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SOME SPECIFIC CHARACTERISTICS OF EU ELECTRICITY MARKET

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The paper analyses specific characteristics of electricity as a commodity and its impact on electricity market functioning. The analysis outlines main trends in the process of transition from vertically integrated industry structure to well-functioning market mechanism in the production and supply of electricity. Impediments for competition from demand and supply side are discussed. The role of regulation in this market is also emphasized. Some conclusions are made for the challenges and problems encountered by countries as regards the ongoing reform in the EU electricity market.

Key words: electricity market, market structure, switching rate.

The European Union's efforts for creating an internal energy market, as an integral part of EU single market, aim to establish a common energy policy that adheres to the principles of free competition that will enhance market efficiency and consumer choice. This involves the setting of conditions and rules necessary for market operation.

As Paul Joskow writes the changes are designed to foster competition in the generating segment of the industry, to expand inter-regional and international trade in electricity and the equipment required to produce and use it, and to reform the regulation of the transmission and distribution functions which continue to be viewed as natural monopolies and to which non-discriminatory access is required to support competition in the generating segment [10].

This will allow entry of new market participants and lower incumbents' market power. It is expected that competitive electricity markets will be able to respond by reducing demand when prices are high and increasing it when they are low. Changes in market prices should encourage flexible production and demand management which will increase the competitiveness of EU economy.

Birchfield and Duffield further explain that free competition should mean that energy consumers are free to choose service from companies across Europe, whereas the suppliers in turn should encounter no barriers to transport of electricity and gas across Europe's national borders. While necessary, securing such freedom of choice is far from sufficient for competition to be fair. This would depend on market conditions free from dominant actors as well as harmonized governmental regulations across national contexts [2].

The experience of the countries that first made steps toward a change shows that liberalization is not a single event affecting only limited elements of a whole. It is a continuous process that influences a wide-ranging number of actors and interests.

Anaya comments on the complexity of the electricity sector restructuring and the requirement for a persistent government commitment. She emphasizes that the reform involves mainly institutional and organisational issues, degree of intervention and degree of competition such as unbundling versus vertically integrated structures [1].

Years after the start of the reform, the creation of competitive electricity markets is still a great challenge for EU countries. The interdependence among market actors significantly impedes the process of successful transition from vertically integrated monopoly structure of the industry to introduction of a well-functioning market mechanism in production and supply of electricity. Specific characteristics of electricity as a commodity and of electricity sector as a system gives opportunities for incumbents to raise barriers for new market entrants. State intervention in the sector, also plays a role in limiting competition and increasing concentration in the industry.

The nature of electricity makes electricity markets different from all others. As a commodity «it is transmitted at the speed of light through the grid» [7]. Practical matching of production and consumption of the goods requires constant balancing between its demand and supply through the whole system. Excess market supply is considered inefficient, while market shortage becomes a reason for destabilization of the sector and the economy of the country [6].

Daily, weekly and seasonal demand variations combined with high costs of storing electricity require a centralized optimization of plants production. The result is a close interdependence between producers. The behavior of one market participant aimed at profit maximization is able to limit significantly the ability of other market actors to produce and sell electricity. Any extension of the energy system by building new production facilities and construction of an adjacent network, respectively decommissioning of existing plants, is accompanied by optimizing the system. Thus, realized gains and losses by producers depend on fluctuations in demand and centralized coordination and optimization.

The impossibility in short term to build a new production capacity in response to increase in demand determines another feature of the power system – the need for keeping reserve capacity. It is a prerequisite for incumbents to put strategic barriers for entry of potential competitors. The availability of spare production capacity for covering fluctuations in demand deters new entrants in the long term.

The economic importance of electricity and the lack of substitutes make governments be directly concerned with sector development and the security of supply. In production, legal requirements for entry become a significant economic barrier, if it takes long time before a new market participant to become an active player. The duration of the administrative procedures has an opportunity cost which delays the time of profit making by new market actors. Uncertainties regarding changes in support schemes increase risks for participants by raising the cost of capital and reducing competitiveness of new production facilities. Price regulation, subsidies

for different types of production, long-term contracts for purchasing electricity, if not properly designed, may have restricting effects on competition.

The measures taken for market opening do not have the expected results. In 2011 electricity generation segment in most EU countries continues was highly concentrated. In six member states – Estonia, France, Cyprus, Latvia, Luxemburg, Malta – incumbents are those that produce more than 80 % of total electricity. There are some countries as Poland, Romania, Estonia, Lithuania and Italy where the number of generating companies is growing. The lowest share of the largest producer is in Poland 17.8 % and in Spain 23.5 %.

Table 1

Market share of the largest generator in the electricity market (%)

Country	2001	2007	2008	2009	2010	2011
Cyprus	99,6	100	100	100	100	100
Denmark	36	47	56	47	46	42
Estonia	90	94	96,5	90	89	87
Finland	23	26	24	24,5	26,6	25,6
France	90	88	87,3	87,3	86,5	86
Germany	29	30	30	26	28,4	-
Italy	45	31,3	31,3	29,8	28	27
Latvia	95	86	87	87	88	86
Lithuania	77,1	70,5	71,5	70,9	35,4	24,5
Luxemburg	-	-	-	-	85,4	82
Malta	100	100	100	100	100	100
Poland	19,8	16,5	18,9	18,1	17,4	17,8
Romania		27,5	28,3	29,3	33,6	26
Spain	43,8	31	22,2	32,9	24	23,5
United Kingdom	22,9	18,5	15,3	24,5	21	45,6

Source: Eurostat Pocketbooks, Energy, transport and environment indicators. – 2013

The technical requirement, electricity to be delivered to end users through a grid, is an additional impediment for competition. The inadequate network capacity limits the size of electricity markets, in which participants compete and is likely to hinder the development of cross-border trade.

The high unrecoverable fixed costs for building and maintaining and the low marginal costs for serving every additional consumer make the duplication of the network in a given geographical area economically inefficient.

Long-term operating costs related to business expansion are a major determinant of industry structure, the behavior of market participants and market outcomes [9]. Taking advantage of the characteristics of a natural monopoly, network business, through mergers and acquisitions, could close a supply chain from generation to supply, as an argument for achieving a higher internal efficiency through economies

of scale and scope. This is another way of preventing the entering of potential competitors.

In terms of the structure of the electricity generation and retail distribution markets, there are significant differences between EU countries. There are between one and nine electricity utilities with more than 5 % share of total national generation. The total number of power generation companies representing at least 95 % of national generation reached a three-digit or even a four-digit figure in certain Member states (Germany, Italy and Denmark). However, in most of the EU Member States concentration in electricity generation stays high.

On the retail side, there is a similar picture as far as the number of market participants that provide at least 5 % of the national electricity consumption – and also the number of retail companies – is concerned [5].

Table 2

The structure of the electricity market in 2010

Country	Number of companies representing 95% of generation	Number of main electricity companies	Total number of electricity retailers	Number of main electricity retailer
Austria	122	4	129	6
Belgium	4	3	37	3
Bulgaria	22	5	36	5
Cyprus	1	1	1	1
Czech Republic	24	1	324	3
Denmark	>1000	2	33	NA
Finland	29	4	72	3
France	>5	1	177	1
Germany	>450	4	>1000	3
Hungary	68	3	38	5
Italy	217	5	342	3
Latvia	45	1	4	1
Poland	68	5	146	7
Portugal	107	2	10	4
Romania	10	6	58	8
Sweden	24	5	134	5
United Kingdom	19	9	22	6

Source: EC, Energy Markets in the European Union in 2011, 2012

Companies are considered as main if they produce at least 5 % of the national net electricity generation. Retailers are considered as main if they sell at least 5 % of the total national electricity consumption.

Consumers are seen as the main beneficiaries of the ongoing European and global reform. Competitive electricity market should allow an increase in the number of participants, a diversification of the product range and the customer choice in parallel with a decrease of product prices. In economic theory, it is assumed that consumers would change their behavior in response to changes in goods prices. It is valid, provided a market gives them necessary information. The presence of asymmetric information in favor of the seller does not provide consumers with information for alternatives and enables the supply side to exercise market power.

As a commodity without a substitute and of great importance for the quality of life and economy's functioning, electricity demand is characterized by a very low price elasticity. The coefficient of price elasticity of demand for electricity varies between 0.1 and 0.2 in the short run and 0.3 and 0.7 in the long run [8]. The lack of incentives for reaction of consumers is also a factor for low price elasticity of electricity demand in the short term. Regulated electricity prices, used technologies for measurement, inadequacy of information on prices in real time, do not help increasing elasticity of demand, as well. For the process of deregulation to have positive effects on consumers, they should be able to respond to changes on the market, make comparisons between different suppliers' contracts and motivate their choice.

Provided that demand is inelastic, costs of changing supplier are high or there is a potential for market power abuse by suppliers, users can not benefit from a competitive market.

The data on the levels of switching in recently liberalized markets confirm the low activity of users. Although in 2007, almost all EU consumers were given the right to choose their supplier, mainly large and medium-sized industrial users are those who change suppliers. In terms of households, switching in most Member States is at very low levels – in 2010 less than 10 %. Countries that perform best are the United Kingdom, Belgium, the Netherlands, Finland, Sweden, Italy, Germany and Denmark. The data for other countries are close to zero or not available.

In the presence of significant barriers to entry, a real competition, not the potential determines market prices. Incumbent players are able to take advantage of the oligopolistic market structure by exercising market power and setting market price higher than marginal costs. There is a market failure because the competitive market fails to provide a price that is equal to the marginal cost of producing the product

Difficulties in establishing the final market price of electricity arise as a consequence of the production process. Although electricity is a homogeneous commodity, it is produced by different energy resources and technologies. Depending on access to resources, their prices, achieved production efficiency, change in weather conditions, there are great differences in the level of fixed, variable and marginal costs of production of the electricity.

In addition, the price of electricity depends on the costs for: network services, system balancing, waste management and external effects. As a result, electricity becomes a product the marginal costs of production and delivery of which differ at every moment, which is a great challenge for the proper functioning of the market mechanism [10].

Table 3

Electricity switching rates for different customer types in 2010 in %

Country	Households	Large industrial customers	Medium sized industry
Austria	1,7	5,2	11,6
Belgium	8,8	NA	NA
Czech Republic	3,2	72	30
Denmark	4,2	NA	11,4
Finland	7,6	NA	NA
Germany	6.0	13,9	7,4
Italy	4,1	17,8	28,8
Romania	0	21,6	4,3
Spain	2,1	14,9	29,7
Sweden	8,2	9	9
The Netherlands	8,9	NA	NA
United Kingdom	17,3	NA	NA

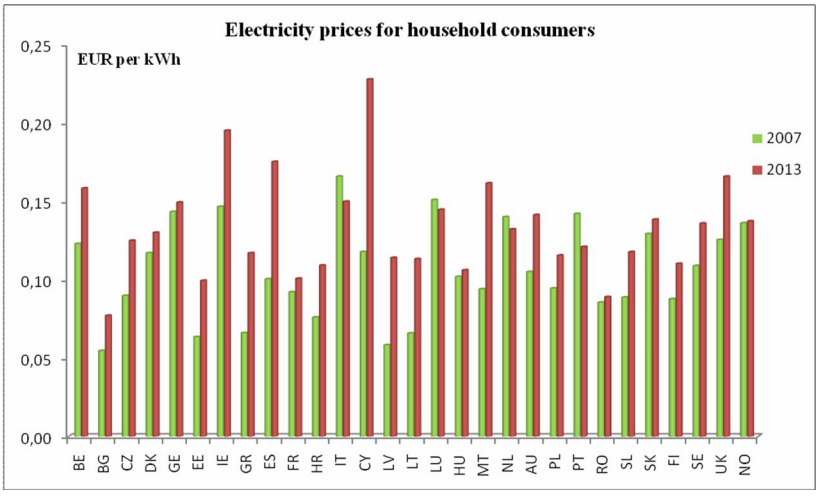
Source: EC, Energy Markets in the European Union in 2011

In spite of all these peculiarities it is assumed that a well-functioning electricity market should work towards price decrease and price convergence between national wholesale and retail markets. The data in the graph below show an opposite trend.

Graph 1

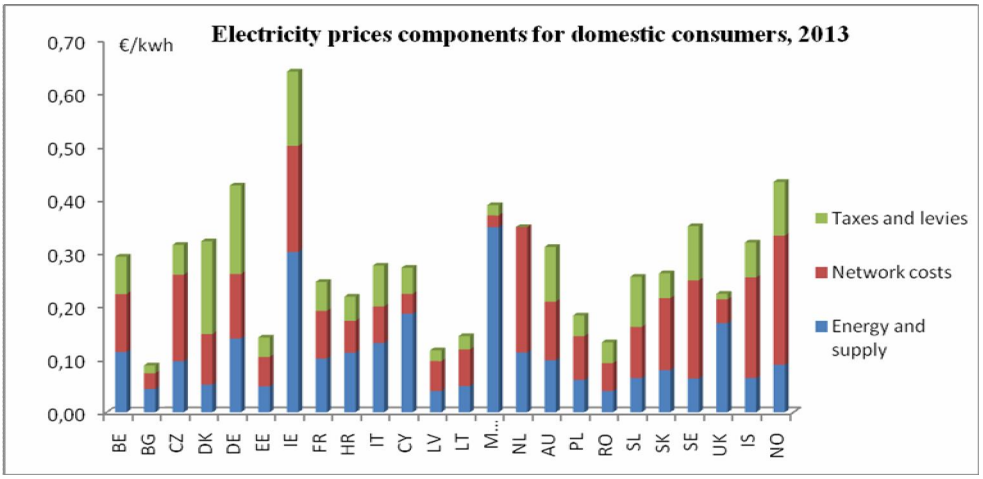
Source: Eurostat

For the period of 2007–2013 only four countries in the EU has achieved a slow decrease in household prices – Italy, Lithuania, the Netherlands and Portugal. Nevertheless, their prices are still above the average level. In all other countries prices continue to go up. The highest prices are in Cyprus, Ireland, Spain and the United Kingdom. The lowest price levels remain in Bulgaria and Romania.



Electricity prices are decomposed into energy and supply costs, network costs and taxes. The decomposition provides information on some reasons of price diversity across Member States.

Graph 2



Source: Eurostat

In all the Member States, the «energy and supply» component accounts for a relative high share of total prices. The countries displaying the highest energy and supply prices for households are Malta, Ireland, Cyprus, the United Kingdom and Germany.

The second component of electricity prices are network costs. They have a significant share of the electricity price. The highest network costs for households are found in Norway, the Netherlands, Ireland and Sweden.

The share of the last component – tax and value added – is higher in Denmark and Germany and lower in Bulgaria and the United Kingdom.

Overall, as mentioned above end-user prices reflect different stages of competition across the value chain, in particular the energy and network parts. However, they can also be constrained by State intervention through price setting aimed at some social, economic, security of supply or another objective. A large number of countries still apply price regulation in electricity.

Table 4

Application of end-user price regulation in electricity in 2010

	Countries with price regulation	Countries without price regulation
Non-Households - Electricity	CY, DK, EE, FR, HU, MT, PT, PL, RO, SK	AT, BE, CZ, DE, ES, IT, FI, LU, LT, NL, SE, SI, UK.
Households - Electricity	CY, BG, DK, EE, EL, ES, FR, HU, IE, LT, MT, PT, PL, RO, SK.	AT, BE, CZ, DE, FI, IT, LU, NL, SE, SI, UK.

Source: DG Energy and ACER, 2012

In spite of the ongoing reforms, in many countries the end-user prices remain regulated. This is typicaly for Bulgaria, Estonia, Latvia, Hungary, Poland, Romania, Slovakia, as well as France.

When regulated prices are set below market prices and are not in line with wholesale market prices, they can have adverse effects on the energy market, and the economy as a whole.

First, regulated prices tend to strengthen the position of the historical incumbent by preventing the market entry of competitors.

Second, regulated prices tend to reduce the incentives to invest in and modernise the distribution networks.

Third, regulated household prices tend to harm the competitiveness of European businesses by burdening them with higher energy costs. Government through price regulation cross-subsidise loss-making segments.

Fourth, consumers do not receive the right price signals and their incentives for energy efficiency improvements are reduced.

In addition, public authorities often justify price regulation for social reasons. However, wealthier households, which generally consume more energy than vulnerable ones, tend to profit disproportionately from the lower prices [4].

Specific features of electricity and technical constraints of electric system combined with various interests of participants on supply and demand side hinder the proper functioning of market mechanism and makes restructuring of the sector a very difficult task. In some EU countries the reform is still going, in others it is stopped. The final results are still unclear and vague. Nevertheless, neither market model would work well, if there is not sufficient number of participants to compete and mitigate the positions of established companies. The state plays a crucial role in market functioning, giving guidelines for its further development.

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ДЕЯКІ ОСОБЛИВОСТІ РИНКУ ЕЛЕКТРОЕНЕРГІЇ ЄС

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Проаналізовано специфічні особливості електроенергії як товару і його вплив на функціонування ринку електроенергії. Досліджено основні тенденції в процесі переходу від вертикально інтегрованої структури галузі в добре функціонуючий ринковий механізм у галузі виробництва і поставок електроенергії. Описано перешкоди для конкуренції з боку попиту та пропозиції. Також підкреслена роль регулювання на цьому ринку. Зроблено деякі висновки щодо проблем, з якими зіштовхуються країни відносно проведених реформ на ринку електроенергії ЄС.

Ключові слова: ринок електроенергії, структура ринку, швидкість переходу.

НЕКОТОРЫЕ ОСОБЕННОСТИ РЫНКА ЭЛЕКТРОЭНЕРГИИ ЕС

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Проанализованы специфические особенности электроэнергии как товара и его влияние на функционирование рынка электроэнергии. Исследованы основные тенденции в процессе перехода от вертикально интегрированной структуры отрасли в хорошо функционирующий рыночный механизм в области производства и поставок электроэнергии. Описаны препятствия для конкуренции со стороны спроса и предложения. Также подчеркнута роль регулирования на этом рынке. Сделаны некоторые выводы относительно проблем, с которыми сталкиваются страны в отношении проводимых реформ на рынке электроэнергии ЕС.

Ключевые слова: рынок электроэнергии, структура рынка, скорость перехода.