ANALIZING THE INTERDEPENDENCE OF RENEWABLE ENERGY AND WEALTH GENERATION

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1. Purpose

Climate policy raises some of the most important and complex issues in public policy making. It involves aspects such us: ethical choices, international cooperation, development and deployment of new technologies, interaction with other environmental problems, and economic calculations of costs (Ackerman 2014).

The pressure put on natural resources will increase during the next years, as a consequence of the world population's growth and the effects of new emerging classes' rise. Then, the competition among states and business to assure the natural resources supply, will turn the non-conventional energies exploitation into a relevant focus of world economy and geo-policy (PwC 2016), all of that in a context of neighbour countries' energetic interconnection.

Climate policy leadership is not only the right thing to do; it can be a source of innovation and comparative advantage in the world economy (Ackerman 2014). In the present context of uncertain global green policy, policy response has had a lack of ambition and coordination. Besides that, the facts demonstrate the relevance of the adopted measures: new investment in clean energy surpassed investment in conventional energy generation in 2010 (Dimitri, 2016) and renewable energy (RE) generation and energy efficiency investment has quadrupled since 2004 according to Bloomberg New Energy Finance. Thanks to this energetic efficiency, it is estimated that the necessary amount of energy to generate 1 unit of GDP will be reduced by 36% between 2012 and 2035 (BP, 2015)

The studies on RE frequently underestimate the socio-economic effect of such invests. 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 (wind turbines, solar wafers, etc.), the construction of the plant, services of transport, employees of researching and maintenance, etc. 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). Then, RE sectors have brought significant changes to the current industrial structure of countries, in the demand side of the labour market and in the management of economic policy goals, as the impact of environmental policies in economic growth and wealth is a main worry for policy makers (Cai 2014).

Taking into account the previous statements, the main aim of this paper is to estimate socioeconomic benefits of RE's introduction in Spain. More concretely, the goal is to calculate the effects in economic activity and job creation, in the national different productive sectors. Effects on the resting European Union countries and on the rest of the world (RW) will be considered.

2. Methodology

To achieve this goal, it is proposed a multi-sectorial model based in the Input-Output analysis with the more recent data from WIOD (TIMMER 2012) and real data of each technology's costs of investment, operation and maintenance during 2010 (Cabal 2015). These two data sources provide the elements needed to make the estimation.

The Leontief's inverse matrix is obtained from WIOD Input-Output tables (last disposable year is 2009). This data source also contains information of added value and employment vectors required for the study. Likewise, the costs related to RE technology which compound the autonomous demand vector can be found in the above mentioned source.

According to the disaggregation of WIOD, the study will consider the effects on 35 national productive sectors and the corresponding effects on the RW.

3. Results/Findings

On the one hand, results show that the contribution of RE to the Gross Added Value (GAV) in Spain during 2009 was € 9,967 million (1.02 % of GAV) being the hydraulic energy, the biomass energy and photovoltaic energy those which have contributed the most (€ 3,952 m.; €2,942 m. and € 1,987 m. each one). Results also demonstrate the contribution to the economic growth of the RW, having differences among the different technologies: the biomass is the one that beneficiates the most to the RW (contributing € 3,277 millions), followed by photovoltaic (€ 2,500 m.) and eolic (€ 1,930 m.).

On the other hand, RE has generated 638,532 employments in Spain (1% of national total employment). The most contributing energy into the country is hydraulic energy while the resting RE has favoured more the employment creation in RW (80% eolic energy and the 76 % photovoltaic).

4. Conclusions

The main conclusion is that RE has important social and economic benefits, such as the reduction of environmental impact, the reduction of energetic dependency and the generation of wealth and employment. Those benefits compensate the high generation costs of RE. If there are only considered the production costs, the conventional energies are more advantageous than RE, but this would be a very narrow analysis, as it would underestimate the previous mentioned effects, so critical for sustainability .

The most developed RE in Spain, have generated a higher economical and social impact outside Spain than inside the country. Those results invite us to think again about the development of the industrial model; 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.