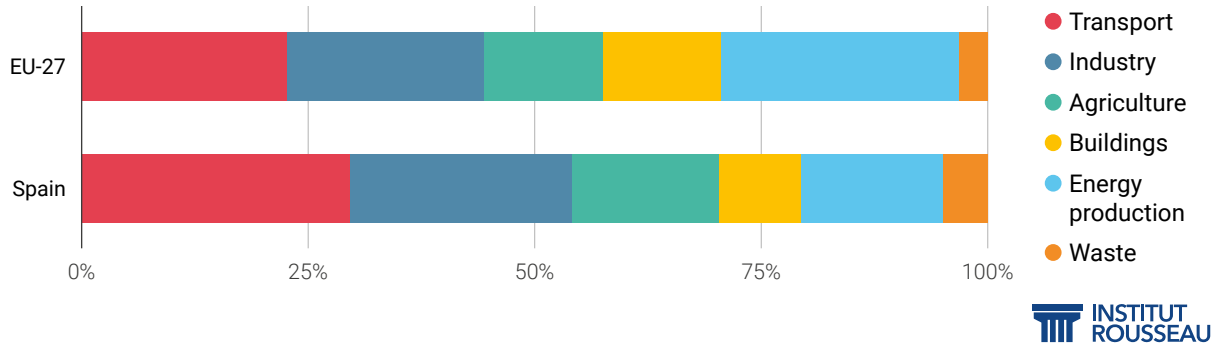
Despite a recent increase in public budget, **Spain support for transition related R&D has to be strongly increased** considering last decade's limited support.

1 Current GHG emissions, decarbonisation potential and action levers available

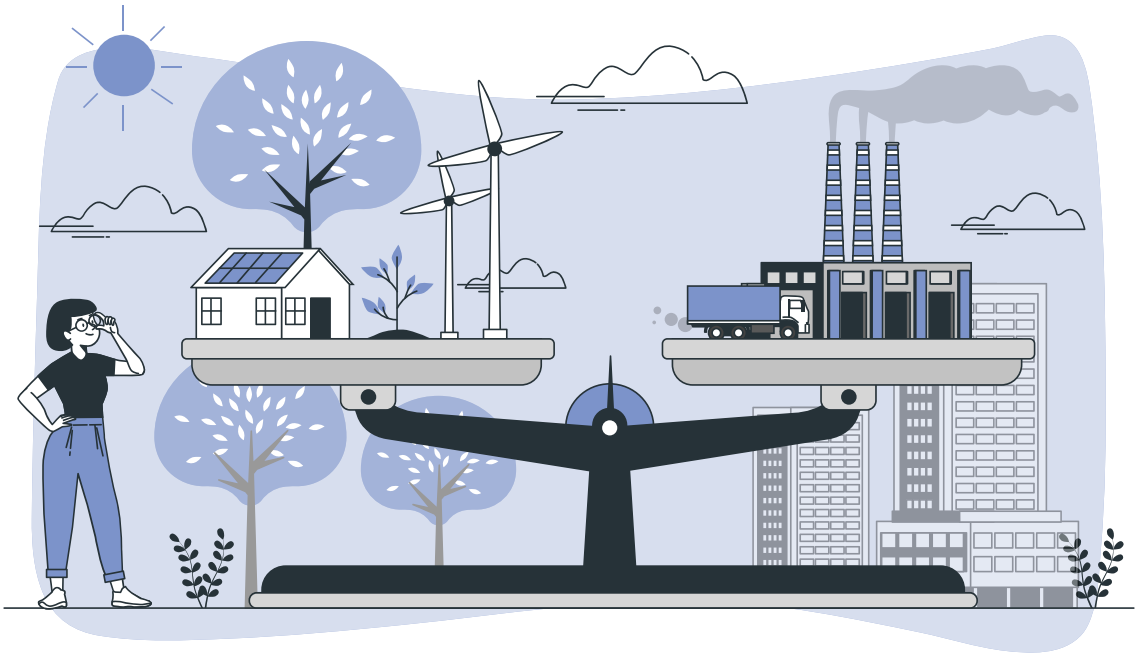
1.1 Current GHG emissions profile

Spain's territorial emissions are primarily due to transport (30%) and industry (25%). Agriculture and buildings (which consume energy for heating, lighting, cooking, ventilation, etc.) follow with 16% each, before energy production (9%). Waste management constitutes the remaining 5%, primarily attributed to methane emissions resulting from the natural decomposition of organic waste in landfills.

Fig. 1 **Sectoral breakdown of Spain and EU-27 current domestic emissions (2021), in %**



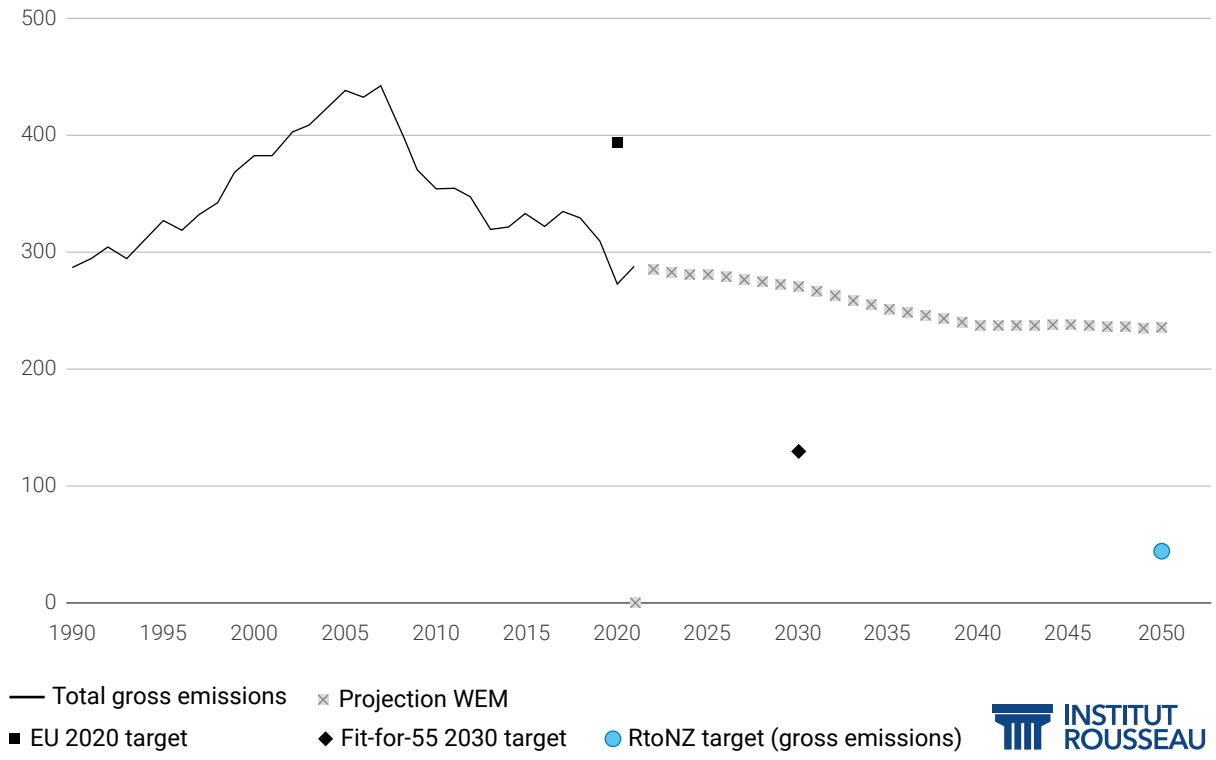
Compared to the rest of the EU, Spain stands out with a much less carbon-intensive energy mix and lower buildings-related emissions. As a result, the transport sector carries proportionally more weight in Spain than the EU average.



1.2 GHG emissions trend

Spain is the fifth greenhouse gas emitter in Europe. It contributed 289 million tons of CO_2-eq in 2021, i.e. approximately 8% of the European Union's emissions. Since 1990, the country's emissions haven't decreased at all, due to a sharp rise until 2005 (compared to a 29% decrease at the EU-27 scale), as shown on Figure 2. This is the only studied country in that case.

Fig. 2 **Spain's past domestic emissions and progress towards achieving 2030 and 2050 targets, in million tons of CO_2 equivalent ($MtCO_2e$).**



WEM: With Existing Measures. European Environment Agency, 'Total net greenhouse gas emission trends and projections in Europe', 2023.

1.3 Decarbonisation levers

To meet these targets, it is necessary to activate multiple levers. There are 37 decarbonisation levers in total, outlined in Figure 3. Key decarbonisation levers with significant emission reduction potential involve energy (power production), transport (cars, trucks) and building renovations. But there is no single solution for instantly decarbonising the Spanish economy. All listed levers, regardless of their scale or economical efficiency, must be engaged to reach the goal of carbon neutrality.

Fig. 3 **Decarbonisation levers proposed and modelled in this study, by sector**

TRANSPORT

1. Reduce the number of vehicles and convert them to low-carbon technologies
2. Develop public transportation
3. Develop soft mobility
4. Reduce air traffic and switch to Sustainable Aviation Fuels
5. Transition to zero carbon navigation

INDUSTRY

1. Reduce industrial production through end-use sufficiency
2. Increase material efficiency
3. Increase energy efficiency
4. Decarbonize industrial energy mix
5. Develop low-carbon innovative processes
6. On-site Carbon Capture, Utilisation and Storage
7. Develop EU strategic industrial sectors for the transition

AGRICULTURE

1. Reduce herd size and adapt breeding practices
2. Convert crop systems to agroecology
3. Convert tractors to low-carbon technologies

BUILDINGS

1. Efficient renovation of housing
2. Efficient renovation of public tertiary buildings
3. Efficient renovation of private tertiary buildings

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ENERGY PRODUCTION AND INFRASTRUCTURE

1. Decarbonize and adapt the power system
2. Switch from fossil gas to biogas and other 'green' gases
3. Phase coal and oil out, end conventional refining activities
4. Decarbonize heat production for district heating

WASTE MANAGEMENT

1. Separately collect and recover biowaste
2. Reduce plastic use, increase plastic recycling and substitution with other materials
3. Reduce wastewater treatment emissions through process adaptation
4. Produce biogas from waste and sludge

CARBON SINKS (LULUCF)

1. Improve forest management
2. Revitalise degraded ecosystems
3. Support wood industry adaptation
4. Increase forest area
5. Turn grasslands back to net sinks
6. Plant hedgerows and field trees
7. Protect wetlands and peatlands
8. Reach net zero artificialisation

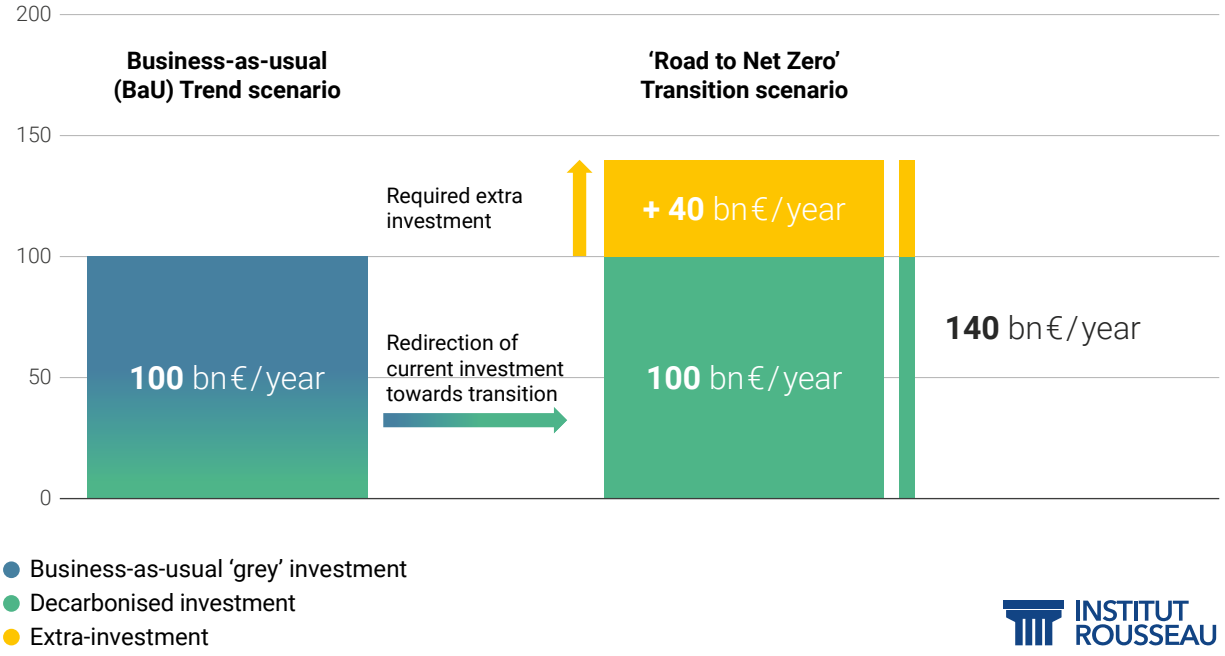
CROSS-SECTOR LEVERS

1. Enhance Research & Development in transition solutions
2. Foster public awareness of environmental issues
3. Boost the Fair Transition Fund to support professional transitions

2 Global investment required

The collective investment required to activate all decarbonisation measures is estimated at €3.8 trillion by 2050, averaging €140 billion yearly (Figure 4). This equals almost 10.5% of current GDP. This contrasts with the ongoing business-as-usual (BaU) scenario, estimated at around €2.6 trillion between now and 2050, averaging €100 billion per year (7.3% of current GDP). The difference, about €1.2 trillion or an average of €40 billion per year, represents the 'extra investment' needed for carbon neutrality. This extra investment represents a 40-45% increase compared to the baseline scenario and around 3.2% of current GDP.

Fig. 4 **Concepts and amounts of total EU-27 investment required for the transition and extra investment compared with a business-as-usual scenario (in billions of euros per year)**



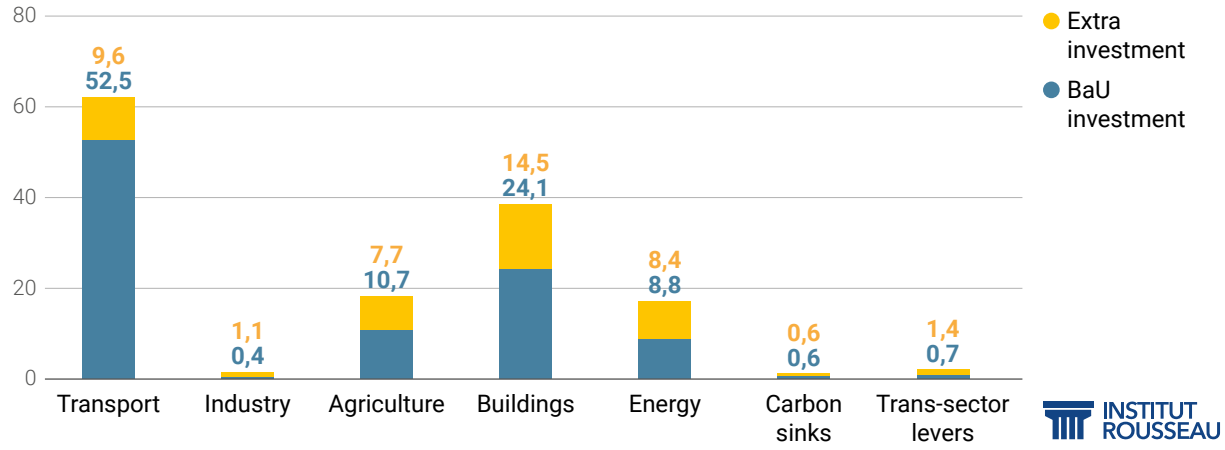
These estimates are correct only under the express condition that all BaU investments are actively redirected towards the transition by 2050. This implies a massive divestment from sectors that have become partially to completely obsolete. Without this active shift, not only will carbon neutrality not be achieved, the above-mentioned extra cost will also be higher.

In terms of total investment (Figure 5), approximately 71% is focused on two sectors: transport (**44%** of overall investment, €62 billion annually) **and buildings** (**27%**, €39 billion annually). This is due to the large-scale nature of these sectors, which invest in tens of millions of vehicles and buildings. These sectors are followed by agriculture (13%, €18 billion annually and energy production and infrastructure (12%, €17 billion annually). Industry (€1.6 billion annually), cross-sector measures (€2.1 billion annually), carbon sinks (€1.2 billion annually) and waste management require only 3-4% of total investment.

When considering extra investment compared to the business-as-usual trend, the top four sectors remain the same : buildings (33% or €14.5 billion per year), transport (22% or €9.6 billion per year),

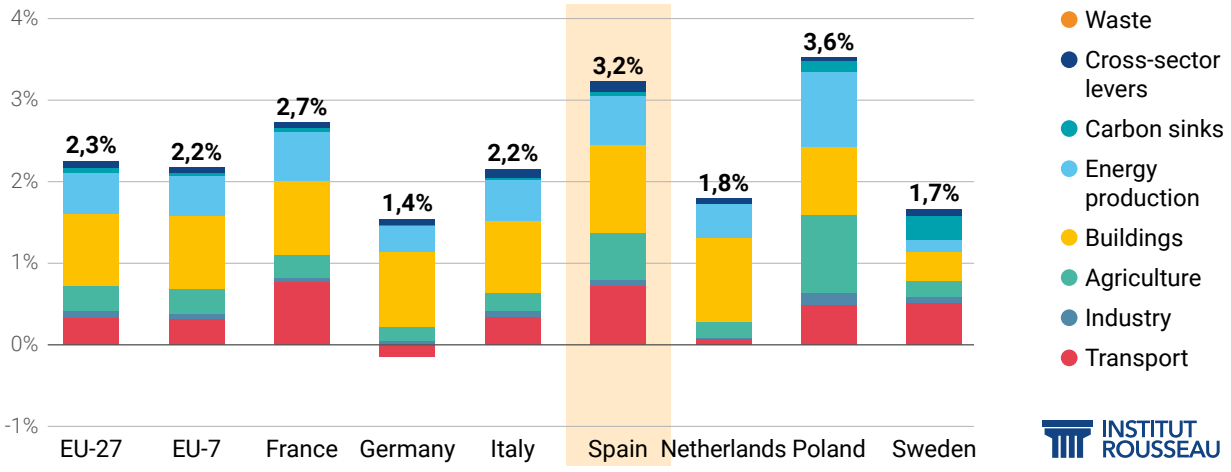
energy production (19% or €8.4 billion per year) and agriculture (18% or €7.7 billion per year) sectors require the most substantial extra effort. In the building sector, this is attributed to the need for an accelerated renovation pace and a shift towards comprehensive renovations, which are individually more expensive. On the energy side, the assumption of strong electrification in the transition scenario leads to a doubling in electricity consumption compared to the trend scenario. Contrary to the other countries, the transport sector's remains in second position (despite a reduction in the private car fleet size which reduces the investments needed in the transition compared to the business-as-usual scenario). This is due to very high investment needs in alternative mobility infrastructures (train and bikes).

Fig. 5 **Spanish trend investment, extra-investment and total investment per sector, in billion euros per year, on average, by 2050.**



When considering all sectors, Spain stands out with one of the highest requirements for additional investments among the studied countries, as illustrated in Figure 6.

Fig. 6 **Yearly extra investment needed by sector per country (in % of GDP 2022)**



This is primarily attributed to three key factors:

- **Significant investment needs in rail networks and soft mobility infrastructures**. Despite their crucial importance, these infrastructures have limited territorial coverage in Spain, resulting in a marginal modal share for non-road modes, especially for freight transportation.

- **Higher investment needs in the energy production and infrastructure sector**, with an energy transition strategy relying not only on renewables but also with renewable gases to replace fossil gas. This requires both a transformation of the gas system and more electricity capacities to produce these renewable gases domestically.

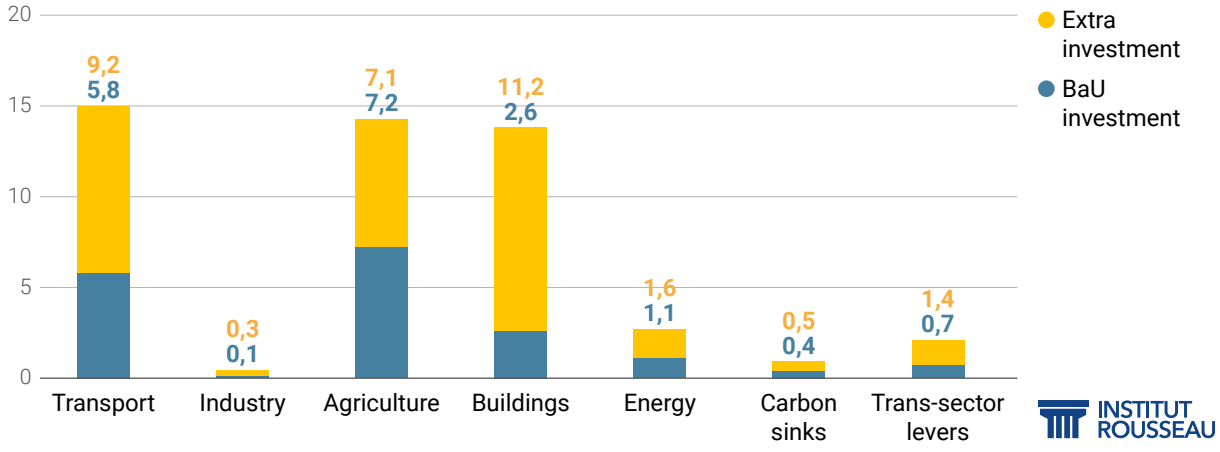
- **The exceptionally high ratio of agricultural area to GDP in Spain**. This factor predominantly drives the substantial additional investment needs for agricultural transition. Currently, support for this transition remains relatively limited.

3 Public investment required

This study also outlines 73 public policy proposals to catalyse these investments, categorised for each of the 37 decarbonisation levers.

The total public cost of these measures for Spain is estimated at €50 billion annually, with €32 billion exceeding the trend scenario. This is equivalent to almost tripling (×2.8) average annual public investment.

Fig. 7 **Spanish public trend investment, extra-investment and total investment per sector, in billion euros per year, on average, by 2050.**



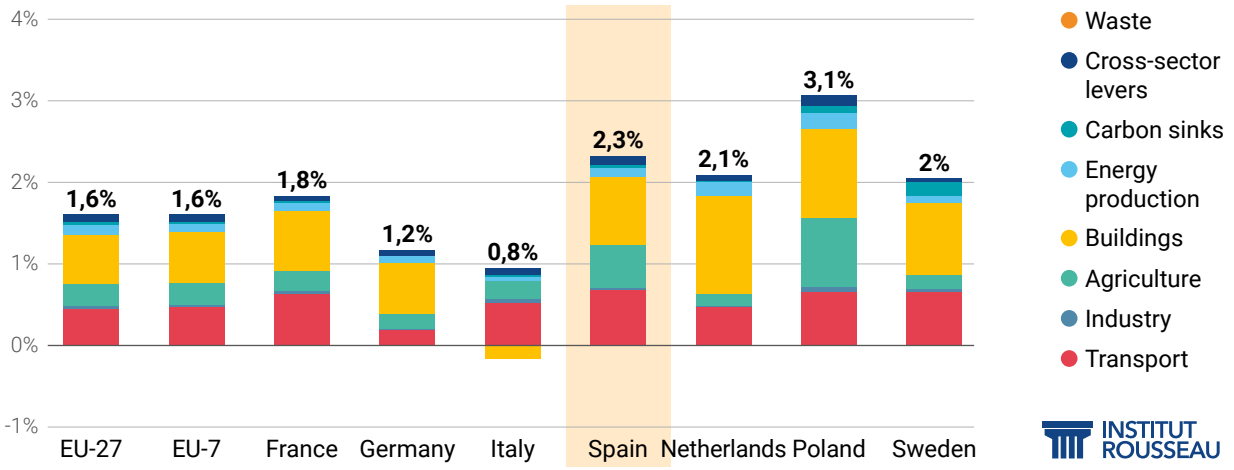
The sectoral breakdown of the €50 billion investments shows that the transport sector (30%), the agriculture sector (29%) and the building sector (28%) together account for 87% of the essential public investments. Compared to other countries, the agricultural sector holds particular significance, while the buildings sector, by comparison, is less prominent.

When considering extra public investments, the same three sectors alone account for 88% of the extra public investment needs: buildings (36%), transport (29%) and agriculture (23%). Energy

production and infrastructure (5%) and cross-sector measures (4.5%) come next, with much lower amounts. The ranking remains consistent with total public investment needs, since public support allocations are generally calculated within the same scope between the transition and reference scenarios.

These €32 billion per year of additional public investment represent approximately 2.3% of Spain's current GDP. This relatively high need for extra public investment is primarily attributed to the significant support required for agricultural transition. Similar to Poland, this level of additional support is largely due to a very high agricultural area/GDP ratio, coupled with limited current support for organic practices.

Fig. 8 **Yearly public extra investment needed by sector per country (in % of GDP 2022)**



Other significant shifts in Spain's public investments include:

- **Doubling public investments in railway infrastructures to address the current low railway network and modal share**, particularly in comparison to other EU countries, especially for freight. However, these high investment needs are somewhat mitigated by recent increases in railway investments, similar to the situation in Italy.

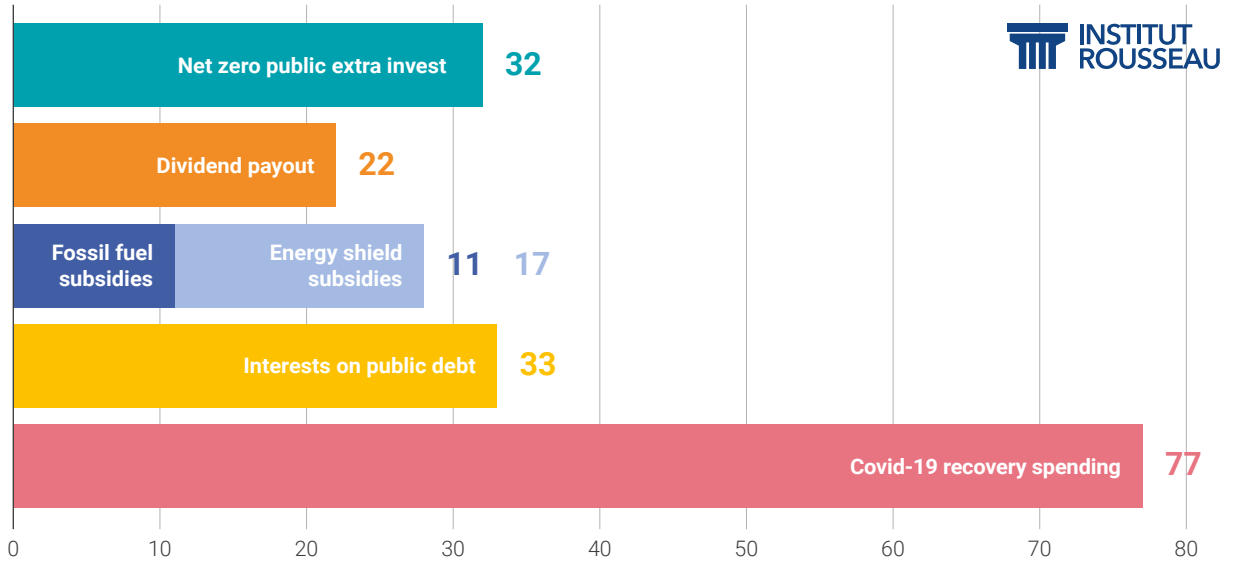
- **A considerable effort is required to promote soft mobility, with current investments in bike development expected to increase by more than fourfold**. Additionally, eco-bonus incentives are set to more than double to encourage the purchase of low-carbon vehicles.

- **For building renovations, an alternative strategy to current government proposals is considered here**, focusing on efficiently renovating the entire primary and vacant stock built before the 1980 regulation (comprising 13.5 and 7 million homes respectively). Even with this strategy, the proportion of housing stock eligible for efficient renovation will remain relatively limited compared to other countries (60%), yet yielding significant benefits in heating and air conditioning consumption.

- **Despite a recent increase in the public budget, Spain's support for transition-related research and development (R&D) must be significantly strengthened**, considering the limited support observed over the past decade.

Contextualising the proposed €32 billion per year is crucial. This amount, allocated to empower public authorities in stimulating, encouraging, and overseeing all stakeholders while setting the necessary pace to meet the European Union's climate objectives, must be viewed in perspective (cf. Figure 9). **€32 billion per year is comparable to Spain's yearly interests on public debt or what the country spent on fossil fuel subsidies (including price caps) in 2022. It is less than half of its Covid-19 recovery spending.**

Fig. 9 **Contrasting extra public investment with known yearly budget (2022 values)**



This additional investment plan :

- Can be partially financed by redirecting existing fossil fuel subsidies.
- Will be offset in the short term by a significant decrease in energy costs for households, businesses, and public authorities.
- Is approximately six times less expensive than the potential cost of inaction[1][2].
- Will generate numerous local jobs, amounting to several million net positions at the European scale. All conventional sectors affected by the transition to net zero will require social support through a dedicated Just Transition Fund, included in the investment plan.
- Will yield returns by reducing the need for future public expenditure, such as unemployment insurance, energy bills, and costs related to climate change adaptation.
- Is nearly 50% less expensive than the investment plan proposed by the European Commission[3] (on a similar scope of sectors), thanks to a reduction in final energy consumption achieved through both efficiency and sufficiency measures.

If sufficiency and local production options are prioritized, it will also enhance the EU's energy security, economic sovereignty, competitiveness, and trade balance.

Images: Storyset.com/Freepik.com, Unsplash.com

Notes

1. Kotz & al., The economic commitment of climate change, published in the journal Nature in April 2024.

2. Additionally, ADEME estimates adaptation costs for France alone at €260 billion per year; 'Climate risks and their costs for France: to preserve the economy, the urgency to act now', December 2023. To be compared to a + €70 billion per year of global (public + private) net zero extra investment in our scenario, i.e. a × 4 ratio.

3. European Commission 2040 climate target, feb 2024.