

ANALYZING THE ACHIEVEMENT OF THE TARGETS FOR ENERGY AND ENVIRONMENT ASSUMED BY ROMANIA

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Abstract: The work represents a continuation of the author's concerns about sustainable development issues. This paper is aimed at meeting Romania's targets for energy and the environment, targets with a major impact on the objectives of sustainable development. The concrete targets included in SDSEU and RES are highlighted, defining and specifying how to assess their degree of achievement. For the evaluations, the official information from the NRAE and DB of NIS is used. The conclusions contain references to the degree of achievement of TC for EM as well as proposals for improvement.

Keywords: energy, environment, strategy, sustainable development, targets.

1. INTRODUCTION

Romania's integration into the EU involves the assumption and the operationalization of some essential objectives and targets regarding their development and compatibility in social, economic and ecological terms. The general and specific objectives, respectively, the concrete targets are included in the national development strategies, being in line with those assumed at EU level. The present paper is a continuation of previous papers [1-5], which reaffirms the author's concerns in the field of sustainable development, on the medium and energy directions, two essential directions for the operationalization of sustainable development. Compared to the analysis carried out in [6], which refers to the EU level, we do in this paper a similar analysis, but with reference to Romania. The strategies in which Romania assumes clear objectives and concrete targets in the field of energy and the environment with direct impact on sustainable development are:

- National Strategy for Sustainable Development of Romania (NSSDR) [7]
- The Romanian Energy Strategy (RES) [8]

The NSSDR was adopted..... in 2008 at the request of the EU and in line with the EU Development Strategy [9] and has set targets for three time horizons: short (2013), medium (2020) and long (2030). This strategy has remained unchanged since the adoption to date, not updated, which is welcome because it facilitates the analysis that we wanted to achieve in this paper. RES is a traditional strategy of Romania and reflects national energy policies. Lately, the RES has taken over the EU's general objectives: energy security, sustainability and

competitiveness [8, 9]. Some of the targets included in the NSSDR were also taken over in the RES [7, 8]. A less desirable aspect is the relatively high rate of change / update of the RES.

2. WORK METHODOLOGY AND OUTCOMES

From NSSDR, we will retain the targets for the short-term (2013) and medium-term (2020) horizons. We will refer to the currently valid RES [8], bypassing the RES version 2007-2020, as well as the variants in the project stage (RES 2016-2030, RES 2016-2035). The concrete targets (TCs) assumed, at least in one of the two strategies, with a major impact on energy and environment (EM) and referring to the sustainable development (DD) of Romania, are [7, 8]:

- TC1: 8% greenhouse gas (GHG) reduction by 2013 (compared to 1990);
- TC2: 20% reduction in GHG emissions by 2020 (compared to 1990);
- TC3: Reduction of primary energy intensity (IEP) by 0.26p / 1000e (2005) and final energy intensity (FEI) by 0.17 toe / 1000e (2005) by 2020;
- TC4: Increase the share of Renewable Energy Sources (RER) by 24% in final energy consumption by 2020;
- TC5: Increase of RER electricity consumption share to 33% (2010), 35% (2015) and 40% (2020);
- TC6: 13.5% reduction in final energy consumption during 2008-2016 compared to average consumption over 2001-2005;
- TC7: Increase in the share of biofuels - in total transport fuels - to 5.75% (2010), 8% (2015) and 10% (2020);
- TC8: Rehabilitation by 2020 of 35% of all buildings

In RES [8], the EE consumption forecast is correlated with the GDP/capita indicator for three scenarios, with the values in Table 1.

Table 1 Values of GDP/capita indicator [e2008/capita] according to RES [8]

scenario \ year	2008	2010	2015	2020
basic(reference)[SR]	6591	5944	7273	9254
Unfavorable1[SN1]	6591	5794	6783	8484
Unfavorable2[SN2]	6591	5906	6373	7745

Source:Realised by the author based on the data from RES, 2007-2020,

http://www.minind.ro/energie/strategia_energetica_a_romaniei_2007_2020.pdf

The values obtained and recorded in the RES [8] for the average growth rate of net EE consumption are shown in Table 2. We note that a total energy consumption forecast is not included in the RES, which is a minus of this document.

Table 2 Average growth rate of EE consumption (REE) in Romania [8], [%]

Year \ Scenario	2009	2010	2011	2012	2013	2014	2015	2016-2020
SR	7,97	2,36	2,7	2,7	2,7	2,7	2,7	2,6
SN1	7,97	2,36	1,31	1,31	1,31	1,31	1,31	1,57
SN2	7,97	2,36	1,28	1,28	1,28	1,28	1,07	0,99

Source:

Realised by the author based on the data from RES, 2007-2020, http://www.minind.ro/energie/strategia_energetica_a_romaniei_2007_2020.pdf

We find that the two strategies include concrete targets for the four energy action lines to ensure DD: increasing energy efficiency, reducing energy consumption, increasing RER weight and increasing the share of biofuels. Regarding the greening component of DD, the targets are mainly related to GHGs and are not specific targets for: waste recycling rate, dust and sludge emissions, municipal waste collected and recovered, all of which are important tools for reducing the harmful impact on the environment. As presented in [6], in line with international practice, within GHG are included: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hidrofluorocarbonus (HFCS), perfluorocarbonus (PFCs), sulfur hexafluoride (SF₆). Typically GHG emissions are expressed in CO₂ equivalent, including the contribution of international aviation but excluding LULUCF. By LULUCF we mean "land use and forestry sector". Proceeding like [6], for a certain target (TC_i) of NSSDR and/or RES we assess the degree of fulfillment in [GTC_i(t)], the relationship:

$$GTC_i(t) = \frac{TC_i(t)}{TC_i(t_R)} 100 [\%] \quad i = \overline{1, n} \quad (1)$$

where,

TC_i(t) – target or indicator value for the target (TC_i) in year "t".

TC_i(t_R) - TC_i value in reference year, indicated in NSSDR and/or RES

n – number of concrete targets of the NSSDR and/or RES, on the EM fields

The information necessary for the calculation of the GTC indicator will be taken from the National Institute of Statistics database [10] and from the reports of the National Regulatory Authority for Energy [11]. According to [10, 11], the evolution of indicators that are subject to the concrete targets analyzed is in accordance with Figures 1-6

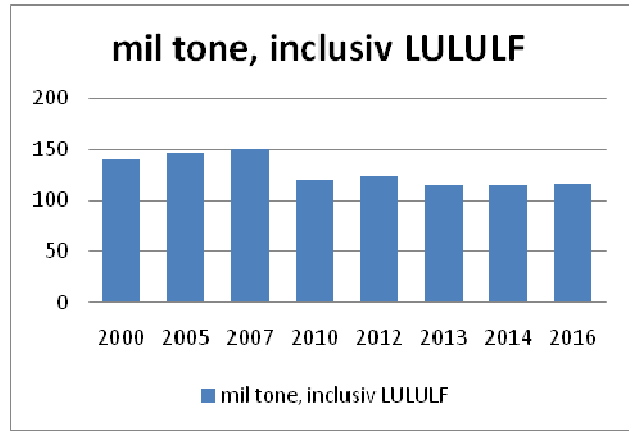


Fig. 1 Total GHG emissions excluding LULUCF in Romania [10]

Source:Realised by the author based on the data from DB NIS-Sustainable Development Indicators, www.insse.ro

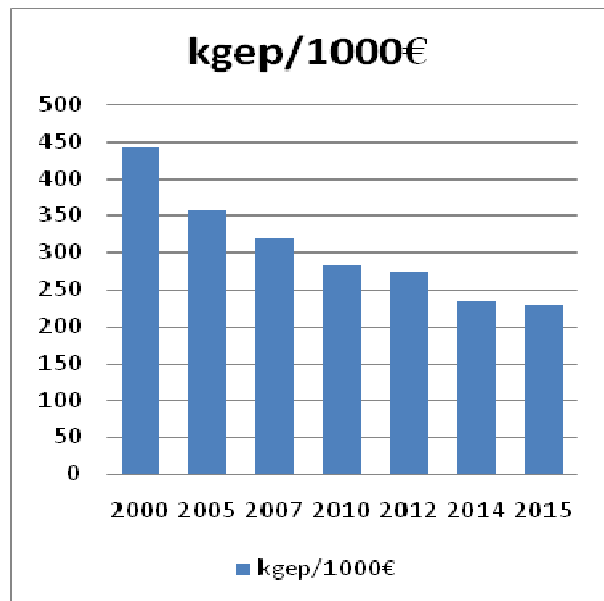


Fig. 2 Energy intensity of the economy [10, 11]

Source:Realised by the author based on the data from DB NIS-Sustainable Development Indicators, www.insse.ro and from Annual Report on ANRE Activity, 2016, www.anre.ro

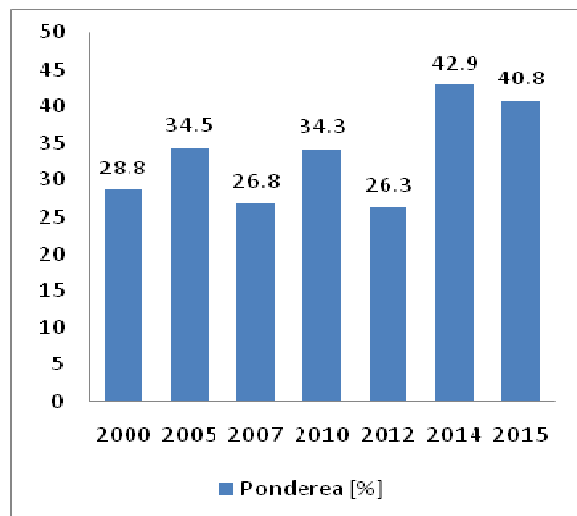


Fig. 3 EE consumption share of RER [10]

Source:Realised by the author based on the data from DB NIS-Sustainable Development Indicators, www.insse.ro

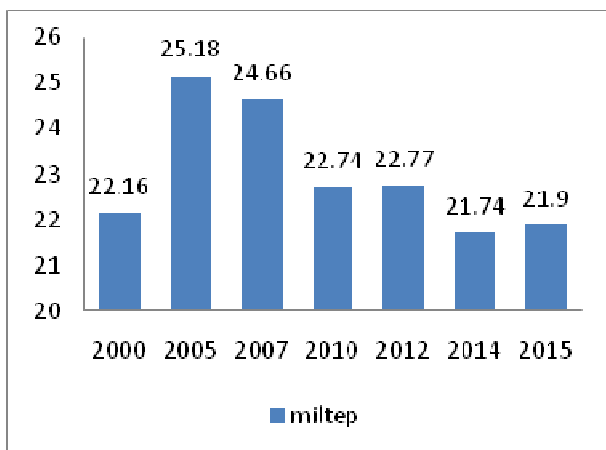


Fig 4 Evolution of final energy consumption [10]

Source:Realised by the author based on the data from DB NIS-Sustainable Development Indicators, www.insse.ro

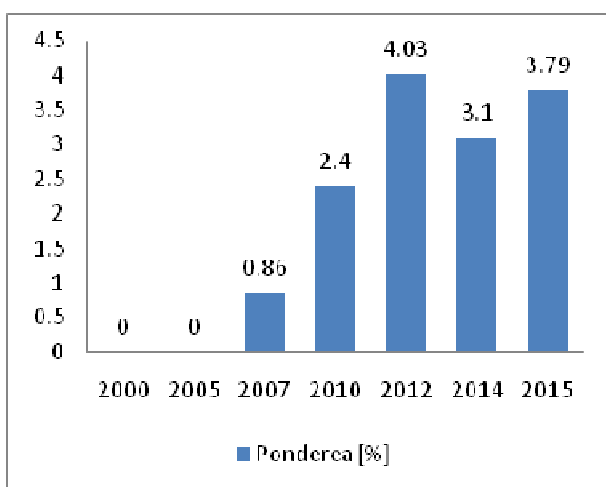


Fig 5 The share of biofuels in total fuels used in transport [10]

Source:Realised by the author based on the data from DB NIS-Sustainable Development Indicators, www.insse.ro

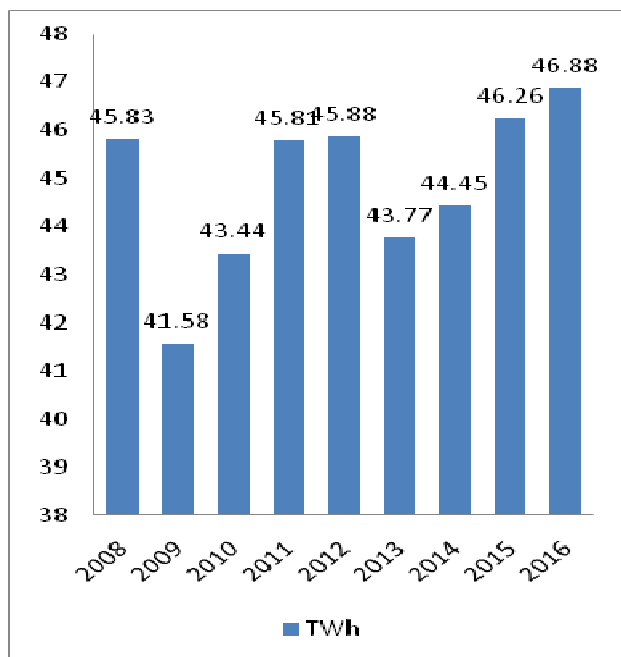


Fig. 6 EE consumption in Romania [11]

Source:Realised by the author based on the data from Annual Report on ANRE Activity, 2016, www.anre.ro

The official reports [10, 11] do not contain data on specific indicators, so it is not possible to assess the achievement level of TC4, TC8, the FEI component of TC3, or the value of the GDP / capita indicator - based on which we could assess the degree of achievement values admitted in the RES (Table 1). The average operational growth rate of EE consumption in [%] will be calculated on the basis of the data taken from [11] and read in Table 2. The GHG emissions in 1990 were taken from [12] to 254 million tonnes. Based on the information above, we calculated the GTC values for the concrete targets for which there is certain information (Fig. 1-6), as well as the REE level. The results obtained are presented in Table 3 and Table 4.

Table 3. GTC values

concrete target abbreviated	subtarget	Values of GTC [REE] [%]
TC1	-	682
TC2	-	387-2016
TC3	IEP	91,7-2015
TC5	2010	104
	2015	116,6
TC6	-	63,7-2015
TC7	2010	41,7
	2015	47,4

Table 4. Growth rate of EE consumption

Year	2009	2010	2011	2012	2013	2014	2015	2016
REE [%]	-9,3	4,7	5,4	0,1	-5,4	1,6	4,0	1,3

3. CONCLUSIONS

Most of the concrete targets included in the NSSDR - for the environment and in the NSSDR and RES - for energy have been achieved (TC1, TC2, TC5) or there is a real realization perspective (TC3). There are exceptions: TC6 - on the reduction of final energy use in the [2008-2016] period, reaching a level of achievement by 2015 at 63.7%

TC7 - on the use of biofuels with an output below 50%
As the official data are missing, the degree of achievement of TC4 targets (related to the RER share of final energy consumption), TC8 (building fund rehabilitation) and TC3 - the final energy intensity part, can not be assessed. The expected level in the RES for the growth rhythm of EE consumption in the period [2009-2016] is not confirmed. The NSSDR target assumed by SDSEU for GHG emissions has proved to be too modest in relation to the possibilities and needs of limitation, which is under review in both Romania and the EU28.

The analysis reveals inconsistencies between the targets assumed by strategies and reports or official statistics. There are irrelevant targets in official reports or statistics (TC4, TC8, TC3-FEI), while there are relevant indicators for sustainable development, highlighted in official statistics but not included in the strategies (waste recycling rate, dust emissions and slumps, municipal waste collected and exploited, share of thermal power

plants with high efficiency cogeneration). We believe that in the future it would be possible and useful to correlate these inconsistencies.

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