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INTERIM REPORT

The economic challenges of the net zero transition

DECEMBER 2023

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Executive Summary

The French Minister of the Economy, Finance and Industrial and Digital Sovereignty has commissioned the Directorate General of the Treasury to undertake a review of the economic challenges of the net zero transition. This interim report is a first milestone towards a final report that will be published in 2024. Along the same lines as the Net Zero Review conducted **by the UK's HM Treasury, the report will examine the key economic challenges of the net zero transition for the French economy.** It will address macroeconomic and sectoral dimensions and outline the key challenges for businesses, the labour market, foreign trade, households and public finances. The report will rely on **analyses conducted as part of the government's** ecological planning strategy, economic literature and an analysis of available data, and draw lessons from international comparisons to identify best practices and potential pitfalls. This document was produced under the responsibility of the Directorate General of the Treasury and does not necessarily reflect the position of the Ministry of the Economy, Finance and Industrial and Digital Sovereignty.

The interim report is comprised of four chapters and includes in particular a preliminary study on the implications of the net zero transition for fuel duty receipts and a sectoral analysis of the decarbonisation of the housing sector. The first chapter summarises the existing literature on the economic costs of climate change and the economic implications of the net zero transition. The second chapter outlines the policy instruments that can be used to reduce emissions and compares their relative merits. The third chapter presents preliminary findings on the implications of the net zero transition for public finances, especially fuel duty receipts. Sectoral economic challenges and policy considerations are examined specifically for the housing sector in the fourth chapter.

If the world does not decarbonise faster, warming could reach 3°C above pre-industrial levels globally and 4°C in France by the end of the century according to the Intergovernmental Panel on Climate Change (IPCC), which would lead to serious socioeconomic repercussions.

- Average temperatures rose by 1.15°C globally and 1.9°C in France over the 2013-2022 period compared with pre-industrial levels, already causing significant damage.
- Each additional temperature increase has major biophysical impacts, such as increasing the frequency and intensity of extreme weather events and contributing to further biodiversity loss. Without an acceleration of the pace of global decarbonisation, there would be significant economic damage globally and in France, with a risk of reaching climate tipping points that could lead to additional impacts which are not yet fully understood.
- According to the latest estimates from the Network of Central Banks and Supervisors (NGFS), France stands to lose 8 percentage points in GDP by 2050 under a 3-degree warming scenario due to economic losses from extreme weather events and productivity losses from extreme heat. Damages might even be higher than these estimates. Global warming is also predicted to have adverse impacts on human health and reduce ecosystem services (such as pollination or soil carbon sequestration).

A fast and far-reaching transition of the economy is required to meet the emissions reduction targets adopted by France and the European Union, incurring additional costs during the transition period. Under certain conditions, the net zero transition could however unlock economic opportunities for France due to the relatively low carbon intensity of its economic activity. Indeed, **France's energy mix and production** are currently less emissive than those of its main economic partners.

In the long run, the net zero transition will be beneficial for the economy and enhance well-being in comparison with a scenario of unmitigated global warming.

- To limit global warming to 1.5°C, France and the European Union have made ambitious commitments to reduce their net greenhouse gas emissions by 55% in 2030 compared with 1990 – an intermediary milestone towards achieving net zero in 2050. The transition to net zero is part of a broader transition designed to mitigate the environmental impacts of economic activity.
- Achieving these targets means accelerating decarbonisation efforts, even more so as land carbon sinks have been severely reduced in recent years (-40% between 2016 and 2021), calling for additional efforts in other areas.
- Achieving net zero implies a far-reaching transformation of the economy, production processes and consumption behaviours. The **“Economic Implications of Climate Action” task force led by Jean Pisani-Ferry and Selma Mahfouz** concluded that this shift is achievable from an economic standpoint, albeit with additional costs during the transition period. Energy sources and manufacturing and agricultural processes will need to switch to low-carbon alternatives which will be more expensive at first, while jobs and capital will be reallocated between sectors and businesses to low-carbon activities. The transition could be hampered by the cost of acquiring new skills or the early decommissioning of highly carbon-intensive facilities (**“stranded assets”**).
- Decarbonisation will require substantial private and public investments, estimated at around **€110bn annually in 2030 by the Directorate General of the Treasury** (additional gross investment compared with 2021) in a working paper to be published soon. The figures for 2050 are not available yet. Those investments will reduce energy bills overall. At the same time, carbon-intensive investment could be cut. For instance, the increasing uptake of electric vehicles and demand-side shifts in mobility could contribute to reducing investments in internal combustion engines (ICE) cars by around **€37bn annually in 2030**. These amounts are overall consistent with the findings of the task force led by Jean Pisani-Ferry and Selma Mahfouz and cover additional economic sectors.
- In the short term, the transition could slow economic growth due to the higher costs of low-carbon production. However, the availability of low carbon energy sources at competitive prices, combined with a favourable framework for green innovation, could facilitate the development of low carbon activities.
- In the medium and long-term, climate change mitigation policies yield benefits, most importantly because they avert adverse consequences of unmitigated climate change, but also because they lead to productivity gains in low-carbon technologies, diminish the energy bill through reduced fossil fuel imports, and may improve several facets of wellbeing, especially health.

The decarbonisation of France's economy should be guided by adequate policies combining consistent and complementary market mechanisms with long-term planning.

- **To decarbonise the French economy, France's national low-carbon strategy** relies on six levers: decarbonisation of energy sources; energy efficiency and sufficiency; carbon efficiency of industrial and agricultural processes; changes in consumption patterns; and carbon sequestration through natural carbon sinks or industrial processes.
- The economic literature shows that carbon pricing (through a carbon tax or a cap-and-trade system) induces the most cost-effective decarbonisation actions and encourages businesses to pursue low-carbon innovation, which is crucial for future productivity. Greenhouse gas emissions are already subject to a pricing scheme in France under the national taxation system and the **EU's Emissions Trading System (ETS)**, but pricing is not consistent between sectors and the existing carbon price is too low to achieve the 2030 targets and net zero in 2050. 71% of French greenhouse gas emission are covered by an effective carbon price (net from subsidies) at an average rate of 83 €/tCO₂eq. Worldwide, 41% of emissions are covered at an average rate of 17 €/tCO₂eq. Market failures and regressive impacts from carbon pricing mean that other public policy instruments should be used as complements, in particular targeted subsidies and proportionate regulations designed to promote decarbonisation efforts without increasing energy bills for households. Low-carbon innovation is another area that requires specific government support, such as the one provided under the France 2030 Plan.
- The effectiveness of climate policy must be addressed from a European and global perspective, and through the lenses of both our territorial emissions and carbon footprint, which includes imported emissions. The EU recently adopted more ambitious domestic climate mitigation policies and commercial policy should follow suit. In particular, the Carbon Border Adjustment Mechanism (CBAM), which has been gradually implemented since October 2023, prevents carbon leakage more effectively by narrowing gaps between the carbon price of goods produced in the EU and those imported into the EU, all within a framework that remains compliant with World Trade Organisation (WTO) rules.
- In addition to market mechanisms, long-term planning is required, in particular to develop the required infrastructure to support a low-carbon economy as well as increase the availability and prioritise the uses of essential but limited resources for the transition such as biomass, hydrogen and low-carbon electricity, but also labour and skills.
- To contain the public and private cost of the transition, undertaking the most efficient decarbonisation actions is key and public policy instruments should be designed accordingly.
- This involves first analysing abatement costs (*i.e.* the cost to reduce the emissions of a tonne of carbon dioxide equivalent), building on the work of the Criqui commission hosted by France Stratégie, a governmental think-tank advising the French government. More broadly, this report provides an analytical framework for climate mitigation policies, called **"ABCDE"** in French, which includes abatement costs and abatement potential (in terms of territorial emissions or carbon footprint) (A), effects on the balancing of supply and demand for key resources especially in the energy sector (B), consistency between instruments (C), the incentivising impact of public policy on private investment (D) and the indirect effects (E), for example on health or the trade balance.

The transition to net zero brings about many challenges for public finances which have not yet been examined in full. In addition to the direct and indirect costs of reducing emissions, and those from climate change damages and adaptation measures, the transition to a low-carbon economy will result in the erosion of tax revenues from fossil fuels, especially fuel excise duties, if the tax system remains unchanged.

- Climate mitigation policies will have a direct impact on the public balance which will depend on the mix of instruments used, *e.g.* additional carbon tax revenue or subsidy spending. The policies will also have indirect consequences for public accounts because of their macroeconomic impacts on productivity, interest rates and inflation. The costs of physical risks, depending on how it will be shared with the private sector, and the cost of adaptation policies implemented to mitigate those risks will also affect public finances directly or indirectly. Those impacts should be studied further.
- If the tax system remains unchanged, gradually moving away from fossil fuels will automatically lead to a reduction in tax revenue from these types of energy sources, especially fuel excise duties – the focus of this interim report. **A scenario compatible with our climate targets would reduce revenue from excise duties on fuels by €13bn by 2030 and €30bn by 2050 under an unchanged tax system.**
- The erosion of tax revenue will mainly affect the road sector because of the electrification of vehicles, as electricity is taxed at a lower rate than petrol and electric vehicles are more energy efficient. More broadly, road taxation aims to cover the socioeconomic costs of road use, including greenhouse gas emissions, local air pollution, infrastructure wear and damage, accidents, etc. At current levels of road pricing, only half of these costs would be covered by road pricing by 2050, compared to a near-complete coverage at present (excluding congestion and air pollution from sources other than exhaust gases).
- Scandinavian countries started to electrify their vehicle fleets earlier and are already facing road tax revenue erosion. Several European countries are responding to this trend by increasing other tax revenue streams within the road sector (*e.g.* pay-per-kilometre tax, tax on vehicle acquisition or ownership, urban road tolls) and cutting subsidies and tax rebates on electric vehicles as acquisition costs come down.

The economic challenges associated with decarbonising the private housing sector highlight the importance of implementing a combination of instruments grounded in an analysis of market failures and the distributive effects of public policy.

- Decarbonising the private housing stock plays a key role in achieving carbon neutrality in France. This involves both using decarbonised energy systems for heating and reducing energy consumption through improved insulation. Building retrofits also helps combat energy poverty and improve the health and thermal comfort of households.
- Insulation can be an efficient way of improving energy efficiency in homes that are very inefficient (*i.e.*, with Energy Performance Certificate – EPC – G or F), but the abatement costs are higher for homes that are already relatively energy efficient. In addition, actual reductions in energy consumption and emissions from retrofits tend to be lower than predicted by energy efficiency modelling and costs tend to be higher than anticipated. Concurrently, the construction industry is currently experiencing sluggish productivity growth and labour shortages.
- The initial priority should therefore be to insulate very energy-inefficient homes and promote heat decarbonisation for others (*e.g.*, installing heat pumps and heat networks), while ensuring low-carbon energy generation can keep pace with demand.

In addition, electricity pricing needs to become more dynamic to improve the balance of supply and demand of low-carbon power throughout the day.

- Because of market failures arising from asymmetric information between landlords, tenants and renovation companies about the energy efficiency of homes and the quality of retrofits, instruments providing information about the energy efficiency of homes, such as the EPC rating scheme, are important.
- Lastly, regulatory instruments (*e.g.*, standards, mandatory requirements and bans) may have a role to play if they are proportionate and well-designed. Sweden has shown that stringent emissions standards for new buildings – later adopted by France – pay off in the long run. The announced ban on renting out energy-inefficient homes encourages landlords to undertake the necessary renovations, even more so as prices of inefficient homes have gone down even further, which may already contribute to making retrofits of individual homes in France profitable through higher sales prices, without even factoring in renovation subsidies.

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The Directorate General of the Treasury builds capacity on the economic analysis of environmental policies

This report falls within a broader strategy pursued by the Directorate General of the Treasury to build capacity on the economic analysis of environmental policies. In September 2023, a new **“Ecological Transition” division was created within the organisation. At the same time, it has been developing macroeconomic modelling tools to evaluate the effects of environmental policies. In particular, a new module was added to the macroeconomic model “Mésange” in summer 2023 to assess the impacts of policy changes and economic shocks on greenhouse gas emissions and the energy mix.**

