

SUSTAINABILITY RENEWABLE ENERGY PRODUCTION

Phd. Gabriela PICIU, Senior Researcher

”Victor Slăvescu” Financial and Monetary Research Center,
Romanian Academy, Romania
Email: gabriela_piciu@yahoo.com

Abstract: Article includes a brief overview of the situation of the energy sector in the context of sustainable development and the need capitalization of renewable energy sources. Sustainability Romanian energy sector is of major importance, given that one of the basic pillars of economic policy, included in the Europe 2020 Strategy is to increase resource efficiency and energy security's rate. Europe 2020 strategy were assumed lines of action for sustainable development of the energy sector: increasing the share of renewable energy, improving energy efficiency, reducing emissions of greenhouse gases. Also, the article proposes solutions to the proper management of renewable energy sources and reduces anomalies renewable market in Romania. Harnessing renewable energy sources utmost interest to all countries, especially in Europe, as a country's energy policy must permanently ensure a balance between security of supply, competitiveness and economic viability and the environment.

Keywords: renewable energy, efficiency, sustainability, reducing emission, dynamic harmony, energy generation.

JEL Classification: Q42, Q43, Q48.

1. Introduction

Interrelationship between energy, economy and environment, and the role of the international market economic future of a country is widely recognized today. Progress depends largely on the ability of countries and use of energy resources so as to be able to enhance economic competitiveness, protect the environment and maintain national security.

European Community decided to address environmental issues through collective action at the global level, which sought to define and implement them through an appropriate international framework. Internationally, this framework has been done time being in a dynamic evolution, including legal action, both binding - in the form of treaties or conventions and non-binding - in the form of declarations, resolutions, sets guidelines and policy guidance, institutional arrangements and funding mechanisms viable.

2. Energy market in Romania

In Romania, energy transactions are carried out on two markets, the regulated market and competition, which are divided into the wholesale market, the retail market and green certificates market.

If the regulated market, the amount of energy supplied and charges are established through contracts are regulated, competitive market they are based on the principle of supply and demand. Competitive market is divided into three markets: wholesale, retail and green certificates.

Wholesale market was for the fact that electricity is purchased from producers or other suppliers for their own consumption or resale, and network operators to cover its own technological consumption. It is divided into bilateral contracts market, day-ahead market, balancing market and ancillary services market.

The retail market is characterized by the fact that electricity is purchased by final consumers for their own consumption or aggregators. The evolution of the electricity market and its value in Romania is shown in Table no.1.

Table no. 1. Evolution of the electricity market and its value energy in Romania

Net acquisition	2013		2014		2015	
	Competitive market	Regulated market	Compet. market	Regul. market	Compet. market	Regul. market
Quantity [GWh]	25.451,36	18.963,24	29.239,83	15.213,24	32.088,37	14.128,40
Value [thousand lei]	5.579.995	3.481.982	5.498.529	2.449.168	5.558.921	2.313.050

Source: Data processed by the author based on statistics ANRE (2016)

In the electricity market plays an important role in the energy market from renewable sources, competition in terms of producers and suppliers, but regulated in transport and distribution.

Market instruments competitive energy sources are bilateral contracts between generators and suppliers, concluded to smooth consumption related to eligible consumers import contracts related suppliers, export contracts, contracts for import of domestic producers to ensure obligations under bilateral contracts market transactions spot market transactions green certificates for contracts. Service transmission system and distribution service of carriers or distribution.

3. Market evolution of energy from renewable sources in Romania

Renewable energy market is in a process of dynamic evolution, transmission and distribution form a monopoly and are enacted, introducing government policies and social.

Although market producers of energy from renewable sources (RES-E) are more numerous, thus competing market still tends to be oligopolistic, individual companies can influence the price.

Number of E-RES accredited steadily increased from 3 in 2005 to 696, 70 of them using wind energy, 87 energy using hydraulic power plants with installed power of 10 MW, 514 of solar and 25 using biomass in 2015 (Figure no.1).

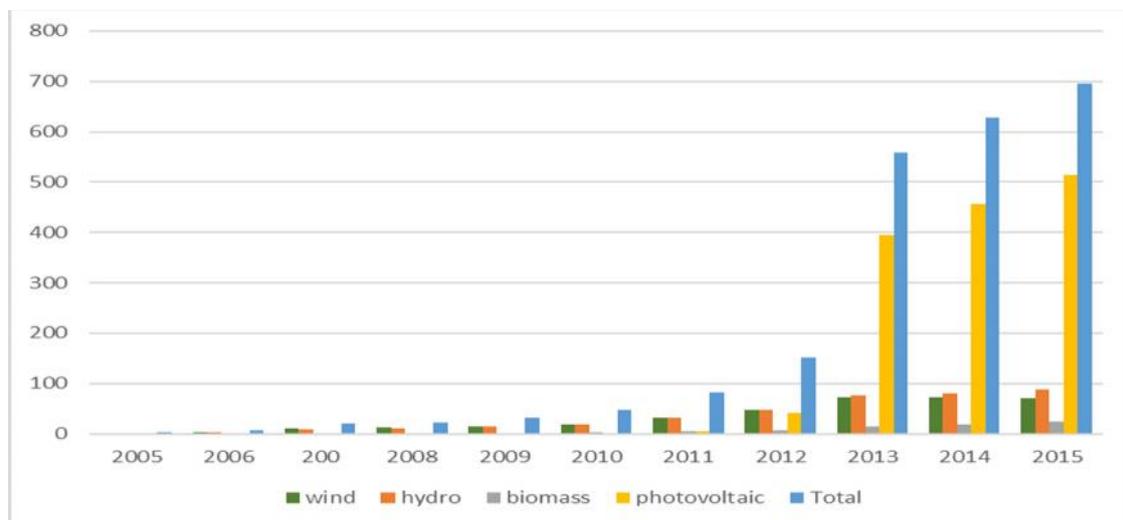


Figure no. 1. Total number of producers accredited for producing E-RES

Source: Data processed by the author based on annual reports ANRE (2016)

Green certificate market is a separate market for the electricity market operating under competitive mechanisms, supply and demand of green certificates.

Their purpose is to enable gradually developing new technologies for the production of electricity from renewable sources without public aid. It can be seen that the system based on price there is no limit regarding the amount of energy produced, it allows forecasting results, revenues and also the realization of a long-term business plan.

The Second correlation system requires energy from renewable energy sources (RES-E) at the cost of energy from conventional sources. In this system usually use green certificates mandatory quotas combined and used in the United Kingdom, Romania, Sweden, Belgium, Italy and Poland. With this combination, the amount of power is set by the government and the market price of green certificates.

Romania practice since 2005 when it was created and green certificates market, the second tariff system for electricity produced from renewable sources, where each megawatt of energy produced from RES, each producer receives a green certificate (CV) which It could be exchanged within OPCOM (Electricity Market operator in Romania).

Market green certificates traded certificates attesting 1MWh amount of electricity produced from renewable energy sources. These certificates are issued in order to promote RES-E through a competitive market-oriented mechanism, the mandatory quotas combined with the trading of green certificates (GC) because energy suppliers must purchase a share of E- SER and resell to end users.

These certificates can be traded separately from the associated electricity in a market of bilateral contracts or on the centralized market for green certificates and unlimited validity.

If at the beginning of 2009, renewable energy was weak get a total of 31 producers with a total capacity of 97.28 MW in 2014 can be seen increasing the number of entrants to 672 in 2014 (Table no. 2).

Table no. 2. Evolution of the number of manufacturers and installed energy capacity from renewable sources

Source	No. producer in 2009	Installed capacity (MW) 2009	No. producer of the year 2013	Installed capacity (MW) 2013	No. producer of the year 2014	Installed capacity (MW) 2014
Wind	15	14.1	73	2593.39	87	2759
Hydro	14	74.3	77	531.04	109	542
Biomass	1	8	14	65.87	19	100
Photovoltaic	1	0.88	395	1158.2	457	1227
Total	31	97.28	559	4348.5	672	4628

Source: Data processed by the author based on statistics ANRE (2015)

From Table no.2, it can be seen that at the end of 2013 were cu 18% more producers of energy from renewable sources compared to 2009, which shows an intensification of activities in the field. Also, we can see that the highest increase was recorded in energy that comes from solar power, followed by hydro and wind.

In terms of installed capacity (MV) of E-RES, one can observe an increase of 47.5% in 2014 compared to 2009, which confirms the interest in this field.

In Romania, renewable energy investments were mainly in wind turbines and tanning beds, because of relatively small amounts of starting their rapid recovery with the help of support schemes.

Thus, from 2010 to the present wind brought Romania investment of over 4.5 billion euros in 2012 recorded 923 MW install capacity that exceeds that of a reactor in Cernavod , equivalent to 370 wind turbines.

The development of this field green becomes increasingly more widespread in 2012 as proof that concern public and private actors to promote and attract more investment (Table no. 3) because the electricity from renewable sources is considered a solution depletion of conventional sources of energy and environmental protection.

Table no. 3. The evolution of investments in the field of energy production from renewable sources

New type	Investment (MW) 2011	Investment (MW) 2012	Investment (MW) 2013	Investment (MW) 2014	Total
New technology wind	1.243	1.272	1.015	143	3.673
New hydroelectric	61	67	240	36	403
Biomass Cogeneration	-	30	86	0.384	116
Solar	3	62	1.228	43	1.336
Total	1.302	1.431	2.568	223	5.529

Source: Data processed by the author based on statistics ANRE (2015)

From Table no. 3 it can be seen that investment in renewable energy sector decreased from 2013, the largest decreases were recorded in solar technology and biomass for cogeneration.

Wind farms and tanning beds as Ajuga fourth position in the energy system in Romania, accounting for nearly 16% of energy consumption in 2015 (Table no.4).

Table no. 4. Green energy production, energy consumption and the share of green energy in total consumption

Year	2009	2010	2011	2012	2013	2014	2015
Green energy production (TWh)	0.239	0.67	1.5	3.4	6.2	7.85	8.1
Energy consumption (TWh)	49.92	52.03	53.74	52.36	49.69	50.73	51.74
The share of green energy in total consumption (%)	0.48	1.29	2.79	6.49	12.48	15.47	15.66

Source: Data processed by the author based on statistics ANRE (2016)

Since 2012, Romania entered for the first time in the top 10 countries in the world, according to the attractiveness of the business environment for investors in green energy. Romania also holds a leading position in wind energy in Europe, supported in this position by the generous support scheme in EU.

After more than three years of intensive development and a period of boom in renewable energy, Romania is now a modest place 34 out of a total of 40 countries analyzed.

According to data published by the European Wind Energy Association (EWEA), in 2015 in Romania were installed 10 wind turbines of 23 MW capacity (Figure no.3).

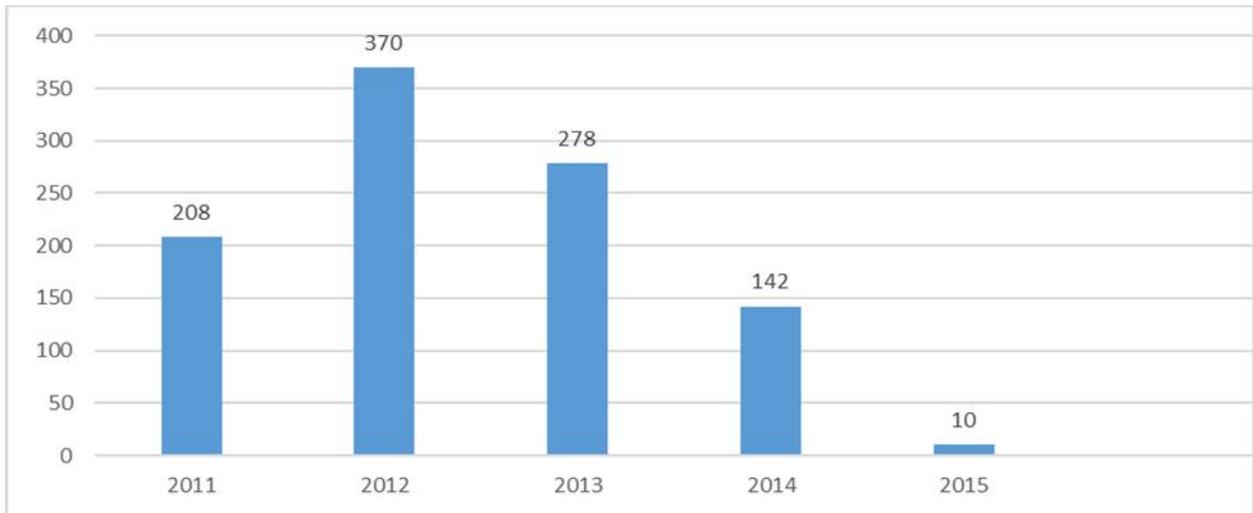


Figure no 3. Evolution of the number of wind turbines installed in Romania during 2011-2015

Source: Data processed by the author based on the annual reports of the European Wind Energy Association (EWEA)

In 2017, which will remain as certificates shall be preserved by ANRE (National Regulatory Authority for Energy) to estimate and calculate the number of green certificates corresponding to each investor. Their value can be used only in 2017, until then it remains blocked.

That payment has been delayed for green certificates produced negative effects, 4 million that had to be collected for the production of green energy from wind in the month of July 2013 will be recovered after January 2017.

For those who put renewable energy systems in operation at the beginning of 2014, it was decided to apply a support reduced. Thus, the end of 2013 the market for renewable energy projects froze many who have invested in this area having significant depreciation of assets (Table no.5).

Analyzing the data in Table 5 we see that the largest groups that had losses in renewable energy were: Czech group from Tomis Team (CEZ-wind), Ovidiu Development (CEZ-wind) and MWTeam Invest (CEZ-wind) The Austrian group Alpha wind (Verbund-wind), Ventus Renew Romania (Verbund-wind) and Italian group Enel Green Power Romania (Enel-wind).

All these groups have recorded losses in 2014. Although most of the money invested by them reached the green energy wind turbine producers accounts abroad, none of these groups having factories in Romania, one quarter of the value of investments remained locally benefiting from other renewable energy related businesses: road builders, electrical works firms, law firms.

However, the latest data from the Registry of Commerce show that among the top ten companies that have accumulated at the end of 2014 losses worth 2 billion lei are found among companies in renewable energy that only a year ago, recorded profits of 500 mils lei.

Table no. 5. Evolution of renewable energy companies

Company	2013		2014	
	Profit / Loss (mil. lei)	Fiscal value (mil. lei)	Profit / Loss (mil. lei)	Fiscal value (mil. lei)
1. Tomis Team (CEZ – wind)	136	524	-506	180
2. Ovidiu Development (CEZ – wind)	36	319	-356	152
3. Alpha Wind (Verbund)	9,5	59	-232	49
4. CAS Regenerabile (Verbund wind)	26	66	-212	46
5. Ventus Renew România (Verbund – wind)	-	-	-177	35
6. M.W.Team Invest (CEZ – wind)	14.2	86.1	-137	43
7. Enel Green Power România (Enel – wind)	248	286	-121	267
8. Eviva Nalbant (Martifer – wind)	11.3	27.2	-67	15
9. GPSB Solaris 48 (Bester – solar)	-0.3	0	-66	40
10. OMV Petrom Wind Power	23.6	51.5	-62	26
TOTAL	504.3	1 418.8	-1.936	853

Source: Data processed by the author based on statistics ANRE (2015)

The best example in this case is the Czech Group CEZ who has invested 1.1 billion Euro in the project for construction of 240 turbines in the town Fântânele-Cogealac (Constan a). CEZ Group results at the end of 2014 were strongly affected by wind project developments with a loss of 871.6 mil. Lei at the end of 2014, given that the company was forced to reassess wind project due to legislative changes that the Romanian state it did in 2013, resulting in a loss of 743.7 mil. lei.

4. Conclusions

Although the liberalization of the energy market is at stake access to energies more competitive and therefore more efficient and cheaper, and the role of a regulated market power should be limited and works until it creates fully competitive market, this has not been valid in Romania (there were difficulties in implementing the legislative package for liberalization). Thus, in a smaller proportion, there regulated market, although in 2007, with the accession to EU, was delineated a suitable legislative framework for liberalization.

Separation zones competitive from the natural monopolies and regulated prices, so as to ensure optimum use of resources natural monopoly of the competitive market is not a solution, as the market becomes attractive only if the size and density it allows competition active more operators. Markets have their own sensitivities and lack of well-designed rules

and development programs can generate huge risks (e.g. crisis in California since 2006 - was necessary introducing market regulator, state intervention). The transition from monopoly to market requires close monitoring of both, while it was observed that separation also requires a more elaborate regulation.

Also, the green certificates remain a sensitive issue for both authorities, especially among renewable energy producers believed they would benefit from government support over a long period of time. Thanks to a very generous support schemes (the most generous in Europe) there is a danger of a phenomenon similar to that produced in the real estate sector in 2006 - 2008 by creating a bubble of investment in non-conventional energies. Investment in renewable bubble would burst after reducing the number of green certificates, which is a government measure. Because they are not yet clear legislative measures to be taken in respect of green certificates are likely to decrease their number or their value reduced.

References

1. Aitken, M., 2010. Wind power and community benefits: Challenges and opportunities. *Energy Policy*, 38(10), pp.6066-6075.
2. Americano, B., 2008. CDM in Brazil: Towards structural change for sustainable development in some sectors. In: K.H. Olsen and J. Fenhann, eds. 2008. *A Reformed CDM Including New Mechanisms for Sustainable Development*. Roskilde: UNEP Ris Centre. pp.23-46.
3. Brunnschweiler, C.N., 2010. Finance for renewable energy: an empirical analysis of developing and transition economies. *Environment and Development Economics*, 15(3), pp.241-274.
4. Clarke, S., 2009. Balancing environmental and cultural impact against the strategic need for wind power. *International Journal of Heritage Studies*, 15(2-3), pp.175-191.
5. Deichmann, U., Meisner, C., Murray, S. and Wheeler, D., 2011. The economics of renewable energy expansion in rural sub-Saharan Africa. *Energy Policy*, 39(1), pp.215-227.
6. European Commission, 2016. *Progress reports - Member State progress reports*. [online] Bruxelles. Available at: <<https://ec.europa.eu/energy/en/topics/renewable-energy/progress-reports>> [Accessed 15 January 2017].
7. Eurostat, 2016. *SHARES 2014: Short Assessment of Renewable Energy Sources*. [online] Bruxelles. Available at: <<http://ec.europa.eu/eurostat/web/energy/data/shares>> [Accessed 15 January 2017].
8. Firbank, L., 2008. Assessing the ecological impacts of bioenergy projects. *BioEnergy Research*, 1(1), pp.12-19.
9. International Energy Agency, 2016. *RD&D Online Data Services, Energy Technology RD&D Budgets: Beyond 2020*. WDS (database). [online] Paris. Available at: <<https://www.iea.org/statistics/rddonlinedataservice/>> [Accessed 15 January 2017].
10. REN 21, 2015. *Renewables 2015. Global Status Report, Renewable Energy Policy Network for the 21st Century*. [pdf] Paris. Available at: <http://www.ren21.net/wp-content/uploads/2015/07/REN12-GSR2015_Onlinebook_low1.pdf> [Accessed 15 January 2017].
11. Saygin, H. and Cetin, F., 2010. New energy paradigm and renewable energy: Turkey's vision. *Insight Turkey*, 12(3), pp.107-128.

12. Thiam, D.R., 2010. Renewable decentralized in developing countries: Appraisal from microgrids project in Senegal. *Renewable Energy*, 35(8), pp.1615-1623.
13. Thompson, S. and Duggirala, B., 2009. The feasibility of renewable energies at an off-grid community in Canada. *Renewable and Sustainable Energy Reviews*, 13(9), pp.2740-2745.
14. United Nations Environment Programme, 2015. *Green energy choices: the benefits, risks and trade-offs of low-carbon technologies for electricity production — Summary for policy makers*. [pdf] Paris: UNESCO, CLD. Available at: <https://www.internationalinsurance.org/files/TC/PDF/-Green_energy_choices__The_benefits__risks_and_trade-offs_of_low-carbon_technologies_for_electricity_production-2016UNEP_GEC_web.pdf.pdf> [Accessed 15 January 2017].
15. World Energy Council, 2010. *Survey of Energy Resources*. [pdf] London. Available at: <www.worldenergy.org/documents/ser_2010_report_1.pdf> [Accessed 15 January 2017].