The economic challenges of the transition towards carbon neutrality

Comments on the interim report of the Treasury Directorate General
Alain Grandjean and Ollivier Bodin (February 2024)

A report on the economic challenges of the transition to carbon neutrality has just been published by the French Treasury. This is a welcome follow-up to Jean Pisani and Selma Mahfouz's report on the economic impact of climate action. It is indeed important to continue exploring the economic impact of the transition. It is also useful to have an interim report that enables us to make comments that could be considered or at least discussed in the final report. The following remarks are limited to a few observations and do not constitute an overall assessment.

1/ The long-term impact of climate change on GDP is grossly underestimated

The report describes the difficulty of assessing climate change impacts relative to a "no climate change" counterfactual and the limitations of existing literature. It clearly states that there is no reliable method for quantifying ex ante the economic impact of climate change on the economy (Table 2, p. 22) [1] and emphasises both the high risk of underestimation and the high degree of uncertainty in any estimate (see box below).

In spite of all these precautions, the report (like all other documents on the subject) ends up citing some results from work on the economic valuation of climate damage, which are grossly underestimates of the impact.

The report cites the conclusions of reports by the NGFS, the network of central banks and financial supervisors working on climate issues. According to these, a trajectory leading to +3°C in 2100 at global level (i.e. around +2°C in 2050) would result in an 8% fall in France's GDP in 2050. It is important to understand that this fall is envisaged in relation to what GDP would have been in the absence of global warming, the latter assuming continued growth. So it is not a fall in GDP in absolute terms that is on the cards between now and 2050, but a slowdown in its growth[2]. For example, instead of GDP growth of 1% a year between now and 2050 without global warming, we would have GDP growth of just 0.7% a year. To put this in perspective, the cost of flooding in the Ahr valley in Germany in 2021 alone is estimated at €40 billion, which equates to around 1% of Germany's GDP[3].

The report also cites the IPCC, which in its latest synthesis report states that "a temperature increase of around 4°C in 2100 would lead to a decline in world GDP of between 10% and 23% by that date" (compared to GDP without global warming) [4].

[1] This is confirmed by Figure Cross-Working Group Box ECONOMIC.1 (IPCC 2022, WG 2 P. 2497)

[2] For more information on the methods and results of the economists who make these estimates, see the Global warming: what impact on growth? fact sheet on The Other Economy platform.

[3] The floods in the Ahr Valley in Germany (2021) also cost the lives of more than 200 people.

[4] A careful reading of the IPCC synthesis suggests a higher range, up to almost -40% for a 4°C rise. See Figure Cross-Working Group Box ECONOMIC.1 (IPCC 2022, WG 2 P. 2497). The graph is also reproduced in the Treasury's own report, graph 5 p. 23.

The risks of underestimating the economic impacts of climate change and their degree of uncertainty are high.

The report describes the reasons for the underestimation of each of the methods used to estimate climate damage: the enumerative method does not take certain sectors into account; in equilibrium models[5] , the distance between the old and new equilibrium points discredits the assumption of stabilisation through price adjustment; econometric methods[6] pose a problem, particularly because of their linearity.

Whatever the method, the lack of relevant observations to estimate unprecedented phenomena creates major uncertainty about the quality of the figures, the scope of the damage to be taken into account and the regularity of the links between different phenomena. In addition, estimating the impact of climate change necessarily hinges on a greenhouse gas emissions scenario (and therefore on global policies) and its consequences for temperature rises. Even if we set the central scenario for greenhouse gas emissions, there are still many sources of uncertainty - what we "know we don't know":

A) Uncertainties linked to the physical impact of global warming on the biosphere :

- The relationship between emissions and rising temperatures,
- Potential tipping points (accelerated thawing of permafrost, oceanic methane hydrates, reduction in snow cover, etc.)
- Continental and national variations in the average global rise in temperature
- Impact on the biosphere and ecosystems[7]

B) Uncertainties linked to impacts on socio-economic systems

- Depending on the geographical area, developments at business partners
- Global and European agricultural production and food chain safety
- Political and social destabilisation of partners
- Internal social risks

The report states in its conclusion to chapter 1.2: "However, these estimates remain highly uncertain and depend heavily on the modelling options chosen. They do not include the non-monetary issues detailed at the beginning of this section, such as certain effects on health or well-being, as well as some of the ecosystem services provided by biodiversity".

It is important to question the coherence of messages that simultaneously communicate potential impacts and acknowledge that the numbers are highly uncertain[8]. The risk is twofold, because numbers are easier to remember than a list of caveats.

Firstly, the discrepancy between the main risks described by the IPCC that will directly or indirectly affect France and the European Union and the very low average figures circulating in the public

[5] The estimate in the PESETA report quoted on p. 21 combines an enumerative approach with the use of an equilibrium model. For the list of impacts not taken into account (much longer than those taken into account), see p. 59 of the PESETA report or the Greentervention.eu (2020) note, P.4.

[6] These project historical observations of the impact of temperature differences between countries or the same group of countries at different dates.

[7] See, for example, The Economic Case for Nature, Wolrd Bank Group (2021).

[8] See also the Fiche Réchauffement climatique : quel impact sur la croissance ? on the platform The Other Economy and the note (FR and EN) La représentation de la question climatique par la Commission européenne. Un biais contre-productif ? Greentervention (2020)

sphere undermines the credibility of the work of climate scientists, while at the same time obscuring regional and social disparities.

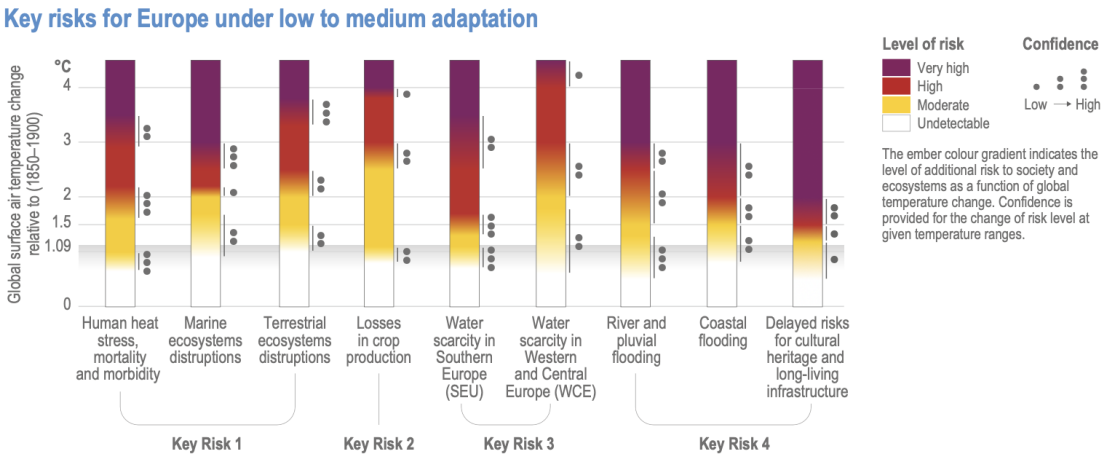


Figure 13.28 | Burning ember diagrams for low to medium adaptation. (More details on each burning ember are provided in Sections 13.10.2.1–13.10.2.4 and SM13.10. Some burning embers are shown again in Figures 13.29–13.34 alongside burning embers with high adaptation.)

Source: IPCC Sixth Assessment Report, Impacts, Adaptation and Vulnerability, Chap. 13. Graph. 13.28, P. 1874

Secondly, these figures will guide the amounts that economic actors (public authorities, financial and non-financial companies and households) are prepared to invest in adaptation and in meeting international commitments to reduce greenhouse gas emissions. The attempt to adapt the French economy and society to a temperature rise of 4°C is a legitimate precautionary measure, even if it shows severe limites[9]. However, a low estimate of the impact of such a warming is likely to slow down action: coping with such a level of warming may seem quite manageable on a case-by-case basis, with a growth rate of 1 to 2% per year. Basic prudence would mean not only not overestimating the human costs (health and mortality), but also not underestimating the economic and therefore social impacts. To do otherwise would be to demobilise the actors, especially in a social context where the difficulties of the transition for certain actors are highlighted.

Faced with this immense challenge, we must have the courage to admit that existing macroeconomic models are not well suited to this work and that the reliability of their figures is low, in addition to the general criticism that can be levelled at them[10] for representing new, disruptive situations with a high degree of uncertainty. Other approaches need to be explored as soon as possible.

2/ Inadequate consideration of transition risks leads to a deadlock with the financial system.

The Treasury report makes four brief references to the need to consider the link with the financial system. Once, to point out that the banking and insurance sector will be one of the five most

[9] See the article Les quatre degrés de l'Apocalypse, Alain Grandjean, Claude Henry & Jean Jouzel, Le Monde diplomatique (December 2023).

[10] See Comparaison des modèles météorologiques, climatiques et économiques, Alain Grandjean and Gaël Giraud , Energy and Prosperity Chair (2017)

affected sectors, along with energy, tourism, infrastructure and agriculture[11]. A second time, to mention that "the economic impact will also depend on the response of the financial system" (p.18). A third time, indirectly, to note that climate change impact studies generally do not take into account the cost of devalued assets (which will inevitably affect the financial system); a fourth time to repeat that "macroeconomic and financial stability will be a necessary condition for a successful transition" (p.44).

There is no doubt that the financial system and its regulation are part of the solution and an essential complement to fiscal policy. The financial system interacts with the climate in both directions: climate change poses transitional and physical risks to the financial system, and most of the activities it finances emit greenhouse gases. For economic and financial actors, the term "double materiality" is used to characterise these two effects. The European Union has started to incorporate dual materiality into its financial regulations[12].

Following Mark Carney[13] , the Network of Central Banks to Green the Financial System (NGFS) distinguishes between two types of risk:

- physical risks, which are the direct consequence of the impact of climate change on assets (flooding, drought, storms, etc.)
- transition risks, which relate to the effects on economic players of an unexpected change in regulations and public policies, consumer preferences or innovations with a view to achieving a zero-carbon economy. To the extent that neither current trends nor announced policies will be sufficient to meet climate commitments, transition risks are not zero[14] .

The NGFS considers seven scenarios which, depending on the policies pursued around the world and the resulting global warming, combine to varying degrees the transition risks and the physical risks[15] . They provide a framework within which national risk prevention policies can be assessed.

[11] "In the banking and insurance sectors, the increase in claims on insured assets would result in higher insurance premiums and could lead to certain risks becoming uninsurable, while financial investments affected by an extreme weather event would see their value depreciate".

[12] See La CSRD: an opportunity to build a robust environmental strategy, Carbone4 (2023)

[13] Mark Carney, then Chairman of the Financial Stability Board and Governor of the Central Bank of England, introduced this distinction in a famous speech to Lloyds in 2015. In addition to the 2 risks mentioned, he also introduced the risk of liability (lawsuits). To find out more, see the article Le climat est source de risques systémiques avérés, on The Other Economy website.

[14] On the relationship between the effectiveness of transition policies and financial stability, see also the ECB report Climate change and sovereign risk (2023).

[15] The scenarios can also be applied at national or European level. See the Treasury report, P. 34, for a comparison of different transition scenarios in France in a given international context.

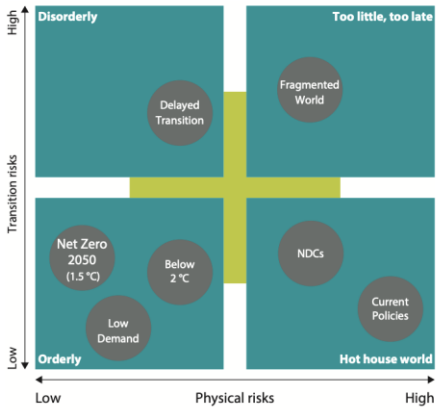
The NGFS scenarios explore the impacts of climate change and the transition with the aim of providing a common reference framework.

The NGFS scenarios explore a set of **seven scenarios** which are consistent with the NGFS framework (see figure) published in the First NGFS Comprehensive Report covering the following dimensions:

- **Orderly** scenarios assume climate policies are introduced early and become gradually more stringent. Both physical and transition risks are relatively subdued.
- **Disorderly** scenarios explore higher transition risks due to policies being delayed or divergent across countries and sectors. For example, (shadow) carbon prices* are typically higher for a given temperature outcome.
- **Hot house world** scenarios assume that some climate policies are implemented in some jurisdictions, but globally efforts are insufficient to halt significant global warming. The scenarios result in severe physical risk including irreversible impacts like sea-level rise.
- **Too-little-too-late** scenarios assume that a late and uncoordinated transition fails to limit physical risks. This quadrant is explored for the first time in this vintage.

Notes: (*) Shadow carbon prices are defined as the marginal abatement cost of an incremental ton of greenhouse gas emissions. Prices are influenced by the stringency of policy as well as how technology costs will evolve.

NGFS scenarios framework in Phase IV



Positioning of scenarios is approximate, based on an assessment of physical and transition risks out to 2100.

Source: [NGFS scenarios for central bank and supervisors, November 2023]

The French Treasury report seems to focus on the global "hot house" scenario, which assumes low transition risks[16], while physical risks are considered to be high (albeit largely underestimated), but only materialising "in the longer term". The adaptation of the insurance and banking sectors would then be limited to managing the increased physical risks by increasing premiums or declaring them uninsurable.[17]

However, two other global scenarios deserve particular attention:

- the scenario of a "late transition = transition policies suddenly accelerated at global level around 2030 following a multiplication of disasters and/or political pressures";
- the "fragmented world" scenario = with divergent transition policies between the major blocs.

In such scenarios, the materialisation of transition risks through the rapid devaluation of certain assets and the consequent destabilisation of the banking and financial system, as well as through price pressures or even a reduction in the availability of imported fossil fuels, must be considered as possible "tomorrow", with a probability that increases over time. It is our view that it is the insistence on the transition risks and the emphasis on the short to medium term nature of these risks that will increase the chances of an "orderly" acceleration of national policies to reduce dependence on fossil fuels.

By focusing on the worst-case scenario in physical terms, the "hot house" scenario paradoxically tends to delay efforts (either through fatalistic "all is lost" reasoning or through a "free rider" effect), especially if its macroeconomic impact is presented as manageable. This is also an incentive to favour solutions whose effects are felt in the long term and whose political/social or competitiveness costs are low in the short term. But sooner or later these decisions will have to be revised under the pressure of the inevitable consequences of climate change.

[16] Scenario with few stranded assets, i.e. factories, fossil plants, pipelines closed before their useful life.

[17] Insurers are already taking such decisions. And the additional premium that finances French insurers' natural disasters scheme will be increased from 1er January 2025, from 12% to 20% for homes. This is very problematic from a social point of view.

Macroeconomic models that ignore the risks of instability in the financial system (especially general equilibrium models) are inherently unsuitable for considering this type of scenario, whether at the global or national level. As Olivier Hamant suggests[18], the aim of public policy should be to ensure the resilience or robustness of our societies to repeated, unexpected shocks of various origins (meteorological, epidemic, geopolitical, social, etc.), rather than to optimise under constraints and seek the "least cost". The approach to be adopted should therefore be more forward-looking and qualitative. It should identify the rare areas of relatively high certainty and the various possible major risks. The operational conclusions to be sought are more in the area of prevention, precaution and preparation for adaptation than in the area of least cost.

It is hoped that the final report will include these financial stability aspects in its considerations.

3 How should we think about the sustainability of public finances?

The above analysis does not imply that we are suggesting a return to "whatever it takes" and ignoring the constraints of our public debt.

Nevertheless, it has to be said that the approach adopted by the European rules (in their current version or in the reform proposals currently under discussion) is narrowly focused on the gross debt size. However, investments that reduce the climate risks for our societies and economies[19] de facto also limit the risks for public finances, since they are also likely to reduce the risks of a rise in public debt. These are therefore factors relevant in assessing its sustainability.

It is sometimes argued that the issue of public debt is independent of the nature of the expenditure financed[20] . This argument should be treated with caution. The French government has never raised so much debt (285 billion is forecast for 2024) and it is sometimes claimed that, given the current level of its total debt, it runs the risk of the rating agencies downgrading its rating, which would lead to a rise in interest rates and further increase the burden of debt and the public deficit.

On the one hand, French government debt remains highly valued by the markets, particularly because interest rates make it an attractive investment, but above all because it remains a safe investment[21] compared with the alternatives.

On the other hand, as the climate risks mentioned above are real, it is hard to believe that they will not eventually be taken into account by investors, just as the measures taken to "reduce" them would be appreciated. It is clearly more sustainable for public debt to grow a little more in the short term[22] to prevent it from spiralling out of control than the opposite - debt that is apparently under control in the short term but is potentially explosive.

It is essential to get away from the idea hammered home by some of our European partners that we are the "bad pupils of Europe". Germany has slowed down the transition in Europe and on its own soil through far too restrictive budgetary policies. The Scholz government has been forced

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[18] See his books *La troisième voie du vivant* and *Antidote au culte de la performance, La **robustesse** du vivant*.

[19] On the impact of investments in adaptation on risks and costs, see for example P. 16 of the IPCC 6 report, Working Group II.

[20] Because of the tautology that "an increase in debt is an increase in debt, whatever the nature of the expenditure financed".

[21] French debt is seen as safe by the financial markets because the fiscal capacity of governments is considered to be solid, but also because the Central Bank, the financier of last resort, cannot, given the relative size of the French economy, let France down as it threatened to do with Greece.

[22] This is clearly the position expressed by the authors of the Pisani Mahfouz report on the economic impact of climate action. See page 116: "Delaying the investments needed to achieve climate neutrality in the name of controlling public debt would only improve the situation on the surface, without any substantive benefit.

to renege on its commitments to invest in the transition because a ruling by the Constitutional Court no longer makes it possible to accommodate the constraints of this economic nonsense known as the debt brake, a provision that is even more restrictive than European rules.

Finally, the macroeconomic effect of transition investments should not be underestimated, particularly as they ultimately contribute to reducing oil and gas imports. In this respect, the models used to assess the macroeconomic impact of transition are ill-suited to taking this positive effect into account. We will come back to this later.

4 Mitigation: the emphasis on the carbon tax is too strong, even though the need for a policy mix is clearly emphasised.

The report does mention the need to combine various public policy instruments (chapter 2.1), but insists that a price signal via a carbon tax or quota system is the most effective instrument, the one that will enable the transition to be achieved at the lowest cost. The issue has been the subject of much debate in France since the Grenelle Environment Forum.

Without going into an exegesis of all the works, let us limit ourselves to a few considerations.

First of all, if we follow a logic of robustness and not optimisation, the question of the costs of a measure is not an absolute priority. In this case, the authors of the report take note of this by proposing an ABCD rule (which could be discussed in detail, but the essential point here is the spirit of the reasoning) for abatement costs.

Secondly, Alain Quinet's report on La valeur de l'action pour le climat (2019) shows that the level that the price signal alone must reach (€250 per TCO_2 in 2030 and up to €775 in 2050) is politically unattainable. The successive episodes of the bonnets rouges, the gilets jaunes and the farmers' revolt at the beginning of 2024 clearly demonstrate the difficulty of the exercise, while we are still a long way from the desired levels. More fundamentally, sociologists point out that the price signal cannot be the only lever when agents are embedded in a set of tangible or intangible structural constraints (infrastructure, budgetary constraints, social norms, etc.).

Finally, the question of just transition is constantly being raised and requires more appropriate approaches. If we want to decarbonise the economy, in the context and with the objectives set out in point 2 above, we have to recognise that we need a comprehensive system (public infrastructure, regulation of advertising, aid and subsidies, appropriate redistribution mechanisms). The report also mentions the need to take redistribution issues into account.

The priority given to carbon taxation in the report is obviously not unrelated to the need to control public debt. Carbon tax is a source of revenue for the State budget, and the subject is all the more sensitive because revenues from the distribution of fossil fuels are set to fall, as the report rightly points out. We therefore need to look at the issue as a whole and put a figure on the impact on public accounts of a coherent package of measures, of which the carbon tax (and its possible slow growth) could be a part.

It should be remembered that the tariff shield cost the public purse around €100 billion in 2 years, and that this emergency measure was clearly inappropriate because it allowed wealthy citizens to take advantage of it and discouraged them from reducing their energy consumption. Other solutions appear to be both less costly and more effective[23] for reducing greenhouse gas emissions.

[23] Take, for example, the proposal by Christian de Perthuis and Marc Maindrault published in Le Monde Transition énergétique: "The instrument to replace the tariff shield must be a genuine component of the income paid to households" in January 2024.

5 The regulation of international trade should not be limited to the Border Carbon Adjustment Mechanism.

Developments in the international context are worrying for many reasons. Three aspects of the ecological transition need to be highlighted.

Firstly, the availability of cheap fossil fuels in Europe could be called into question for a variety of reasons. The war in Ukraine was a wake-up call, but the decision to over-equip Europe with LNG terminals was inappropriate to say the least, as Carbone 4 showed at the time. The Biden administration's recent decision to suspend authorisation for the construction of LNG terminals, based on climate and domestic political considerations, clearly shows that we cannot remain entrenched in certainties on this issue.

Secondly, the rise of protectionism (and far-reaching plans such as the Biden administration's IRA) should make us change our way of thinking very quickly. The rapid decision to close certain factories in Europe should be a wake-up call.

Finally, the impact of the transition (whether orderly or not!) on France's and Europe's trade balance is a central issue. While public debt is a subject that should not be ignored, those of our dependence and our balance of trade are on the one hand even more sensitive and on the other strongly linked to the scale of the consequences of the rise in public debt. If we are living beyond our means, it is first and foremost in terms of our trade balance that this can be assessed and measured. Conversely, if our trade balance improves, we will be less dependent on external supplies of capital to finance our public debt.

In conclusion, we can no longer take as our central reference point a collective optimum that would be free trade, which would only need to be tempered in certain cases[24] . Nor can we take supply-side policy as the core of our reasoning. This policy considers that the trade balance depends first and foremost on the competitiveness of our companies. This is not entirely untrue, of course, but supply-side policy has simply failed. The list is long[25] of the disappearances or contrition of industries and services that have not withstood the tsunami of free-trade globalisation. And this can only continue or even increase. There is a high risk that France will become a holiday resort for the winners of the global economic war. We will be ecologically virtuous at home, but all our industries will have disappeared.

We need to put the issue of sobriety at the heart of our economic reasoning, as political scientist Benjamin Brice suggests.

The interim report mentions the international issue but does not deal with it exhaustively. It rightly states that "It is difficult to anticipate the impact of the transition on France's trade balance". (page 39). Indeed, if we accelerate the reduction of our dependence on fossil fuels (to meet our climate commitments but also for the economic and geopolitical reasons mentioned above) this will have a positive effect on our balance of trade which could, however, be offset by the effects mentioned in the report (carbon leakage, imports of low-carbon components and technologies and critical inputs).

Let's stress one point here. The Border Carbon Adjustment Mechanism (CBAM) that has been decided on is a measure that is "a step in the right direction", like all "mirror measures". Thanks to it, the industries concerned will see the conditions of international competition on Europe's doorstep become fairer again, without having to rely on free allocations of allowances that do not encourage them to decarbonise. However, industries exposed to international competition that

[24] The report recommends, for example (page 41), the introduction of a tax credit for the French heat pump industry. This type of case-by-case scheme is desirable but clearly insufficient.

[25] Steelmaking, paper mills, sawmills, refineries, even beekeeping...

do not benefit from these allowances are seeing their purchase prices for materials subject to the CBAM rise. This bias needs to be corrected quickly, pending the widespread introduction of the CBAM.

What's more, this tool is no answer to the scale of the challenge outlined above; we need a new industrial and trade policy in Europe and France. Several instruments need to be mobilised: a European moratorium on free trade agreements, refusal to sign the EU-Mercosur agreement and border taxes on goods, services (including data transfers) and capital.

More fundamentally, as suggested by David Edgerton and the Foundational economy collective[26], we need to put the infrastructures and markers of everyday well-being at the heart of our thinking.

6 Renovating public buildings: a key challenge from both a climate and financial perspective.

The report rightly addresses the issue of housing renovation, which is an important subject.

However, the public sector should not be ignored. The stakes are high in terms of investment: 400 million m^2 , a cost estimated at between 4 and 500 billion euros, a priori borne by public finances, which is simply not possible given the budgetary policies announced. It is also a major issue in terms of greenhouse gas emissions (direct emissions from public buildings are in the region of 12 million tonnes of CO_2) and the energy bill for these buildings weighs heavily on public finances every year. Buildings also have a substantial heritage value. The service in charge of public property (DIE) estimates the value of the State's property assets at around €70 billion[27] . There do not appear to be any solid estimates for the value of local authority property (which is three times greater in surface area), but it cannot be less than 200 billion euros[28] . Finally, it concerns civil service employees who live in buildings that are mostly in a state of disrepair or at least poorly maintained.

The renovation of public buildings can also be a major lever for the success of property renovation in general. The scale of the operations can be considerable[29] , mobilising the major construction companies that can structure a sector that remains too fragmented in the field of renovation, too few in number and insufficiently trained in the energy field. Proposals have been made as part of the IFD's work to speed up this process.

[26] A group of researchers that emerged in the UK in the early 2010s. See the article Capitalisme politique contre politique socialiste, David Edgerton, Le Grand Continent (2023)

[27] The figure of €66billion for 2019 is quoted in the 2020-2021 activity report of the Conseil de l'immobilier de l'État.

[28] The figure of €1,000 billion is mentioned in the book "Gestion de l'immobilier public" published by Editions du Moniteur in 2017.

[29] This does not happen spontaneously, and it may be necessary to organise groupings. From this point of view, the creation of public landholding companies is one possible solution.