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EconomeFITc evaluation of the impact of the French Institutes of Technology and the Institutes for Energy Transition



**Summary of the final report for the
Agence nationale de la recherche**



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This summary presents the results of the **economeFITc evaluation of the impact of the French Institutes of Technology (FIT) and the Institutes for Energy Transition (IET)** conducted by **Technopolis | group | France**¹.

The study is based on an economeFITc method developed to measure the effects on companies that co-financed projects carried out within the framework of the French Institutes of Technology and the Institutes for Energy Transition.

The scheme under review is relatively recent since most of the co-financing was carried out from 2016 onwards. As the official statistics were not available beyond 2017 at the time of the report writing, this study therefore lacks temporal hindsight.

Context of the study

The French Institutes of Technology (FITs) and the Institutes for Energy Transition (IETs) were created within the framework of the Investments for the Future Programme (*Programme d'investissements d'avenir*, PIA in French) launched in 2010. They are developed within a logic of long-term partnerships between public research, higher education, and businesses in order to organise and manage technological research activities that are 'market-oriented', i.e., that meet the needs of businesses. Designed by the French State as a tool for strengthening innovation systems, they rely on 'founding members' who are notably academic and indusFITal players.

The French State, through the Investments for the Future Programme, finances FITs and IETs and allows these institutes to be supported by third parties (businesses and academics) through co-investment and mutualisation. This allows to collectively share the risks inherent to technological innovation. The objective is to promote the value of research output based on two hypotheses:

- IndusFITal partners only co-finance a project if they have an interest in the work and the expected results, thus avoiding opportunistic research projects motivated solely by the prospect of obtaining public aid;
- if an indusFITal co-funder loses interest in utilizing the results of a project, the Institute, which retains the intellectual property rights to the results, can implement another means of valuation of these results.

There are several types of expected impacts of FITs and IETs. They primarily concern the production of research output, in particular patents or scientific and technological developments. Second, they are involved in the development and structuring of technological innovation sectors and campuses which bring visibility and attractivity to increasingly robust and sustainable ecosystems. The aim is therefore to strengthen the skill levels and technological know-how of the personnel in the related economic sectors or the economic spin-offs for the

¹ Study team: Patrick Eparvier, Aurélien Fichet de Clairfontaine, Alain N'Ghauran, Aurélien Seawert, Corinne Autant-Bernard, Ruben Fotso, Antoine Schoen et Patricia Laurens



'application sectors'. Finally, they contribute to job and value creation by companies involved in FITs and IETs projects.

The socio-economic impact of FITs and IETs must therefore be achieved mainly by their partners (companies that co-financed projects), who are not, however, direct beneficiaries of aid in the usual sense, but potential beneficiaries of the results produced by the FITs and IETs of which they are members. It is therefore the co-financing contributions that serve as a reference for the impact analysis.

Eight FITs were selected² at the beginning of 2012 for a maximum funding of €920 million and 14 IET candidates were selected, eleven of which are labelled IET (and still active) for an initial funding of €410 million³. Following a merger of three institutes they remain nine IETs in total. As of 2019, a total amount of €228 million was effectively spent.

Between 2015 and 2018, an overall €663 million were invested by the partners of the FITs. This overall amount includes both co-financing of projects supported by Investments for the Future Programme, and co-financing of project without Investments for the Future Programme. However, most of the partner funding has come to complement financing from Investments from the Future Programme (47% of the projects and 89% of the total funding).

For IETs, the co-financing of companies between 2015 and 2019 amounts €196 million.

Available data and sample study

Information collected for this study on companies which co-financed projects for the period 2012-2018 are irregular between 2012-2014 and more complete between 2015-2018⁴. In this context, the co-financing contributions considered in our study represent about half of the total contributions of FIT projects. For IETs, the study covers more than 80% of the co-financing contributions.

Our sample corresponds to a subset of 723 companies which co-financed projects in 8 FITs and 9 IETs (536 companies co-financing FIT projects, 215 co-financing IET projects and 28 co-financing projects in FITs and IETs). However, the econometric analysis covers only a subset of Small and Medium Enterprises (SMEs) and mid-cap companies, excluding large corporate groups for which the creation of a counterfactual group is complex (and the identified impacts difficult to attribute to FITs and IETs).

The analysis of data on co-financing contributions does not allow to identify homogenous characteristics of both types of institutes (be they FITs or IETs), but rather specificities of industrial and economic sectors. This reflects the high degree of suitability of the institutes to their environment, as well as the flexibility and adaptability of their model. Some remarkable facts emerge from this analysis:

- The sectors of the co-financing companies in our sample correspond to the specialisation of FITs and IETs. Six out of ten companies come from both 'specialised, scientific, and technical activities' and 'manufacturing industry' sectors. Their co-financing activities cover

² Nanoelec; M2P ; Bioaster; Saint-Exupéry ; Railenium; Jules Verne ; b<>com ; SystemX

³ Efficacity ; France Energies marines ; Géodénergies ; INES.2S ; Institut Photovoltaïque d'Ile-de-France ; NOBATEK/INEF4 ; PIVERT ; SuperGrid ; VEDECOM

⁴ Prior to 2015, the monitoring of co-financing required by the French State only covered total payments and not amounts per project and per company.



more than two thirds of the total. Six institutes are present in very technology-intensive sectors: INES.2S, IPVF, Jules Verne, Saint-Exupéry, Nanoelec and M2P. More than one in two companies are located in a knowledge-intensive sector;

- For certain institutes, one or more major players concentrate a very large share of co-financing, while for other institutes (often developers of generic technological bricks covering several application sectors), this concentration of co-financing is less visible. However, whatever the level of concentration, the largest contributors of co-financing are the large industrial groups around which the FITs and IETs have been built. These large industrial groups lend credibility to the creation of technological innovation campuses with international outreach.
- Apart from Nanoelec (distinguished by the very large number of SME partners in its Easytech programme dedicated to this firm category) and INEF4, two thirds of co-financing companies in FITs and IETs are large companies and one third of co-financing companies are SMEs and mid-caps;
- Three out of five companies are members of a competitive cluster ("pôle de compétitivité", 61%). This share is even higher for FITs (79%) than for IETs (51%). FITs therefore often attract companies that are already active in R&D activities and present in structured ecosystems. This is in line with the targets of the French State, i.e., to capitalise on already advanced structures. By comparison, IETs clearly have a stronger ability to attract companies that are not in competitiveness clusters, i.e., that are not yet part of structured and sustainable ecosystems.

EconomeFITc approach

To estimate the impacts of FITs and IETs on financial, employment and R&D indicators of companies co-financing FIT and IET projects, we have developed a quasi-experimental approach to public policy evaluation which consists in comparing the socio-economic indicators of companies that co-financed projects with the indicators of non-co-financing but similar companies, i.e., counterfactuals, based on predefined criteria.

The study focuses on the following financial and employment indicators: balance sheet (net asset value), full-time equivalent headcount, total turnover (in France and abroad) and value added. It also covers indicators of research and innovation activity: R&D budget (external and internal expenditure), R&D staff, number of researchers and number of patent applications.

The economeFITc analysis can only cover a (maximum) number of 309 companies (only 141 companies for R&D indicators since those are survey-based). The sample size may even be reduced when firm data is missing for one or more pre-cofinancing periods. **The analysis focuses mainly on SMEs and mid-cap companies** due to the impossibility of finding a counterfactual set for large companies.

Over the analysis period, the hindsight in measuring impacts (number of annual observations post-cofinancing activities) is only 1.6 years on average, since government statistics are only available from 2010 to 2017. It is therefore unlikely to observe causal impacts on the economic performance of companies co-financing FIT or IET projects for the most recent projects.

Main economeFITc results

The results reveal that the **R&D budget of co-financing companies in the sample had a higher growth rate than that of counterfactual companies**. The difference in growth of external R&D expenditure (sub-contractors) reflects the co-financing of FIT and IET projects carried out by

the companies, **which would validate the hypothesis of an absence of crowding out effect**. The increase in internal expenditure could be due to a knock-on effect from external expenditure. In this sense, companies increase their R&D efforts in order to incorporate the results of research outcomes generated from projects carried out within the framework of FITs or IETs. If this effect is confirmed by further analysis, it would suggest two things. On the one hand, it would confirm that the increase in external spending is not at the expense of internal spending, invalidating the hypothesis that an increase in external R&D efforts translates into an equivalent decrease in internal spending. **FITs and IETs would therefore have the effect of increasing the internal efforts of companies that finance R&D projects within these FITs and IETs. On the other hand, it would indicate that FITs and IETs fulfil their role as providers of technologies on low TRLs which are then incorporated and developed within companies.**

Patenting by the companies co-funding the FIT and IET projects has not evolved differently from that of the counterfactual companies. There is, in fact, a slightly negative (yet statistically insignificant) trend in the number of patents filed in the post-processing period for the co-founders of the FIT projects. It should be reminded that the rules applicable to intellectual property (IP) in FITs and IETs require that the IP must be owned by the institute and not by the company.

Net assets (on the balance sheet) increased more strongly for co-financing companies than for non-co-financing companies, which probably reflects the accounting immobilisation of contributions to projects.

Added value and export indicators of co-financing companies did not grow faster in the post-co-financing period than those of counterfactual companies. There is a positive trend for the turnover of the co-financing companies in the first years following co-financing. This result can be explained in two ways. A first explanation could come from the SMEs that have worked with FITs or IETs with strong SME impact and firmly oriented towards the development and transfer of processes and know-how⁵. In this hypothesis, SMEs co-financed projects within these FITs or IETs for demonstrators or prototypes and then quickly integrated the results by developing products or services that were brought to the market. This result is however contradicted by R. Fotso for Nanoelec⁶. Another explanation could be that the companies that co-financed FIT or IET projects were on a more favourable economic trajectory than the counterfactual companies, thus translating into a stronger increase in R&D expenditure and turnover.

The effects of co-financing of FIT and IET projects on company turnover are expected to be longer term for technologies developed on low TRLs. Thus, the development into products or services put on the market are generally expected over a longer period than that retained in this study. This relationship should be tested in a few years' time to measure the ability of companies to generate value from the projects they have co-financed.

In the two years after the first co-financing, the growth in employment (measured in full time equivalent) of co-financing companies is significantly higher than that of non-co-financing companies. However, this result concerns only a sub-population of co-financing companies for which data is available for the second year after the first co-financing. This result cannot therefore be generalised. The explanation would be similar to the one proposed for the higher increase in co-financers' turnover: a surplus of turnover would materialise in net job creation.

⁵ Laurent Vieille (2019), *Explicitation des impacts des IRT*, unpublished study for the National Research Agency

⁶ Ruben Fotso (2019), *Évaluation quantitative des politiques d'innovation fondées sur les relations science- industrie : cas des instituts de recherche technologique rhônalpins*. Économies et finances. Université de Lyon



The treatment effects estimated with the companies are mostly borne by the companies co-financing the FIT projects, with the exception of a few indicators such as number of full-time equivalent staff, number of researchers and internal R&D expenditure. The difference in significance of the results can however be attributed to the low number of companies co-financing IET projects (less than 50 in both samples, i.e., half as many as the companies that co-financed FIT projects).

Conducting robustness tests with different matching techniques shows that the trends in growth spreads are confirmed, albeit with different magnitudes. The indicators for which the results seem unconditional to the matching technique are the balance sheet, the R&D budget (in their external and internal components) as well as the full-time equivalent total and (to a lesser extent) R&D headcounts.

Concluding remarks

This study developed an economeFITc method to assess the economic impact of FITs and IETs. While the estimates remain limited by a lack of hindsight, they do show that SMEs and mid-cap companies that have co-financed FIT and IET projects have increased their external R&D expenditure (of which only a share corresponds to the expenditure related to these projects) but also their internal expenditure. This would reflect the fact that the results of FIT and IET projects are then integrated back into companies that must incur specific expenditures to ensure the development of these technologies.

It will be necessary to extend this initial evaluation work to see whether the increase in R&D investment by companies co-financing FIT and IET projects ultimately translates into value.