

# **Structural dynamics of networks funded by the European Union in the context of systemic innovation in the renewable energy sector**

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**Abstract** –Given its disruptive characteristics, the innovation in the renewable energy (RE) sector has increasingly built upon a concept of systemic innovation that encompasses the entire innovation cycle from technology exploration to market exploitation. With the growing interest on systemic innovation, the EU has operated the research and development (R&D) program to mobilize and integrate resources from different thematic fields and geographic regions. However, there is still a dearth of understanding on whether the instrument has contributed to establishing an ecosystem for systemic innovation. Therefore, this study develops an analytic framework to evaluate the systemic innovation performance of the EU-funded R&D networks by carrying out a time-series social network analysis on five structural properties of the networks: redundancy, small-worldness, hierarchy, assortativity, and positioning. An idealized systemic innovation network needs to facilitate not only the exploration of new technologies but also the exploitation of R&D results in the market. Therefore, the analysis of this research will show whether the compatibility of the explorative and exploitative activities as well as the interoperability of both dimensions have been structurally ensured by the R&D network and whether the open innovation behavior of each actor has been effectively combined with its positioning in the network. Taken these findings together, the present research finally evaluates whether the EU-funded R&D

networks have evolved in the systemic direction.

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