

Energy Efficiency and Institutional Quality. The Role of Renewable Energies

J. Barrera-Santana. Universidad de La Laguna. Josuebarsan91@hotmail.com
 Francisco Javier Ramos Real. Universidad de La Laguna. frramos@ull.es
 Gustavo Marrero Díaz. Universidad de La Laguna. gmarrero@ull.edu.es

1. Overview

Energy efficiency (EE) and renewable energy systems (RES) have been a major concern of energy policy mainly due to resource scarcity and climate change issues. However, the successful deployment of energy efficiency and renewable energy systems can be compromised by institutions and governance performance. While the influence of institutions on these issues is well-documented in the literature [1] [2] [3], the absence of an energy efficiency governance index (EEGI) has prevented testing the relationship between EE governance and the improvements in EE and RES.

This work contributes to fill this gap and proposes the construction of a composite index that captures the institutional, economic and political environment underpinning EE governance. The index assesses 32 OECD countries and represents the period between 2000 and 2015. The existence of this index enables the establishment of a country ranking about EE governance in which countries such as Denmark or Germany compound the top of the ranking, and others such as Mexico or, surprisingly, Switzerland, are included within the bottom of the list. On average, the ranking is shown to be positively correlated with economic development and general governance quality. Finally, this work also illustrates the positive correlation between EE governance and both the long-run energy intensity (EI) growth and changes in the share of renewable energy.

Furthermore, the EEGI proposed can be used to study a wide range of questions in the literature regarding EE performance and RES

deployment. Likewise, EEGI can also play an important role in the development of models which explain the features of EE performance and RES deployment, facilitating the choice of policies adapted to the context of each country.

2. Methodology

According to the International Energy Agency (IEA) [4], EE governance is the combination of three main areas –legislative and funding frameworks, institutional arrangements and co-ordination mechanisms– which enable the implementation of EE policies. Likewise, each area is compound of a set of indicators. The structure of the EEGI proposed in this work is based on this description (see Figure 1).

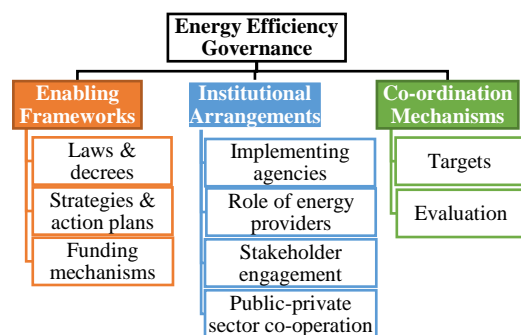


Figure 1. Key indicators assessed by EEGI.

Regarding the construction procedure of EEGI, it has been inspired by [5]. A set of coding rules is used to assess the information relative to each indicator with the aim of scoring in a scale between 0 and 4, with a higher score reflecting better EE governance. Then, indicators in each area are aggregated through an arithmetic mean to construct a sub-index, one for each EE governance area.

3. Results

Figure 2 illustrates the overall scores and the contribution of each sub-index. The enabling framework sub-index seems to be highly correlated with the overall EEGI. More concretely, the laws and decrees indicator is crucial to achieve a high EEGI score. These results are partially explained by economic development and general governance quality, since there is a positive correlation between these variables and the EEGI score.

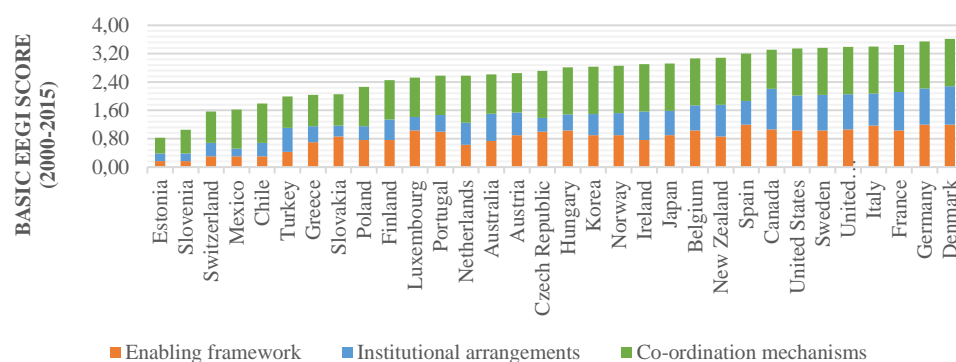


Figure 2. Overall EEGI and decomposition by sub-index.

The index has been also correlated with both the long-run EI growth and changes in the share of renewable energy. It has been found a negative correlation between the EEGI score and EI growth (i.e., the higher EEGI score, the lower EI growth) and a positive correlation between EEGI score and changes in the share of renewable energy (i.e., the higher EEGI score, the higher improvement in the share). In addition, while changes in the share of renewable energy seems to be more related to the enabling frameworks area, EI growth is more related to institutional arrangement and co-ordination mechanisms areas.

4. Conclusions

This work constructs, for the first time, a multi-dimensional index of the quality of EE governance in a set of 32 OECD countries. This index breaks new ground, since indices about EE governance are not available yet and it complements the available institutional

indices in the assessment of the influence of institutions on EE performance.

The results seem to maintain a positive correlation with economic development and general governance quality. Additionally, this work has evidenced the adequate correlation between EEGI (i.e., EE governance performance) and both EI improvement and RES deployment. However, further research is needed yet in order to establish a proper model that explains more profusely the features of EI and thus, EE, through EEGI.

References

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