

GREEN ELECTRICITY IN ROMANIA DEVELOPMENTS AND CHALLENGES

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The present paper examines the support scheme for renewable electricity and intends to identify the effectiveness level and effects that the instruments induce. Since there is no optimal support scheme, the policies should consist of a portfolio of measures to support the deployment of the relative high renewable energy sources potential.

Keywords: support scheme, renewable energy, assessment.

1. Introduction

In 2001, Romania ratified the Kyoto Protocol as an Annex I party with a commitment inscribed in Annex B. The Romanian National Energy Regulatory Authority (ANRE) together with the Government introduced at the end of 2005 a Quota System with Tradable Green Certificates (TGC) to promote electricity from renewable energy sources (RES-E). The concept consists of the electricity suppliers' obligation to buy annually a number of green certificates that is equal to the quota-determined amount of energy supplied. The producers can sell the green certificates (GC) in order to gain an extra income. The expected impact of the scheme implementation on a long-term is that it will increase electricity prices, which will cause affordability issues for households. So that the measures have to be carefully evaluated and optimized in order to achieve the targets.

An overview of the energy sector in general in Romania by comparing the objectives and strategies of the European Union with the one in Romania reveals a partial adaptation of the Romanian results to ones desired at European level as showed in Table 1.

The table above shows that the government has to take the respective measures in a more efficient way. A permanent control over the support schemes is crucial in achieving the desired effects. A more detailed assessment of the support scheme for renewable electricity in particular that focuses on the current effects of the measures taken so far and will provide the base for recommending ways of optimizing the support scheme for this segment of the energy sector.

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Table 1
European objectives and strategies in Romania

European Union – Objectives	European Union - Strategies	Romania - current situation
Development of renewable sources	The development of the energy mix	24 % from the gross energy consumption of 2020
Alternative fuels	Mandatory quota for bio fuels	Compliance with mandatory quota
Reduction of energy demand	Educating consumers, effective use of technology	Lack of educating consumers, low use of new technology, use of old technologies
Fighting climate change	Green certificates Certificate for GHG emissions	Scheme for issuing green certificates, Scheme for issuing GHG permits
Fighting pollution	Waste segregation, recycling, proper storage of waste	Limited waste segregation, limited recycling, improper storage of waste
Stimulating investment in clean energy sources	Ensuring stable legislative framework	Relatively unstable legislative framework
Stimulating investment in achieving energy efficiency	Ensuring stable legislative framework	Unstable legislative framework
Mitigation of the impact of higher prices	Social protection, Price regulation	Misdirected social protection, Regulation on the prices on the producer side
Europe - leader in terms of energy technologies	Development of Research	Lack of incentives or ineffective incentives in developing research activities
Development of internal markets in electricity and natural gas	Open competition and effective regulation	Presence on the market of: ANRE, OPCOM with certain dysfunctions in their activities

Section 2 presents the Romanian Quota System in detail. In section 3, the paper presents the barriers hindering the effectiveness of the support scheme. The non-technical aspects and grid access issues that obstruct the deployment of RES projects presented in the specific conditions of the country make clearer the aspects that need improvements. Section 4 concludes and proposes an additional instrument to the promotion scheme.

2. Romanian support scheme for RES-E

Since Romania became an EU-Member State, the government agreed to achieve a target for renewable electricity. The target for 2020 is 38% for RES-E from the gross electricity consumption. Producers of RES-E sell the energy on the electricity market and they get a number of certificates for one MWh of electricity delivered into the national electricity network, which they can sell for an

additional income. The generated power from RES has access with priority, as long as this has no negative impact on the safety of the National Energy System.

In theory, the quota system is the instrument that guarantees the achievement of the targets, because it regulates the quantity of RES-E over a long period [1]. In addition, because companies compete on the electricity market and on the green certificates market the Romanian quota system is compatible with the principles of a liberalized energy market. By observing the GC-market in the past years, we concluded that the market was stable enough to provide the maximum revenue level for the RES investors. Still ANRE adjusted the mandatory annual quota instated initially due to the low number of certificates that was issued each year. The resulting mandatory quotas were very small in comparison to the one established by law. Figure 1 shows the difference between the established quota at the beginning of each year and the revised quota.

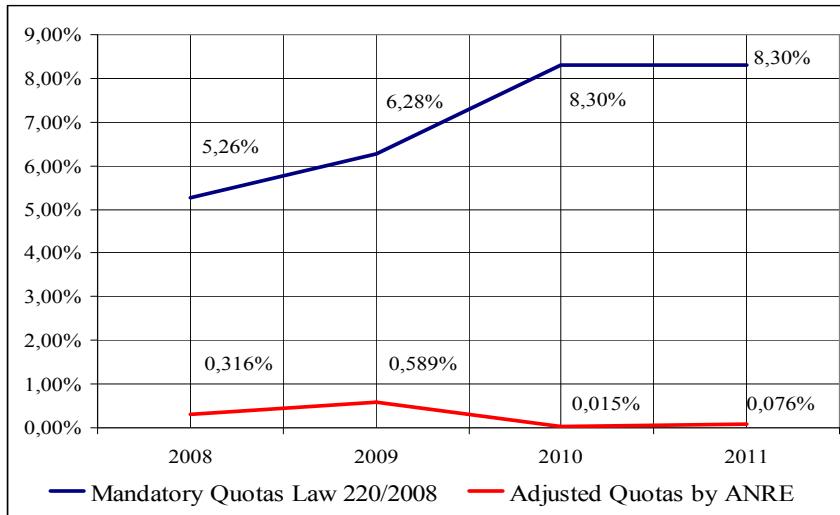


Fig.1. Planned vs. adjusted mandatory quotas

ANRE was entitled to do this adjustment because one cannot penalize the supplier who supposedly wanted to buy the GC but could not do so due to the insufficient number of certificates offered on the market. The adjusted quotas are a sign that the support scheme does not incentivize the development of RES in the desired way.

An assessment of the Romanian support scheme for RES-E in terms of efficiency will help identify future challenges and ways to optimize the existing instruments and a “precondition for effectively functioning RES-E markets”[2].

In order to see if the support scheme was effective with respect to RES-E penetration on the electricity market, the method compares the achieved RES-E generation to the amount of RES-E targeted in 2020. The evaluation shows for

any given technology, e.g. wind, if the generated power increased since the introduction of the Quota System. The effectiveness indicator for that given technology is calculated.

By effectiveness of a scheme for the promotion of renewable electricity, it is understood “the increase of electricity generation potential due to this policy as compared to a suitable reference quantity. Such a reference quantity could be the additional available renewable electricity generation potential or the gross electricity consumption“

“In more complex terms, effectiveness is defined as the ratio of the change in the electricity generation potential over a given period of time to the additional realisable mid-term potential by 2020 for a specific technology” [3].

The assessed potential takes “into account the country-specific situation as well as realisation constraints” [4]. Romania had in 2006 an achieved potential of RES of 18,3 TWh [5]. This means that in 2006 the additional generation potential until 2020 was 32,6 TWh. In 2009 the additional generation potential was 35,2 TWh. The fact that the additional generation potential for all RES increased instead of decreasing after the implementation of the support scheme is due to the major dependency on hydropower. Excluding wind, for the other RES-E technologies was difficult if not impossible to calculate the effectiveness indicator due to the existence of only a few small/experimental projects, which the investors announced in the past two years, which are not sufficient to describe a market segment.

Using statistical data from the National Institute of Statistics, we calculated the effectiveness indicator for wind for the year 2009 ($E_{wind,2009}$) as being equal to 0.47% according to the formula introduced by the OPTRES Final Report presented in the equation below [6].

$$E_n^i = \frac{G_n^i - G_{n-1}^i}{ADD - POT_{n-1}^i} \quad (1)$$

E_n^i Effectiveness Indicator for RES technology i for the year n

G_n^i Electricity generation potential by RES technology i in the year n

$ADD - POT_{n-1}^i$ Additional generation potential of RES technology i in the year n until 2020

We compared this value to the ones shown in the report “Monitoring and evaluation of policy instruments to support renewable electricity in EU Member States”. The average annual effectiveness indicator for wind onshore electricity in the period 1997-2004 for the countries that also had implemented quota system with tradable green certificates was less than 1%. The conclusion is that the market is still immature but since additional projects are under construction, it we expect that the share of wind power will grow. The wind park from Fântânele will

be one of the world's biggest onshore parks, with 600 MW installed power. The development of the installed power in Romania has a spectacular growth as Figure 3 shows.

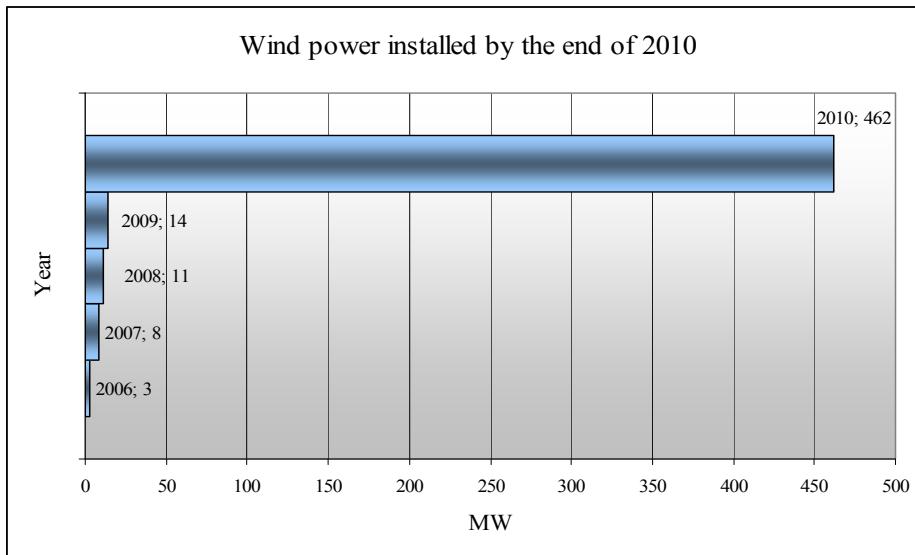


Fig.2. Wind power installations by the end of 2010[7]

The small number of projects involving other renewable technologies does not provide enough data, so that we could consider it for in the present assessment. We recommend that the policy becomes operational, so that investor gain confidence and that the number of solar and biomass projects increase.

3. Barriers for Implementation of Renewable Energy Projects

The main barriers that hinder the development of RES-E project are grid capacity, administrative and other barriers like the one of financial and social nature.

The national power system is currently not stable enough for more than about 4.000 MW installed power from renewable energy and is in need of expansion. In addition to internal network development, the government is planning new interconnections with neighboring countries as mentioned in the Renewable Energy Action Plan from 2010 (concrete plans for interconnection to Serbia, Turkey and Moldova).

One administrative barrier is the slow process of implementing the legislation regarding RES-E [8]. For example, Romania adopted the new Law on the promoting RES-E in 2010 but until October 2011, there was no methodology

to implement the law. Hence, the previous law, Law 220/2008 still applied even though the new law provided higher incentives for the development of solar projects.

The administrative barriers for RES-E from wind are analysed in the WindBarriers [9] project, which gathered information on the administrative and grid access barriers that obstruct the development of wind energy in Europe. The survey shows that Romania has relatively short lead times. The total lead time is 31.65 months, lower than the EU average (54.80 months). Therefore, administrative procedures are not the main reason for the low installation level (only 14 MW cumulative installations at the end of 2009). However, a critical drawback of the survey is that the results may not be representative given the small number of respondents (less than four projects).

The main barrier for biogas, presented in the “Report on barriers for biogas implementation in Romania” [10], is the decline of the Romanian agriculture. Other barriers include financial or social aspects that are also encountered on the path to develop any other renewable projects. By considering, the non-technological barriers related to the use of biogas plants the authors of the study aimed at identifying and describing market, financial and other related barriers for biogas implementation in Romania. The decline of the agriculture in general and decline of specific sectors in agriculture seem to be the serious issues threatening the development of biogas-related projects.

Financial barriers include the long payback period and high costs. The high risk of the projects makes it difficult to get financial support from commercial banks. Social barriers include the lack of communication between the investors and local communities. The social acceptance of RES is good. From the consumers point of view the mistrust comes sometimes from the lack of information. The intermittent character of RES or concerns about increasing energy bills, that RES promotion could generate on short term, are other important barriers. Overall, the lack of a vision in dealing with renewable energy projects is the main barrier that the authorities need to overcome.

Increasing taxes (VAT percentage increase from 19% to 24%) and the 25% cut-off from the revenues of the state employees have put a high pressure on household budgets. This affects overall the payment of household expenditures.

A recent study [11] states that a Romanian family spends 24% of its annual income to pay energy bills, which the authors consider to be “energy poverty”. It is recommendable to include people with low incomes in national energy efficiency programs. By reducing their consumption, on a long term, they will need less assistance. The statistics show that people already have problems to pay the bills for electricity on time as seen in Table 2. Therefore, the additional increases of the bills will make this issue an even more serious one.

Table 2
The percentage of households, which could not pay on time the electrical energy expenditures

Occupational status of household head	Expenditures type which could not be paid on time	2007	2008	2009
		%	%	%
Employee	Electrical energy, radio subscription	47.9	47.2	45.2
Employer	Electrical energy, radio subscription	:	48.4	43.7
Self employed in non-agricultural activities	Electrical energy, radio subscription	71.2	60.6	54.5
Unemployed	Electrical energy, radio subscription	60.1	52.6	66.3
Farmers	Electrical energy, radio subscription	81.8	60.9	69.4
Pensioner	Electrical energy, radio subscription	61.2	48.8	54.6
Other	Electrical energy, radio subscription	68.3	70.4	57.1
Total	Electrical energy, radio subscription	61	51.8	54.2

The biggest challenge facing the deployment of RES projects seems to be the financial aspect. The authorities should face financing and affordability more often in the methodology for the support scheme. In addition, more transparency regarding information and procedures will support the promotion of RES in Romania.

4. Conclusions & Recommendations

The next period (2-5 years) will be a milestone for the development of RES-E projects. The supporting legislation needs to be operational. In addition, if the Government, the Romanian Energy Regulatory Authority and the Ministry of Economy improve their collaboration and show more transparency in order to eliminate as much as possible bureaucratic barriers and shortcomings of the legislation then the scheme could probably provide the necessary incentives for RES-E investors. A more flexible legislation should provide the needed instruments that will adjust the portfolio and overcome the shortcomings of the existing support scheme.

One of the biggest challenges that Romania is facing is How to overcome the limitations of the national power grid system? Solutions could lay in common projects with other countries. For this, investments should aim at strengthening the national infrastructure as well the power grid connections with neighboring countries, so that in case of a surplus the RES-E can be exported or stored. Until 2022, investors plan to develop projects that will increase the capacity of the national power grid as Table 3 shows.

Table 3

Investments in the national power grid up to 2022 [12]

Project description	Estimated year for finalizing the investment
LEA 400 kV Isaccea(RO)-Varna(BG) și Isaccea(RO)-Dobrudja(BG)	2015
LEA 400 kV d.c. Smârdan – Gutinaș	2016
LEA 400 kV d.c. Cernavodă – Gura Ialomiței – Stâlpu	2020
400 kV Stâlpu – Teleajen – Brazi	2018
LEA 400 kV s.c. Suceava – Gădălin	2021
CHEAP Tarnița Lapuștești	2019
LEA 400 kV d.c. Medgidia – Constanța	2020
LEA 400 kV s.c. Portilede Fier – Reșița	2016
LEA 400 kV România – Serbia	2019
LEA 400 kV Reșița – Timișoara – Săcălaz	2022

Since the introduction of the support scheme wind-power projects developed in a spectacular way. The effectiveness indicator for wind for the year 2009, ($E_{wind2009}$) was 0.47% revealing a still immature market, but with large ongoing projects that will increase the share of RES-E from wind power.

Moreover, the authors of some of the mentioned studies expect that on mid-term other RES projects like the use of biomass or photovoltaic parks would become operational due to a higher promotion in the legislation.

Nevertheless, a critical aspect is the affordability of energy bills that will increase in order to cover the present and future investments. Two of the most important players in the electricity market ANRE and Transelectrica analyzed the impact of investing in renewable electricity and measured the increase of the electricity price. The ANRE analysis from 2011 reveals an up 23% electricity price increase in 2020 at the final electricity consumer. The analysis takes into account the cost of the support scheme for renewable energy sources. The other analysis, the one that Transelectrica made in 2011 considers the costs for maintaining the safety and stability of the national power grid. This analysis forecasts a price increase between 1.5 Euro/MWh and 2.5 Euro/MWh. Keeping this in mind, it is obvious that the social protection system is in need of

reorganization and has to focus on energy efficiency. Saving energy is the most efficient measure on a long term and could keep people with low incomes away from energy poverty and allow them to live in conditions that are at least similar to the ones they had up to this point.

The Romanian support scheme envisaged first large scale RES projects. It is important that the support measures reach also the small-scale projects. This way the government can diversify the portfolio of the support scheme, by incentivizing small-scale projects to use RES-E. The instrument could envisage households or small businesses that can afford the initial investment. The concept focuses on the consumer that is in the same time a producer. The owner of a small-scale project should agree to a long payback period. Some regulations regarding prices and ways of selling electricity/GC have to complete the relationship between supplier and consumer. The project must be approved by the corresponding authority as a RES-E producer and receive GC for the respective amount of generated electricity. While the producer sells the green certificate along with the delivered quantity of RES-E, he receives the maximum price for the GC and the market-clearing price for the generated electricity. This is similar to a feed-in tariff system. The supplier has to agree to share the burden of interconnection costs and buy the electricity over a long period. Even if the proposed sub-scheme would take into account different technologies, by offering technology specific payments, it does not include competition. This instrument can bring higher shares of RES-E. If the respective authorities implement the process for a sufficient period, so that the investor can recover his initial investment and have a surplus over time, this could become an interesting instrument of the scheme.

Also promoting demand side management and energy service companies are other possibilities to improve the portfolio of instruments in supporting renewable electricity related projects [13]. ESCO companies focus on developing energy-saving projects including energy conservation, infrastructure improvement, generation and supply and risk management. ESCO provides a detailed analysis of the objective, develops an energy efficient solution, installs and maintains systems necessary elements to ensure energy savings during the payback period.

The managerial experience is often a weakness of the leaders of public institutions. In particular, the management skills are vital to successful projects. In addition, the involvement of the private sector in public institutions can bring a risk-sharing effect, when a third party provides new financing sources and managers that are more competitive. Other important elements are communication strategies and actual implementation of projects at local and national level.

To make the necessary changes in public institutions of the energy sector, our country could also learn from private companies that have successfully

adapted to today's constant changes. Since there is no optimal support scheme that can promote successfully all technologies, the energy policies should consist of a portfolio of instruments and decisions should consider long and stable developments.

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