

Chapter 2

The Development of Energy Markets in Europe

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Abstract Europe has been engaged in a debate aimed at building an integrated and competitive energy market since the early 1990s. The European Union has instituted to share the responsibility to develop a strategic policy to change current trends, and hence a truly competitive, single European electricity and gas market is expected to open the competition of Europe-wide companies. In this vain, the aim of this chapter is to analyze the developments of European energy markets and regional markets in accordance to the market efficiency criteria and financial aspects of energy. Despite the physical, economic, and political barriers, the number of financial players participating in these markets is continuously increasing and a considerable success has been achieved for efficiency of the markets. However, 10 years after the Lisbon Treaty, the European energy markets are significantly far from the unique energy market goal. Moreover, in Europe's energy market there are serious malfunctions causing moves to regional fragmentation. Generally, it is agreed that the future structure of the European energy market has not been yet clearly defined.

Keywords Electricity market · Energy markets · European Union · Gas market · Market information

2.1 Introduction

The worldwide discussion on energy markets reform started in the early 1980s and then several emerging and developed countries have commenced reform initiatives including liberalization, privatization, and restructuring of the energy supply and distribution industry. In this regard, Chile (1982), United Kingdom

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(1989) and Argentina (1992) are the pioneer countries experiencing energy market liberalization. The motivation for the energy market reforms is driven mostly by economic reasons to make the energy sector cost efficient through the introduction of competition among the players (Sioshansi 2006). There are also other drivers for reform namely; political ideology on the faith of market forces, distaste for strong unions, the desire to attract foreign investment and environment concerns (Woo et al. 2003). However, the approach of the European Union (EU) in terms of restructuring energy markets has a broader perspective, which includes not only economic concerns, but also strategic/political goals.

Europe, which is heavily dependent on oil and gas from external sources, has been engaged in a debate on building an integrated and competitive energy market since the early 1990s. Leaving aside the previous national energy models, the EU has instituted to share the responsibility to develop a strategic policy to change current trends. A truly competitive, single European electricity and gas market is expected to be a free market and open to competition of Europe-wide companies rather than being restricted to only dominant national actors. The new energy market will improve security supply and boost efficiency and competitiveness. According to a Green Paper, the energy strategy of the EU has three pillars which balance fundamental needs of the Union; securing an expanding supply of energy from both domestic and foreign sources, developing a more competitive internal energy market, and encouraging and supporting environmental protection and development of clean and renewable energy sources (Barroso 2006).

The market reform in Europe has started with the British experience and the developments in British markets inspired the EU energy strategy and became the main driver for further developments. Over recent years, a number of changes have occurred in the European energy sector, but 10 years after the Lisbon Treaty the energy markets of Europe still are significantly far from the unique energy market goal (Kroes 2007). The theoretical framework of the European energy policy seems to be suitably designed, but its application is posing considerable problems.

The aim of this chapter is to analyze the recent developments in European energy markets and energy trading. In this regard this chapter investigates the stages of energy reform, namely privatization, competition, unbundling, and market efficiency. The expected integration of the regional energy markets in the upcoming years is also discussed. The paper is structured as follows: after a general introduction, Sect. 2.2 reviews the background on the EU's liberalization and integration. Section 2.3 discusses the EU energy markets with their energy trading, whereas the next section focuses on the barriers of competitive energy markets. Furthermore, market functioning and efficiency of energy markets are analyzed in Sect. 2.5 followed by the discussion of the future of European energy markets in Sect. 2.6. Finally, the conclusions are given in Sect. 2.7.

2.2 Background

Since the early 1980s, the most developed countries and also some emerging countries have started to liberalize their infrastructural sectors. Schneider and Jäger (2003) claim that this change is closely related to the increasing importance of infrastructures to modern societies. The energy sector liberalization of the EU is part of the trend toward liberalization and the withdrawal of the state from involvement in infrastructure industries. Jamasb and Pollitt (2005) indicate that currently European energy market liberalization represents the world's most extensive cross-jurisdiction reform of the electricity sector involving integration of distinct state-level or national electricity markets. Although there have been considerable developments in the last 20 years, it is unfair to praise only the works of the EU member countries. It can be acknowledged that the reform process of the EU is dependent on mostly the driving force of the European Commission (EC). Without the efforts of the EC as a policy maker, the pace of reform in many member states would have been considerably slower. The main advantage of the EC over the individual member states is its approach to the process from a broader perspective and to be free from national interests. It should be noted that the EU's slow and decisive process, which also includes political goals, is not limited by the adaptation of common rules for member states¹ and market integration in Europe is more about moving forward together than about who should adapt to whose trading arrangements.

The roots of the energy reform of the union depend on the 1957 Treaty of Rome and the Single European Act (SEA) of 1987, which set the new deadline of 31 December 1992 for the single market's completion. Then the publication of the 1995 Green Paper on energy policy constitutes a momentum to create a single energy market. This was the initial spark for the new energy market of Europe. Next, European Directives prescribing the liberalization of energy markets entered into force in the second half of the 1990s. Directive 96/92/EC of the European Parliament and of the Council of 1996-12-19 concerning common rules for the internal market in electricity, has made significant contributions towards the creation of an internal market for electricity. A similar approach was implemented for the gas sector in 1998.

The role of the Lisbon Strategy (2000) is remarkable in this process. It not only triggered the creation of energy markets in the EU, but also prepared an agenda for the following years. It underlined that without improving the competitiveness of energy markets, the EU would not be the most dynamic and competitive knowledge-based economy in the world, which is an issue aimed at the Lisbon Strategy. The new aims were far more ambitious and global than the first directives on energy markets, and this time gas and electricity were treated jointly in one proposal.

¹U.S. experience is entirely sourced by economic reasons and has never enacted a mandatory comprehensive federal restructuring and competition law, leaving the most significant reform decisions to the states under the politics of de-regulation (Joskow 2008).

Over the years, several other pieces of energy market legislation have been adopted and political attention has gradually shifted from energy market liberalization towards energy market integration. The second mandated Gas Directive (2003/55/EC) regulated Third Party Access (TPA) as the basic rule for all existing infrastructure, as well as moving the level of unbundling of Transport System Operators (TSO) to the level of legal separation. The third package of legislative proposals for the European gas and electricity markets, which provides a general overview of the future energy policy of the EU, was adopted on 25 June 2009. The novelty of the third package is the integration of the energy and the environment objectives of the EU through the use of market-based environmental and other measures. The package also contains measures to reinforce security of supply.

The liberalization and integration of European energy markets is a process of discovery, involving continuous interactions between the market players and the regulatory authorities. The historical experience reveals that to reach a more competitive and efficient market structure, the following stages of energy reform should be completed: privatization of publicly owned electricity assets; the opening of the market to competition; the extension of vertical unbundling of transmission and distribution from the generation and retailing; and the introduction of an independent regulator (Pollitt 2009a). Although these stages are interrelated, they are not being developed even in the various European countries.

2.3 EU Energy Markets

The new energy market of the EU is expected to encourage diversification and flexibility to react to market conditions across the countries. It also provides a more powerful bargaining position for European energy companies when sourcing energy in global markets, since there is a larger range of options available with regard to supply routes and there is better access to customers. However, the short experience of the EU revealed that, due to political and economic barriers, the EU would not be able to reach her goals in the near future. These barriers caused significant development differences among the regions, which have different, trading arrangements.

After the adoption of the second energy package in June 2003, the EU's approach to the single market goal in energy markets became much more crystalized and the third package emphasized and routed this objective by the detailed sanctions. In this direction, the EU followed the idea that the final aim of a single electricity market could be achieved by the creation of regional markets as an intermediate step. Currently, European electricity and gas markets are separated into seven and three different regional initiatives respectively, as can be seen in Table 2.1. So, the energy markets have been moving to a regional segmentation. Currently, the regional nature of the energy market is motivated by EU policy makers hoping to manage them more easily in the future than many small markets.

Table 2.1 Electricity and gas regional initiatives of EU

<i>Electricity Regional Initiative (ERI)</i>	
Regions	Countries
Central-West	Belgium, France, Germany, Luxembourg and the Netherlands
Central-East	Austria, Czech Republic, Germany, Hungary, Poland, Slovakia and Slovenia
Central-South	Italy, Austria, France, Germany, Greece, and Slovenia
Northern	Denmark, Finland, Germany, Norway, Poland and Sweden
South-West	Spain, France and Portugal
Baltic	Latvia, Estonia and Lithuania
France-UK-Ireland	France, Ireland and the United Kingdom
<i>Gas Regional Initiative (GRI)</i>	
North-West	The Netherlands, Belgium, Denmark, France, Germany, Ireland, Sweden and the United Kingdom
South	Spain, France and Portugal
South-South East	Austria, Italy, Bulgaria, Czech Republic, Greece, Hungary, Poland, Romania, Slovakia and Slovenia

Source: European Commission (2010b) From regional markets to a single European market, prepared by Everis and Mercados EMI

The main advantage of this bottom-up regional approach is that it enables the involvement of the relevant stakeholders more than it is usually possible on a European level. In addition, the regional approach can also better take account of regional specificities, where divergences from the European standards are needed on an exceptional basis. At the same time, the regional approach enables a step-by-step development towards an integrated European energy market. However, it should be noted that, in contrast with the original regional strategy, the regions are different and overlapping. In practice, countries involved in more than one region can of course not be equally committed to every region at the same time.

As the spot markets develop, a similar trend in financial markets on energy is being observed with the growth of a variety of derivative instruments. Currently the structure of Europe's power markets seems considerably complex. There are more than half a dozen exchanges, most of which offer trading in both spot and futures contracts. Some of them started to broaden their activities beyond the national borders.

2.3.1 Electricity Market

The electricity market is the leading market of the EU energy sector even though it has some important problems with competition among member countries and its effectiveness. Although the EU has recognised seven regional electricity initiatives, specifically the European electricity market can be observed in three regional groups: the United Kingdom, the Nordic Countries and Continental Europe. The

markets differ in not only their historical experience, but also as to their regional characteristics.

A recent research indicates that the UK's energy market remains the most competitive in the EU and G7, since it moved from pure monopolies to a market economy (OXERA 2007). The level of consumer participation in UK energy supply markets is among the highest of any retail energy market throughout the world. The annual switching rate of 18% also compares well with other retail services in the UK, such as fixed and mobile telecommunication, insurance products, mortgages, and personal current accounts. Almost all consumers (96%) know that they can change energy suppliers and most (70%) feel confident that they know how to do this (Ofgem 2009).

The Nordic energy market, which is established by integration of the markets of Denmark, Finland, Norway, and Sweden, is the most harmonized cross-border electricity market in the world since the mid 1990s. Nordpool is established by Norway and Sweden as the first international power exchange and next Finland (1998) and Denmark (1999–2000) joined the Nordic spot market. A few major power producers have a dominating position in their markets, but none of them has a big share (more than 20%) of the Nordic market. It indicates that the degree of integration increases the level of competition among the market players. Public ownership is still dominating the region (Amundsen and Bergman 2006). The level of consumer participation in Nordic energy supply markets is relatively high given that customers can easily change their suppliers and tariffs. Since the main feature of Nordic countries is the relatively higher level of annual electricity consumption than in other European countries, this provides an incentive for customers to take an active interest in the market (Littlechild 2006). The Nordic market has properties that distinguish it from the rest of Europe. Amundsen and Bergman (2006) claim that the adoption of the Nordic experience in other countries is not easy, as the success of the Nordic model depends on area-specific factors, such as ample supply of hydropower and significant inter-connector capacities. In particular, the Nordic experiences suggest that a “deregulated” market for electricity works well if there are no price regulations and constraints on the development of financial markets and there is continued political support for a market-based electricity supply system also when electricity is scarce and prices are high.

The energy market reform process in most Continental European countries has been driven by the initiation of Germany in the late 1990s, a decade after the advances made in the UK and Norway with the Directives of the EC. The German electricity market is the biggest in continental Europe by number of players and generation capacity. It is also the fastest to open up, with immediate 100% full customer choice without any restructuring of the industry. France has a mass market with more than 3.5 million eligible customers, which makes it third in size among all open markets within the EU (Barthe 2005). The French government postponed liberalization at the beginning, then after 2004, the status of public company EDF has been changed and the market is opened to liberalization. Austria's electricity market was partly opened to liberalization in 1999, then the whole market was liberalized during the early 2000s and a voluntary energy spot

market of Austria – EXAA – was established. Four regional companies (EPZ, EPON, UNA and EZH) were dominating the generation in the Netherlands until 1998. Although the Dutch government had planned to organize a “national champion” by merging the four companies into SEP that would have competitive power in the EU market, the merger failed and the major restructuring feature was a sell-out to big companies of Europe (Electrabel, Reliant E.ON) (Van Damme 2005). In Belgium, the process has been dominated by Electrabel, which is controlled by the French Suez Group through the intermediate engineering contractor Tractebel. Electrabel and Tractebel were merged in 2005 to be an important player in EU and the world market (Haas et al. 2006).

According to the report of the International Energy Agency (2009), Spain has made substantial progress in its energy policy, over the last 4 years. Together with Portugal, it has set up the common Iberian electricity market, MIBEL, and has strong ambitions in developing it further. Spain is determined and successful in promoting renewable energy and puts increasing emphasis on improving energy efficiency. Furthermore, all South East European countries agreed to adopt the EU legislation.

Central European countries are physically integrated within the western European grid, and have taken the first steps towards adopting the EU Western Europe model with regulated third party access for larger customers. Poland and Hungary were the forerunners of energy reform (Kaderják 2005). The central European electricity market is the largest regional market in Europe and it is obvious that further progress towards an integrated electricity market in Europe will depend strongly on the development of this market (Jamash and Pollitt 2005). However, the last 10 years of experience indicates that the generation capacity of Central Europe is not diversified well and the number of competitors in the market has not increased sufficiently. Therefore, contrary to expectations in the late 1990s, the wholesale and retail markets lagged behind the objectives of the EU.² Recent research indicates that there is a very strong market correlation between Scandinavian and continental electricity markets (Germany, Holland, France, Austria and Spain) yet Italian and Polish markets are poorly correlated to all other markets (Majstrovic et al. 2008).

2.3.2 Gas Market

European gas markets have gone through a profound restructuring process since 1998, but the decline of indigenous resources and a growing dependence on large share gas supplies are still the main obstacles of market liberalization and integration. Natural gas accounts for 25% of primary energy use in the EU and nearly 60% of consumed gas is imported (Rademaekers et al. 2008). Since 1998, following the

²Germany and the Netherlands have persuaded mergers; the Netherlands, Estonia, Austria, and Czech Republic have oligopolies that control more than 70% of the market. Portugal and France have supported the concept of national champions (Haas et al. 2006).

gas directives, EU markets attempted to integrate and harmonize gas markets while asking for country-specific solutions to take into account different national characteristics.

As the gas market of Europe is liberalized, the gas market centres and hubs are developed. Particularly the Bunde-Qude, Zeebrugge, and Baumgarten hubs are the main hubs that are dealing with the largest volumes of gas in Europe. Currently, Germany has the most structured market within the EU and it not only consumes natural gas, but also provides a fair amount of gas storage and serves as a transit country for gas, e.g., to France, via Switzerland to Italy or via Belgium to the U.K.

At the beginning of 2000, EU was expected to reach full liberalization before the mid-decade, but European gas markets still lacked competition, cross-border integration, and harmonization. Due to the discretion of the European framework regulation, member states can choose to a large extent which regulatory instruments to apply. Although most consumers in Europe can now choose their gas supplier and a significant progress has been achieved towards the harmonization of national legislation as a result of the EU energy policy, obstacles to competition that are related with the market structures or national attitudes of the countries still remain. Although the former monopoly gas companies are still very powerful in many countries, their market shares have been reduced ever since the competition was introduced. Many European energy companies have moved defensively and tended to resist a change to their traditional business model. To compensate for this, many companies invested particularly in Central and Eastern European countries. Many gas companies have also diversified into the sale of electricity and other utility products such as water and telecoms (Harris and Jackson 2005). It should be underlined that currently power companies play an important role in the European gas market, particularly in Italy, Spain, and the U.K. A recent research indicates that the reform brought about a divergent convergence of regulatory regimes that now functions as a framework for natural gas market organization in the EU (Haase 2008).

The sectoral inquiry launched by the EC (2007a, b) reveals serious failures in a competitive gas market in the EU. The report points out five important distortions; the first one is the high level of market concentration in the gas market due to insufficient unbundling and the dismantlement of vertically integrated large incumbents. The second defect is the existence of illiquid gas markets and a lack of infrastructure limiting the access of new entrants. The insufficient cross-border competition, lack of reliable information and transparency of gas markets are the other three distortions. On the other hand, International Energy Agency (2008) underlines that after the 2005–2006 supply crises; energy policy has progressively focused on security of supply issues, instead of on market competitiveness.

2.3.3 Financial Aspects of Energy Trading in Europe

During ongoing liberalization of the energy sector in Europe and many other parts of the world, electricity and gas trading has dramatically increased in many

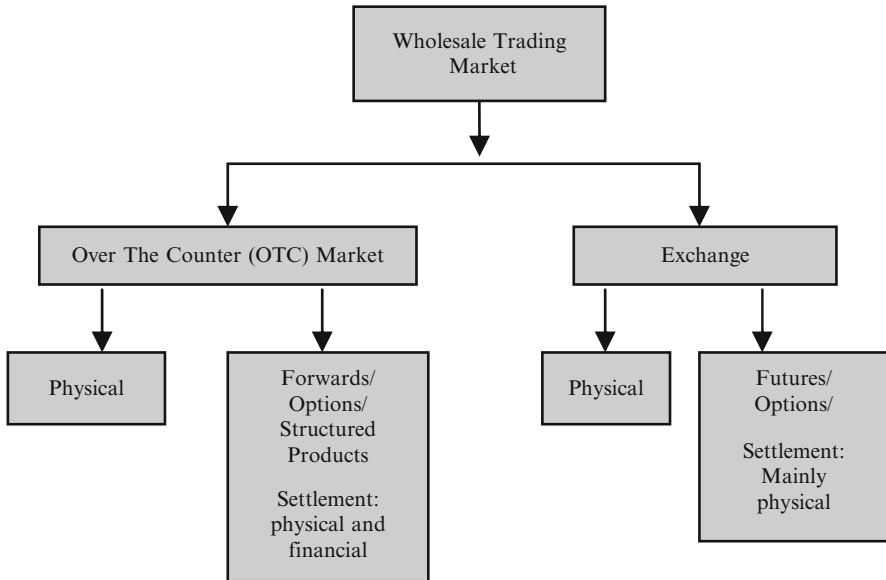


Fig. 2.1 The structure of power trading in Europe

Source: Rademaekers et al. (2008)

countries and numerous over-the-counter markets (OTC) and energy exchanges have emerged. Despite the multiple obstructions, the number of financial institutions participating in these markets is continuously increasing. Thus, trading in these exchanges became a basic indicator of market liberalization, but also one of the key drivers of the liberalization.

Wholesale power trading in Europe is handled in exchanges and OTC, but these are not equally divided in terms of volumes. The general structure of European power trading is given in Fig. 2.1. While OTCs are the main power of power trading, the importance of energy products and derivatives trading are increasing due to the substantial price and volume risks that the markets can exhibit. Energy trading offers the standardized products in Europe to manage the more volatile market conditions and contributes to lower prices for customers. At the same time, promoted market information supports competition and reinforces market efficiency. Liquid day-ahead and forward markets, together with open intra-day and balancing markets are instrumental to integrating markets.

2.3.3.1 Power Exchanges and OTC Trading

The European power exchanges trade spot and energy derivatives. The total exchange in the spot markets was 820,000 GWh in 2007, which was about 30.4%

of electricity consumption of the EU-27, whereas futures trading in the same year was about 1.1 million GWh. The biggest three electricity power exchanges are Nordpool, EEX and IPEX (Rademaekers et al. 2008). Pownext and APX NL constitute the second group and the third group of exchanges has very low trade volume: APX U.K., EXAA, Towarowa, Belpex and OMEL.

The Nord Pool power exchange is the main trading platform of the Nordic electricity market. The Nord Pool is not only a spot market, which determines the prices on an hourly basis, but also operates financial derivatives markets where major players on the market can hedge system price risks. It is one of the most mature, liquid, and volatile financial power markets in the world. Its price volatility is mainly driven by climate conditions and rainfall. EEX is placed in Germany and it is one of the most important power exchanges in terms of volumes exchanged in continental Europe for both spot and future products. IPEX is the Italian power exchange and it was launched in 2004, as part of an effort at liberalizing the national market and introducing competitive price settling in the physical spot market for power. While Pownext (French) offers spot and future trading, APX NL is a provider of power and gas exchanges for the wholesale market, providing markets for short term (spot) trading only in the Netherlands, the United Kingdom, and Belgium. A single wholesale electricity market for UK was created in 2005, with the inclusion of Scotland, by the implementation of the British trading and transmission arrangements (BETTA). Important characteristics of the UK wholesale electricity market are a relatively high number of different players and the strong role of liquid bilateral markets. Power exchanges account for a relatively small share of electricity trading in UK, given that the majority of the trading takes place bilaterally in the OTC markets through power brokers.

Although some power exchanges play an important role in Europe, according to the sectoral inquiry of the EU Commission (2007b), the market concentration is still very high in the national wholesale markets and the large energy consumers still do not believe that prices on spot and forward markets are reflecting the competitive prices. A report of European Commission DG TREN (2008) reveals that spot power exchanges show high volatility over the 2002–2007 periods, although with increasing participants and liquidity, volatility tends to decrease over time. It is also found that derivative markets, although less developed than exchange markets, traded higher volumes in 2007. More importantly, they were notably less volatile than the spot trading. In addition, year-ahead contracts are the most traded products in the derivatives market by volumes. Finally, the study found a clear correlation effect among exchange prices over the 2002–2007 periods.

The majority of the electricity trading is carried in the OTC markets. The power market has increased in size by a large extent in Europe as a whole from 2006 to 2007 and continues a trend of growth since 2004. An important component of this trend is the focus of trade in the forward physical markets, although very low financial volumes are being traded. Specifically, approximately 1% of total volumes are made up purely by financial trades (e.g., swaps and options).

European markets are moving towards greater physical integration, with more market coupling to increase the efficiency of cross-border interconnectors. The spot

prices of the biggest two EU markets, the French and German ones, show parallel trends, while the Dutch market shows consistently higher power prices. This finding is in keeping with the perceived consolidation of the two major markets, as they increasingly integrate (ECORYS 2008).

2.3.3.2 Gas Exchanges and OTC Trading

There are significant well working gas trading platforms in Europe. These are APXNL, APX ZEE, APX U.K., Powernext, EEX and Endex (future) platforms. EEW has also established a separate gas exchange platform, which has been offering spot and future trading since 2007. APX has a link to the Zeebrugge Gas Hub, the natural gas trading point in Belgium. It is connected to the National Balancing Point (U.K.) via the Interconnector. There are two spot exchanges that offer gas trading on the APX exchange, which are APXNL (Netherlands) and APX Zee (Belgium). The APX Zee is a relatively new and small exchange and its trading volume is pretty low. APX U.K. is the most mature gas exchange in the Europe. Powernext launched a spot and futures national gas market at the end of 2008.

The OTC wholesale gas market in the EU depends on long-term contracts (15–25 years) between incumbents. Oil and oil product index contracts are the main instruments of the markets. The main importers and producing companies from exporting countries are the most significant players of OTC markets, like Gazprom in Russia, Statoil in Norway, and Sonatrach in Algeria. The dominant OTC markets of Europe are Zeebrugge (Belgium) and the TTF (Netherlands). Several other ones are emerging; however, their development is hindered by obstacles in transiting gas cross-border within the EU. Currently the UK is one of the largest natural gas producers of the world and it constitutes the biggest gas market in Europe.

The prices witnessed in hub trading have begun to be used as the pricing basis for gas supply contracts, leading to the development of markets where gas is priced according to gas-to-gas competition, rather than being indexed to the price of alternative fuels such as gasoline, fuel oil, and coal, as has traditionally been the case (Harris and Jackson 2005). In the well working markets, gas hubs are supposed to be the platforms for short term gas trading and foster competition through trade with multiple buyers and sellers. However, this principle is not valid in most of the gas hubs in the EU. The trade volumes differ largely among European countries. Gas-to-gas competition is well established in the UK and the gas prices in the UK hubs serves increasingly as a reference for long-term contracts and they are beginning to get a foothold in continental Europe. The influence of oil prices as a reference for the gas prices is thus diminishing and the gas price becomes less dependent on short-term reactions in the oil market. Currently, this phenomenon is limited to the UK, but continental hubs should be further fostered to increase competition and to reduce the impact of oil prices on the gas prices (Schwark 2006).

2.4 The Barriers on Competitive Energy Markets

The strategic and economic importance of energy for the countries, its non-storable feature and environmental impacts gave energy products a special and distinguished status among the other commodities. Inevitably, these distinctive features shaped the three pillar energy strategy of the EU. The strategy and objectives are separately rational and achievable, but all together, they have a very complicated and troublesome nature. Actually, none of these goals are completely separate from one another, but during the process, some of the goals create difficulties to achieve others in the short run. Additionally unwillingness and self-seeking behavior of the member states cause additional problems.

These problems that decrease the efficiency of the market are caused by not only technical barriers but also economic and political barriers. Nonetheless, some of the barriers have a mixed nature. The technical barriers are connected with the characteristics of energy. Energy relies on a physical network, which makes markets less liquid and adds technical complexity in the operation of markets. This implies some inherent tendency of gas and electricity markets towards regional fragmentation. More importantly, it even creates strong interdependence among regions with respect to the operation of the network. Network operators have to be closely coordinated in order to make trade possible and the existence of geographical barriers does not always permit trade between different regions.

The second group of barriers that slow down the efforts towards the single market has a political and economic nature. Governments are directly or indirectly keeping their grip on market competition. Two reasons in particular, namely security of supply and the complexity of this commodity, justify the intervention of the State (Domanico 2007). Energy security is the most important barrier for the single market goal of Europe and it is very closely connected with other economic and political ones. Energy security issues are forcing member states to continue to retain significant national control over national energy markets and external relations with energy producing countries (Belkin 2008). Besides, the energy sector is considered extremely important for the economic development for all other sectors. This situation has led to the lack of economic incentives for efficiency and thus direct and indirect state subsidies have been required to maintain a stable industry. Several problems, such as overcapacity of generators, did not foster competition but resulted in a lack of incentives for innovation. Furthermore, the type of energy source chosen for using in the electricity production process was based on both internal resources and considerations of security of supply rather than on being the cheapest available (Serrallés 2006). It is also widely observed that the degree of implementation of the liberalization directives and competition law differs from country to country. Some governments have favored the emergence of national champions arguing that they help to secure their energy supplies. According to The EC Benchmarking Report (2009), which underlines this problem, most of the electricity and gas markets have opened competition in retail at a very high level, but the openness of the market does not reflect the effectiveness of the

Table 2.2 Degree of concentration in electricity (generation)

Very highly concentrated (HHI above 5,000)	BE, DK, EE, FR, GR, IE, LV, LX, ML, PT, SK, SL
Highly concentrated (HHI 1,800–5,000)	CZ, DE, ES, IT, LT
Moderately concentrated (HHI 750–1,800)	AT, CY, FI, HU, PL, UK, NL, SW

The Herfindahl–Hirschman Index or HHI, is a measure of the size of firms in relation to the industry and an indicator of the amount of competition among them. Increases in the Herfindahl index generally indicate a decrease in competition and an increase of market power, whereas decreases indicate the opposite

Source: European Commission (2009) Progress in creating the internal gas and electricity market. DG 742 Tren Staff Working Document Report, SEC 287

competition. The market concentration in the gas market is much higher than the power market. Shares of the three biggest companies in the electricity market are still very high in major countries like France, Germany, and Spain, yet as seen in Table 2.2 they are less than 50% in the UK. The share of the big three is more than 70% in all of the EU countries. On the other hand, the market liberalization process is still pending in Bulgaria, Cyprus, Hungary, Malta, Finland, and Portugal.

National electricity markets within the EU are extremely diverse in terms of their mix of electricity generation. France depends heavily on nuclear power, coal is significant in Germany, hydro is dominant in Norway, and gas is relatively important in Italy and the UK. Since it is relying much on nuclear energy sources, France has a comparative advantage over her neighbor countries. Although she is supporting integration as a main state of the EU, the uneven distribution of the gains is discouraging the French government from pursuing further integration.

Finally, some policies, which support the use of renewable energies, have a regional character and might increase the fragmentation of energy markets. Higher incentives for green energy in a specific country or region might increase the cost of electricity and might cause price differences among the EU countries. On the other hand, investment decisions can be distorted by the existence of different mechanisms to support renewable energies and by the different allocation of emission permits in the context of the European Emissions Trading Scheme (Delgado 2008).

Neelie Kroes (2007), who is the European Commissioner for Competition Policy, addressed that 10 years after the Lisbon Treaty the energy markets of Europe were significantly far from the unique energy market goal. The findings on the level of energy market competition indicate that there are serious malfunctions in Europe's energy markets, due to barriers which were discussed above. In particular, the EU has found some strong evidence that wholesale markets are still at a very high level of concentration, choices of consumers are denied due to the difficulties faced by new suppliers trying to enter the markets, there is no significant cross-border competition, a severe lack of transparency prevents new entrants from competing effectively, and finally, prices often are not determined on the basis of effective competition.

2.5 Market Functioning and Efficiency of the Energy Markets

Recent researches indicate that energy markets are developing in the EU at rapid rates and the deregulation of energy has had successful results, despite the problems which continue to exist (Christopoulos et al. 2008). However, taking a close look at the some stages of the EU energy market reform and effectiveness of markets gives a clearer picture about the current status of EU markets.

2.5.1 Privatization

The privatization stage is an initial but difficult part of the reforms. Although market structures of the countries have changed in the last decades, only a few countries have full private ownership in the electricity market. Figure 2.2 illustrates a strong move away from full public ownership towards more private involvement, but still the public companies are powerful in France, Portugal, Poland, and some other countries. The reason behind this picture is mostly political given that the governments are keeping their power on market competition. In many cases, governments keep considerable economic interests in energy companies, which might constrain business decisions and thus be an obstacle to the acquisition of such firms by private investors.

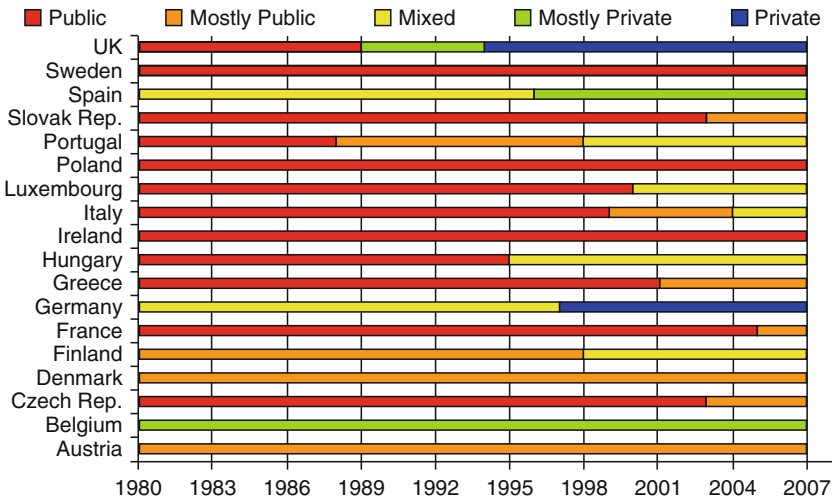


Fig. 2.2 Electricity privatisation timeline by country
Source: OECD International Regulation Database, 2009

2.5.2 *Unbundling*

The current EU Electricity and Gas Directives impose minimum obligations on energy network operators with regard to legal and functional unbundling between transmission/distribution networks on the one hand and upstream (generation or production)/downstream (supply) functions on the other. The companies are not obliged to create separate legal entities for network activities, but have to separate their executive management and decision-making with respect to operation, maintenance, and development of the network. Legal unbundling also presupposes the creation of separate accounts. In addition, Transmission Systems Operators (TSOs) are obliged to treat all system users alike, including access to information according to the principle of transparency and non-discrimination.

The majority of the EU countries have applied the unbundling regime; however France, Germany, Greece, Austria, and some other small countries have no ownership unbundling of the TSO. Public ownership is very high and many countries have not legally unbundled TSOs in their energy markets. It is important to underline that ownership unbundling would not oblige the member states to privatize the supply and/or the network business. Where both network and supply activities are currently in public hands, it would be possible to retain the public ownership, provided that sufficient structural separation is achieved.

According to the Sector Inquiry of the EU Commission (2007a, b), the unbundling provisions as required by the Second Electricity and Gas Directives are not fully adequate. The ineffectiveness of current unbundling requirements is a major reason for the slow pace of the market integration and the low growth in cross-border trade observed in EU electricity and gas markets.

2.5.3 *Independent Regulatory Agency*

Although national regulatory agencies have been empowered in the EU during recent years, governance of European energy regulation is still characterized by multi-authority structures at the national level. This structure is criticized by some authors. Specifically, Meeus and Belmans (2008) claim that due to a lack of a European-wide energy regulatory authority, market integration in Europe has been mainly driven by informal regulatory networks among the network operators, standardization authorities, and national regulators. The member states did not accept the creation of a common energy regulator and, instead, tried to increase the regulatory impact through enhancing co-operation among national regulators. Each member state must guarantee that its national regulatory authority exercises its powers “impartially and transparently”. To protect the national regulator’s independence, a member state will have to ensure that the regulator has separate annual budget allocations and can autonomously implement this budget, whereas the members of the regulator’s board or top management are appointed for a fixed

term of 5–7 years, renewable once. Johannsen et al. (2004) developed an “independence index” which based on the four dimensions of independence: from government, from stakeholders, in decision-making and organizational autonomy, using the data of 16 national independent regulators. They found that the scores of the European regulatory agencies are quite different and the regulators in countries with the least amount of market opening score the highest, i.e., most independent. On the other hand, Jamasb and Pollitt (2005) scored the power of a regulatory agency according to five characteristics, which are indicative of its independence from central government. According to their model, a score of 5 indicates the highest level of independence. They revealed in their December 2009 report that Belgium, Ireland, Portugal, the U.K., and Norway scored 5 and Germany, Denmark, Greece Netherlands and Spain got the lowest score (3). The comparative analysis of Larsen et al. (2006) on 16 European regulators found large differences with respect to formal independence as well as to regulatory practice. They concluded that European liberalization of the electricity market is young and, it is early to expect a definite model of the European independent regulator.

Since, the current approach of the EU focuses on an integrated approach to climate and energy policy, the regulation cannot be particularly concentrated on market issues. In addition, as expressed by the EU Council on December 2008, regulation must take energy efficiency issues into account (Vasconcelos 2009). But most European Energy Regulators are state owned and ad hoc governmental agencies so that they do not have any sufficiency of qualification on main energy efficiency matters (ICER 2010). In this regard, EURELECTRIC (2004) points out the followings as the basic weakness of the current European regulatory models:

- Lack of appropriate balance in emphasized on all regulatory objectives
- Inadequate transparency and consultation
- Insufficient regulatory accountability
- Lack of clear responsibility for security of supply
- Inadequate competent resources
- Lack of co-ordination between regulatory authorities
- Inappropriate price controls or inadequate returns

2.5.4 Effectiveness of Energy Markets

Recent reports on EU energy markets indicate that the liberalization has had a positive contribution on effectiveness of gas and electricity markets, but still much effort would be needed to reach the expected level. A report by Ernst and Young (2006) shows that the prices in the gas and electricity markets have significantly decreased. The market created a strong incentive to reduce costs, price volatility, and responded to price signals providing appropriate levels of investment. The researches of Steiner (2001), Hattori and Tsutsui (2004), Fiorio et al. (2007), and

DaSilva and Soares (2008) showed that there is a strong evidence of productivity improvements, weaker evidence of price benefits and some evidence of price convergence in energy markets. Whereas the study by Meeus and Belmans (2008) reveals that there still exist large wholesale price differences of electricity markets among countries in Europe. The electricity prices in Italy, Ireland, and the U.K. are much higher than the prices in such North Europe countries as Poland, Slovakia, Austria, and Slovenia. On the other hand, Zachmann (2008) shows that the electricity market reforms in the last decade that explicitly targeted the creation of a single European market for electricity were only partially successful.

Growitsch et al. (2009) investigated the impact of market operation between the entry–exit zones and market integration in the natural gas sector of Germany, which is the biggest in Europe. They revealed a fair price convergence between the entry–exit zones, implying an increasingly integrated market. The results thus support the notion of a competitive natural gas wholesale market through greater market integration in Germany. On the other hand, the high grid charges, discrimination with respect to access to the distribution network, and high transaction costs of the negotiated TPA (Third Party Access) have been criticized (Haas et al. 2006).

Yang et al. (2009) found that the Nordic electricity futures market is gradually tending towards maturity. They revealed that the operation efficiency of the market during 2000–2003 is higher than that during 1996–1999.

Lastly, Pollitt (2009b) evaluated the effectiveness of the European energy market, using some well-known measures of efficiency; falling prices, price convergence, improved use of available capacity, labour productivity, resource diversity and energy security. His findings are:

- EU average prices (excluding taxes) decreased in real terms for householders and industry.
- There has been a price convergence across EU countries, especially for large industrial customers.
- Supply and demand balance has improved in recent years.
- Labour productivity of the electricity and gas sector increased about 5% for 5-year periods 1995–2000 and 2000–2005 across the EU-15.
- The diversity trend of electricity generation is positive since 1994.
- There is limited evidence that the risk of large multi-country blackouts has increased cross-border trade in electricity.

2.6 Future of the European Energy Markets

While technological, environmental, economic, and geo-political factors are determining the new structure of European energy markets, the EC is leading the way in several dimensions namely: market restructuring, integration of national markets, internalization of environmental costs, and introduction of new technologies (Vasconcelos 2009). Considering the complex structure of the EU, it is not easy

to anticipate the speed of the works on the energy reform project, but recent developments evidence that it takes more time than initially expected. Not only the strong will of the commission, but also influences of interest groups and universities, institutions of EU, member state governments and external forces such as Gazprom, and some important suppliers will shape the future structure of the market (Eikeland 2008). On the narrow and rough way of the integration process, the role of the Florence forum, which is academically supported by the Florence School of Regulation since 1998, is very noticeable. The Florence forum is a platform for informal regulatory networks to meet and discuss the integration of energy markets. The forum was established as cooperation between the EC, national regulatory authorities, system operators and network users (producers, traders, suppliers, consumers, market operators, etc.).

In spite of the positive developments, the EC report (2010a) underlines that the future success of the regional initiatives depends on how they are able to adapt to a number of challenges. The first challenge is to match the “bottom-up” approach of the regional initiatives, and the more “top-down” approach of the third package, particularly in relation to the drawing up of framework guidelines and network codes. Secondly, there is the risk of divergence if different regions implement different solutions to tackle similar issues. In addition, some important technical and political challenges may slow down, pause or reshape the structure of markets (Domanico 2007; Pollitt 2009a). Haase (2008) points out that once the security of supply enters the policy framework, regulations are less likely to follow competitive market models. Expected increase in future geopolitical uncertainties, together with a greater import dependency on fewer suppliers, energy supply security is likely to move up on the political agenda and needs to balance its position vis-à-vis carbon reduction objectives. On the other hand, Eikeland (2008) shares the similar view that the EU still has no sufficient will to advocate free-market compatible solutions to greater energy-related environmental problems and security of supply problems. Coupled with European industrial competitiveness concerns, this appears to have cooled down the market enthusiasm of energy policy stakeholders. His study claims that interest groups, supply security issues, new technological advancements on renewable energy sources, reactions of incumbents to market liberalization, and the strategies of former incumbents that increase concentration, rapid decarbonization of the electricity sector, and national interests, will influence the shape of the future market structure of Europe.

As discussed by Domanico (2007), the special situation of the small EU member states may have considerable effect on the speed of market development. The study points out that through broader strategies and possible anticompetitive behaviors, the big European incumbents are increasing their attention towards different markets and new geographical areas towards the creation of giant multi-utilities. On the other hand, Pollitt (2009b) underlined that South East Europe (SSE) is receiving large amounts of technical assistance from the EU and thus will be a test of the transferability of the EU reform model within the EU.

2.7 Conclusion

Europe has been aiming at restructuring a competitive and single European energy market since the early 1990s. The Lisbon Treaty is the first EU treaty to make specific reference to energy and aims to ensure the functioning of the energy market and other single and competitive energy market issues. The approach of Europe depends on the three pillar policy of the EU, namely energy security, competitive markets, and development of renewable energy sources, and includes not only the economic, but also strategic and political goals. Initially, the new energy policy is expected to overcome barriers and to develop security supply and increase efficiency. However, recent experience showed that slow decision processes of the EU have incurred significant difficulties to reach the aimed structure in the foreseeable future. The liberalization process will seriously be influenced by not only the inherent characteristics of energy sources which create technical barriers, but also political and economical problems, which are sourced by government interventions, environmental issues, and energy security. With the forcing effect of successive energy directives and energy packages, the EU has made substantial progress towards competitive energy markets, but currently Europe's energy market has moved to regional fragmentation, the wholesale markets are still at a very high level of concentration, consumers have some difficulties to switch suppliers, and there is no significant cross-border competition and no transparency in markets, and prices are not sufficiently competitive. However, the comparison of the current market structure with other sectors like telecoms, which have relatively limited barriers for competitiveness, implies some rooms for progress (Wölfl et al. 2009).

Despite the physical, economic and political barriers, the number of financial players participating in these markets is continuously increasing. As the number of banks and investment companies enter in energy markets, it is expected that not only market liquidity and volume will increase, but also new investment instruments will be developed and therefore attract the attention of new investors. It is apparent that the participation of financial institutions is a significant factor in the rapid growth of trading volumes observed in recent years in certain major European markets.

Generally, it has been agreed that the future structure of the European energy market is still not clearly defined. European policy makers have largely followed a 'trial and error' approach in order to pass over these barriers and find the appropriate way to establish the rules and regulations so as to govern energy markets (De Jong and Hakvoort 2008). As the chair of ERGEG, Lord Mogg said (CEER and ERGEG 2009), "The 3rd Package is like Lego. The European market has regional energy markets initiatives, the framework guidelines, and network codes are like the pieces of the Lego, but nobody knows which sort of market should be built".

References

- Amundsen ES, Bergman L (2006) Why has the Nordic electricity market worked so well? *Utilities Policy* 14(3):148–157
- Barroso JM (2006) The EU and energy: looking to the future. *EU Focus* September 1–3
- Barthe F (2005) Deregulation and opening of the electricity market in France. In: 18th international conference on electric distribution, Turin, June 6–9
- Belkin P (2008) The EU's energy security challenges' CSR report for congress, Resource document. <http://www.fas.org/sgp/crs/row/RL33636.pdf>. Accessed 10 April 2010
- CEER and ERGEG (2009) European energy regulators' news. November Resource document. http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/NEWSLETTERS/June%202009. Accessed 5 March 2010
- Christopoulos AG, Mylonakis J, Francis T (2008) The deregulation process of electricity and gas markets in the European Union and the influence of energy prices on inflation. *Eur J Sci Res* 19 (4):844–859
- DaSilva PP, Soares I (2008) EU spot prices and industry structure: assessing electricity market integration. *Int J Energy Sector Manag* 2(3):340–350
- De Jong HM, Hakvoort RA (2008) European electricity market integration: an analysis of the European governance dynamics. In: *Proceedings of the 31st IAEE international conference: bridging energy supply and demand: logistics, competition and environment*, Istanbul, Turkey, pp 1–26
- Delgado J (2008) European energy markets: moving in a common direction. In: Gnan E, Gudmundsson M (eds) *Commodities, Energy and Finance*. SUERF/OeNB, Vienna, pp 41–52
- Domanico F (2007) Concentration in the European electricity industry: the internal market as solution? *Energy Policy* 35(10):5064–5076
- Eikeland OP (2008) EU internal energy market policy: new dynamics in the Brussels policy game? CANES working paper
- Ernst and Young (2006) Final report research project: the case for liberalisation, Resource document. <http://www.dti.gov.uk/files/file28401.pdf>. Accessed 15 February 2010
- EURELECTRIC report on regulatory models in a liberalized European Electricity Market (2004) EURELECTRIC SG Regulatory Models, Brussels, ref: 2004-030-0052
- European Commission (2007a) Energy sector inquiry report, Resource document. <http://ec.europa.eu/competition/sectors/energy/inquiry/>. Accessed 11 February 2010
- European Commission (2007b) Energy sector competition inquiry. http://ec.europa.eu/competition/antitrust/others/sector_inquiries/energy/
- European Commission (2008) Second strategic energy review: an EU energy security and solidarity action plan, COM/2008/0781 final
- European Commission (2009) Progress in creating the internal gas and electricity market. DG Tren Staff Working Document Report, SEC 287
- European Commission (2010a) Report on progress in creating the internal gas and electricity market, communication from the Commission to the Council and the European Parliament SEC 251
- European Commission (2010b) From regional markets to a single European market, prepared by Everis and Mercados EMI
- European Commission DG TREN (2008) Review and analysis of EU wholesale energy markets, prepared by ECORYS Nederland BV
- Florio CV, Florio M, Doronzo R (2007) The electricity industry reform paradigm in the EU: testing the impact on consumers. *Consumers and utility reforms in the EU conference*, Milan, June 8–9
- Growitsch S, Nepal R, Stronzik C (2009) Der Deutsche Gasgroßhandel – Marktgebiete und Marktintegration. *WIK News* 75:23–42

- Haas R, Glachant JM, Keseric N, Perez Y (2006) Competition in the continental European electricity market: despair or work in progress? In: Sioshansi F, Pfaffenberger W (eds) *Electricity market reform: an international perspective*. Elsevier, Amsterdam
- Haase N (2008) European gas market liberalization: are regulatory regimes moving towards convergence? Oxford Institute for Energy Studies, NG 24
- Harris N, Jackson M (2005) A picture of European gas trading market in 2005. *Pipeline Gas J* 232(8):54–58
- Hattori T, Tsutsui M (2004) Economic impact of regulatory reforms in the electricity supply industry: a panel data analysis for OECD countries. *Energy Policy* 32(6):823–832
- International Confederation of Energy Regulators (ICER) (2010) A description of current regulatory practices for the promotion of energy efficiency. *Energy efficiency report*, June
- International Energy Agency (2008) *World Energy Outlook 2008*
- International Energy Agency (2009) *Energy policies of Spain*, Resource document. <http://www.iea.org/Textbase/npsum/spain2009SUM.pdf>. Accessed 21 January 2010
- Jamasb T, Pollitt M (2005) Electricity market reform in the EU: review of progress toward liberalization & integration. *Energy J* 26(Special I):11–42
- Johannsen KS, Pedersen LH, Sørensen EM (2004) Independent regulatory authorities – a comparative study of European Energy Regulators. AKF Forlaget, Copenhagen
- Joskow P (2008) Lessons learned from electricity market liberalization. *Energy J* 29(Special II):9–42
- Kaderják P (2005) A comparison of electricity market models of CEE new member states. Ensuring sustainable electricity enlargement, SESSA working paper 14
- Kroes N (2007) Improving Europe's energy markets through more competition, European Commissioner for competition policy, Resource document. <http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/07/175&format=HTML&aged=0&language=EN&guiLanguage=en>. Accessed 22 January 2010
- Larsen A, Pedersen LH, Soensen EM, Olsen OJ (2006) Independent regulatory authorities in European electricity markets. *Energy Policy* 34:2858–2870
- Littlechild S (2006) Competition and contracts in the Nordic residential electricity markets. *Utilities Policy* 14(3):135–147
- Majstrovic G, Bajs D, Sutlovic E (2008) Correlation and regression of wholesale electricity market daily prices in Europe. *Int Rev Electr Eng* 3(4):699–708
- Meeus L, Belmans R (2008) Electricity market integration in Europe. *Revue E* 124(1):2008
- OFGEM (2009) *Energy protecting consumer interests: now and for the future*. Annual report 2008–2009, 82/09
- OXERA (2007) *Energy market competition in EU and G7: forward projections, 2007–11*. Prepared for Department for Business, Enterprise and Regulatory Reform
- Pollitt MG (2009a) Electricity liberalization in the EU: a progress report. University of Cambridge, working paper in economics, 0953
- Pollitt MG (2009b) Evaluating the evidence on electricity reform: lessons for the South East Europe (SEE) market. *Utilities Policy* 17(1):13–23
- Rademaekers K, Slingenberg A, Morsy S (2008) Review and analysis of EU wholesale energy markets. EC DG TREN, ECORYS Nederland BV, Rotterdam
- Rademaekers K, Slingenberg A, Morsy S (2008) Review and analysis of EU wholesale energy markets. ECORYS Netherlands, EU DG TREN Final Report
- Schneider V, Jäger A (2003) The privatization of infrastructures in the theory of the state: an empirical overview and a discussion of competing theoretical explanations. In: E Wubben FM, Hulsink W (eds) *On creating competition and strategic restructuring*. Edward Elgar, Cheltenham, UK, pp 101–137
- Schwark B (2006) Important New Nodes; Gas Hubs and their Impact on Competition, MIR Network Industries Quarterly, December 2006
- Serrallés R (2006) Electric energy restructuring in the EU: integration, subsidiarity and the challenge of harmonization. *Energy Policy* 34(16):2542–2551

- Sioshansi FP (2006) Electricity market reform: what have we learned? what have we gained? *Electr J* 19(9):70–83
- Steiner F (2001) Regulation, industry structure and performance in the electricity supply industry. *OECD Econ Stud* 32(1):143–182
- Van Damme E (2005) Liberalizing the Dutch Electricity Market: 1998–2004. TILEC Discussing Paper, DP 009
- Vasconcelos J (2009) Energy regulation in Europe: regulatory politics and politics of regulation. *Eur Rev Energy Market* 3(3):1–11
- Wölfl A, Wanner I, Kozluk T, Nicoletti G (2009) Ten years of product market, reform in OECD countries: insights from a revised PMR, indicator. OECD Economics Department Working Papers, 695, [10.1787/224255001640](https://doi.org/10.1787/224255001640)
- Woo CK, Lloyd D, Tishler A (2003) Electricity market reform failures: UK, Norway, Alberta and California. *Energy Policy* 31(11):1103–1115
- Yang H, Liu S, Zhang Y, Luo W (2009) Empirical Research on Efficiency of the Electricity Futures Market. *Int J Emerg Electr Power Syst* 10(2):1–15
- Zachmann G (2008) Convergence of electricity wholesale prices in Europe? – a Kalman Filter Approach. *Energy Econ* 30(4):1659–1671

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