



Paper to be presented at DRUID22
Copenhagen Business School, Copenhagen, Denmark
June 13-15, 2022

Assessing the industrial effects of the deployment of renewable energy technologies:
when product identity matters

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Abstract

Investment in renewable energy technologies (RET) produces impacts on economic activity and job creation that are fundamental to increase the social acceptability of those technologies. Previous research that attempted to measure the impacts of RET has mainly focused on its effects in energy production and climate mitigation, but surprisingly little is known about the potential of RET to transform the industrial structure of an economy. This paper proposes a methodology to understand and measure the industrial transformative impact of RET. The paper draws on contributions from the sustainability transitions literature and from the economic literature that analyses the socioeconomic impacts of RET, and combine them with the economic complexity literature in order to address two main gaps: the lack of measurement of industrial transformative effects in the first; and the assumption of product homogeneity in the second that precludes an assessment of more structural impacts. We develop a conceptual approach to the way technology deployment can lead to changes in the industrial structure, centered on the notion of product heterogeneity intrinsic to the economic complexity literature. We advance three main dimensions along which to measure the changes in the industrial structure driven by modifications in the basket of products being produced due to the development of the technology value chain: sophistication, connectivity, and competitiveness. We also propose a more precise delineation of the industrial value chain of the technology, by considering the actual weights of each sector to the technology and the technology to each sector. This approach is applied to the case of wind energy in Portugal (a successful fast follower), compared with three other main wind energy producers (Spain, Denmark, Germany). The results show a strong relationship between the deployment of the technology and the sophistication and the competitiveness of the products; composing the industrial value chain. The paper proposes a novel analytical framework