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EFFECTS OF THE EU ELECTRICITY MARKETS OPENING ON COMPETITION AND PRICES

The paper studies the ongoing regulatory, institutional and organisational developments in EU energy sector during the last two decades that change the way electricity markets operate. In particular, it addresses the EU efforts in creating competitive and sustainable electricity markets. Its aim is to explore the effects of the reform on market competition and electricity price evolution. The paper firstly presents the specific aspects of the electricity market, which helps to understand its overall functioning. The current electricity market structure, participants behaviour and market performance are discussed. The analysis presents the contradictions between the EU energy and climate targets and their adverse impact on end-consumers, who are stated as the main beneficiaries of the reform. The study comes to the conclusion that the persistence of shortcomings in the electricity market defined by policy deficiencies at an EU level and diverging energy policies at a Member State level requires further efforts to make national markets work as a single European energy market with common rules and prices.
JEL: D40; Q20; Q41; Q42

Introduction

Providing an important input and service to the other economic sectors, the energy industry is a cornerstone for the overall development of the economy. Over the years the steady rise in electricity demand has demonstrated the high dependence of modern industrialised societies on secure electricity supply. Furthermore, the expected growth of electricity share in the world's final energy consumption to 24% in 2040, compared to 19% in 2018 (IEA 2019, p. 258) further emphasise the significance of the reliable access to electricity at affordable prices for the economic growth and international competitiveness.

Due to the leading socio-economic role of electricity, the introduction of competition in energy markets is of great importance than in many other sectors of the economy. The underlying principle for this profound change in electricity markets is the economic insight that competitive markets should lead to efficiency gains, optimal allocation of society's resources, technical progress, firm's flexibility to adjust to a changing environment, thus

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reducing market prices (Motta 2004, p. 3). In this context, the EU policy on bringing about pro-competitive change in electricity generation and supply and improving sector regulation on network services is supposed to enhance competition in the wholesale and retail markets and reduce end-user prices. However, the physical characteristics of electricity as a commodity that is "transmitted at the speed of light through the electricity grid" (Hunt, 2008, p. 69) and the specifics of its supply chain set high requirements for the liberalisation reform and the establishment of efficiently functioning electricity markets.

Given the developments in recent years, as well as the technological and policy changes being in progress, this poses the necessity to investigate the results of the pro-market reform in the energy sector till now. While there are many issues, related to the functioning of electricity markets, this report focuses on those related to competition and prices in electricity markets.

The main focus of the paper are the ongoing changes in the EU electricity sector that include successful and unsuccessful attempts to create a new legislative framework, new regulatory mechanisms and new electricity markets with more competition and increasing share of renewable energy sources (RES). The objective of the article is to study the progress in energy market reform and to assess the results of the practical implementation of liberalisation on market competition and electricity price development. The main thesis is that two decades after the beginning of the reform, the liberalisation of the markets is still an ongoing process. The persistence of shortcomings in the electricity markets defined by policy deficiencies at an EU level and diverging energy policies at a Member State level requires further efforts to make national markets work as a single European market with common rules and prices. The paper discusses mainly the changes in the last fifteen years 2003 – 2018 in order to analyse current events and draw conclusions and recommendations.

The rest of the paper is organised as follows: section one provides a description of the electricity market specifics, which make this market different and largely complicate its competitive development. A comparison between traditional and liberalised electricity market is made and the marginal pricing mechanism is discussed. Section two makes a review of EU dynamic regulatory framework concerning the liberalisation of the national markets and the creation of an internal electricity market. On the basis of the recent statistical data section, three examines the latest developments with regard to electricity market structure, including number and market share of main generators and suppliers, merger and acquisition activity in the sector, the entry of new participants, as well as the switching activity of consumers. It serves as a base for discussion of the market competitive deficiencies. Section four presents an analysis of wholesale and retail price evolution between 2008 and 2018. The main drivers behind are analysed, focussing on the penetration of renewables. The section takes a look at the composition of retail prices and determines how it has changed over time, how various policies have impacted prices and which elements contribute the most to their increasing or decreasing. This allows for the comparison of price developments over time and across countries. Section seven summarises the consequences of the reform and presents conclusions regarding the role of the market mechanism and the public regulation in creating a competitive electricity market.

The analysis is based on primary and secondary literature, legislative texts, government documents, strategy papers, company's reports and official statistics (Eurostat, IEA, OECD).

1. Traditional and liberalised electricity markets

1.1. Specific characteristics of the electricity market

The specific physical characteristics of the electricity as a good and the way it is generated, traded and consumed should be taken into account in order to understand why the electricity markets do not behave like other energy markets, such as natural gas or oil. In view of the functional structure of the electricity industry, the electricity supplied to end consumers consists of the energy commodity – the amount of power per unit time (KWh); the transportation service, which includes transmission, distribution and operation of the system; as well as the metering and invoicing services related to its final supply. As a commodity of a special kind – a coordinated flow of electrically charged particles flowing through a specially constructed electricity network – electricity differs from all other commodities exchanged in the market. It is a secondary energy product that has homogenous qualitative and technical characteristics, regardless of the primary energy resource used for its production (coal, nuclear fuel, water or wind power, solar energy, biofuels). As there isn't cost-effective energy storage on a large scale[2], yet, any oversupply of electricity is lost at the moment it is produced. However, in the case of a market deficit, the system is threatened by destabilisation. That's why power consumption (demand) and production (supply) need balancing at all the time.

Properties of electricity to be converted into different physical states determine its wide application. Functionally it could replace all products on the energy market, but the electricity itself has no direct substitute. This defines the low price elasticity of its market demand which allows price rising above the marginal costs in case of a market deficit.

Like other network industries (railway, water, and telecommunications) the electricity market is completely dependent on the network infrastructure. The distinctive features of transmission and distribution grid (economies of scale, necessity to operate as an interconnected system, the need of sufficient capacity to absorb the peak loads) make its duplication economically inefficient and hinder the entry of competitors. The characteristics of the networks allow network companies to close the supply chain through vertical integration with electricity generation and supply and increase efficiency in the industry. However, this stimulates cross-subsidisation between the different activities in the supply chain and allows preferential treatment of own enterprises with regard to third-party access to the network. The discriminatory potential is an economic disadvantage for other market participants. For this reason, even in a competitive market, network services remain a natural monopoly and their regulation is a key factor for competition development.

Another challenge to the functioning of a competitive electricity market is the constant daily, monthly and seasonal fluctuations in electricity demand. The continuous changes of periods with peak and lower consumption require the maintenance of sufficient production capacity

[2] Currently, there is limited storage capacity in the EU electricity system (only around 5 % of the installed electricity production capacity) almost exclusively from pumped hydro-storage. The development of other forms of storage, such as batteries, flywheels, hydrogen, chemical storage, is still rather limited. Source: DG for internal policy, European Energy Industry Investments, 2017, p. 33)

that could cover the base and peak load in the short and long term. Therefore, a diversified energy mix is needed, part of which is not constantly loaded, the so-called cold reserve.[3]

Meanwhile the high capital intensity and the long construction and payback period of the plants raise high entry and exit barriers which make impossible the quick reaction (building new capacity or network) in case of power shortages in the market. Thus, in the short term, generators are protected from competition, which facilitates consolidation, market concentration and information asymmetry in the sector. Since the construction of power plants is characterised by a significant sunk costs, the decision of investment in new plants is highly dependent on the expected future revenues. So, the fluctuations in wholesale market prices, the fuel price changes, the technology characteristics, the operational costs, as well as the EU ETS CO2 price are all related to the risks which should be considered.

1.2. A comparison between a regulated and liberalised electricity market

The specifics of the sector defined the structure and organisation of traditional non-liberalised European electricity markets. In most of the countries prior to liberalisation, an incumbent monopolist (single vertically integrated companies) ranged across generation, transmission, distribution and final supply of electricity. There was no competition in each segment of the industry and customers had no choice of a supplier regardless of the consumer's size. The dominant company has full responsibility for the long term supply of electricity which was ensured by long term take or pay contracts that guaranteed the security of supply. The cross border trade was controlled by the monopolists from both sides of the border who allocate the transfer capacity on the interconnector.

Traditionally in the regulated market, the state plays the role of both an owner and a regulator. The government sets the retail electricity prices, seeking to prevent price volatility in order to protect end customers from price uncertainty. Prices are set on the basis of average production costs for power plants. This pricing method allows the higher costs of less efficient plants to be offset by the lower costs of more efficient plants. The costs for expansion and modernisation of the electricity system are also included as an investment component in the final price of the electricity. Thus, the investment risk is easily transferred to end-users, even in cases when the investment projects for the development of the electricity network are not optimal and there is a discrepancy between projected and actual electricity consumption.

A liberalised electricity market, by contrast, functions in a completely different way. First, monopoly power is not accepted. Theoretically, competition in electricity generation and supply activities should be between as many market players as possible and the price signals define the commercial decisions, thus maximising efficiency and minimising costs and prices.

[3] Along with the base plants (nuclear and coal power plants), which operate continuously and are designed to meet the base load of the system, additional generators (water, gas power plants) must be available in order to quickly and easily switch to high or low productivity depending on consumption changes.

An advantage that liberalised markets have over traditional markets is the creation of an exchange trading and financial instruments which improve the efficiency in the market by giving a range of price signals and allowing a range of risks to be hedged. Wholesale market transactions reflect the fact that electricity has to be delivered when it is needed: They match supply and demand at each point of time resulting in different markets depending on the time horizons: long-term contracts market, forward and future markets, day-ahead market, intra-day market, balancing market which ensures that demand is equal to supply at any time.

The role of the government and the sector regulator is to implement rules for the natural monopoly segments – the network services – by promoting reasonable charges for the access and the use of the network by new market participants. Thus, in liberalised markets, network operators are important market intermediaries that not only guarantee efficient management and security of supply, but also support trade relations and future market development.

From a theoretical assumption, the end consumers in a liberalised market can choose their contract with respect to price, conditions (fixed or variable rates) and energy source ('green' versus conventional power sources). Suppliers charge customers according to their specific contract for the energy delivered, as well as network costs, taxes, surcharges and possibly levies for various other policy objectives as renewable energy support.

1.3. Electricity price formation in liberalised markets

The wholesale markets have a key role in the liberalised electricity market as they set the prices, which are then passed on to the retail customers. The technological possibility to produce electricity from different primary energy resources, using technologies with different operation efficiency, economies of scale and dependence on weather conditions, further complicates the nature of electricity markets. This feature of production causes large differences in the structure of fixed and variable production costs of individual power plants which gives an advantage of one company over the others.

Spot electricity markets are designed based on a marginalist approach and the construction of a merit order. In practice, the various power generators offer quantities of electricity at different prices, which are ranked from cheapest to most expensive. So, to minimise the costs of electricity production, the plants with the lowest short-term marginal costs per unit of electricity are called to dispatch first (most often using hourly fuel consumption per MW). If demand increases, plants with higher costs are included, until electricity consumption is satisfied. In theory, the price paid for the provision of electricity at a certain point in time equals the marginal costs of the marginal generator which was called to dispatch. This mechanism of competitive market operation allows electricity to be generated at the lowest possible cost for each hour of the day.

When this market design is combined with higher shares of renewable generation, some market distortions occur. The renewable facilities, such as wind and solar, having nearly zero marginal production costs, are dispatched first. However, the decrease of wholesale prices thanks to the penetration of renewables doesn't mean a real decline in the full system cost of electricity generation because renewable technologies are not too cheap in terms of total cost yet. It only reflects the very low marginal costs of production of renewables that gives them

priority in dispatch. This paradox leads to a divergence between the true cost of the system and the spot price of electricity in markets with high shares of renewable energy. Given the intermittent nature of renewables, this further increases the inherent price volatility in electricity markets.

In this context, the effectiveness of marginal pricing and its ability to cover capital costs and stimulate necessary investment in flexible production capacity (conventional plants) for ensuring the security of supply is questioned. As mentioned above, due to the specifics of the power system, the moment of production of electricity coincides with the moment of its practical consumption. Producers do not enter the market with a certain amount of products at a given price. Consumption fluctuations during the year cause changes in the operational load of power plants, which activity is optimised on the basis of the lowest hourly, daily, weekly or seasonal marginal costs throughout the energy system. This makes the competitive electricity market "unique" because producers do not know exactly how much electricity they will produce and what total short-term costs they will have.

That feature of the power system is often underestimated, which creates problems in the pricing process. The hourly costs include only the variable costs of electricity generation. They are not short-term costs in the sense of microeconomics that set prices in "normal" markets. In general, short-term costs cover the entire short-term period (year) and include both variable and fixed costs, on the basis of which the average total costs are calculated, which reflect the real value per 1 kWh of electricity. Theoretically, the spot electricity market is not a real short-term market because its prices do not reflect the real value of electricity. This can be done for the entire short-term period on the basis of short-term total costs for electricity generation. The distinction is important for the energy industry due to the constant fluctuations in consumption at different times of the day and the inability to separate production and consumption processes.

While in the pre-liberalisation period capital costs were incorporated and distributed within the overall rate structure, in marginal cost pricing, the capital recovery element is eliminated and relies solely on the price per kilowatt for an hour. Plants with marginal production costs, that are lower than the market-clearing price, earn additional revenues and could cover their fixed costs. The marginal plant, which determines the price of the system, receives revenues to cover its marginal cost, while those after it who do not produce at this volume of demand receive nothing, but it does not mean that they are unnecessary. In the case of peak consumption or in case of an accident in some of the power plants, they are dispatched.

With the growing share of subsidised intermittent wind and solar energy that leads to both a decrease in wholesale electricity prices and an increase in their volatility, the profitability of conventional generators is undermined. To stay in the system, the shorter the periods when these plants are dispatched, the more revenues should they receive. This means sufficiently high price levels and sufficiently high load factors (Epermans 2019). However, relying on very high prices is quite risky for any market, but also quite problematic for a politically sensitive market such as the electricity one.

Another impact of RES deployment is the so-called "cannibalisation effect". As a consequence of the zero or even negative market prices, the quasi-rent is zeroed and producers are incapable to recover their fixed costs. This price-reducing effect drives down

the market value of RES capacities too, i.e. RES are said to cannibalise each other. (Metis studies 2019, p.13)

Therefore based on the existing market design, the penetration of renewables capacity has its limits because renewable generators would be unable to earn a return on their investment without conventional technologies to provide a floor for electricity prices. So, with the current market design and renewables policies, the energy system relies on the availability of flexible generators that have already covered their capital costs which practically mitigates the problem. Another opportunity is the long term contracts where prices include total costs, i.e. the forward market for long-term contracts occurs the real electricity market.

2. EU energy legislation and the internal electricity market

2.1. Regulatory and institutional framework

Traditionally the energy policy has been national government competence and prior to the Treaty of Lisbon, the progress in EU energy legislation has strongly depended on the voluntary cooperation by member states. The European Commission was the initiator of the reform introducing competition in the electricity market. The 1987 Single Act mandated it to conduct policies towards a single market in communication, transport and energy.

The primary legislation by which the EU has brought about a change is through three electricity directives in 1996 (96/92/EC), 2003 (03/54/EC) and 2009 (09/72/EC), part of the Three Liberalization Packages. Prior to this legislation, only few countries – the UK, Sweden and Norway, had liberalised their electricity sectors and introduced competition in their wholesale power markets. The First electricity directive allowed every country to choose between regulated and negotiated third-party access to the transmission network and the separation between transmission and supply companies was only on the basis of companies' accounts. As Member states had different opinions on the principles of liberalisation and its advantages over the existing monopoly structure in the electricity sector, this first attempt of the EU commission to push ahead the creation of a liberalised common market was not successful. In 2003 the Second Electricity Directive forced the slowly reforming countries to make progress with the pro-market reform. Member states were required to ensure that industrial consumers had the freedom to choose a supplier not later than July 2004 while domestic consumers not later than July 2007.

Despite the EU regulatory interventions, electricity market transformation remained slow. There were registered serious delays in the implementation of the liberalisation packages amongst Member states, as well as "nationally inspired policies" and distortions of competition in the electricity markets. More specifically, they include:

- high levels of market concentration and a lack of liquidity in national markets;
- a low level of cross-border trade and little integration between Member States' markets;
- an absence of market information and limited trust in the pricing mechanism;
- persisting vertical integration of generation, supply and network activities;

- no freedom of choice for customers. (DG COMP, 2007)

The persistence of systematic competition inefficiencies paved the way for the introduction of the Third Electricity Directive in 2009. It imposed further stronger regulatory requirements for competition enforcement with regard to the unbundling of generation, transmission and distribution; strengthening of the powers and independence of sector regulators; increasing of cross-border regulatory coordination, 10% minimum interconnection levels between member states, removing of regulated retail prices. It encouraged the move to a single market by removing barriers to entry into national electricity markets and established an Agency for the Cooperation of Energy Regulators (ACER).

The climate related-initiatives are another element that currently affects the level of competition and prices at electricity markets. In the general environment, society and economy are independently operating systems which at the same time interact closely with each other (Petrova 2018, p. 59). Since the conference in Houston in 1999 where "the end of the oil age" was announced and the need for a shift from a carbon to a hydrogen economy was justified (Stoyanova 2011, p. 39), countries have been pursuing climate and energy targets. By accepting the Climate and energy package[4] in 2007, the Member States backed the Commission's drive for a common energy policy and approved the link between climate and energy policies. In 2014 the European Union reconfirmed this linkage by the approval of the 2030 Framework for Climate and Energy.[5] The realisation of the climate and energy priorities is directly related to EU member states leadership role in the implementation of the Intended Nationally Defined Contributions (INDCs), which are at the heart of the Paris Agreement on Climate Change (Tsonkova 2019, p. 170).

The Energy Union package launched in 2015 put together the decarbonisation objectives and the energy policy priorities. It set broader goals concerning energy security, internal energy market, energy efficiency, decarbonisation, research, development and competitiveness. The legislative proposals building the Energy Union were delivered as a part of the 4th Energy Package tabled in 2016: 'Clean Energy for All Europeans'. The ultimate objective of all these legislative initiatives is to have a well-functioning fully integrated, liberalised and decarbonised EU energy market. The assumption is that efficient energy market will not only lower energy costs and wholesale and retail prices, but will also ensure electricity price convergence at an EU level and keep industry competitive, delivering enough revenues for major sector investments. The end consumers are supposed to be the biggest beneficiaries of the reform receiving the right to choose the offer that best fits their needs. The achievement of these goals should contribute to the overall transition to an energy-efficient and sustainable EU economy in which new jobs are created, the resource productivity is increased, the environment is protected, the energy dependency is reduced and the economic growth is improved.

[4] In 2007 Climate and Energy Package.the EU has set its 2020 targets They include a 20% reduction in CO2 compared to 1990 levels; a rise of renewable energy to an amount of 20% of energy consumption in the EU, and a 20% increase in energy efficiency.

[5] It increased the binding targets to 40% reduction in greenhouse gas emissions; >27% renewable energy in final energy consumption and >30% increase in energy effciency, as well as the completion of the internal energy market (interconnection target of 15% between Member States).

The process culminated with the launch of the European Green deal at the end of 2019, announced as a new ambitious strategy for economic growth that will make EU economy sustainable. It is seen as a means for the "greening" of the European economy by integrating sustainable development into all EU policies. It works through a framework of new regulation and legislation setting targets. The net-zero carbon emissions by 2050 and a 50-55% cut in emissions by 2030 compared with 1990 levels are at the core of the strategy, alongside the incentives to encourage private sector investment, changes in rules for state subsidies that will suspend the support to fossil fuels, a revision of the carbon trading scheme. This raises serious socio-economic concerns for the Member States like Bulgaria where the production of electricity and heat from coal contributes to over 90% of GHG emissions in the sector and around eleven thousands of people are engaged in the coal industry.

The wide energy legislation that the European Commission has adopted witnesses the complexity of the electricity market transformation and the difficult EU energy transition. EU policymakers have attempted to ensure greater degrees of liberalisation as well as to achieve increasing environmental sustainability, security of supply and competitiveness of the EU economy. However, there is a paradox: the introduction of market competition is inevitably accompanied by an increase in regulatory activity. Given the fact that the classical laws of competition do not entirely apply in the electricity market, where barriers to competition exist, flexible regulatory models for reorganising the behaviour of market participants through a variety of rules and standards, taxes, levies and subsidies, price caps or some type of price regulation have proved necessary. Thus, re-regulation is both a result of liberalisation and a means for its successful implementation.

3. Status quo of EU electricity market

3.1. Overview of wholesale and retail market structure

The policy of introducing competition in electricity markets in the EU has proved to be a difficult task and the above-mentioned expectations as a result of market liberalisation have not fully justified. Since 2003 when the Second energy package was adopted with the requirement for unbundling and competition, the total number of effective competitors has been increasing. Although thousands of companies are now active in the EU electricity markets, the number of main electricity generators[6] in the EU fluctuated between 75 and 83 companies between 2003 and 2018. At a member state level, there has been very heterogeneous development. There are countries where the main generating companies have increased with one or two (e.g. Portugal, Germany, Luxembourg), another group of countries where their number has decreased (e.g. Denmark, Estonia, Croatia,) and a third group of countries where no change in main generators has been registered (Cyprus, Latvia, Slovakia and Bulgaria).

It should be noted that in several countries where first an increase in 2010 was registered, a few years later main companies decreased again (Italy, Belgium, Sweden, Ireland, Lithuania,

[6] Main generating company is a company that produces at least 5% of the national net electricity generation.

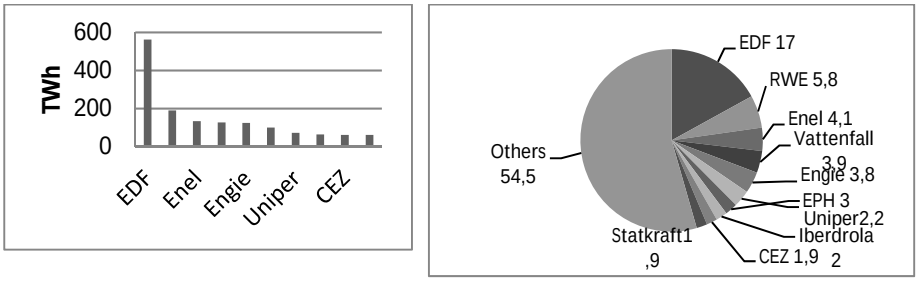
United Kingdom). In the UK the restructuring of the electricity industry within the context of liberalisation resulted in a highly fragmented and competitive market between the late 1990s and the early 2000s. In this period the competition between a large number of generators and suppliers contributed to decreasing prices. However, a reconcentration of the market was observed as major European energy utilities entered the UK. Within a few years, a highly concentrated market arose, dominated by the big transnational companies (E.ON, EDF, RWE, Scottish Power, SSE). The French EDF and the two German companies RWE and E.ON have become the three largest generators and suppliers of electricity in the country.

A possible explanation of this effect of the national market opening was that it stimulated a wave of mergers and acquisitions in the sector across the EU. Former monopoly incumbents were encouraged to make restructuring of their business activities and cross border entry in neighbouring member states. Getting bigger through acquisitions was an opportunity for utilities to cope more easily with the energy transition, too.

French, German, Spanish and Italian companies (EDF, RWE, E.ON, Iberdrola, Enel and Vattenfall) extended their business outside the home markets in both generation and supply. By the mid-2000s, most of the smaller EU generators and retailers were acquired by major European-wide companies which resulted in the reintegration of the initially unbundled generation and retail. Thus, at an EU level, the market concentration has not been eliminated. This is proved by the few major market players present in several European countries either directly or indirectly through a subsidiary. The Top 10 European power generators provide near 45% of gross power generation.

Figure 1

Top 10 European power generators share in TWh, (%)



Source: RWE, Factbook, 2018, p. 24

The first three companies EDF, RWE and Enel group generate around 27% of EU electricity. The French giant EDF, which is the world's leading nuclear operator, with a nuclear fleet of 58 reactors in France and 15 reactors in Great Britain, has accelerated the development of renewables and has achieved a new balance for its generation mix. By developing low-carbon technologies, the company has bolstered its position in Europe, expanding into new geographical areas, mainly in Western Europe, as well as ensuring the presence in emerging markets. It has become the European leader in renewable energies with net installed capacity of 32 GW hydro, wind and solar power and more than 10 GW of projects under construction or already secured (EDF 2019, p. 121).

RWE, the second biggest company in European power generation, with diversified 43.4 GW net generation capacity, is the leading generator in the Netherlands and in Germany with 80% and 75% market share, respectively and the second biggest in UK. It has become a global leader in renewables too, especially in offshore wind. (RWE 2018, p. 23) The other German company E.ON expanded substantially and is already present in a majority of countries. The company owns and manages the energy distribution network of 980 000 km in Germany, Sweden, CEE and Turkey and has leading positions in energy sales in 8 EU countries with 22 million customers.[7] (E.ON 2019, p. 42)

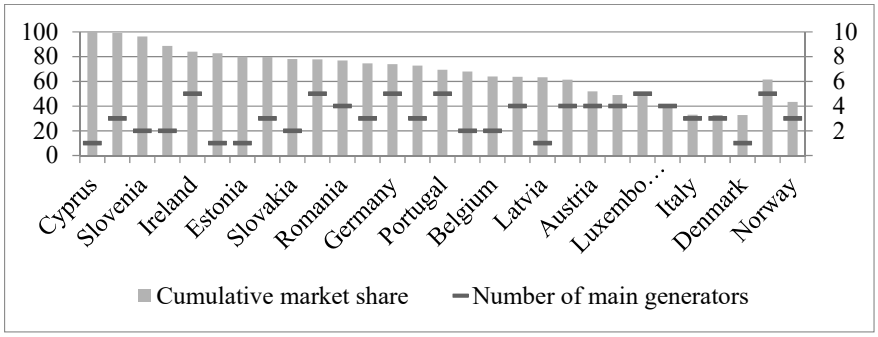
The Enel Group is the leading electricity utility in Italy and Spain and the second largest operator in the electricity sector in Portugal. The company is present in 32 countries (11 EU Member states) with 86 GW total installed capacity and 2.2 million km in the distribution network. With a market capitalisation of about 56 billion euros and 50 billion euros, respectively Enel and Iberdrola have grown to EU renewable energy giants.

The infrastructure funds, insurance and pension companies have been involved in the energy deals, too. They all seek for assets to generate steady and reliable yields. But rather than buying companies focused on green energy, funds buy a minority stake in the renewable energy assets, leaving the developer as the main operator with a majority ownership.

As a result of the strategic shifts in the market during the last two decades, in 2018 in half of the EU Member States one, two or three main generating companies reported a significant share of electricity generation at a national level. The cumulative market share of the main generating companies exceeded 60% in sixteen member states. All other generators are very small and can influence neither market price, nor market competition.

Figure 2

Number of main electricity generating companies and their cumulative market share, 2018



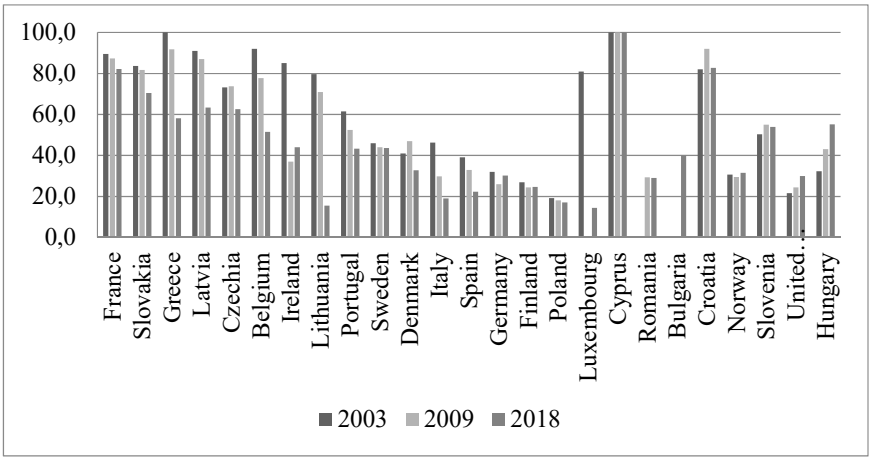
Source: Eurostat

[7] E.ON is the Top 2 in Germany and UK and Top 3 in Romania, Czech Republic, Slovakia, Hungary and Sweden. Switching to higher-earning activities such as solar and wind power, E.ON and RWE have separated the green energy and retail operations from their centralized power businesses. E.ON has retained the renewables business and put its old power plants in a company called Uniper. RWE, on the other hand, kept its traditional plants and put the green and retail businesses in a new company called Innogy.

Apart from Cyprus, where one single company dominates the national electricity generation, figures above 80 % for the largest electricity generators are observed in Estonia (80 %), France (82 %) and Croatia (83 %). Only in four member states Luxembourg, Lithuania, Poland and Italy, the market share of the biggest generator is below 20% while in most of the new Member states is above 50%.

Figure 3

Market share of the largest generator in the electricity market



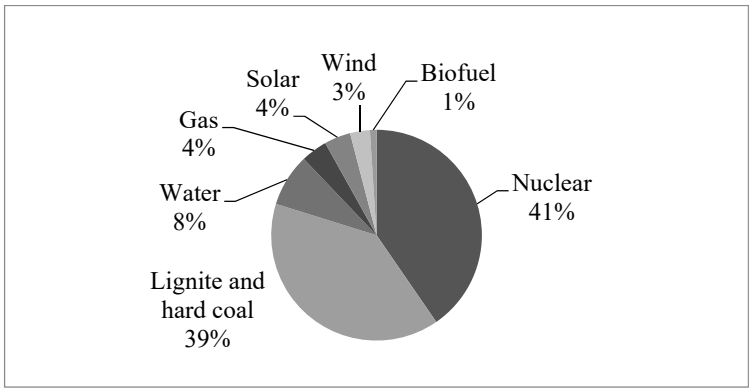
Source: Eurostat

In Bulgaria, the leader in electricity production is Kozloduy NPP EAD, with the largest market share of over 40%. TPP Maritsa East 2 EAD and ContourGlobal Maritsa East 3 AD have significantly smaller market shares between 10 and 15%. They are followed by the companies AES-3C Maritsa East 1 EOOD, TPP Bobov Dol EAD and HPP of NEK EAD which market shares range between 5 and 10%. For the above six companies, the total concentration index is with a value of 90 units, which is a characteristic of a concentrated market with limited competition. This conclusion is supported by the value of the Herfindal-Hirschman index, whose value is over 2,360 units.

The sufficient number of active suppliers is another important factor for the proper functioning of the retail electricity markets. They provide the link between wholesale and retail prices. The indicators of the number of suppliers and their entry and exit activity are indicative of consumers' choice of offers in the market, the existence of entry barriers and the importance of regional markets. Offering contracts with differentiated prices and giving customers adequate information concerning products, charges, quality and risk, supply companies help for the overall development of the electricity markets and the more efficient use of electricity. With this regard companies need to react to the shortening of the cycle for new products and service developing in order to increase their competitive advantages. (Dimitrova 2018, p. 6)

Figure 4

Energy mix of Bulgaria in 2019



Source: EWRC, Report on the activities of the Energy and Water Regulation Commission for 2019, p.31

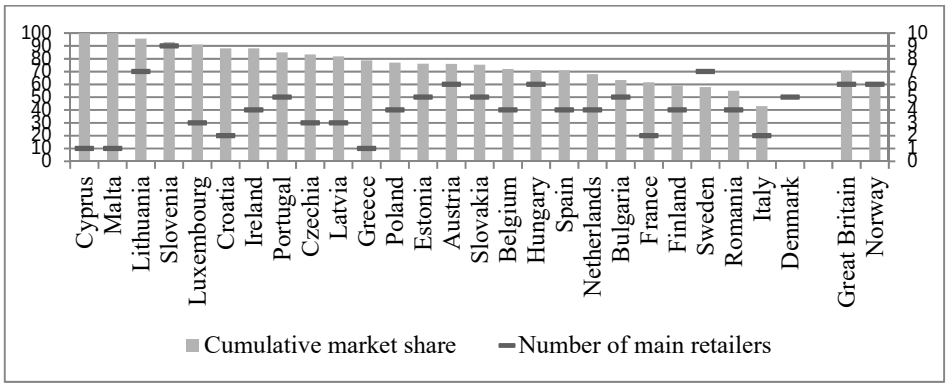
The liberalisation of the market has contributed to the entry of a large number of new market players. At an EU level, the number of active suppliers has gone from 2 871 in 2011 to 3 719 in 2016 and 4300 in 2018. However, in some countries, there are significant differences between the total number of suppliers and the number of nationwide active suppliers. The EU average number of active nationwide electricity suppliers per country in 2018 was around 40 in the sector, with smaller countries like Lithuania having 4 nationwide suppliers and others like the Czech Republic and Spain, with 79 and 215 suppliers respectively. For example, Italy is the country with the largest number of active suppliers 509, of which just 64 are active nationwide.

The reason behind is that the majority of new suppliers are more active in local areas or serve a few large industrial customers and have market shares below 1%. At the same time, the number of "main" electricity retailers in the EU stays stable around 100. In 16 member states, the market is served by between one and four main suppliers. In 10 of the countries, the cumulative market share of the main electricity retailers is over 80% which means that in these countries the market for non-main retail companies is below 20 %. The market for "minor" retail companies is the largest in Sweden (42 %), Romania (45 %) and Italy (57 %).

Slow developments can be seen in the market concentration measure CR3, which shows the market share of the three largest suppliers in the electricity retail markets. Between 2011 and 2016, the European average market share of the three largest suppliers in the retail electricity household segment fell from 84.3% to 80.6%, ranging between 38% and 100% by a member state. Only in 5 member states, there was no change or increase of the market shares by the three largest suppliers in 2016 compared to 2011. The most significant reductions in CR3 in this period were reported by Germany, Great Britain and Slovenia. Concerning the whole retail market, the market share of the three largest suppliers of electricity in EU-28 has dropped from near 79% to 63,5%.

Figure 5

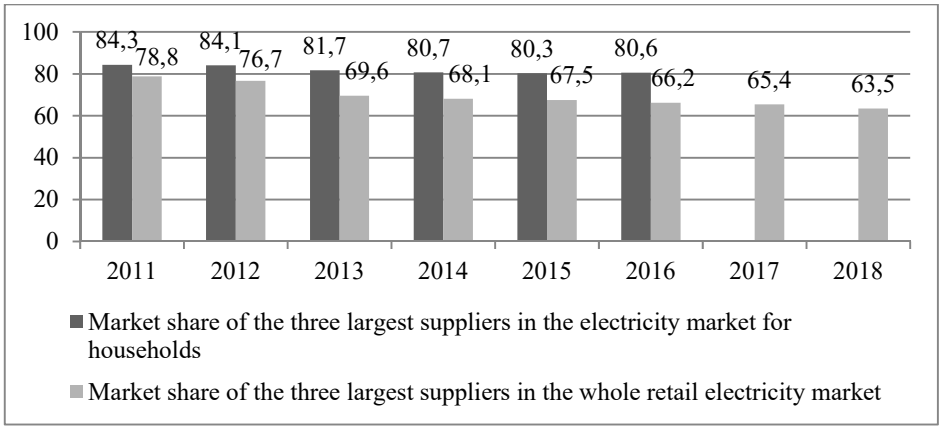
Number of main electricity retailers and their cumulative market share, 2018



Source: Eurostat

Figure 6

Market share of the three largest suppliers of electricity in EU-28



Source: CEER, Retail Markets Monitoring Report, 2017. 2018. 2019

In 2018 the countries with the lowest concentration ratio of CR3 were Great Britain, Norway and Sweden. There were fifteen countries with a CR3 equal or above 70%, in comparison to 2017, when there were thirteen countries. Hence, electricity retail markets continue to be dominated by a few larger suppliers which indicate low market openness, low market competition and low customer choice, respectively. Markets, where only one main company is dealing with the sales of electricity, are registered in Greece, Cyprus, and Malta.

The situation in Bulgaria is the same as in most of the member states. Despite the large number of suppliers in the household market (35), there is a very slight decline in the market

shares[8] of the three largest suppliers CEZ, EVN and ENERGO-PRO. In the household consumers market, suppliers with a market share of over 5% are eight. Seven suppliers have a market share between 1% and 5%, and twenty suppliers have a market share below 1% (EWRC Bulgaria**,** 2018, p. 31).

CEZ Electro Bulgaria AD has the largest market share, but it drops slightly between 2015 and 2018, from 44.76% to 40.01%.

Table 1

Market share of end suppliers in Bulgaria

End supplier	**2015**	**2016**	**2017**	**2018**
CEZ Distribution Bulgaria AD	44.76%	40.71%	40.79%	40.01%
EVN Bulgaria Electricity Supply EAD	37.85%	35.24%	35.83%	37.19%
Energo-Pro Sales AD	25.71%	24.05%	23.38%	22.81%

Source: EWRC, Annual Report to the European Commission, July 2018, p. 31

According to HHIs in 2018 in only seven of the countries the household market in electricity was low concentrated with the HHI scores below 2 000. Typically the level of concentration in European retail markets for households is higher than that of non-household markets where fourteen countries reported HHIs below 2 000. Still, there are countries as Cyprus and Lithuania, where HHI value is 10 000, meaning that there is just one supplier and therefore no competitive development. (CEER, 2018, p. 20) This suggests that at the retail market level, additional efforts are required to increase retail competition.

Table 2

HHI for the household market based on metering points in electricity for selected countries, 2018

HHI < 2 000	Denmark, Sweden, United Kingdom, Austria, Slovenia, Netherlands, Norway
HHI 2000 – 4 000	Belgium, Estonia, Romania, Poland, Bulgaria, Hungary
HHI 4000 – 10 000	Italy, France, Portugal, Luxembourg, Greece, Croatia, Lithuania, Cyprus

Source: CEER, 2019, p. 20

3.2. Development of switching rates in electricity retail markets

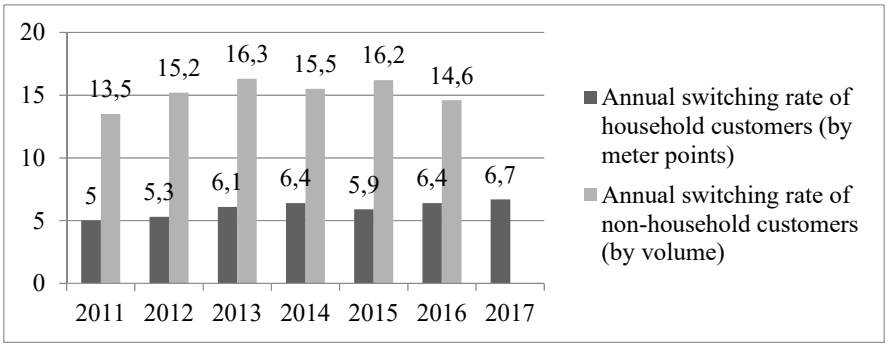
The value of the switching supplier index is another important indicator in analysing the latest competitive development in retail electricity markets. As mentioned above the process of liberalisation could benefit consumers if only they have the practical possibilities for switching their incumbent supplier with a new one.

[8] Market shares of end suppliers are calculated on the basis of energy sales to household and non-household customers connected to the low voltage distribution network. End suppliers participate in the regulated market and supply electricity to a geographically limited market within the license of the economic group distribution network operator. In practice, suppliers that are end suppliers are not in competition with each other. (EWRC Bulgaria, 2018, p. 31)

When comparing the 2011 and 2017 levels of the average switching rate of households in the EU, a slight increase from 5% to 6.7%, is observed. This trend is consistent with the increase in the number of active suppliers, which has led to a greater variety of products and price differentials in the market. However, the figures show that a large part of the consumers has remained inactive and doesn't switch their incumbent.

Figure 7

Switching rates in the EU electricity retail markets, (%)



Source: CEER, Retail Markets Monitoring Report, 2016, 2017, 2018

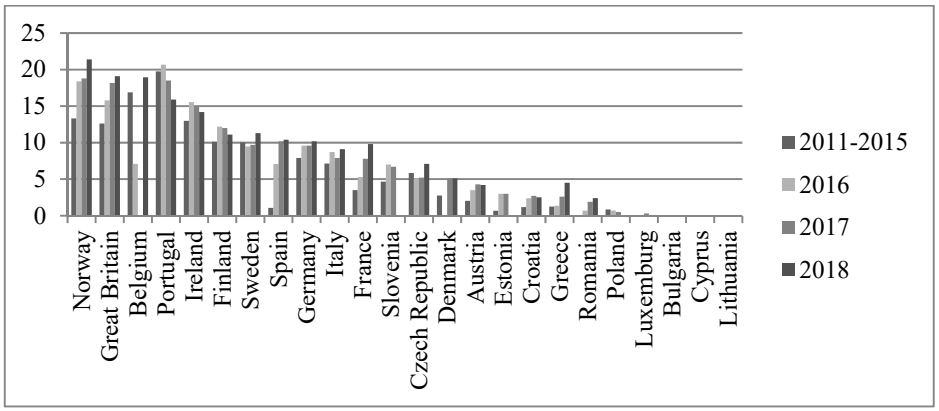
In general, the average switching rate in the non-household segment across Europe has higher values than in the household segment (around 15 %), which can be explained by the high saving potential of industrial consumers. However, the values of the index are a signal that there is no effective competition between the suppliers in the EU market, and the customers do not have incentives to change a supplier, as well.

In addition, there are still big differences between member states' external switching rates of household customers ranging from 0% to 21.4%. In 2018 the highest external switching rates were recorded in Norway (21,4%) and in Great Britain (19.1 %). Other countries with a relatively high switching rate (above 10%) were Belgium, Ireland, Finland, Sweden, Portugal, Spain and Germany. An upwards trend could also be seen in some Eastern European countries such as Croatia, Czech Republic, Greece and Romania, where electricity consumers had access to more offers compared to previous years. Meanwhile no or almost no switching was reported by Bulgaria, Lithuania and Poland (0% – 0,04%). In Bulgaria, household customers' value of the switching supplier index was 0,002% which indicates the negligible number of free-market consumers. In Cyprus and Malta, there is only one supplier, so switching is not possible.

Concerning the change in electricity switching rates of household customers from 2017 to 2018 Belgium and Norway are the countries with the highest increase in external switching rates in electricity, compared to the previous year (+ 3% and +2.6%, respectively). A significant increase was also reported in France, Greece and the Czech Republic.

Figure 8

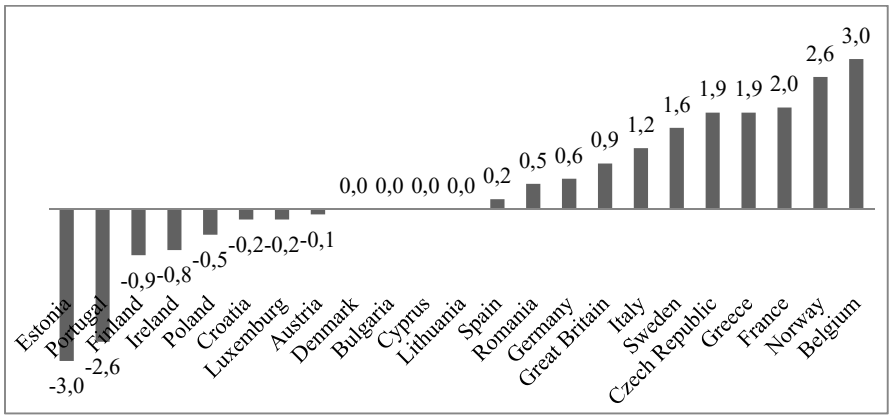
Switching rates for electricity household customers, (%)



Source: CEER, Retail Markets Monitoring Report, 2016, 2017, 2018, 2019

Figure 9

Change in electricity switching rates of household customers from 2017 to 2018



Source: CEER, Monitoring consumer protection, empowerment and retail energy market, 2019

A decrease in switching rates in 2018 in comparison with 2017 was recorded in eight member states which indicate an unfavourable trend for customers returning back to the regulated market. It was the most in Estonia and Portugal (3% and 2,6% respectively).

Similar to the household segment, switching rates for non-household customers differ significantly across MS. Countries with a high switching rate are the Czech Republic, Italy, Lithuania, Poland, Portugal and Spain (at least 25%).

There are multiple reasons for customers not to switch their supplier. In the first place, they can refer to regulated prices. If they are set below cost levels, the development of competitive

retail markets is hampered and no economic incentive for switching exists. In this case besides the existence of suppliers on the market, household customers do not switch. In 2018, in eight out of 14 countries with price intervention in electricity, there was still an end-user price regulation for household customers (Bulgaria, Cyprus, France, Hungary, Lithuania, Malta, Spain, Poland and Portugal) In some of them the market seems to be completely closed, as 100% of the households are under a price intervention mechanism. This is the reason why the external switching rate in Bulgaria and Lithuania is very low (0% – 0.04%). France also has a high number of households under a price intervention mechanism in electricity (77.3% in 2018 and 82% in 2017) which is price regulation.

The insufficient monetary incentives are another reason for not switching. If taxes and other fixed price components make up a high percentage of the final price, there is no saving potential from switching. In addition, behavioural aspects also play a major role in making a decision for switching the supplier A lack of trust in new suppliers or loyalty to the old supplier may prevent customers from switching as well as the complex and time-consuming switching procedures.

4. Evolution of electricity prices

4.1 Wholesale price developments

The sluggish economic growth that limited power demand from various sectors of the economy on the demand side, as well as an increasing share of renewables, decreasing fossil fuel costs and permanently low carbon prices on the supply side contributed to the downward wholesale electricity price trend in the 2011-2017 period. In this context, after the reached peak of 82 €/MWh in the mid of 2008, European wholesale electricity prices fell back as the economic crisis broke out and stabilised in the range of 39-46 €/MWh in 2009-2010 period. The price evolution of coal and gas directly influenced wholesale electricity prices in the European markets, because these two input fuels usually set the marginal costs of electricity generation. As both coal import prices and natural gas prices decreased significantly since the beginning of 2011/2012, the fossil-fired power generation costs became lower. In the second quarter of 2014, the PEP fell to 38-39 €/MWh, being the lowest since the summer of 2009. At the beginning of 2015, the coal prices further decreased below 50 €/Mt, reaching the lowest level since 2009. In addition, the low carbon prices contributed to the competitiveness of coal.

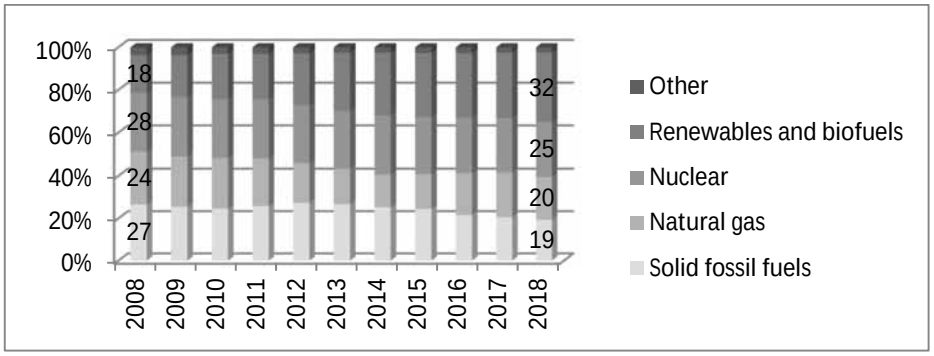
In the second quarter of 2016, wholesale baseload electricity prices reached their lowest quarterly averages in the last decade in many European markets (Belgium, Germany, Great Britain, Italy and the Netherlands). The average European wholesale electricity price was 31 €/MWh. German prices were among the lowest in the EU (28.98 euros/MWh on average). Overall, this trend is consistent with lower gas prices in 2016, when prices fell by 30% compared to the previous year.

This downward trend of electricity wholesale prices was due to, among other factors, the increasing share of renewables in the European power mix. While in accordance with the EU's 20-20-20 targets industrial plants were increasingly required to carry out their activities

complying with certain environmental protection measures (Pencheva 2016, p. 13), including restrictive emission standards for conventional electricity generators, the renewables have been subsidised by national governments (mainly through feed-in tariffs, feed-in premiums, green certificates and investment grants). As a result, the structure of the EU energy mix has changed.

Figure 10

EU 28 Electricity generation mix, 2008-2018, (%)



Source: Eurostat

The relative share of renewables-based electricity generation has increased dynamically in parallel with the slight rise in electricity demand in the EU and the decreasing electricity production from conventional power plants, respectively. The share of the renewables sector in the power mix of EU has reached 32%.[9]

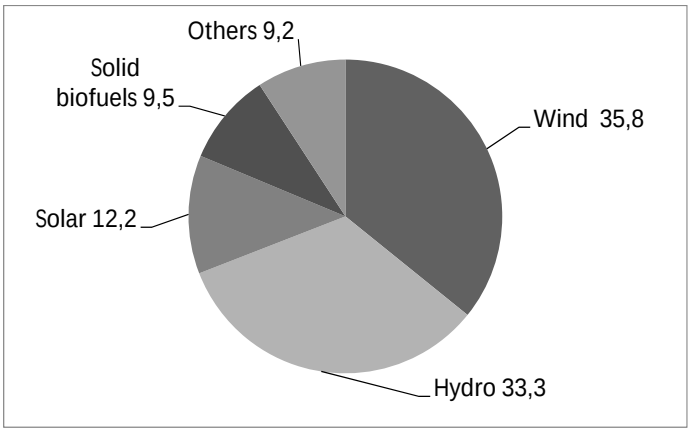
The growth in electricity generated from renewable energy sources reflects an expansion in three renewable energy sources – wind, solar and solid biofuels. The increase was most significant for wind and solar generation plants. As a result, the hydro-power was replaced by wind power as the largest source for renewable electricity generation in the EU-28.[10]

[9] The EU produced a total of 44% of the world's solar electricity. As a percentage of the world solar electricity generation, Germany ranks second with 15.7% after China 18.3%. The EU has a significant share in the global wind electricity generation, too (35.7%). Germany has the largest share of European countries in the world electricity production by wind with 9.5%. In front of it are the US with 23% and China with 22.2%. The EU-28 also accounts for 10% of the world's electricity production by hydro power, with Sweden in the first place with 2%.

[10] The quantity of electricity generated from solar was 15,5 times as high in 2018 as in 2008 giving 12,2 % of the total quantity of electricity generated from renewable energy sources. Almost 40% of the solar-PV electricity in the EU-28 was produced in Germany, Italy and Spain. The relatively high increase in these countries is due to the greater policy support for renewables.

Figure 10

Gross electricity generation from renewable sources in EU, 2018. (%)



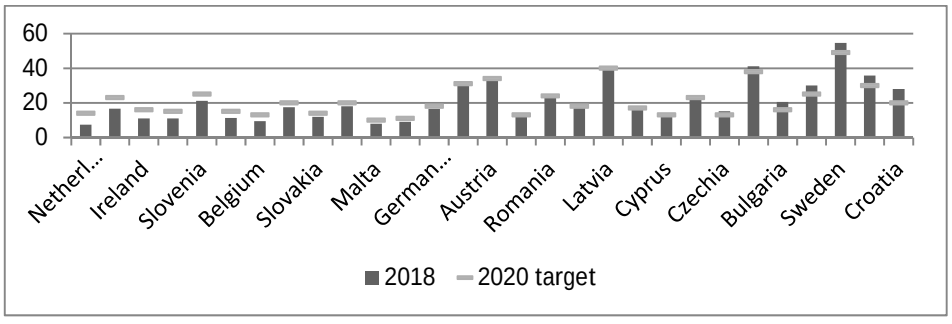
Source: Eurostat

In spite of the increasing wind and solar capacity installations in the EU, hydro-based power generation still remains an important energy source. The electricity generated from hydro is relatively similar to a decade earlier, i.e. around 33 % of total electricity production.

In 2018 the share of energy from renewable sources in the gross final consumption of energy in the European Union reached 18% against a target of 20% for 2020, above the indicative trajectory of 16% for 2017/2018. Twelve of the EU Member States have already achieved their national 2020 targets among them Bulgaria, Romania, Croatia, Czech Republic, Denmark, Finland and Sweden. Sweden had the highest share with 54.6% of its energy coming from renewable sources in its gross final consumption of energy. On the contrary, the Netherlands and France are the furthest away from their national 2020 indicative targets with 6.6 % and 6.4 %, respectively.

Figure 11

Member States' progress towards 2020 targets in renewable energy



Source: Eurostat

Since 2013 Bulgaria has exceeded its national target of 16% share of renewable energy in gross final energy consumption for 2020. In 2018, a 20,5% share of renewable energy was achieved in the gross final energy consumption of Bulgaria. The production of electricity from renewable energy amounted to 8,5 GWh and increased by 42% compared to 2012. Although on the supply side, the share of RES in the electricity generation mix has been increasing, their downward impact on day-ahead prices was offset by the increase of the costs of fossil fuel electricity generation. In 2018 the prices of coal, gas and CO2 European Emission Allowance increased by 4%, 32% and 170%, respectively.

The increasing prices in 2017 and 2018 broke the downward price trend, observed in the previous years. In 2017, average DA electricity prices increased in all bidding zones. The highest electricity price increases were recorded in the Czech Republic, Slovakia, Hungary and Romania (4MMC market), followed by the Iberian and Italian markets, with an overall price increase of 34%, 32% and 25%, respectively, compared to 2016. On a year-to-year basis, the 2018 prices in the Nordic and Baltic regions and Poland showed the highest rate since 2011. As a consequence the highest annual average DA prices were observed in the British, Italian, Irish (SEM), Greek and Iberian markets, whereas the lowest annual average DA prices were recorded in the Bulgarian, Nordic and German markets.

On the demand side of the market, the main factor for the increase in DA prices is the economic growth. The EU's gross domestic product grew by 2.5% compared to the previous year, which is the highest annual growth rate since the beginning of the financial and economic crisis.

On the supply, side prices are mainly explained by changes in the European generation mix and in fuel prices. As regards fuel prices, both gas and coal prices increased significantly. Generation technologies with relatively low variable costs, such as hydro and nuclear power, were partly replaced by more expensive fossil fuel-based technologies. In particular, the share of electricity generated by gas-fired power plants increased, reaching its highest level in seven years.

Additionally to the general price drivers, specific regional and national factors also affected the upward evolution of the 2018 DA price. In the 4MMC market, the price increase is explained by the limited availability of flexible generation technologies at times of high demand putting upward pressure on prices, e.g. limited coal generation due to frozen stocks and frozen rivers in Hungary in January 2017, or lack of nuclear generation due to unplanned outages in Romania during the heatwave in August 2017. In the Iberian market, the price increase in 2017 is explained by the decrease in generation from hydro-power (-51%) compared to 2016, which led to more fossil fuels in the generation mix that put upward pressure on domestic generation costs. In Italy, the upward price developments in 2017 are partially explained by fewer imports from France due to high DA prices there, which were caused by reduced nuclear availability, as well as a shift in the generation mix. Compared to 2016, in 2017, Italy recorded an increase in the utilisation of natural gas and solar power by 15% and 14%, respectively,

Meanwhile, the EU policy for increasing sustainability and reducing energy dependence on imported sources has created new challenges for the security of electricity supply. On the one hand, the intermittent output of the renewable energy technologies makes trouble for the

overall balancing of the electricity system. On the other hand, some of the existing power plants are reaching the end of their operational lifetimes, some cannot meet the new environmental and emissions standards, while others will be phased out as a result of national energy policy choices (for example phasing out of nuclear energy in Germany).

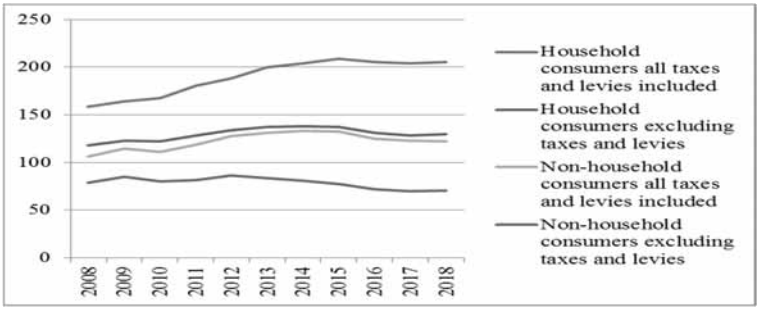
Hence, it has become obvious that the moving to a competitive low carbon economy through increasing renewable energy penetration contributes for price decreasing in spot markets, but it also requires additional investments in the flexible energy system which should supply the market demand fluctuations. All this imposes additional costs for the entire energy sector and a burden on electricity bills of end-consumers.

4.2 Retail price developments

In competitive electricity markets, final prices are expected to reflect costs as wholesale prices should be easily transferred to the retail level at competitive margins. So, the steady decline in wholesale prices with nearly 36% in 2008-2017 period should have been seen in retail markets. In contrast to the price dynamics at wholesale markets, the EU average retail prices have been continuously rising. The average annual growth rate for household consumers was around 3% and for industrial consumers, 1.5%, which have outstripped period's average annual inflation rate (1.2%).

Figure 12

Dynamics of Retail Electricity Prices, 2008-2018 period (EUR/MWh)



Source: Eurostat

In absolute terms, the average prices of electricity including taxes and charges for household consumers in the EU have increased from 158.3 EUR/MWh in 2008 to more than 205 EUR/MWh in 2018. For industrial users, the price rise was not as high: from 106.1 EUR/MWh in 2008 to 121.7 EUR/MWh in 2018. An explanation for this is that the energy-intensive industries might enjoy exemptions from certain energy charges.[11]

It is noteworthy that since 2016 there has been a slight decrease in prices, more pronounced for industrial consumers. Nevertheless, prices remain at higher levels than in 2008. Although

[11] Moreover, industrial consumers often do not participate in the retail, but in the wholesale market.

wholesale electricity prices are more than one third lower than in 2007 and consumers are able to choose from a number of suppliers, the anticipated price decreases did not occur.

Generally, there are many factors that can divert price levels from competitive market (effective) equilibrium: market imperfections, trade barriers, regulated prices, labour regulation measures, asymmetric information alongside fiscal distortions and externalities. (Vrachovska 2014, p. 211) As far as the energy sector is concerned, the price of energy in the EU depends on a range of different supply and demand conditions, including the historic diversity in member states' energy mix, the import diversification, the network costs, the environmental protection costs, the weather conditions or the levels of taxation, the externalities as well as the significant public intervention and the geopolitical situation.

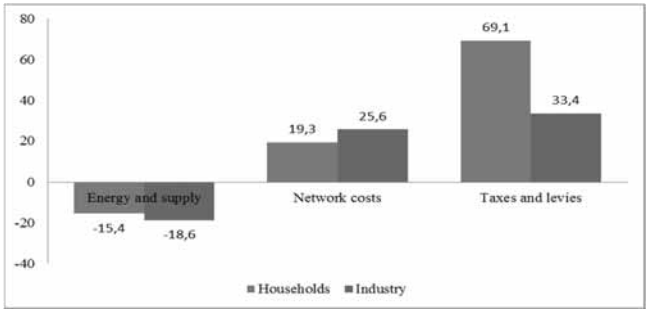
One of the main reasons why the changes in the wholesale prices are not directly transferred to the retail prices is the specific structure of retail electricity prices and the different weight of every price component included in it – 1) energy and supply, 2) network costs, 3) taxes and levies. The energy and supply component is the only one which depends on market competition, while the network costs and the taxes and levies are determined by the regulatory authorities.

Therefore the decisions of the regulatory authorities are crucial for market functioning as they have powers to control end-users prices by determining the taxes present. In this regard, taxes and levies (along with financial support and other incentives) have become the most discussed and commonly used economic instruments within the EU. They are an effective means of internalising external costs and environmentally friendly resource consumption, while also potentially stimulating innovation and structural change (Doneva 2001, p.45).

In particular, taxes and levies on electricity provide revenues to governments for financing general government expenditures, as well as energy investments for the clean energy transition and support for low-income households. However, aiming at minimising the sector's harmful impact on the environment, regulatory actions often stand in contradiction with the electricity market's liberalisation. The state interference in electricity market pricing is able to limit the operation of the market mechanism and thereby reducing the flexibility of market supply and demand.

Figure 13

Average change in electricity price components in the period 2008-2018, (%)



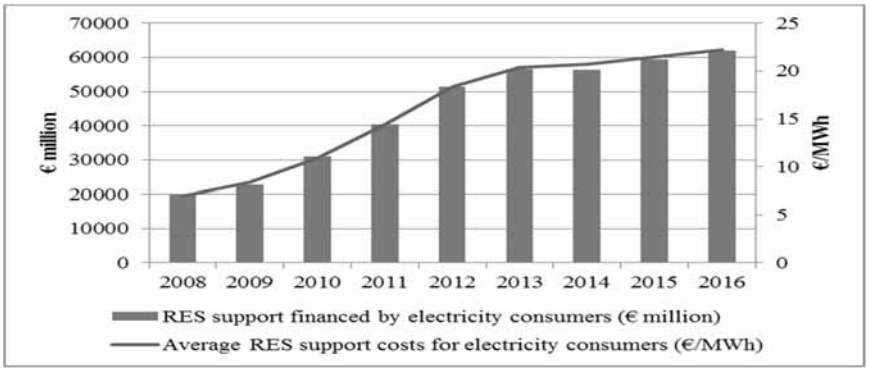
Source: Eurostat

The calculations about the changes in the relative share of the electricity price components for the 2008-2018 period confirm that the main drivers of price increases from 2008 to 2018 were the costs of environmental obligations and network costs. The taxes and levies grew on average by 69% for household consumers and by 33% for industrial consumers.

In the period 2008 and 2016, the amount of subsidies to renewable energy (mainly wind and solar electricity generation) tripled from €25 bn to €76 bn (EC 2019a, p. 211). Out of them, 20 bn euro in 2008 and nearly 62 bn euro in 2016 were financed by the levies on the final prices of electricity users, excluding the subsidies paid by the government or other means (Trinomics 2018, p. 297).

Figure 14

RES support financed by EU end-consumers



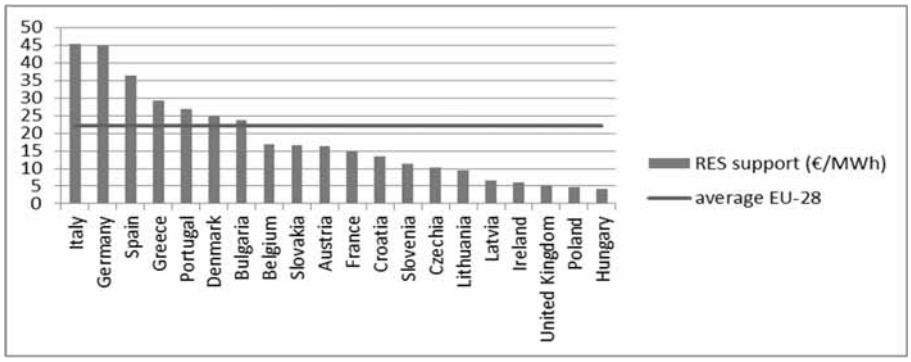
Source Trinomics B.V. (2018) Study on Energy Prices, Costs and Subsidies and their Impact on Industry and Households, p. 297

As the larger part of the cost of subsidies has been financed by the end electricity users, the majority of them experienced increases in energy prices. Over the period 2008 to 2013, the average renewable policy cost burden for final energy consumers in the EU increased threefold, from €7.0/MWh to €20.4/MWh. Since 2014 the increase in levies paid by the average EU electricity consumer has slowed down[12] and in 2016, the financing burden of renewable support was 22 €/MWh. (European Parlianent 2017, p. 36) The burden has hit the most electricity consumers in the countries with the highest levels of subsidies for electricity producers (Germany with €44.8/MWh and Italy with €45.3/MWh in 2016).

[12] The registered slowdown in subsidies increase could be explained by cost reductions as the technologies are deployed at scale and manufacturers gain experience. The cost of electricity from solar fell by almost three-quarters in 2010-2017 period and continues to decline. Wind turbine prices have fallen by around half over a similar period leading to cheaper wind power globally. Onshore wind electricity costs have dropped by almost a quarter since 2010, with average costs of USD 0.06 per kilowatt-hour in 2017 (IRENA 2018, p.14).

Figure 15

Renewable energy sources support (€/MWh)



Source: Trinomics B.V. (2018) Study on Energy Prices, Costs and Subsidies and their Impact on Industry and Householdsp, p. 296

Concerning the support levels for RES generation, they varied widely across countries and different technologies, with values ranging from approximately 3 €/MWh for geothermal in Austria to somewhere between 200 and 300 €/MWh for the strongest supported technologies which still is solar. Generally, the countries with higher penetration of supported renewables have higher RES electricity support per unit of gross electricity produced. In 2016 Germany spent the most on renewable energy support (€27 bn), while the United Kingdom spent the most on fossil fuel support (€12 bn). Germany, Italy, France and Spain spent more on renewable energies than on fossil fuels.

In the EU as a whole, energy subsidies amounted to 1,1% of the Gross Domestic Product (GDP) in 2016. It's noteworthy that as a percentage of GDP Luxembourg spent the lowest share on energy subsidies (0,3%), while Bulgaria spent the most (2,7%) (EC 2019a, p. 215). In addition, across all Member States, the households in Bulgaria and Greece have the largest expenditures on electricity as a share of disposable income (7%), while the households in Luxembourg and the Netherlands the lowest around 2% (Trinomics 2018, p. 214).[13]

In terms of the duration of support, most of the countries grant support from 8 to 15 years. The support in Belgium, Bulgaria, France, Germany, Malta and the UK ranges from 6 to 20-years. Only the Czech Republic, Greece, Hungary, Italy, Portugal and Spain grant support for more than 20 years (CEER 2018b, p. 16).

[13] In accordance with the 2030 EU Energy and climate framework the determined national target of Bulgaria by 2030 is at least 27,09% renewable energy share in gross final energy consumption. (INPEK 2019, p. 63) To achieve the objectives for renewable energy set in INPEK, Bulgaria plans to invest almost 2.4 billion euros for the period 2021-2030 in the development of renewable energy capacities for the production of electricity and heat. About 1,7 billion euros are expected to be invested in the development of solar plants, as well as about 400 million euros in biomass. (INPEK 2019, p. 288)

The significant rise in taxes has increased their relative share in the final electricity price. In 2018 the taxes and levies made up between 28% and 38% of electricity prices amongst the different member states. The VAT's weight in the tax component has declined from 48% in 2008 to 35% in 2018, while that of renewable taxes has more than doubled from 14% to 33% in 2018. As a result, renewable taxes' relative share in the final price of EU household consumers reached 14%. The highest taxes were charged in Denmark, where 64.3% of the final price was made up of taxes and levies (ACER/CEER 2018, p. 6).

So, on the one hand, the additional taxes are a means of raising funds for covering the preferential prices of electricity from RES and cogeneration, but on the other hand, they are a burden on consumers' budgets. This has led to a net increase in electricity costs for most of the final electricity consumers, despite the reductions in wholesale prices.

The increase in taxes and additional levies in the retail price is accompanied by a rise in the network charges for households (19%) and industrial consumers (26 %) as well. Due to the progressive increase of the regulated components in the retail price, their average share in the household electricity price has reached 65%. Respectively, the average share of the energy and supply component in the final price has decreased to 35% (ACER/CEER 2018, p. 16). This negative tendency shows that market competition has very little effect on electricity's final price. Therefore the policy for the liberalisation of electricity markets can't ensure competitive prices for consumers as there are multiple other factors that influence electricity pricing.

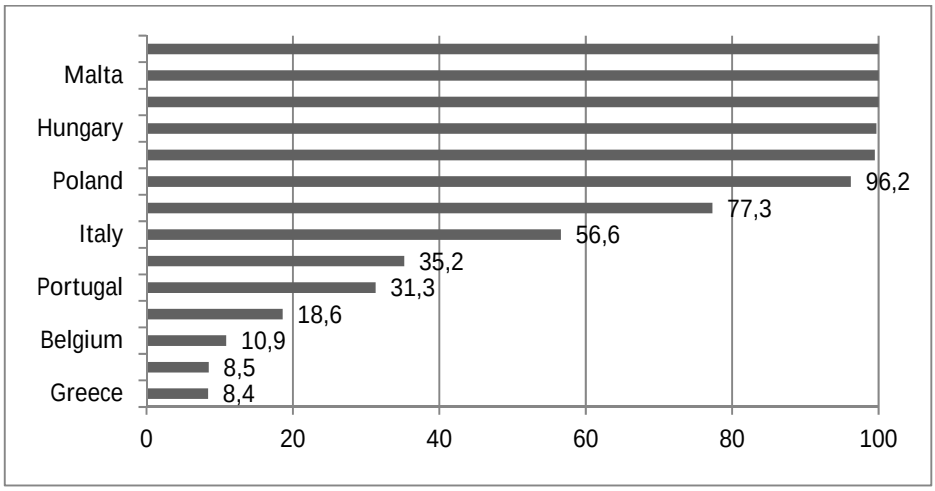
The average decrease in the energy and supply component (the only component that directly depends on competition between market participants) with 16% for household consumers and 18% for industrial consumers is significantly lower than the changes in wholesale prices over the period (-36%). It indicates the inefficiency of competition in retail markets which can't guarantee the expected reduction in end-user prices.

It should be considered that the transfer of energy and supply component is influenced not only by the degree of competition on the market, but also by the different forms of price regulations. When end-user prices are regulated, (as in 14 member states for household electricity customers and 6 member states for industrial consumers in 2018), it stands to reason that the energy and supply component in retail prices is not too sensitive to changes in wholesale prices. Thereby the policy interventions based on the socio-economic nature of electricity conflict with electricity market deregulation since the price signal from the production are overlaid with different policy signals that determine the attractiveness of different investment options (OECD, 2015, p. 58). Thus all economic agents and entrepreneurs are involved in a complex and dynamic environment (Hristova 2019, p.85). They are under the influence of a lot of micro- and macro-level factors with different intensities, which requires companies to look at the rapidly changing market conditions (Radukanov, 2017, p. 182).

Compared to the total number of households, Poland, Bulgaria and France have a high percentage of households supplied under regulated prices with a percentage between 77% and 97%, whereas in Hungary, Cyprus, Lithuania and Malta 100% of the households are supplied under regulated prices (CEER, 2018a, p. 10).

Figure 16

Percentage of electricity household customers under price intervention, 2018



Source CEER, Monitoring Report on the Performance of European Retail Markets in 2018, 2019

In these countries, the demand for electricity is influenced by the level of regulated prices. If they are set at a low level and don't accurately and completely reflect all costs, this hinders the opening of the market for competition; discourage new entry; stimulate overconsumption of a subsidised service and limit the ability of suppliers to make competitive offers on the wholesale market.

Furthermore the customers who are already on competitively supplied contracts will be urged to switch back to a regulated tariff. In addition, where the price signal is misleading the efficiency of producers is hidden and the cross-subsidisation between the different types of power generators is unclear. As a consequence, the regulatory support measures add to the lack of transparency in the market, which results in inefficient energy choices by consumers and further inefficiencies in the whole energy system.

In a recent study by the ACER (2018) concerning the responsiveness of the energy component of electricity retail prices to changes in the wholesale price and the evolution of the mark-up[14] over the 2008-2017 period, they came to the conclusion that in some countries with regulated prices (Latvia, Romania and Lithuania), average mark-ups were negative because the energy component of the retail prices was set at a level below wholesale electricity costs. These regulated end-user prices are attractive to consumers in the short term; however, such a policy is an obstacle to effective retail competition and the emergence of new market players. In markets with persistent negative mark-ups, market participants do not receive the right price signals, and consumers do not pay the actual cost for the energy they

[14]Mark-up is the percentage or amount added to the cost of a commodity to provide the seller with a profit and to cover overheads and costs.

consume. On the other hand, negative mark-ups may have a negative impact on long-term investments in electricity infrastructure due to the uncertainty of suppliers' return on investments in the long term.

The energy component of retail prices and wholesale prices correlate well only in several competitive markets (electricity markets in Norway, Sweden, and Finland) where final retail prices contain a direct reference to wholesale costs and a mark-up. In addition, a good correlation is observed in certain countries with regulated retail electricity prices, e.g. in Denmark, Hungary and Poland, where retail household prices are set closely to follow changes in wholesale prices (ACER/CEER 2018, p. 27).

As a result of the different national policies and energy mixes, the electricity price structure of individual member states differs strongly between countries. The share of taxes and levies in the retail price in the EU ranges from 68% in Denmark and 54% in Germany to 5% in Malta and 17% in Bulgaria. Taxes for RES and high-efficiency cogeneration vary from 22% in Portugal and Germany to 0-2% in Hungary and Ireland. Large differences in the energy and supply component are also observed. In Malta and Bulgaria, it is 78% and 59% respectively, while in Denmark and Sweden it is only 13% and 23%. There is a big variety in the share of network component too – 51% in Slovakia and 17% in Greece.

On average, the total electricity price for households in Bulgaria has increased from 8,2 cents/kWh to 9,8 cents/kWh in the 2008-2018 period. The energy and supply component has the largest share in it and hasn't changed significantly over the entire period. The main reason for the increase in the total cost of electricity are taxes and levies, which have doubled from 1,4 cents/kWh in 2008 to 2,9 cents/kWh in 2018. So in 2018, taxes and levies accounted for 31% of the total household electricity price (EWRC 2018, p. 6).

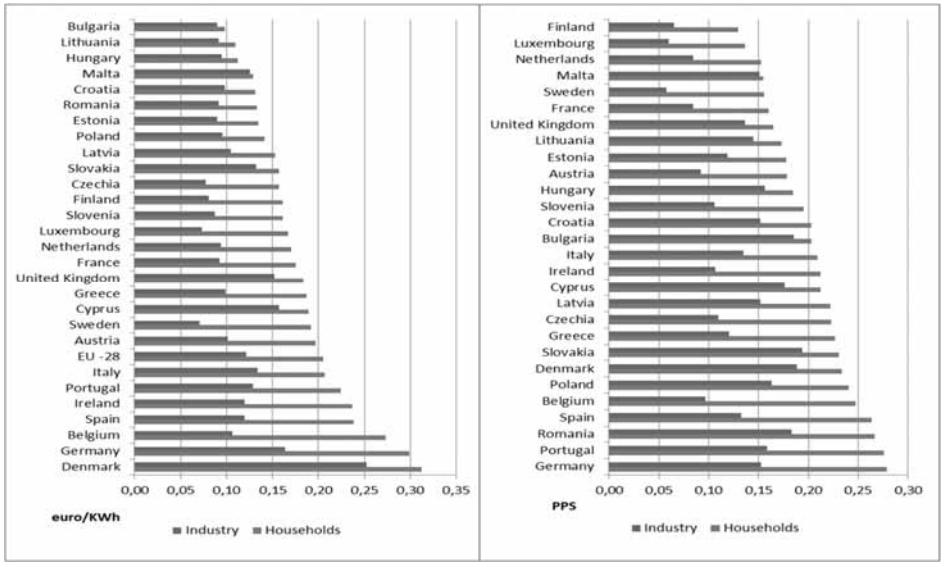
Given the specific characteristics of member states' electricity markets in the first half of 2018, a significant disparity in the final household prices within the EU is observed. The values in the country with highest electricity prices (Denmark, 0,31 euro/KWh) were more than three times as high as in the country with the lowest electricity retail prices for household consumers (Bulgaria, 0,10 euro/KWh).

However, if the comparison is made on the base of purchasing power standard (PPS) prices in order to remove the price level effect, the difference between the highest and lowest price decreases and the ranking of countries changes, especially for the lower-income countries, like Bulgaria. Finland, Luxembourg and Netherlands become the countries with the lowest prices which mean that their households pay a lower percent of their income for electricity while Bulgaria ranks in the 14th place after the retail prices in France, Great Britain, Austria and most of the Central and Eastern Europe countries.

Unlike household electricity prices, there aren't such great differences for industrial users. Considering the price structure on average, the weight of the taxes has increased constantly from 13% in 2008 to 30% in 2018. In the second half of 2018, the highest share of taxes was charged in Germany, where non-recoverable taxes and levies made up 48.5 % of the total price paid by non-household consumers. In seven Member States, there is an increase in the energy and supply component over the period, which confirms the insufficient price competition at the retail market.

Figure 17

Electricity prices for households and industrial consumers by EU member states for the first half of 2018

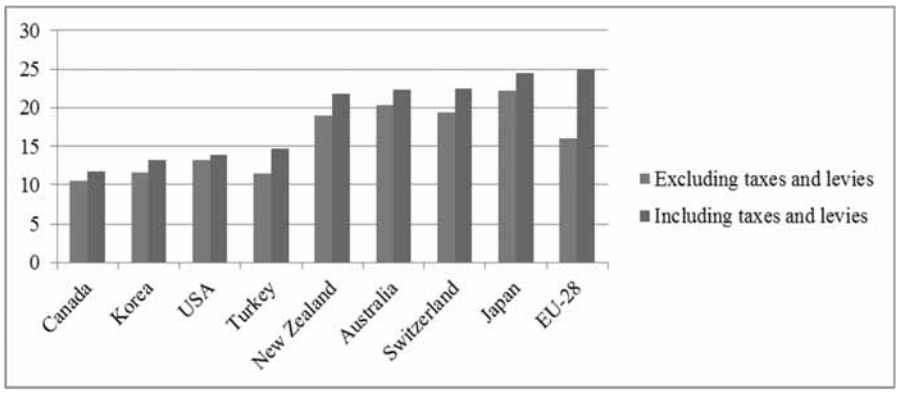


Source: Eurostat

Apart from the above-mentioned differences in electricity prices within the EU, there is also a large divergence between EU household electricity prices and the prices in non-EU member states.

Figure 18

Household Electricity Prices in 2017 (EUR /KWh)



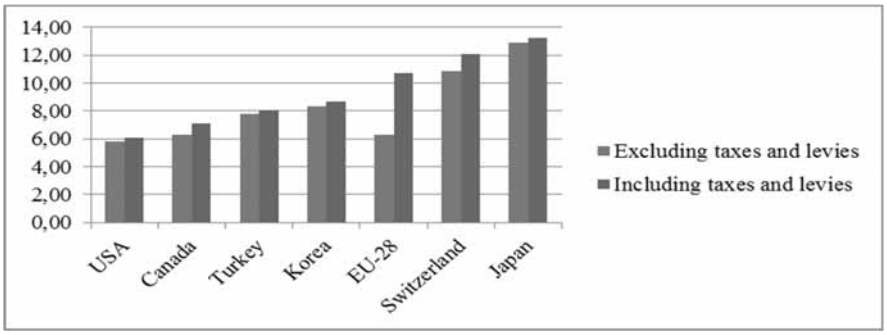
Source: IEA, Energy Prices and Taxes 2017

Household users in Canada, Korea, the USA and Turkey pay significantly less for electricity than EU consumers. Further, it should be noted the low percentage of charges included in the price of electricity in non-EU member states, which confirms that network costs and especially taxes and levies drive prices higher in the EU.

Comparisons at the international level show that the industrial prices in the European Union almost double US levels. The EU industrial power prices also remain higher than the prices in Canada and Turkey but lower than those in Japan and Switzerland. Relatively high non-recoverable taxes and levies in the EU play an important role in this difference.

Figure 19

Industrial Electricity Prices in 2017 (EUR/KWh)



Source: IEA, Energy Prices and Taxes 2017

The high electricity prices have contributed to the increase in the production costs of the EU products and their exporters' prices. Given the concern that European industry should be able to compete in international markets, energy-intensive industries have faced a great challenge. In some countries, the rise in electricity costs for the industry has been over 25% (Italy, Spain and Denmark) (Trinomics, 2018, p. 18). In this regard, the analysis of the factors influencing the company's competitiveness is a subject of serious scientific interest because of their positive effect on the economy. They create benefits not only for the company's owners and employees, but also are key factors for economic growth (Stefanov, 2018, p. 186). The price of electricity as one of the important production factors determines the cost of the final products and their competitiveness with the other products on the market.[15]

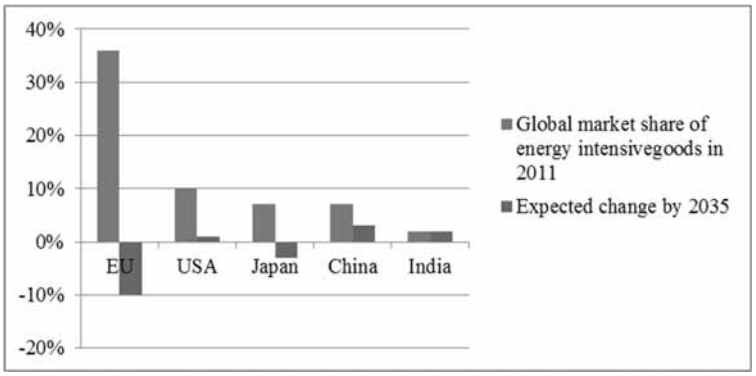
The energy intensity in the EU is usually higher than in Japan and South Korea, comparable to the US and lower than in China and Turkey, although with considerable variation by sector (EC 2019, p. 9). The difference in energy prices and energy intensity is expected to cause a significant decline in the EU industry competitiveness. According to a report of World

[15] In energy intensive sectors the energy share of production costs ranges from 3 to 20 % (manufacturing of cement, lime and plaster, clay building materials, pulp and paper, glass, iron and steel, basic chemicals, non-ferrous metals). Still for a range of energy-intensive industries like aluminium, the costs of electricity can reach up to 40% of the total cost.

Economic Forum the market share of EU energy intensive goods will drop from 36% to 26% over the next 20 years (WEF 2015, p. 10). That will have implications on the whole EU economy as energy-intensive goods account for a big per cent of industrial employment.

Figure 20

Global market share of energy-intensive goods



Source: WEF, The Future of Electricity Attracting investment to build tomorrow's electricity sector, 2015, p. 10

Since the final energy costs of companies are the result of both the price and the consumption, this determines the need for constant efficiency improvements through optimisation of production costs. In general, the saving of material resources should be realised by increasing the level of their performance (Ivanova, 2018, p. 134). Thus, rising energy prices may further encourage the progress for greater energy efficiency, which will mitigate the differences in energy prices and improve company's cost-competitiveness in international competition.

Therefore the low price of electrical energy for the industry is a major comparative advantage that has to be maintained. In the long run, increasing electricity costs could affect the country's specialisation, as is observed in the case of environmental regulations – comparative advantage in industries that use the most pollutant of technologies is reduced, resulting in relocations. Hence it is essential for industry competitiveness the right signals to be sent to economic players as electricity price is a short-term cost and a long-term investment signal.

Conclusion

Over the last 20 years, the EU energy markets have seen a policy and technological development, that have profoundly changed the way they work. Compared to the historical situations, when the industry often was dominated by a single state-owned monopolist, the complexity of the market has increased significantly nowadays. The sector-specific regulation, in particular the liberalisation packages, gave the framework for a gradual opening of national electricity markets to competition. However, the practical implementation of

competitive national markets hasn't turned out to be a fast and fluent process and the theoretically-derived expectations that competition in a liberalised market would lead to lower electricity prices, wider consumer choice and higher competitiveness levels, however, has not been confirmed yet. The possible explanation for this trend is a complex set of factors.

On the first place are the specific nature of the market and the different level of commitment of the Member states to implement the pro-market reform, including the step of national legislation harmonisation. Although competition in both wholesale and retail markets has increased in most of the countries, there are still regulatory and market failures which hinder effective market functioning. The markets continue to be dominated by a small number of players with dominant positions and a high market concentration. The number of customers that effectively moved from regulated to the free market, still remains very low, even though the consumer right to choose an electricity supplier is pointed as a fundamental pillar of the reform,

To ensure the security of supply in periods of peak demand flexible dispatchable power generation capacity (mainly coal and gas) will continue to play a very important role in the market by providing a back-up capacity and energy storage technology for intermittent generation sources.

Examining the impact of electricity market liberalisation on electricity prices and the degree to which consumers benefit from it, highlighted the important issue that the introduction of a wholesale spot market does not necessarily result in lower retail prices. The analysis also shows the increasing share and importance of the nationally regulated retail price components (network charges, levies, taxes) in the final electricity bills.

Additionally, the price divergence at retail markets across the EU emphasises existing drawbacks in EU energy policy. In particular, the EU renewables and decarbonisation agenda, including energy mix changes in favour of wind and solar power have a significant impact on the electricity industry, its costs and final market performance, respectively. The different support schemes for renewable energies have induced major inefficiencies if viewed from a European perspective. The imposed cost of renewables and climate policy obscures the impact of the market opening and market coupling concerning costs and prices. In this regard, the disparity in electricity prices can largely be explained by the fact that EU countries have their unique energy markets and follow their own paths in meeting their energy targets.

The lack of coherence in EU energy and climate policies is another reason for the current market trends. The variety of approaches, applied by member states for promoting energy from renewable sources, has created new challenges for the process of market deregulation and competition. The support measures for emerging technologies run against the policy of market liberalisation and the aim of increasing the competitiveness of the European economy.

The mismatch between the priorities of EU energy policy: competitiveness, sustainability and security of supply requires a fundamental rethinking of the functioning of the electricity sector. The investing in new technologies and the connecting energy markets across the EU is putting European households and industries (who are identified as the main beneficiaries of the reform) at risk of additionally increasing energy costs in the future. The decrease in

the environmental impact leads to an increase of the electricity prices and a decrease in EU competitiveness.

So, we can conclude that although many steps have been made towards the establishment of the internal energy market, further efforts are required in order to EU markets to function more efficiently and treat market participants more fairly. The successful implementation of competitive markets is closely linked to the regulatory process. Reforms in the electricity sector have significant potential benefits, but at the same time carry the risk of significant costs if they are implemented incompletely or incorrectly,

The challenge for policy-makers is to find the appropriate mix of instruments to manage the sector transition and finalise the process of the fully opening of national energy markets as well as the completing of the EU internal energy market. A way to deal with such a situation is to take certain proactive measures for identifying all types of risk that can turn into undesirable results (Tsanevska 2017, p. 135), otherwise many of the benefits of an Internal Energy Market will be lost and costs for consumers will continue to increase. With this regard, a main challenge is to find the intersection between the economy and the environment (Byanov, 2019, p. 151). It could be achieved through further regulatory improvements that ensure a better coordination and coherence between EU energy and climate policies and priorities. The right market design should also be in place to undertake the multiple tasks ahead and reduce the cost of the energy transition for consumers by enhancing the security of supply through common rules and closer integration of national electricity markets.

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