Evolution of Renewable Energy Capacities in Europe after the Lisbon Treaty

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Abstract

Energy sector is vitally important for each country and has included a significant strategic side. The way to obtain energy and the environmental impact have become extremely important issues for all countries.

In general, most countries have understood the need to obtain energy from alternative sources wich are cleaner and sustainable but also stimulate the development of an effective infrastructure of Renewable energy because it creates not only a cleaner environment but also job opportunities in sustainable industries.

The paper aims to analyze the evolution of renewable energy capacities in Europe, in total and on detailed representative countries, due to the impact of signing and assuming the Lisbon Treaty in 2007.

Key words: renewable, energy, sustainable development
J.E.L. classification: Q01, L89

1. Introduction

Since the Rio Conference (1992) to the UN Conference on climate change in Paris in december 2015 (treaty signed by over 135 countries), the international community decided to deal with issues of sustainable development and the environment concerns through collective measures at the global level [Guvernul Romaniei 2012a].

Thus, in 2007, EU countries have signed the Treaty of Lisbon which includes specific protocols on climate change and the fight against global warming. And some of the provisions of the Treaty refers punctually to the problems of energy supply, but also the necessity of changes of position in European energy policy [Guvernul Romaniei 2012b].

The Lisbon Treaty for the first time includes a special section that is dedicated to a very important chapter in economies of the countries but at the same time, essential for sustainable development, namely: energy and the sources of obtaining it. For the first time is define a legal basis for future EU action in the field of energy. As is well known, the strategic energy sector has an important aspect for individual countries, but also at EU level. In this respect, the Lisbon Treaty gives the European Union a competence shared with the Member States in ensuring effective operation of the energy market, especially in terms of energy supply to Member States, securing energy supplies and especially the development of renewable energy resources. All EU energy activities will be done by protecting and amelioration of the environment [Ministerul Afacerilor Externe 2009].

In general, most countries have understood the need to obtain energy from alternative sources, cleaner and sustainable and also to develop of an effective infrastructure for renewable energy because it creates a cleaner environment but also job opportunities in sustainable industries and economies.

2. Energy analysis

For analyzes on energy capacities were used mainly statistical data from situations of the International Renewable Energy Agency (IRENA) and also other international organizations and agencies, such as UNEP, IEA.

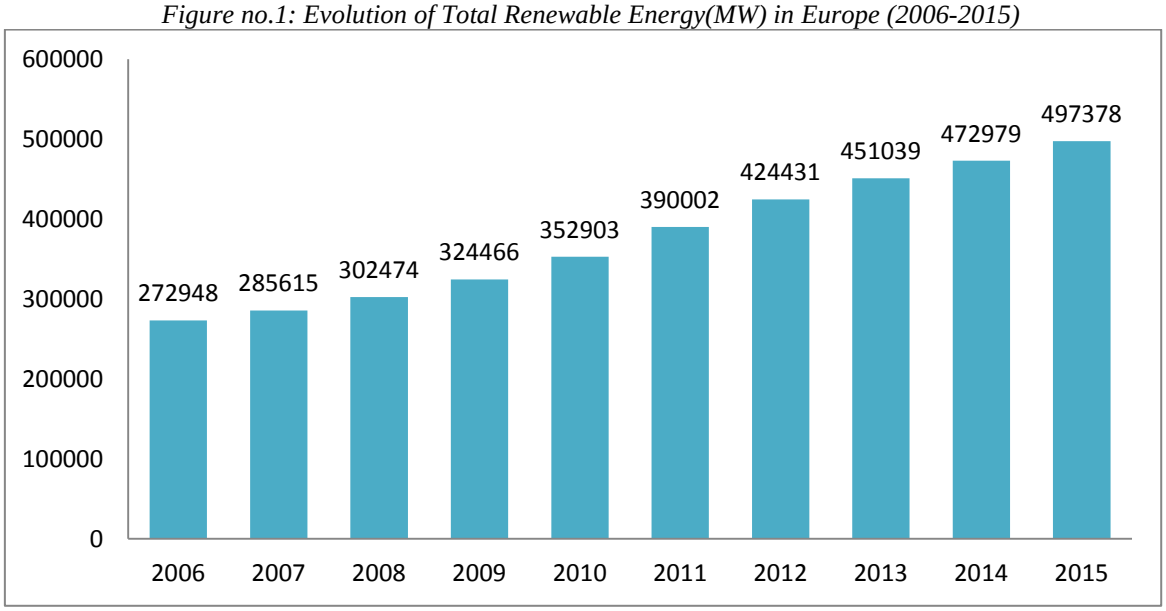
In this case, the statistics provided by IRENA (IRENA Renewable Capacity Statistics 2016) used the following concepts: "Renewable power generation capacity is measured as the maximum net generating capacity of power plants and other installations that use renewable energy sources to produce electricity and the data reflects the capacity installed and connected at the end of the calendar year, measure in megawatts (MW)". [IRENA 2016b].

The paper will present comparative situation of total energy for Europe and for the first four countries in Europe (EU) in ranking with the highest energy capacity, for the last four countries in ranking, with the smallest energy capacity and for Romania and neighboring countries, former socialist: Bulgaria, Hungary but also for Austria.

2.1Europe-Total renewable energy

The first analysis is made for total Renewable energy capacities in Europe in the period 2006-2015 and its dynamics is presented in figure 1(personal processing using data source from IRENA Renewable Capacity Statistics 2016).

Figure no.1: Evolution of Total Renewable Energy(MW) in Europe (2006-2015)



Data source: (IRENA 2016a, p.12)

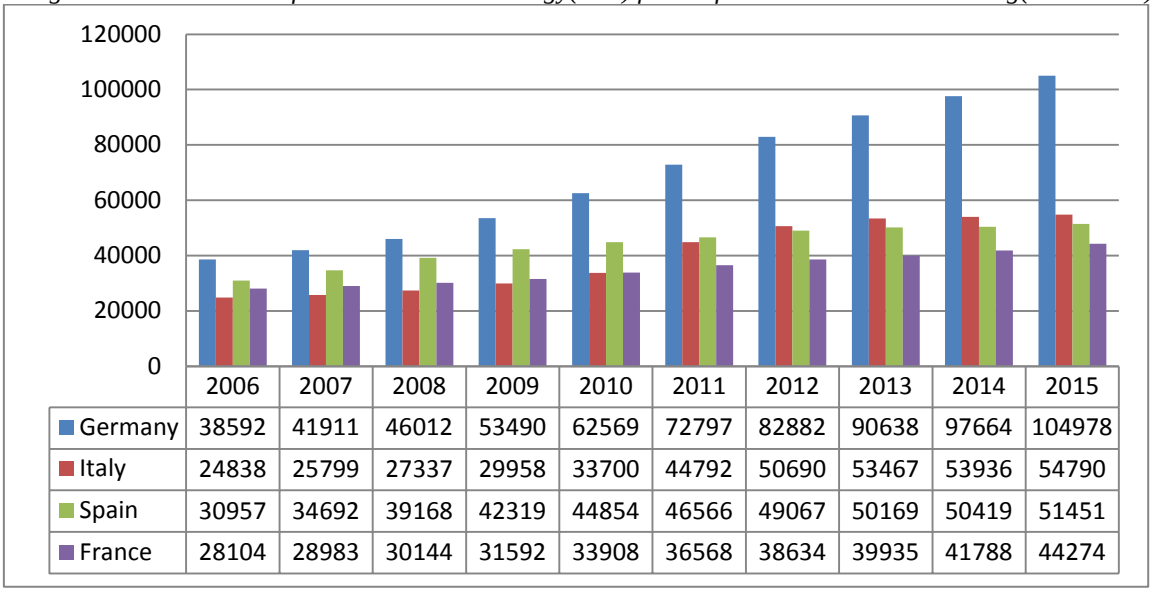
Evolution of total energy capacities in Europe after 2006 saw a steady ascending trend. Thus, in 2006 compared to 2007, energy capacities rose by 4.6%, in 2007 compared to 2008 increased by 5.9%, in 2009 compared to 2008 by 7.27%, in 2010 compared to 2009 by 8.76%, in 2011 compared to 2010 by 10.5%, in 2012 compared to 2011 by 8.82%, in 2013 compared to 2012 by 6.26%, in 2014 compared to 2013 by 4.86% and 2015 compared to 2014 by 5.15%. The total power capacity in the analyzed period, in 2015 compared to 2006, increased by 82.2% reaching value.

2.2 Renewable energy dynamics analysis for the member countries

The leading position in Europe in terms of renewable energy capacity are the following countries: Germany, Italy, Spain, France (figure 2).

Germany is the country that has the highest renewable energy capacity in Europe, with a percentage of 14.13% in 2006, reaching a value of 21.11% of the total capacity in 2015 from Europe's total renewable energy capacity.

Figure no 2: Evolution of Total Renewable Energy(MW) for the first countries in the ranking(2006-2015)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Germany	38592	41911	46012	53490	62569	72797	82882	90638	97664	104978
Italy	24838	25799	27337	29958	33700	44792	50690	53467	53936	54790
Spain	30957	34692	39168	42319	44854	46566	49067	50169	50419	51451
France	28104	28983	30144	31592	33908	36568	38634	39935	41788	44274

Data source: (IRENA 2016a, p.13)

Like most European countries, in Germany, renewable energy capacity has known a steady rising tred. Otherwise: in 2007 compared to 2006 were increases of 8.6% , in 2008 compared to 2007 growth of 9.78%, in 2009 compared to 2008, increases of 16.25%, in 2010 compared to 2009 by 16.97%, with 16.34% in 2011 compared to 2010, with 13.85% in 2012 compared to 2011, by 9.36% in 2013 compared to 2012, by 7.75% in 2014 compared to2013, and up to 7.49% in 2015 compared 2014. During the entire period, 2006 vs. 2015 total renewable energy capacity increased by 172%. Is the biggest jump among leading countries.

Second state in terms of renewable energy capacity is Italy. This has seen a similar trend in terms of capabilities with German renewable energy capacities. Thus, in 2007 compared to 2006 capacity has increased by 3.87% , with 5.96% in 2008 compared to 2007, with 9.59% in 2009 compared to 2008, by 12.5% in 2010 compared to 2009, but with a maximum of about 33 % in 2011 compared to 2010, followed by a decrease in growth rate, namely 13.17% in 2012 compared to 2011, with 5.48% in 2013 compared to 2012, only 0.88% in 2014 compared to 2013 and 1,58% in 2015 compared to 2014. During the entire period, 2006 vs. 2015, total renewable energy capacity of Italy increased by 120%.

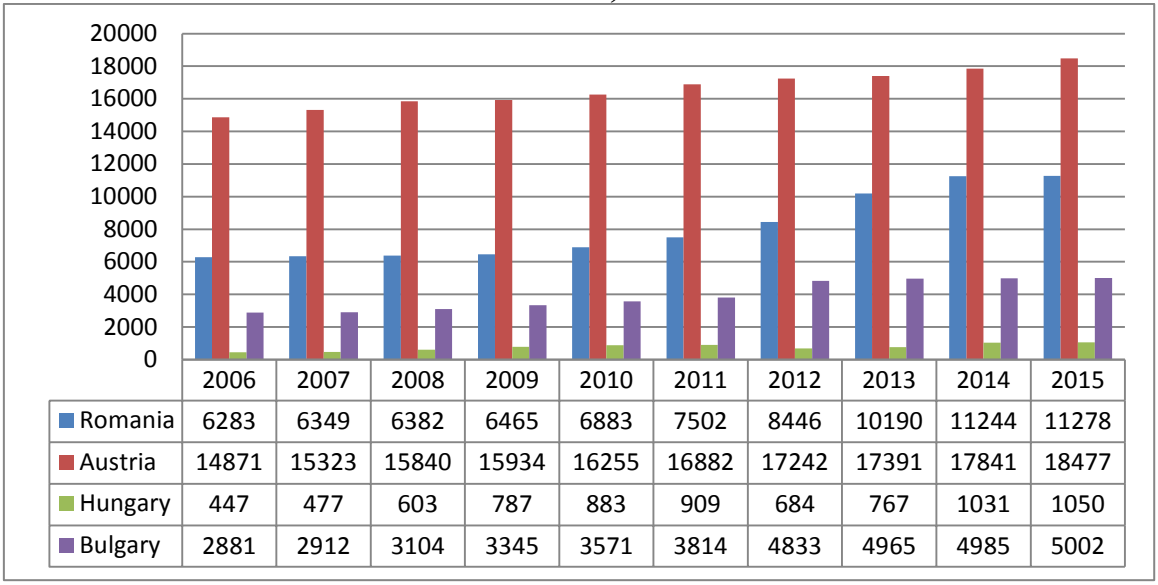
The third state as installed capacity is Spain. Renewable energy capacity increases situation is as follows: with 12.7% in 2007 compared to 2006, by 12.9% in 2008 compared to 2007, by 8% in 2009 compared to 2008, with approx. 6% in 2010 compared to 2009, with 3.82% in 2011 compared to 2010, with 5.37% in 2012 compared to 2011, 2.25% in 2013 compared to 2012 and only 0.5% in 2014 compared to 2013 and by 2.05% in 2015 compared to 2014. During the entire period, 2006 vs. 2015, total renewable energy capacity of Spain increased by 66%.

France is only fourth in this ranking. Capacity increases are steady but modest as value. Thus: Total renewable energy capacity increased in 2007 compared to 2006 by 3.13%, with 4.01% in 2008 compared to 2007, with 4.80% in 2009 compared to 2008, with a peak in 2010 and 2011 when it increased by 7.33 % and 7.84%, followed by more modest increases of 5.65% in 2012 compared to 2011, 3.37% in 2013 compared to 2012, by 4.64% in 2014 compared to 2013 and by 5.95% in 2015 compared to 2014. During the entire period, 2006 compared to 2015, the total capacity of renewable energy of France increased by 57.5%.

Regarding Romania's renewable energy situation and its neighbors, as is visible in Figure 3, it can be concluded that, overall, there are increases in energy capacities but with some important fluctuations for some states.

For Romania, the increases were constant throughout the period analyzed (2006-2015) energy capacity grew by 79.5%.

Figure no 3: Evolution of Total Renewable Energy(MW) for Romania, Austria, Hungary, Bulgaria (2006-2015)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Romania	6283	6349	6382	6465	6883	7502	8446	10190	11244	11278
Austria	14871	15323	15840	15934	16255	16882	17242	17391	17841	18477
Hungary	447	477	603	787	883	909	684	767	1031	1050
Bulgary	2881	2912	3104	3345	3571	3814	4833	4965	4985	5002

Data source: (IRENA 2016a, p.13)

On the years, the situation is this: in 2007 over 2006 the increases were only 1.05%, in 2008 compared to 2007 increases were only 0.52%, in 2009 compared with 2008 assist to growth of 1.3%. Follows a better growth in 2010 compared to 2009 is by 6.47% and follows a similar trend, so in 2011 compared to 2010 increased by 8.99%, in 2012 compared to 2011 growth is 12.58%, followed by a maximum of 20.68% in 2013 compared to 2012 and a drop of 10.34% in 2014 compared to 2013, for just 0.30% in 2014 compared to 2015.

In Austria, the energy capacity installed in 2015 was only 24.4% higher than in 2006, the increase was smaller than Romania, Bulgaria or Hungariei. in years, this development has the following dynamics: 2007 compared to 2006 increased by 3.04%, 2008 compared to 2007 with 3.37%, in 2009 compared to 2008 by 0.59%, in 2010 compared to 2009 by 2.01% , in 2011 compared with 2010 by 3.86%, in 2012 compared to 2011 by 2.13%, in 2013 versus 2012 by 0.86% , 2014 versus 2013 by 2.59%, in 2015 compared to 2014 by 3.56%.

In Hungary the renewable energy capacity installed in 2015 was 134% higher than in 2006, represents the maximum growth of the countries analyzed. In absolute terms, installed capacity is modest compared to the other countries analyzed. Installed capacity increases were as follows: in 2007 over 2006 with 6.71%, in 2008 compared to 2007 by 26.42%, in 2009 compared to 2008 we have a maximum increase of 30.15%. In 2010 compared to 2009 the increase was 12.2% following a downtrend, obviously due to the crisis, so in 2011 compared to 2010 increased by 2.94% and -24.75% in 2012 compared to 2011. In 2013 compared to 2012 the increase was 12.13% , in 2014 compared to 2013 by 34.4%, and in 2015 compared to 2014 by 1.84% .

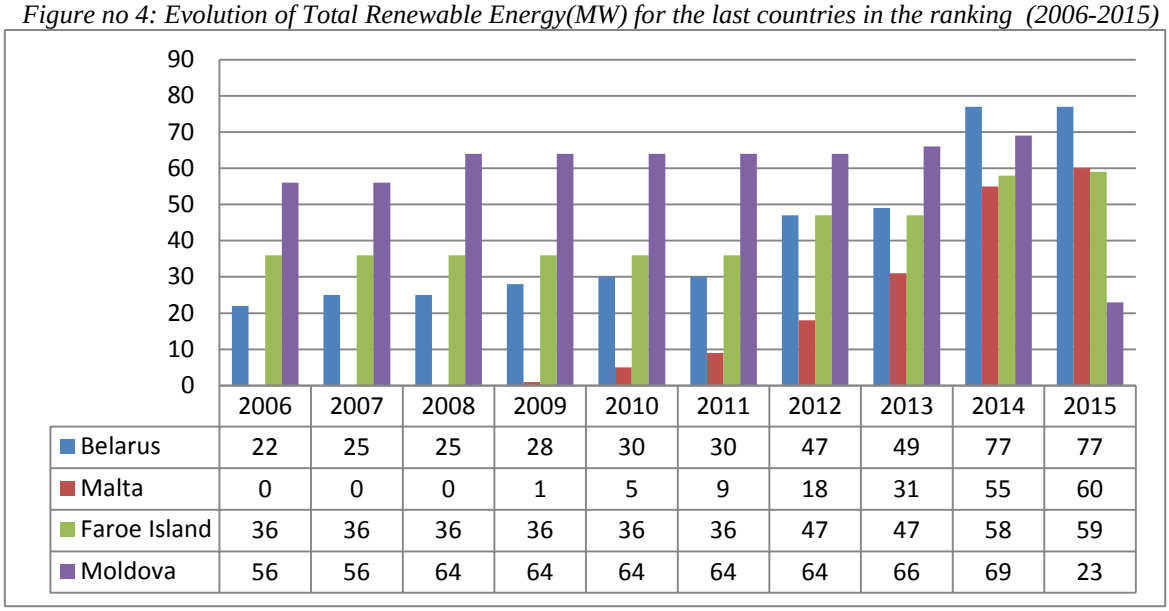
In the case of Bulgaria, the renewable energy capacity installed in 2015 was 73% higher than in 2006. In the years, situation is as follows: in 2007 over 2006 the increase energy capacity was by 1.08% in 2008 compared to 2007, by 6,59% in 2009 compared to 2008, up to 7.76% in 2010 compared to 2009, up to 6.76% in 2011 compared to 2010, to 6.80% in 2012 vs 2011, with a maximum of 26.72%, in 2013 compared to 2012 with 2.73%, in 2014 compared to 2013 only 0.45% and a minimum increase of only 0.34% in 2015 compared to 2014.

On the last places in ranking in Europe there are four countries: Moldova, Belarus, Faroe Island and Malta (Figure 4).

The last in Europe in terms of total installed renewable energy capacity are countries with different economic development and size. Thus, if Belarus and Moldova are somewhat similar re as former socialist countries, Malta and Faroe Islands are very small countries, so obviously the installed energy capacities are small.

For Belarus, increased power capacity, for the entire period, was 3.5 times higher in 2015 compared to 2006! Thus, in 2007 compared to 2006 capacity growth was 13.64%, followed by stagnation in 2008 compared to 2007, a growth of 12% in 2009 compared to 2008 and with 7.14% in 2010 compared to 2009, again a stagnation in 2011 compared to 2010 and increases by 56.67% in 2012 compared to 2011, with 57% in 2014 compared to 2013 and stagnation in 2015 compared to 2014.

Figure no 4: Evolution of Total Renewable Energy(MW) for the last countries in the ranking (2006-2015)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belarus	22	25	25	28	30	30	47	49	77	77
Malta	0	0	0	1	5	9	18	31	55	60
Faroe Island	36	36	36	36	36	36	47	47	58	59
Moldova	56	56	64	64	64	64	64	66	69	23

Data source: (IRENA 2016a, p.13)

Moldova, however, witnessing a rise in capacity with only 23% in 2014 compared to 2006, with years in which growth was 0, in 2007 compared to 2006, in 2009 vs 2008, in 2010 compared to 2009, in 2001 compared to 2010, in 2012 compared to 2011. Increases renewable power capacity by 14.29% in 2008 compared to 2007 and with 3.13% in 2013 compared to 2012 and with 4.55% in 2014 compared to 2013. In 2015, the situation looks a dramatic decrease of 66.67% compared to 2014.

In the case of Faroe Island, the increase is by 63.88% in 2015 compared to 2006. The increases is zero from 2006 until 2011 and in 2013 compared to 2012, followed by increases of 30.5% in 2012 compared to 2011 and by 23 4% in 2014 compared to 2013 and only with 1.72% in 2015 compared to 2014.

And for Malta, we are witnessing explosive growth, from very low values: 1MW to 60MW, in 2009 until 2015. In fact, Malta has developed this branch of renewable power after the Treaty of Lisbon.

Conclusions

All European countries, even those that are not part of the EU, understood the need for transformations of energy sectors to produce clean energy as much as posible. The review clearly shows that after 2007, European countries have tried to apply the Lisbon Treaty in the field of Renewable Energy, so there are countries which have established new branches of clean energy and countries which had outstanding increases.

The most powerful countries in Europe have made important contributions in the field of Renewable Energy before 2007 and after 2007 generally were constantly increasing trends. New member countries were "hardworking" and have filed more effort in this regard (especially since

certain types of energy: wind, solar photovoltaic, biogas etc, had no lucrative capacities before 2007).

System crisis that began in 2007-2008 did not influence the development of new renewable energy capacities, on the whole period, although it can be seen an explosion in increasing renewable energy capacities in countries like Belarus or Malta. The only country that has varied uptrend is Hungary, which had years with decreasing renewable energy capacities. Moldova has just one year , in 2015, with decreasing renewable energy capacities .

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