

ANALIZING THE INTERDEPENDENCE OF RENEWABLE ENERGY AND WEALTH GENERATION

López Bernabé, Elena¹, Carrasco Monteagudo, Inmaculada¹, Córcoles Fuentes, Carmen¹
¹Faculty of Economy and Business, University of Castilla-La Mancha

elena.lopez.bernabe89@gmail.com , inmaculada.carrasco@uclm.es , carmen.corcoles@uclm.es



INTRODUCTION

The energy sector is considered a strategic sector for the economic growth, the progress and the social development of a society, which has proven the existence of an almost lineal relationship between the economic growth measured in terms of GDP and the energy consumption.

The pressure put on natural resources and climate policy led to Spain and other countries to the exploitation of renewable energies (RE). But in the present context of uncertain global green policy and the high investment costs associated to RE technologies in the current Spanish energy system, the growth of RE installation (in Spain) has decreased.

This fact has been drawn due to studies on RE which frequently underestimate the socio-economic effect of such invests. If we only consider the production costs, conventional energy sources gain advantage over renewable energies. However, renewable energies have other economic and social benefits. These include wealth and employment generation, reduction of the environmental impact and reduction of the energy dependence.

The investment in a renewable energy plant contributes positively to the economic growth and the wealth of society by the increase of services and goods demand, and the employment creation. It also produces a demand effect, due to the necessary production of the components. Moreover, climate policy can be a source of innovation and comparative advantage in the world economy (Ackerman, 2014).

OBJECTIVES

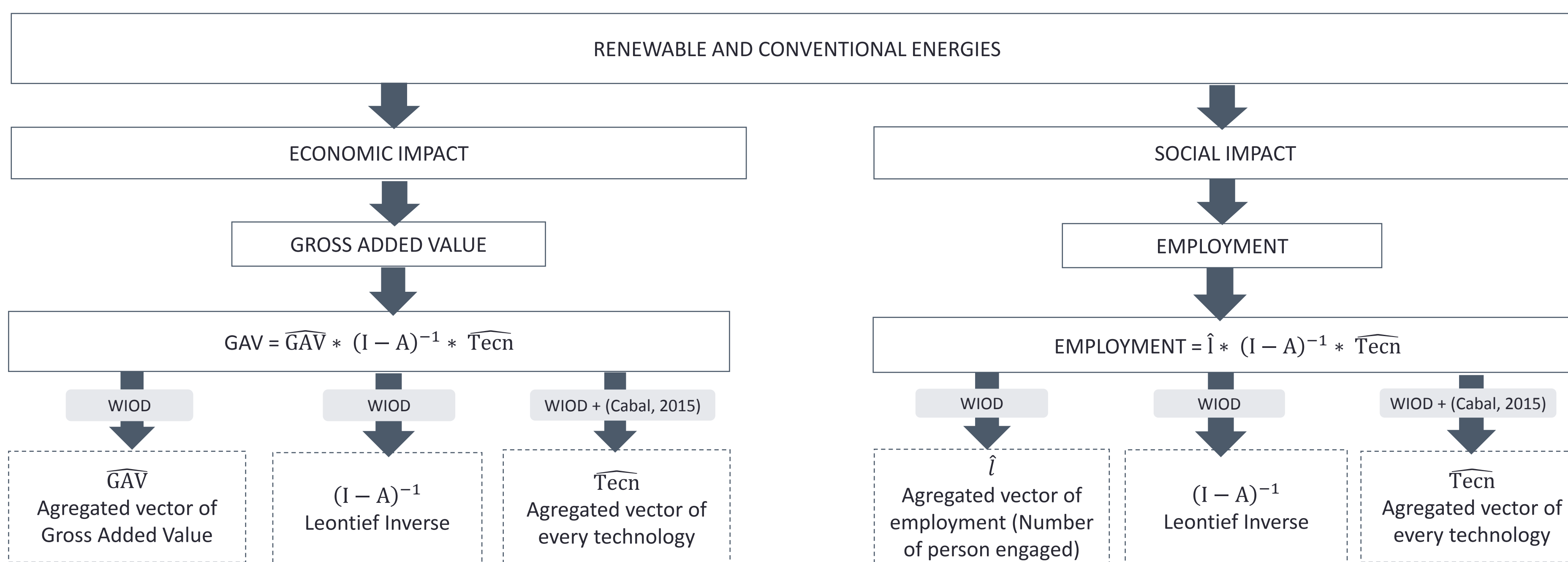
- The objective of the work is to estimate the socio-economic impacts of renewable energy installed in Spain:
 - Economic effects are calculated from the contribution of RE to the Gross Added Value (GAV).
 - Social effects are estimated from job creation.
- It considers these effects not only on Spain but also on the rest of the European Union and the countries all around the world.
- Considering exports and global markets, helps to understand better the effects and dynamics of countries which have developed a renewable energy industry sector (Lehr, 2012).



METHODOLOGY

INPUT-OUTPUT methodology is applied (Leontief, 1996) with data taken from WIOD 2009 (TIMMER, 2012) to obtain the Leontief inverse, that represents the total (direct and indirect) requirements per unit of final demand.

- Multi-regional analysis: 35 production sectors and 7 regions.
- Estimated year: 2010, considering WIOD 2009 and the investment cost of every technology in 2010. Ratio per unit of power estimation to calculate the renewable energies impact from médium to long term perspective.
- Renewable energies study away from conventional energy sources with high demand.
- Consideration of the investment costs and the operation and maintenance costs of each energy technology as vectors of autonomous demand.



Investment costs of every technology analyzed (T _{ecn})	
RENEWABLE ENERGIES	
Productive sectors	Investment costs (€/KW electricidad)
Construction	5.843
Industry	12.246
Services	1535
Total	21.625

Operation and maintenance costs (€/KW electricidad)	
Productive sectors	Operation and maintenance costs (€/KW electricidad)
Construction	35
Industry	473
Services	72
Total	581

Final Consumption Expenditure by Households (WIOD) × Multiregional analysis × Gross Fixed Capital Formation (WIOD)

RESULTS

Figure 1: Contribution to GAV mundial of every RE analyzed.

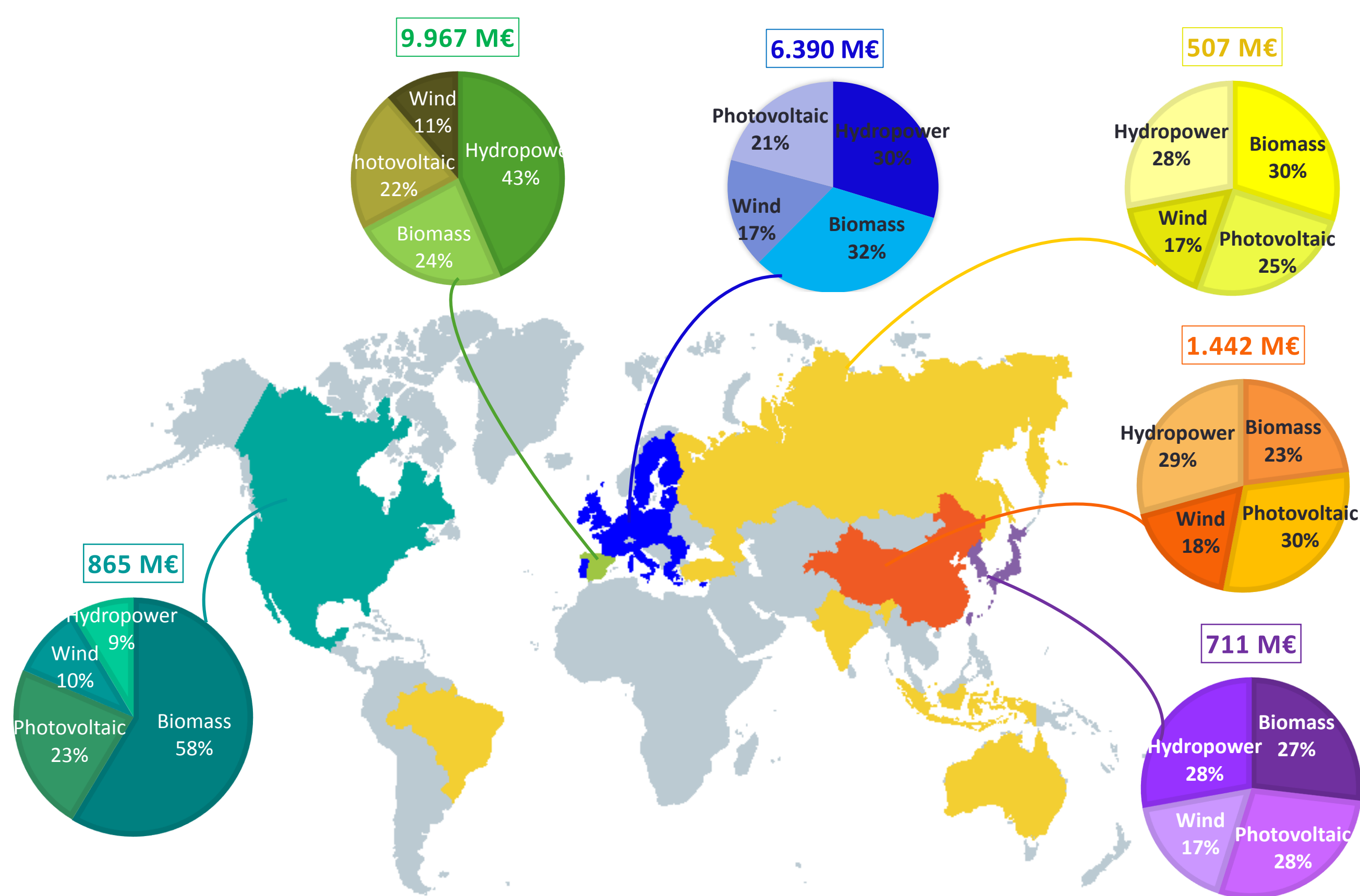


Figure 2: Employment generated by RE in Spain

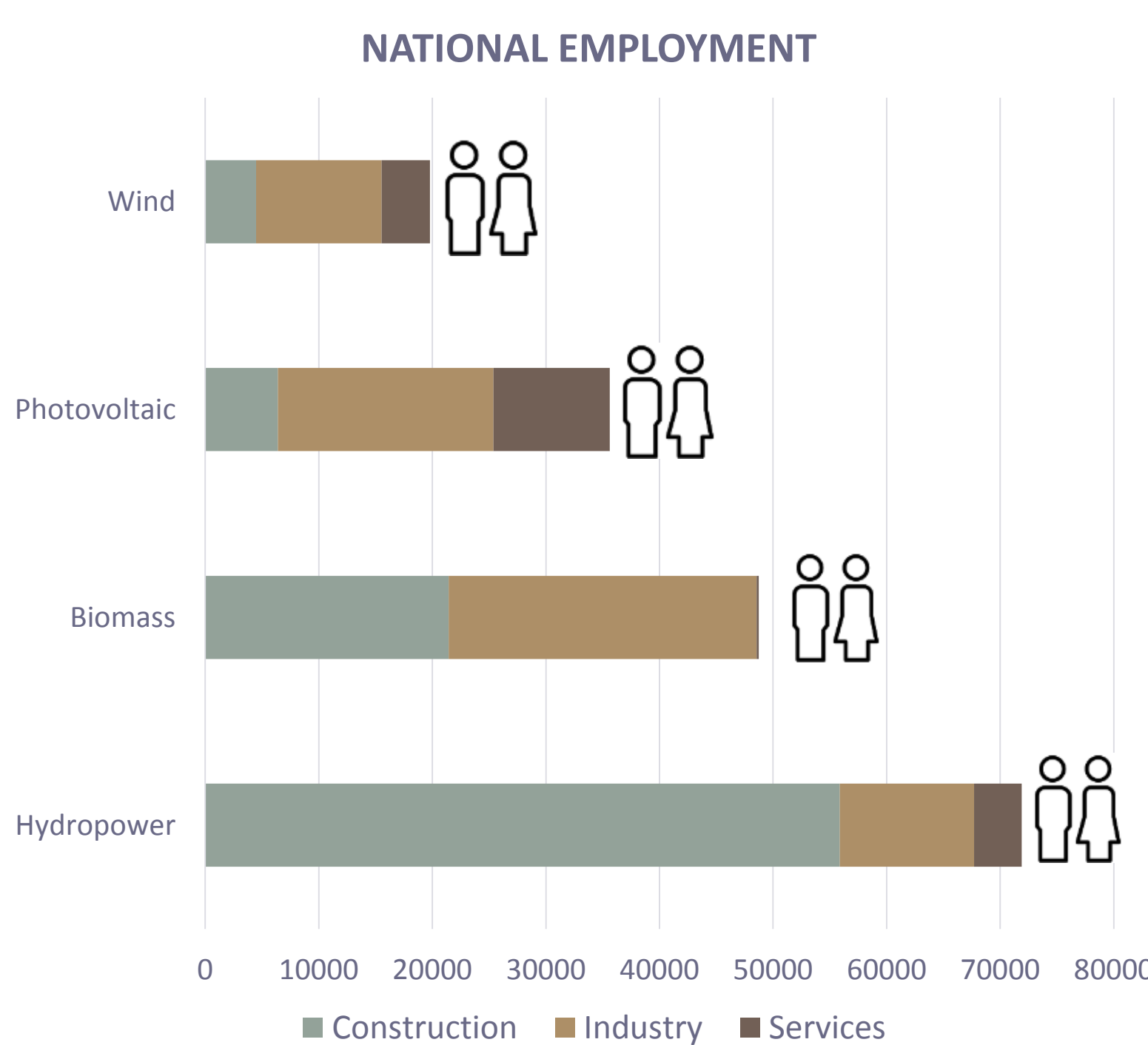
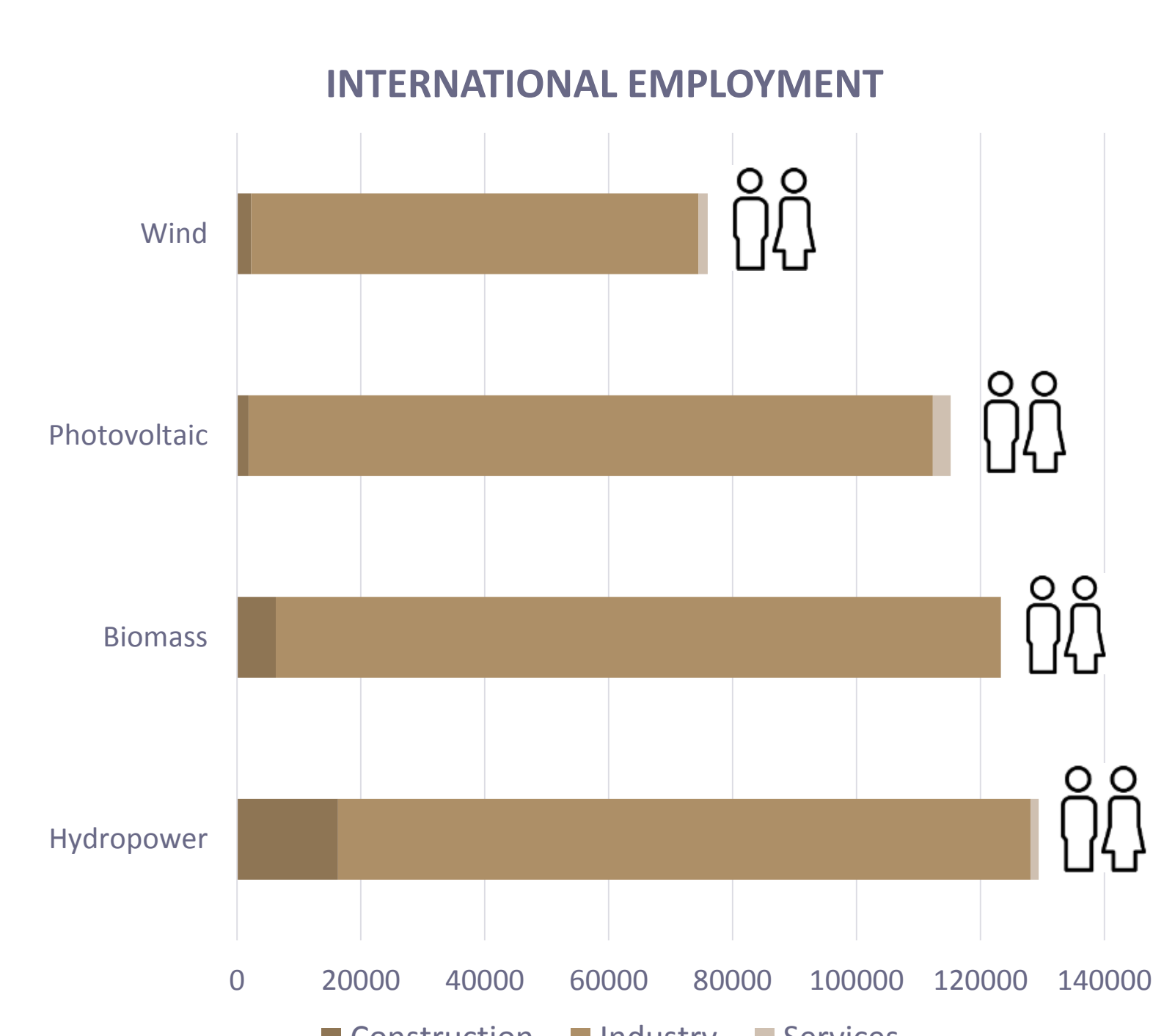


Figure 3: Employment generated abroad by RE installed in Spain



CONCLUSION

- When compared with conventional fossil fuel technologies, renewable energies often have several socio-economic and environmental benefits which are seldom internalized.
- Hydropower and nuclear energies have produced important benefits in Spain. The rest of RE developed in Spain, have generated a higher economical and social impact outside Spain than inside the country.
- The majority of goods and services demand to productive sectors is produced at early stages of investment and construction of renewable energy system.
- Demand of goods and services and employment creation in the rest of countries is concentrated mainly in industrial sector.
- The results invite us to think again about the development of the industrial model in our country. Also about the most accurate and precise design of the financial assistance given to the promotion of renewable energy with the aim to increase their benefits.

REFERENCES

- Ackerman, F., 2014. *(Mis)understanding climate policy: the role of economic modelling*. Synapse Energy Economics. Cambridge MA.
- Cabal, H., 2015. *Ex Post and Prospective Analyses of Renewable Policies in Spain*. Springer.
- Leontief W, 1996. *Input-Output economics*. Oxford University Press, New York.
- Lehr, 2012. *Green jobs? Economic impacts of renewable energy in Germany*. Energy Policy.
- TIMMER, M. (2012): "The World Input-Output Database (WIOD): Contents, Sources and Methods", *Working Paper Number 10*, University of Groningen.