

Implementation of Energy Policy in the European Union Countries in the Aspect of their Sustainable Development

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Abstract. The energy sector in the European Union is currently undergoing very deep transformations from the transition from conventional energy to new technologies and renewable energies. By defining energy policy guidelines, the European Union has followed the principle of sustainable development and has adopted the following targets for the development of the energy sector for the years 2010-2020: 20% reduction of greenhouse gas emissions, 20% increase of renewable energy share in final energy consumption, by 20% and by increasing the share of biofuels in the total consumption of transport fuels by at least 10%. The aim of the article was to analyze the current state of implementation of the basic assumptions of the Community in the field of energy policy. The ambitious energy policy objectives for 2010-2020, as outlined by the European Union, have been demonstrated to a varying extent by the Member States of the Community. This was influenced primarily by the global economic crisis, the diversification of the political and economic interests of individual member states, and the large diversification of strategic energy carriers.

1. Introduction

The energy sector in the European Union is currently undergoing very deep transformations from the transition from conventional energy to new technologies and renewable energies. This is the result of an energy policy in the Union. In defining the guidelines for energy policy, the European Union subordinated it to the principle of sustainable development, which was adopted as a rule of socio-economic development of the whole Union. Consequently, the Union has gone away from a traditionally understood energy policy to produce energy that meets the needs of a given country, without paying any attention to ecological effects [1].

The concept of sustainable development was first defined in 1987 by Gro Harlem Brundtland, in the report "Our Common Future" [2]. According to this definition, sustainable development is a process of development that fulfills current needs without compromising future generations ability to meet their own needs. This means that the economic development of the country and the protection of the environment and its resources should not be treated separately but jointly.

The EU's pursuit of sustainable development in energy policy has led to the following goals and values:

- counteracting climate change and addressing serious environmental problems,
- promoting energy efficiency,



- increasing the competitiveness of renewable energy sources,
- developing a common energy market based on the same ecological priorities.

The European Union's energy policy in recent years has been largely directed at supporting the development of renewable energy. There are many causes for the development of renewable energy sources, but most important are the increase in EU energy security, potential reduction of fossil fuel imports outside the Union and creation of new jobs in this sector [3].

Renewable energy and sustainable development have long been one of the most important elements of European Union policy.

The aim of this article is to analyze current state of implementation of the basic assumptions of the Community in the field of energy policy. Conducted research should demonstrate which of the Member States of the Community is implementing its energy policy and in which implementation is at risk.

2. Energy policy of the European Union

The EU Energy Policy is a series of directives, strategies and legal requirements for the Member States in the energy sector. The most important acts governing the activities of the energy sector and indicating aims and directions of its development in the Community and in the individual Member States are:

- European Energy Policy,
- Europe 2020 - A strategy for smart, sustainable and inclusive growth,
- Green Paper. Framework for climate and energy policy until 2030

The European Energy Policy is a climate and energy package adopted in March 2007 by the Council of the European Union, according to which, by 2020, the European Union [4]:

- will reduce by 20% greenhouse gas emissions (with a 30% reduction if other developed countries commit to comparable emission reductions, and developing countries contribute to their commitments and opportunities) relative to the 1990 level,
- will increase by 20% the share of renewable energy in final energy consumption,
- will increase by 20% energy efficiency, compared to the 2020 projections,
- will increase the share of biofuels in the total consumption of transport fuels by at least 10%.

Europe 2020 is a long-term strategy for the development of the European Union for the years 2010-2020. It was approved by the European Council on 17 June 2010. The program offers three basic, mutually reinforcing priorities [5]:

- smart growth - that is knowledge and innovation development,
- sustainable growth - a transition towards a low-carbon, resource-efficient and competitive economy,
- inclusive growth - that is, to support a high-employment economy and ensure economic, social and territorial cohesion.

Progress towards the Europe 2020 Strategy has also been defined as measurable development goals to be achieved in 2020 at the EU level. In the context of the energy sector, this is implementation of the 3x20% initiative presented in the European Energy Policy. Instruments to deliver the Europe 2020 goals are developed by the EU Member States National Reform Programs and the flagship initiatives of the European Commission. Among the latter, attention should be paid to the initiative entitled *A resource-efficient Europe*, which points to the need for a shift towards a low-carbon economy and efficient use of environmental resources.

In March 2013, the European Commission, together with the publication of the "Green Paper. Framework for climate and energy policy until 2030." launched a debate on the future energy strategy of the EU.

As a result of this debate and consultation between countries of the Community, an agreement was reached setting out the objectives of energy and climate policy by 2030, adopted by the Council of Europe in October 2014. The four main goals to be faced by the energy sector are [6]: reducing greenhouse gas emissions by at least 40% by 2020 compared to 1990 (binding target), by at least 27%

renewable energy by 2030 At least 27% improvement of energy efficiency by 2030 (indicative target), supporting the development of a full internal energy market by urgently implementing the 10% interconnection electricity target, especially for the Baltic Sea States and the Iberian Peninsula.

3. The implementation of the European Union's energy policy objectives

The assessment of the implementation of EU energy policy has been carried out on the basis of indicators that characterize the four main areas identified as key in the link between the energy sector and the concept of sustainable development. These are:

- energy efficiency,
- percentage of generated electricity from renewable energy sources,
- CO₂ emissions in EU countries,
- share of renewable energy in fuel consumption in transport.

Energy efficiency is an economical way to reduce energy consumption while maintaining an unchanged level of economic efficiency [7]. Therefore, the energy efficiency index for EU countries was determined as a ratio of GDP to the volume of electricity generated in the economy. Energy efficiency in the EU (Figure 1) in 2008 increased by 8% compared to 2008 (this year the climate change-energy package of the European Energy Policy was adopted), thus less than the 20% growth expected by 2020.

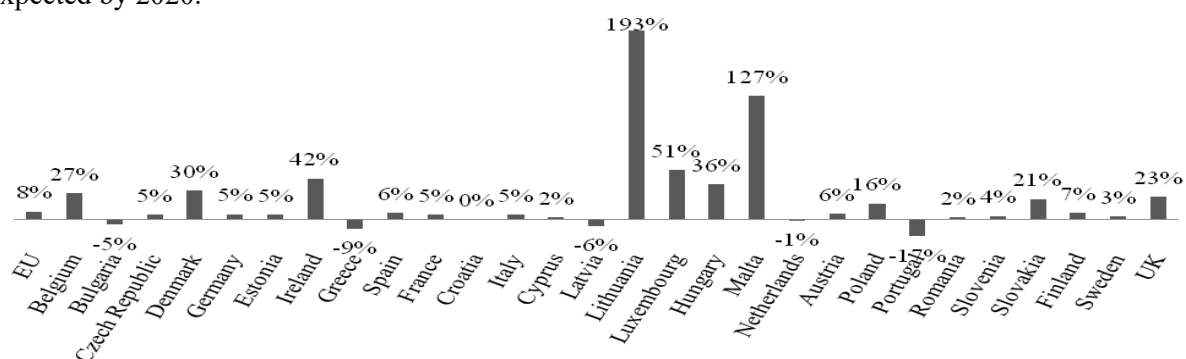


Figure 1. Changes in energy efficiency in EU countries in 2008-2015.

Source: Calculations and own elaboration based on Eurostat and World Bank data

The country with the highest increase in energy efficiency is Lithuania - 193% and Malta - 127%. Luxembourg, Ireland, Denmark and Belgium have also achieved significant reductions in energy consumption. During the period under review, energy efficiency declined in Portugal, Latvia and Bulgaria and Greece.

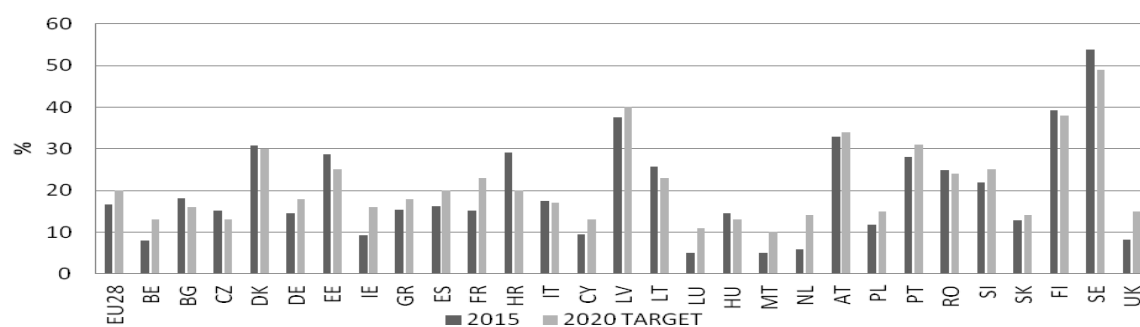


Figure 2. Percentage of energy from renewable energy in EU countries in 2015.

Source: Calculations and own elaboration based on Eurostat data

Taking into account the economic development of individual countries of the Community, each individual has a specific target for renewable energy. By 2015, the share of renewable energy in total energy consumption was 17%, thus the only 3% below the 20% target for 2020 (Figure 2). The group of countries that reached their "national" target for renewable energies in 2015 included Sweden (54%), Estonia (29%), Bulgaria (18%), Croatia (29%), Denmark (31%), Czech Republic (15%), Finland (39%). Moreover, in the Nordic countries, the share of renewable energy in total energy consumption is highest. The countries with the lowest levels of renewable energy use are Ireland, Malta, Cyprus, Netherlands and the United Kingdom. These countries have not yet fulfilled their targets for renewable energy use.

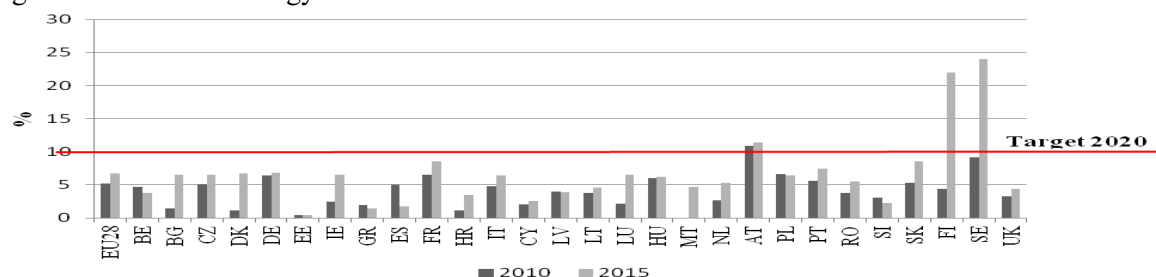


Figure 3. Share of renewable energy in transport fuel consumption in EU countries in 2010 and 2015. Source. Own study based on Eurostat data

According to data from the European Environment Agency, transport accounts for about a quarter of EU greenhouse gas emissions. Hence, the emphasis is on the use of renewable fuels in this sector [8]. In 2015, the share of biofuels in transport fuel consumption is growing steadily in each of the EU countries (Figure 3). For the whole Union, the share was 6.7%. Only in Finland (22%), Sweden (24%) and Austria (11.4%) the share of renewable fuels in transport fuel consumption reached the level of 10% required for 2020. The transport sector responsible for the highest CO₂ emissions is road transport. The countries with the highest participation in European road transport are Poland, Spain and Germany and the Netherlands. At the same time these are countries where the use of biofuels in transport is at the lowest level among all EU countries.

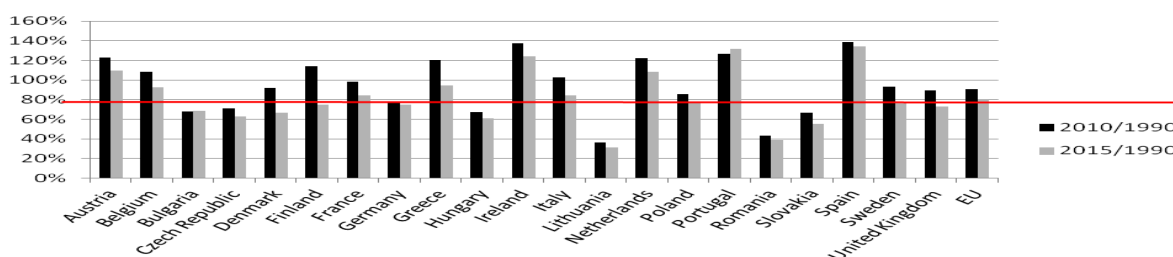


Figure 4. CO₂ emission dynamics indicators for the EU in 1990-2015.

Source: Calculations and own elaboration based on BP Statistical Review of World Energy June 2017

The climate and energy package has set a target of reducing CO₂ emissions in the European Union by 20% compared to 1990, and this assumption has already been fulfilled by 2015. Countries that have reduced carbon dioxide emissions by 20% are Bulgaria, Czech Republic, Germany, Denmark, Hungary, Lithuania, Romania, Slovakia, United Kingdom and Poland. Among countries where CO₂ emissions are above 100%, which means that emissions in 2015 are above 1990 levels are among others Austria, Belgium, Greece, Ireland, Portugal, Spain and the Netherlands.

4. Summary

The ambitious goals of the 2010-2020 energy policy outlined by the European Union are to varying degrees carried out by the member states of the Community. The EU is the best place for greenhouse gas emissions, as it achieved its target for 2020 in 2015. It is equally good in terms of renewable energy development. By far the worst target, EU member states and the whole EU is failing to reach is the share of biofuels in total fuel consumption in transport and in improving energy efficiency.

Undoubtedly, the impact on the different levels of energy policy objectives by individual EU countries has had a global economic crisis. The economic downturn has slowed down investment in the energy sector [9]. The economic situation also had a negative impact on development of renewable energy sector, whose main driving force was to subsidize investments in this area by the governments of the Member States. The crisis has caused the subsidies in many countries (Germany, Czech Republic, Italy, Bulgaria, Great Britain) to be limited.

Very slow process of communitarisation of energy policy in the European Union also adversely affects the achievement of the "3x20%" target. This is due to the diversity of political and economic interests of individual Member States, especially the largest energy consumers like Germany and France, who are eager to make the decision to cooperate with Russia on specific projects. Although a long-established fact is the significant dependence of EU countries on imports of fuels and energy from the east [10].

What is more, also the large diversity of member states in terms of country-specific energy carriers adversely affects the common goals of the EU's economic policy, which is reflected in their energy mix. This means that different countries invest in different energy-producing technologies. For example, Germany is moving away from nuclear power, while Poland and Finland have plans to develop this energy sector.

The EU's energy policy combines economic and social goals, while pursuing a philosophy of sustainable development. It must be stated that achieving the ambitious goals of energy policy will make the European Union an economy with high economic efficiency and low CO₂ emissions.

References

- [1] Włodarczyk A 2015 Evaluation of the carbon market impact on the Polish Power Exchange, *Materials, Methods and Technologies* vol. 9 pp 64-79
- [2] *Our Common Future. Report of the World Commission on Environment and Development* 1987 Oxford University Press (New York: Oxford)
- [3] Pach-Gurgul A 2014 Renewable energy in the European Union in the context of economic crisis *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego* 27 pp 130-147
- [4] *An energy policy for Europe* 2007 COM(2007)1 (Brussels) pp 3-28
- [5] EUROPE 2020. *A European strategy for smart, sustainable and inclusive growth* 2010 COM(2010) 2020, (Brussels) pp 3-29
- [6] *Green paper: A 2030 framework for climate and energy policies* 2013 COM (2013) 169 (Brussels) pp 2-17
- [7] Paska J and Surma T 2013 Polityka energetyczna Polski na tle polityki energetycznej Unii Europejskiej *Polityka Energetyczna* 4 T.16 pp 7-19
- [8] Bunn D and Munoz J 2016 Supporting the externality of intermittency in policies for renewable energy *Energy Policy* vol 88 pp 594-602
- [9] Włodarczyk A 2017 Environmental Management Instruments in the Restructuring Process of Polish Energy Enterprise [in:] ed R Borowiecki and J Kaczmarek *The Propensity to Changes in the Competitive and Innovative Economic Environment. Processes-Structures-Concepts* Publishing House: Foundation of the Cracow University of Economics (Cracow) pp 215-225
- [10] Miciuła I Polityka energetyczna Unii Europejskiej do 2030 roku w ramach zrównoważonego rozwoju 2015 *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania* 42 T.2 pp 57-67