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Editors

Financial Aspects in Energy

A European Perspective

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Preface

Over the 10 last years, the trading of infrastructure-bound gas and electricity has become a mainstream activity in Europe. Following the liberalization of these energy markets in the first years of the century, a whole plethora of activities has emerged for trading, as well as for portfolio and risk management.

On the one hand, these activities replace (and improve upon) the dispatch mechanisms being employed in the old monopolistic structure for the daily physical generation and flows. So the trading activity has a strong component in the daily determination of physical generation, transport and delivery. On the other hand, these trading and portfolio/risk-management activities have expanded into the financial realm.

Partly, these are new aspects to the world of energy and gas trading. Some of these new financial activities were not preceded by a visible equivalent in the old monopolistic world. One of the most striking examples is the trading of standardized futures contracts for delivery or cash-settled. Liquidity in such markets has grown over the years, on exchanges like power exchanges and gas exchanges, as well as on facilities trading "Over the counter" (OTC), thus in many ways resembling other traded markets like the markets in commodities or in stocks and bonds.

In addition, the newly liberalized energy markets have created a whole new practice in almost every aspect of financial discipline. Price determination, for instance, is done differently. Asset valuation is done from a different perspective. Efficiency is achieved in totally different ways. Financing of investments, either for regular electricity generation, for infrastructure activities or for renewable generation is done under totally different circumstances.

This book deals with many of these new practices and new realities, seen from the financial angle. The authors look into many financial aspects of the market structures, rules and practices that have grown over the last ten years. Those developments are still evolving as we speak, at the time of this introduction. So in a way, this book takes a snapshot of an ever-moving reality. At the same time, it is more than a snapshot. While the practices are still evolving, many of the underlying principles have already been set and will remain, at least to some extent,

in the future. So the picture taken will give you, as the reader, not only knowledge that is applicable today, but also a solid basis from which you can extend your knowledge, learning from the ongoing changes in the nearby future.

A recurring theme in many chapters is the dependency on the underlying market mechanisms for physical trade. As I have learned in my experience at APX-ENDEX, an energy exchange in both physical and financial products, a basic understanding of the physical arrangements and attached regulation is sometimes a prerequisite, but at least always very helpful for understanding the financial structures and consequences. Because of this, the world of energy markets may seem more complex initially than some other areas of expertise. Fortunately, this book gives you the backgrounds in order to unravel at least part of that complexity. Then, you will also find out that in the end, some of the outcomes are surprisingly familiar. You will also often acknowledge the importance of a European scope, at the same time leaving room for different local implementations.

Then, after reading this book, one might ask: is the current situation, after the liberalization and introduction of markets, really a better one than before, in the monopoly situation? The answer is, now, undoubtedly Yes: it is better now 10 years after the start, but it took some years before we achieved that situation. This view may seem strange from someone like me, being the CEO of an energy exchange. However, many have forgotten that the old world of monopolistic delivery had its own way of achieving efficiency, sub-optimal though as it was. The breakdown of these old structures did destroy some of these old efficiencies upfront, and it has taken time and experience and improvement for the new market-based mechanisms to first match the old efficiency levels, and then improve upon that. We are now safely in that latter, more optimal situation, and still developing in the right direction.

The European energy market is a mature market with electricity achieving an ever-better optimum in an ever-integrating market with a wider, more integrated European scope. This is due to a professional trade and financing structure around many financially oriented markets based on a sound underlying, internationally integrated, physical trade facilitated more and more by market coupling across the national borders in Europe. Recent experience shows that the gas market is following suit, catching up fast. This book will give you tour around this exciting field of expertise. I wish you energetic reading.

May 2011

Bert den Ouden
CEO-APX-ENDEX, the Dutch-British-Belgian energy exchange

Contents

Chapter 1
Introduction: Financial Aspects in Energy

Wim Westerman, Özgür Arslan, André Dorsman, and Mehmet Baha Karan

Abstract European energy markets have been becoming increasingly integrated and competitive; take for instance the markets for renewable energy and emission allowances. Prices on spot markets and futures markets follow suit and a new pricing regime emerges. Also, whereas the supervision as to e.g. energy contracts remains in their hands, European states hand over much sovereign power to the European Union. While governmental controls in energy industries thus remain valid, firms have an opportunity to create economic value in this regulatory framework. In this vein, this book provides a timely guidance armed with chapters covering a wide spectrum of financial aspects of energy, particularly regarding the scope of a speedily changing environment.

Keywords Energy firms · Energy markets · Energy prices · Energy regulations · Energy risks · Energy and value

Europe has engaged in a debate aimed at building an integrated and competitive energy market since the early 1990s. Leaving the previous nationally oriented energy frameworks models aside, the European Union (EU) has taken up 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 operating companies. The latter may stem from Europe, but also from countries such as China and others.

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Several parties have responded to these changes by developing new products and markets. Specifically, the physical energy markets that they have been creating are different from traditional financial markets. Stock, bond and derivatives markets trade abstract goods. The "law of one price" holds here, but not for the commodity markets, such as energy. Furthermore, although (commodity) energy markets and financial energy markets are closely interrelated, differences in their characteristics and behaviour patterns are substantial. This entails price formation and complex exchange processes.

Both risk managers and investment managers want to understand the above mentioned differences and how these differences impact both on investment decision-making and effective risk management approaches. Given that securing energy supply is still seen as being vital at a country level, the same may count for regulatory authorities. Furthermore, both academics and students will find it interesting to study these exciting advancements and consultants may resort to an update on academic debates and practical developments.

Following the above motivation, *Financial Aspects in Energy: The European Perspective* deals with the interface of Europeanisation tendencies, energy issues and accompanying financial aspects that emerge. This book is organised around four themes: markets, prices, regulations and firms. Chapters 2–4 elaborate on the energy markets developments in Europe while in Chaps. 5–7 the emphasis is on price developments. The developments are so vast that regulations have to be adjusted. In this vein, the steps being taken are discussed in Chaps. 8–10. Chapters 11 and 12 ("firms") show the impact of the markets, prices and regulatory developments at the specific energy firm level.

1.1 Energy Markets

In Chap. 2, Karan and Kazdağli sketch the developments in Europe. The EU has been building an integrated and competitive energy ("single") market for about 20 years now. Still being far away from this aim, the markets have moved towards regional fragmentation. Karan and Kazdağli also find that the energy markets have become considerably efficient. The same counts for the corresponding financial markets. Despite physical, economic and political barriers, the number of financial market players is continuously increasing.

Chapter 3, by Kuik and Fuss, introduces renewable energy technologies from the European perspective through discussing their advantages and disadvantages along risk profiles. The authors find that support policies at the EU level and in the member states are heterogeneous and add uncertainty to potential investors. German, Spanish and British experiences lead to some challenging insights (for example, solar energy investment stimulation). A review of these issues from a financial theory perspective helps to fuel current and future policymaking.

In Chap. 4, Daskalakis et al. assess the trading of 'CO_2' emission allowances. The EU Emissions Trading Scheme (EU ETS), a Europe-wide market for the

trading of emission allowances, has grown tremendously. In this vein the chapter evaluates the successful operation of the market during its trial phase, focusing on the functioning of exchange platforms and the financial regulations of the market. The pitfalls of the scheme provoke policy implications for the post-2012 period, making the financial markets behave in a less risky manner.

1.2 Energy Prices

Chapter 5 by Dorsman et al. deals with the imperfections of the electricity spot markets caused by the limited capacity of the interconnectors that are used for transporting electricity from one grid to another. The electricity networks used to be linked only with interconnectors with limited capacity. Such a limitation is an imperfection and may lead to an inefficient price-forming process. The capacity of the interconnectors has increased and the limitations of a free flow between the electricity networks have diminished. Yet, the authors show that the capacity is at times fully used and electricity prices of interconnected grids in turn may differ.

In Chap. 6, Bredin and Muckley examine the price formation process in European energy markets in the years 2005–2009. The authors adopt factors including prices of both energy and EU allowance and also control for important influences such as economic growth. They use multivariate cointegration likelihood ratio tests to estimate potential theoretical relations. Their findings are indicative of a new pricing regime emerging since January 2008. The regime empirically interlinks the coal, gas and oil markets with EU allowance futures contracts.

In Chap. 7, Umutlu et al. note that a deregulated electricity market consists of at least two parts, a *day ahead* so called spot market and *futures* markets for future delivery or hedging activities. Market participants attempt to hedge risks of a non-storable electricity commodity with new energy based financial products. The authors illustrate this argument with data of APX-ENDEX, a regional power and energy derivatives exchange. They also perform an empirical analysis about the relationship between spot and futures electricity markets of APX-ENDEX.

1.3 Energy Regulations

Westaway and Simpson argue in Chap. 8 that the EU has weakened the ability of sovereign states to determine what is most appropriate for their own territories, imposing policies and laws that reflect common interests on the energy sector instead. The authors assess the implications of the dissolution of the concept of state sovereignty within the EU on the development of sustainable energy policies. They also provide an econometric analysis on country risk with energy industry stock market data and related political risk indicators.

Pielow and Lewendel reason, in Chap. 9, that the Treaty of Lisbon, which went into force in 2009, fuels the integration process within the EU. The new Treaty

chapter on "Energy" shows that energy policy has evolved into a European subject. The EU may rely on a new energy competence concerning the domestic policy and will issue new acts in the future more easily than before. The authors wait with suspense whether the measures of the legislative package for the energy internal market will be successful.

Bommel, in Chap. 10, discuss supervision on various sorts of energy contracts per category of energy suppliers, trade mechanism and time frame. They find that supervision is aimed at counteracting market abuse and not at delivering secure supply. The EU leaves discretionary powers to the member states to execute and comply with its new articles of supervision. The supervision of the financial aspects of energy transactions requires substantial expertise and measures, as well the closure of holes in the supervisory framework.

1.4 Energy Firms

Pätäri and Westerman discuss, in Chap. 11, the value creation concept within renewable wood-based energy sources. Firms that (re-) direct activities to this area can create value on the interplay between firm-specific capabilities and new business opportunities opening up. The authors show this with an augmented Dephi study on innovating and re-defining business models in the mature Finnish pulp and paper industry. This way, she exemplifies how economic value creation can be assessed at ultimately the firm level.

In the final Chap. 12, Arslan and Kazdağli start by holding a plea for increasing government control of natural monopolies in the natural gas and electricity industry. European countries have conducted energy reforms since the early 1980s. The Turkish reform example has two aspects. Within the electricity industry, the regulation of entities is undertaken by giving various types of licenses to the firms. The regulation of natural gas markets aims at dismantling the vertical integration in the industry and the study explains the tools that can be put in place to achieve this.

1.5 Energy and Value

Through discussing wide array of concepts touching on European energy markets, prices, regulations or firms, the book ultimately has a financial standpoint. Actually, it has also a perspective of value creation which does not just necessarily mean 'exploiting resources', 'reducing risk', 'making money' or whatsoever. Nevertheless, it may well be the intended outcome of market, pricing, regulatory, or internal processes with governments, consumers, suppliers, companies or other stakeholders. Yet, in pursuing such an aim for the sake of the stakeholders, value creation boils down into financial value creation for them (Rappaport 1986). However, financial markets should do their work properly.

The financial value of any activity or item is related to its expected economic earning capacity (see Grinblatt and Titman 1998). This perspective has especially

taken off in finance, which studies the trade-offs between the present and the future. The finance view does not treat energy differently from other inputs of production like capital, labor, land, and materials. Yet, the various valuation techniques it has developed can be used to value energy stocks, flows, and claims. Value is the monetary equivalent of the discounted expected cash flows. In valuing energy, the view takes into account uncertain cash flows and uncertain discount rates.

The goal of stakeholders is maximisation of the financial value they are entitled to, being:

$$V = CFL_1/(1+k) + CFL_2/(1+k)^2 + CFL_3/(1+k)^3 + \cdots + CFL_n/(1+k)^n$$

with:

V = financial value of the stake

CFL_t = expected free cash flow at time t

k = (weighted average) cost of capital

The financial value is the sum of the free cash flows, discounted by the cost of capital. The cost of capital consists of the risk free rate of return and several additions for risk components one of which is energy risk. In the wake of the financial crisis, the risk components in the cost of capital have gained importance. In the past, when governments fixed energy prices from time to time, the consequences were treated as exogenous factors. With deregulation of markets, governments no longer determined the prices. Now markets establish the prices. Energy risk, the cash flow volatility from energy price changes, became not only larger, but also endogenous. Its change from being exogenous to endogenous enabled organisations to manage their risk positions. This is what the authors of *Financial Aspects in Energy: The European Perspective* point out.

1.6 Energy Risks

The risk components of the cost of capital are made up of operational factors as well as financial factors. The former have to do with the business activities of the firm, whereas the latter include risks of interest rate, currency and energy. Especially since the latest credit crisis, many people are aware of the meaning of interest and currency risk. However, most of the people, including many economists, have no clue about what energy risk is. Nevertheless, energy risks have become more important over the years, even without the financial crisis of the late 1900s. For example, a spiking of the oil prices may recur sooner rather than later (Gok 2009).

As another example, the electricity market changed from government dictated pricing to a situation where a price is the highly volatile result of market supply and demand. Reduction of energy risk creates – providing that the cash flows remain at the same level – stakeholder value. If being a market party (that is, a relatively small energy consumer to whom energy risk is of little relevance), it does not pay to manage energy risk and a fixed price contract or hedged price will be preferred.

However, if a company is a relatively large energy consumer, managing energy risk becomes relevant.

Still, managing energy risk is not the same as selecting the option with the lowest risk. For example, fuel costs are a main cost component of Ryanair and have a substantial influence on its profit. If Ryanair always manages its open fuel risk position to zero, this policy implies that it is ultimately bringing money to the markets. So, in cases when energy risk is relevant for a certain firm, the company treasurer may want to manage the risk position at a certain level and report upon this. The control of structural risks, such as energy risk, could then be left to the market. It is the task of the treasurer to inform the market about the energy risk position of the company and by doing so the market can use this information in the pricing of the shares of that company in a proper way.

Yet, during the height of the 'credit crunch' (late 2008 and early 2009), Ryanair was following another strategy. According to The Times (February 3, 2009), Ryanair 'screwed up' its policy. The firm locked in fuel prices at US$ 124 a barrel for 80% of its consumption during the third quarter of 2008. The carrier subsequently lost money, as the price of oil collapsed to a low of US$ 133 a barrel during that period. However, it was reported that a lack of hedging in the fourth quarter would enable Ryanair to take full advantage of the low oil price at that time. By only partly (80%) fixing the fuel position, Ryanair was creating a position that deviated from her competitors.

So, if the pricing in the market is against the company, it will be difficult to explain company actions to shareholders. Yet, one could argue as follows. Maximisation of shareholder wealth is the firm's goal, but that goal specifically applies to the normal operations of the firm. In other matters such as hedging market risks, management should be risk averse as the shareholders would be a lot more angry if the fuel position were unhedged and money was lost. Therefore, Ryanair management took a responsible position in removing uncertainty from the fuel price rather than make a speculative gain on the fuel price. As mentioned the shareholders would be livid in the event of a speculative loss. One should not be too quick to accuse managers of irresponsibility in losing money through hedging.

With thoughtful energy risk management, parties are well equipped to raise and manage their 'energy value'. Especially when prices are highly volatile and the future supply of different energy inputs is uncertain, energy risk management is a 'must'. Given the strategic nature of energy in an energy-intense world, it is evident that this energy value counts at micro, meso and macro levels. However, different objectives, systems, and people are needed at each level in order to satisfactorily manage energy value and energy risk (see also Burger et al. 2007).

1.7 Concluding Remarks

Recently, European energy markets have become increasingly integrated and competitive. The imperfections decline and perhaps so do the inefficiencies. The financial structures at the EU, country and industry levels are following suit. Spot

and futures financial markets have been established and the number of market players is steadily increasing. Buyers and suppliers can exploit unprecedented private value creation potential as regulatory bodies discover value creation mechanisms to be used for aligning market players with societal aims.

Not withstanding the above, the contributors to *Financial Aspects in Energy: The European Perspective* show remarkable deficiencies of energy markets and financial structures. These include, for example, the handling of sovereignty issues, the coherence of energy programs, the stimulation of sustainable energy sources, the holes in the regulatory frameworks, the tackling natural supply monopolies, the incomplete interconnectedness of networks, the interlinking of prices at the diverse markets and the riskiness of primary and derivatives products.

Although the authors of this book do point at solutions for closing the gaps, they must also admit that the issues to be handled are without precedents and very complex. Furthermore, whilst at a European level considerable achievements have been made, a large part of the challenges are occurring at a worldwide level and there is a need for feasible global policies, directives and measures. Nevertheless, as *Financial Aspects in Energy: The European Perspective* learns, European approaches help to achieve global understanding.

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Part I
Markets

Chapter 2
The Development of Energy Markets in Europe

Mehmet Baha Karan and Hasan Kazdağli

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 initiates 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 attach 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 markers are analyzed in Sect. 2.5 followed by the discussion of the future of European energy markets is 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 states[1] 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.

[1]U.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 crystallized 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

Electricity Regional Initiative (ERI)	
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
Gas Regional Initiative (GRI)	
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