

Executive summary

ROAD TO NET ZERO

BRIDGING THE GREEN
INVESTMENT GAP

January 2024

Key takeaways

- We must invest **€40 trillion by 2050 to decarbonise the EU economy**, equivalent to approx. 10% of the current EU GDP.
- **Three quarters of these funds can be secured by reallocating current expenditure** that is either superfluous or harmful to the transition process.
- **An additional €10 trillion investment is needed by 2050, averaging around 2.3% of current GDP yearly.** This is about half of what the EU spent on fossil fuels imports in 2022.
- **Public expenditure should double** from €250 to €510 billion per year to catalyse private investment and finance non-profitable decarbonisation solutions. **The stability pact constrains the ability of states to take action**, and transition investments should be excluded from these budgetary rules.
- **This additional public investment of €260 billion per year amounts to around 1,6% of the current EU GDP.** This is less than EU Covid-19 recovery spending (€338 billion per year) or EU-27 fossil fuel subsidies (€359 billion per year).
- **Renovating buildings and promoting modal shift from cars and planes should be priority targets for extra public support**, although public commitment is required across all sectors.
- **The required additional investments as a percentage of GDP can vary by a 2.5 ratio among countries**, depending on the current carbon-intensity of their economies and the intensity of current investments.
- **These investments will be higher if delayed. These amounts are an estimate of the lowest required investment**, since carbon net neutrality is only a part of the ecological transition and does not fully address the challenges related to biodiversity or natural resource scarcity.
- **Sufficiency measures are imperative.** Electrification without reducing demand is much more costly (e.g. an additional €200 billion per year of alternative fuel imports in scenarios showing lower sufficiency levels). It also poses higher risks to energy sovereignty, and is faced with resource constraints and industrial deployment rate bottlenecks.
- **This investment plan is not just necessary but also beneficial.** It will create local jobs and enhance the purchasing power of most Europeans in the short term. If sufficiency and local production options are chosen, they will also bolster EU's energy security as well as economic sovereignty, competitiveness, and trade balance.
- **Moreover, these public investments will yield returns by reducing the need for future public expenditure**, such as unemployment insurance and climate change adaptation costs.



Over the past three decades, the European Union has positioned itself as a guardian of a relatively steady improvement in environmental and public health preservation. This has been achieved by implementing common standards and integrating numerous instruments for the protection of nature and public health into national laws. Yet, tangible emission reductions are still lagging behind. **The main driver of the gap between the ambitious scale of the objectives set and the actual implementation of policies to reach them, both at the EU and member state levels, is the financial barrier.** Therefore, public and private investments stand as both the primary hindrance to realise these policies and the most accurate lens to measure the commitment levels of European and national authorities.

This report addresses three main questions:

1. Which public and private investments are needed to achieve the transition to carbon neutrality in Europe by 2050?

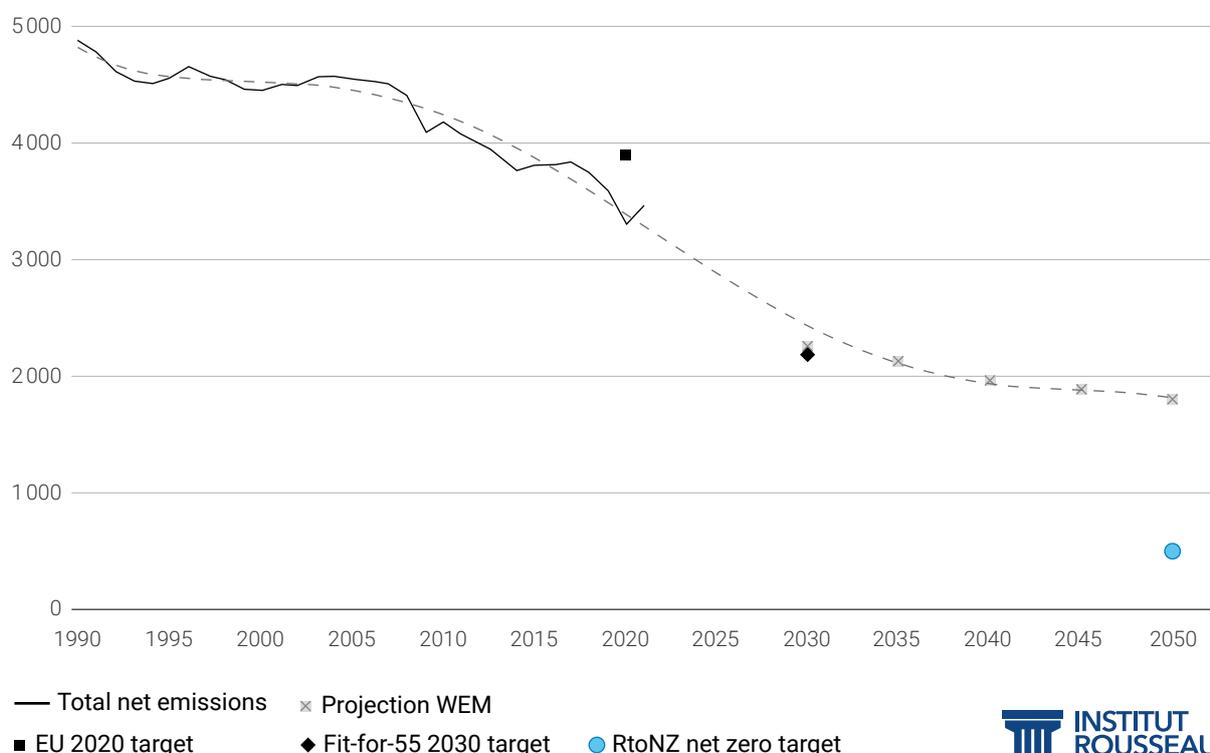
2. How do these investment amounts compare to the existing planned investments in a business-as-usual scenario of similar scope?

3. What measures can the public sector employ to guide, support, and accelerate this transition? What would be their cost for public finances?

Europe's territorial emissions stem mainly from energy production (26%), the transport of goods and people (23%), and industry (22%). Agriculture and buildings contribute in roughly equal measures (around 13% each). Despite meeting the 2020 target, Europe currently falls short of the 2050 objective and the Fit-for-55 2030 target, as depicted in Figure 1. However, targeted actions in each sector have the potential to significantly or completely reduce emissions. In our simulated transition scenario, we achieve a stringent 85% reduction in the EU's annual emissions compared to 2021, resulting in a residual of 519 million tons of CO₂-eq in 2050.

Fig. 1

Past UE-27 domestic emissions (MtCO₂-eq per year) 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.

To meet these targets, it is necessary to activate multiple levers. There are 37 decarbonisation levers in total, outlined in Figure 2. The potential to significantly reduce emissions lies in key levers related to energy (power production), transport (cars, trucks), and building renovations. Implementing all listed levers, regardless of the scale, is imperative to reach carbon neutrality.

Fig. 2 Proposed decarbonisation levers 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

The collective investment required to activate all decarbonisation measures is estimated at €40 trillion by 2050, averaging €1,520 billion yearly. This equals almost 10% of current EU-27 GDP. This contrasts with the ongoing business-as-usual (BaU) scenario, estimated at around €30 trillion between now and 2050, averaging €1.160 billion per year (7,3% of current EU-27 GDP).

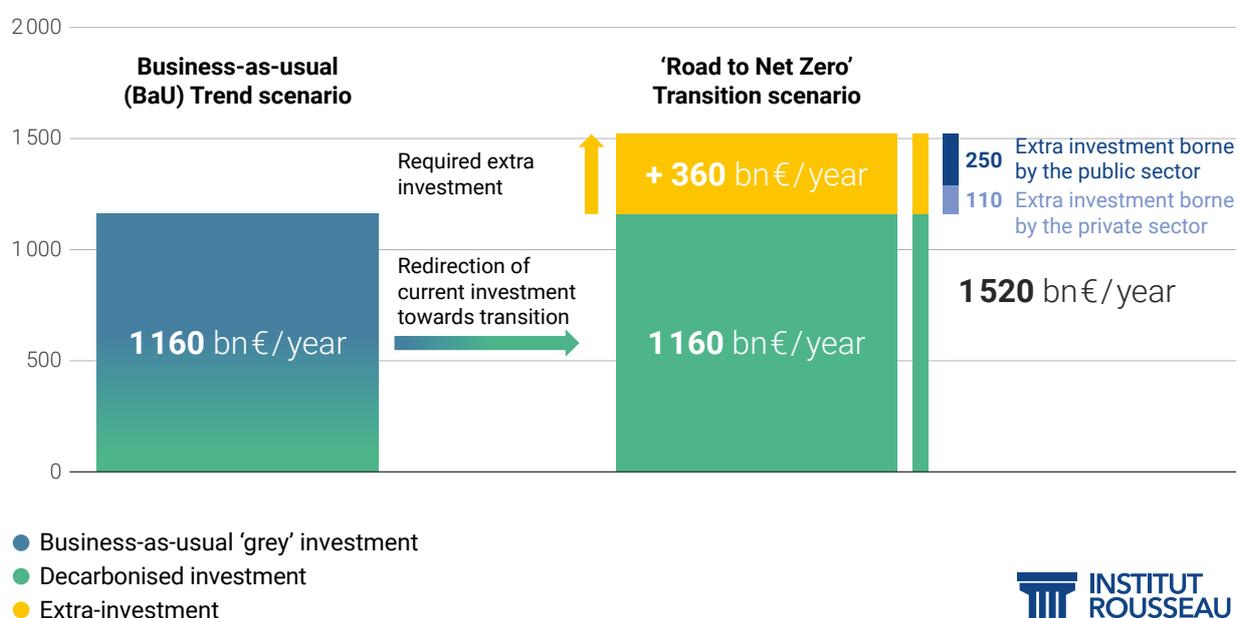
The difference, about €10 trillion or an average of €360 billion per year, represents the 'extra investment' needed for carbon neutrality. This

extra investment represents a 31% increase compared to the baseline scenario and around 2,3% of current EU-27 GDP.

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.

Fig. 3

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)

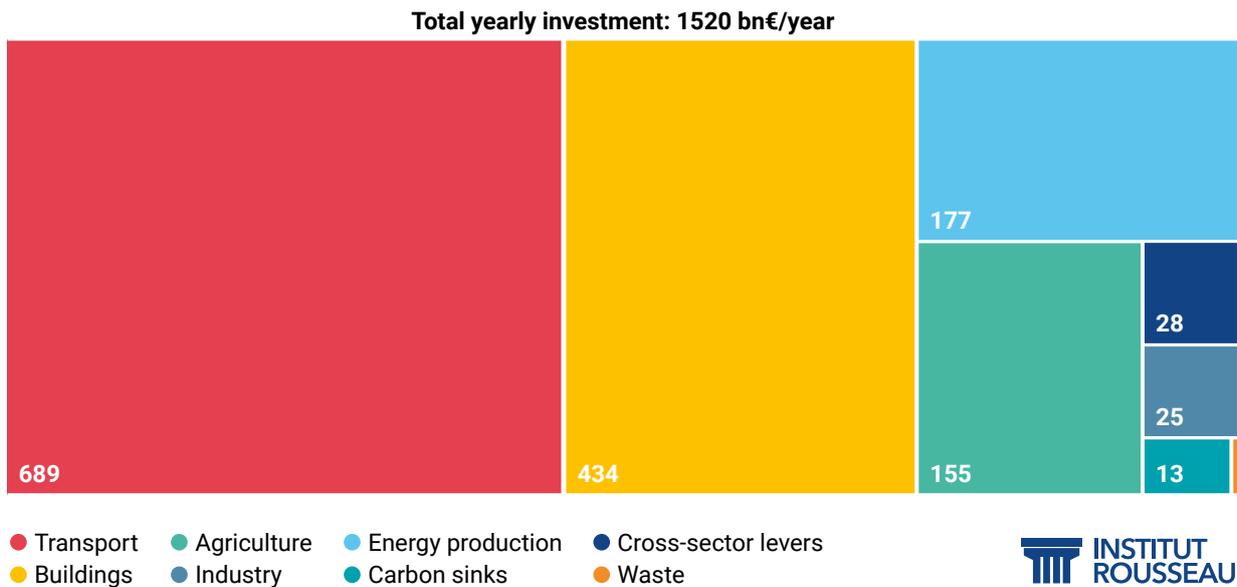


In terms of total investment, approximately 75% is focused on two sectors: transport (45% of overall investment, €689 billion annually) and buildings (29%, €434 billion annually). This is due to the large-scale nature of these sectors, which invest in tens of millions of vehicles and buildings. These sectors are followed by

energy production and infrastructure (12%, €178 billion annually) and agriculture (10%, €155 billion annually). Industry (€25 billion annually), cross-sector measures (€28 billion annually), carbon sinks (€13 billion annually) and waste management require only 4% of total investment.

Fig. 4

Yearly investment needed by sector (in billions of euros per year)



When considering extra investment compared to the business-as-usual trend (Figure 5), the top three sectors remain the same, but the building and energy production sectors require the most substantial extra effort, with respectively 39% (€142 billion per year) and 22% (€79 billion per year) of the total extra investment required. 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 an increase in electricity consumption of at least 70% compared to the trend scenario. The transport sector's decrease in extra investment ranking is mainly due to reducing the private car fleet.

Fig. 5

Extra Investment needed by sector (in billions of euros per year)

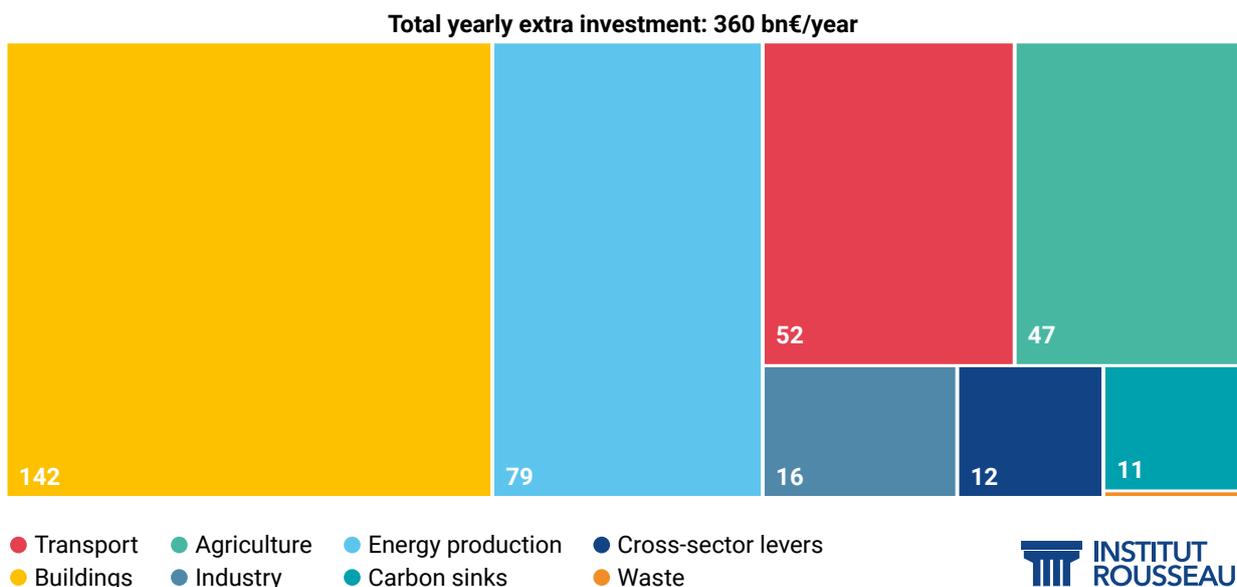
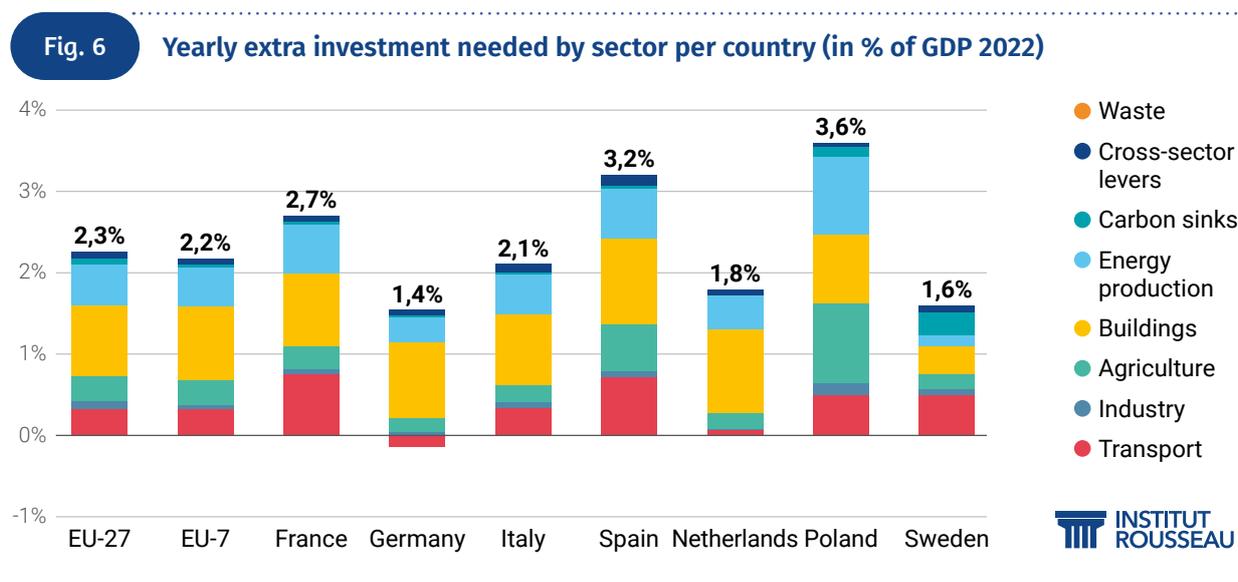


Figure 6 shows how these extra investments may vary from country to country, in % of their Gross Domestic Product (GDP).



The divergences in the sectoral breakdown are mainly explained by the relative level of carbon intensity between each sector and country. For Germany and the Netherlands, the weight of transport investments is limited due to well-established public transport infrastructure and greater opportunities for reducing road transport costs (through fleet size reduction and average vehicle size), while for France and Spain, substantial efforts are needed to extend railway networks and soft mobility infrastructure. Poland shows a comparatively higher level of extra investment needs, mostly due to the strong carbon intensity of its current energy mix and a very high agricultural area/GDP ratio.

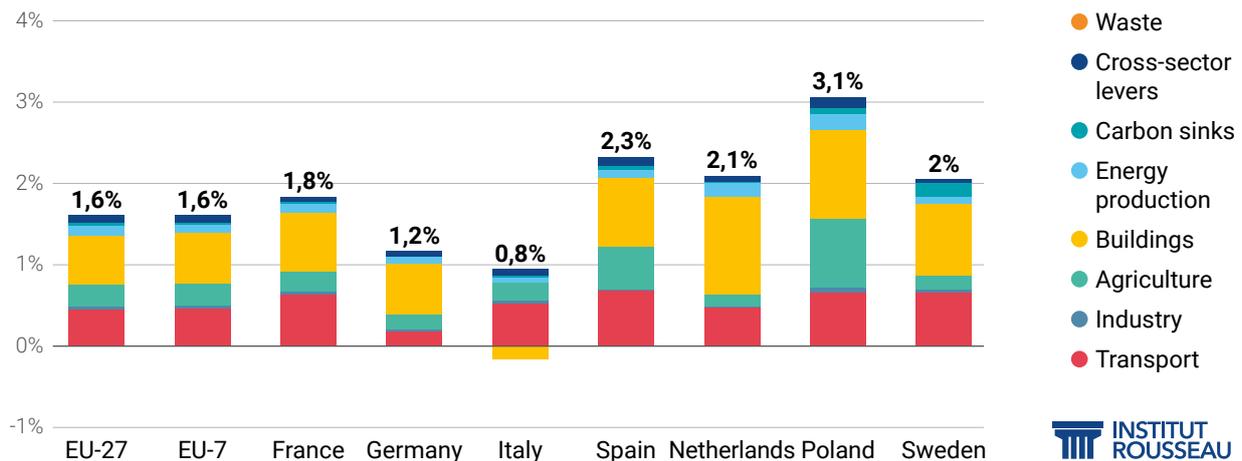
This study is also a first-of-a-kind in outlining and quoting 73 public policy proposals to catalyse these investments, categorised for each of the 37 decarbonisation levers. The total public cost of these measures is estimated at €510 billion annually, with €260 billion exceeding the

trend scenario. This is equivalent to **doubling average annual public investment**. **The sectoral breakdown of the €510 billion investments shows that the construction sector (35%) and the transport sector (27%), together account for two-thirds of the required public investment. Agriculture stands for 21%, which brings these three sectors to a total of 84% of the essential public investments.**

When considering extra public investments, the same two sectors alone account for two third of the extra public investment needs: construction (38%) and transport (28%). Agriculture (17%), energy production and infrastructure (8%) and cross-sector measures (5%) 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.

Fig. 7

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

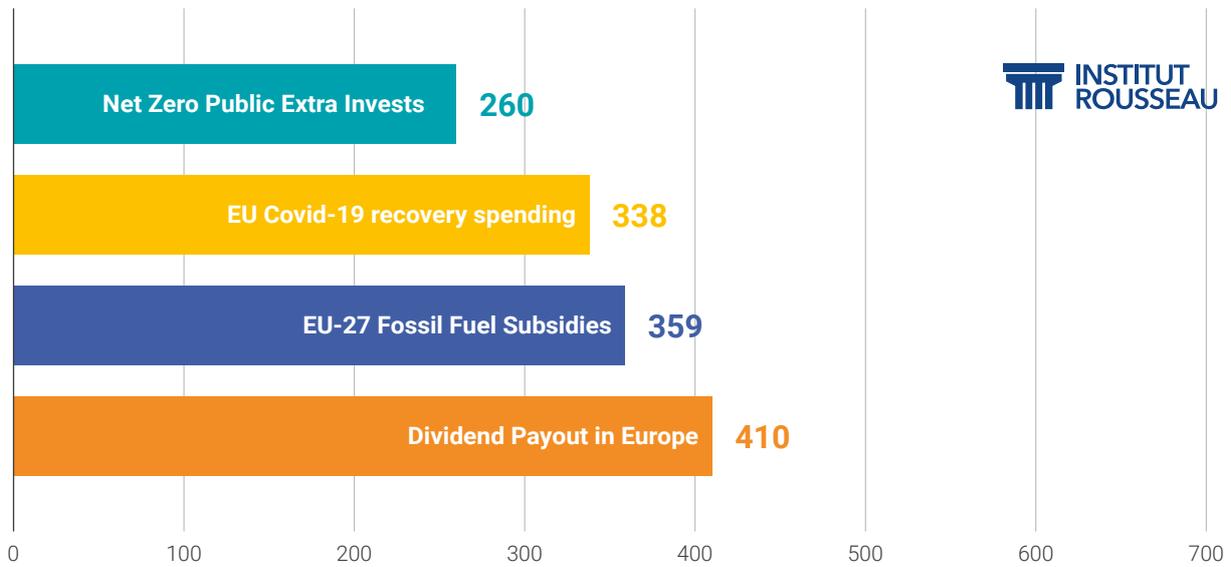


Germany requires relatively modest additional public investments, thanks to its already substantial current spending on existing public transport infrastructure and a comparatively low ratio of agricultural area to GDP. In contrast, Poland exhibits a much higher level of additional public investment needs, driven primarily by a substantial ratio of agricultural area to GDP and, secondarily, a significant proportion of energy-intensive buildings necessitating renovation (with both the agriculture and buildings sectors demanding substantial public support). Italy's 'negative' additional public cost for buildings is attributed to the 2020 launch of the 'Superbonus 110%', resulting in extensive and uncontrolled tax credit commitments. Excluding this specific factor, Italy's additional public investment needs would align with the EU-27 average.

Contextualising the proposed €260 billion per year of extra public investment 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 7). **€260 billion per year is less than both the EU's Covid-19 recovery spending and Member States' yearly fossil fuel subsidies**, and stands at nearly half of Europe's 2022 dividend payout. Also, funding the ecological transition remains cheaper than other investments in the EU's collective future, such as education, which stands at €626 billion per year.

Fig. 8

Contrasting extra public investment with known yearly budget



Time is an increasingly scarce resource. The closing window of opportunity underscores the urgency of our task. Delays in these crucial steps jeopardise the future of our planet, a risk we cannot afford to take. We know the direction we must take, and we have a clear understanding of the financial commitments required. This report is a call for European decision-makers to implement the necessary policies. The challenges may be significant, but the consequences of inaction are far greater. Our collective actions today will determine the legacy we leave for the

future: let us choose the path of responsibility, courage, and commitment to safeguarding the future of our shared home.

This EU-wide study, led by Institut Rousseau, has involved more than 150 experts, researchers and volunteers from 20+ organisations across Europe, including economists, engineers and public policy experts.

For more details, please refer to the full report.