1 INTRODUCTION

As a matter of fact, natural resources, especially the exhaustible and non-renewable ones, have understandably always been a matter of concern to economists, politicians, and even philosophers. Through time, this attention has taken various forms and experienced spurs of intense controversy, alternating with periods of relative calm.

Resources have represented significant dimensions in shaping history and economic development. Important population movements have been interpreted by economic considerations, in particular, the availability of certain resources. While the realization of such dependency promoted the intellectual development which shaped the discipline now known as natural-resource economics, main measures in the development of modern economies have generally taken place in conjunction with the exploitation of some crucial natural resource.

While early economists such as the mercantilists were keenly aware of the importance of adequate supplies, natural resources, in fact basically the issue of the food supply was first given a truly specific treatment with the work of Malthus, Ricardo, and Mill. Non-renewable resources only became the focus of much attention when Jevons raised the coal question (1856). If the British industrial revolution was made thanks to the availability of coal as a source of energy, what was to be expected when the coal reserves were to run out? Similar issues where to be raised recurrently during the following decades, for example, the most recent version dating back to the recent oil crisis (Lasserre, 2016).

Applied economics is the study of economics in relation to real-world situations, as opposed to the theory of economics. It is the application of economic principles and theories to real situations and the effort to predict what the outcomes might be. Put simply, applied economics is the study of observing how theories work in practice. Applied economics may be practiced at macroeconomic (the whole, aggregate economy) or microeconomic (analyzing individual consumers and companies) levels. Applying economics to the status of the economy of a country, household, or company helps eliminate all attempts to dress up a situation so that it will seem better or worse than it really is (Irani, 2016).

2 WHAT IS APPLIED ECONOMICS

Applied economics is the application of economic theories and principles to real-world situations with the desired aim of predicting potential outcomes. The use of applied economics is designed to analytically review potential outcomes with explanations backed by numbers. Applied economics can involve the use of econometrics and case studies. Because economics relies on the interpretation of historical events in its theories, applied economics can lead to "to do" lists for steps that can be taken to ensure stability in real-world events (Academic, 2012).

Also, it is the study of observing how economic theory works in practice. Applied economics may be practiced at the macroeconomic or microeconomic levels. For example, one may conduct a study examining the performance of a government regulation in a national economy. This would involve gathering data from real businesses and/or individuals, as opposed to constructing a model on how such regulation should work. The term originated in the early 20th century.

3 RENEWABLE ENERGY AS A RURAL DEVELOPMENT OPPORTUNITY

Renewable energy deployment increases the tax base in hosting rural communities and generates extra income for landowners and land-based activities. Developers have to pay taxes to the hosting community. Some of these taxes are paid at once, such as building permits; others are paid on a yearly basis, they are related to the businesses' turn over. Local taxes provide revenue for the hosting community and can have a dramatic impact on service delivery, for instance, in the United States where local services are more dependent on local taxes. Local authorities can themselves deploy renewable energy installations in public space, taking advantage of public subsidies for alternative energy. Whereas, in several case studies (Abruzzo, Italy; Scotland, United Kingdom; Prince Edward Island, Canada), these tax revenues have increased the availability of key public services like schools and senior residences. Renewable energy in rural areas can also create extra income for landowners and can be united with specific production processes. For instance, in several of the case study regions, farmers and forest owners are themselves producing renewable energy, allowing them to diversify, stabilize, or increase their income (OECD, 2011).

Furthermore, renewable energy can create valuable job opportunities for people in regions with few employment opportunities, although the number of direct jobs created is limited. In fact, most of the direct jobs are in operating and maintaining the installations. Some of these jobs pay high salaries and can have an important impact on the long-term sustainability of rural communities. However, the largest share of long-term jobs is not in direct energy generation but along the renewable energy supply chain, either in construction, manufacturing, or specialized services, and also rural activities such as farming, forestry, etc. Those regions which have policies to attract renewable energy on a large scale can generate a large enough demand for installations and components to attract supporting manufacturing services. Manufacturing companies may decide to base their operations in these regions to reduce transportation costs (e.g. transporting the pillars for wind turbines), or to benefit from subsidies, grants, and tax breaks. This was the case of Québec policy to deploy wind energy, for instance. In Extremadura (Spain), where the newest manufacturing jobs were created in firms, producing metal frameworks to support solar energy installations, and in Maine, where the policy aims at reviving the shipbuilding industry through off-shore wind deployments, the presence of renewable energy installations can revive existing manufacturing activities not previously related to energy production (OECD, 2011).

4 ECONOMIC BENEFITS AND ACHIEVEMENTS OF RENEWABLE ENERGY

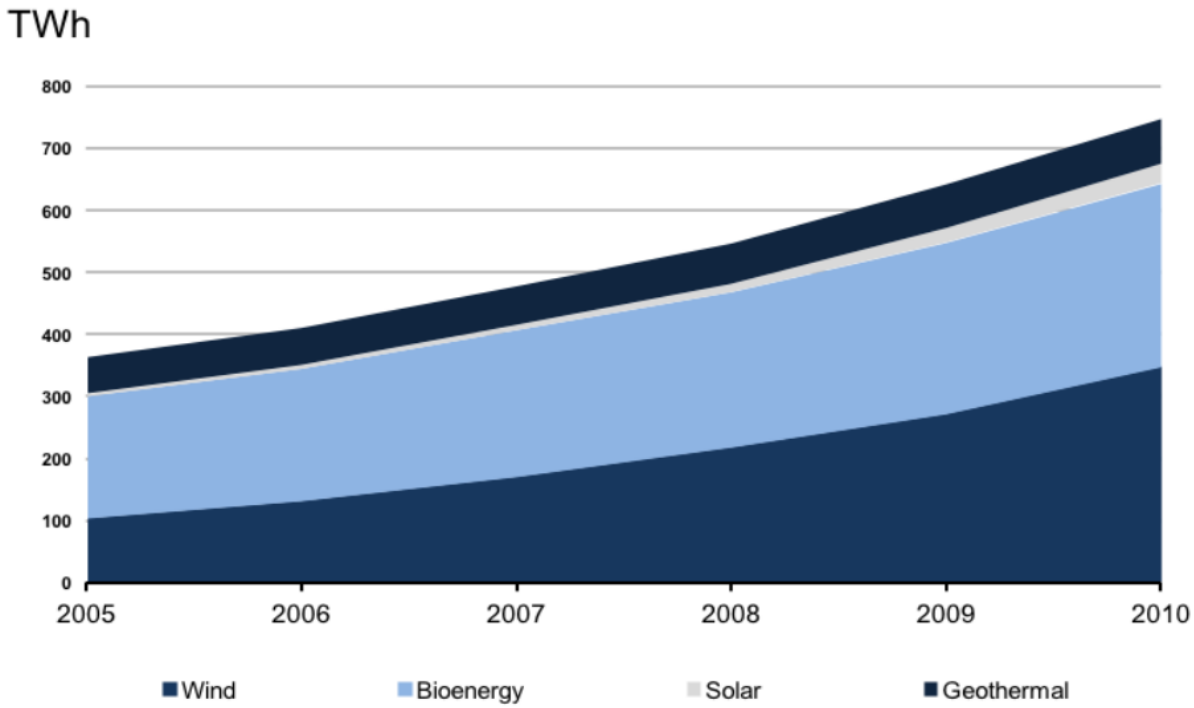
Developed countries such as Europe and North America have planned to consume renewable energy because it reduces their dependence on foreign countries and is safe and healthy (Menegaki, 2011).

Renewable energy has created 18% of the world's electricity production in 2007. In Europe, the energy created by the wind is the highest (in renewable energy). After the wind, there is the energy created by the sun and then by biomass, which is the most common. But the energy created with hydraulic base had a negative growth in the years 1997-2007. Less than 7% of energy in Europe comes from renewable energy (Menegaki, 2011). Some European countries such as Denmark, Germany, and the United Kingdom have increased their energy exports. In other words, renewable energy technologies have found a global marketplace to sell and create jobs. For example, in 2006, Germany sold renewable energy instruments worth

€ 21.6 billion and created 200,000 jobs. Denmark has created 20,000 jobs in wind energy (Wilson-Späth, 2016).

The global deployment of renewable energy has taken off from the **OECD**. While the renewable energy electricity sector grew by 26% between 2005 and 2010, today it provides about 20% of the world's power. Hydro-electric power generates 84% of the world's renewable electricity, while the other newer renewable energy electricity technologies have also grown rapidly; doubling their production between 2005 and 2010 (Figure 1). Wind energy has grown the most rapidly in absolute terms. Solar photovoltaic has grown at a rate of 50%, and its installed capacity had reached about 70 GW by the end of 2011 (IEA, 2011).

Renewable energy for heating, cooling, and transport fuels is also steadily growing. The production of heat from renewable sources grew by 6% between 2005 and 2009, with the use of biomass (e.g. wood) still the dominant technology. However more "modern" heating technologies – particularly solar heating but also geothermal heating – have seen an overall growth rate of nearly 12% between 2005 and 2009. The production and use of biofuels for transport have also been growing rapidly, providing 3% of road transport fuels (2% of all transport fuels) in 2009. Biofuel production and consumption are still concentrated in Brazil and the United States (ethanol) and in the European Union (biodiesel) (OECD, 2011).



*Notes: excluding hydro-electric

Figure 1. Global growth in renewable electricity generation, 2000-2010* *(**Source**:* IEA (International Energy Agency) (2011), Deploying Renewables 2011: Best and Future Policy Practice, IEA, Paris)

4.1 ON THE MACROECONOMIC LEVEL

4.1.1 ECONOMIC GROWTH AND GROSS DOMESTIC PRODUCT

Currently, the GDP for each country is very important because it shows the size of the market and the purchasing power of the populations. If there is a significant relationship between market size and renewable energy consumption, countries can apply and develop consumption of renewable energy. Therefore, the aim of this report is to study the causal relationship between renewable energy consumption and economic growth (Hung-Pin, 2014).

Aperghis and Payne (2010), using variables such as capital formation, GDP, labor, and renewable energy consumption, have shown that in Eurasia there is a bidirectional relationship between economic growth and consumption of renewable energy (Apergis, 2010); they reported the same result for OECD countries in 2010. Sadorsky (2009), Menyah and Wolde Rufael (2010), and Menegaki (2011) also studied the relationship between economic growth and renewable energy consumption. Lund (1999) has shown that the subsidies for renewable energy will increase the number of jobs in Denmark.