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Using Renewable Energy for a Sustainable Development

Aurel Gabriel SIMIONESCU*, Mariana Carmelia DRAGOMIR**

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ABSTRACT

Regarding energy, the greatest global challenges is ensuring growing demand to provide access to energy and to substantially reduce the sector's contribution to climate change. The aim of this article is to analyze the current situation of renewable in the EU and Member States' targets for sustainable and ecological development in context of Europe 2020. Wind power was proposed a significant increase to 494.7 TWh in 2020, for photovoltaic to 83.3 TWh and 370.3 TWh for hydropower. Sustainable development by promoting the use of renewable resources may be limited by constraints of infrastructure integration but also by economic factors and technologies.

1. Introduction

"To achieve a sustainable future we must already look beyond the short term priorities." [1]. Increasingly more often, especially in recent years, the word "sustainable" has become a key issue in most of the arguments that are made for or against any individual/collective initiatives on local, national or international level.

Wishing to emphasize the idea of caring for spending money and consuming resources, environmental influences and thus the future of humanity, economic transformations, social and behaviors necessary including in terms of cross-border dimension of these actions, sustainability has become one of the strong arguments of documents produced in Europe and beyond, to establish development strategies in the coming years.

"We are convinced that sustainable and efficient use of European territory and resources is a key element of cohesion. Better land use can contribute positively to economic development, equitable access to services of general interest, infrastructure and public goods, and intelligent management of natural and cultural heritage. "[2]. It is one of the messages started coming in 2011 to add several others.

Thus in Europe 2020, one of the three mutually reinforcing priorities is "sustainable growth: promoting a more efficient in terms of resource use, greener and more competitive" and one of the seven flagship initiatives to stimulate progress in this area is " Resource efficient Europe " to help decouple economic growth from resource use and support the transition to a low carbon economy, but also by supporting increased use of renewable energy to modernize our transport sector and promote energy efficiency.

From this point of view Europe 2020 strategy proposes a very important objective, an increase of 20% renewable energy share of total final energy and a 20% increase in energy efficiency. [3]

This objective is based on reality of ministerial meeting emphasized that on the one hand Gödöllo European region faces security challenges in energy supply is heavily dependent on imports of fossil fuels and specialized in energy-intensive activities produced to yield low, on the other hand rising energy prices and emissions points to the need to find sustainable energy solutions oriented renewable energy, low carbon green with a reduced environmental impact (relatively low water consumption for wind or solar energy production, require large areas of land for hydro pools, plants producing biofuels), and financial (eliminating subsidies for about 268 billion dollars in 2009 for fossil fuels and routing of these amounts by the research - development sector).

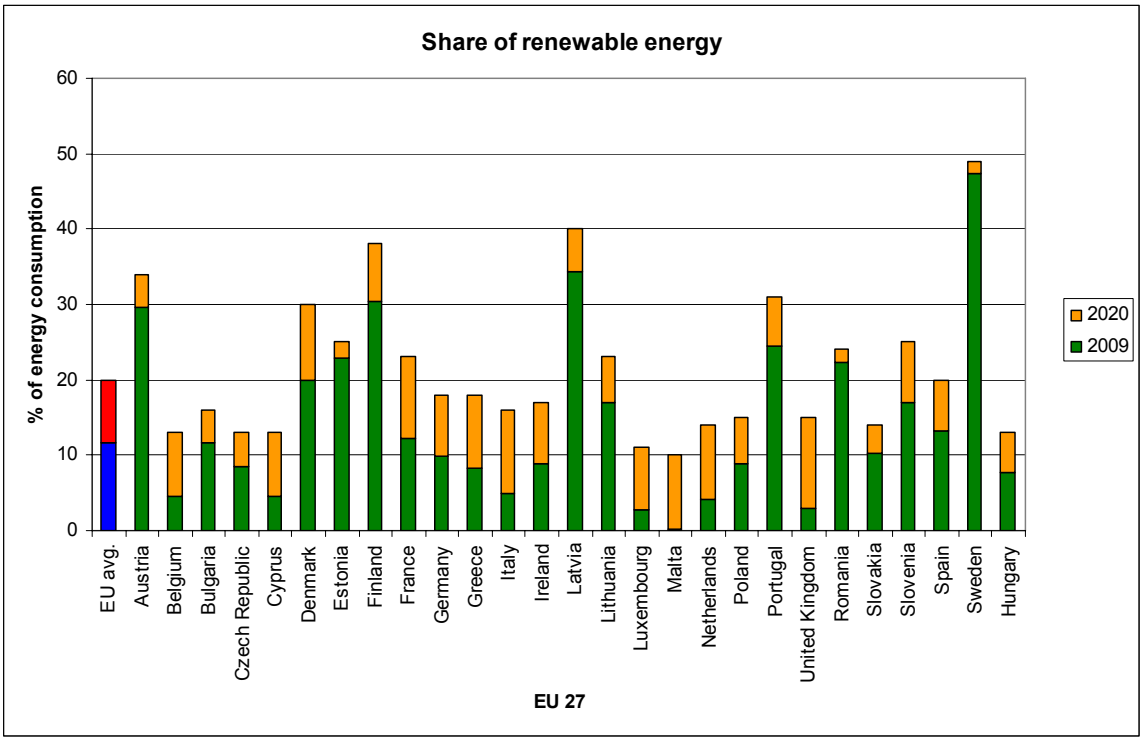
2. The share of renewable in the current context and targets 2020

Based on these realities, European countries have had different approaches to renewable energy sources and their share in total national energy consumption.

A first observation is related to the large differences between the existing EU minimum weights (0.2% Malta) or weights of up to 5% (2.7% Luxembourg, UK 2.9%, Belgium 4.6%, Cyprus 4.6%, Ireland 5%) and weights of more than 30% (Latvia 34.3% Finland 30.3%, Sweden 47.3%).

* Constantin Brâncoveanu University, Pitești, Faculty of Administrative Sciences and Communications Braila, Dunarea de Jos University of Galati, Faculty of Engineering, Braila. Email addressess: ag_simionescu@yahoo.com (A.G. Simionescu) cdragomir@ugal.ro (M.C.Dragomir)

Figure 1: Share of energy from renewable sources



We appreciate that Romania, with a share of renewable energy in total energy consumption by 22.4% (11.7% above the EU average) has a good position, but the estimated increase for 2020 (24% share) - can be significantly improved even if it remains above the European average, 20%.

Note that the expected changes in the production and use of renewable energy will require special efforts in major EU countries where both the domestic and industrial consumption is considerable.

In this case France will have to actually double its renewable energy consumption (from 12.3% to 23%) so has to do Germany from 9.8% to 18%, Denmark from 19.9% to 30%, Slovenia from 16.9% to 25%, Italy (from 8.9% to 17%) and the Netherlands (from 4.1% to 9.9%) when Great Britain needs an increase of four times (from 2.9% to 12%).

Table 1. Production capacity using renewable energy sources in the EU for 2010

	Wind energy (MW)	Photovoltaic (MW)	Hidro energy (GWh)	Biofuels (thousand tons)
EU 27Total	78981	51340,1	323347	21904
EU Average	**3037,73**	**1901,49**	**11975,81**	**811,26**
Austria	1011	174	37651	560
Belgium	911	1812	366	670
Bulgaria	375	133	4065	425
Czech Republic	215	1959	2263	427
Cyprus	82	10,1	0	20
Denmark	3752	17	21	250
Estonia	149	0,2	17	135
Finland	197	11,2	13206	340
France	566	2831	56979	2505
Germany	27214	24857	21054	4933
Greece	1208	631	3999	662
Ireland	1428	0,7	691	76
Italy	5797	12764	38369	2375
Latvia	31	1,5	2881	156

	Wind energy (MW)	Photovoltaic (MW)	Hidro energy (GWh)	Biofuels (thousand tons)
Lithuania	154	0,1	419	147
Luxembourg	42	31	90	0
Malta	0	11,5	0	5
Netherlands	2237	118	99	1328
Poland	1107	1,8	2263	710
Portugal	3702	144	10371	468
United Kingdom	5204	1014	4682	609
Romania	462	2,9	18003	307
Slovakia	3	488	4685	156
Slovenia	0.03	90	3927	105
Spain	20676	4214	29499	4100
Sweden	2163	19	67600	277
Hungary	295	4,1	147	158

From this analysis we can identify differences between Member States and the efforts that they will have to do taking into account natural resources available from EU countries.

Therefore in case of wind energy the total installed capacity of 84074 MW is a result of 27676 MW in Germany, 20676 MW in Spain, 5797 MW in Italy, 462 MW in Romania, Slovakia 3 MW, 0.03 MW in Slovenia and 0 MW in Malta.

From total quantity of photovoltaic 29,829 MW, Germany remains in first place with 17370 MW, 3484 MW Italy, Spain 3859 MW to 1.9 MW while Romania ranks among the last countries below us as Poland 1.8 MW, 0.7 MW Ireland, Lithuania 0.08 MW.

It is interesting to note that in the last five years, these capabilities have increased from simple to double as in the production and consumption of biofuels which shows particular concern for the use of these resources.

We have to mention, that apparently Europe's hydro potential is exploited almost completely.. The economic potential is estimated to be around 470 TWh / year.

Hydro energy EU in 2010 was 323 TWh representing 9.85 of electricity and 60% of electricity generation from renewable sources.

Certainly investments in these sectors should be increased and targeted primarily at overall system efficiency and maximum exploitation of specific resources available to each country (wind potential: Denmark, Ireland, Malta, UK, the solar: Cyprus, Greece, Portugal, Romania, Spain, Italy).

Proposals desired target for 2020 is as follows.

Table 2. Production of electricity using renewable energy sources for each Member State in 2020 (TWh)

	Wind (TWh)	Photovoltaic (TWh)	Hidro Water (TWh)	Biomass (TWh)
EU 27Total	494,7	83,3	370,3	232
EU 27 Average	**18,3**	**3,1**	**13,7**	**8,6**
Austria	4,8	0,3	42,1	5,1
Belgium	10,5	1,14	0,44	11,04
Bulgaria	2,26	0,45	3,95	0,87
Czech Republic	1,5	1,73	2,27	6,17
Cyprus	0,5	0,31	0	0,14
Denmark	11,71	0,004	0,03	8,85
Estonia	1,53	0	0,03	0,35
Finland	6,1	0	14,4	12,9
France	57,9	5,9	71,7	17,2
Germany	104,43	41,39	20	49,46
Greece	16,8	2,9	6,6	1,26
Ireland	11,97	0	0,7	1
Italy	20	9,7	42	18,8
Latvia	0,91	0,004	3,1	1,22

	Wind (TWh)	Photovoltaic (TWh)	Hidro Water (TWh)	Biomass (TWh)
Lithuania	1,25	0,02	0,47	1,22
Luxembourg	0,24	0,08	0,12	0,33
Malta	0,26	0,04	0	0,14
Netherlands	32,4	0,57	0,71	16,7
Poland	15,2	0,003	3	14,2
Portugal	14,58	1,5	14,1	3,52
United Kingdom	78,3	2,2	6,4	26,2
Romania	8,4	0,3	19,8	2,9
Slovakia	0,6	0,3	5,4	1,7
Slovenia	0,2	0,1	5,1	0,7
Spain	78,3	14,3	39,6	10
Sweden	12,5	0,004	68	16,7
Hungary	1,55	0,08	0,24	3,32

It is noted substantial increases (about six times the wind), four times the photovoltaic and almost three times the biomass. In terms of hydro growth estimates for 2020 to 370.3 TWh.

To emphasize the fact that hydropower production in the EU is not seen as a political priority while water problems (using its existing resources, pollution, etc.) have become a significant concern of all States.

It is actually an attempt to achieve a balanced integration of the three dimensions of sustainable development, economic dimension, social and environmental.

3. Economic development and control of emissions and concentrations of greenhouse gases

Special report developed by the Intergovernmental Panel on Climate Change on on Renewable Energy Sources and Climate Change Mitigation states that "85% of global primary energy comes from fossil fuels and fossil fuel consumption is 56.6% of the total anthropogenic emissions of greenhouse gases. [4]

The 27 EU Member States are responsible for about 11% of emissions of greenhouse gases worldwide. More than 80% of EU emissions from energy production and use, including transport. [5] "CO_2 concentrations values continued to achieve increasingly higher and by the end of 2010 reached 390 ppm CO_2, 39% more than in pre-industrial times. " [6]

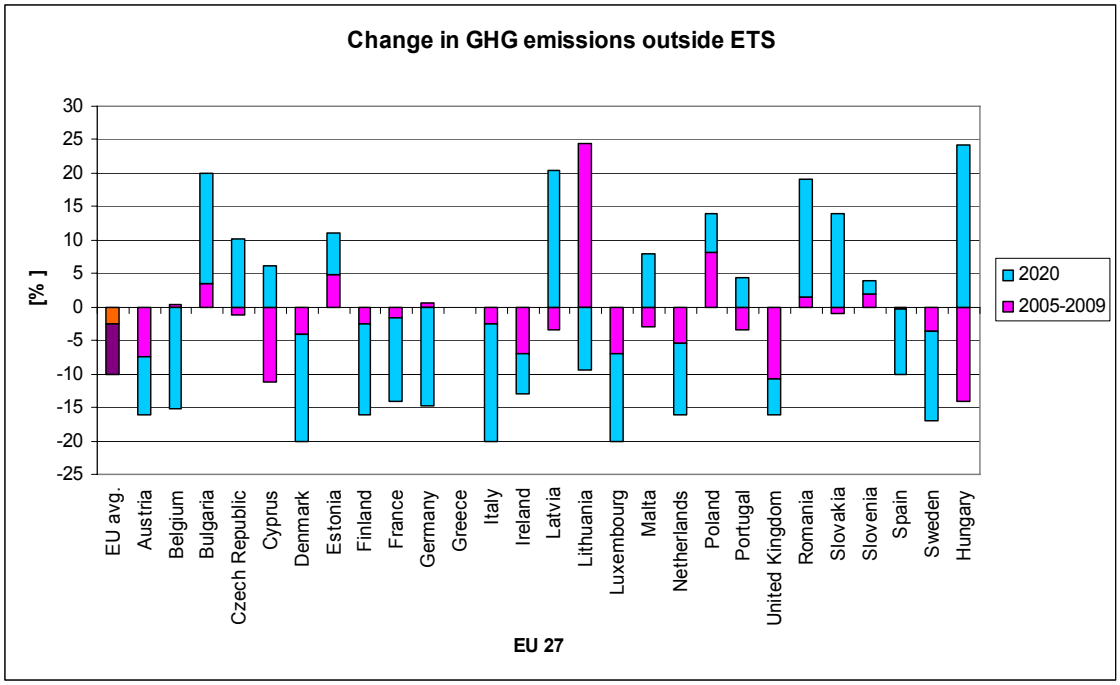
In this context is increasingly important need for the creation and use of new renewable energy production to reduce CO_2 emissions, low carbon emission per unit of energy output (typically 1-10%). Contribution of renewable to primary energy supply varies substantially by country and region. According to the Renewable Energy Policy for the 21st Century (REN21), the global number of countries implementing policies on renewable energy has almost doubled to an estimated 55 in early 2005 to more than 100 in 2010, including all 27 EU Member States. [7]

For developing countries, especially the poorest, energy is required to boost production to generate income and sustain social development and to reduce the serious health problems caused by the use of firewood, charcoal and agricultural waste. For industrialized countries, the main reasons for encouraging renewable include emission reductions to mitigate climate change concerns to increase security of energy supply and create jobs. Renewable resources sector may open opportunities to address these multiple dimensions of environmental, social and economic development, including adaptation to climate change [8].

A fundamental aspect of the European strategy for reducing emissions of greenhouse gases with low impact on climate change is the EU trading scheme and emissions (EU ETS), each Member State setting a national limit of greenhouse gas emissions gases for industrial activities based on its analysis.

EU ETS trading scheme introduces the concept of a harmonized approach at EU level for allocation of greenhouse gas emissions and requires development investments in low carbon technologies, allowing Member States of the European Union to achieve emission reduction targets under the Kyoto Protocol at a cost of less than 0.1% of GDP. [9] System is essential to meet EU emission reduction targets for 2020 and beyond. The 27 EU countries will have to reduce by 17.6% the greenhouse gas emissions. Specifically largest declines will occur in Ireland with 17.6%, Germany 14.7%, Belgium 15.3% and Sweden with 13.4%, while a number of countries will to maintain or increase the amount of greenhouse gas emissions by 24.1% like Hungary, Latvia 20.5%, and Bulgaria 16.6%. If we point out Romania, the target for 2020 is 19%. Although this country stays under this limit, it will have to implement production technologies with high performance for each industrial sector in order to stay under its target assumed in the Kyoto Protocol [10].

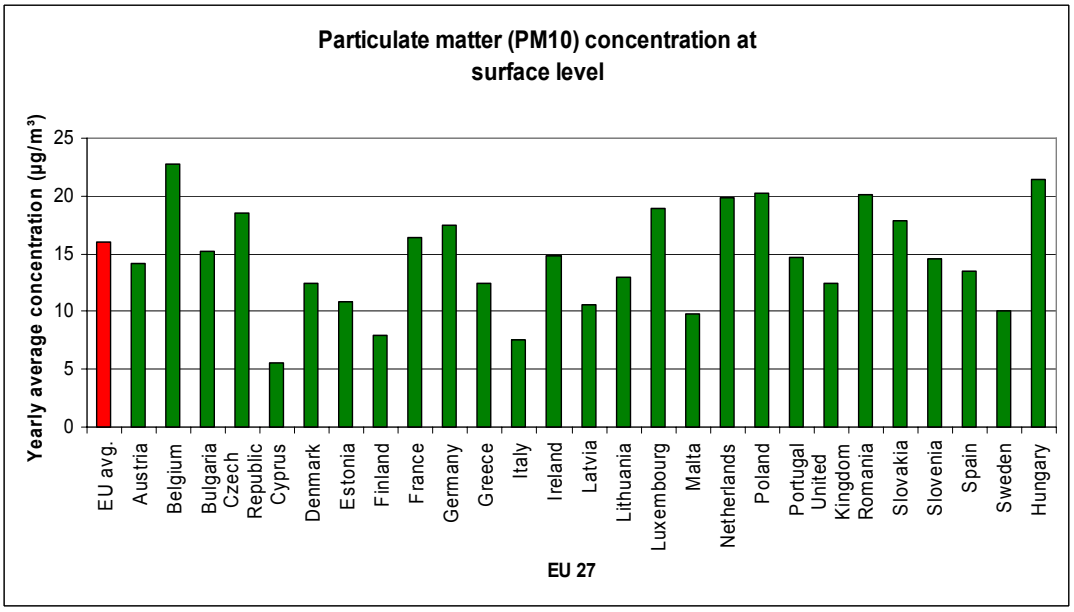
Figure 2. Changing emissions of greenhouse gases



Currently greenhouse gases and pollutants PM_{10} are most problematic in Europe in terms of air quality. [11]. High concentrations of particulate matter resulting from the use of renewable energy sources have a major impact on air pollution in view of influence on the formation and properties of clouds and that deposition of suspended particles can alter Earth's surface reflectivity, especially accelerating glaciers melting.

According to Directive 1999/30/EC limit value for PM_{10} is 40 µg/m^3 for annual average and 50 µg/m^3 daily average, not to be exceeded more than 7 times starting with 2010. [12]

Figure 3. Particulate matter (PM_{10}) concentration at surface level



The highest concentrations of PM_{10} in the EU 27 were recorded in Belgium, 22.7 µg/m^3, in Hungary 21,4 µg/m^3, in Poland 20,3 µg/m^3, in Romania 20.1 µg/m^3, and Netherlands 19.8 µg/m^3. Concentrations below the EU average were recorded in Cyprus 5,5 µg/m^3 , Ireland 7,6 µg/m^3, Finland 8 µg/m^3 and Malta 9,8 µg/m^3.

If we analyze the period 2000 - 2010, presented by the European Environment Agency report can be seen that the concentration of PM_{10} in EU 27 decreased by 14%. [13] This and the fact that European cities and

local authorities are facing big penalties compliance with those limits and are struggling to find effective measures to reduce PM_{10}.

Meet at Rio de Janeiro in June 2012, Heads of State and Government reiterated their commitment to joint action to generate sustainable development and stressed "the need to further sustainable development at all levels to integrate economic, social and environmental and recognition of interconnections in order to achieve sustainable development in all its dimensions ". [14]

Underlining once again the agreement implementation procedures of the Kyoto Protocol, the Heads of State and Government reaffirmed their support for policies related to green economy, increasing the role of international research on how sustainable development while maintaining a clean environment, promote sustainable consumption and sustainable production patterns.

Especially for developing countries, the link between the social, economic development and the need for modern energy services is obvious. Access to clean energy and energy security are essential contributing, inter alia, economic activity, income generation, poverty eradication, health, education and gender equality. [15] In this context, control of emissions and concentrations of greenhouse gases emissions, the main source of climate change is a permanent and increasingly urgent worldwide.

4. **Conclusions**

In the current scenario, electricity generation using renewable technologies has the potential to significantly reduce air pollution at local and regional level compared to electricity generation based on fossil fuels.

Sustainable development based on renewable energy development will improve the impact of air pollution from local to regional level, emissions of greenhouse gases, deforestation and forest degradation. As climate change is now inevitable, adaptation to climate change is also an essential component of sustainable development.

In the present context, for sustainable production and delivery of energy services should have a low environmental impact. EU countries have different economic development, and customized access to different types of renewable energy, which requires the implementation of differentiated strategies in terms of energy use, especially in promoting technologies with low environmental impact and reducing greenhouse gas greenhouse. Promoting a green economy is a means by which social and economic policy research environment, allowing the company to use resources efficiently, thereby increasing quality of life and while protecting natural resources and systems. Transforming the current economy green one in Europe, includes both a social dimension by ensuring equitable access to the benefits of nature and protection against pollution and health risks, and intergenerational issues by addressing social and natural capital stocks used in the context expansions projects and environmental policies on the long term. [16]

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