

PROGRESS MADE BY ROMANIA IN MEETING OBJECTIVES OF THE ENERGETIC POLICY OF U.E.

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Abstract: The article contains an analysis of the way in which Directive 2009/28 / EC was implemented in Romania, reveals the possibilities of increasing the share of renewable energy in the total electricity and the results obtained from the use of renewable energy.

The 2020 Strategy provides for a strong and ambitious European framework for an energy policy based on the promotion of the use of energy from renewable sources with a share of 20% in gross final consumption by 2020 and a 10% share of renewable energy in energy consumption Transport from the same year.

Romania's Energy Strategy for 2007-2020 is based on the main objectives of the EU's energy and environmental policy: 20% reduction in greenhouse gas emissions (or even 30% under favorable conditions) compared to 1990 levels, increasing the share of renewable energy sources to 24% and increasing energy efficiency by 20%.

The article also identifies a series of barriers to further progress in the field of renewable energy in Romania: deviation from its own national renewable energy action plan, persistence of administrative and network barriers in the way The exploitation of energy from renewable sources, the recent disturbing changes in the national system for support for renewable energy.

Keywords: energy from renewable sources, Romania's Energy Strategy, progress in the field of renewable energy, sources and financial flows

INTRODUCTION

The energy challenge is one of the biggest challenges facing Europe today, rising prices and dependence on energy imports endangering the security and competitiveness of the EU Member States.

In order to prevent these risks, clear energy regulations, quantified targets, market-based investments, and incentives compatible with State aid rules of around € 1 trillion over the next ten years are needed to diversify existing resources, replace equipment, The infrastructure of Europe. Reliable integration of renewable energy sources is probably the most controversial factor in sustainable energy supply. This is largely due to the fact that the integration of renewable energy is a complex process because it involves a change in the electricity supply activity, and partly because some renewable energy technologies do not pose additional challenges.

Much of the task is about balancing production and electricity consumption. Delivery and energy demand are physically linked via the electrical network: an increase or decrease must be balanced, and more or less instantaneous.

Electricity is produced by a variety of different technologies and derives from a wide range of energy resources, including fossil, nuclear and renewable. Each of them has advantages and disadvantages in terms of costs, carbon footprint, pollution and impact on the energy system. Therefore, strategic energy policy must avoid a fragmented approach. In many countries, energy policy is increasingly driven by an urgent need to reduce greenhouse gas (GHG) emissions, reduce pollution from conventional fuels and increase fuel security U.E. On energy and climate change

have been incorporated into the Europe 2020 Strategy for smart, sustainable and inclusive growth adopted by the European Parliament and its initiative "Resource efficient Europe".

The 2020 Strategy provides for a strong and ambitious European framework for an energy policy based on the promotion of the use of energy from renewable sources with a share of 20% in gross final consumption by 2020 and a 10% share of renewable energy in energy consumption Transport from the same year. The 2020 Strategy also provides for a 20% reduction in greenhouse gas emissions (or even 30% under favorable conditions) compared to 1990 levels and a 20% increase in energy efficiency

The 20 per cent of the EU target for increasing the share of renewable energy sources for 2020 is a combination of national targets set for each Member State in terms of greenhouse gas (GHG) reductions, emissions, gross final consumption Energy from renewable sources and improving energy efficiency.

Achieving targets for renewable energy and energy efficiency at EU level depends on reaching the national target for each country for 2020.

Goals and trajectories to reduce GHG emissions have been jointly established by all EU Member States, so that the projected reductions in Renewable Energy Sources (RES) in the pre-2020 period were taken into account when they were Established GHG objectives. In addition to the binding targets for 2020, the EU has recently adopted an energy and climate framework for 2030 that provides for three new commitments:

- a 40% reduction in the minimum internal GHG binding reduction compared to 1990 levels;
- a 27% share of energy from renewable sources in the EU's gross final consumption of energy.
- a minimum of 27% indicative improvement in energy efficiency.

The use of energy from renewable energy sources (RES) is important in achieving the transition to the European Energy Union and the benefits of its use consist in reducing GHG emissions, the environmental impact of 3-10 times that resulting from the use of systems based on Conventional resources, reduction of fossil fuel imports, diversification of energy supply and the creation of new jobs, skills and innovation in local markets and progressive sectors with significant potential for growth.

In the run-up to 2020, two interim trajectories are subject to the assessment of the evolution of the EU Member States in their progress towards their binding targets:

- indicative trajectories (minimum) for each country.
- projected trajectories adopted by Member States in their national renewable energy action plans.

The EU's target for renewable energy for transport is 10% by 2020, it is equally divided into 10% national transport targets for all countries. The RED (Renewable Energy Directive) also provides a set of cooperation options in order to help countries reach their cost-effective targets.

Energy produced from renewable sources on a state's territory depends on the economic, political and accessibility of its resources.

PROGRESS MADE BY ROMANIA IN MEETING OBJECTIVES OF THE ENERGETIC POLICY OF THE U.E. INCLUDED IN THE STRATEGY 2020

Strategy Romania's Energy Strategy for 2007-2020 is based on the main objectives of the European Union's energy and environmental policy: 20% reduction in greenhouse gas emissions (or even 30% under favorable conditions) 1990 levels, increasing the share of renewable energy sources to 24% and increasing energy efficiency by 20%. Table 12 discusses how to achieve these goals and how far they are achieved.

Table 1: Ways to Achieve the Goals Committed by Romania in the 2020 Strategy

Objectives	Ways to achieve goals	Achievement of objectives in 2013	2020
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A. Increasing the share of energy produced from renewable sources in the total energy produced of the gross electricity	Increasing the share of energy produced from renewable sources in gross final consumption of electricity. In 2013, the share was 40%	23.90% in 2013, and in 2014 the target was exceeded 26.27%	24%
B. Climate change	Exploiting the potential of renewable energies to reduce greenhouse gas emissions in relation to 1990 levels;	Greenhouse gas reduction by 49.74% in 2013 compared to 1990 and achieving the 9.95% target of the target to be achieved in 2020	20%
C. Energy efficiency	Increasing energy efficiency (expressed as a reduction in primary energy consumption)	7 Mtep (ANRE estimate) 18.5% (ANRE estimate)	10 Mtep – 19%

Source: ANRE data processed by the author

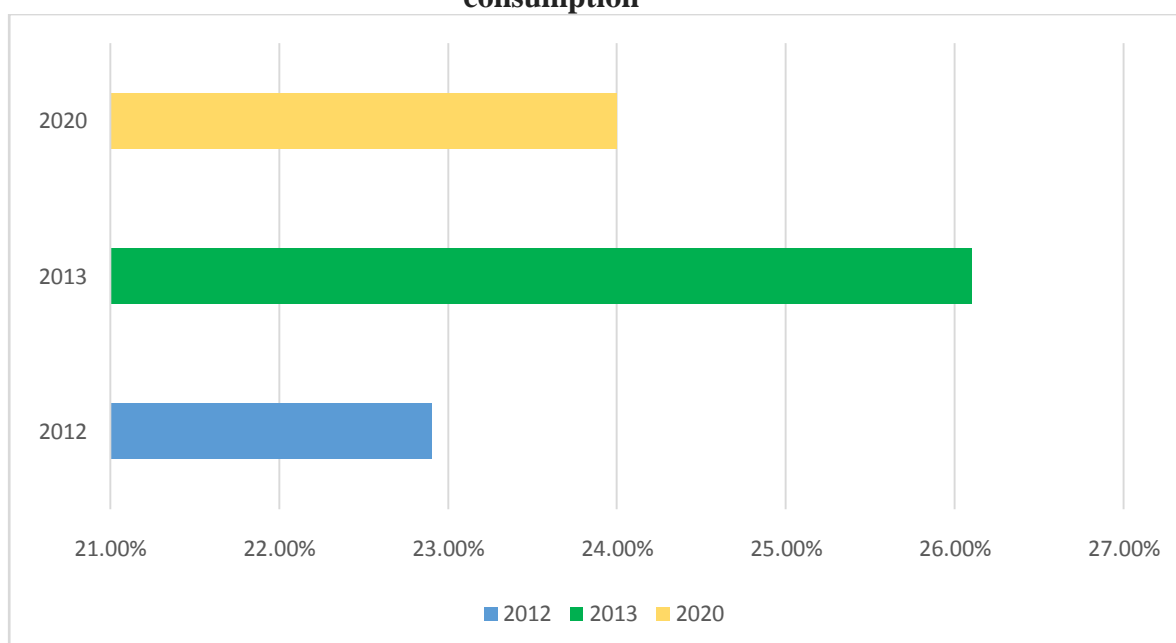
METHODOLOGY

The methodology used consists in the analysis of the quantitative aspects (decision substantiation) and the qualitative relational (the way decisions are implemented in practice) with methods of behavioral and managerial research, the latter highlighting the malfunctions, deficiencies and distortions within the system in order to obtain energy from Renewable sources.

Increasing the share of energy produced from renewable sources in the total energy produced of the gross electricity

Romania recorded a substantial increase in the share of energy from renewable sources in gross energy consumption during 2004-2014, from 17% in 2004 to 26.27% in 2014. In 2014, the indicator's value exceeded the target of 24% set for 2020 by Directive 2009/28 / EC (Figure 1).

Figure 1: Share of energy produced from renewable sources in gross energy consumption



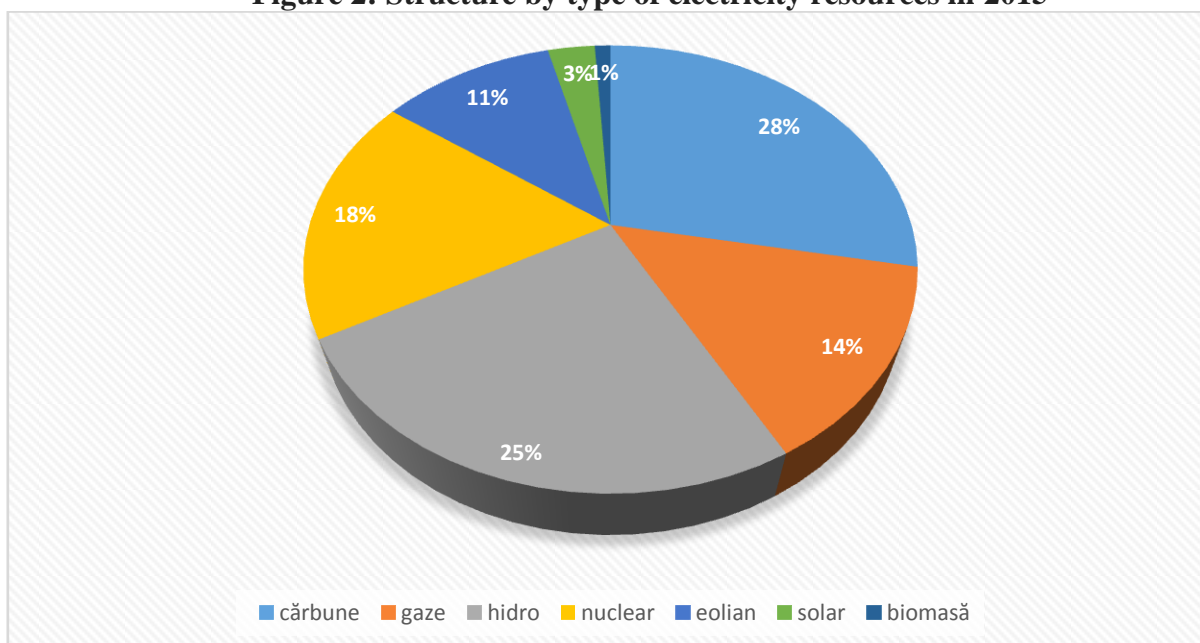
Source: ANRE and OPCOM (2014) data processed by the author

Promoting and using energy from renewable sources has been achieved by improving the efficiency of renewable energy support systems, financing investments and supporting less energy-intensive energy production.

In the Member States of the EU The distribution of energy from renewable sources is different from one country to another, each with a different energy mix.

Romania has a balanced energy mix, the structure of electricity production in 2015 was as follows: 28% coal (mainly lignite), 25% hydropower, 18% nuclear, 14% natural gas, 11% wind, 3% photovoltaic and 1 % Biomass (Figure 2).

Figure 2: Structure by type of electricity resources in 2015



Source: ANRE and OPCOM data processed by the author

Analyzing the data from Figure 2 we can say that Romania has a balanced energy mix as well as a good potential for replacing volatile (hydro and renewable) resources, which is an essential factor for the security of the national energy system: 40% of the 40% electricity mix consists of renewable energy, 58% of greenhouse gas (GHG) and 72% of relatively low CO₂ emissions. In the electricity mix, CO₂ per unit of electricity produced is similar to the European average of about 300 gCO₂/kWh;

The acquisition of energy from renewable sources has benefited from the massive support of the authorities to enter the Romanian energy mix. The sudden and unexpected cut in funding in 2014 has slowed the growth of the sector, and public aid for the development of renewable energies could continue to decline with the maturity of technologies.

Of course, the volatility of wind energy production is a problem of the Romanian energy sector, but also a potential area of technological and entrepreneurial innovation.

Romania's energy mix is broadly similar, similar to that of the EU-28, with the difference of a larger quantity of greenhouse gases and a lower share of oil consumption. Compared to 1995, the share of oil and greenhouse gases in gross domestic energy consumption decreased (by 3 and 10 percentage points), while the share of energy from renewable and nuclear sources increased (by 9 and 8 respectively percentage points).

The Romanian electricity generation mix is quite balanced in terms of technological neutrality and the use of indigenous resources, which are important for ensuring Romania's energy

security, confronted with geostrategic threats and vulnerabilities. Trends in the development of SER production in the energy mix of the total energy obtained from renewable sources in Romania, the largest share of the hydroelectric power is 25%, obtained with a low operating cost and with a high efficiency of transformation of the hydraulic energy into electricity.

Other renewable energy sources: wind, photovoltaic, although marginal cost of the energy source, have high costs for wind turbine maintenance work and solar panels.

The installed power in wind power plants is about 3000 MW, and in photovoltaic power plants is about 300 MW, but the high volatility that characterizes wind power production requires the entire NPS energy system, requiring a resizing of the balancing market.

The evolution of wind and photovoltaic capacities depends on the predictability of the support scheme for both in-service units already affected by legislative changes in 2014 and for investments in new projects.

Climate change - Reducing greenhouse gas emissions (GHGs)

Another target, stipulated in the EU 2020 Strategy, is to reduce GHG emissions by 20%. In Romania, the achievement of the target is 9.95% of the target to be achieved in 2020. The published greenhouse gas (GHG) indicator is the GHG emissions index (excluding LULUCF), as compared to the base year 1990. One rule out of the rule is made by one EU country, Romania, which calculates the GHG emissions index by taking Calculated as base year 1998 (Table 2).

Table 2: Variation of the GHG emissions index

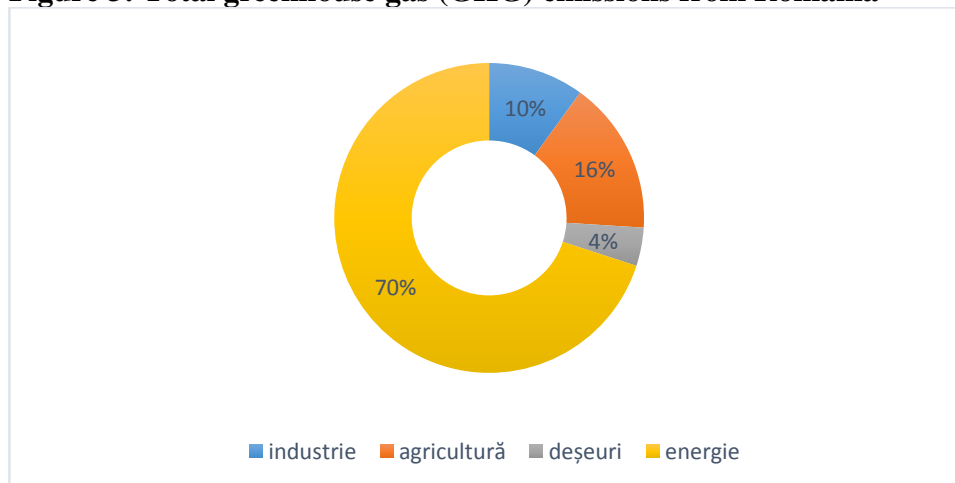
U.E.	Indicele emisiilor de gaze cu efect de seră GES- 2007	Indicele emisiilor de gaze cu efect de seră GES -2020
România	63,05	99,47
U.E.	90,7	80,00

Source: Data processed by the author of the European Commission Report (2015)

Total emissions of greenhouse gases fell by 5.93% between 2005 and 2014 (from 71.34 million tonnes of CO2 equivalent to 67.11 million tonnes of CO2 equivalent). With this value Romania is in line with the target set in the EU 2020 Strategy, with the limit of a maximum increase of 19% emissions compared to the reference year 2005.

Of the total greenhouse gas (GHG) emissions, the energy sector accounts for 70% of them (Figure 3).

Figure 3: Total greenhouse gas (GHG) emissions from Romania



Source: Eurostat data processed by the author

The continuous reduction of the carbon emissions of the energy sector is also a consequence of the use of energy from renewable sources and the improvement of Romania's energy efficiency. The decline in economic activity and energy consumption in the period 1989-1992, the commissioning of the first reactor of the Cernavoda nuclear power plant (1996), have been the causes of the decrease in total greenhouse gas emissions.

The evolution of the share of different sectors in the economy influences the evolution of GHG emissions. Supporting and promoting a low-GHG economy, reducing them in the energy and transport sectors, and improving the quality of the environment can lead to mitigation of the effects of climate change.

Romania continues the measures to reduce GHG emissions in the energy sector and to stimulate the production of energy from non-polluting sources through projects funded by the Environment Fund or through SOP Environment.

Energy efficiency

Romania's energy efficiency target for 2020 is 42.99 Mtoe (Million tonnes of oil equivalent) expressed in primary energy consumption (30.32 Mtoe in final energy consumption).

Even if Romania's current primary energy consumption (30.9 Mtoe in 2012) is below the 2020 target, it should continue its current energy efficiency efforts to maintain primary energy consumption at this Level or slightly increasing it so that it will reach the 2020 target even if the economy continues to grow over the next five years. In the second half of 2015, energy efficiency legislation has been completed and "alternative measures" have been implemented in accordance with Article 7 of the EU Energy Efficiency Directive.

According to data provided by Eurostat, Romania has positive GDP developments and significant energy savings during the period 2007-2014, which creates favorable conditions for reaching the energy efficiency target (expressed as a reduction of the Primary energy consumption by 20%) by 2020 (Table 3).

Table 3: Evolution of GDP and energy consumption in Romania in the period 2007-2014

Indicator	UM	2010	2011	2012	2013	2014
PIB în prețuri curente	Mil.Euro	126746,4	133305,9	133511,4	144253,5	150230,1
Consum intern brut de energie primară	Mii țep.	35799,6	36558,4	35373,2	32427,7	32289,7
Consum de energie primară pe locuitor	țep/loc	1,691	1,724	1,674	1,543	1,544
Consum de energie finală pe locuitor	țep/loc	1,113	1,127	1,135	1,091	1,088
Intensitatea energetică primară- raport între consumul final de energie și PIB	țep/1000 Euro	0,282	0,274	0,265	0,225	0,215
Intensitatea energetică finală- raport între consum final de energie și PIB	țep/1000 Euro	0,178	0,171	0,171	0,151	0,145

Source: Eurostat data processed by the author

Representative energy efficiency indicators, primary energy intensity and final energy intensity had a reduction rate of 4.5% / year and 3% / year compared to the EU average of 2%. The primary energy intensity in Romania has fallen since 2005, but remains about twice as high as the EU average.

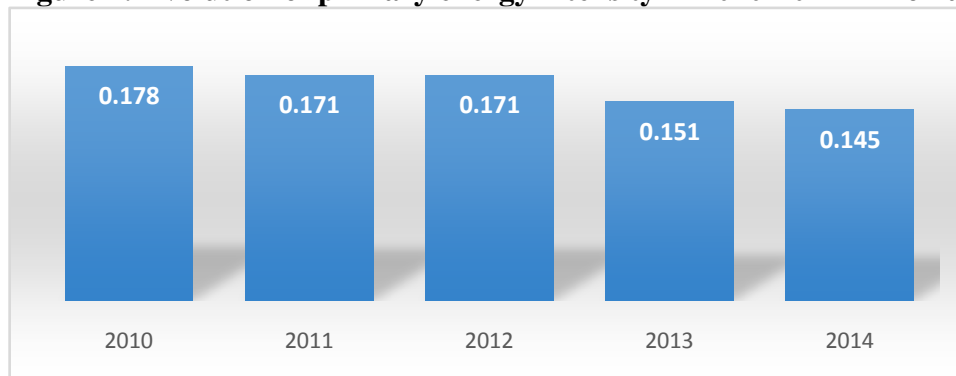
Energy intensity in the industrial sector has been almost half since 2005, but still remains above the EU average, one of the main reasons being the much higher share of the industrial sector in the Romanian GDP compared to the EU average.

RESULTS AND DISCUSSIONS

In Romania, the primary energy consumption per capita required to produce a unit of gross domestic product has the lowest value in the 28 EU Member States (1,544 toe / inhabitant, 31,0 Mtoe in total in 2014), to Almost twice as low as the EU27 average in the same year (2,973 toe / inhabitant).

The evolution of the primary energy intensity during 2010-2014 is presented in Figure 4.

Figure 4: Evolution of primary energy intensity in 2010-2014 in Romania



Source: Eurostat data processed by the author

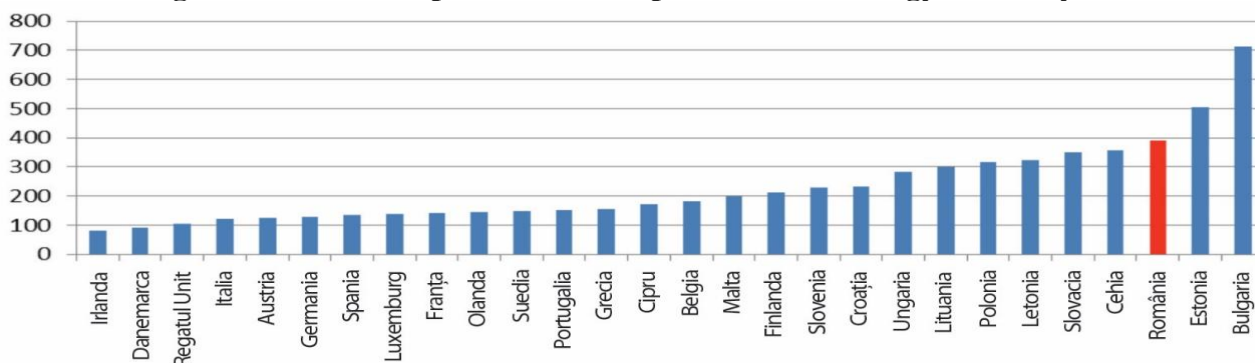
In order to increase energy efficiency in Romania, the state aid scheme for the promotion of high efficiency cogeneration has been applied since 2011.

The scheme provides for financial support to electricity and heat producers who own or operate commercially high-efficiency cogeneration plants that achieve at least 10% of their fuel savings compared to separate production.

Under these conditions, the primary energy consumption per capita still has a continuous downward trend, being 80% in 2008 compared to the value in 2008 and 90% compared to the value in 2011.

Energy efficiency policies have made an important contribution to this evolution. Thus, Romania's position (3rd place) in Europe from the point of view of energy efficiency can be seen in Figure 5.

Figure 5: Romania's position in Europe in terms of energy efficiency



Source: Council of Europe report (2016)

The differences between the energy consumption in Romania and the Nordic countries are normal given the differences in climatic conditions. However, there are also differences with countries with similar or even milder geoclimatic conditions (Italy, Slovenia, Croatia etc.).

Romania has the lowest electricity consumption per capita in the EU (0.0513 toe / inhabitant), 2.6 times lower than the EU27 average (0.1332 toe / inhabitant). The indicative national energy efficiency target is based on primary energy consumption and represents a 19% reduction in forecasted primary energy consumption (52.99 million tep).

CONCLUSIONS

The Country Report on Romania - SWD (2016) 91, drafted by the European Commission, states that "Romania is on its way to achieving the energy efficiency target set for 2020". According to the same report, "the deregulation of electricity prices and a stable legal framework could stimulate competition and investment in a sustainable and cost-effective supply." Electricity prices for non-household and domestic consumers are fully liberalized from 2014 and 2015 respectively, and the liberalization of domestic consumer markets is scheduled to end by 2018 for electricity.

Such changes are expected to deliver short-term benefits for consumers and ensure long-term sustainable objectives.

Contrary to expectations, the value of electricity bills increases as a result of a European Union-wide decision to keep jobs and exports. This decision specifies that in the event of a fall in energy consumption, large energy consumers will be exempted from paying green certificates for a larger amount of electricity.

As Romania's energy consumption continues to decline, having a value of 45.6 TWh in 2015, 5 TWh less than last year, the value of electricity bills in Romania will continue to increase.

BIBLIOGRAPHY

- Afgan, N.H., F. Begic, and A. Kazagic (2007). Multi-criteria sustainability assessment - A tool for evaluation of new energy system. *Thermal Science*, 11(3), pp. 43-53.
- Aitken, M. (2010). Wind power and community benefits: Challenges and opportunities. *Energy Policy*, 38(10), pp. 6066-6075.
- Bailis, R., and J.C. Cutler (2004). Wood in household energy use. In: *Encyclopedia of Energy*. Elsevier, New York, NY, USA, pp. 509-526.
- Barbier, E.B. (2009). Rethinking the Economic Recovery: A Global Green New Deal. Report prepared for the Green Economy Initiative and the Division of Technology, Industry and Economics of the UN Environment Programme, Available at:
- Bloomberg, (2015), 'Bloomberg New Energy Finance', (<http://about.bnef.com>).
- Brunnschweiler, C.N. (2010). Finance for renewable energy: an empirical analysis of developing and transition economies. *Environment and Development Economics* 15, pp. 241-274.
- 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.
- Deichmann, U., C. Meisner, S. Murray, and D. Wheeler (2011). The economics of renewable energy expansion in rural sub-Saharan Africa. *Energy Policy*, 39(1), pp. 215-227.
- Deng, Y. Y., Haigh, M., Pouwels, W., Ramaekers, L., Brandsma, R., Schimschar, S., Grözinger, J. and de Jager, D., (2015), 'Quantifying a realistic, worldwide wind and solar electricity supply', *Global Environmental Change* 31, pp. 239–252.
- Eurostat, (2016), *SHARES 2014: Short Assessment of Renewable Energy Sources*, (<http://ec.europa.eu/eurostat/web/energy/data/shares>), accessed 27 February 2016.
- Frankfurt School-UNEP, (2015), *Global Trends in Renewable Energy Investment 2015*, Frankfurt am Main.

- IEA, (2015), *WorldsRenewable and Waste Energy Statistics: Internatioanl Energy Agency — Renewables Information Statistics* (database); accessed 20 November 2015.
- IEA, (2016), *RD&D Online Data Services, Energy Technology RD&D Budgets: Beyond 2020 WDS* (database); accessed 15 January 2016.
- Langhamer, O., K. Haikonen, and J. Sundberg (2010). Wave power - Sustainable energy or environmentally costly? A review with special emphasis on linear wave energy converters, *Renewable and Sustainable Energy Reviews*, 14, pp. 1329-1335.
- OECD/IEA, (2015), *Energy Technology Perspectives 2015 -- Mobilising Innovation to Accelerate Climate Action*.
- REN 21, (2015), *Renewables 2015. Global Status Report*, Renewable Energy Policy Network for the 21st Century, Paris, France.
- UNEP, (2015), *Green energy choices: the benefits, risks and trade-offs of low-carbon technologies for electricity production — Summary for policy makers*, United Nations Environment Programme.
- WEC (2010). *Survey of Energy Resources 2010*. World Energy Council (WEC), London, UK. Available at: www.worldenergy.org/documents/ser_2010_report_1.pdf
- Worldbank, (2015), *World development indicators. Labor force, total*, (<http://databank.worldbank.org>), accessed 19 November 2015.