

Macro-economic impacts of low-carbon infrastructure investments in France

(Long abstract)

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Context/Motivation

Infrastructure policies are an essential lever in efforts to reduce GHG emissions and adapt to the consequences of global warming. In view of the environmental transition in France, significant investments will have to be made in the coming years to transform, renovate, and maintain infrastructures. In this paper, **we analyze the macro-economic consequences of additional investments in infrastructure necessary to achieve the objectives of the French National Low Carbon Strategy by 2050.**

Methodology

The analysis is conducted using the French version of ThreeME¹, an open-source integrated assessment Computable General Equilibrium model. ThreeME is designed to assess short- and long-term impact of environmental and energy policies at the macroeconomic and sector levels. The sectoral disaggregation allows for analyzing the transfer of activities from one sector to another, particularly in terms of employment, investment, energy consumption or trade balance.

In addition to a baseline reference scenario, we carry out a prospective analysis based on the development of possible scenarios, constrained by physical flows and by France's carbon budget defined in the National Low-Carbon Strategy. We consider **two contrasting scenarios designed to achieve carbon neutrality by 2050** :

- (i) "Pro-Techno" is based on a world without any major change in current consumption and production patterns, relying mainly on technological developments and the deployment of innovations to achieve climate objectives.
- (ii) "Sobriety" is based on a decrease in energy consumption, and a profound change in lifestyles and consumption patterns (housing, mobility, industrial production). It involves a reduction in the consumption of certain types of goods and services (e.g. individual vehicles, air transport, increased use of digital technologies, ...).

Figure 1 shows the additional infrastructure investment (wrt. baseline).

¹ www.threeme.org

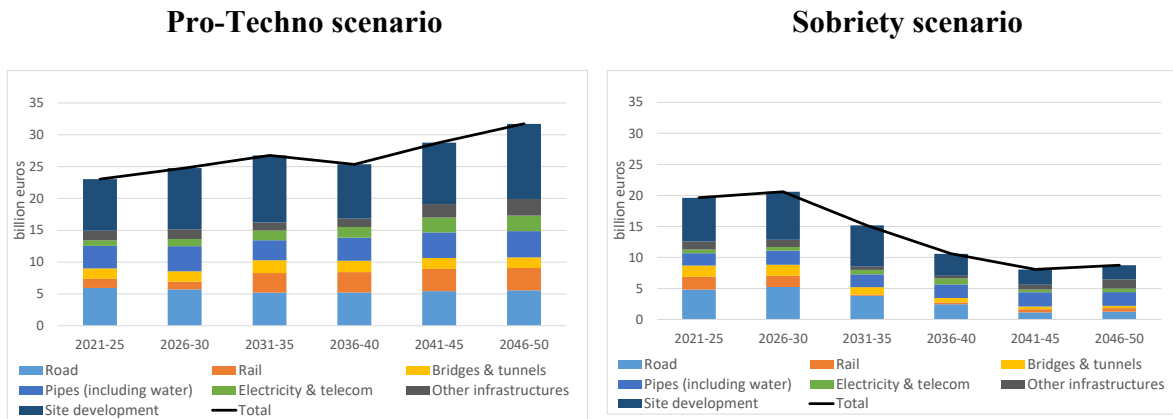


Figure 1. Additional investment by scenario and by sector

Results

In both scenarios, **the increase in infrastructure investment has both a direct and indirect positive effect on economic activity**. It results in increased activity in the public works sectors, with an indirect effect of increased activity in other sectors from which the public works sectors source. This growth in activity, in turn, leads to increased employment, increased household income and increased consumption ("multiplier effect"). However, this increase in activity is offset by a deterioration in the trade balance, which results from two effects. The first is a wealth effect: the increase in demand is partly met by the increase in imported products. The second is a substitution effect: the increase in activity generates a rise in inflation and thus a deterioration in competitiveness vis-à-vis foreign producers. This leads to an additional increase in imports and a decrease in exports.

Considering all the effects (multiplier and inflationary), the Pro-Techno scenario leads to an increase in GDP of 1.2% on average with respect to the baseline over the period 2021-2030 and of 1% over the period 2030-2050. In the Sobriety scenario, the increase in GDP is comparable over the period 2021-2030 (1% compared to the baseline scenario) but considerably lower over the period 2030-2050 (0.4%) (Figure 2).

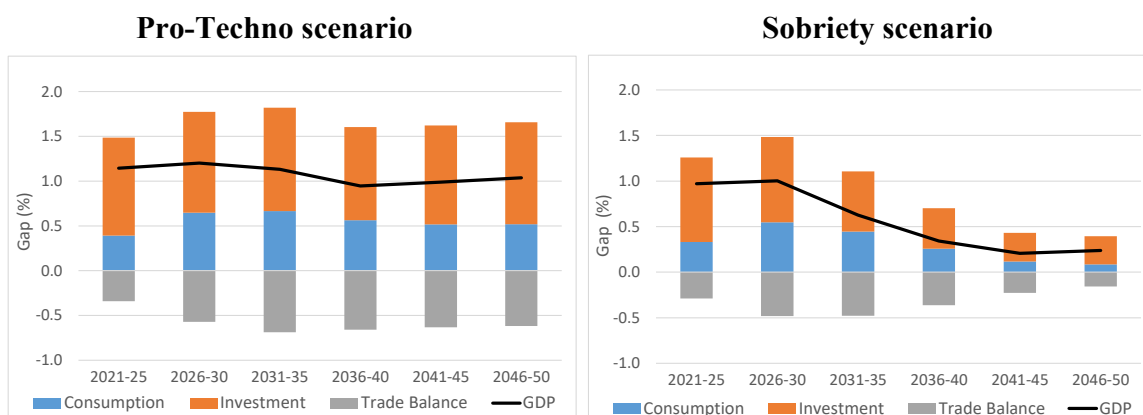


Figure 2. Contribution of consumption, investment and trade balance to GDP variations (wrt. BAU)

In both scenarios, **infrastructure investment leads to a significant increase in the number of jobs in the French economy**. The Pro-Techno scenario would create 325,000 additional jobs over the period 2021-2025, and 410,000 additional jobs between 2026 and 2030. The Sobriety scenario would generate a similar increase in employment over these periods, although slightly less (270,000 additional jobs over 2021-2025 and 340,000 over 2026-2030). This significant result reflects the magnitude of the investment to be made in the first decade in both scenarios, which result in many new jobs. From 2030 onwards, however, there is a significant divergence. In the Pro-Techno scenario, investment amounts remain close to those of the first decade, resulting in a similar increase in employment between 2030 and 2050 (about 300,000 jobs). Conversely, the Sobriety scenario is characterized by a marked decrease in investment from 2030 onwards, which leads to a more limited increase in employment in the following two decades compared to the baseline (200,000 additional jobs between 2031 and 2035, and about 60,000 additional jobs over 2036-2050).

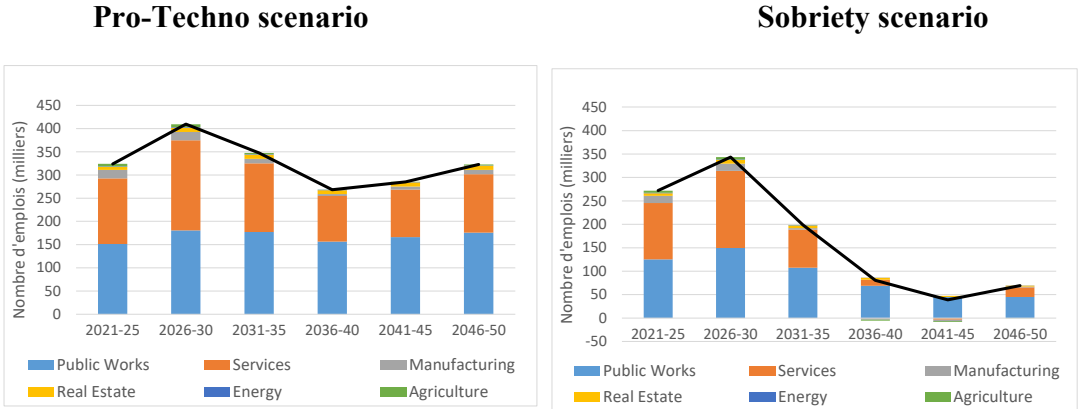


Figure 3. Additional jobs by scenario and sector (wrt. BAU)

To sum up, the estimated economic impacts are relatively similar between the Pro-Techno and Sobriety scenarios, but a divergence appears especially after 2030. The latter is the direct translation of the higher investment amounts in the Pro-Techno scenario, which therefore generate higher economic activity. However note that these results do not include all the economic effects underlying each scenario and that the choice between them should be guided by other evaluation criteria, starting with their effects on health and social inequalities.