

RECONSIDERING AND INTENSIFYING THE ROLE OF THE STATE IN THE FIELD OF RENEWABLE ENERGY

Abstract

This study investigates the role of the state in the field of renewable energy with an eye to reveal a change of paradigm, in the sense that this role is nowadays reconsidered and intensified. Therefore, this study reveals firstly some issues regarding research and development services in the field of renewable energy. Secondly, it discloses the technological maturity of renewable energy, and thirdly, it envisages the new intensified role of the state in this field. The results of this study may be used for future research in the area of implementing renewable energy projects.

Keywords: state, renewable energy, services, research and development.

JEL CODES: Q42, M10, O33, O44, R11.

RECONSIDERAREA ȘI INTENSIFICAREA ROLULUI STATULUI ÎN SECTORUL ENERGIEI REGENERABILE

Andreea ZAMFIR

Lecturer PhD, Faculty of Management, Bucharest
University of Economic Studies
E-mail: zamfir_andreea_ileana@yahoo.com

Rezumat

Studiul investighează rolul statului în sectorul energiei regenerabile cu scopul de a evidenția o schimbare de paradigmă, în sensul reconsiderării și intensificării rolului statului în zilele noastre. Tocmai de aceea, în cadrul studiului sunt reliefate unele probleme privind serviciile de cercetare-dezvoltare în domeniul energiei regenerabile, maturitatea tehnologică a energiei regenerabile, precum și noul rol intensificat al statului în acest sector sensibil al economiei. Rezultatele acestui studiu ar putea fi utilizate pentru cercetări viitoare în zona implementării proiectelor din domeniul energiei regenerabile.

Cuvinte cheie: stat, energie regenerabilă, servicii, cercetare-dezvoltare.



Proceedings of the 9th Administration and Public
Management International Conference
"Governance and management in a globalized context"

1. INTRODUCTION

This study investigates the role of the state in the field of renewable energy with an eye to reveal a change of paradigm, in the sense that this role is nowadays reconsidered and intensified. Therefore, this study reveals firstly some issues regarding research and development services in the field of renewable energy. Secondly, it discloses the technological maturity of renewable energy, and thirdly, it envisages the new intensified role of the state in this field.

The research was conducted using a large variety of sources, such as books, research reports and articles. The research question was answered by analyzing and evaluating published sources, and by interpreting and reorganizing concepts.

2. RESEARCH AND DEVELOPMENT SERVICES IN THE FIELD OF RENEWABLE ENERGY

In order to survive, the humankind has to find solutions to a number of issues such as environmental conservation, economic growth, as well as associated and inevitable increases of energy and natural resources consumption (Holdren, 1997; Yoda, 1995). The continuous growth of energy consumption, subject to the limits of energy resources and reserves is one of the main problems of humankind in general and of the energy sector in particular.

Natural resources are both a driver and a possible constraint of economic growth (Figure 1). If the gross domestic product is higher, then the demand for natural resources is higher, and increased demand leads to higher production, depleting stocks. On the other hand, stocks in decline leading to reduced potential production of natural resources in the medium and long term, which hampers economic growth. Resource efficiency can lead to reduced demand and improved supply management. Also, the opposite effect should be considered because it reduces the expected benefits of increased efficiency by increasing demand (UNEP, 2011: 507).

The pressure on global demand for natural gas, the export capacities of the producers, the gradual degradation of hydrocarbon reserves, the relatively upward trend in prices, the difficulties in applying nuclear programs and changes regarding the environment when using coal are all factors that influence the energy supply conditions.

The limited energy resources and the impact of their use on the environment causes increasing concerns about the research and development services, the finding of new energy resources, new ways to exploit the existing ones, and implementing sustainable development scenarios.

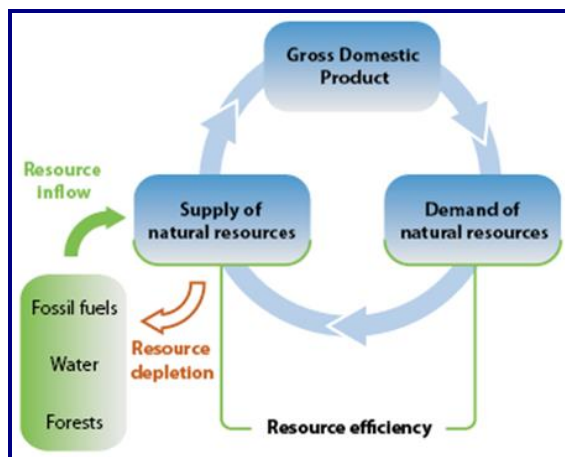


FIGURE 1 – RELATIONSHIP BETWEEN ECONOMIC GROWTH AND NATURAL RESOURCES
Source: UNEP, 2011, p. 507.

By its nature, character and implications on the future of the planet, the resources problem turns out to be extremely complex and multifaceted: technical, economic, political, social, environmental and, last but not least, it has become a global problem. Nowadays it is a fact that in addition to the development and progress of mankind, its peace and security crucially depend on the availability of resources. Therefore, the resources and the competition for their procurement have now an unprecedented dimension, and saving and using better the resources (especially energy resources) remains the only realistic solution to cope with the realities of the present and the challenges of the future.

Renewable energy can make a major contribution to the interconnected challenges of responding to a growing global demand for energy services and simultaneously reducing negative impacts associated with its production and use. Investments in renewable energy contribute to climate change mitigation, but to maintain an increase below 2°C of the average global temperature, the development of renewable energy have to be clearly accelerated. Renewable energy has other social and environmental benefits, including those to mitigate or avoid many health problems and reduce impacts on ecosystems caused by the extraction, transport, processing and use of fossil fuels (UNEP, 2011: 202). Therefore, there is a need of developing the research and development services in the field of renewable energy, taking into account the technological maturity of renewable energy.

3. TECHNOLOGICAL MATURITY OF RENEWABLE ENERGY

Renewable energy technologies may be analyzed according to the stage of maturity, which are: research and development stage, demonstration and deployment stage, diffusion in the economy and commercial maturity. Table 1 shows the stages of technological maturity of renewable energy (UNEP, 2011, p. 212).

TABLE 1 – STAGES OF TECHNOLOGICAL MATURITY OF RENEWABLE ENERGY

Renewable energy	Research and development stage	Demonstration and deployment stage	Diffusion stage	Commercial maturity stage
Hydropower		Hydrokinetic turbines		Run-of-river Reservoirs Pumped storage
Biofuels	Aquatic plant-derived fuels	Pyrolysis-based biofuels Lignocellulose sugar-based biofuels	Gasification-based power Lignocellulose syngas-based biofuels	Traditional usage Cookstoves Domestic heating Small/large-scale boilers Anaerobic digestion Combined heat and power Co-firing fossil fuels Combustion-based power Sugar and starch-based ethanol Plant and seed oil-based biodiesel Gaseous biofuels
Wind energy	Higher-altitude wind generator	Wind kites	Offshore, large turbine	Onshore, large turbines Distributed, small turbines Turbines for water pumping
Solar energy	Solar fuels	Solar cooling	Solar cooking Concentrating PV Concentrating solar thermal power	Photovoltaic (PV) Low temp solar thermal Passive solar architecture
Geothermal energy	Submarine geothermal	Engineered geothermal systems		Direct use applications Geothermal heat pumps Hydrothermal, binary cycle Hydrothermal, condensing flash
Ocean energy	Ocean currents	Wave Tidal currents Salinity gradients Ocean thermal energy conversion		Tidal range

Source: UNEP, 2011, p. 212.

The most mature technology is hydropower, which currently covers 16% of the electricity demand in the world (UNEP, 2011, p. 211). As well, the onshore application of wind energy are commercially mature, while offshore wind energy is still in the diffusion stage and, in some situations, is approaching the commercial maturity stage. Solar energy technologies for heating (low temperature solar thermal) are commercially mature and are commonly used in many parts of the world. Photovoltaic electricity is approaching commercial maturity for small scale applications (solar systems on rooftops or solar lanterns in off-grid areas), but, generally, it still depends on subsidies or price support mechanisms. Geothermal energy can be harnessed for heat in almost any temperate climate, and in some places

also for power generation. It is mature in many countries, including Italy, Kenya, New Zealand, the Philippines and the United States (UNEP, 2011, pp. 211-212). For instance, Iceland and El Salvador derive over 15% of their electricity needs from geothermal sources (IPCC, 2008, pp. 7-8). Cost-effectiveness of renewable energy technologies has significantly evolved in recent decades. Many renewable energy technologies are rapidly maturing and their costs are becoming competitive compared with fossil fuel alternatives. Consequently, investments in expanding renewable energy production have increased dramatically in the last decade (UNEP, 2011). For instance, Păceșilă (2013, p. 62) concludes in her study that there is a high potential of renewable energy sources in Bulgaria, Romania and Greece, and these sources play an essential role in reducing the dependence on energy imports, creating new jobs and ensuring the environmental protection.

Renewable energy services would be more competitive if the negative externalities associated with fossil fuel technologies were taken into account. These include both current and future impact of various pollutants on the health of the population, and the cost of adaptation to climate change and ocean acidification resulting from CO₂ emissions. Existing evidence shows that fossil fuel technologies have external costs substantially higher than those of renewable energy (UNEP, 2011, p. 202).

Research and development services in the field of renewable energy present some peculiarities that can generate situations when the obtained results do not match those that were expected. For example, for some research themes, the solutions might not be obtained, or the time for solving the problem might be extended while increasing spending. In other cases, the solutions are obsolete due to the influence of time. The risk occurs throughout the research-production cycle and especially during the practical application of the research results. Risk reduction is crucial because of the expenditure curve which follows a geometric progression with ratio 10: into the research phase is 1, into the development phase is 10, and into the application phase is 100.

4. THE NEW ROLE OF THE STATE IN THE FIELD OF RENEWABLE ENERGY

World history has shown that there are many connections, of high complexity, between the way people are behaving, the choices they make, and the natural world in which all live. Throughout recent history, the effects of humans' choices on the planet have expanded from local to regional level, and now are getting a global scale (Consiliul Mondial al Energiei, 2003, p. 22). One of the reasons of accelerating the pace of history is human ambition, which requires collision with the natural limits of the planet. National political leaders spend more time to treat the consequences of these collisions (damaging aquaculture zones, groundwater lowering rates, diminishing food, devastating storms), for dealing with international

refugees who are leaving their countries because of the environment, and with many other effects of exceeding the limits of the nature. Change has accelerated, thus the situation has evolved from the stage where individuals and societies were slowly modified to the stage in which they are changing continuously (Brown, 2001, p. 20).

Over the centuries, more and more people have lost connections with the natural environment. Our knowledge and understanding of the ecosystems have declined. The inhabitants of the cities have fewer notions about how nature acts, how species behave and react, and how rural residents have maintained (by their habits, by tradition) a reasonable balance between man and nature (Consiliul Mondial al Energiei, 2003, p. 134). Nowadays almost half of the world's population lives in cities and the consequences of the urban growth on the environment are significant. Generally, cities are prolific users of natural resources and large generators of waste (Popescu, 2007, p. 165). Rural residents believe that urban citizens do not understand the natural world, nor recognize the economic and social priorities of rural communities. Currently, in many countries, there are serious concerns regarding the threats against the natural environment, but in reality, despite the rhetoric, most of these threats are continuing and amplifying. Usually, only where there are threats of human life (due to the poor quality of air, water or due to the soil contamination) has started the fight against them. Instead, the threats on the environment are tolerated if they are produced by actions intended to enhance human comfort (Consiliul Mondial al Energiei, 2003, p. 134).

Energy policy and existing regulations play an important role in fostering regional projects for the production and use of energy from renewable sources. Opportunities for economic growth through innovation and a sustainable and competitive energy policy are recognized by the experts. 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).

Policies to support renewable energy and energy efficiency must be adapted to the features of various regions, to the situations and circumstances in these regions, and to the potential for developing new energy sources (Applica & Ismeri Europa, 2011, p. 10).

Support for renewable energy will have to be significantly expanded to promote accelerated investment in this type of energy. These investments involve greater risks, such as those commonly associated with the development and dissemination of new technologies, increased by high upfront capital costs.

Various public mechanisms to support renewable energy were developed in order to reduce the risks and the payback periods. The competitiveness of renewable energy sources has increased lately in part due to the use of various tools and policy support schemes to overcome barriers. Government policy to support increased investment in renewable energy should be carefully designed in an integrated manner, as it cannot be used the same approach (one-size-fits-all) for all renewable energy sources and regions where they are. The range of regulatory policies, tax incentives and public funding mechanisms for supporting renewable energy is large and may be supplemented by support for research and development and other measures, such as investment incentives to adapt grid infrastructure. The diversity of circumstances among countries and regions, including the existing energy systems and potential development of renewable energy requires careful design of strategies and energy policies and their adaptation to specific situations (UNEP, 2011, p. 203).

The relationships established in the energy market are, above all, economic relations and are governed by economic laws of each country. On the other hand, the specific nature of these relationships has imposed the need for special regulations. The main characteristic of these regulations in the field of energy has its roots in the concept of "public service". This is generally associated with economic and social infrastructure, justified by the role played by public power, which is the protector of the citizen consumer, 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 community) estimates that at some point, within the area of responsibility, a good or an essential (existing or new) service for all, cannot be achieved satisfactorily only through market mechanisms (Bădileanu, 2001; Comănescu, 2000; Leca, 1997).

Among the general principles of public service developed at European level, the following are considered to be defining for the public service in the field of electricity: (1) the principle of operators pluralism (administration, public operator, private or mixed); (2) the principle of public services evaluation (for the regulating authority, as well as for the operators); and (3) the principle of competition and cooperation between operators (the regulating authority has to find the right balance of competition and cooperation between operators) (Bădileanu, 2001; Comănescu, 2000; Leca, 1997).

Although the role of private investors in the energy sector has increased, they cannot solve alone all these problems within the power system. The governments are involved in the issues of the energy sector even if it has a high degree of privatization in some countries. The involvement of the governments may be at local, regional, national and supranational level, and their presence may take the form of partial ownership or control imposed by the legislation. Even though there are very liberal

energy sectors, where the role of market forces is predominant, there is a need of state control, by specific levers of the market economy. This state control is achieved by regulatory agencies that provide access to natural monopoly segments such as transportation networks, licensing and pricing procedures, thus allowing fair treatment to all candidates (Muşatescu, 2003, p. 131). The role of the state in ensuring energy security, as well as in establishing tariff 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, distributors and suppliers; (7) supporting the research and development in the energy sector (Zamfir, 2013). In order to bring the energy companies in an efficient operating condition it is necessary to adapt them to changes that occur in the environment in which they operate. Restructuring and privatization of the energy system entail changes of the companies' objectives, emphasizing the objective of obtaining financial returns on invested capital. Therefore, 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. The role of the state in administrating the energy sector is nowadays more diverse and deeper and even though its actions do not lead automatically to the removal of all imbalances, it is necessary that the policy makers to analyze the energy market situations in terms of cost-benefit correlations, social equity principles and environmental protection.

CONCLUSIONS

This study has revealed that nowadays there is a need of reconsidering and intensifying the role of the state in the field of renewable energy. 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. The results of this study may be used for future research in the area of implementing renewable energy projects.

REFERENCES

- Applica & Ismeri Europa (2011), Inception Report, Expert Evaluation Network Delivering Policy Analysis, Contract No. 2010.CE.16.B.A.T.041. Retrieved June 25, 2011, from <http://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/eval2007/expert_innovation/inception_rep_2011.doc>.
- Bădileanu, M. (2001), *Prețurile energiei electrice și analiza valorii*, Bucharest: Editura Economică.
- Brown, R. L. (2001), *Eco-economie. Crearea unei economii pentru planeta noastră*, Bucharest: Editura Tehnică.
- Comănescu, M. (2000), *Politici energetice europene*, Bucharest: Editura Economică.
- Consiliul Mondial al Energiei (2003), *Trăim pe o singură planetă. Dezvoltarea durabilă văzută dintr-o perspectivă energetică*, Bucharest: Editura Academiei Române.
- Holdren, J.P. (1997), "Federal Energy Research and Development for the Challenges of Twenty-First Century", Report of the Energy Research and Development Panel of the President's Committee of Advisors on Science and Technology, Washington D.C.
- Intergovernmental Panel on Climate Change (IPCC) (2008), "Climate Change and Water", Technical Paper of the IPCC, Document IPCC-XXVIII/Doc.13 (8.IV.2008).
- Leca, A. (coordinator) (1997), *Principii de management energetic*, Bucharest: Editura Tehnică.
- Mușatescu, V. (2003), *Politici investiționale în domeniul energiei*, Bucharest: Editura Tribuna Economică.
- Păceșilă, M. (2013), "Analysis of the Balkan Countries Policy on Renewable Energy Sources: the Case of Bulgaria, Romania and Greece", *Management Research and Practice*, vol. 5, issue 1, pp: 49-66.
- Popescu, R.I. (2007), *Orașul și competiția urbană*, Bucharest: Editura Economică.
- The European Parliament and the Council of the European Union (2009), "Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC". Retrieved March 25, 2011, from <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT>>.
- UNEP (2011), "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication". Retrieved November 14, 2012 from <www.unep.org/greeneconomy/>, <http://www.unep.org/greeneconomy/Portals/88/documents/ger/ger_final_dec_2011/Green%20EconomyReport_Final_Dec2011.pdf>.
- Yoda, S. (1995), "TRILEMMA: Three Major Problems Threatening World Survival", Tokio: Central Research Institute of Electric Power Industry.
- Zamfir, A. (2013), *Managementul strategic al serviciilor de valorificare regională a energiei regenerabile*, Bucharest: Editura ASE.