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Differences in End-Customer Power Prices Across the EU – Reasons and Challenges for the Future

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Abstract:
Many years have passed since the first liberalization processes in the electricity sectors the in European Union that were performed in order to establish a single market for electricity. In practice, convergence between neighbouring market areas was established mainly between the Member States in Central-Western Europe, while other countries have allowed for only limited levels of competition. As a consequence, many market areas remain illiquid and consumers pay relatively higher prices for the energy they consume. The final bill is further increased through financing the increasingly ambitious climate agenda, gradually leading to social opposition against ever-growing prices. The aim of this article is to provide examples of differences in market functioning in Member States, leading to discrepancies in average energy costs for end consumers. The consequences of different levels of market concentration, infrastructure investments and renewable generation subsidization are analysed using publicly available statistics. Careful literature review is also performed before the conclusions are presented.
Keywords: Clean Energy Package, RES, energy mix, CRM, subsidies.

1. Introduction

Liberalisation of the electricity sector already has a history in the European Union (EU), although it is not broadly understood and recognized by the society [10]. The term *liberalisation* refers to the splitting of the previously vertically integrated entities that have held a monopoly on the power sector along the entire business chain under one roof and exposing part of the sector to competition. Through such *unbundling*, energy companies have been split into those responsible for production, transmission, distribution, supply and trading. The transmission side was seen as a "natural monopoly" i.e. an area where market-based competition would be counterproductive due to the way through which electricity can be transferred [24] – building parallel, competing transmission or distribution lines would not be possible both due to the associated costs and public resistance. This way, national monopolies in form of Transmission System Operators (TSOs) and Distribution System Operators (DSOs) have been established. The other areas of the business chain were exposed to competition, which was made possible largely thanks to the Third-Party Access (TPA)

principle, ensuring unprejudiced access to transmission and distribution systems at a regulated price to all system users as per art. 20 of Directive 2003/54/EC of the European Parliament and of the Council. It should be noted here that the principles of non-discriminatory access to power transmission and distribution systems was laid down already in articles 7 to 12 of Directive 96/92/EC establishing the first set of common rules for the internal market in electricity.

Implementation speed and scope of the EU rules across the Member State varied significantly and over the years and still varied at the time of preparing this article. As a result, the benefits of market liberalisation also vary, leading to a spectrum of opinions over the success or failure of the market for electricity in Europe. This article provides an overview of the development stage of the power markets in Europe and the consequences this has on the prices and future economic competitiveness of the Member States in general. First, the status-quo of the electricity markets in 2019 is presented. This section is followed by an overview of the electricity prices for non-households customers in chosen Member States and possible explanations for their levels. Finally, the potential future developments of the end customer prices in the EU are outlined in the context of the competitive position of its Member States and conclusions are presented.

2. Electricity Markets Status-Quo in Europe

The so-called Electricity Directive, laying down the common rules for the internal market for electricity inside the EU has seen three recasts already since its original version of 1996 [4;5;7]. Several legislative packages have been brought about along with the recast Electricity Directives:

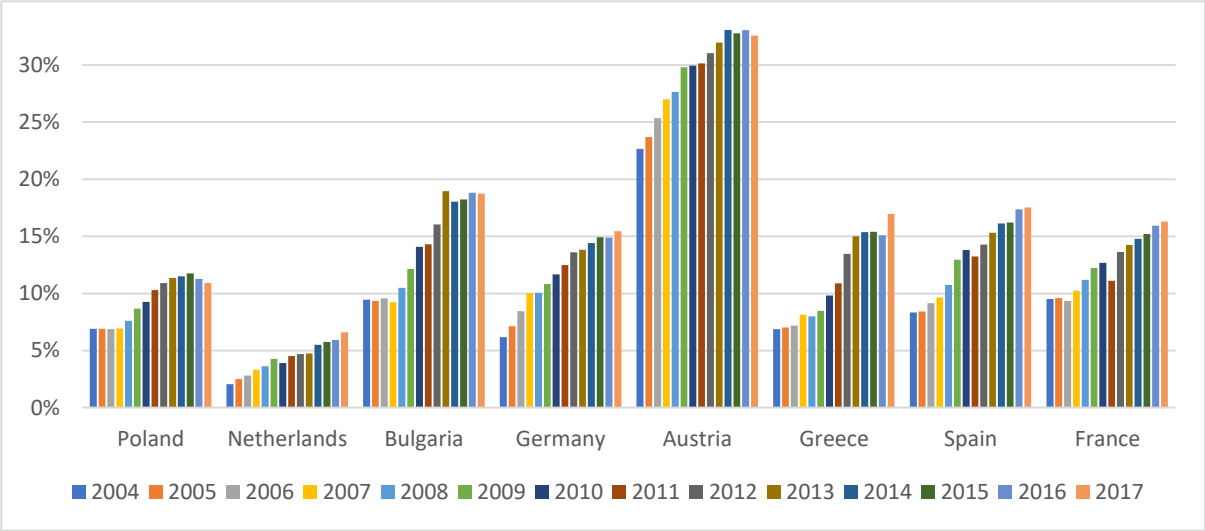
- First Energy Package, 1996 – the first "package" in terms of electricity market was in fact the Electricity Directive in itself, laying down the fundamental market principles. It was referred to as a package together with Directive 98/30/EC that liberalized the natural gas sector as well.
- Second Energy Package 2003 – the second Electricity Directive doubled the size of the agreed provisions, at least in the number of pages. This time it was also supplemented with Regulation 1228/2003 [25] on accessibility of cross border electricity exchanges – this document called for greater cooperation between TSOs and improved commercial access to interconnections (i.e. transmission lines connecting two countries) between Member States.
- Third Energy Package 2009 – third and by far broadest legislative package that has entered into force at time of preparing this article, consisting of two directives (one of which was the Electricity Directive, the other was on natural gas) and three regulations. Previous Regulation on network access to cross-border electricity exchanges was updated through [26; 27], establishing European Network for Transmission System Operators (ENTSO) for power and gas. Second Regulation [26] has established the Agency for the Cooperation of Energy Regulators (ACER). Together, they were to enhance cross-border cooperation and streamline implementation of the Package.
- Clean Energy Package 2019 – the latest set of legislation, consisting of the revised Electricity Directive and three Regulations – one on risk-preparedness of the electricity sector in the EU [28], one on the internal market for electricity [30] and one revising the Regulation establishing ACER [29]. The Clean Energy Package has enforced a set of regulations limiting the subsidisation of fossil-fuel based electricity generation and enforced international coordination of measures ensuring electricity supply adequacy at all times.

The concept of liberalized, interlinked power systems across the European Union had to face tremendous reluctance from the Member States attempting to protect the interests of the former incumbents in their country. This was done in a number of ways, including punitive licensing and reporting obligations for new entrants, requirements to use the national language, taxes on exported electricity etc.

Apart from market liberalisation, another notable change over the past 20 years that shaped the power markets as they are now, was a shift towards production from Renewable Energy Sources (RES). Public pressure from the society has popularized subsidy schemes for the development of energy sources that are considered to be environmentally friendly, particularly wind turbines and solar photovoltaics (PV). Substantial incentives have been offered to investors in this field,

attracting many new entrants to the energy industry and developing substantial share of renewable energy in their energy production (see figure I).

Figure I Share of energy from renewable sources in the national energy mix (%)



Source: own elaboration based on [13].

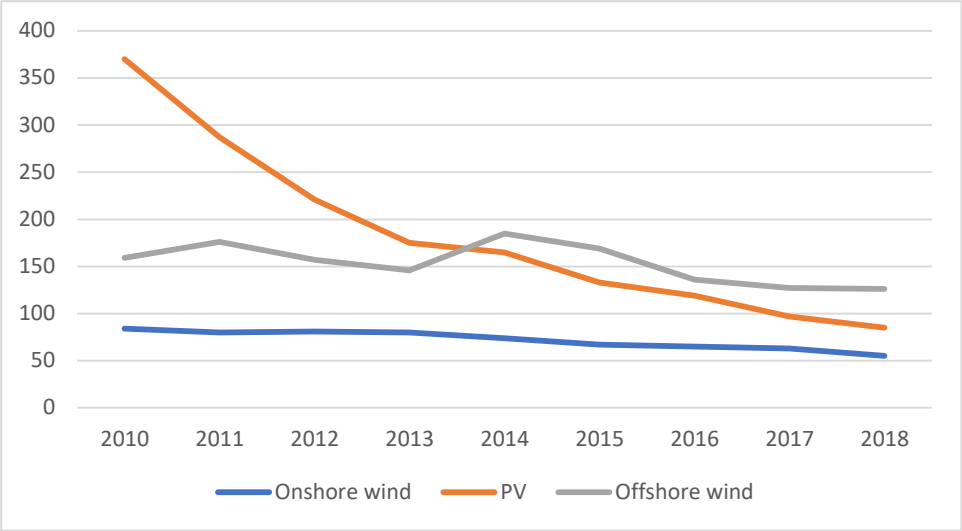
Information on figure I indicate that the share of RES has grown notably between 2004 and 2017. Interestingly enough, many Member States are still far away from their ambition laid down in the so-called Renewable Energy Directive to reach a 20% share of renewable energy in their national energy mix until 2020 despite the substantial cost of the incentives that were offered. Development of renewable energy sources, particularly of wind- and solar- based generation, had downsides also from the electricity market perspective. These include:

- **Higher balancing costs** - for most system users i.e. the costs that the TSOs and DSOs bear in order to ensure that supply equals demand at any time, as it is a precondition for the security of supply. These costs are distributed between the system users, yet some support schemes have exempted certain RES from their responsibility to bear their share of the costs to make the investment more attractive.
- **High intermittency** - an increasing share of renewable generation in an electricity system is at the same time the main reason of growing system balancing costs. The output from most RES that are weather based is highly intermittent and results in significant amounts of energy appearing and disappearing from the system as the weather conditions change. This forces the system operators to ensure sufficient backup at times of unfavourable weather conditions.
- **Non-market prices** - some support schemes offered the investors to offtake their production at any time at a price fixed upfront (so-called feed-in tariffs). This has made the investor's risk fairly small and at the same time it has detached his generator from the market reality, where he had no incentive to increase or reduce his output for any reason, potentially moving away the system further from balance.

A combination of support scheme costs and higher system balancing costs, has led to a situation, where power prices for end customers have not decreased despite the fact that both wind turbine and PV have negligible operating costs and their total cost is in decrease for years.

Figure II represents the weighted average levelized cost of energy (LCOE) of wind turbines and solar photovoltaic, which represents the total lifecycle costs of installing and operating a generator divided by its total electricity output. The total cost of these technologies has dropped particularly for PV. The author believes that the changing investment cost in renewable energy sources is yet another argument why subsidy schemes detached from the changing market conditions, such as feed-in tariffs, have proved to be very costly and unreasonable.

Figure II Wind and power generators levelized cost of energy (USD/MWh)



Source: own elaboration based on [14].

Altogether, renewable generation incentives and deviations from full implementation of the EU acquis for the electricity market, have led to a situation where household prices still need to be regulated and the industry often has to face increasing electricity costs. This situation could suggest that the energy system transition towards market-based competition was a mistake as can be observed in certain reports [2] and publications [22].

In the following section the subject of energy costs to end-customers will be discussed in the broader context to identify the drivers of their evolution over time. Relevant Eurostat statistics shall be analysed for eight EU countries representing a different stage of development in order to discuss different reasons for consumer price evolution scenarios. A relatively small-sized, non-household consumer group (consumption up to 70 000 MWh/year) has been chosen for the analysis, as this is the group that typically does not benefit from any form of price regulation or subsidies to their consumption and therefore represents the average energy costs quite well. Explanations for the respective price curve shapes are then sought in literature and official documentation of the relevant authorities, particularly the system operators and energy regulatory offices. Eurostat database has also been used to extract the share of taxes and levies the examined consumers pay in their electricity bills in order to identify to what extent the final price is a result of supply and demand equilibrium on the market.

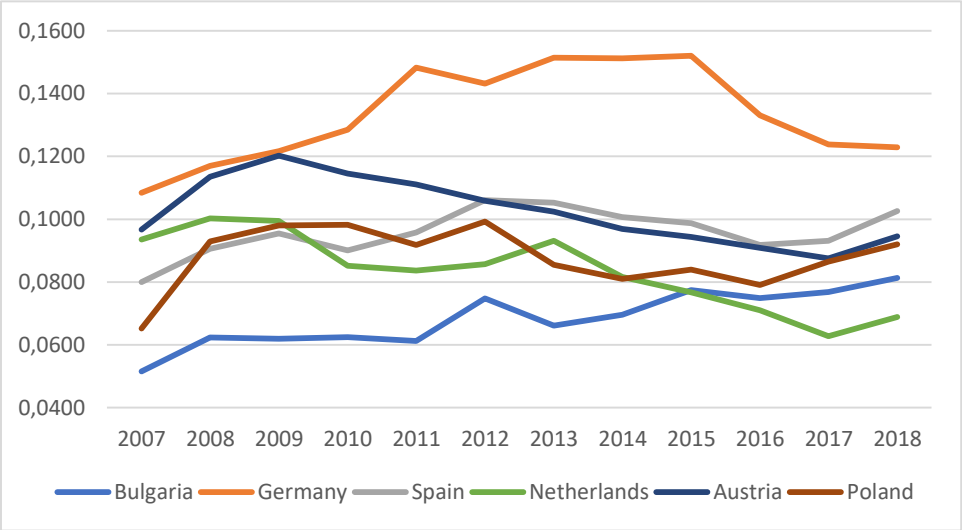
3. Electricity Prices in Different Member States

Different market development stages can be observed across Europe. While North-West Europe (NWE) region has developed substantially and their markets are increasingly integrated especially in terms of short-term power prices, countries in Central and South-Eastern Europe (CSEE) are still monopolized to a large extent and are isolated from their neighbours, effectively still not in line with the spirit of the Third Energy Package of 2009. It should also be noted that while NWE countries have largely liberalized the prices for all end customers, many other countries still administer the prices that can be offered to households. Therefore, for the purpose of this article, only non-household consumer prices are analysed in order to reflect the impact of the national policies.

In this section, eight national markets from both regions are analysed in order to evaluate the potential consequence of such different market development stages to the competitiveness of the economy: Bulgaria, Germany, Spain, Netherlands, Austria and Poland. The choice of specific Member States from these regions for the analysis was largely dictated by the author's knowledge of the way the electricity sector has developed in these countries over the past years. The timeframe was limited by the availability of the relevant statistics to years 2007 to 2018. It should be noted

that the electricity market in each Member State has its own characteristics that affects the resultant electricity costs and the analysis presented below highlights only the features of these markets that can be affected by the decisions taken by the national authorities.

Figure III Average electricity costs for non-household consumers consuming up to 70 000 MWh/year (in EUR/kWh)



Source: own elaboration based on Eurostat [13].

Figure III provides an outline of the average electricity costs borne by a relatively large non-household consumer in six selected countries. This price includes all the taxes and levies associated with the electricity bill received by the consumer in these countries. In 2018 Bulgaria and the Netherlands have recorded an average price of no greater than 0,08 EUR/kWh. The highest electricity price has been recorded for Germany even though it has decreased substantially since 2015. The results can be surprising particularly when taking account of the fact that Germany is considered to have the most developed wholesale electricity market in Europe. At the same time the Bulgarian electricity market remains largely monopolized and difficult to access, whereas the prices are among the lowest in Europe.

Bulgaria's electricity market remains to be one of the least developed markets in all of the European Union. The list of market entry barriers is very long, while the scope of interference with the business activities there tended to be substantial over the past years. These include cumbersome trading license acquisition procedure followed by a long list of reporting obligations that generates substantial costs to the system users, discouraging new entrants. License holders are also obliged to pay fees that are calculated against their turnover from trading activities, automatically discouraging engaging into frequent transactions at a wholesale level. More spectacular example of market interference in the case of Bulgaria was the introduction of fees on cross-border transactions back in 2012, ultimately constituting a fee on exports and imports of electricity on the internal market of the European Union. This approach was changed only recently with the amendments to the Energy Law from July 2019. The observed electricity price actually stems from the national energy mix that is based on legacy investments in conventional power plants and nuclear power, that are fully amortised, and their costs are relatively low [18].

The case of the Netherlands is far from the Bulgarian case – the country has pursued the liberalisation of the power market quite well and remained open to cooperation with its neighbours. At the same time, it should be noted that some non-household consumers (such as the ones analysed in this articles) can benefit from substantial tax discounts on the electricity they use in their production processes [3].

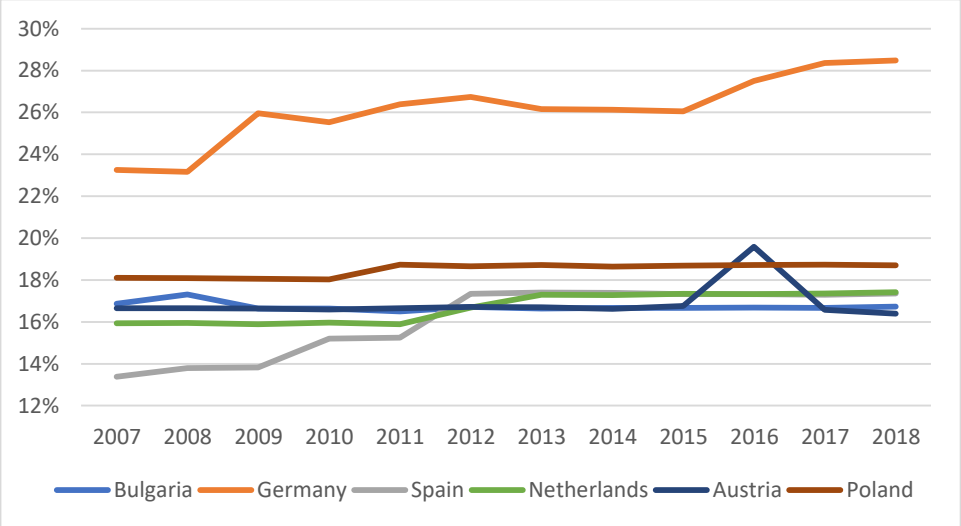
The Spanish power market is an example of relatively well-developed market, where substantial funds have been invested in renewable generation, partly under the feed-in tariff regime

[31]. At the same time, substantial investments in highly flexible, controllable natural gas-fired generators had to be taken, leading to a situation where the latter electricity source began to set the marginal price for the market [14].

The Austrian market should formally be classified to the CSEE region, yet the aspirations of the national authorities and the long-established cooperation with the German market would rather position Austria among the developed markets of NWE, especially since the country was operating in a common wholesale price zone with Germany between 2002 and 2018 [12]. The decision to split both markets was dictated by the physical constraints existing between the transmission systems of both countries – at times of high electricity production from wind in the north of Germany, the national grids was not able to accommodate all the commercial imports into Austria and the surplus energy unexpectedly started flowing through the Polish and Czech transmission systems (so- called "loop flows") leading to security of supply issues due to the overload of the transmission lines [23]. The split has affected the electricity prices in Austria and remains a very contentious subject between the Member States affected by the "loop flows".

Poland has started the liberalisation process relatively well from a wholesale power market perspective after taking a decision to split the former incumbent into four competing companies. The development of market liquidity that followed, was however undermined by a number of impediments ranging from entry barriers (in particular the license acquisition procedure and the obligation to pass a trader's exam in Polish in terms) to compliance risks in commercial operation due to general lack of transparency from the authorities and multiple, often overlapping reporting obligations. Nonetheless, Polish electricity market was progressing despite relatively high market concentration and the prices were relatively low due to ample generation capacity. More recently, through decision to suspend the power market and administer the electricity prices for some end consumers for 2019 [32] much of the progress made was foregone, as companies became discouraged or unable to continue business activities in Poland.

Figure IV Share of non-refundable taxes and levies in the total electricity costs for non-household consumers consuming up to 70 000 MWh/year (in %)



Source: own elaboration based on [13].

The case of Germany's electricity market was intentionally left to be analysed last, due to the dissonance between the liquidity and maturity of the market at the wholesale level and the prices offered to end customers. German market is functioning well, offering fast and easy access to wholesale trading without a multitude of overlapping reporting obligations or measures constraining competition, which has resulted in a traded volume level much larger than the rest of the EU wholesale markets combined. In order to explain the phenomenon of the tremendous gap between wholesale prices and end-customer bills the level of taxes and levies imposed on end customers should be quoted (see figure IV).

Over the past twelve years, the share of non-refundable taxes and levies in the total electricity costs for non-household consumers in Germany has exceeded 25% and is coming close to 30% in 2018. This trend is a consequence of different policies ranging from coal- and nuclear-based generation phase-out [17] to measures supporting development of RES and biogas, including generous feed-in tariffs [19]. Information on figure 4 also indicate remarkable stability of the share of the aforementioned taxes and levies over the past five years in other countries. Nonetheless, it is important to underline that the share of non-market related costs in the end-customer electricity bill is typically around 17%. The example of Spain in this context can be particularly interesting – the end of the ramp-up of taxes and levies share in non-household prices coincides with the decision to phase-out feed in tariffs for new RES and retroactively limiting the subsidy scope that was already granted [21].

4. Electricity Prices in the EU Going Forward

Development of liquidity on a market in different timeframes is a process that takes time and its success is highly reliant on the trust that users along the value chain build in the market [12]. Changing regulatory environment can only harm that trust. The scale of interference with the power market over the past years have resulted in substantial financial losses for companies that have tried to compete and invest in countries like Poland or Bulgaria. The importance of having a liquid and competitive electricity market can be observed on the example of Germany – if it wasn't for the remarkable competition level and the associated liquidity of this market that allowed low price at a wholesale level, the burden of taxes and levies would be hard to bear by the industry. This conclusion only underlines the need for the CSEE-region Member States to ensure full compliance with the EU acquis, not only in legal terms but also in practice, so that they can benefit from an interconnected, liquid internal market for electricity.

Another aspect of interference with the market is the fact that, as a result, the market is not capable of forming the right price signals to encourage new investments. The specificity of the electricity sector is particularly vulnerable in this aspect, as most industrial-size investments are both highly capital-intensive and take a lot of time to develop. Unfortunately, the proposed measure to solve this problem, instead of improving the general market environment, has taken the form of a so-called "capacity remuneration mechanism" (CRM) under which power generators are paid for becoming/remaining available to meet the demand at all times. This type of subsidies can be either price- or volume-based [1], but in both cases, they offer additional remuneration to producers, affecting the price formation on the market and adding directly to end-consumer bills once again. The author also believes that very often the design of CRMs considers the electricity supply adequacy of a Member State in isolation from its neighbours, leading to different level of subsidization and affecting the competitive position of producers on the EU internal market.

Finally, although as highlighted before, substantial investments have been made in developing new renewable energy sources, most Member States will probably fail to meet their 20% RES share in gross energy consumption target by 2020. It is therefore worth to analyse what impact will the increased targets until 2030 and beyond will have on the future electricity prices in Europe. The author believes that a simple extrapolation of the historical costs of developing renewable energy into the future would be incorrect, both because of the observed reduction in the investment costs (see Figure II) and because Member States have realized that subsidy schemes detached from market reality are not fit for purpose. Nonetheless, especially when considering the most recent ambition under the Clean Energy Package of reaching 32% of RES in the consumed energy mix by 2030, the costs of the desired transition will be remarkably high, especially since such a high share of intermittent generation will still require maintaining substantial controllable generation capacity as backup.

5. Conclusions

European Union's ambitious climate policies affect the end-customer electricity bills in a number of ways, ranging from direct taxes related to financing the RES subsidies to additional measures taken to ensure sufficient reserve capacity to meet the peak demand at all times. Even if less market-intrusive ways of promoting renewable energy are implemented in the future, they are bound to contribute to further inflation of the electricity prices, especially if the targets for the share of non-fossil-based energy consumption are increased further.

The problem of policy-related costs of electricity paid by the consumers was analysed in the context of the market development stage. This was to prove that through competition and increased efficiency, electricity markets have the potential to reduce the wholesale power prices substantially, helping the end-customers to bear the costs of the increasing taxes and levies. The author believes that an integrated, liquid EU electricity market can enshrine the competitive position of the Member States in terms of the costs of the energy consumption. Allowing greater competition through eliminating regulatory barriers to conduct business activities on all electricity sectors in the EU could ensure both the necessary investment signals to ensure generation capacity adequacy and promote the development of RES without excess subsidization.

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