

Extending MRIO analysis of energy technologies with dependence and governance aspects

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Author: Ana Rosa Gamarra

Co-Authors: Gonzalo Escribano, Johan Lilliestam, Lara LÃ¡zaro Touza, Natalia Caldes Gomez, Yolanda LECHON

Policy makers are currently confronting the challenge of transforming energy systems into more sustainable ones must simultaneously consider the environmental, economic and social implications of any decision they make. Multiregional Input Output (MRIO) methods extended with environmental, socioeconomic and social vectors -such as the Framework of Integrated Sustainability Assessment (FISA), allow analysing the potential effects of energy technologies, strategies and plans in terms of their economic, socio-economic and environmental implications but leave aside other key factors affecting the decision making process such as geopolitical aspects. In an attempt to partially address this missing dimension, this work enlarges the FISA scope by integrating geopolitical import dependence risks.

In this context, our research question is: It is possible to go beyond the social, economic and social implications and simultaneously assess part of the geopolitical risks that any technology deployment or energy policy may entail with the proposed extended MRIO framework? And if so, what are the right indicators or combination of indicators to consider?

To shed some light to this research questions, a review of the state of the art related to the assessment of import dependence and governance is conducted. Then, we propose the development and inclusion of specific indicators for assessing import dependence in relation to governance levels: Based on the geographical concentration of potential suppliers for a given technology that results from a classical MRIO analysis it is considered to develop a dependence indicator. For governance issues, criteria such as political stability, human rights respect, absence of violence, rule of law, corruption, regulatory quality, legislation and policy, and others are considered. When combining these indicators, the proposed framework is able to measure the risks of dependence from countries with low levels of governance that will potentially hinder or endanger the deployment of the technology, strategy or plan under analysis. The paper discusses how this link between the indicators and subsequent risks can be established. Next, the proposed framework of analysis is applied to a concrete case study. Finally a discussion on the advantages, limitations as well as added value for decision makers of the proposed extended framework is presented.

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