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Nonconventional renewable energy governance in Brazil: Lessons to learn from the German experience

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ABSTRACT

This paper presents a comparative analysis of energy governance regarding nonconventional renewable energy sources (NCRES) in Brazil and Germany. Brazil is a world leader in the use of conventional renewable energy sources, such as hydro power, while Germany has been achieving outstanding results in fostering NCRES. The focus is on two critical issues: the legal and regulatory framework and the institutions created to support the NCRES market development. The comparison shows that, despite the very different energy situations and policy drivers, valuables lessons can be extracted from the German experience. The main lesson for Brazil is to think NCRES as a strategic opportunity to rely less on fossil fuel and large hydroelectric power plants, to decentralize the electric power sector, to use the huge solar, biomass and wind power potential available in the country and to create a environment-friendly NCRES industry. To this end, three critical points were identified: (1) the legal and regulatory framework should be improved; (2) long-term energy planning taking into account social, economic and climate issues and; (3) the current institutions supporting NCRES in Brazil should be upgraded and/or new ones, such as more specific energy agencies, should be created.

Contents

1. Introduction

Renewable energy sources (RES) bring benefits whilst addressing many current challenges faced by humanity. For example, problems related to the increasing demand of energy, external energy dependence, energy security, air pollution, respiratory health and greenhouse gas (GHG) emissions can be attenuated through a wider use of RES [20,27,49,50]. Moreover, decentralized RES have positive impacts in the operation of electric grids, as they increase system reliability and power quality, minimize land use effects, reduce grid congestion costs and the need of peak power supply, and allow savings in transmissions and distribution (T&D) losses [7,23,36,45,70,77].

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Although there is a general consensus on the centralized and decentralized RES benefits, the attention given by governments towards the development of RES markets varies greatly from country to country. While some countries have improved their energy governance[1] dedicated to manage RES, other countries still have old structures for the energy sector, with a limited capacity to handle NCRES activities and the new set of technologies and business models that are aviated with them.

The need for a good governance to manage nonconventional[2] renewable energy sources (NCRES) arises from the fact that they are subject to diverse types of barriers and market failures that limit their development [56,57]: unequal government subsidies and price taxes that lead to price distortions; trade barriers; lack of economies of scale; absence of a legal and regulatory framework; lack of technical or commercial skills and information, and market failure to value public benefits related to the development of NCRES. International experience has shown that the most successful countries in overcoming these barriers are those that have built an elaborate governance system to specifically handle NCRES [29,40,42,82]. This governance includes energy policies, legislation, regulation, specific policy instruments, such as funding mechanisms, market mechanisms and fiscal incentives, energy research facilities and data centers. It also includes suitable institutions, such as executive energy agencies, government offices or departments, devoted to implement, manage and evaluate activities related to the development of NCRES.

Legal and regulatory frameworks are fundamental to ensure a good environment for the NCRES market development. Well-designed laws and regulations provide the conditions to mitigate the short- and long-term risks, thus inducing a wider deployment of NCRES technologies. For instance, when regulations concerning grid connection, grid usage and grid expansion are well established, the investors have a guarantee that their access to the grid will not be denied or delayed. Additionally, other support instruments have shown to be necessary since several of the NCRES technology costs are still not competitive with conventional energy sources, such as fossil fuels and nuclear energy, which are heavily subsidized in many countries [4,64,72,76,78,91]. To overcome this barrier, several governments have implemented one or more policy instruments to promote investments and/or make NCRES investments more attractive. Some examples of support instruments that have been implemented are feed-in tariffs, renewable portfolio standards or quota systems, tradable energy certificates, public investments, public competitive bidding, capital subsidies, loans, grants and rebates. Many studies (e.g. [2,22,24,46,61,67,80,85]) have pointed out the importance of appropriate legal and regulatory frameworks and the need for specific policy instruments to promote the NCRES market development.

Institutions also are essential to support NCRES policies and strategies and to assure their implementation, compliance and effectiveness. Institutions in charge of the promotion and implementation of NCRES policies usually are government bodies (ministries, departments and agencies), banks or other financial institutions, scientific and research organizations (energy institutes, energy centers, universities, etc.), energy companies, such as electricity utilities, or energy suppliers, energy service companies (ESCOs) and nongovernmental organizations (NGO). The international experience has shown that institutions have played an essential role in applying legislation and regulations, enabling funding schemes and implementing and managing policy mechanisms in order to achieve the NCRES targets. Some studies [34,35,50,54,73] have evaluated and highlighted the importance of institutions for energy efficiency and NCRES technology dissemination. Jacobsson and Johnson [54], for instance, mention that "institutions greatly affect the specific path that a NCRES technology takes".

Well-managed institutional structures with strong technical capacity can provide innovative solutions to foster the diffusion of NCRES, besides increasing the awareness, acceptance, attractiveness and access to NCRES [9,34,35,38,73,86]. Besides, empirical studies ([63,6,47] have shown that there is a high correlation between institutional quality and environmental quality, since the spillover effects of institutions are determinants for a more sustainable development.

Institutions in charge of NCRES policies have taken many forms from country to country. While most developed countries use specialized institutions to handle NCRES, in most developing countries, which are typically characterized by high-energy intensities (Energy/GDP) and low per capita energy consumption, this does not occur. According to WEC [86], more than 85% of the European and American/Asian countries in the Organization for Economic Co-operation and Development (OECD) have at least one energy agency looking after energy efficiency (EE) and/or RES. On the other hand, in South America and non-OECD Asia, approximately 45% of the countries have an EE/RES institution. Additionally, it can also be observed that the energy agencies in OECD countries are effective, whereas, in most developing countries, they are usually weak, unsystematic and cumbersome [34].

Germany is a successful example regarding the development of a legal and regulatory frameworks and institutional structure devoted to promote NCRES. In fact, Germany is one of the leaders in NCRES technology development and in installing NCRES technologies. The country has developed large markets for green technologies, for instance, has about 11% (39.2 GW) of global wind energy installed capacity and has about 22% (39 GW) of global photovoltaic (PV) installed capacity [75]. It is also worth to mention that these developments have resulted in positive effects on the economy, such as, for example, rising employment in Germany's NCRES sector, which reached 377,800 jobs in the year 2012 (BMU, 2013). The Germany has been a reference on NCRES development and several studies (e.g. [15,26,48,59]) have taken Germany as an example.

This paper compares the governance related to NCRES in Germany and Brazil. Through a broad literature review, which included official documents, reports, academic studies, papers, data collection and the government official websites, knowledge was acquired regarding key issues for NCRES development. Two key issues related to the NCRES governance process are addressed. The first is the legal and regulatory framework, which is crucial to create a suitable environment for the investors. Then, there are the institutions created to handle the NCRES activities. The analysis aims at explaining the main reasons for the differences observed in the NCRES market development in each of the two countries. Besides being a descriptive and explanatory work, this paper identifies critical issues that should be addressed in order to improve the Brazilian NCRES governance.

Initially, Section 2 describes the present economic and energy situations in the two countries. Section 3 provides an analysis of the main police drivers, which lead each country to give more or less attention to NCRES. Then, Sections 4 and 5 discuss the policies for NCRES in each country, including the existing legal and regulatory framework, the policy instruments that have been implemented and the institutions in charge of NCRES. Finally, lessons from the German NCRES governance experience are pinpointed and they are used to draw some recommendations for Brazil.

[1] In this paper governance is defined as a process composed of activities related to policy formulation, implementation (mechanisms and programs), administration and evaluation and feedback mechanisms.

[2] Renewable energy sources other than conventional such as large hydropower plants.