

# ***Innovation ecosystem in the offshore wind sector: an analysis of the Brazilian case***

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## **Overview**

Clean energy technology innovation plays a critical role in accelerating the global energy transition and this occurs in the offshore wind field. However, strong government support for innovation growth is required, which can include mechanisms such as Research and Development (RD&D) funding, market instruments, and policies. Offshore wind energy is emerging as a promising source of renewable energy with substantial potential to boost sustainable development, particularly in development, particularly in nations with vast stretches of coastline, such as Brazil. However, to make effective use of this source in the country, it is necessary to have the capacity to implement it, which requires, among other factors, technological development and the enhancement of the national innovation ecosystem.

A healthy innovation ecosystem allows innovations to develop and be adopted. The growth of the indicators in this category and their broadening to involve more organizations and countries is a positive sign of progress in technology. An innovation ecosystem can be measured by metrics such as scientific publications, patents, and RD&D collaboration. The influence of the Innovation Ecosystem in creating a more effective regulatory environment for the offshore wind industry is highlighted, providing a comprehensive analysis of the role of innovation in this sector in Brazil, especially when considering the financing mechanisms, market instruments and policies essential to economic development in this area. (NORONHA et al., 2021)

The technological advances that occurred in the offshore wind sector in the world were relevant, as well as the contribution of this energy source to the energy transition in the world and therefore this article aims to measure the innovation ecosystem for the offshore wind energy sector in Brazil and also to provide new elements of analysis on the economic impacts of offshore wind energy with special attention to Brazil's potential. To accomplish its proposal this article aims to examine the financing mechanisms aimed at Research and Development (R&D), assess the expected economic impacts of the adoption and implementation of this innovative technology, as well as the market instruments and specific policies crucial to boost economic development in this sector, which included job creation, economic growth and reduction of carbon dioxide (CO<sub>2</sub>) emissions.

## **Methods**

There are difficulties and limitations in understanding the impacts of innovation, as, in reality, the innovation process is extremely complex, involving many factors that go beyond those contained in the concept of "scientific and technological development system", nor always perceived in a superficial observation of countries like the USA or Japan. (LONGO, 2007)

Some initiatives and projects in the world already try to track and understand the influence of innovation in offshore wind sector, that was the case of the Innovation Impacts Dashboard project (supported by the government of the United Kingdom and Northern Ireland) and of the Tracking Energy Innovation Impacts Framework project, (supported by the Horizon 2020 Programme of the European Union). However none of them were focusing on Brazil's context and both of them were in initial steps also with limitations. The innovation ecosystem was a point of analysis in both tow projects, and even if with limitations some aspects and indicators will be use as a inspiration for this article but with adaptation to Brazil's context limitations

The methodology adopted will be interdisciplinary in order to combine an analysis of the innovation ecosystem with an economic analysis. To measure the innovation ecosystem of the offshore wind energy sector in Brazil, the analysis will be divided into three factors for the period comprising the last decade (2011-2019): a quantitative assessment of scientific publications related to the topic of energy offshore wind; a qualitative analysis of collaboration mechanisms to promote the Research and Development (R&D) sector; and a quantitative analysis of patent applications for technologies aimed at offshore wind. Regarding the last point, the technological prospecting methodology is adopted by consulting the Industrial Property Research portal – pePI (INPI).

Regarding the methodology for economic analysis, secondary data will be used, including government reports, academic studies and statistical data, to examine the current scenario of offshore wind energy in Brazil and its economic context. In addition,

benchmarking analyzes will also be carried out with countries that have already successfully implemented offshore wind energy to identify best practices and lessons learned, as well as trends and patterns of investments in offshore wind, sector growth, impact on job creation and reduction of CO2 emissions.

## Results

Expected results include mapping the characteristics of Brazil's current innovation ecosystem, highlighting its strengths and areas for improvement, as well as a proposal on how it could be strengthened to boost the development of offshore wind. The expected results also include the identification and analysis of the main financing mechanisms for R&D, market instruments and specific policies related to offshore wind energy in Brazil. It is also expected

Furthermore, it seeks to quantify the economic impact of implementing offshore wind energy, including job creation, increased economic production and reduced greenhouse gas emissions. The results can also provide insights into Brazil's economic competitiveness in the global context of renewable energy, as well as showing the existing challenges in the search for technological advances.

## Conclusions

This article sought to contribute to the development of an analysis focused on the innovation environment as well as economic issues using an interdisciplinary approach and a quantitative and qualitative methodology. The limitations of the methods used in this article do not allow for a deeper analysis, however, given the initial context of much of the research involving the impacts of innovation in the offshore wind sector, it is possible to say that the results presented contribute to the construction of policies and economic incentives for offshore wind farms in Brazil

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