

# Barriers to Investment in Energy from Renewable Sources

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## ABSTRACT

*This paper attempts to create an overview of the current situation in the Romanian energy sector, pointing out elements of energy demand, production, investment in the sector and not least the potential of renewable energy sources.*

*As Romania has aligned itself with the European Commission's 20-20-20 program, an important step in achieving the set targets is represented by a significant amount of investments in the development of energy from renewable sources. But there are a number of challenges that investment projects may face, namely, barriers more or less deliberate, more difficult or easier to overcome or remove, some of them real market distortions and others coming from the comparison between green energy and classic sources of energy.*

*So, the last part of the work is dedicated to these barriers. Dividing them into four categories administrative barriers, technical and technological barriers, market barriers and economic barriers allows a better distribution of the identified barriers. It is a comprehensive and equitable approach than their splitting into cost barriers and non-cost barriers, which would have meant a long list for the second category specified.*

**KEYWORDS:** *barriers, energy potential, investment, renewable energy*

**JEL Classification:** *Q20, Q40, Q41, Q42.*

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## Introduction

Approximately 20% of the world population consumes 60% of the total energy produced, and the remaining 80%, representatives of less developed countries or developing countries, consume 40% of the total energy produced (Mohammad & Munim, 2010). No matter the way this consumption is divided, the fact is that it is in a period of continued growth. The advocates of environmental policies and projects see only the negative effects of this consumption, effects that are focused on: a high consumption of conventional resources, namely a decrease in oil, natural gas and coal reserves, an increase in pollution, global warming by increasing emissions of greenhouse gases etc.

To ensure sustainable development, a first solution would be to use renewable energy sources, thereby reducing the dependence on fossil fuels, covering a large part of energy demand and reducing the degree of water, air and soil pollution. This is possible through the investment process, as the only support for economic development (Cicea, Vasilescu & Banacu, 2009).

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Among EU objectives set out in An European Strategy for smart, ecological growth and favorable to inclusion, are: reduction of greenhouse gas emissions by at least 20% below the 1990 (...); increase to 20% of renewables share in final energy consumption and an increase of energy efficiency by 20%.”

Romania is in line with EU objectives, trying to increase usage of renewable energy from 17.8% in 2005 to 24% in 2020 to reduce emissions of greenhouse gases by 21% and to use 10% biofuels in the composition of fuels by 2020 (European Commission, 2010). This can only mean the need to develop investment projects in the field, to help achieve the targets set. According to the literature and given the relative novelty of renewable energy is necessary to identify those elements that constitute barriers to the development and implementation of investment projects. They are mentioned in the second part of the paper, whereas in the first part, was shaped an image of the Romanian energy system in terms of renewable energy and investments in the energy sector.

## **1. Romanian Energy Sector**

In Romania, energy is produced primarily in plants based on coal, natural gas and oil, plus energy from hydropower and since 1996, nuclear power (CNE Cernavodă, 2004). We have three big energy consumers (REECO Group, 2009) in order of consumption: industry, households and transport.

The entire energy sector is regulated by the National Regulatory Agency in the Energy Field – ANRE is the abbreviation in Romanian, which “has the mission to create and enforce regulations necessary for the energy sector, heat and natural gases market functioning.” (ANRE, 2011) It is about their functioning in conditions of efficiency, competition, transparency and consumer protection. In the same time and a system is needed to implement the necessary regulations for energy efficiency and to promote the use of renewable energy by final consumers.

Although it is considered to be an authority of national interest, ANRE is suffering political influence since Romania's Prime Minister appoints the President of the Agency. The European Commission has threatened with applying sanctions precisely because of this and lack of specialized people to leading positions (Bujac, 2011).

National companies acting in the energy field (Dragoman Development, 2010): Nuclearelectrica for generating nuclear energy, Hidroelectrica for hydropower production, Termoelectrica for energy and electricity production, Transelectrica for energy transport, Electrica for distribution and supply of energy, Romgaz the largest national producer of natural gas, Transgaz, a national gas distribution company.

### **1.1. Renewable Energy in Romania**

In the National Plan of Action in the Field of Energy from Renewable Sources, abbreviated PNAER (MECMA, 2010) are specified types of energy resources for our country, but also the potential of renewable energy. But use of these sources is restricted, therefore the potential is lower than that presented in Table 1, because of technological barriers, implications of economic efficiency but also on the environment. All values are in thousands toe, this measure unit meaning thousands tones oil equivalent.

**Table 1. Annual potential of energy from renewable sources**

| Nr. Crt. | Renewable source of energy | Annual energy potential (thousands toe) |
|----------|----------------------------|---|
| 1.       | Solar termal energy        | 1 433                                   |
| 2.       | Photovoltaic solar energy  | 103,2                                   |
| 3.       | Wind energy                | 1 978                                   |
| 4.       | Hydro energy               | 3 440                                   |
| 5.       | Geothermal energy          | 167                                     |
| 6.       | Biomass                    | 7 597                                   |

Source: PNAER

Romania produces and consumes energy from renewable sources (sources mentioned in Table 1), according to Eurostat (Eurostat, 2011b) and presented in Table 2:

**Table 2. Production and consumption of energy from renewable sources in period 2002-2008**

| Indicator   | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|------|------|------|------|------|------|------|
| Primary production of renewable energy (thousands toe)                      | 3748 | 4061 | 4594 | 4984 | 4831 | 4717 | 5418 |
| Gross internal consumption of energy from renewable sources (thousands toe) | 3749 | 4002 | 4567 | 4940 | 4781 | 4753 | 5483 |

Source: Eurostat, 2011a

If we study briefly the data presented in Table 2, we see that in certain years, gross internal consumption exceeds renewable energy production. This is possible because Eurostat calculates this consumption, summing the primary production with recovered products, with total imports and stock changes, minus total exports and bunkers. Bunkers include, as National Institute of Statistics defines it, quantities of fuel delivered to ships, regardless of the flag they fly. It does not include quantities consumed by all vessels operating in inland waters.

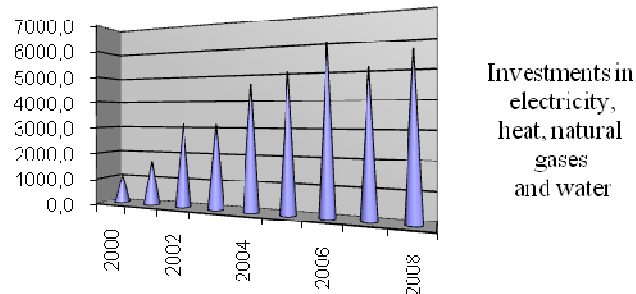
## 1.2. Investments in Energy Sector, Especially in Renewable Energy

Promotion of investment projects in renewable energy (wind, solar, biomass, geothermal, including municipal waste) and harmonizing the legal framework“ (MECMA, 2010) is one

of the directions for achieving the strategic objectives in the energy sector, namely ensuring energy security for our country.

Typically, such investments are characterized by: substantial financial costs, the investment recovery takes place over the years, there are elements of risk and uncertainty about future flows of income and expenditure (Popescu, 2011).

In Romania's Energy Strategy for 2007-2020 (ENERO, 2007), an estimated 1.8 billion needed for investment in new electricity generating capacity, with operation period of 2007-2015, "so electricity gross consumption from renewable sources to be 33% in 2010 and 35% in 2015 from gross national electricity consumption." In 2008, according to Eurostat (2011b), it was 20.4%, amounts for 2009 are not specified, so it remains to be seen whether Romania has managed to reach the target in 2010.



**Figure 1. Investments in electricity, heat, natural gases and water**

*Source:* after data from INS, 2009

In the period 2000-2008 investment in energy development (in lei million current prices), including gas and water, was that of Figure 1, with a peak in 2006 (INS, 2009).

To achieve the targets mentioned in PNAER, Romania would require investments worth 2700 million Euros by 2015 (Wind Alliance Group, 2010). From what sources can come these investments? Romanian State and the European Union make available to investors, the following (GIR Services AS, 2009):

- EFRD - European Fund of Regional Development – Sectoral Operational Programme Increase of Economic Competitiveness, by Priority Axis 4: Increasing energy efficiency and security of supply, while fighting against climate change.

Key Area of Intervention 1: Efficient and sustainable energy.

Key Area of Intervention 2: the use of renewable energy sources to make green energy.

- EAFRD - European Agricultural Fund for Rural Development - Measure 121 - Modernisation of agricultural holdings

Axis I: Improving the competitiveness of agriculture and forestry sector;

Measure 121: Modernization of agricultural holdings;

Types of projects that may be funded: Investment for the production and sustainable use of renewable energy on the farm, establishment of crop forestry species with short rotation and regenerating by vegetative way to produce renewable energy.

- Governmental funds - Environment Fund, managed by the Environment Fund Administration

Types of projects funded: Increasing production of energy from renewable sources.

## **2. Barriers to Develop Investment Projects in Renewable Energy**

There are many barriers, which constitutes in most of the challenges for development of investment projects in the energy sector, especially in developing projects that focus on renewable energy. Therefore, we conducted a grouping of them into four categories that will be presented below.

### ***Administrative barriers***

A study of 27 European Union countries (Ecorys Nederland BV, 2010), including Romania, reveals that energy sector stakeholders identified a number of administrative barriers, meaning all types of difficulties encountered by them in the implementation of investments, difficulties that relate to working with people and public institutions. These barriers will be presented in an order that shows that they were mentioned too many times, meaning they were often identified as appearing in the stakeholders' mentions. Thus among the administrative barriers include:

- *Insufficient spatial planning*

For most technologies of renewable energy obtaining, sites need considerable length, for example wind power plants. Thus, in many places exploitation of this energy is viable, from different reasons it cannot be determined a suitable location for energy power plants.

- *nimby attitude*

Nimby stands for "not in my back yard". The nimby effect or attitude can be translated here as a reluctant attitude towards a project of general interest (Wikipedia, 2011), the social opposition as a protest against construction of buildings usually near houses.

- *troublesome procedures*

It refers to the time (a lot of time) needed to obtain authorization in order to develop, implement investment projects in renewable energy.

- *too many authorities involved*

Closely linked to the above mentioned, this barrier is related to excessive number of authorities involved in licensing procedures.

- *local government*

The reasons for which the actions of local authorities can be seen as barriers may be: considering that such a project would have negative impact on tourism, the local population's disagreement, the influence of groups in the energy field.

- *lack of experience*

In most cases, those dealing with permit procedures, lack of expertise on RES, Renewable Energy Sources, delaying or refusing to grant permits.

- *uneven application of law*

It was found that many times, the same legal provisions are applied differently depending on the region, territorial administrative unit etc. This is possible because the laws are suffering from political influence and are constructed so as to leave place for interpretation.

- *an unclear administrative framework*

This includes corruption, conflicting statutory provisions, the discretionary power of the administration, lack of transparency.

- *Government attitude*

The attitude of government refers to the way is involved in energy system operation, the ways of intervention in the energy market through various measures and regulations.

### ***Technological and technical barriers***

This category of barriers relates to the degree of novelty of the technologies that are used depending on the type of renewable energy. Also new technologies compete with old technology (Union of Concerned Scientists, 2009), so the first two barriers are materializing. Their order of presentation is random.

- *lack of economies of scale in production of technology for obtaining renewable energy*

Economies of scale can lead to lower price units of production, even if we're talking about technology for obtaining wind, solar or biomass energy. But as long as demand for these technologies is low, then the production level will be low, therefore costs will remain high.

- *infrastructure*

Investments in renewable energy also imply investing in infrastructure construction, which at least in the early years is reflected in higher costs of electricity supply from renewable sources exploited. Also, negative implications arise when access to a power transmission line is difficult. In the same time, environmental aspects are taken into account, namely negative influences that future technology may have on the environment.

Some authors (Beck & Martinot, 2004), are including the following two barriers in the category market barriers, but we included them here, since are clearly referring to the technique and technology used. Perhaps a better classification of them was in a separate category that relate to social barriers, as it concerns employment which will operate with different technologies.

- *lack of technical skills*

Technical skills it is primarily aimed at those who will work directly with the technology of producing energy from renewable sources and will perform any installation, operation, maintenance. These skills are affecting them and those who develop the project, the engineers, managers, architects and so on, because their absence will complicate decisions on correlating technological characteristics with existing resources, needs for maintenance, identifying operating costs etc.

- *lack of information on new technologies*

Technologies used in the production of renewable energy are relatively new, little know information about them so that they understand how they work. Not many know, for example, that solar energy can be obtained also when the sky is not blue. This is possible because we are talking about solar thermal and solar photovoltaic (based on light).

- *Inadequate technical studies*

Inadequate technical studies are the result of incorrect measurements of solar radiation at ground level or on wind power regions. An example is wind power plant in Prahova County, built in 2001, that never worked at full capacity and was doomed to failure (Eco Pontica, 2006).

#### **Market Barriers**

- *the size of investment projects*

If the investment project is expected to be implemented by a small company, therefore it will not refer to a technology or large facility. Such a company will not be able to state and attract customers, its power of decision within the sector will be low.

- *cost of transportation for energy from renewable sources*

It is usually high, as production units, such as wind power plants or of biogas production can be located away from population.

- *consumers' choices*

Although many people say they are willing to pay more and use renewable energy sources, when it comes to choose, they choose the lower tariff against the tariff which ensures environment protection.

- *price formation rule*

Two aspects of renewable energy use can be discussed. The first refers to a situation where this energy is included in the national network, and people pay the same costs of distribution, whether or not they are near the plant. The second refers to the fact that the relevant authorities governing the non-domestic electricity prices.

- *restricted access for new competitors*

In practice, market access for new producers or small producers is restricted by traditional companies on the market, which also develop green energy projects.

#### **Economic barriers**

Among economic barriers, we can identify those related with risk, financing and cost (Duffey, 2010).

- *high economic risk*

This refers to the fact that after implementing the projects, the market is the one which determines the prices, without taking into account the high initial costs and lower operating costs, which could provide long term stability of prices.

- *obtaining financing*

In this regard, small producers are concerned, since most often have no collateral required to borrow funds.

- *Higher initial investment*

Although operating costs are lower, initial costs are high, which may mean that a plant that produces energy from renewable sources has a capacity per monetary unit invested less than conventional energy plants.

### **Conclusions**

Renewable energy sources have great potential in our country, so that investment projects can be developed to ensure a green energy production, necessary for a sustainable future.

Through this work, we tried to outline the barriers that tend to limit the development of renewable energy, without claiming that we have given them all. These are just some of the most common challenges when it comes to investment in RES projects. Grouping them into four categories is one chosen by the authors in the literature can be found several approaches.

The reported barriers can be eliminated through various policy measures in the energy sector and beyond. Identifying and removing them is important, since many of renewable energy sources are produced with low cost at small scale, on niches. For example, photovoltaic panels are still not effective in large-scale applications.

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