

Sweden 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 €10 billion investment is needed by 2050 to decarbonise the Swedish economy, averaging around 1.6% of current GDP** yearly.
- 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**.
- **Sweden's public expenditure should double** from €9 to €20 billion per year. **This additional public investment of €11 billion per year amounts to around 2% of the current GDP**. Biggest needs for additional public support are in the **buildings and transport sectors**.



CARBON SINKS (LULUCF)

- Despite robust forest health, investments in adaptation are crucial. While Sweden anticipates low climate change impact on habitat evolution, **the lack of species diversity poses a significant threat to boreal forests**, making them vulnerable to pests, diseases, and wildfires.
- 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**.
- Sweden's wetlands and peatlands aren't costly to protect but essential to reach high levels of decarbonization. **If half of Sweden's peatlands were to be degraded, additional 19 Mha of forest** (about 2/3 of the total wooded area) **would need to be planted** to temporarily offset such a loss.



TRANSPORT: The primary public extra-investments are related to enhancing public transportation, aiming to reach 40% of the freight volume transported by train by 2050 (compared to the current 30%, which already exceeds the 18% EU-27 average). Another significant set of extra costs is associated with implementing policies to support the decarbonisation of maritime transport.



BUILDINGS: Despite very low direct emissions, Sweden building sector still requires significant investments in efficient renovation in order to sufficiently reduce Sweden's global energy consumption and indirect emissions of buildings which remain high.



AGRICULTURE: Sweden relatively low investments need in Agriculture are mainly explained by its rare useful agricultural areas and secondly by its already high % of organic surfaces.



ENERGY PRODUCTION AND INFRASTRUCTURE: Relative to its GDP, Sweden has **one of the lowest additional costs to decarbonise the energy system**, benefiting from its low renewable energy production costs.



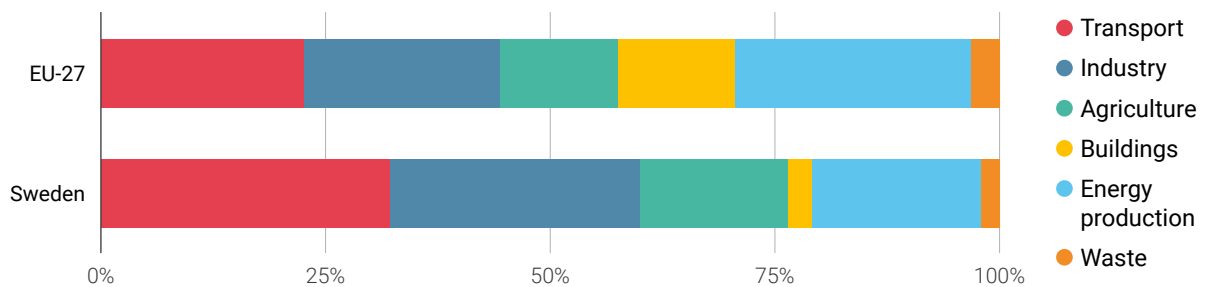
CROSS-SECTOR/R&D: Like Germany or the Netherlands, Sweden is slightly above the EU average in terms of energy and agriculture. However, **additional investment needs remain significant in energy R&D and its high support for agricultural R&D must be reoriented towards agroecological systems**.

1 Current GHG emissions, decarbonisation potential and action levers available

1.1 Current GHG emissions profile

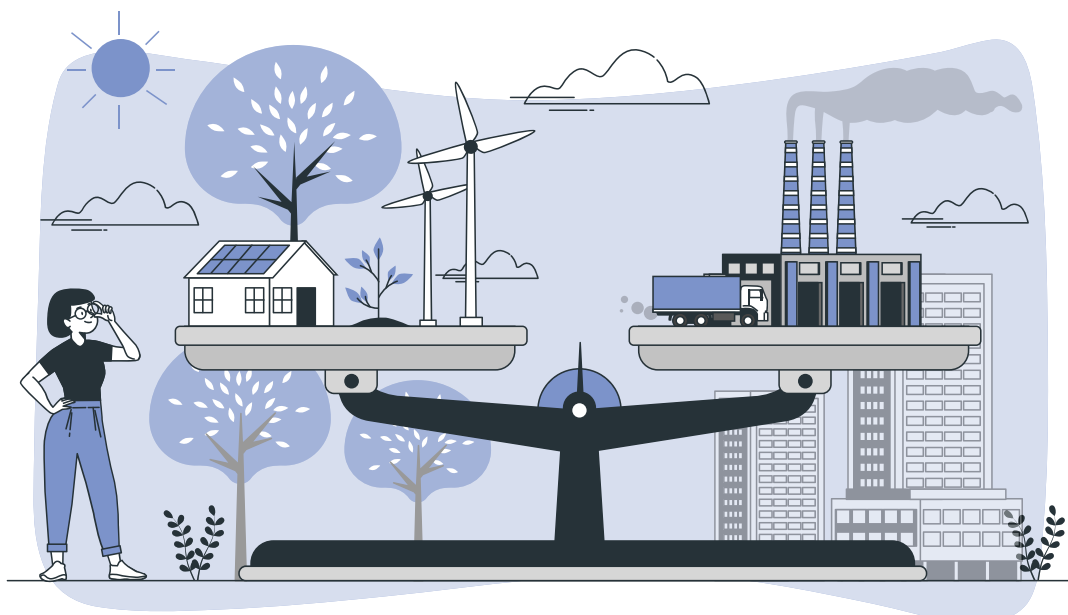
Sweden's territorial emissions are primarily due to transport (32%) and industry (28%). Energy production and agriculture follow with 19% and 16% respectively. Buildings (which consume energy for heating, cooking, etc.) and waste management (mainly through methane emissions resulting from the natural decomposition of organic waste in landfills) constitute the remaining 5% (with 3% and 2% respectively).

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



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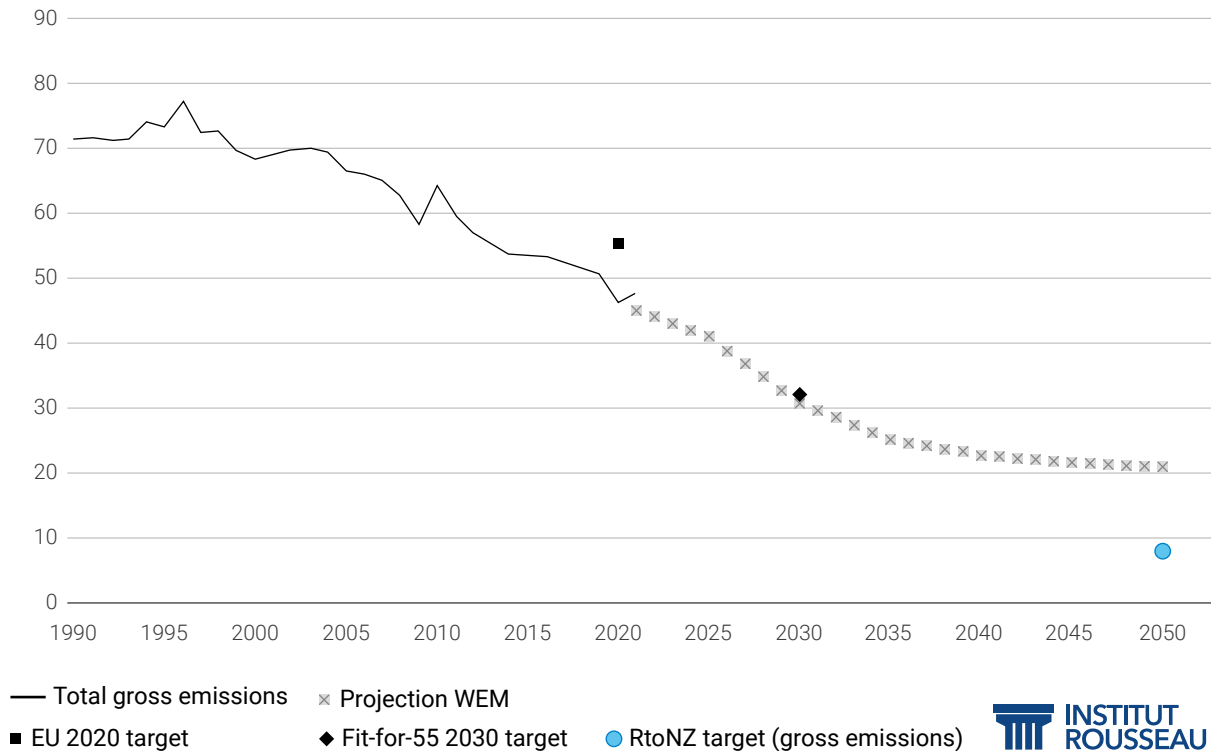
Compared to the rest of the EU, Sweden stands out with proportionally much smaller buildings-related emissions (mainly due to high insulation and renewable-base district heating systems) and a lower-carbon energy production mix. On the contrary, the transport, industry and agriculture sectors carry proportionally more weight in Sweden than the EU average.



1.2 GHG emissions trend

Sweden is the 17th greenhouse gas emitter in Europe. It contributed 48 million tons of CO₂-eq in 2021, approximately 1.4% of the European Union's emissions. Since 1990, the country's emissions have decreased by -33% or 0,77 million tons per year on average (compared to -29% for EU-27), as shown on Figure 2.

Fig. 2 Sweden's past domestic emissions and progress towards achieving 2030 and 2050 targets, in million tons of CO₂ equivalent (MtCO₂e).



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 Swedish 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

 **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**

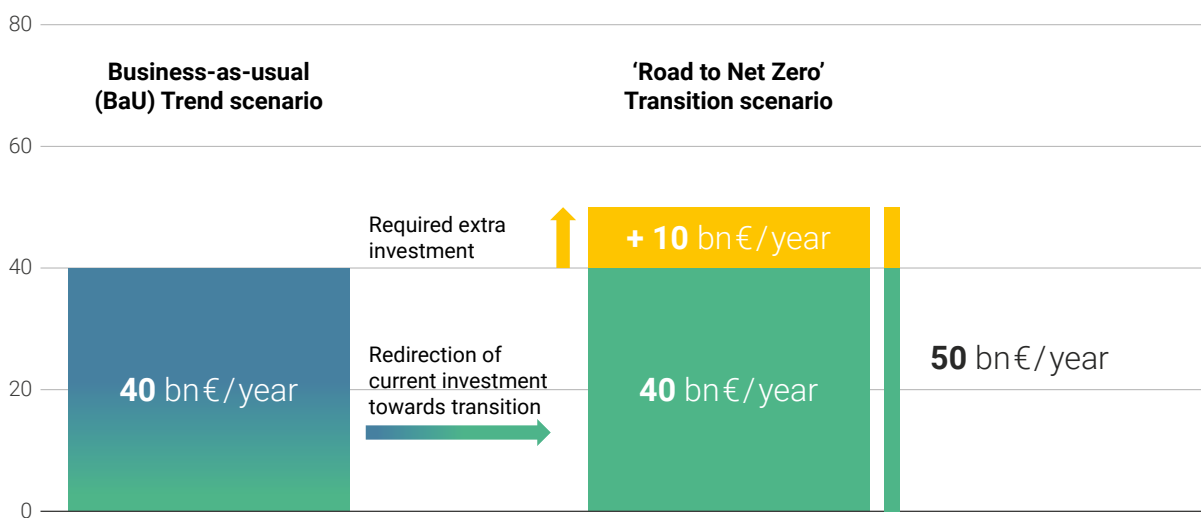
- 1 Enhance Research & Development in transition solutions
- 2 Foster public awareness of environmental issues
- 3 Boost the Fair Transition Fund to support professional transitions

2 Global investment required

The collective investment required to activate all decarbonisation measures is estimated at €1.4 trillion by 2050, averaging €50 billion yearly (Figure 4). This equals almost 9.1% of current GDP. This contrasts with the ongoing business-as-usual (BaU) scenario, estimated at around €1.15 trillion between now and 2050, averaging €40 billion per year (7.5% of current GDP). The difference, about €250 billion or an average of €10 billion per year, represents the 'extra investment' needed for carbon neutrality. This extra investment represents a 22% increase compared to the baseline scenario and around 1.6% 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)



- Business-as-usual 'grey' investment
- Decarbonised investment
- Extra-investment

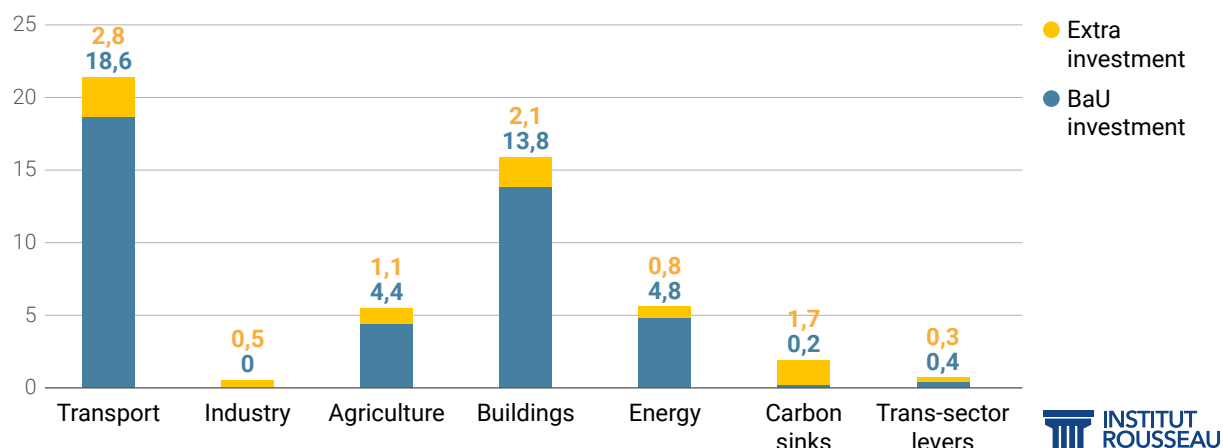
These estimates are correct only under the express condition that all BaU investments are actively redirected towards the transition by 2050. This implies a massive divestment from sectors that have become partially to completely obsolete. Without this active shift, not only will carbon neutrality not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

In terms of total investment (Figure 5), approximately 72% is focused on two sectors: transport (42% of overall investment, €21 billion annually) and buildings (31%, €16 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 energy production and infrastructure (11%, €5.6 billion annually) and agriculture (11%, €5.5 billion annually). Industry (€0.5 billion annually), carbon sinks (€1.9 billion annually), cross-sector measures (€0.6 billion annually) and waste management require only 4% of total investment.

When considering extra investment compared to the business-as-usual trend, the top two sectors remain the same, the transport sector requiring 31% (2,8 billion per year) and the building sector

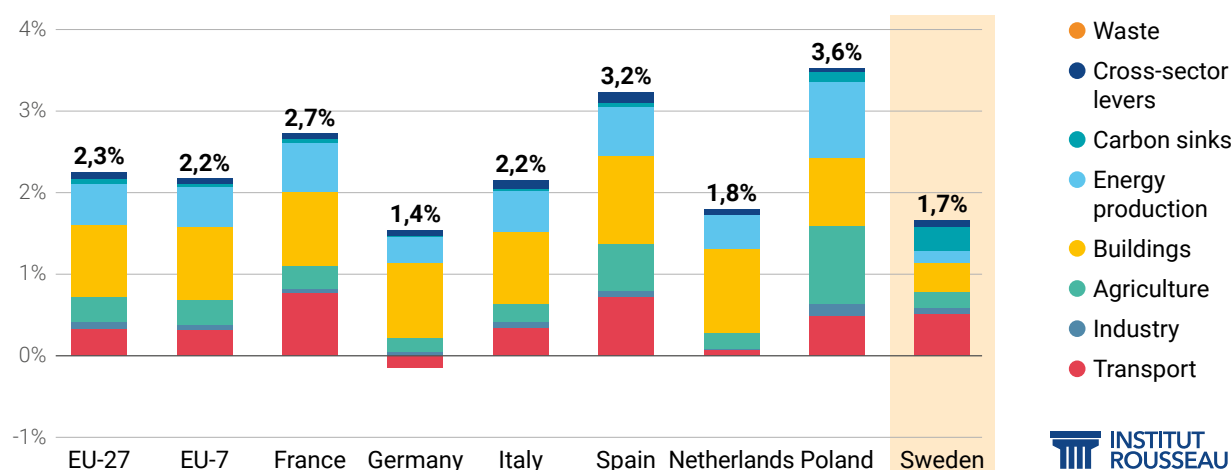
23% (2,1 billion per year) of the total extra effort. The carbon sink sector also represents a significant investment with 18% (1,7 billion per year) of the total, especially regarding the necessity of increasing diversity of species in the boreal forests in order to prevent from pests, diseases, and wildfires.

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



All sectors considered, Sweden requires one of the lowest additional investments among the studied countries, as depicted in Figure 6. This is primarily due to an already decarbonised energy production mix, requiring comparatively lower extra investments, a comparatively lower needs in the building renovation sector coupled with an already quite high trend of investment and a low used agricultural surface/GDP ratio.

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



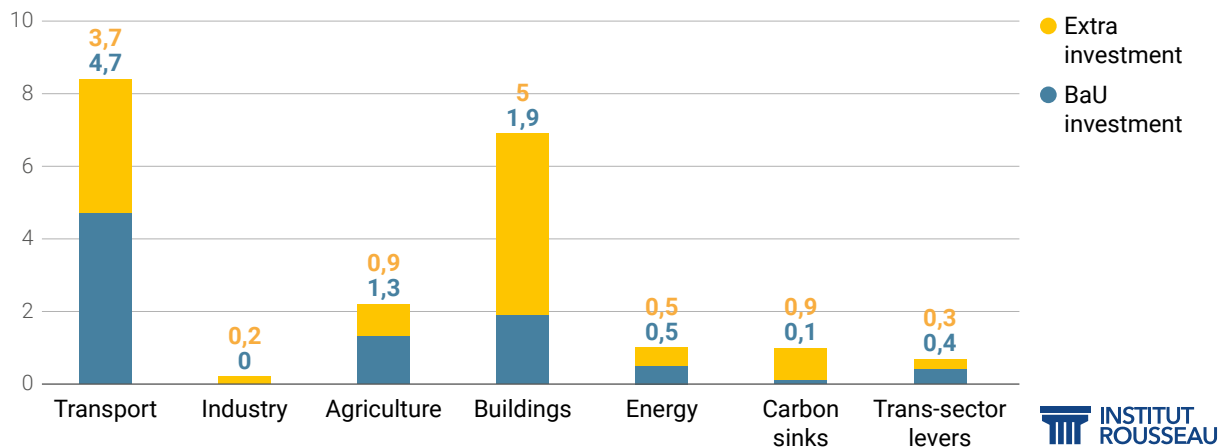
3 Public investment required

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 Sweden is estimated at €20 billion annually, with €11 billion exceeding the trend scenario. This translates to doubling the average annual public investment, aligning with the EU average.

Fig. 7

Swedish public trend investment, extra-investment and total investment per sector, in billion euros per year, on average, by 2050.



The sectoral breakdown of the €20 billion investments shows that the transport sector (41%) and the buildings sector (28%), together account for three-quarters of the required public investment. Agriculture stands for 11%, which brings these three sectors to a total of 86% of the essential public investments.

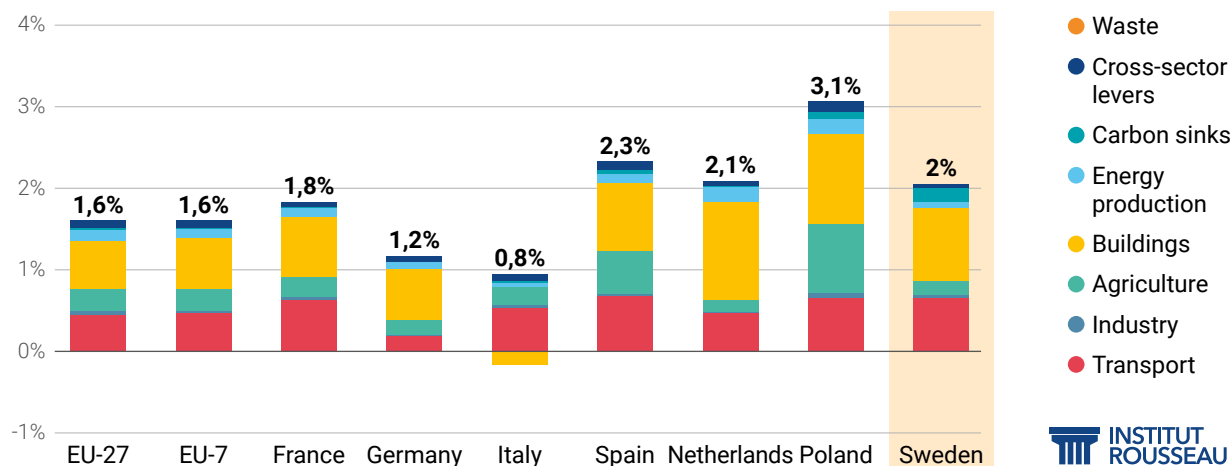
When considering extra public investments, the same two sectors alone account for 76% of the extra public investment needs: buildings (43%) and transport (32%). Agriculture (8%), energy production and infrastructure (4%) and cross-sector measures (2%) come next. The ranking remains consistent with total public investment needs, since public support allocations are generally calculated within the same scope between the transition and reference scenarios. Buildings claim an even greater portion of the extra public investments ranking due to comparatively lower business-as-usual investment levels in this sector compared to the transport sector.

These €11 billion per year of additional public investment represent approximately 2% of Sweden's current GDP, placing it at the higher end of the country sample. Despite Sweden's already high public expenditure on public transport infrastructure and a relatively low ratio of agricultural area to GDP:

- **Carbon sinks extra investment is higher than anywhere else**, due to the importance of forest ecosystems in Sweden, and a particularly high share of public investments in this sector.
- **Swedish building renovations necessitate a significant increase in public support**. Despite a relatively high proportion of insulation, energy consumption remains high, and current public support for residential renovation is very limited.

- In the transport sector, the additional public expenditure is primarily driven by the necessity for new railway lines to double the passenger modal share, particularly in long-distance travel. Many of these projects are already included in the trans-European network.

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



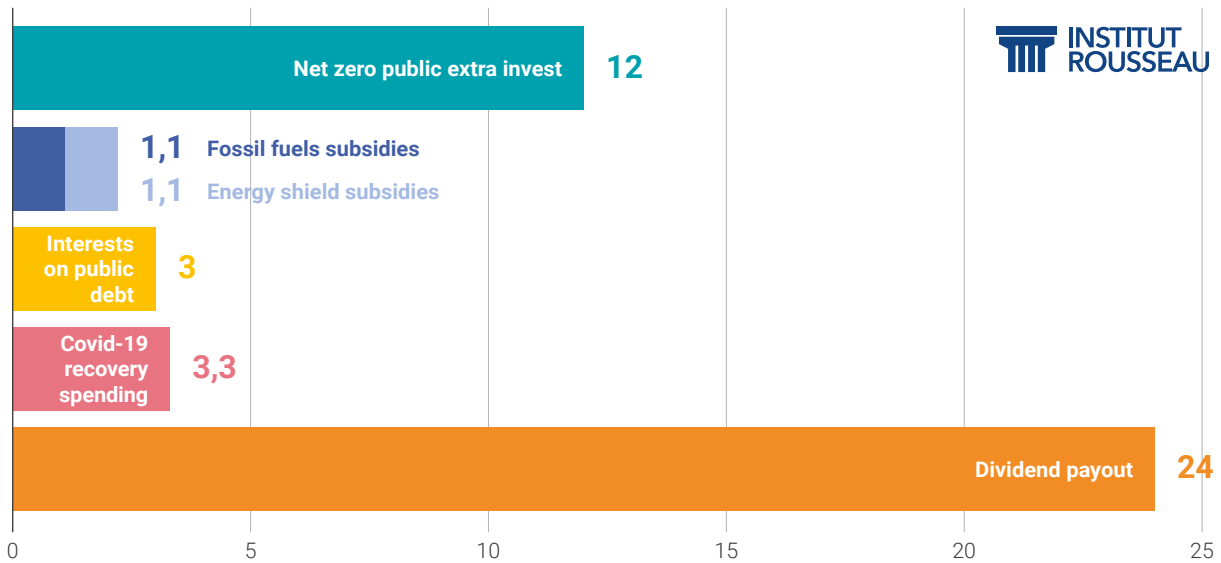
In addition, Sweden's public investments necessitate notable shifts in other sectors:

- Although Sweden has lower agricultural areas and currently significant public support for agroecological systems, long-term public backing for such systems must be bolstered due to the continued prevalence of intensive practices.
- In terms of research and development (R&D), Sweden also requires a robust redirection of its agricultural public R&D towards agroecological systems.

Contextualising the proposed €12 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). **€12 billion per year is about half of the country's dividend payout.**

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 inaction¹².
- 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 Commission³ (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](#).