

## Peculiarities of development and reforming markets of electric energy as one of the key energy products in the European Union

A. Zaverbny

Educational-scientific Institute of Economy and Management, Lviv Polytechnic National University, Ukraine,  
e-mail: anzas@i.ua

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**Abstract.** The article discusses the historical background and problems of reforming electricity markets in the European Union. It elaborates on the dynamics of the main indicators and analyses the main trends in the EU electricity sector. The article presents statistics on the energy production and consumption in the EU and examines the legal framework of the electricity industry reform.

**Key words:** electric energy markets, reforming energy markets in the EU, liberalization of electric markets.

### INTRODUCTION

Electric power industry is the infrastructure component of the economic system in any country. Effective operation of this industry has direct influence on country's economic performance, well-being of people and societies [1]. Therefore, the development of the robust and efficient electricity market is commonly treated as an important task for every economy worldwide. The relevance of energy issues to the global development agenda can be proved by many international policy papers, like the United Nations General Assembly resolution 65/151 [2]. This document declared 2012 the year of sustainable energy in response to the growing importance of energy issues nowadays. The following industry objectives are set to be met by 2030 [2]:

- Provide access to modern energy services,
- Double the level of energy efficiency,
- Double the share of renewables in the global energy balance.

The world and European Union energy balances in 2010 are shown below (Fig. 1 and Fig. 2) [3]. The EU uses nearly five times more nuclear power and almost three times less crude oil.

The need for radical changes is caused by the fact that in 2010 the share of renewable energy sources is less than 15% worldwide and less than 20% in the EU. However, problems arise not only from the energy balances of

countries. The competition levels in some energy markets are sources of concern as well. For example, natural gas markets still remain heavily monopolized. As far as the secondary energy products (produced from primary sources) are concerned, electricity generating companies are very prominent natural monopolies.

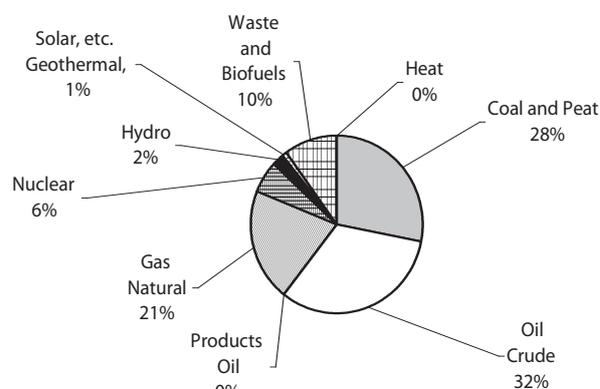


Fig. 1. World energy balance structure [3]

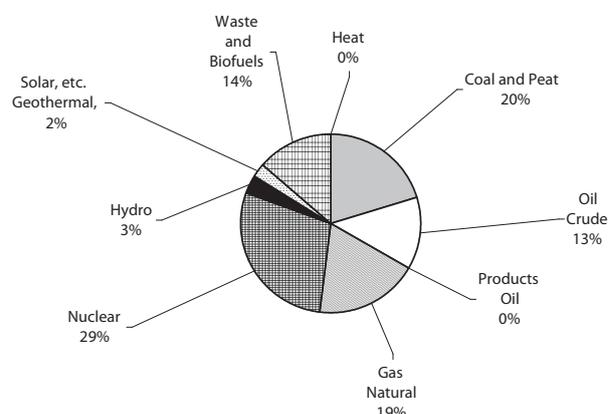


Fig. 2. EU energy balance structure – 27 [3]

## ANALYSIS OF THE LATEST RESEARCH

Such economists as V. Verbynsky, G. Gasanov, G. Geletuha, D. Dolisznyj, S. Jermilov, G. Zemlyany, S. Kazansky, O. Kendiuhov, E. Krykavsky, O. Kuzmin, O. Lapko, S. Melnikova, I. Nedin, A. Rabia, A. Ryzova, O. Solovej, P. Serra, P. Starovojtov, V. Toczylin, V. Petrenko, R. Fisher, E. Chlobystov, V. Caplin, A. Czuchno, N. Czuhraj, A. Szevcov, A. Szydlovsky, A. Szot, N. Shpak have paid much attention to the problem of raising competitiveness among producers of electric energy over the last few years.

Despite the significant amount of studies about the international experience, there's a lack of research papers providing complex analysis and scrutiny of the electricity markets in the European Union.

## THE PURPOSE OF THE STUDY

The main purpose of this paper is to analyze and to generalize international (especially European) experience in establishing market relations in the electric energy sector.

## THE RESULTS AND DISCUSSION

Energy plays a vital role in the economic life of every country, influences the daily life of people and impacts the environment. Energy interacts with all three major components of sustainable development (economic, social and environmental) [2]. Therefore, it is important to the development of any country. Electricity is one of the most versatile forms of energy [4, 5, 6].

Research about the development of electricity markets in EU countries showed that up until the end of 80-ies the industry was influenced by the centralization trends in almost all countries. This was caused largely by the concerns about the energy independence and, therefore, the national security of countries after the Second World War. Centralization allowed to achieve higher efficiency by introducing economies of scale in the production of electricity. Reliability of electricity supply at fixed prices was yet another advantage of centralization. However, the innovation in the electricity sector made it possible for the medium-size power plants to compete with the larger plants. Still the centralization trends in the development of the electricity sector posed significant problems. This mainly applies to prices (which were controlled by the governments) and quality of supply and services. Consumers were passive objects in the market, which was manipulated by governments and energy companies. That monopoly in the electric power industry led to higher prices coupled with low quality power supply. Realizing the shortcomings for the centralization, governments began a gradual withdrawal of the electricity industry from natural monopolies in the early 90-ies [1]. Power generating and sales to large consumers were in

the vanguard of the electricity market reforms in most EU countries.

Governments of different countries reconsidered the natural monopoly character of power generating and started to introduce the elements of competition to the industry in the early 90-ies. The pioneers in decentralization of the industry were England and Wales (1990). In 1991 they were joined by Norway, followed by Finland (1995), Sweden (1996), Germany, Spain (1998), Denmark, Austria, Luxembourg, Netherlands, Italy, Portugal (1999), Belgium and Ireland (2000) Greece (2001) [7]. The liberalization of electricity markets in Europe allowed to achieve the following objectives:

- Reducing the cost of electricity,
- Increasing the efficiency of power supply and transporting,
- Attracting foreign investment in this sector,
- Giving consumers the right to choose suppliers,
- Improving the quality of service,
- Increasing the competitiveness of domestic producers of electricity.

The changes in the energy sector in different EU countries were caused by a significant number of factors. The most important were the following:

- technological changes in the electricity generating process,
- organizational changes in the production and transmission of electricity,
- utilization of new sources of energy (natural gas, solar and wind energy, etc),
- introduction of the international electricity trading,
- development of the new infrastructure (primarily, for trading and information exchange).

The above mentioned factors in the electricity markets accelerated the adoption of the competition mechanisms in the EU.

Reforms in the electricity sector of the European Union supported by the respective legislation. Specifically, European Parliament adopted a directive 96/92/EC in 1996. (Directive 96/92/EC of the European Parliament of the Council of December 1996) [8]. It defined the ways of markets restructuring. The basic idea of the directive was to give customers a free choice of electricity suppliers. According to the Directive, the free choice availability was to reach a level of 30% of the electricity market in 2000 as a result of market liberalization. However, the reform process was much faster and the share hit 80% in 2000.

This reform also led to an increase in production and consumption (Fig. 3, Fig. 4) and free flow of electric energy between the EU countries. This in turn facilitated efficient use of power capacity of each of the participating countries.

Directive 2003/54/EC of the European Parliament from 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC is another legal act that governs the electric energy industry of the European Union [9]. This Directive establishes the requirement of electricity market liberalization in the EU with further integration of local

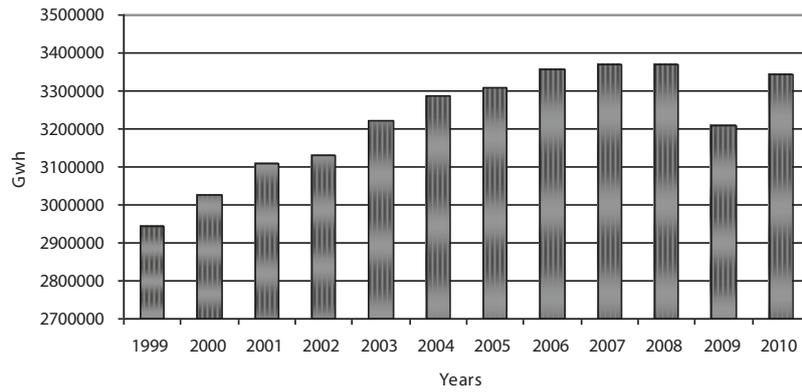


Fig. 3. Dynamics of the electric power production volumes in the EU in 1999-2010 years

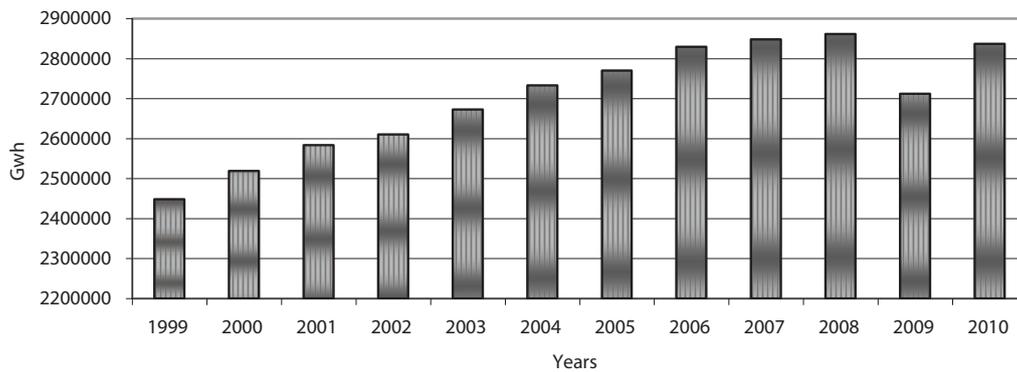


Fig. 4. Dynamics of the electric power consumption volumes in the EU in 1999-2010 years

markets. Measures spelled out in the Directive aimed to achieve the following:

- increase of efficiency of electric energy production,
- price abatement on electric power,
- improvement of service quality,
- increase the competition on the electric power markets.

The main directions of the reform were the following: the liberalization of national electricity markets of the EU, the development of regional markets, coordination between markets and integration on the European level [10]. The vertically integrated companies were primarily differentiated by type of activity. Reforms required the level of competition in the market, the economic justification for the cost of electricity and the possibility of free choice of provider, reducing CO<sub>2</sub> emissions and so on. Some countries struggled with the implementation of these objectives. First of all it concerned the national character of generating electricity (network, infrastructure). Another problem was the lack of transparency in the electricity sales. To solve these issues, the European Commission adopted the Directive 2009/72/EC on 13 July 2009 [11]. However, unlike the execution of Directive 96/92/EC, the proposed guidelines unfortunately are not followed by many EU countries [11, 12]. All obligations are fulfilled by only eight out of twenty seven member states. These countries are Czech Republic, Denmark, Germany, Greece, Hungary, Italy, Malta and Portugal. The worst implementation record is in Bulgaria, Cyprus, Luxembourg, Netherlands, Romania, Spain and Slovakia.

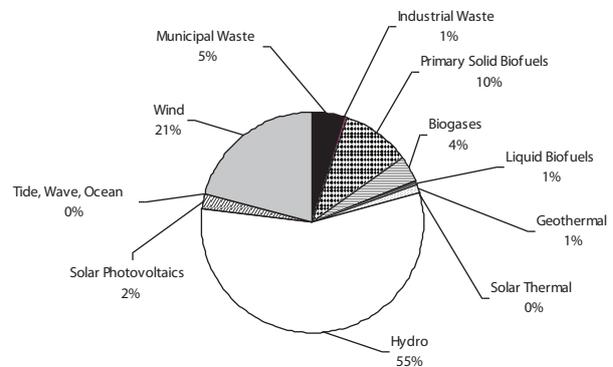


Fig. 5. Renewables and Waste in the European Union - 27 in 2010 year

Requirements of the Directive 96/92/EC apply to different energy markets. However, the positive changes occur primarily in the electric power sector due to the maturity of the respective market and relatively smaller conflict of interest between the market players.

The integration processes are becoming more prominent in the energy sector as well. This can be illustrated by the single price association in the North-West Europe. According to forecasts, the final reform and the creation of a single price zone will happen by the end of 2014.

The EU member states require larger amounts of energy from year to year. Given the shortage of the traditional energy supply, the need for renewable energy is

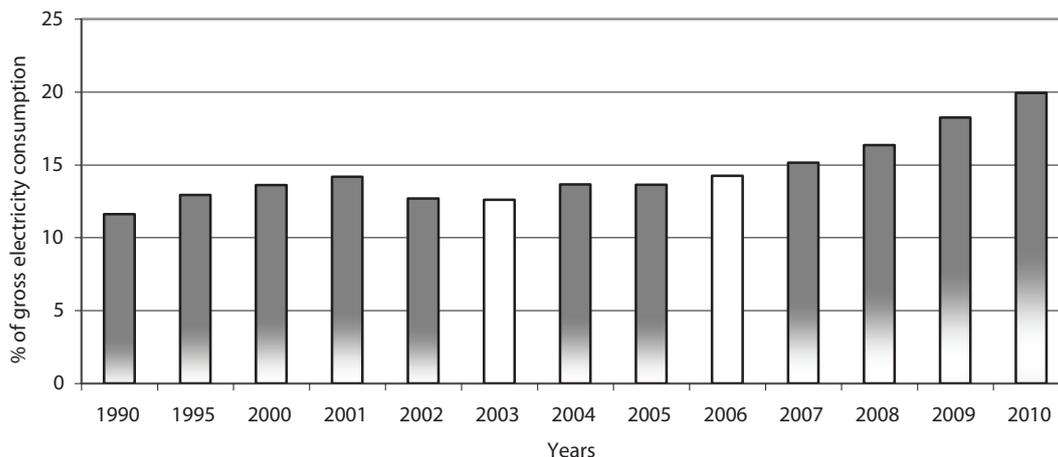


Fig. 6. Electricity generated from renewable sources (1990-2010), % of gross electricity consumption.

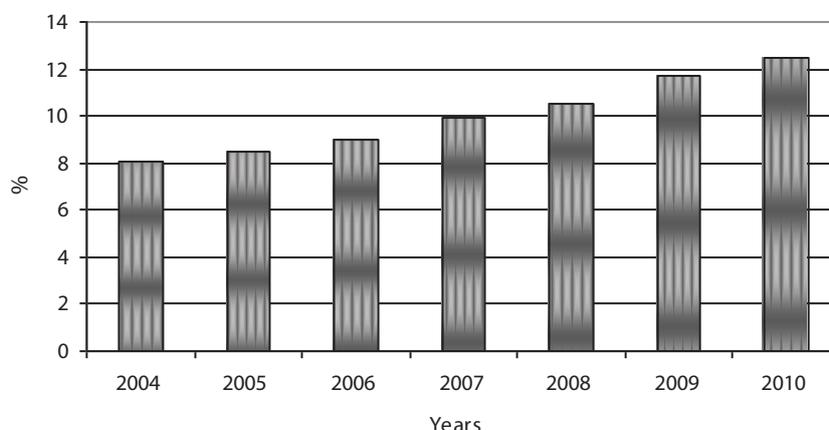


Fig. 7. Share of renewable energy in gross final energy consumption in the EU (2004-2010), %

becoming more prominent [24]. For example, in the recent years a share of wind energy has increased to 1/5 (Fig. 5).

The volumes renewal energy sources grow from year to year (Fig. 6) [14]. Moreover, the consumption of renewable energy also increases (Fig. 7) [15]. The leaders in renewable energy consumption are Norway (61,1%), Sweden (47,9%), Latvia (32,6%), Finland (32,2%) Austria (30,1%) , Portugal (24,6%), Estonia (24,3%), Romania (23,4%) and Denmark (22,2%)

As previously noted, nuclear energy has a large share in the energy balance of the EU countries. The largest nuclear power generating capacity is concentrated in the countries like Switzerland (20%), Sweden (over 30%), France and Finland (16%), Belgium (36%), Germany (22%) [1]. At the same time, the governments of some countries like Germany and Switzerland have decided to withdraw nuclear energy from their own energy balances in the future. However, due to the different approaches to nuclear power and limited opportunities to influence the nuclear market, the EU is not yet expected to have a common nuclear energy policy for all 27 member states [16]. The same applies to the development of markets of other energy products.

## CONCLUSIONS

Research showed that the electric power markets are most liberalized in such countries as Germany, Great Britain, Norway, Sweden, Finland, Spain. Markets of France, Italy, Portugal, and Greece remain less open. However, unlike the execution of Directive 96/92/EC many requirements of the Directive 2009/72/EC not met by many EU countries. All obligations are fulfilled by only eight out of twenty seven member states. These countries are Czech Republic, Denmark, Germany, Greece, Hungary, Italy, Malta and Portugal. The worst implementation record is in Bulgaria, Cyprus, Luxembourg, Netherlands, Romania, Spain and Slovakia.

Despite all the differences in the electricity markets reforms in the EU, there is one thing in common. This is the separation of natural monopoly (electricity transmission and distribution management) and potentially competitive activities (power generating, sales and repair services), as well as the liberalization of the electricity markets. The success of the EU reforms is proved by a steady increase in production and consumption.

Another trend in the development of energy markets in the EU is the formation of the electricity exchange. Bilateral contracts are signed during the direct negotiations between parties. Electricity exchange is a tool which

helps to sell standardized contracts for generation and supply easily and quickly.

Potential areas for further research are the possibilities to apply the EU experience in reforming the electricity market of Ukraine. This will facilitate the development of the electricity market of Ukraine and its further integration into the EU.

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