DEVELOPING URBAN RENEWABLE ENERGY PROJECTS: OPPORTUNITIES AND CHALLENGES FOR ROMANIA

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Abstract
This study investigates the public authorities support for the development of renewable energy projects, with an eye to reveal a change of paradigm, in the sense that their role is currently reconsidered and intensified. Therefore, this study reveals firstly the responsibility of the public authorities in the field of renewable energy, and secondly, the main aspects of the public policy in the field of renewable energy, together with its opportunities, challenges and possible solutions. Thirdly, this study discloses the main issues of the public renewable energy policy in Romania, revealing the evolution of the renewable energy sector and the support schemes used by the public authorities so as to develop renewable energy. The results of this study may be used for upcoming research in the area of public authorities support for the development of urban renewable energy projects.
Keywords: Urban projects, Renewable energy, Public authorities, Public policy, Public service.

1. INTRODUCTION

Nowadays there is more and more acknowledged the fact that renewable energy can make a major contribution to the economic development, and consequently, it is reasonable to involve the public authorities in renewable energy projects' implementation. In this context, the debate regarding the ways by which to support the development of renewable energy projects has involved more and more companies and public authorities. All actors are playing an essential role in managing this change, at local, regional, national and European level.

This study investigates the public authorities support for the development of renewable energy projects, with an eye to reveal a change of paradigm, in the sense that their role is currently reconsidered and intensified. Therefore, this study reveals firstly the responsibility of the public authorities in the field of renewable energy, and secondly, the main aspects of the public policy in the field of renewable energy, together with its opportunities, challenges and possible solutions. Thirdly, this study discloses the main issues of the public renewable energy policy in Romania, revealing the evolution of the renewable energy sector and the support schemes used by the public authorities so as to develop renewable energy.

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The research was conducted using evidence provided by articles (such as research papers, conceptual papers, and literature reviews), as well as books. The research question was answered by analyzing and evaluating published sources, and by interpreting and reorganizing concepts. Answering the research question was difficult, due to the variety of approaches, concepts and definitions found in the literature.

2. RESPONSIBILITY OF THE PUBLIC AUTHORITIES IN THE FIELD OF RENEWABLE ENERGY

In today's world of services, people act as clients or consumers of services, as well as providers of services, depending on their interests on different markets. Nowadays people need to have universal access to modern energy services, and also environmentally-focused small and medium sized enterprises or other service organizations need business development services (Zamfir, 2013a). The European Union and its Member States have established different objectives and targets for renewable energy, expressing this way their ambitions and technological priorities (Lean and Smyth, 2013; Gawel *et al.*, 2014).

The role of the public authorities is under constant debate in the last years, due to the changing global economic, social, and political conditions. Extensive adoption of democracy as the preferred form of government, and widespread of the market economy as the preferred economic system are reasons to clearly define the control and responsibility in the provision of public services (Argüden, 2011, p. 40).

The relationships established within the energy market are mainly economic relations, governed by the economic laws of each country, but the specific nature of these relationships has imposed the need for special regulations. The basic characteristic of these regulations in the energy field is derived from the concept of "public service". This concept is generally associated with economic and social infrastructure, and it is justified through the role played by public power, that is the role of protecting the citizen, especially in two respects: the right to receive the requested service and the right to equitable tariff. It is widely accepted that there may be a public service if a community (local, regional, national, European) estimates that at some point, within the area of responsibility, a good or an essential service for all, existing or new, cannot be satisfactorily provided only through market mechanisms (Bădileanu, 2001; Comănescu, 2000; Leca, 1997).

In this context, there is a need for a new philosophy of designing and managing modern services for developing renewable energy in the European Union. In order to comprise a large percentage of the

energy mix, there is a need for political support for renewable energy (Stigka *et al.*, 2014). The benefits of renewable energy may increase regional cohesion, and this may lead to a positive synergy between renewable energy support and local development policies (Del Río & Burguillo, 2009: 1325). The integration of renewable energy projects into regional development process may create external positive effects concerning increased energy security and other regional development goals, such as the reduction of unemployment and the decrease of environmental impact (Klevas *et al.*, 2009: 155).

Urban management in more prosperous advanced countries is rapidly and seriously transiting from conventional to sustainable energy technologies (Ingwe *et al.*, 2009). The development of renewable energy sources is increasingly planned at a regional and local level, but renewable energy sources are currently unevenly and insufficiently exploited in the European Union. The production of energy from renewable sources often depends on local or regional small and medium-sized enterprises. While regional energy strategies are implemented in the context of European integration, the role of regions as economic players is also becoming increasingly important. The investment in regional and local production of energy from renewable sources may enhance the opportunities for growth and employment in the Member States and their regions (Zamfir, 2011a, p. 41). The development of regional renewable energy projects depends on the regional public policies, the infrastructure, specialized human resources and management of the plans and programs of urban development, in addition to other tools, such as methodologies and procedures that help their application. Furthermore, regulation and rules play an important role in the use and profitable exploitation of renewable energy, as well as the way to apply public policies in the region does (Hernandez Moreno, 2009: 138).

There are some defining principles for the public service within the energy field among the general principles of public service developed at European level (Zamfir, 2013c). These principles are the following: (a) the principle of operators pluralism (administration, public operator, private or mixed operator); (b) the principle of public services evaluation (both for regulator authority and operators); and (c) the principle of competition and cooperation between operators (the regulator authority has to find the right balance of competition and cooperation between operators) (Bădileanu, 2001; Comănescu, 2000; Leca, 1997).

Despite the increasing role of private investors in the energy sector, they cannot solve alone all the problems that might appear in this field. Even in the countries with a high degree of privatization the governments are involved in the problems of the energy sector at local, regional, national and supranational level. Their presence may be identified in the form of partial ownership or control imposed by legislation. There is a need for a state control through specific ways of the market economy, even in

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very liberal energy sectors in which market forces prevail. This control may be achieved through regulatory agencies that provide access to natural monopole segments such as transportation networks, through authorization and tariffs procedures, thus allowing a fair treatment for all candidates (Muşatescu, 2003, p 131).

The process of profound changing of the structure and specific regulations is to continue in Romania in order to modernize and develop the energy sector. Romania's accession to the European Union has determined important changes in energy policy, energy legislation alignment and promotion of renewable energy (Colesca and Ciocoiu, 2013, p. 149). Moreover, understanding energy market phenomena and relationships, ways of action and processes entailed is a key factor for the success of organizational modernization of the energy sector in Romania, and of the review and implementation of regulations on energy. They take part in achieving the objective of meeting the energy needs of the companies and population at a competitive price, in terms of energy and economic efficiency, of quality and energy security, of efficient use of resources and limiting environmental impact to the allowed levels in Europe. Nowadays the state's role in managing the energy sector is more diverse and profound. Although its actions do not automatically lead to eliminate all imbalances, it is necessary for the decision and policy makers to analyze market situations in terms of cost-benefit correlations, social equity principles and environmental protection.

A large number of companies would act to achieve sustainability and sustainable development if the governments intervene by supporting costs, granting preferential tax treatments and incentives. However, renewable energy might prove to be nothing else but another way of profiting from large subsidies granted to the development of such types of sources (Momete, 2013, pp. 254-255). Therefore, public authorities have to spend the public funds so as to ensure that investments are efficiently meeting the renewable energy policy objectives. Hence, because of this principle of efficiency, a careful policy design is needed to avoid over-subsidization and it may not be thought as maximum deployment at minimal cost. This is because the policy objectives could include, for instance, driving long-term price reductions or supporting technologies at different stages of development (Weischer *et al.*, 2011, p. 12).

The governments are involved in the issues of the energy sector through partial ownership or control imposed by the legislation. Energy policy and existing regulations play an important role in fostering regional projects for the production and use of energy from renewable sources. Moreover, there are various public mechanisms to support renewable energy developed in order to reduce the risks and the payback periods for the investors. In addition, another way in which the state's role is crucial is the need for strong and effective state intervention in order to maintain ecological equilibrium, to ensure a reserve

of resources as long as possible and to respect regeneration cycles of energy resources (Zamfir, 2013b). Furthermore, local public administration should be involved in regional development of renewable energy, because energy policies need to be adapted to the features of different cities and regions (Zamfir, 2011b).

The role of the state and the services it provides in ensuring energy security, as well as in establishing energy policy will continue to be important, and will be intensified in some areas of action, such as: (1) regulating the energy market; (2) exercising the function of arbitrator of the energy market by monitoring the deviations from the rules and imposing correction measures; (3) establishing the development strategy for the energy sector; (4) establishing the conditions for import and export of energy resources, including electricity; (5) ensuring transparency of business processes in the energy sector; (6) protecting consumer interests and supporting community interests in relation to electricity producers, distributers and suppliers; (7) supporting the research and development in the energy sector (Zamfir, 2013c).

Public support is needed to reach the Community's objectives with regard to the expansion of electricity produced from renewable energy sources, in particular for as long as electricity prices in the internal market do not reflect the full environmental and social costs and benefits of energy sources used. To obtain an energy model that supports renewable energy there is a need to encourage strategic cooperation between Member States, involving, as appropriate, regions and local authorities (The European Parliament and the Council of the European Union, 2009, pp. 19-20).

Opportunities for economic growth through innovation and a sustainable and competitive energy policy are recognized by the experts (The European Parliament and the Council of the European Union, 2009, p. 16). It is often assumed that innovation mainly happens in the research and development phase. However, there is a need for innovation beyond the lab, i.e. throughout the life cycle of the products, across the entire supply chain, and throughout the energy system (Weischer *et al.*, 2011, p. 12). Therefore, the European Commission and Member States should support national and regional development measures in the field of renewable energy, should encourage the exchange of best practices in the production of renewable energy between local and regional development initiatives and should promote the use of Structural Funds in the field of renewable energy (The European Parliament and the Council of the European Union, 2009, p. 16). The partnership of urban stakeholders for creating green cities may lead to the development of renewable energy. In this context, public-private partnerships could be a solution for implementing urban renewable energy projects (Zamfir, 2012, p. 83). In other words, the public administration should act as a catalyst for urban renewable energy projects' implementation and development.

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3. DEVELOPING URBAN RENEWABLE ENERGY PROJECTS IN ROMANIA: OPPORTUNITIES AND CHALLENGES

3.1. Evolution of the renewable energy sector in Romania

Renewable energy sources have a large potential in Romania (Păceşilă, 2013). Moreover, each development region benefits from at least two renewable energy sources that might be exploited. An investment in energy from renewable sources can recover now faster than before (Pîrlogea, 2012, p. 22). In these conditions, the key is to decide what technology of energy efficiency to use, what renewable resource to exploit, how to decrease greenhouse gases emissions, how to enhance a green architecture by consuming less of those finite resources and more of renewable ones (Pîrlogea and Cicea, 2011, p. 81).

In Romania, installed capacity in power plants that use renewable energy sources (figure 1) grew at an accelerated pace between 2009 and 2013. Compared to approximately 100 MW installed by the end of 2009, in the next years were installed about 370 MW in 2010, about 750 MW in 2011, about 1100 MW in 2012, and about 1800 MW in 2013 MW (Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE. Raportul al doilea, perioada 2011-2012, 2014, p. 46).

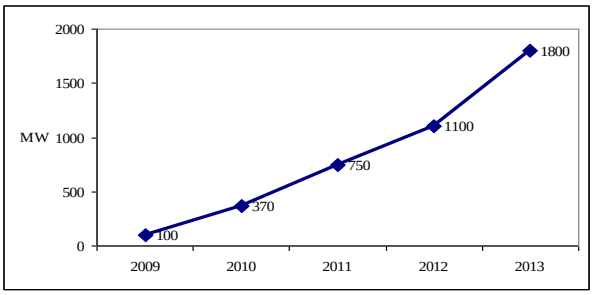

FIGURE 1 – EVOLUTION OF INSTALLED POWER FOR ELECTRICITY FROM RENEWABLE SOURCES IN ROMANIA.
Source: Author, data from "Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE.

Intermediate targets for the share of electricity from renewable sources in gross final energy consumption are 19.66% for 2013-2014, 20.59% for 2015-2016, 21.83% for 2017-2018 and 24% for 2020 (Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE. Raportul al doilea, perioada 2011-2012, 2014, p. 47). Based on these new targets the renewable energy production and consumption were re-estimated starting from the real data from 2012 (figure 2).

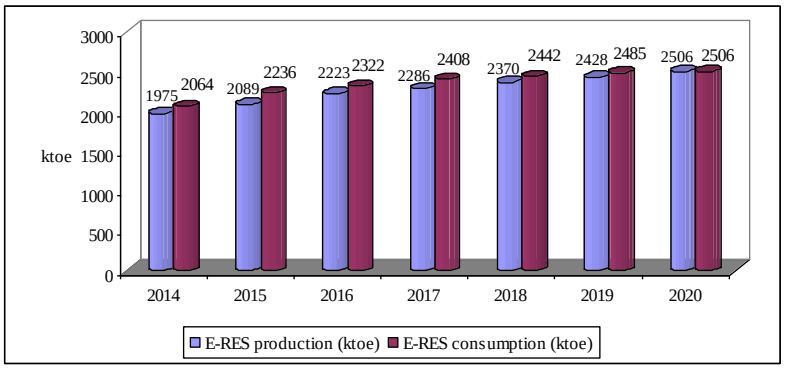

FIGURE 2 – FORECASTED ELECTRICITY FROM RENEWABLE SOURCES PRODUCTION AND CONSUMPTION IN ROMANIA.
Source: Author, data from "Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE.

Renewable electricity production estimation for the period 2013-2020 has considered the following elements: (1) the normalized production value in power plants of over 10 MW and the investment program in the sector; (2) the installed capacity and under development installed capacity at the end of 2013 for the hydro production technologies under 10 MW, wind, solar and biomass; (3) the capacity factors made for each technology in 2012; and (4) the effect of support schemes and grant co-financing programs of investment. Gross final energy consumption was estimated with an annual increase of 2% compared to the real level in 2012 (Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE. Raportul al doilea, perioada 2011-2012, 2014, p. 47).

Overall, for the period 2013-2020, in each of the years analyzed, the estimated production of energy from renewable sources is higher than the gross final energy consumption from renewable sources that ensures the achievement of interim and final targets for the share of renewable energy sources in the gross final energy consumption.

3.2. Changes of the support scheme in Romania

Romania uses a quota obligation combined with tradable green certificates as a support scheme for developing renewable energy. In the last few years, due to the need to align the system to the European legislation, some measures have been taken, and the existing support scheme has been modified.

An ongoing concern of the decision makers at national, regional and local level consist in evaluating and improving the administrative procedures for renewable energy development and aligning these procedures to European Union standards. In this respect, two main actions and measures have been undertaken: (1) improving the system of quota obligation combined with tradable green certificates; and

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(2) financing renewable energy projects (Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE. Raportul al doilea, perioada 2011-2012', 2014, pp. 11-12).

Within the quota obligation system combined with tradable green certificates ANRE establishes a fixed quota of electricity generated from renewable sources that the suppliers have to buy. The producers of renewable electricity are yearly qualified by ANRE in order to receive green certificates. They receive for each MWh delivered into the network a green certificate, which can be sold separately from the electricity, on the green certificates market. In order to fulfill their obligation, the suppliers have to own a number of green certificates corresponding with the quota imposed. The green certificates value represents an additional income received by the producers for the renewable energy delivered into the network. The price of electricity sold is determined on the electricity market, while the additional price received for the green certificates sold is determined on the green certificates market, where the environmental benefits of the renewable electricity production are traded. If the annual quota obligation is not fulfilled by the producers they will pay a penalty, which is the value of green certificates that were not purchased.

The quota obligation system combined with tradable green certificates was applied in Romania since 2011 and it was the most generous within the European Union. The producers received 2 green certificates per MWh delivered in the network for wind energy generators, 6 green certificates for photovoltaic energy generators, and 3 green certificates for small hydro energy generators. Therefore, the market has expanded and thousands of renewable energy projects were developed, with investments above 4.5 billion euro in recent years.

The quota obligation system combined with tradable green certificates for supporting renewable energy was supplemented by secondary regulations issued by the Romanian Energy Regulatory Authority (ANRE) in order to define the procedures for accreditation, issuance and trading of green certificates, access to networks and treatment priority, obligations for green certificates acquisition, etc. The secondary regulations issued by ANRE are based on the applicable principles and rules which belong to the Community legal framework.

Parallel to the operational help offered to the producers of electricity from renewable sources through the above mentioned support system, there were initiated funding programs for renewable energy projects in Romania. These programs provide investment support to a wide range of potential beneficiaries (individuals, companies, public institutions, etc.) in order to implement local interest projects, to diversify the energy supply, to exploit potential resources that do not justify a commercial

interest, etc. The projects co-financing through public intervention is designed to remove the difficulty of implementing economic and socially justified projects, but which have a funding gap that makes them unattractive to investors. In order to ensure proper participation in these programs one of the major concerns is the removal or reduction of administrative barriers. The procedures for accessing these funds are established by specific Community and national legislation.

The special programs are financed from the Environment Fund, another component that contributes to the support of renewable energy for specific applications, which would not be achieved without investment support. These programs are the following: (1) the Program for increasing energy production from renewable sources (for companies); (2) the Program for the installation of heating systems using renewable energy, including replacing or supplementing traditional heating systems ('Green House' Program, for individuals); and (3) the Program for the installation of heating systems using renewable energy, including replacing or supplementing traditional heating systems (for territorial administrative units, public institutions and religious units) (Raport de progres al României privind promovarea şi utilizarea energiei din surse regenerabile, în conformitate cu Art. 22 din Directiva 2009/29/CE. Raportul al doilea, perioada 2011-2012', 2014, p. 12).

The *Program for increasing energy production from renewable sources* (wind, geothermal, solar, biomass, and hydro) aims to stimulate the use of renewable energy sources, to improve the quality of the environment, to reduce greenhouse gas emissions, to use rationally and efficiently the primary energy resources, and to conserve and protect the ecosystems (Ministerul Mediului şi Pădurilor, 2010b). In 2010, only 50 projects were approved within this program, and after that the program was suspended because of lack of funds.

The aim of the *Program for the installation of heating systems using renewable energy, including replacing or supplementing traditional heating systems ('Green House' Program, for individuals, and Program for territorial administrative units, public institutions and religious units)* is to improve air, water and soil quality by reducing pollution caused by burning wood and fossil fuels used to produce heat energy used for heating and production of hot water. Moreover, the aim of the program is to encourage the use of non-polluting, renewable energy systems through the grants from the Environmental Fund that stimulate the installation of heating systems using renewable energy, including replacing or supplementing traditional heating systems (Ministerul Mediului şi Pădurilor, 2010a; 2011). This way, through the *'Green House' Program* the state finances individuals who want to install renewable energy systems, in order to stimulate the wider adoption of these clean technologies. This program was launched in 2010 when it was very successful and, despite the interest of the population it was suspended in 2011, due to lack of

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funds. According to the Ministry of Environment and Forests, it seems that the program will restart in 2014.

From the point of view of the efficiency of the support schemes, we may state that the most efficient was the quota obligation system combined with tradable green certificates since it led to an unprecedented development of the market, an increase of the investment in the field, and an increase of the renewable energy production. On the other hand, the special programs financed from the Environment Fund have not proven to be efficient and the investors were disappointed because these programs were suspended before producing the expected results.

5. CONCLUSIONS

This study has revealed that the public authorities have a particular responsibility in the field of renewable energy, their role in managing the energy sector being more diverse and profound. The role of the public authorities in the renewable energy sector may be synthesized as: (1) partial ownership of the companies or control imposed by the legislation; (2) energy policy and regulations derived from the concept of public service; (3) public mechanisms to support renewable energy developed in order to reduce the risks and the payback periods for the investors; (4) intervention in order to maintain ecological equilibrium and to protect the environment, to ensure a reserve of resources and to respect regeneration cycles of energy resources; (5) intervention in order to ensured energy security; (6) analysis of the market situations in terms of cost-benefit correlations, social equity principles and environmental protection; and (7) intervention in order to ensure universal access to modern public energy services for the population and companies.

Another conclusion of this study is that there are both opportunities and challenges in establishing and implementing the public policy in the field of renewable energy. For this policy to be 'smart', it has to take into account the broader context in which renewable energy operates, in order to create an enabling urban environment.

The main opportunities for the development of renewable energy identified in this study are: (1) the transition to a green era, to a renewable energy industrial era with distributed and collaborative relations between all stakeholders; (2) the possibility to accelerate this transition through public policy measures such as supporting business with incentives and favorable conditions, rewarding companies by investing in the ideas and technologies that lead to the sorts of innovative products and services that create jobs and entirely new industries; (3) the evolution of the cost-effectiveness of renewable energy technologies; (4) the growing number of service organizations that offer energy efficient services and

solutions, which creates significant potential for energy savings in business and industry; and (5) the possibility to respond to a growing global demand for energy services through the development of renewable energy and simultaneously to reduce the negative impacts associated with its production and use.

Besides opportunities, there are some challenges identified in this study, such as: (1) the need to find new ways of providing services and a new culture of services, since the emerging green era is based on distributed and collaborative relations and services; (2) the need to change the methods and techniques of designing and managing modern energy services in order to respond to the actual needs of the clients; (3) the need to adapt the policies to support renewable energy and energy efficiency to the features of different regions, the circumstances prevailing there and the potential for the development of new energy sources; (4) need to invest in research and development services in the field of renewable energy, taking into account the technological maturity of renewable energy; (5) the need for further reductions in cost and improvements in performance, reliability, and safety of renewable energy technologies in order to replace more emissions-intensive alternatives; (6) the need of investments along the entire innovation chain; and (7) the need to reduce or eliminate the administrative barriers to the development of investment projects in renewable energy.

Furthermore, this study has revealed that renewable energy sources have a large potential in Romania and each development region benefits from at least two renewable energy sources that might be exploited. However, without a real support from the public authorities, in order to stimulate electricity generation from renewable energy sources, this high potential could still remain underutilized.

Policy goals in the renewable energy field could be achieved by using a large variety of instruments and supporting schemes. Romania uses a quota obligation combined with tradable green certificates as a support scheme for developing renewable energy. The modernization and the development of the Romanian energy sector are possible only through continuing the process of profound changing of the structure and specific regulations. In the last few years, due to the need to align the system to the European legislation and to simplify the administrative procedures, some measures have been taken and the existing support scheme has been modified so as to improve the system of quota obligation combined with tradable green certificates and to finance renewable energy projects.

The findings of this study may be used for upcoming research in the area of public authorities support for the development of renewable energy projects.

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