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Prospects for the Development of Prosumer Energy in Poland

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Keywords: prosumer; energy sources; renewable sources of energy; climate and energy policies

Abstract: Renewable energy will play a key role in the transition towards a competitive, secure and sustainable energy system. In 2014 the European Commission proposed an objective to increase the share of renewable energy to at least 27% of the EU's energy consumption by 2030. The European Council endorsed this target which is binding at EU level.

The Renewable Energy Directive (Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC) was implemented in Poland on 20 February 2015 by the new renewable energy sources act.

The objective of this article is to analyse the current state of the Polish energy sector related to the prosumer energy industry. It also describes the future potential for the development of prosumer energy in Poland. The analysis was conducted in the light of the new EU climate and energy initiatives.

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At the beginning, the article presents the current general state in the EU's energy sector. European Union Climate and Energy Package targets up to 2050 and the state of renewable energy use gives the background to conduct an analysis of prospects for the development of prosumer energy in Poland. That is why the last part is devoted to the prosumer energy sector in Poland in the context of European Union regulations. The critical analysis of the current situation in that sector has made it possible to evaluate prospects for the development of prosumer energy in Poland in the context of the recently introduced legal regulations.

Introduction

Energy is a vital factor in socio-economic development, seen by many countries as strategic to their future. It is a source of growth for competitiveness and the development of modern economies. The important role of energy stems from the fact that primary energy includes sources used by man in the process of the industrial production of electricity, heat and chemical products. The sources of energy include solid fuels, liquid fuels, nuclear fuels, and so-called renewable fuels (Niedziółka, 2010, p. 7).

Renewable energy will play a key role in the coming years in the transition towards a competitive, secure and sustainable energy system for EU as an international organization as well for the Member States. In 2014 the European Commission proposed an objective of increasing the share of renewable energy to at least 27% of the EU's energy consumption by 2030. The European Council endorsed this target, which is binding at the EU level.

The Renewable Energy Directive (Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC) is one of the Climate and Energy Package document. The Directive established a common framework for the use of energy from renewable sources in order to limit greenhouse gas emissions and to promote cleaner transport. Each Member State has a target calculated according to the share of energy from renewable sources in its gross final consumption for 2020. That Directive was implemented in Poland on the 20th of February, 2015, by the new renewable energy sources act.

The objective of this article is to analyse the current state of the Polish energy sector related to the prosumer energy industry. It also describes the future potential for the development of prosumer energy in Poland. The analysis was conducted in the light of the new EU climate and energy initiatives.

Research Methodology

This article is an attempt to find answers to the following question: What are the prospects for prosumer energy to be included in the recently introduced legal regulations in Poland? Whether the European Union regulations concerned Climate and Energy package will help the development of prosumer energy sector in Poland?

It seems that the development of prosumer energy in Poland is an opportunity for the Polish energy sector; however, it will depend primarily on the attitude of prosumers, their energy needs and the state support for the microinstallations.

To realize the objectives of the article, the analysis is divided into four parts. At the beginning, the article presents the current general state in EU's energy sector. European Union Climate and Energy Package targets up to 2050 and the state of renewable energy use gives the background to conduct an analysis of prospects for the development of prosumer energy in Poland. That is why the last part is devoted to the prosumer energy sector in Poland.

Literature concerning European climate and energy policy is extensive (see Wojtkowska-Łodej, 2003; 2014; Ważniewski, 2014; Michalski, 2013), however, until now, there is a gap in the information available about the Polish energy sector related to prosumer energy (compare Nowicka-Skowron & Pachura, 2013).

The results of analysis are available for different countries and they concern different issues. J. Rodriguez-Molina, M. Martinez-Nunez, JF. Martinez and W. Perez-Aguiar deal with emerging business models for smart grid prosumers, their strengths and weaknesses and puts forward new prosumer-oriented business models, along with their value propositions (Rodriguez-Molina *et al.*, 2014, pp. 6142-6171). GKH. Larsen, ND. van Foreest and JMA. Scherpen analysed a balance of power in a group of prosumers, based on a price mechanism (Larsen *et al.*, 2013, pp. 828-836). A. Filipowska *et al.* (2013, pp. 289-314) present a solution for managing the energy consumption and production in microgrids. They present challenges of managing such networks as well as functionalities of a system, that enables for e. g. preparation of forecasts, tracing the energy consumption or creation of recommendations for the microgrid prosumers, in order to deal with these challenges.

The analysis in this article is based on the study of literature, the legal regulations and Eurostat's statistics.

Situation in the EU Energy Sector

As part of the regional economic integration in Europe, Member States took steps towards increasing integration of energy markets and creating common energy policy. These were accompanied by EC efforts aimed at protecting the environment, especially working against its degradation. Depending on the state of the world economy at the time, actions taken in the 70s, 80s and 90s of the previous century were varied in character. In the first decade of the 21st century, a new factor in the discussions and strategies were the attempts to link the issues of energy and climate change. This also finds expression in the policies of the Treaty on the Functioning of the European Union (Wojtkowska-Łodej, 2014, pp. 44-45). According to article 194 of the TFEU introduced in the Lisbon Treaty, „1. In the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member States, to:

- ensure the functioning of the energy market;
- ensure security of energy supply in the Union;
- promote energy efficiency and energy saving and the development of new and renewable forms of energy; and
- promote the interconnection of energy networks.” (see Zajączkowska, 2014).

These energy targets are an important factor in the EU’s Europe 2020 growth strategy (European Commission, 2010) based on the increase in competitiveness of the EU, as well as a roadmap for moving to a competitive low carbon economy in 2050 (European Commission, 2011).

In 2011, the European Union (EU-28) was the fourth biggest energy producer (6.1%), behind China (18.4%), USA (13.5%) and Russia (10%) (European Commission, 2014b, p. 10). In 2012, primary energy production in the EU stood at 794 million tons of oil equivalent and was 15% lower than in 2004. In the first decade of the 21st century, the drop in energy production was gradual. An exception was the year 2009, when energy production dropped around 5% in relation to 2008 (Eurostat, 2013). This was partly the effect of the global crisis, and a drop in the demand for energy in certain Member States. An additional reason for the gradual drop in energy production could be ascribed to the industry, namely the problems faced by suppliers in the oil and gas sector.

The structure of the world’s energy sources has remained unchanged for decades. It is mainly based on the location of energy resources as well as strategic political decisions, which have the biggest influence on the development of the nuclear and renewable energy sectors. In 2011, the part

played by oil and oil derivatives worldwide stood at 31.3%, solid fuels 29.2%, gas 21.2%, renewable energy 12.9%, and nuclear energy 5.1%. Also noticeable is the steady increase in the consumption of oil, fossil fuels, gas and renewable sources since 1995. An exception to this is the part played by nuclear energy, which in 2011 dropped by 6% in relation to 2010 (European Commission, 2014b, p. 11).

In the European Union, the situation is slightly different. In 2012, the percentage of oil and oil derivative products used in the production of energy was 11.1%, solid fuels 20.7%, gas 16.5%, renewable sources 21.9% and nuclear energy 28.1%. Renewable energy sources and nuclear energy, therefore, constitute half of the energy production in the EU. It must be noted that 48% of the EU energy sector is dependent on fossil fuels, which produce the most CO₂ emissions, which is responsible for climate change. A major difference between the European Union and the rest of the world is the place of oil and oil derivatives (-20 p.p.), as well as nuclear energy (+23 p.p.) (European Commission, 2014b, p. 35).

Climate and Energy Package Targets up to 2050

One of the key objectives of the current Climate and Energy Package is the reduction of greenhouse gas emissions by 20% compared with base year 1990. In the light of the Kyoto Protocol, participating countries were responsible for the reduction of emissions of seven greenhouse gases: carbon dioxide, methane, nitrous oxide, fluorinated gases, including hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and ozone trifluoride (European Commission, 2014a, p. 3).

In January 2014, the European Commission published the terms of the next Climate and Energy Package valid until the year 2030. Two main aims were introduced: the reduction in the emission of greenhouse gases by 40% and increasing the use of renewable energy sources to 27%, without precisely setting specific levels for each country. The debate on the future EU strategy, which began in March 2014 (Green Paper to establish a 2030 framework for climate and energy policies), turned out to be difficult. The Union aims for climate and energy policy until 2020 are set out clearly (known as the “20-20-20” targets or 3x20% targets). They are based on three main criteria: competitive economy, sustainable growth, and security of supply. At the start of the debate, a controversy arose on whether the European Union should accept only one binding target – the reduction of

greenhouse gas emissions, or whether all currently binding targets should be kept (Gawlikowska-Fyk, 2014, p. 1).

In October 2014 the Union leaders gathered for the Brussels summit agreed that by 2030 the EU will reduce CO₂ emissions by at least 40 per cent compared with 1990. Additionally, under a new Climate and Energy Package it was established that free allowances for emissions will be applicable after 2020 and not only until 2019, as established previously. Efforts will be made in Brussels concerning legislative solutions, which will ensure this goal is achieved. The European Union will therefore introduce its obligations in the first quarter of 2015.

For 2050, EU has endorsed the objective of reducing Europe's greenhouse gas emissions by 80-95% compared to 1990 levels as part of efforts by developed countries as a group to reduce their emissions by a similar degree set for 2020 year.

Renewable Energy Use

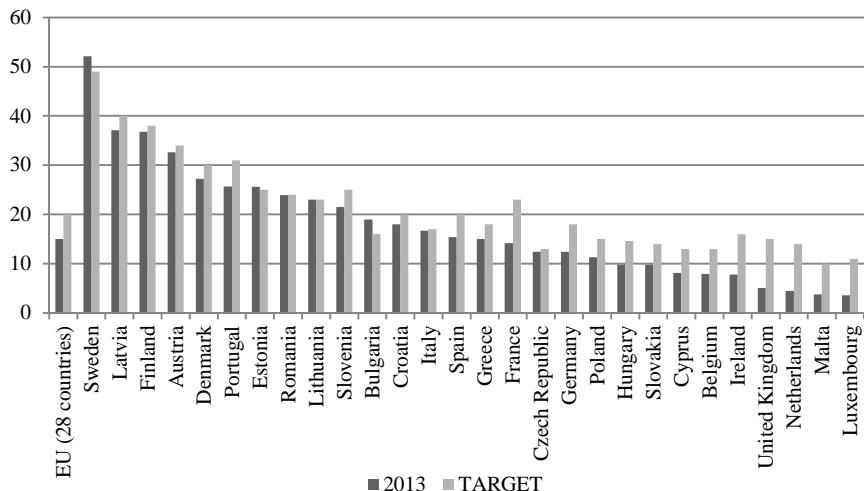
In the currently applicable 3x20% targets, the increased use of renewable energy sources has been set to at least 20% of overall energy production (in the electricity, heating and transport sectors), with 10% of biofuels to be used in transport, relative to 2006. The real capabilities of Member States were, however, taken into account, hence the application of the category of national plans, in which Member States set their own indication levels towards which they are striving. The ranges vary substantially across the Union.

Figure 1 shows the share of renewable energy sources in the final total energy consumption of EU Member States in 2012 against national plans for the year 2020.

Analysis of the data presented in the figure above, leads to the conclusion that quite early on, the plan to increase the usage of renewable energy has been successfully implemented in Sweden, Estonia, Lithuania and Bulgaria, with Sweden exceeding the 50% mark. The furthest from meeting their national criteria were Great Britain (9.9 p.p.), Netherlands (9.5 p.p.), France (8.8 p.p.) and Ireland (8.2 p.p.). Poland has a chance of meeting its target of 15%, because it achieved a level of 11.3% as early as 2013 (Eurostat, 2013).

From the above Figure 1 it can be seen that the highest target in the usage of renewable energy as an overall part of country energy mix was set by Sweden at 49%, with the lowest being Malta at 10%.

Figure 1. Share of renewable energy in gross final energy consumption of EU Member States in 2013 compared with national plans for the year 2020 (in %)



Source: own calculations based on Eurostat (2013). Retrieved from: http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_31&plugin=1 (26.01.2015).

Situation in Poland's Energy Sector

The energy situation in Poland seems challenging. Most electrical power and heating stations have old power units that should be taken off the grid in the next few years due to wear and age. Even if a decision is made to build a nuclear power station, it will only meet a small portion of the country's energy needs. Also, shale gas extraction will not be ready in the nearest future. Therefore every decision concerning the country's energy policy will play a vital role in securing Poland's energy as well as diversifying energy sources (Grzegorczyk, 2014, p. 208). Creating small microgrids systems might become the solution that will help solve Poland's two basic energy problems: the necessity to modernize coal power stations; and support for building nuclear power stations. The simultaneous passing of legislation concerning renewable energy sources will meet European Union climate and energy policy targets while also fulfilling Poland's international responsibilities.

After a few years of work on the project, on 20 February 2015 Polish Parliament passed legislation concerning renewable energy sources (Renewable Energy Sources Act, 2015). The Renewable Energy Resources Act will come into force after 30 days and regulations concern an auction system and fee-in tariffs on 1 January 2016. The new laws introduced new principles that support energy production from renewable energy sources. It is the sign of the Renewable Energy Directive implementation.

One of the fundamental changes to the currently applicable laws supporting renewable energy sources is the replacement of the guarantee green certificates with an auction system. The government is to decide how much renewable energy is needed, taking into account the EU climate policy. Auctions are then prepared, in which the lowest bidder wins. In exchange they are issued a guarantee of support for 15 years. Auctions will be separate for different technologies, as well as large and small installations. The support of renewable sources will be passed onto consumers, who will incur an additional renewable energy fee. In its first year this cost will amount to PLN 2.27 per megawatt-hour of electricity.

The legislation also foresees the requirement to buy energy and feed-in tariffs for the resale of electrical energy by prosumers. A constant price of PLN 0.75 per kilowatt-hour has been set for 15 years from sources up to 3 kW and for energy originating from hydroelectric, wind and solar sources. A constant price will also be applicable for sources between 3 kW and 10 kW – PLN 0.70 for one kilowatt-hour of energy from agricultural biogas, PLN 0.55 for biogas from storage, and PLN 0.45 from sewage works. A constant price of PLN 0.65 will apply for a kilowatt-hour of energy for hydroelectric, wind and solar energy. For these sources there is also an obligation to purchase for 15 years from when the installation goes into use.

Feed-in tariffs for home micro-installations of renewable energy sources is a chance for many people to lower their energy bills. This solution could in time improve the situation for all citizens, because it provides access to the energy production market even for the smallest home renewable energy source and lowers the cost of investment in distribution networks, which would be spread amongst all energy users. The government's earlier proposal would have meant that only wealthy people would be able to afford investing in renewable energy sources. Feed-in tariffs have leveled the opportunity of buying micro-installations, as well as limiting costs and distributing them in a fairer way. This change is important, but minor from the overall perspective of the whole renewable energy sector, as it only amounts to 1% of the whole electrical energy market. It is therefore not enough to solve the problems of renewable energy in Poland.

A valuation of the effects of regulation estimates the cost of the future legislation at ca. PLN 4 bn per annum. For prosumer installations, i.e. those up to 40 kW, no concession or formation of a business will be required. It will also be possible to sell surplus energy back to the grid (compare Cyglicki, 2014).

Conclusions

Two of three treaties calling the European Communities into existence dealt with the energy sector. Over the last few decades the EU has accepted legislation amounting to numerous Energy, and later Climate and Energy Packages. However, specific regulations regarding energy were not written into the primary law of the EU. The situation changed with the acceptance of the Lisbon Treaty. By the authority of this treaty, articles concerning Energy were introduced into the Treaty on the Functioning of the European Union, whereby energy policy gained treaty backing. Next, these resolutions were included in the Strategy for smart, sustainable and inclusive growth, and in the Roadmap for moving to a competitive low carbon economy in 2050. These documents show the direction the EU will take in the next 30 years, which can be described as green growth and stable development. It should also be highlighted that the acceptance at the Brussels summit in October 2014 of goals regarding the reduction of CO₂ emissions by at least 40 percent by 2030 relative to 1990 requires further detailed legislative work, which will ensure reaching the target. Work on these will take place in parallel with the international agreement which will be reached at the COP20 summit in Paris in 2015 and will replace the currently used Kyoto protocol of 1997.

The dynamics of reform and real change in the energy sector in Poland differ from those found in the energy sectors of other EU countries and are mainly the result of historical factors. While preparing the framework for the next Climate and Energy Package, the European Commission should consider the specifics of the energy sector in each East-Central Europe country, including Poland. Failing that, the meeting of the interests of individual countries will become more important than the implementation of the common Climate and Energy Policy. The European Union should therefore increase the size of the European funds assigned to infrastructure investments in the energy sector of countries in East-Central Europe.

The energy-mix options available in each Member State are varied. Member States can focus on developing their own choice of energy

sources, but it is also necessary to include European targets, especially renewable energy sources.

It seems that, in light of the experiments conducted in different countries, prosumer energy presents an opportunity for the Polish energy market, because it could lower the cost of electrical energy and create new sector jobs. There are analysis that in 2020 aggregate heat and electricity power from microinstallations based on renewable energy sources will achieve 38,5 TWh (for electrical energy 2,9 TWh) and the number of prosumers will exceed 2,5 million in Poland (Institute for Renewable Energy, 2013).

Moreover, the growth of prosumer energy supplies could have a positive impact on meeting the criteria of the Climate and Energy Package, specifically the 20% reduction of CO₂ emissions by 2020.

However, the final word on growth will belong to the prosumers, their local conditions, as well as individual preference and choice.

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