

# Drivers of energy R&D in manufacturing industries

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## Executive summary

### 1. Motivation underlying the research

The agreement reached at the Paris Summit to hold the increase in the global average temperature to below 2 °C poses significant challenges for the energy sector that require new efforts in R&D and innovation. The shortfall in energy R&D is of particular concern when seen in the light of the major technological challenges that face the sector.

However, while many reports and papers stress that the internal R&D of energy utilities remains low to meet these challenges, utilities are not the only sector investing in energy-related R&D. In fact, many other industries devote a share of their research expenditure to energy issues.

Various papers have recently analysed the R&D determinants of energy utilities firms and the effects of the liberalisation of electricity markets on R&D investment. However, data constraints affecting private R&D expenditure are substantial making it difficult to differentiate between energy and non-energy related R&D in non-energy industries. This paper seeks to fill this gap by examining the determinants of investment in energy R&D in non-energy industries. Understanding the participation of other sectors in energy R&D and the determinants of this participation is clearly relevant in establishing the overall R&D effort in energy and the impact of energy policy on business decision-making.

### 2. A short account of the research performed

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To analyse the drivers of energy R&D in non-energy industries we conduct an empirical analysis of 21 manufacturing sectors in Spain for the period 2008–2013. To overcome problems of data availability, we build a comprehensive database drawing on different surveys of innovation in energy-related R&D.

In the estimations, we include two main explanatory variables. The first one is the amount of products from manufacturing sectors acquired by energy firms. This variable allows us to analyse the role played by suppliers in energy R&D investment, given that according to the literature this is likely to be significant. The second corresponds to innovations in energy efficiency, the other key factor that may account for energy R&D in non-energy industries. In addition, we include different control variables (sales, participation of foreign capital and energy intensity) and a set of variables regarding different policy instruments that may foster energy R&D (public financing of business R&D, energy taxes and environmental regulatory requirements).

### 3. Main conclusions and policy implications of the work

The objective of this paper has been to contribute to the literature on energy economics by examining the drivers of energy R&D in non-energy industries. The data on the amount of R&D investment made in energy by manufacturing sectors show the importance of including sectors other than the energy utilities in studies of energy R&D and its main drivers. The results from the empirical analysis point, first, to the important role played by suppliers in the overall volume of energy R&D. Second, R&D investment by non-energy firms does not seem to be related to the innovation objective of improving energy efficiency. The estimations also suggest that, among the three policy instruments examined, only public funding of business R&D is related to R&D investment in energy by non-energy industries.

R&D in energy has a systemic character that requires a policy focused on the development of the innovations and their diffusion in accordance with the new energy model. The objective of promoting R&D in energy requires the deployment of direct and indirect measures that cover all the sectors; energy, suppliers and non-energy sectors. Overall, to improve R&D effort and innovation in energy requires an increase in cooperation between energy utilities, firms in related industries and public institutions and agents.