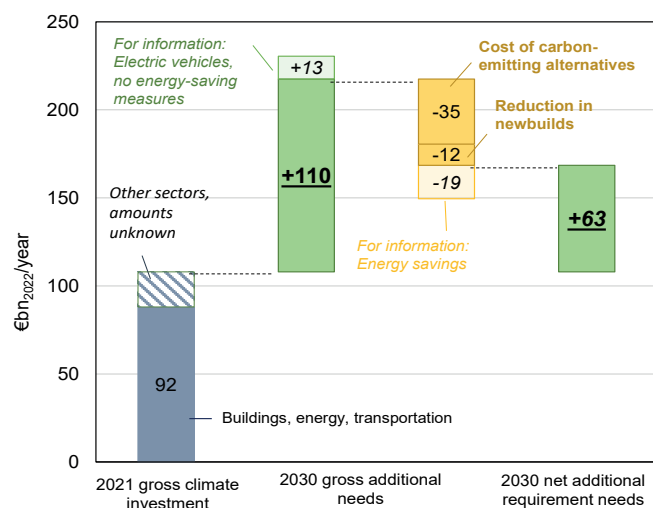


How Much Investment Is Required To Reach France's Decarbonisation Targets For 2030?

Logan Gourmand

- A large-scale redirection of investment flows towards decarbonisation items is required for France to achieve its climate targets. Many estimates of the additional low-carbon investment needs have been made, ranging from €55 billion to €130 billion per year from now to 2030 (an additional two to five percentage points of GDP). Comparing these estimates is particularly challenging given the wide range of definitions, methods and scopes used.
- Theoretically, minimising the costs of decarbonisation should be based on a comprehensive analysis of the abatement costs of each intervention across the entire economy. In practice, the investment needs are calculated by sector.
- When applying a consistent methodology across sectors, the gross additional investment needs in low-carbon items (compared to 2021) are estimated at approximately €110 billion per year by 2030.
- When deducting the lower investments in (i) carbon-emitting alternatives (e.g. only factoring in the additional cost of an electric vehicle compared to an internal combustion engine vehicle), and (ii) newbuilds, assuming reduced land take, the net additional investment needs would drop to €63 billion per year (see Chart opposite). This net requirement could be further reduced by the reduction of other fossil fuel investments (e.g. lower demand for new internal combustion engine vehicles) and by energy bill savings.
- These estimates are subject to considerable uncertainties. In addition, the share of the effort between public and private economic agents is not addressed in this paper, as it will depend on the set of public policies implemented.

Additional low-carbon investment needs in 2030, compared to 2021



Source: L. Gourmand (2024), "How Much Investment Is Required To Reach France's Decarbonisation Targets For 2030?", DG Trésor Working Document, no. 2024/2.

1. Various estimates of the investment needs coexist

In July 2023, at a time when national climate targets were being raised, the French government published a provisional overview of the measures and trajectories for cutting emissions planned for the development of the next National Low-Carbon Strategy (SNBC3).¹ This transition will require large-scale investment in low-carbon assets, the amount of which has been estimated on numerous occasions using a wide variety of methodologies (see Box 1).

This paper outlines the estimated investment needs in line with the SNBC3, through a harmonised approach across all sectors.² The results presented relate to:

- “**investments**”: creation of physical assets and end consumption of durable goods within the meaning adopted by national accounts (i.e. excluding R&D, training expenses etc.) ;
- “**low-carbon investments**”: required to achieve decarbonisation targets for 2030 (e.g. insulation of buildings, electric vehicles, etc.) ;
- “**additional investments**”: outlining the progress in investments required by 2030 compared to the 2021 investment figure, but not providing a detailed year-by-year investment timeline ;
- “**gross investment**” and “**net investment**”: respectively, total investment, and, by deducting (i) the cost of carbon-emitting alternatives (e.g. only considering the additional cost of low-carbon vehicles compared to internal combustion engine vehicles) and (ii) the drop in low-carbon investment given the achievement of other environmental targets (e.g. reduced number of newbuilds and thus reduced investment in insulating these buildings).³

Box 1: Estimation methodologies

- In theory, in order to effectively cut emissions, estimates should be based on the abatement costs of each intervention, grouped in a comprehensive analytic grid.^a In practice however, estimates are based on more technical approaches adopted on a sector-by-sector basis.
- In technical sector-specific bottom-up studies, low-carbon investment needs are calculated by multiplying the volume of low-carbon assets by the related costs or prices. These studies can reproduce the trajectories under consideration in the sector-specific decarbonisation scenarios.
- In macroeconomic studies, these requirements are most often calculated by introducing results from technical studies as input parameters for macroeconomic modelling, which are then modified by macroeconomic feedback effects. These studies illustrate the price effects and the effect of the price signal.

The results presented in this paper utilise technical models based on the physical trajectories of the SNBC3 and the related price assumptions. They are compared to a review of technical and macroeconomic studies, with which they are also consistent.

a. In its report published in December 2023 (op. cit.) DG Trésor sets out an analytic grid called the “ABCDE” framework.

2. The additional annual investment needs are estimated at €110 billion by 2030 compared to the 2021 figure, and a maximum of €63 billion in net terms

In France, the Institute for Climate Economics (I4CE) estimated private and public investment for climate action at €92 billion in 2021 (3.7% of GDP). These figures have increased by nearly 40% since 2016, surging by €18 billion between 2020 and 2021, particularly attributed to the effect of the France Relance recovery plan and to the post-pandemic recovery.

After harmonisation of the results, recent studies on France quantify the gross additional low-carbon investment needs at an amount ranging from €55 billion to €130 billion per year by 2030 compared to 2021 (i.e. between two and five additional percentage points of GDP). Over the 2024-2030 period, this additional investment requirement represents a maximum of €110 billion per year on average.

(1) Secretariat General for Ecological Planning (SGPE – 2023), La planification écologique – [La synthèse du plan](#) (in French only).

(2) This document provides a summary of the results of L. Gourmand (2024), “[Quels besoins d’investissements pour les objectifs français de décarbonation en 2030 ?](#)”, *DG Trésor Working Document*, no. 2024/2, that provided input for the [Interim report on the economic challenges of the net zero transition](#), published by DG Trésor in December 2023.

(3) Considering investments from a “net” perspective can better establish the additional cost of low-carbon assets for the economy compared to 2021, while the “gross” investment needs establishes the total cost differentials.

Table 1: Sectoral breakdown of the additional low-carbon investment requirement in 2030 compared to the 2021 figure

Sector	Additional low-carbon investment requirement (€bn ₂₀₂₂ /year)	Type
Construction	+39	Gross
	-6	Cost of carbon-emitting alternatives
	-12	Drop in newbuilds
Transportation	+43	Gross
	-29	Cost of carbon-emitting alternatives
Energy	+17	Gross
Industry	+5*	Gross (investment), including operational cost increases
Agriculture and forestry	+5	Additional costs and reforestation
Waste	+1	Additional costs
Total	Environ +110	Gross
	+63	Net
<i>For information</i>	+13	<i>Electric vehicles without demand reduction measures</i>
	-10	<i>Energy savings (residential)</i>
	-9	<i>Energy savings (road vehicles)</i>

* Including operating expenses.

Source: L. Gourmand (2024), *op. cit.*

The assessments set out in this paper are based on new figures for main residence retrofits, the electrification of road vehicles and reforestation, using the physical trajectories of the SNBC3. For the remaining sectors, the figures are supplemented with results from the literature that were previously harmonised. Our estimate for the gross additional investment needs stands at approximately €110 billion per year in 2030 compared to 2021. When deducting the drop in newbuilds, assuming increasingly reduced land take, and the cost of carbon-emitting alternatives, the net additional investment needs would fall to a maximum of €63 billion per year.

The sectoral breakdown of the gross additional investment requirement is as follows (see Table 1):

- **Construction (+€39 billion/year):** Investment in this sector relates to insulation and switching heating systems. The related energy bill savings could total €10 billion per year. In bolder scenarios of land take reduction, the investment needs could be partly covered by shifting investment away from newbuilds.
- **Transportation (+€43 billion/year):** The investment needs primarily relates to the purchase of low-carbon road vehicles and heavily relies on an assumed drop in the demand for vehicles.⁴ The additional cost of low-carbon vehicles compared to their internal combustion engine counterparts is however considerably lower than the gross additional investment needs, which reach a maximum of €13

billion per year for passenger vehicles. Energy bill savings attributed to the electrification of passenger vehicles could also offset a large part of this additional cost – approximately €9 billion per year on average up to 2030.

- **Energy (+€17 billion/year):** The investment needs chiefly concerns electricity and low-carbon gas generation. They are expected to increase through to 2050 to cover the rising electricity demand.
- **Industry (+€5 billion/year with the additional costs of operating expenses):** The investment needs in this field are calculated assuming a constant level of production and in light of a heavily decreasing emissions trend. They include additional operational costs, estimated to total approximately €1 billion per year (net).
- **Agriculture (at least +€1 billion/year for the SNBC2) and forestry (+€4 billion/year):** This segment includes reforestation, the electrification of farm equipment and changes in practices.
- **Waste (+€1 billion/year for the SNBC2):** This segment comprises the thermal recovery of waste and the anaerobic digestion of methane. However, studies on this area are still rudimentary at this stage.

These figures for the additional investment needs are in line with the results of the report by Jean Pisani-Ferry and Selma Mahfouz,⁵ which costed the same needs at an extra +€101 billion per year (a net extra +€66 billion/

(4) For example, higher demand for passenger vehicles would increase the investment requirement by €19 billion/year, all engine-powered vehicles included.

(5) See J. Pisani-Ferry and S. Mahfouz (2023), “The Economic Implications of Climate Action”, France Stratégie, Note de synthèse. This report uses some of the results presented in L. Gourmand (2024), *op. cit.*

year given the drop in carbon-emitting investment). The results are also in line with a European and global

range of around two to three additional percentage points of GDP.

3. These estimates do not establish the future share of the efforts made by agents

The estimates presented in this paper are calculated on a partial scope, which could lead to an underestimation of the investment requirement: (i) only national requirements have been factored in, therefore excluding the support given to international decarbonisation projects; (ii) the cost of damage caused by climate change, as well as expenditure related to climate change adaptation, and to other environmental targets are not included;⁶ (iii) investments in R&D, consumer goods and human capital (induction training and retraining), and expenditure for easing economic frictions linked to the transition are also excluded.

Some of the adopted assumptions may also lead to investment needs being overestimated: (i) behavioural assumptions, particularly those relating to demand reduction and other changes in practices (e.g. modal

shift), are sometimes prudent and a greater reduction in consumption is possible, which would drive down the total investment requirement;⁷ (ii) the same applies to cost reductions that could result from the acceleration of incremental or disruptive innovation, and from the large-scale rollout of low-carbon technologies.

Lastly, the future share of the efforts made by public and private agents is not provided, as it will depend on the sector, the decarbonisation levers and the combination of public policy tools envisaged (e.g. price signals, regulations, subsidies). In addition, the decrease in revenue for the government as a result of decarbonisation efforts could be considerable.⁸ It is therefore important not to consider these amounts as the total net additional cost of the ecological transition for households, businesses, local authorities and the French government.

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- (6) The damage of rising temperatures on France's economy are still insufficiently known, but a rise of 3°C could cut French GDP by at least eight percentage points by 2050 according to the latest estimates from the Network for Greening the Financial System (NGFS). At EU level, the investment needs for other environmental targets should account for a third more investment than those needed for decarbonisation: an extra €130 billion/year for biodiversity, resource and waste management and combating pollution (see the European Commission (2021), [SWD\(2021\) 662 final](#)), as well as an extra €477 billion/year for decarbonisation (see the European Commission (2023), [SWD\(2023\) 68 final](#)).
- (7) These behavioural measures can also mitigate the rebound effect subsequent to the adoption of new low-carbon technologies, which has been observed for example in the housing sector (rise in electricity consumption following insulation work).
- (8) In its [Interim report on the economic challenges of the net zero transition](#), published in December 2023, DG Trésor estimates losses in the government's energy revenue of €13 billion in 2030 and €30 billion in 2050.

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