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Competition on European Energy Markets

Between policy ambitions and practical restrictions

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Preface

This report analyses recent developments within the electricity market and the natural gas market within Europe. Both markets are currently moving towards more competition, following the launch of the EU Directives on Electricity and Gas in the late 1990s. The aim of this policy is to increase efficiency within the energy sector and consequently consumer welfare by creating Community wide markets for electricity and natural gas. At the same time, governments want to maintain the security of supply of energy and to increase the sustainability of the use of energy.

What are the results of the liberalisation process up to now? Are the policy goals within reach? Which factors hamper the creation of one competitive European energy market? Which challenges do governments face?

These are the main questions answered by this report. Its focus is on the electricity market, albeit the natural gas market receives some attention. Moreover, the report looks into the situation of opening the energy markets in the accession countries.

Stefan Speck, working as a free lance economic researcher and living in Austria, wrote this report on request of the CPB. Machiel Mulder, CPB's head of the Energy unit, initiated and guided the project.

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Henk Don,
Director CPB

1 Introduction

1.1 Policy ambitions

One of the objectives of the European Union is the creation of Community-wide markets for products and services. Such common markets already exist for some energy products, such as oil products, but not for other energy products, such as electricity and gas. It is, therefore, not surprising that the prevailing energy systems for electricity and gas have been of some concern to the political decision-makers in the EU in the past.
The lack of competition and differences in the prevailing systems led to wide divergences in energy prices among the EU member states. National policy goals diverged with the consequences of differences in the mix of fuels and plant type used in electricity production and large variations in the use of gas in EU member states. Furthermore, the networks transporting electricity and gas can be characterised as natural monopolies because it will never be economic to build competing networks to serve the same customers.

The implementation of the objective of establishing a single internal market for electricity and gas led to a number of significant changes in the energy policies and systems within EU member states. The major driving forces for the liberalisation of these energy markets have been the Directive on Electricity and the Directive on Gas. The intention of these directives is the creation of a single European market for electricity and for gas consequently guaranteeing competitive European energy markets and simultaneously contributing to achieving the general energy policy objectives. The formation of these markets shall generate economic benefits in terms of improving the efficiency of electricity and gas production. Competition between producers and suppliers should lead to innovation and to the delivery of energy to final consumers in the most efficient way thereby improving the welfare of European citizens.

Furthermore, there have been widespread concerns at national and European level that energy prices were unnecessarily high compared to the major trading partners in the world, thus damaging national competitiveness and leading to a loss of consumer welfare. To address these anti-competitive trends in the market, the European Commission launched the Electricity and Gas Directives, which had to be transposed into national legislation by EU member states.

Both directives established a timetable for achieving minimum levels of market opening and established approaches for the introduction of competition in the energy market. After the first evaluation of the implementation of the Electricity and Gas Directives a revised version of the directives, the new Acceleration Directive dealing with some of the imperfections of the initial directives were proposed by the European Commission in March 2001. The European Council held in Barcelona in March 2002 welcomed the progress made in implementing these

directives. However, the European Council requested annual updates of the process of opening up the markets for electricity and gas. The European Commission published the second benchmarking report in October 2002.

The European Energy Council agreed at its meeting in November 2002 to several issues such as a timetable for market opening, provisions regarding the unbundling of transmission and distribution system operators (TSOs/DSOs). Based on these compromises the deadlines for the complete liberalisation of the electricity and gas markets will be July 2004 for non-household users and July 2007 for household users.

1.2 Research questions

The creation of a competitive energy market is not a straightforward task as the recent development clearly shows and as various scholars as well as the European Commission state in different reports. Several potential problems are addressed in the directives themselves. The actual difficulties of creating such competitive markets became really visible during the process of transposing these directives into domestic national law, and implementation of the legal and economical requirements of these directives.

- Conditions for the creation of an internal and competitive electricity market
  One of the main questions raised during this process is directed to the analysis of the conditions necessary for establishing an internal electricity market with full competition. There are severe doubts that the current situation and prevailing conditions do not fulfil the basic idea and requirements of having a common and competitive electricity market in the EU. Therefore, the report analyses some of the main features of a competitive market by focusing, in particular, on the price formation and a comparison with the current status of electricity markets in EU member states.
- Factors hampering the creation of a competitive market
  This analysis leads to the identification of factors hampering the creation of a competitive energy market. These obstacles can be of economical, institutional or technical nature and have in common hindering the development of a common European electricity market. This study examines in more detail the issues surrounding access to networks; the problems arising as a result of market concentration at the supply side; and questions related to common environmental policy objectives. The question is how can the obstacles concerning the creation of a competitive European electricity market be removed and whether the problem surrounding these barriers can, at all, be eliminated.
- Transfer of findings (electricity vs. gas market)
  The report attempts to examine whether the findings regarding electricity are valid for the development of the gas market; in other words, are the same obstacles interfering with the creation of a competitive European gas market. Due to a number of special characteristics of

gas, such as long-term contracting and the gas price formation, it is evidently unrealistic to directly transfer all the findings from the electricity to the gas market. The gas price formation is of central importance because the current circumstances of establishing the gas price via the so-called oil-price linkage used in the majority of EU member states is not in accordance with the conditions of a competitive market.

- Transposition of the EU Directive on Electricity in the accession countries
  The last question raised by this report concerns the current status of the electricity markets in the accession countries. Keeping in mind that these countries have to implement all EU directives before joining the EU, an analysis of the condition of these markets has some relevance. An important question that needs addressing is whether the barriers hampering the development of a competitive electricity market identified in EU member states are also relevant for the accession countries.

1.3 Method

The approach used in this study is:

1. to make an inventory of the current situation regarding policies aiming to create a common and competitive energy market for electricity at the European level;
2. to discuss an ideal situation of having a competitive electricity market;
3. to analyse how well are some of the requirements laid down in the relevant EU Directives implemented at the level of EU member states; and
4. to study potential barriers for achieving this policy objective.

However, such an analysis has to be restricted in a way owing to the great number of potential implications resulting from the implementation of the relevant policies on the EU as well as on the national levels. Therefore, the focus is on analysing the effects of general policy measures and the implications of obstacles identified during this process with regard to the price formation by comparing the current and anticipated future situation with a hypothetical situation of a fully competitive electricity market.

Furthermore, an analysis of regional and national electricity markets is carried out considering the features identified as barriers for the creation of a competitive electricity market. Worthwhile studying is the development of a competitive European gas market and the situation regarding the electricity markets in the accession countries using these findings as a sort of benchmark.

1.4 Outline of the report

This report is divided into three parts.
Part I consists of two chapters discussing the current status and progress made in implementing the directives. In addition, it analyses the conditions for having competitive electricity market and identifies factors impeding the development of competition. Part II exemplifies these findings by reviewing the evolution of a number of national electricity markets in Europe. The last part of this report explores whether the identified factors have the potential of hampering the creation of competitive gas market in Europe and provides a short overview of the current status of the electricity markets in accession countries.

Part I starts with an overview of the political background debating the underlying rationale and first results of the implementation process of the EU Directives on Electricity and Gas (Section 2.1), while a more theoretical discussion of the conditions for a competitive electricity market follows (Section 2.2). The most recent development of electricity prices in EU member states is discussed in Section 2.3.

Chapter 3 is divided into three sections. Each section identifies features regularly perceived as severe obstacles in the process of creating a competitive European electricity market. Section 3.1 reveals the importance of network capacity constraints and issues surrounding the access to the networks followed by an investigation of the process of increased market concentration in the electricity supply chain (Section 3.2). The last chapter in this section (Section 3.3) addresses the latent controversy between the objectives of the EU Directive on Electricity and the more general environmental policy objectives. The former are seen as drivers to increase efficiency by bringing in competitive forces aiming to converge the electricity prices at a lower level. The objectives behind environmental policy considerations can lead to an increase in electricity prices resulting from the internalisation of external costs through market-based instruments and promotion of renewable energy sources via special support schemes.

Chapter 4 offers a cross-country analysis of energy markets. It analyse the market in the Nordic/Scandinavian countries, the UK market, the German market, the two southern European markets in Spain and Italy, and finally the Dutch market.

Part III of the report examines whether the patterns identified in the above mentioned chapter are also relevant for the evolution of the European gas market (Chapter 5) and the electricity markets in the accession countries (Chapter 6). The main findings are summarised in the Chapter 7. That chapter ends by analysing challenges for governments.

2 Recent Developments and Future Challenges

2.1 The political background

Energy markets in Europe have been widely dominated by national and regional monopolies in EU member states as well as in the countries in Central and Eastern Europe aiming to join the EU. These, very often national monopolies, could be described as vertically integrated electricity companies generating, transporting as well as selling electricity to the final customer. A similar structure of national or regional monopolies could be found in the gas market in EU member states. Furthermore, these monopolies were often in public ownership, with all the advantages and disadvantages of this form of ownership, and have regularly dominated the 15 national, largely isolated markets. One of the main policy objectives of the European Union is the creation of a European common market, including the completion of an internal energy market by speeding up the liberalisation of the electricity and gas market.

The process of establishing internal electricity and gas markets started with the adoption of the European Parliament and Council Directives for electricity (96/92/EC – Electricity Directive) and for gas (98/30/EC – Gas Directive) and their implementation by the EU member states in 1999 and 2000. Both directives have since been transposed into national legislation. Some of the main features of the directives regarding the liberalisation process of these markets can be summarised as follows[1]:

- Gradually opening the energy markets for electricity and gas[2];
- Establishing of rules concerning access to the transmission and distribution network – regulated third party access (rTPA); negotiated third party access (nTPA); or the 'single buyer' model;
- Establishing requirements for national dispute settlement authority but not as an independent regulatory body;
- Providing two options for the construction of new generating infrastructure: a tendering procedure and an authorisation procedure;
- Ensuring management unbundling of the transmission system operator (TSO); and
- Ensuring accounting separation of transmission and distribution activities from other parts of the companies.

The underlying rationale and objectives for implementing the Electricity Directive have been summarised by the European Commission as follows[3]:

[1] See for a full description of the process and policies with respect to the opening the electricity market: European Commission (1998) and European Commission (2000).

[2] The liberalisation process focuses mainly on the development of the demand side; i.e. liberalisation is measured in terms of market opening by defining the percentage of total consumption accounted for by the end-consumer free to choose the supplier. The development of the supply side has been partly ignored under the assumption that the development of a large single European energy market as the final result of the transition process from 15 national markets would be sufficient.

[3] European Commission (1998), p.4.

- ‘To increase efficiency by introducing competitive forces into the electricity market.
- Electricity price levels, at present, vary enormously between member states. This causes unacceptable, and unnecessary, distortions in competitive conditions across the single market. In addition increased efficiency leads to lower prices. This is essential; electricity in the European Union is more expensive than in many countries with which European industry trades, such as the United States and Australia.
- Essential public services such as ensuring electricity supply to all customers, protecting the old and disadvantaged, and protecting the environment, can be achieved in the competitive single market. Indeed, competition can improve these services if appropriate measures are taken.
- An interconnected market requires less reserve capacity, and reserve capacity is expensive.
- The introduction of competition means that electricity producers will have to make better use of resources in the electricity production process to avoid waste of resources; wasting resources is both expensive and polluting.
- The introduction of competition gives customers the right to choose their supplier of electricity. They can choose for example the nearest one, the cheapest one, the cleanest one, or the one that offers the best service.
- The lower prices for electricity result in lower production prices for European industry, which in turn will be translated into lower prices for products.’

Very similar reasons and also analogous objectives have been put forward by the European Commission by launching the single European gas market[4]. Both directives include a timetable for opening the market for electricity and respectively gas, and factors discussing economic, technical and institutional requirements which are relevant for the completion of the internal energy market.[5] In the first benchmarking report requested by the European Council evaluating the progress in achieving the set objectives, the European Commission found that several member states opened their markets for electricity and gas above the requirements laid down in the directives. Additionally, the report also identified some factors hampering full competition.

The main obstacles identified in this first report with regard to opening up the electricity market have been:[6]

- ‘excessively high network tariffs, which form a barrier to competition by discouraging third party access, and may provide revenue for cross subsidy of affiliated businesses in the competitive market,
- a high level of market power of existing generation companies combined with a lack of liquidity in wholesale and balancing markets which is likely to expose new entrants to the risk of high imbalance charges,

[4] See for a discussion: European Commission (2000).

[5] A detailed analysis of these directives and the associated requirements can be found for example in European Commission (1998) and European Commission (2000).

[6] European Commission (2001) p. 2.

- network tariff structures which are not published in advance or subject to ex-ante approval, this may lead to uncertainty and create costly and time consuming disputes unless combined with full ownership unbundling,
- insufficient unbundling, which may obscure discriminatory charging structures and lead to possible cross subsidy'.

Upon the request of the European Council a second benchmarking report was recently published.[7] The report shows some progress towards the implementation of the European electricity market, although, some severe difficulties in the process identical to those already mentioned in the first report remain. The following issues are identified in the case of the liberalisation of the electricity market in this second benchmarking report:[8]

- 'differential rates of market opening continue to reduce the scope of benefits to customers from competition, leading to higher prices than otherwise to small businesses and households, and also promote distortion of competition between energy companies by allowing the possibility of cross-subsidies at a time when companies are restructuring themselves into pan-European suppliers;
- disparities in access tariffs between network operators which, due to the lack of transparency caused by insufficient unbundling and inefficient regulation, may form a barrier to competition;
- the high level of market power among existing generating companies associated with a lack of liquidity in wholesale and balancing markets which impedes new entrants;
- insufficient interconnection infrastructure between member states and, where congestion exists, unsatisfactory methods for allocating scarce capacity'.

Comparing the main issues revealed by the European Commission shows that some progress have been made, although a lot of work remains to be done before all obstacles to the internal energy market are removed. An even more worrying picture has been drawn in the case of opening of the gas market because less progress is reported in this second benchmarking exercise.[9] Detailed overview of the implementation of the directives in the member states is shown in Tables 2.1 and 2.2. These overviews are listing the main and probably most important topics and indicators necessary – but not completely sufficient - for the creation of Community-wide markets for electricity and gas. As the tables below illustrate, apart from successes in promoting the internal market, different challenges are lying ahead.

[7] European Commission (2002a).

[8] European Commission (2002a) pp. 3-4.

[9] See for a discussion about the progress of implementing the directives: European Commission (2002a) p. 5.

Table 2.1 Implementation of the Electricity Directive

	Declared market % opening	Full opening date	Unbundling transmission system operator	Unbundling distribution system operator	Regula-tor	Overall network tariffs	Balancing conditions favourable to entry	Biggest 3 genera-tors' share of capacity %
Austria	100	2001	legal	accounting	ex-ante	above average	moderate	45
Belgium	52	2003/7	legal	legal	ex-ante	average	unfavourable	96 (2)
Denmark	35	2003	legal	legal	ex-post	average	favourable	78
Finland	100	1997	ownership	management	ex-post	average	favourable	45
France	30	-	management	accounting	ex-ante	average	moderate	92
Germany	100	1999	legal	accounting	ntpa	above average	moderate	64
Greece	34	-	legal/mgmt	accounting	ex-ante	average	moderate	97 (1)
Ireland	40	2005	legal/mgmt	management	ex-ante	average	moderate	97 (1)
Italy	45	2004[a]	own/legal	legal	ex-ante	average	moderate	69
Luxembourg	57	-	management	accounts	ex-ante	above average	unfavourable	n.a.
Netherlands	63	2003	ownership	management	ex-ante	average	moderate	59
Portugal	45	2003	legal	accounting	ex-ante	average	moderate	82
Spain	55	2003	ownership	legal	ex-ante	average	favourable	83
Sweden	100	1998	ownership	legal	ex-post	average	favourable	90
UK	100	1998	ownership	legal	ex-ante	average	favourable	36

Notes: ntpa = negotiated third part access;
[a] nhh = non-household customers.
Source: European Commission (2002a) p. 5.

In 2000, the Stockholm European Council requested not only the evaluation study of the progress achieved in completing the internal energy market so far, but also a proposal aiming to accelerate the liberalisation process in energy markets. The proposal was submitted by the European Commission in March 2001 as a draft Directive concerning 'common rules for the internal market in electricity and gas' (COM(2001)125 final – the so-called 'Acceleration Directive') and based on further comments the Commission drafted an amended proposal in June 2002 (COM(2002)304 final).

The amended proposal plans to fully open the power markets for electricity and gas in two steps: all non-household customers would be free to choose their suppliers latest from January 1, 2004, with deadline from January 1, 2005 for all customers. During the European Council meeting under the Danish Presidency in November 2002 the member states agreed to a compromise. The complete liberalisation of the electricity and gas market will be achieved in two steps: the markets for non-household users will be opened until July 2004 and for household users until July 2007. Furthermore, the member states agreed that transmission and distribution system operators (TSOs/DSOs) should be independent with regard to their legal

form, while the implementation of the unbundling requirement for DSOs can be postponed until July 2007. By comparing the proposed dates with the current situation presented in Tables 2.1 and 2.2, it can be seen that no member state has to speed up the process of market opening.

Table 2.2 Implementation of the Gas Directive

	Declared market opening (%)	Full opening date	Unbundling transmission system operator	Unbundling distribution system operator	Regulator	Transmis-sion tariff structure	Overall network tariffs	Concen-tration in wholesale market
Austria	100	2002	legal	legal	ex-ante	under review	n.a.	yes
Belgium	59	2003/6	legal	legal	ex-ante	distance	normal	unknown
Denmark	35	2004	legal	legal	ex-post	postal	high	yes
France	20	-	accounts	accounts	n.a.	distance	high	yes
Germany	100	2000	accounts	accounts	ntpa	distance	high	moderate
Ireland	82	2005	management	management	ex-ante	entry-exit	normal	unknown
Italy	96	2003	legal	legal	ex-ante	entry-exit	normal	yes
Luxembourg	72	-	accounts	accounts	ex-ante	postal	normal	yes
Netherlands	60	2003	management	accounts	hybrid	distance	normal	yes
Spain	79	2003	ownership	legal	ex-ante	postal	normal	moderate
Sweden	47	2006	accounts	accounts	ex-post	postal	high	yes
UK	100	1998	ownership	ownership	ex-ante	entry-exit	normal	moderate

Notes: ntpa = negotiated third part access.
Source: European Commission (2002a) p. 5.

The analysis of the EU energy policy is, so far, directed to the discussion of the creation of Community-wide markets for electricity and gas. However, this objective is only one of the three main energy policy objectives of the European Community. The three core objectives of EU energy policy reflecting sustainable development issues, which have been established as a requirement for Community policy in the Amsterdam Treaty in 1997, are[10]

- '*security of supply* – which aims to minimise risks and impacts of possible supply disruption on the EU economy and society;
- *competitive energy systems* – to ensure low cost energy for producers and consumers to contribute to industrial competitiveness and wider social policy objectives;
- *environmental protection* – which is integrated in both energy production and energy use to maintain ecological and geophysical balances in nature.'

The complexity of a common EU energy policy based on these core objectives is discernibly leading to potential problems when regarded separately. This problem has been addressed in the recent report prepared by NERA and commissioned by the Dutch Ministry of Economic Affairs which tried to analyse the goals of the Electricity Directive. The authors[11] concluded that

[10] European Commission (1999a) p. 8.
[11] NERA (2003), p.3.

'…economic efficiency appears to us to be paramount. References to security of supply and environmental policies appear not as high-level objectives, but as possible constraints on achieving economic efficiency (although economists would probably argue that the concept of economic efficiency can accommodate both these other aims)'. Both positive and negative linkages are conceivable. For example, energy efficiency improvements in generation technology can have a positive effect with regard to security of supply issues because of a reduction of the consumption of fuels, i.e. reducing import dependency. Additionally, it can have a positive outcome with regard to environmental protection via a reduction of greenhouse gas emissions and other pollutants owing to the reduced consumption of fossil fuels.

However, conflicting effects are also possible, particularly with respect to the process of creating Community-wide competitive energy markets. Competition and increased efficiency in the power generation sector can reduce electricity prices. This development can encourage consumers to increase electricity consumption thus contradicting the objective of environmental protection. Increased consumption leads to an increased emissions of greenhouse gases and other pollutants (such as SOx and NOx) considering that thermal convention is the main generation type in many EU member states. The specific environmental objective of EU energy policy can be further distinguished between the following three issues:

- reducing the environmental impact of energy production and use;
- promoting energy saving and energy efficiency; and
- increasing the share of production and use of cleaner energy.

Interrelations between the different core energy policy objectives are discussed in later sections of the report by looking whether these objectives are congruent or whether possible conflicts exist in reaching them simultaneously. Before studying the most recent developments of energy prices in EU member states, a more detailed discussion about the policy objectives behind the creation of a competitive electricity market is carried out by assessing an ideal situation, assuming that the policy goals of electricity liberalisation would have been achieved.[12]

2.2 Conditions for a competitive electricity market

The restructuring of the 15 national electricity market into a European electricity market is part of the overall goal of the European Union to create a European common market. Such common European markets already exist for many other goods and services, including other energy products such as oil. This process requires that 'monopoly rights at national level had to be abolished, a legal framework to allow new market entry as well as access to the networks had to

[12] We concentrate on the development and situation of the electricity markets in EU Member states in the next sections without paying much attention on the situation of gas markets. However, a discussion whether the results identified on the electricity market can be transferred to the gas market can be found below.

be created and consumers had to be empowered to choose freely their suppliers throughout the EU. Energy liberalisation means thus to build single European electricity and gas markets out of 15 isolated markets through the introduction of competition between energy suppliers for customers'.[13]
Probably the main task with respect to the liberalisation process is to transfer the industry from the quasi monopolistic towards a competitive structure. Quasi monopolistic structure was established owing to historical conditions meaning that the power sector was - and in some member states partly still is – controlled by vertically and horizontally integrated companies. However, the competitive structure of the European electricity markets is expected to 'increase the efficient allocation of resources and enhance consumer welfare. Distortions of competition between substituting fuels should come to an end. Competition between suppliers should lead to a downward convergence of prices in Europe'.[14]

Economic literature has, in some length, discussed the conditions that are necessary for the proper functioning of competitive markets. Before some of these conditions are studied, the specific characteristic of electricity as a commodity must be emphasized since electricity is a (homogenous) commodity good, combining high demand volatility with extreme price volatility and limited storage ability.[15] The latter point is of special interest because temporary variations in demand and supply, for almost all forms of commodities, are regularly controlled via management of stockpiles. This function is almost impossible in the context of electricity. The demand and supply of electricity must be balanced at all times.

Price determination in a competitive electricity market depends on the interaction of supply and demand of the respective commodity thus requiring availability of the surplus capacity, and existence of a liquid and transparent market for trade in electricity. Generally, prices in a competitive market will be equal to the short-run marginal cost of the most expensive plant which is required to satisfy the demand at that moment. The short-run marginal costs (SRMC) of generation usually include fuel costs as well as variable, marginal operating costs such as fuel handling costs. The long-run marginal costs (LRMC) of electricity generation are defined as the short-run marginal costs and the fixed costs that are mainly capital costs required to provide a capital return on capital investment. These latter costs are decisive for potential new market players, i.e. the market price must exceed these long-run costs for investments into new generating capacity.

The amount of surplus or excess capacity is an important factor in determining the wholesale price because, in situations in which a huge surplus capacity is available, a downward price

[13] Albers M. (2001) p. 1.
[14] Albers M. (2001) p. 1.
[15] The limited storage ability refers to the possibility of storing electricity via hydro power in the form of hydro storage dams.

competition can be expected so that the price is set closely to the SRMC. On the other hand it can be expected that the price trend is approaching the LRMC in the case when the surplus capacity is very low and the competition between utilities is ceasing.
Other decisive factors in this context are: market concentration of utilities, functional wholesale markets for electricity as well as interconnection capacity. The latter is insofar significant because the Electricity Directive promotes the creation of a Community-wide market for electricity instead of 15 national and isolated electricity markets. This objective is far from being achieved considering that only about 8 percent of total EU generation is traded between EU member states. One of the reasons is the lack of interconnectors which is not too surprising coming as a consequence of the past energy policies of creating isolated markets with national monopolies in the EU member states. Market concentration of utilities has, therefore, to be assessed as more critical for the development of an internal electricity market owing to the potential of exerting strategic pricing behaviour. Market concentration is not only a feature for the individual national markets but must also be perceived as a feature of the increase of multinational alliances in the power sector in Europe. An intuitive example describing this feature of market concentration in the supply business is recorded in a report published by the European Commission in so far, as market concentration is expressed in market shares of electricity suppliers: '… the concentration indicators are based on non-consolidated, direct market share, not taking into account indirect shareholdings, the concentration indicators for some countries (for example, Germany) are relatively low'[16]. The share of the market leader of the German market, RWE, was reported to be about 14% in 1999 in the case of RWE being a single company. The market share of the RWE Group was around 30%, if taking into account companies in which RWE held a stake. During the most recent years the biggest European utilities continue increasing their stakes in companies in other European countries, which is the logical and probably anticipated consequence of a competitive European electricity market with free access of suppliers.

The determination of the costs for meeting demand for electricity follows the merit order stacking power stations in order of short-run marginal costs (SRMC) so that the cheapest power plant, i.e. the power plants with the lowest SRMC, is generating electricity first and the most expensive last. Based on this merit order it is clear that the ownership of the mid-merit plant which can be generally identified as the price-setter has a favourable position to influence the overall price level. In cases of high market concentration of the supply side the situation can get even worse because of influencing even higher control via capacity management schemes such as plant mothballing.[17] However, a crucial factor for determining the SRMC and consequently the merit order is the energy mix used for electricity generation in the different countries. Table

[16] European Commission (2001b) p. 107.
[17] The increase in market concentration resulting from the two mergers in the German electricity sector in 2000 can serve as a good example for such a development. Two German leading utilities, E.ON and RWE, announced capacity closure programmes with the consequence of increasing generation price and spot market prices.

A.1 in the Annex reveals that technologies used for electricity generation vary between EU member states. Countries, such as Belgium and France, are relying mostly on thermal nuclear compared to countries in which the biggest share of electricity is generated in conventional thermal power plants (the Netherlands and Denmark). Hydro power provides the majority of electricity in Austria, Sweden and Norway. These technologies have also quite different costs[18] thereby clearly influencing the SRMC.

It was obvious from the beginning of the liberalisation process of the electricity market that, apart from opening-up the market for competition on the generation and supply level, regulatory instruments have to be implemented to guarantee the creation of an internal market. The legal basis for the Electricity and Gas Directives are the internal market rules (Article 95 EC Treaty). These regulatory instruments and institutions are of great importance in areas where no competitive market structures are being introduced, such as the case of network tarification, unbundling of network operators and balancing requirements.[19]

Some of the factors obstructing the existence of a competitive electricity markets are discussed in later chapters in more detail. The listing of such economical, technical and institutional factors is far from exhaustive, but it certainly shows the complexity the political decision-makers are facing in the process of transforming 15 isolated national electricity markets, often controlled by publicly owned vertically integrated companies, into a European, competitive electricity market.

2.3 Recent developments in energy prices and the main components

One of the underlying objectives of the Electricity Directive is to liberalise electricity markets by integrating national markets into one European market. This process aims at increasing competition between energy generators and suppliers leading to enhanced efficiency and productivity gains which are closely associated with lower production costs as well as lower electricity prices. Nevertheless, the overall result of the liberalisation process cannot simply be reduced to the concept of lower electricity prices for final consumers, i.e. households as well as industry, etc. The same has been clarified in a recent communication of the European Commission: ‘To refute a common misconception, the internal energy market does not only seek systematically to reduce prices to consumers, but to set a fair price in compliance with

[18] The specific costs of the electricity generation mix are estimated to be around 20 EUR/MWh (nuclear power); 20 EUR/MWh (lignite), 45 EUR/MWh (domestic hard coal), 30 EUR/MWh (natural gas); 30 EUR/MWh (hydro power); 30 EUR/MWh (waste and biomass); 50 EUR/MWh (photovoltaics, solarthermal) and 91 EUR/MWh (wind): in: Auer J. (2002)
See for a detailed discussion of these regulatory bodies and instruments in place: Albers M. (2001), European Commission (1998), and European Commission (2002a).

[19] See for a detailed discussion of these regulatory bodies and instruments in place: Albers M. (2001), European Commission (1998), and European Commission (2002a).

public service obligations'.[20] However, the European Commission does not answer the question what a 'fair price' would be and what does the European Commission understand with the phrase of 'systematically reduce prices to consumers'?
Furthermore, the creation of an internal electricity market should lead to a downward convergence of electricity prices between EU member states. This development is expected to come along with the current transition from the often quasi monopolistic national electricity market of the past to a competitive market of the future. This change in the market structure is generally associated with increased efficiency in the whole electricity supply industry. A liberalised and competitive electricity market is certainly positive with regard to improved welfare for the citizen.

Table 2.3 below compares the change of electricity retail prices (expressed in end-user prices with taxes and without taxes) for industry and households during the time period 1995 to 2001.

Table 2.3 Development of electricity prices and demand

	Change in retail price 1995-2001 Industry		Households	1995-2001	Change in consumption 1995-99
	without tax (%)	with tax (%)	without tax (%)	with tax (%)	% change
Austria (1)	- 8	7	-7	2	7
Belgium	- 3	-3	-4	-3	9
Denmark	29	31	29	40	3
Finland	- 17	-8	-9	1	14
France	-15	-17	-9	-11	9
Germany	-29	-25	-5	2	3
Greece	0	-8	-13	-20	20
Ireland	5	5	8	8	27
Italy	46	28	5	3	10
Luxembourg	-18	-12	5	10	10
Netherlands (2)	8	37	2	18	14
Portugal	-19	-19	-5	-5	25
Spain	-25	-21	-19	-15	26
Sweden (3)	-6	6	-25	-24	1
UK	9	9	-11	-13	9
Norway	-2	0	19	29	4

Notes: price changes are expressed in nominal terms; (1) Households 1996-2001, Industry 1995-1999; (2) 1995-2000; (3) 1996-2001.
Source: European Commission (2001a).

The data presented in Table 2.3 show no unanimous development, i.e. a reduction in retail prices can be recorded in some, while retail prices increased in other countries during this period. This result is certainly not surprising considering that the liberalisation process of the electricity market is in different stages in the EU member states, with the process starting in the

[20] European Commission (2002b) p. 8.

UK and the Scandinavian countries already in the early 1990s. Furthermore, different developments between industrial and household prices occurred within the same country, for example in Italy, as well as between the prices with and without taxes, an example being Austria. The range of price changes is quite high; i.e. the biggest reduction in retail prices including taxes for industry is reported for Germany with 25% and the biggest increase for the Netherlands with 37%. The latter must be ascribed to the introduction of energy taxes in the Netherlands during this period. Quite interesting is a development of the industrial prices in Italy because the percentage increase in the price without tax was much higher than the increase with tax. A reduction in industrial electricity prices has been reported in 8 of the 15 EU member states during this time period. The situation is quite similar with respect to the prices for households. The electricity price paid by Danish households increased by 40%, thus representing the highest increase in EU member states. The biggest reduction occurred in Greece (20%) and Sweden (24%).
An interesting aspect is that in some member states the percentage change in retail prices including taxes has offset the reduction in the retail price. For example, the retail price in Austria reduced by 8 percent (industry) and 7 percent (households), while the end-user price increased by 7 percent (industry) and 2 percent (households). This development has to be attributed to a change in the tax policy in Austria: increase and / or introduction of taxes (VAT or energy) during this period. The same development occurred in Finland and Germany concerning household electricity prices.

Taxes can be used as a policy tool for different reasons: they can have a revenue-generating function and / or they are introduced for environmental reasons. The latter aspect is, in particular, interesting in this report because taxes can offset potential conflicts between diverging objectives. Reduced electricity prices leading to an increase in electricity demand as a result of increased efficiency at the generation stage and competition can be subject to some form of taxation aiming to fully internalise the external costs of electricity generation. Such a policy approach would be in accordance with the policy of European Commission because the European Commission adopted the policy of internalisation of external costs in the sixth environment action programme.

Besides being market-based instruments for achieving the policy of internalisation, it should not be forgotten that taxes are also revenue generating tool. Other fiscal measures very high on the political agenda are tradable emission permits and emission trading.[21]
The formation of the end-user prices depends on these different price components which not only differ between countries but also differ between users in the same country. Prices are generally composed of three components: the commodity price (i.e. the costs of electricity

[21] European Commission (2001c), the results of the meeting of the European environment ministers December, 9 2002; and Mannaerts H. and M. Mulder (2003).

generation), the transport costs (i.e. transmission and distribution costs) and the tax component which can be divided into energy or environmentally related taxes and VAT.[22] The Dutch Energy Research Foundation divided the electricity prices of different EU member states in these components and found that the percentage share of these components is quite different. The biggest share in the Danish end-user price is determined by the eco-tax which does not exist in countries such as Belgium and the United Kingdom. It is also worthwhile to note that the share of transport costs is the biggest cost driver in Germany which is completely in contrast to the UK situation where this component is almost negligible. The relevance of the transport cost is more pronounced in the industrial electricity prices, which is not necessarily of great surprise considering the relatively low tax burden for industrial users.

These findings are quite significant revealing that a detailed analysis requires a separate discussion about the driving forces behind the different price components. The development of transport costs is of central significance when the creation of a Community-wide electricity market is discussed. Vertically-integrated energy companies have also been responsible for the transport of energy (i.e. transmission and distribution) in the past and are still responsible in some EU member states. This situation already started to change as part of the liberalisation of energy markets (electricity and gas) and will be discussed further below because of the possible consequences towards the determination of prices. A further facet of electricity price determination worth to be noted - but not necessarily unexpected - is the fact that eco-taxes play almost no role in the end-user prices of large-scale industrial consumers, i.e. energy-intensive industries. The generation of electricity quite independent of fuel uses causes some form of external costs to the environment. The European Commission in the sixth environment action programme emphasises that these external costs should be internalised, i.e. included in energy prices. Research in the area of environmental taxation clearly shows that this policy approach of internalising external effects applies more to households than to industries. The main reason for the different treatment of electricity users can be linked to economic consideration, i.e. high electricity price levels are often set equal to a loss of competitiveness in international trade.[23]

2.4 Summary

The rationale of creating a Community-wide market for electricity and gas follows the underlying EU principle of establishing European-wide common market for goods and services. This policy approach should lead to a general increase in the citizens' welfare. One of the measures to achieve this overall objective is to increase efficiency through the introduction of competition into the electricity supply chain. Additionally, this policy intends to intensify competition between suppliers throughout the EU leading to a convergence of prices at a lower

[22] See for a discussion and an overview Energy Research Foundation (2001) p. 73.
[23] See for a discussion: Barker T. and J. Köhler (eds) (1998) and Ekins P. and S. Speck (1999).

level. However, it can be argued that the evolution and creation of competitive energy market based on this scenario is probably not easy to achieve. Some of the basic conditions for realising full competition are not straightforward to be implemented because of the specific characteristics of electricity as a commodity. Furthermore, the energy markets and in particular the electricity markets have been protected in a strict legislative framework by creating often monopolistic market structure; i.e. the markets were regularly controlled by vertically integrated companies which, in addition, were sometimes state-owned.

There is no doubt about the progress made with respect to opening of these market structures by launching the liberalisation of the electricity market. The launch started with the transposition of the Electricity Directive into the national legislation. However, as the European Commission concedes, some severe obstacles hampering the creation of competitive, common electricity market do exist and some of these obstacles are discussed in the following chapters.

3 Factors Influencing the Development of Competition

3.1 Introduction

Existence of asymmetries in the electricity markets in EU member states is certainly not surprising. Vertically integrated monopolistic companies have regularly dominated the electricity supply chain. Such structures are still in place in some countries, although they clearly contradict the idea and conditions necessary for creating a competitive electricity market.

In a recent report commissioned by the European Commission, activities along the supply chain were divided into two categories by considering their potential openness to competition:[24]

- '(potentially) competitive activities, mostly in the upstream generation market and the downstream supply market; and
- (naturally) monopolistic network activities primarily present at the transmission and distribution network level.'

Based on this classification it seems quite straightforward to establish the areas within the supply chain where competition can and should take place. As discussed above, numerous technical, economical and institutional factors have an obvious influence in the price formation and creation of competitive markets.

The purpose of this section is to study in more detail the following factors:

- network capacity restrictions and the access to networks;
- the degree of concentration; and
- environmental policy issues.

These features are regularly identified as obstacles for the opening of the electricity market to full competition (see Section 2.2). Furthermore, they were referred to as potential barriers in the Electricity and Gas Directives, as well as in the two benchmarking reports published by the European Commission.

3.2 Network capacity restrictions and the access to networks

One of the main requirements for the operation of a competitive energy market is the non-discriminatory and cost reflective access to the existing electricity networks both domestically and on the pan-European level. The European Commission made it clear in the first benchmark report that serious interconnection bottlenecks are a major constraint regarding the development of a pan-European electricity market.

[24] European Commission (2001b) p. 7.

However, the entire area of electricity transport, i.e. interconnection of national markets, transmission and distribution operations, is generally characterised as a monopolistic network activity as it seems not economically viable to build up a competitive second infrastructure. This situation is undoubtedly demanding a strong and independent regulatory reform to guarantee the third party access to the whole system in a transparent and non-discriminatory manner. Furthermore, it has to be considered that network capacity restrictions can occur either on the national, or the regional level. Effective and fair interconnector access arrangements are required and are decisive for the completion of the single Community-wide competitive electricity market.

This issue has to be seen as critical for the creation of domestic competitive markets. Otherwise existing market dominance of domestic market players would be reinforced what would undoubtedly impede foreign companies entering a domestic market through sales of electricity via cross-border interconnectors.

However, trade in electricity is still relatively low on the EU level (around 8% of EU electricity consumption in 2000). The low trade figure can be attributed to the historical organisation of quasi isolated national markets. The network activities were, in the past, treated as natural monopolies and generally less progress can be reported in unbundling market power of generators over the transmission and distribution grids. Unbundling is identified as one of the major principles for introducing competition as it guarantees that new generators can have indiscriminate access to the transmission grid and it averts cross-subsidisation of generation activities by transmission activities. For example, relatively high profits are made by the large vertically (generation and transmission) integrated utilities in Germany which are in private ownership.[25] In other countries, such as in the Nordic countries and the UK, separate grid operators are responsible for the transmission and distribution networks. Besides the question of network ownership, the issue of regulation is of significant importance: whether an independent regulator is responsible for questions relating to the network and, in particular, to network tarification.

In both benchmarking studies[26] the European Commission argued that some forms of network restrictions could hamper the creation of competitive energy market. In particular, excessively high network tariffs mentioned in the reports are examples of discouraging third party access and providing the possibility of cross subsidisation. However, the European Commission clarifies: ‘These disparities in tariffs do not, per se, form a barrier to competition provided that they are transparent and non-discriminatory. However, in some cases transparency is also lacking since there is not clear unbundling’.[27]

[25] Haas R. (2002).

[26] European Commission (2001a) and European Commission (2002a).

[27] European Commission (2002a) p. 11.

Network tarification

The issues of third party access to the network and network tarification are described by the European Commission as the 'main obstacles in arriving at a fully operational internal market'.[28] Keeping in mind the different components of the final end-user price for electricity, as discussed in the Section 2.3, shows that the setting of network tariffs has considerable effects on electricity prices.[29]

Table 3.1 Estimated level of network charges (unit: EUR/MWh)

	Medium voltage		Low voltage	
	Estimated average charge	Approx. range high - low	Estimated average charge	Approx. range high - low
Austria	20	15 - 25	65	50 – 80
Belgium	15	n.a.		
Denmark	15	n.a.	25	Unknown
Finland	15	10-20	35	Unknown
France	15	n.a.	50	n.a.
Germany	25	15 - 45	55	40 - 75
Greece	15	n.a.		
Ireland	10	n.a.	40	n.a.
Italy	10	n.a.		
Luxembourg	20	n.a.		
Netherlands	10	unknown	35	unknown
Portugal	15	n.a.		
Spain	15	n.a.	45	n.a.
Sweden	10	5-15	40	20 - 60
UK	unknown	10-15	40	30 - 50

Source: European Commission, 2002a

Table 3.1 reveals the differences in the average tariffs applying in EU member states by distinguishing between medium and low voltage. It is not unexpected that network charges paid by households (low voltage) are generally higher in all EU member states. Sometimes these are more than double the amount paid by industrial users (medium voltage) connected only to medium or high voltage network. Furthermore, the range of low voltage charges is higher than is the case for medium-voltage customer. Apart from Austria, Germany and Luxembourg, the estimated average charge for medium voltage is in EU member states from 10 EUR/MWh to 15 EUR/MWh. As stated in the table, these charge rates are only estimates serving as an indicative example of the differences between EU member states. However, a closely connected question is whether we can expect that these tariffs will in the future somehow converge. This would be necessary if the policy objectives of converging electricity prices would be achieved. This issue

[28] European Commission (2002c) p. 15.

[29] See for a detailed analysis of the situation with respect of tariffs for transmission of electricity in EU member states: European Commission (2002d).

has some relevance in the creation of competition because high charges can be a barrier for new players emerging of the electricity market.

From the launch of the Electricity Directive as well as the Gas Directive it was anticipated that they did not address all fundamental issues decisive for the creation of internal electricity and gas market. For these reasons the European Commission initiated a process of setting up the Electricity Regulatory Forum in 1998 (the Florence Regulatory Process).[30] On the agenda of the Florence forum are questions of cross border trade, in particular the concern of tarification of cross border electricity exchanges, and the allocation of scarce interconnection capacities. The outcomes of these process will be important for the future evolution of energy prices and the internal market. In the meantime, some progress has been achieved with regard to tarification of cross-border electricity transactions: all transit and import charges have been removed and instead a single export charge of 1 EUR/MWh has been approved as a temporary solution[31]. There is generally an agreement that a permanent framework has to be adopted. This development must be recognised as a success story since different and uncoordinated systems of charges that has obviously hampered competition, such as pan caking, have been abolished.

Lack of interconnector capacities

One of the major constraints in developing a pan-European electricity market is the current lack of interconnector capacities between EU member states. This situation separates markets across Europe leading to critical bottlenecks and preventing competition and price convergence across the borders. These constraints are in particular noticeable for some countries or regions, such as the regions of the Nordic countries (total import capacity is around 2.5% of total installed capacity) with countries outside, England and Wales (total import capacity is around 6% of total installed capacity), Spain (total import capacity is less than 4% of total installed capacity – the same holds true for Portugal). Although having a higher interconnection capacity (around 14%) Italy is a bottleneck due to reasons discussed below. The issue of the low interconnection capacity and low trade figures between EU member states has been addressed in the conclusions of the European Council meeting in Barcelona in 2002 when the minimum level of external interconnection capacity for national electricity networks was established at 10 percent of installed generating capacity by 2005. Furthermore, the Community financial support mechanisms have been revised in the light of this new target insofar as the Energy and Industry Council approved the revision of the TEN-Energy Guidelines proposing that the maximum ceiling for possible EU co-financing increased from 10% to 20% of total investment costs of priority projects.

[30] See for further information: http://europa.eu.int/comm/energy/en/elec_single_market/florence/index_en.html; the analogue to the Electricity Regulatory Forum is the Gas Regulatory Forum (also called Madrid Regulatory Process) dealing with issues relevant to gas exchange and cross-border questions see for further information: http://europa.eu.int/comm/energy/en/gas_single_market/madrid.html

[31] Proposals were made to reduce the charge to 0.5 EUR/MWh – see the (draft) conclusion of the 9th meeting of the Florence Regulatory Forum at: http://europa.eu.int/comm/energy/en/elec_single_market/florence/index_en.html

A different situation concerning trade in electricity can be found in the region covering Germany, France, Benelux countries, Austria, Switzerland, where quite an intense trade of electricity takes place. It is undisputable that without having sufficient interconnection capacity and an efficient regulatory framework in place no real competition will occur neither on the pan-European level nor on the national level.

Conclusion

The European Commission concluded in its first benchmarking report that there is a lot to be done regarding the establishment of an efficient framework for cross-border exchanges of electricity. Issues which are clearly obstacles in the process of establishing internal energy markets and hampering the development of cost-reflective pricing structures are the missing co-ordination of TSOs concerning capacity allocation of electricity interconnectors (capacity reservation and congestion management) and tarification mechanisms[32]:
Congestion is clearly an obstacle to the creation of an integrated EU electricity market. Most interconnectors are already used intensively without significantly affecting the spread of prices in the Community. However although progress has been made, there also remain regulatory obstacles to efficient cross border exchanges and a lack of co-ordination of capacity allocation and tarification mechanisms.

This subject of insufficient interconnection infrastructure and in addition unsatisfactory methods of allocation of scarce capacity has been followed up in the second benchmarking report by the European Commission and was identified as one of the 'areas that are causing particular difficulties'[33].

This analysis of network capacity restrictions confirms some of the challenges ahead in the process of creating a Community-wide electricity market. Apart from the pure infrastructure measures, i.e. the extension of the current - insufficient - interconnection capacity, further changes in the institutional framework are required. For example, there is a need to harmonise the often country-specific approaches of allocating interconnector capacity. A strong regulatory framework is another precondition for competition on the national market regarding network access and tarification. This latter aspect is of significant relevance for guaranteeing non-discriminatory and cost reflective access to the domestic electricity networks. However, policies allowing unhindered third party access must be investigated in the context of market concentration, another potential barrier to the creation of competitive electricity market.

[32] European Commission (2001a) p. 105.
[33] European Commission (2002a) pp. 3-4. Almost the same problems hold true in the context of the cross-border exchange of gas: 'To date there is very little transparency regarding the availability of capacity and no real co-ordination of tarification in order to facilitate cross-border trade of gas' (European Commission (2001a) p. 107).

3.3 Market Concentration

Another key obstacle to competition is the high level of market power of existing generation and supply companies in the electricity market. This situation has to be seen as detrimental in the process of developing competitive market, particularly regarding the potential entry of new players into a market dominated by incumbents. The opening up and creation of a competitive energy market should be accompanied by the occurrence of new players reducing the market share of the incumbents. Parts of the electricity supply chain in some EU member states are still maintaining a monopolistic or oligopolistic structure clearly contradicting the intention of creating competitive markets.

The concentrations of the electricity generation as well as electricity supply in EU member states are presented in Table 3.2. There is obviously a clear correlation between the process of market opening and high concentration as a comparison between the findings of Table 3.2 and Table 2.1: Countries lagging to open-up their markets, such as Belgium, France, Ireland and Portugal, have a dominating utility. Furthermore, it is interesting to follow the development in Italy on one, and Germany on the other hand. The process of divestment shows to be successful in Italy where the share of the dominating player Enel was reduced from around 78% to around 54% in 2002. However, the development in Germany is in strict contrast to the Italian case because the degree of market concentration increased during the recent years.

Table 3.2 Market concentration in total national electricity generation – 1999/2000 (in % of total generation capacity)

	Market share(s) of: the largest generator	the three largest generators
Austria	45	65
Belgium	87	95
Denmark	27	45
Finland	27	46
France	90	92
Germany (2002)	24 (31)	57 (71)
Greece	98	100
Ireland	95	n.a.
Italy (2002)	78 (54)	83 (76)
Luxembourg	14	37
Netherlands	19	49
Portugal	69	84
Spain (2001)	42 (39)	82 (78)
Sweden	50	86
UK (2001)	16 (14)	38 (40)
Norway	32	45

Source: European Commission (2001b) and Morgan Stanley Equity Research (2002)

One of the basic principles of competition is to possess a large number of competing companies guaranteeing that no single company can influence the price and exercise any form of market power. Owing to the specific characteristics of electricity as a good that cannot be stored, an additional condition for competition is a requirement for having excess capacities in generation. The political decisions of release programmes (divestment programmes) carried out in some member states, i.e. the UK, Italy and Spain, are examples of how countries try to mitigate the consequences of this challenge (see also the discussion in the country chapters below). The first country gaining some experiences with such release programmes has been the UK in the 1990s. The English electricity market has been dominated by two companies which have been broken-up in smaller companies. This development was partly enforced by the UK government. These two utilities dominated the price setting in the English wholesale market. One of the results of the privatisation programme was the creation of twelve independent regional electricity companies in England and Wales. Furthermore, new entrants invested into new capacity, mainly combined cycle gas fired generation driven by the 'dash for gas' policy of the UK government leading to an oversupplied market in England and Wales. These two features, a highly fragmented generation market and an oversupply of electricity, triggered a sharp fall of the electricity price levels during the last years. This low degree of market concentration hinders any form of price setting and exerting market power by a single utility. The situation of the English electricity market corresponds to the conditions and requirements necessary for having a competitive electricity market analysed above. In the meantime, many of the smaller electricity companies have been taken over by other European companies, such as EdF, RWE and E.ON, as part of the 'Europaisation' of the electricity market (see Table 3.5 below). Other policies aimed at overcoming the potential danger of high market concentration are regulatory measures and the creation of power exchanges installed in many member states. The latter is essential because electricity trade on power exchanges leads to a transparent and non-discriminatory price formation which itself can be seen as a prerequisite for the liberalisation process and the creation of an internal market.

No unambiguous evidence for the assumption that high level of market power impedes competition has been put forward. For example, the Swedish Government commissioned a study examining the relation between market power and competition based on the Swedish situation and found out that there are 'risks of inefficient competition, although there is no evidence that companies are using their market power towards their own ends'[34]. However, the possibility of exerting market power by dominant players, in particular by these companies who are operating mid merit (price-setting) plants, can – in the long-run - be seen as a real threat for a competitive market.

[34] Swedish Energy Agency (2002) p. 2.

Correlation between high degrees of concentration and electricity prices

A comparison between the number of generators of domestic markets in EU member states and the electricity end-user prices paid by industry or households in these countries does not show that markets with high concentration, i.e. low number of generators or suppliers, lead directly to higher end-user prices in 2000. The analysis of market concentration is generally done using the Herfindahl-Hirschman Index (HHI). This Index has been calculated by Morrison (2002)[35] who found that a single dominant generator (HHI: 8,000 – 10,000) exists in Belgium, France, Greece, Ireland and Portugal (high concentration); 2-3 large dominant generators (HHI: 2,400 – 4,000) in Austria, Germany, Italy, the Netherlands and Spain (medium concentration); and no dominant generators (HHI: 0 – 1,800) in England and Wales and Nord Pool, i.e. in the Nordic countries (low concentration).[36]

This result should be treated with care as it only describes the situation on the electricity market at a certain time. Dynamic considerations, such as the possibility of strategic pricing behaviour in the medium-to long-run, i.e. a typical behavioural response as the result of a monopolistic or oligopolistic market structure, are not taken into account in such a static analysis.

Table 3.3 Correlation between HH-Index and electricity prices for households between European countries in 2000

	Price excl. all taxes	HH-Index (EUR/MWh)		Price incl. all taxes	HH-Index (EUR/MWh)
UK	158	low	Denmark	238	low (medium)
Belgium	152	high	Norway	192	low (low)
Norway	146	low	Belgium	186	high
Germany	141	medium	Germany	179	medium
Portugal	138	high	UK	166	low
Netherlands	116	medium	Sweden	150	low (medium)
Spain	115	medium	Netherlands	149	medium
Ireland	114	high	France	147	high
Austria	113	medium	Portugal	146	high
France	112	high	Austria	145	medium
Denmark	105	low (medium)	Spain	141	medium
Sweden	102	low (medium)	Ireland	128	high
Finland	83	low (medium)	Finland	110	low (medium)
Italy	67	medium	Italy	83	medium
Greece	66	high	Greece	71	high

Source: Eurostat 2000, Electricity Prices for Households on 1 January 2000 (household category Db)

[35] Morrison M.B. (2002) p. 4. The Herfindahl – Hirschman index is generally distinguished between unconcentrated (HHI<1,000), moderately concentrated (1,000<HHI<1,800) and highly concentrated (HHI>1,800). Unfortunately, this classification does not completely correspond to Morrison's approach.

[36] A slightly different classification is the outcome of subdividing the single Nordic market into the four national markets: the Norwegian market has no dominant generator compared to the other three markets which belong to the criteria 'medium concentration' (based on Morrison's classification); see for further information: Chapter IV.1.

Table 3.4 Correlation between HH-Index and electricity prices for industry between European countries in 2000

	Price excl. all taxes	HH-Index (EUR/MWh)		Price incl. all taxes	HH-Index (EUR/MWh)
Austria (1)	112	medium	Austria (1)	143	medium
Belgium	73	high	Italy	104	medium
Italy	69	medium	Denmark	91	low (medium)
Ireland	66	high	Belgium	89	high
UK	66	low	Spain	78	medium
Portugal	64	high	UK	77	low
Spain	64	medium	Ireland	74	high
Greece	57	high	Portugal	68	high
France	57	high	France	66	high
Germany	52	medium	Germany	63	medium
Denmark	50	low (medium)	Netherlands	62	medium
Netherlands	50	medium	Greece	62	high
Finland	38	low (medium)	Finland	51	low (medium)
Sweden	37	low (medium)	Sweden	47	low (medium)
Norway	36	low (low)	Norway	44	low (low)

Notes: (1) prices are presented for industry category Ie (annual consumption 2,000,000 kWh – maximum demand 500 kW) with the exception of Austria Ic (annual consumption 160,000 kWh – maximum demand 100 kW)

Source: Eurostat 2000, Electricity Prices for Industry on 1 January 2000

The findings of Tables 3.3 and 3.4 suggest no unambiguous correlation between electricity prices and the degree of concentration on the electricity generation level for the year 2000. This result is definitely relevant for the analysis for the households (Table 3.3) but only with some caveats for industry. For example, the degree of concentration is rather low in the three Nordic countries (Finland, Sweden and Norway). In addition, industries in these countries were experiencing the lowest electricity prices. The situation is quite the opposite for the fourth Nordic country (Denmark): a low HHI associated with high end-user electricity prices both for households and industry. It is important to consider that the prices excluding taxes in Denmark, compared to the majority of other EU member states are low, while the prices including taxes are one of the highest in the EU. This fact can be ascribed to the fiscal system, i.e. energy taxes levied on the use of electricity.

A detailed analysis of the relationship between the degree of market concentration and price development requires a dynamic approach. The potential risks associated with high market concentration have different facets and can affect development of competition in many different ways. As discussed in Chapter 2.2 the evolution of the long-run marginal costs are decisive for investment decisions and should therefore be seen in the context of market entry of new market players. In case prices are lower than these costs – which dominant market players may influence– no investment into new generation capacity will be made and the status quo will remain.

The comparison of the development on the UK vs. the German market can serve as an example for some form of strategic behaviour resulting from the recent increase in market concentration. The UK market can be described as a market with a low degree of market concentration and with an oversupply (excess capacity) of generated electricity. This situation differs from the German market where the market concentration increased recently. The two biggest electricity generators (E.ON and RWE) were created through mergers, resulting in an increase of their market power. Following the finalisation of these mergers the two utilities mothballed generation capacity leading to an increase in the prices at the power exchange (see Chapter 3.4). Haas (2002) spells out, such a policy of a reduction of excess capacity can be characterised as a quite common result at the beginning of the liberalisation process[37]: 'First, prices decrease due to efficiency gains but after a short period of time they start to increase considerably, mainly due to the exertion of market power and a lack of excess capacities …'

The structure of the electricity supply industry may be of greater relevance for guaranteeing a competitive electricity market in the medium- to long-run. The present situation with high concentration and excess generating capacity in many EU member states can further hamper the entry of new market players because generation prices tend to be below full cost recovery for new competitors.

Table 3.5 The Internalisation / Europaisation of electricity generators

Company	Nationality	Percentage of EU market	Owned by	Key strategic ownership
EdF	France	17	100% State owned	ASA -Austria; Dalkia-France; Edison; Italenergua; London Electric; EnBW
RWE	Germany	9.7	Private	Innogy (UK)
E.ON	Germany	9	Private	Bayernwerk, Preussen Elektra, VEAG (all Germany); Sydkraft (Sweden); PowerGen (UK)
ENEL	Italy	8	100% State owned	Elcogas (Spain)
Vattenfall	Sweden	5	100% State owned	HEW, VEAG, Laubag, Bewag (all Germany); Finnish and Baltic States
Electrabel	Belgium	2.7	Tractebel (40%) Communis (5%) Tractebel Suez	Hidrocantabrico (Spain); Belgo-Nucleaire; Epon (Netherlands)
Endesa	Spain	2.6	Private	Enersis; NRE (Netherlands); SNET (France)
British Energy	UK	2.6	Private	Active in US market
Iberola	Spain	2.3	Private 2% EdP	Enipower (Italy); Iberdrola-Tractobel
EnBW	Germany	2	EdF part owned	Hidrocantabrico
Fortum	Finland	1.8	50% State owned	Ivo; Neste; Gasum

Source: Turmes C. (2002)

During the recent years several big mergers in the utility sector took place: in 1999, around 17 very large operators existed and nowadays only 11. The danger resulting from a high degree of

[37] Haas R. (2002) p. 3.

concentration within the electricity supply industry concerning the creation of an internal and competitive electricity market is also found in the NERA study[38] current trends would lead to a European electricity market far removed from the goals of liberalisation. If these trends were left unchecked, a few large (and probably state-owned) companies would end up either operating in all markets or dominating national markets, in a return to vertically integrated monopolies'. The number of electricity generators in most EU member states has decreased over time with the tendency of creating larger electricity generators by taking over and or acquiring stakes in other generators in EU member states as well as in the candidate countries. The fast pace of mergers and take-overs in this sector can especially be observed by considering that the money spent on acquisitions by the biggest European utilities (EdF, E.ON, RWE, Enel, Vattenfall, Endesa and Electrabel) increased from around 3.5 billion EUR in the late 1990s to 42 billion EUR in 2001.

The development of creating multi-national utilities must partly be seen in the context of the completion of the internal European market, a process of integrating the national markets into a single European market. The current development shows a new orientation of utilities by differentiating their portfolio; i.e. investing into areas such as telecommunications, water and gas supply. The Dutch energy companies, which are quite small on the European wide scale, realise the danger of the current liberalisation process and estimates are saying that around nine multinationals will survive this development requiring about seven million connections as the minimum customer base.[39]
Taking into account that only about 8% of total electricity consumption has been traded between EU member states in 2000, the discussion of becoming a single European market is probably too early. The current process shows a decreasing number of players at the national market further hampering the entry of new competitors.

The Scandinavian experience with the creation of the Nordic electricity market (Nord Pool) can be seen as a successful approach of integrating domestic markets into a regional one – at least for the time being. The individual markets of the four participating countries Denmark, Finland, Norway and Sweden are – based on the HH index – moderate or highly concentrated while the integrated market can be characterised as unconcentrated. However, the number of generators alone does not guarantee an open market and as Mannaerts and his colleagues conclude: 'sufficient trans-boundary transmission capacity and free access to the foreign electricity grid are also required for openness'.[40]

[38] NERA, (2003), p.ii.
[39] Energy Research Foundation (ECN) (2002) p. 46.
[40] Mannaerts H., M. Lijesen and M. Mulder (2002) p. 15.

Summary

One of the most important principles for creating competition is a low degree of concentration within the electricity supply industry. This implies the existence of many companies in the market thus guaranteeing that no single company can influence the market price and exercise market power. The above analysis reveals an inconsistent picture of the current situation: market concentration is still very high in some countries, such as France, Belgium, Italy and Greece, which are normally lacking behind in opening their electricity market compared to the forerunners, such as Austria, Finland, Germany and the UK. However, it is not possible to draw a general conclusion that electricity users in countries with a high degree of concentration are facing higher prices compared to the users in countries with a low concentration at the generators level. As our analysis shows, this is not surprising since many different factors, such as the electricity generation mix and availability of excess capacities, are influencing the price formation. However, the potential problems and barriers to competition associated with a high degree of concentration have to be analysed in a dynamic timeframe. As a result of takeovers and mergers in the EU member states the number of generators is decreasing. This could lead to quite a low number of international market players in the near future which some scholars are predicting. Such developments can obviously have severe consequences for the price formation in the long-run because competition requires many market players and excess capacities.

3.4 Environmental policy

The discussion so far clearly shows the complexity of energy policy and, in particular, the problems and obstacles to establish a competitive electricity market. The report has, until now, focused on the discussion of the current situation of the electricity markets regarding the energy mix used for electricity generation and features which can potentially hamper the development of a fully competitive and open electricity market. These features, such as network capacity constraints, overcapacity in national markets and the ongoing concentration process on the generators as well as on the supplier levels were addressed in the Electricity Directives. During the implementation phase, which started in 1999, it became clear that the rules and regulations laid down in the Electricity Directive did not go far enough and the European Commission published an amended proposal in 2002[41]. However, not all problems encountered during the implementation process have been equally addressed. It can probably be said there is still a lack of clarity how can the multiple objectives of EU energy policy and their simultaneous achievements be combined. The difficulty with the multiple objectives is discernible when the development of the electricity price is studied. The creation of an open energy market should increase efficiency by introducing competitive forces into the market leading to reduced prices.

[41] European Commission (2002c).

The use of market-based instruments for environmental policy

The European Commission has, in the sixth environmental action programme, emphasised the necessity to internalise the external costs to the environment. A widespread agreement exists that, in particular, electricity prices do not cover the external costs arising during the generation and consumption process. The transposition of this policy requires the use of policy instruments in the form of market-based instruments, such as taxes, tradable emission permits or emissions trading. It is quite evident that the implementation of such measures will influence the price formation.[42]

The estimation of external costs of electricity generation is a very complex task and is tainted with difficulties. A first estimate of the range of external costs of electricity generation from different fuels can be found in Table 3.6.[43]

Table 3.6 Estimates of external costs (EURc/kWh at constant 1995 prices) and electricity prices (EURc/kWh) External costs

	Coal and lignite	Oil	Gas	Nuclear	Biomass	Hydro	Wind	Price of industrial electricity	Price of household electricity
Austria	-	-	1-3	-	2-3	0.1	-	7.8	12.5
Belgium	4-15	-	1-2	0.5	-	-	-	6.3	12.4
Denmark	4-7	-	2-3	-	1	-	0.05	7.6	16.7
Finland	2-4	-	-	-	1	-	-	4.3	6.7
France	7-10	8-11	2-4	0.3	1	1	-	5.5	10.6
Germany	3-6	5-8	1-2	0.2	3	-	0.1-0.2	6.2	13.9
Greece	5-8	3-5	1		0-1	1	0.2-0.3	4.0	5.1
Ireland	6-8	-	-	-	-	-	-	4.9	6.6
Italy	-	3-6	2-3	-	-	0.3	-	7.0	16.8
Netherlands	3-4	-	1-2	0.7	0.5		-	5.4	14.6
Portugal	4-7	-	1-2	-	1-2	0.2	-	4.7	9.1
Spain	5-8	-	1-2	-	-	-	0.2	5.7	8.1
Sweden	2-4	-	-	-	0.3	0.03	-	3.3	9.0
UK	4-7	3-5	1-2	0.3	1	0-0.7	0.1-0.2	5.9	7.5

Source: European Environment Agency (2002) p. 58

The findings of this research project funded by the European Commission estimates the external costs of electricity generation representing around 1-2% of GDP in the EU[44]. The evaluation clearly shows that the costs are fuel-and country-specific. They all have in common that full internalisation of external costs into the prices paid by the electricity consumer would bring dramatic price increases. The reason for such a policy is the current market failure because, in the price formation, it considers only the economic / financial and not the social costs, i.e. the economic costs as well as the external costs. Such price increases would be dramatic in the

[42] See for example: Department of Trade and Industry (2003).
[43] See for further information: European Commission (1999c).
[44] European Commission, (2001e). The external costs of global warming are not included in these estimates.

countries relying on coal and oil as the main inputs for electricity generation. Germany, Spain, Italy and the UK, would be in particular affected with steep rising electricity prices in the case of full internalisation as the external costs of using coal and lignite have been in the same range as industrial electricity prices (see Table 3.6). The external costs of renewables are almost negligible compared to the costs relating to coal and oil.

The comparison of end-user prices and prices excluding any taxes in Tables 3.7 and 3.8 shows many EU member states making use of some form of fiscal instruments. The main focus lies on the third column because the data presented can be interpreted as a form of environmental and / or energy taxation aiming to internalise external costs. However, it would go beyond the scope of this report to analyse in detail whether the underlying rationale for implementing these taxes were environmental considerations or other reasons such as a policy tool to generate revenues.

Probably the most interesting information provided in Tables 3.7 and 3.8 is the last column that illustrates the share of all taxes as a percentage of the end-user price. The main conclusions are:

- this share is generally higher for households than for industries; i.e. household consumption of electricity is relatively and absolutely higher taxed than industrial consumption;
- the prices without taxes are higher for households than for industries in EU member states. This can be attributed to the difference in transmission and distribution costs;
- big differences exist in the size of the taxes between the EU member states as well as between the different users in the same country;
- the share of taxes paid by households is highest in Denmark and lowest in Portugal and in the UK, for example 54% of the price paid by a Danish household is allocated to the governmental budget;
- electricity purchased by households is subject to some form of energy taxation in the majority of EU member states with the exception of Greece, Ireland and the UK;
- the contribution of taxes paid by industrial users is highest in Denmark (41%) and lowest in Portugal (5%);
- energy taxation is less widespread for industry than for households.

Table 3.7 Electricity prices for households in European countries (in EUR/MWh: situation January 2002)

	Price without taxes	Taxes	VAT	End-user price	Taxes in % of end-user price
Austria	109.7	18.7	25.7	154.1	29 (12)
Belgium	141.7	1.5	30.1	173.3	26 (1)
Denmark	120.4	89.6	52.5	262.5	54 (34)
Finland	91.6	7.1	21.7	120.4	24 (6)
France (Paris)	112.5	11.9	22.0	146.4	23 (8)
Germany (western zone)	163.4	17.9	29.0	210.3	22 (9)
Greece (Athens)	68.0	0.0	6.0	74.0	8 (0)
Ireland (Dublin)	130.2	0.0	16.3	146.5	11 (0)
Italy	75.5	10.6	8.6	94.7	20 (11)
Luxembourg	155.7	7.1	9.8	172.6	10 (4)
Netherlands	123.9	22.6	27.9	174.4	29 (13)
Norway	177.3	11.7	45.3	234.3	24 (5)
Portugal (Lisbon)	143.3	0.7	7.2	151.2	5 (0)
Spain (Madrid)	109.9	5.6	18.5	134.0	18 (4)
Sweden	112.9	20.5	35.2	168.6	33 (12)
UK	146.6	0.0	7.3	153.9	5 (0)

Note: prices for households with an annual consumption of 1,200 kWh – category Db; special regulations are applicable for Italian households belonging to this category. Share of taxes other than VAT in % of end user price in brackets.

Source: Eurostat

Table 3.8 Electricity prices for industries in European countries (in EUR/MWh: situation January 2002)

	Price without taxes	Taxes	VAT	End-user price	Taxes in % of end-user price
Belgium	87.9	0.1	18.5	106.5	17 (0)
Denmark	63.9	6.8	38.3	109.0	41 (6)
Finland	44.9	4.3	10.9	60.1	25 (7)
France (Paris)	65.6	0.0	10.6	76.2	14 (0)
Germany (western zone)	76.4	3.6	12.8	92.8	18 (4)
Greece (Athens)	64.0	0.0	5.0	69.0	7 (0)
Ireland (Dublin)	94.9	0.0	11.9	106.8	11 (0)
Italy	82.1	23.6	10.6	116.3	29 (20)
Luxembourg	70.4	6.3	4.6	81.3	13 (8)
Norway	50.0	0.0	12.0	62.0	19 (0)
Portugal (Lisbon)	72.6	0.0	3.6	76.2	5 (0)
Spain (Madrid)	57.0	2.9	9.6	69.5	18 (4)
Sweden	34.6	0.0	8.6	43.2	20 (0)
UK	68.1	3.5	12.5	84.1	19 (4)

Note: prices for industrial users of an annual consumption 1,250,000 kWh with a maximum demand 500 kW (category Id) – no data available for Austria and the Netherlands. Share of taxes other than VAT in % of end user price in brackets.

Source: Eurostat

It is not surprising that the major share of total tax revenues accrued by the government are generally VAT revenues levied on the sale of a unit of electricity. However, during the recent years the contribution of other taxes (i.e. environmental and /or energy taxes) levied on the use of electricity has increased in EU member states. These policies are a consequence of environmental challenges countries are facing and they are often part of more general fiscal restructuring policies such as the implementation of revenue-neutral green tax reform.[45]

Policies promoting the use of renewables

Apart from these fiscal policies attempting to internalise the external costs, other environmental policy initiatives, having in common their direct influence on the creation of a competitive energy market, are becoming more widespread. The common objective of these policies is the promotion of the use of renewables in the energy mix in EU member states. This development illustrates that environmental concern and protection is on the political agenda. The implementation of these policies can, however, lead to possible conflicts between environmental and economic considerations/objectives:

- to internalise external costs - via taxes - and to promote the use of renewable - via special support schemes - with a consequence of increasing electricity prices (environmental considerations);
- to increase efficiency by introducing competitive market conditions with the aim of converging the electricity prices between EU member states and to reduce electricity prices because the currently electricity prices are causing 'unacceptable, and unnecessary, distortions in the competitive conditions across the single market'[46]. High electricity prices are also regularly described as competitive obstacle with respect to the main trading partners outside of the EU (economic considerations).

Environmental concerns have become a crucial driving force of EU policies as it can be seen in the recently adopted or proposed initiatives of promoting the use of renewable, reducing overall energy use and with regard to the Kyoto Protocol; i.e. the reduction of greenhouse gas emissions. The application of environmental taxes can be perceived as part of the strategy of achieving a reduction in the overall energy use by increasing the price of energy products. Increases in prices should trigger behavioural changes and should simultaneously promote energy efficiency improvements, particularly, in the medium- to long-run. Furthermore, the use of economic instruments is advantageous in the dynamic context as they provide ongoing and continual incentives to reduce emission through cost-effective technologies. Apart from these market-based policies some other European policy initiatives that will affect the price formation and competition on energy markets have started. These other policy initiatives are aiming to promote the widespread use of renewables in EU member states:

[45] OECD (2001).
[46] European Commission (1998).

- In 1997, the EC adopted the 'White Paper for a Community Strategy and Action Plan, Energy for the Future: Renewable Sources of Energy' with the target of 12% contribution of renewable energy sources (RES) to total EU gross inland energy consumption by 2010.
- In 2001, the European Parliament adopted the Directive on the promotion of electricity from renewable energy sources (RES-E Directive). This Directive sets a target of 22% of total EU electricity production being generated by renewable energy sources for 2010. Indicative targets for each EU member states are also part of the Directive.
- In 2002, draft Directive on bio fuels aiming to increase the use of bio fuels in the EU has been proposed.

  The 2001 Directive on the promotion of electricity from renewable energy sources will have severe consequences for the European energy market, particularly, for the electricity market and electricity prices. The increasing use of renewables in electricity generation (green electricity) obviously influences the price formation process since the generation prices of green electricity are still higher compared to conventional thermal and nuclear generation costs[47]. Specific support programmes for the promotion of the use of renewables are in place in many member states[48] and are regularly funded through specific earmarked fiscal instruments. The situation in Germany is presented in Table 3.9 providing an example of different policy instruments and schemes in place.

Table 3.9 Estimated average electricity bill of household (per month in EUR and in percentage of total electricity bill)

	1999	2000	2001	2002
Electricity bill – total per month	48.20	40.61	41.72	44.60
VAT (16 %)	6.65 (14%)	5.60 (14%)	5.76 (14%)	6.15 (14%)
Concession charge (1)	5.22 (11%)	5.22 (13%)	5.22 (13%)	5.22 (12%)
CHP law (Kraft-Wärme-Kopplungsgesetz)	0.00	0.38 (1%)	0.59 (1%)	0.76 (2%)
Renewable energy law (Erneuerbare-Energie-Gesetz, EEG)	0.28 (1%)	0.53 (2%)	0.63 (2%)	0.85 (2%)
Electricity tax	2.25 (5%)	3.73 (9%)	4.47 (11%)	5.22 (12%)
Electricity generation, transmission and distribution	33.80 (70%)	25.15 (62%)	25.05 (60%)	26.40 (59%)

Note: Basis for calculation: Electricity consumption of 3,500 kWh per annum; (1) concession charge is regionally differentiated and the rates are set between 1.32 euro cent/kWh and 2.39 euro cent/kWh.
Source: VDEW, www.vdew.de; report published on April 29, 2002.

The table illustrates the development of different cost components between 1999 and 2002. The total monthly bill dropped, between 1999 and 2002, by around 10% as a result of the big fall in the electricity generation, transmission and distribution costs (22%). In contrast, the share of taxes and charges paid by electricity consumers on the total electricity bill increased both in

[47] See for example Auer J. (2002) for a comparison of the specific generation costs for different technologies.
[48] A detailed discussion of the different programmes and models used in EU member states can be found by Huber et al. (2001) and a detailed analysis of the Dutch situation by Energy Research Foundation (ECN) (2001). Considering the fast changing political situation with regard to such support schemes information presented in these reports could be out-of-date.

absolute and relative terms, i.e. from around 6% to 16%. The share of all cost components which cannot be assigned to the generation, transmission and distribution costs is still higher; it increased from 30% to around 41%. The contribution of taxes and charges are even higher in Austria where average bill of a consumers is composed of the costs of energy generation (22% of the final bill), transmission and distribution (41%) and taxes and charges (37%). It is also worthwhile having a closer look on the fiscal system funding the promotion of green electricity in Austria. The system consists of two components: electricity utilities have to pay green electricity from the generator at a price of 45 EUR/MWh (average 'market' price is around 25 EUR/MWh). In addition, financial burden is also levied on the final consumer: households are paying a surcharge of 1.39 EUR/MWh and the energy-intensive industry a surcharge of 0.99 EUR/MWh in 2003.

Table 3.10 shows the current situation with regard to the share of electricity generated by renewable energy resources and the indicative targets for 2010 of the RES-E Directive. All member states have quite a long way to go to fulfil these targets affecting clearly the domestic electricity generation markets because the energy mix for generation of electricity will have to change. That will undoubtedly have some consequences for the electricity prices in the future as the electricity generation costs from renewable sources are still higher compared to conventional technology.

Table 3.10 Electricity generation from renewable sources – current situation and indicative targets

	Electricity generated from renewables (TWh, 1997)	Share of electricity generated from renewables (%, 1997)	Target of electricity generated from renewables (%, 2010)	Electricity generated from renewables (estimated) (TWh, 2010)
Austria	39.05	70.0	78.1	55.16
Belgium	0.86	1.1	6.0	6.30
Denmark	3.21	8.7	29.0	12.88
Finland	19.03	24.7	31.5	30.43
France	66.00	15.0	21.0	112.92
Germany	24.91	4.5	12.5	76.66
Greece	3.94	8.6	20.1	14.57
Ireland	0.84	3.6	13.2	4.46
Italy	46.46	16.0	25.0	89.76
Netherlands	3.45	3.5	9.0	11.94
Luxembourg	0.14	2.1	5.7	0.45
Portugal	14.30	38.5	39.0	24.19
Spain	37.15	19.9	29.4	75.15
Sweden	72.03	49.1	60.0	97.54
UK	7.04	1.7	10.0	50.03
EU	338.41	13.9	22.0	662.45

Source: European Commission (2001f) and Huber et al. (2001)

Setting such indicative targets has to be identified as a political intervention into the energy market that is not necessarily in accordance with the ideal situation of full competition. There are a number of other political motivated interventions: several EU member states have passed laws to close nuclear power plants (for example: Belgium, Germany, and Sweden). One of the consequences of these policies will be that the merit order in the different countries will change. It can, therefore, be expected that the marginal plant during the average load period will have higher generation costs compared to the situation today because nuclear power plants are generally covering the base load in these countries. It is not possible to draw a definite conclusion. Many other factors are determining the choice of future investment, i.e. what types of conventional thermal will be built, in addition to the renewable generation plants, to satisfy expected growth in electricity demand, and to offset the reduction in capacity as a consequence of these nuclear closure programmes. The size of new investment programmes are further depending on the potential of energy / electricity savings measures and how much of this potential will actually be realised.

Several forecasts done by different institutions, such as the European Commission, the International Energy Agency and the US Department of Energy, came to the conclusion that major new development of extending capacities will be investments into CCGT plants using natural gas. This will seriously affect the development of the natural gas market as well as the pricing regimes for natural gas.

Furthermore, it can be expected that subsidy schemes, such as those mentioned in Table 3.10, will have to play a major role in the development of the promotion of green electricity. The types of strategies for promoting electricity generation from renewables are manifold. However, some of these schemes are offering very high amounts which can add up to 200 EUR/MWh in cases of support for PV.[49] Such a high support is more the exemption and the rates for other renewables are much lower. Other policies, as the one implemented in the UK, are also intervening into the electricity market. The, so called, renewables obligation in the UK requires that retailers of electricity have to cover a growing percentage of their supplies from renewable generation. If the retailers do not fulfil their ratio they have to compensate any shortfall by paying for an exemption certificate.

An issue that has, so far, not attracted too much interest in this context is related to problems of availability and volatility of green electricity. A recent study[50] commissioned by the UK Government, Department of Trade & Industry, estimated that the system costs could increase to around £ 400 million per annum, if England and Wales would raise the targets for green electricity to 20% by 2020. The actual figures of the size of these system costs (which exclude all capital and operating costs of renewable electricity generation and the costs of connecting these new generation capacity to the transmission and distribution system) estimated in this report are not as important compared to the reasons why these system costs do occur. The

[49] Huber et al (2001)
[50] ILEX (2002).

unreliability of renewables in electricity generation is identified as the main reason, meaning that additional investments are needed in short-term balancing, and into additional thermal power stations to ensure security of supply. The problematic and complex issue around the short-term balancing mechanisms of renewables is a topic raising further questions about how governments promote and support renewables in electricity generation and how such schemes intervene and distort the market[51].

Summary

As discussed in Chapter 2.1, one of the rationales for introducing the Electricity Directive was the different price level between EU member states and with the main trading partners outside of the EU. The creation of an internal European energy market should remove such distortions by increasing efficiency. An implicit aim of creating competitive market is to lower electricity prices for the electricity users in EU member states.

However, a discussion of energy politics must include other policy areas, such as environmental policy, because of possible synergies and / or discrepancies between them. The use of fiscal instruments for environmental policy issues is a widespread policy tool with quite distinct objectives. The focus of the study is to analyse the use of instruments to internalise external cost associated with electricity generation, and to support schemes promoting the use of renewables in electricity production. The former has to be characterised as a policy tool intervening on the market with the aim of improving the welfare of the citizens. In addition, this approach is completely in accordance with the general accepted polluter pays principle. The latter has to be assessed in the context of a range of different market intervention programmes all aiming to promote the use of renewables. It is worth noting that non-market based measures (in the form of regulations providing indicative targets for the use of renewable in the energy mix in EU member states) are combined with fiscal support schemes. These policies are insofar of relevance because they are opposed to the creation of competitive conditions.

The significance of fiscal instruments has clearly been shown in the analysis considering that taxes (energy / environmental taxes and VAT) can account for up to 50% of the end-user price for households. The share of VAT is generally much higher than the share of environmental policy instruments in EU member states. However, some changes with regard to the latter policy tools will occur in 2004 following the political agreement reached by the EU Economics and Finance Ministers at their meeting in March 2003 to introduce taxes levied on the use of electricity.

[51] This problem is regularly mentioned in the context of NETA see: Helm D. (2002b) and Newbery D.M. (2002).

4 Cross-Country Analysis of Energy Markets and Prices

4.1 Introduction

As shown in Tables 2.1 and 2.2 some progress has been achieved in the process of creation Community-wide energy markets for electricity and gas. Expectations are rather high providing the process should increase efficiency thus leading to a greater competition amongst existing market players and between the incumbents and new market players. The regulation for new entry, laid down in the Electricity Directive stipulates that 'new entry must be permitted under the transparent, objective and non-discriminatory terms of an authorisation procedure. The Directives create thus fundamental conditions for supply-side competition between incumbent operators as well as between incumbents and new market entrants. … The existing monopolistic supply situation does not evolve overnight into a competitive market structure'.[52]
Another implicit aim of the European energy policy is to start a process of converging national energy prices. The figures below show the development of retail prices (nominal prices without taxes) between January 1995 and July 2002 for some EU member states and for different end-users categories.[53]

An uniform development of retail prices cannot be established during this period. Some of these findings are noteworthy: a trend of reducing the prices for the industrial sector is discernible in Germany which is in slight contrast to the evolution in Italy. The retail prices before tax are the lowest in Sweden irrespectable of the different user categories. Based on these developments it is unfeasible to conclude whether the aim of more congruence between electricity prices has been achieved. It should be noted that the policies transposing the Electricity Directive into the national legal systems are in place for only three years in many EU member states. Therefore, it will take some time before any meaningful conclusions can be drawn. It is, indeed, not surprising to find different developments of electricity retail prices considering the potential economical, technical and political obstacles in the context of creating a competitive market. The actual causes can be manifold and are studied in detailed analysis of national electricity markets below. End user prices in some EU member states are presented in the Figures 4.4 – 4.6. Uniform trend in the end-user prices can, again, not be reported. Probably the most irritating development occurred in Italy where energy-intensive users (category Ig) have faced an increase of 30% in the current prices between January 1999 and July 2002 compared to a decrease of 9% for industrial users (category Ib) consuming and of 8% for households. This development is not the result of introducing any fiscal measures. An increase in the end-user

[52] Albers M. (2001) p. 7.
[53] Only the price developments in some countries are shown in these figures. The full tables covering all 15 EU member states can be found in the annexes. The source of these figures is Eurostat's half-yearly publication 'Statistics in Focus – Theme 8 - Energy and Environment' – for further information: see the website of Eurostat at: www.europa.eu.int/comm/eurostat/

prices for households, quite often resulting from the introduction of fiscal measures, can be found in several countries shown in Figure 4.6.

Figure 4.1 Electricity retail price before taxes (current prices EUR/MWh) – Eurostat category Ig – Consumption of 24,000 MWh/year – industrial users

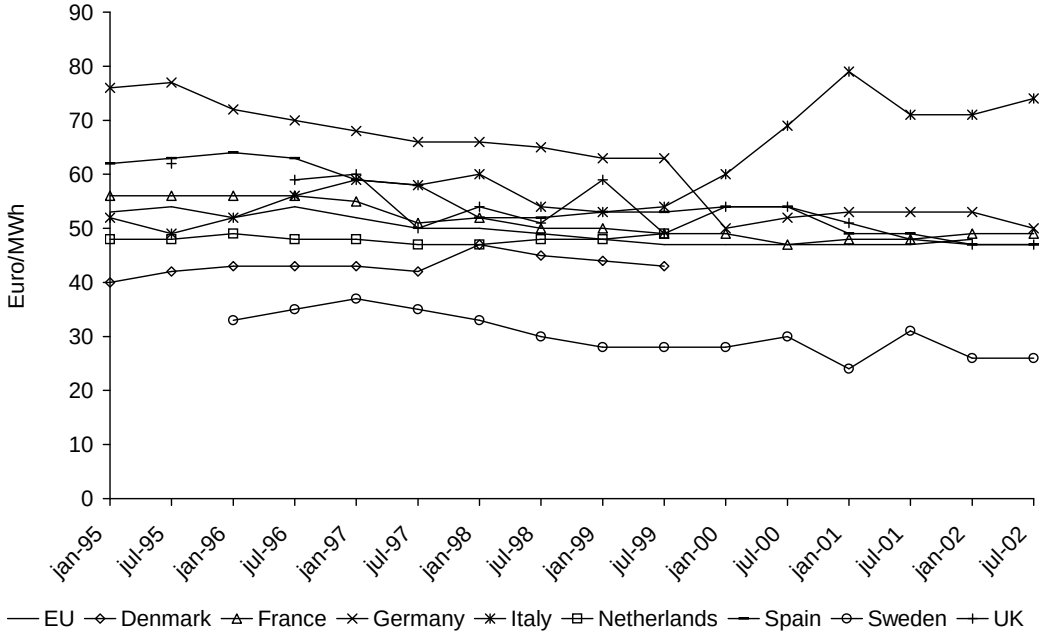
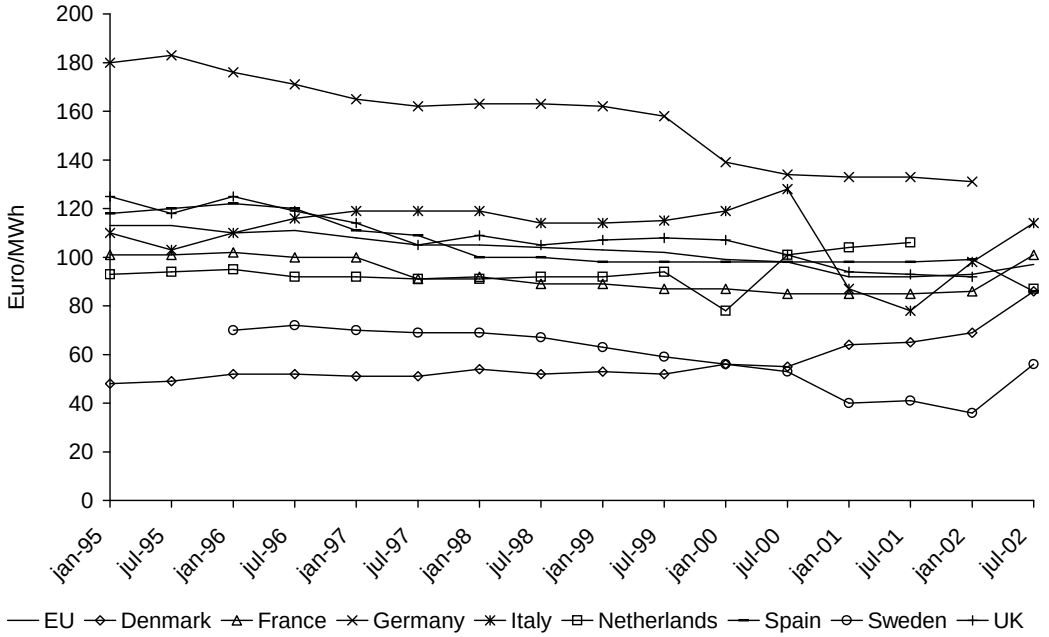
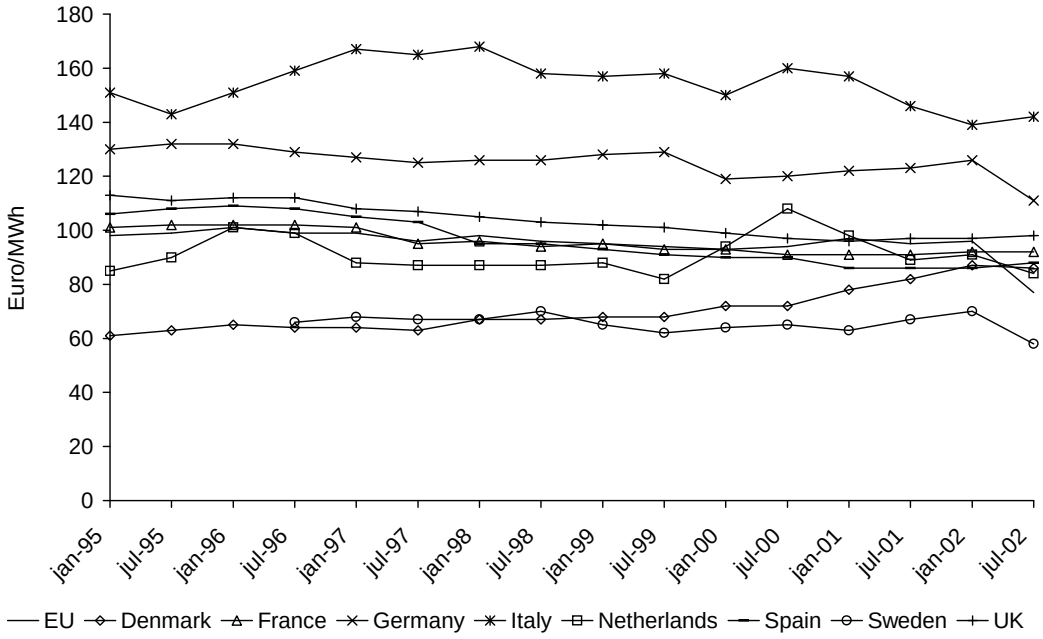


Figure 4.2 Electricity retail price before taxes (current prices EUR/MWh) – Eurostat category Ib – Consumption of 50 MWh/year – industrial users



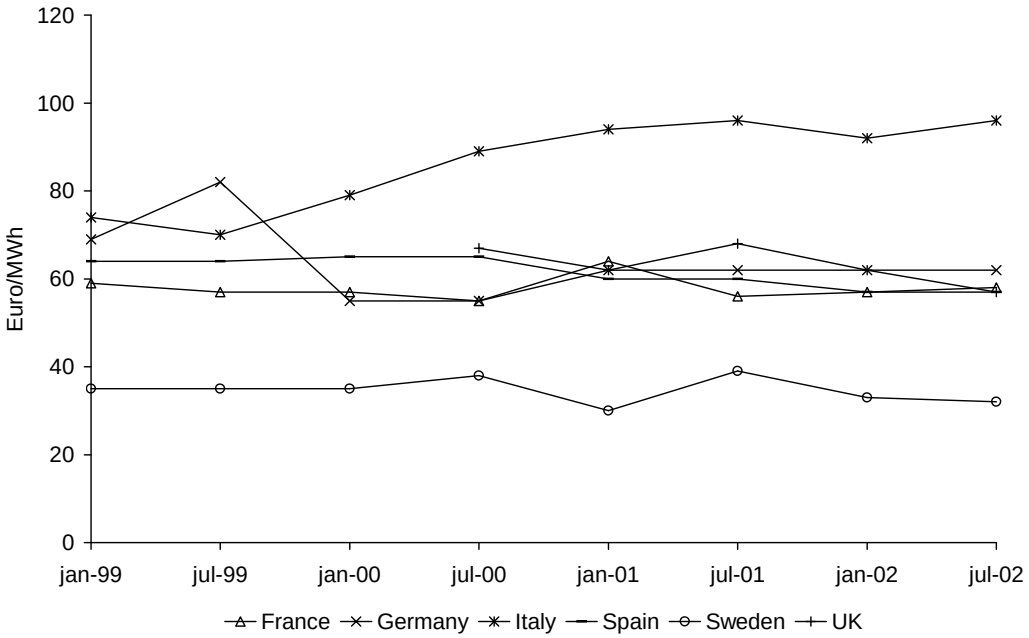
Source: Eurostat and European Commission (2002a).

Figure 4.3 **Electricity retail price before taxes (current prices EUR/MWh) – Eurostat category Dc – Consumption of 3.5 MWh/year – household users**



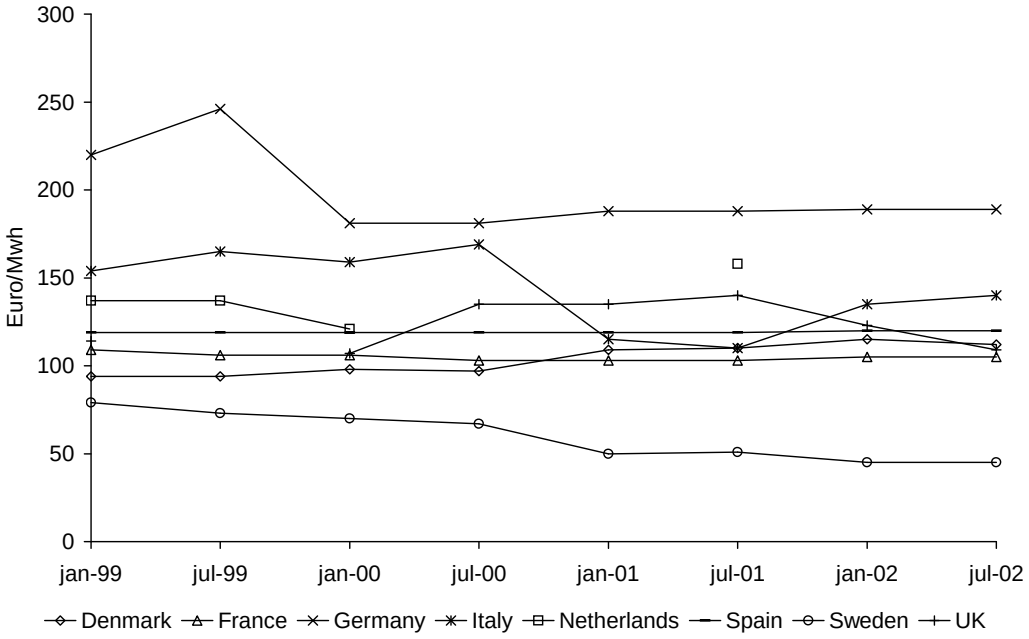
Source: Eurostat and European Commission (2002a)

Figure 4.4 **Electricity end-user prices including all taxes (current prices EUR/MWh) – Eurostat category Ig – Consumption of 24,000 MWh/year – industrial users**



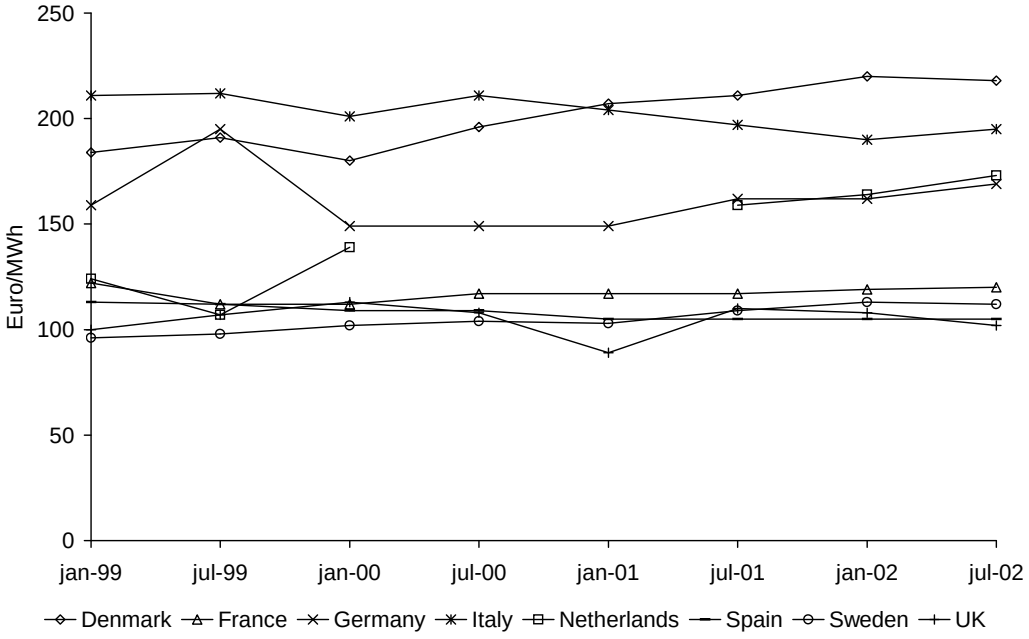
Source: Eurostat.

Figure 4.5 **Electricity end-user prices including all taxes (current prices EUR/MWh) – Eurostat category Ib – Consumption of 50 MWh/year – industrial users**



Source: Eurostat

Figure 4.6 **Electricity end-user prices including all taxes (current prices EUR/MWh) – Eurostat category Dc – Consumption of 3.5 MWh/year – household users**



Source: Eurostat.

The rationale for analysing national electricity markets is to identify country-specific features which can hinder the creation of competitive market structures and influence the price formation. However, a caveat has to be made before the analysis of some national markets is done, that the analysis will be far from exhaustive. The main focus is directed to study the electricity generation mix and to learn more about regulatory systems influencing wholesale prices, particularly, in Spain and Italy. Further issues, such as the current reserve margins in national electricity markets, current patterns in electricity trade and the question of the level of concentration, will also be addressed.

4.2 The Nordic/Scandinavian electricity market

4.2.1 Introduction

The Nordic countries started to reform their electricity markets in the early 1990s, before the Electricity Directive was adopted. The exception was Denmark, which started the reform process in 1999. Owing to some country-specific characteristics, the development in the four Nordic countries should be discussed separately. One of the main differences is presented in Table 4.1. Before the reform process begun the single, vertically integrated generation and transmission companies dominated the national markets and 'market power was a salient feature of the Nordic power market'.[54]

Table 4.1 Electrical energy generated in the Nordic countries in 2001 (in percentage)

	Denmark	Finland	Norway	Sweden	Nordic countries
Hydro		18	99	50	55
Wind	11			0	1
Nuclear		31		44	24
Conventional thermal	89	51	1	6	20
- bio fuels, peat, etc	5	20		2	5
- coal	48	15		1	8
- gas	25	13	0	1	5
- oil	1	2		2	1
- others	9	1	0	0	1

Source: Swedish Energy Agency (2002)

4.2.2 The Norwegian electricity market

Norway was, after England and Wales, the second European country opening its electricity market to competition in 1991. In 1995 all electricity users had the freedom to choose their electricity supplier. Power generation is almost completely based on hydropower (see Table 3.3) which is interesting knowing that Norway is one of the biggest natural gas producers in the

[54] Bergman L. (2001) p. 1.

world. The Norwegian Government is planning to extend the use of renewables in the coming years partly based on an ambitious environmental policy. Discussions about the expansion of gas-fired power generation are also underway. The biggest problem Norway is facing in terms of electricity generation is the complete hydro-dependency and the high volatility of the wholesale price coming as a consequence of the weather dependency. This problem is reduced ever since the Nordic countries established a common electricity exchange Nordic Power Exchange, also known as Nord Pool, which is the most liquid trading place for electricity in Europe. Liquid and transparent trading places for electricity is a major component for the proper functioning of competition in the electricity industry.[55]

4.2.3 The Swedish electricity market

The structure of the Swedish electricity market differs from the Norwegian market. In 2001, the majority of electricity was generated in hydro power plants, as in Norway, but it accounted only for 50% of total generated electricity (see Table 4.1). The major difference is that nuclear power in Sweden accounted for 44%, while the remaining 6% are generated in fossil- or bio fuel-fired plants. The Swedish power sector does not face the big problem of hydro/weather dependency, as it is the case in Norway. Nevertheless this issue is of some concern, in particular, with respect to the nuclear closure programme.

The Swedish electricity market was reformed in 1996 by introducing competition in trading and generation of electricity. However, the transmission and distribution have not been opened and are characterised as a 'regulated monopoly'.[56] In 1997, the Swedish Parliament adopted the Nuclear Power Phase-out Act and the first nuclear power plant has been shut in November 1999. A further shut down of a plant is expected to be 'at the end of 2003 at the latest, provided that the loss of generation capacity can be compensated by reduced electricity consumption and new generation capacity. The Government has considered the matter on two occasions, but then concludes that the conditions were not met'.[57] A possible risk of power shortage was tackled by the Swedish Government by entrusting Svenska Kraftnät, the Swedish grid utility, 'with the task of safeguarding electricity generation capacity during very cold weather. This has been done by purchasing reserve power capacity. The assignment resulted in additional power generation capacity consisting of previously decommissioned power generation plants and companies prepared to reduce their power consumption voluntarily. The procurement of reserve capacity is a temporary transitional measure'.[58]

[55] See for further information: Green R. (2001).
[56] Swedish Energy Agency (2002) p. 2.
[57] Swedish Energy Agency (2002) p. 17.
[58] Swedish Energy Agency (2002) pp. 2-3.

4.2.4 The Finnish electricity market

The reform of the Finnish electricity market started in 1995, with the market completely opened to competition in 1998. The Finnish generation mix is based on conventional thermal power (accounted for 51% in 2001), nuclear power (31%) and hydro power (18%). Finland was, throughout the last years, an importer of electricity. Combined with growing electricity demand for electricity the Finnish Government proposed in January 2002 to build a nuclear power plants, which was approved by the Parliament in May 2002.

4.2.5 The Danish electricity market

The Danish electricity sector heavily relies on coal-fired and gas-fired thermal power plants; the former accounted for 48% and the latter for 25% in 2001. This situation is in sharp contrast to the mix in the other Nordic countries. A further difference is the big share of renewables in the generation mix; wind power accounted for 11%. The long-term energy plan of the Danish Government is to further promote the share of renewables, in particular the use of bio fuels, straw and wood chips. The conversion of bio fuel-fired thermal power plants into combined heat and power plants is also a component of this energy plan.

4.2.6 Summary – the Nordic region

With the exception of Denmark all countries in the Nordic region have in common that a large proportion of electricity is generated from renewable energy sources. However, this is not crucial when the Nordic region is analysed as a whole (see the last column in Table 4.1) because the electricity markets in these four countries became increasingly integrated with the opening of the electricity wholesale pool Nordic Power Exchange (Nord Pool). This implies that developments of the national markets cannot be analysed in isolation considering that Nord Pool is the most liquid market by trading around 29% of total electricity generation on the physical market (spot market) in 2001. Electricity is also traded on a financial market for a period of up to four years (forward market) at Nord Pool.[59]

Nord Pool is currently the common marketplace for electricity trade in the four countries and trading tariffs between the countries have been abolished. All markets have been fully deregulated; i.e. transmission and distribution activities which are seen as natural monopolies are separated from generation and supply, regulated third-party access (rTPA) to the transmission and distribution network, and competition in generation and supply (retail services) is guaranteed. The tariffs of transmission and distribution services as well as the short term stability are regulated in each country separately thus guaranteeing that the overall control of the system remains under national responsibility. Free choice of selecting suppliers is fully established in Finland, Norway and Sweden but, so far, not in Denmark where only 35% of the market is declared open (see Table 2.1) although it is planned to be opened to all Danish

[59] See for further information about Nord Pool: www.nordpool.com and Swedish Energy Agency (2002).

electricity users during 2003. The general transposition of the requirements of the Electricity Directives is rather advanced considering that the European Commission did not identify too many obstacles concerning the effective opening and creating competitive conditions compared to the situation in other member states (see Table 2.1 and EC 2001a).

Table 4.2 Spot market on Nord Pool (EUR/MWh)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual average
1999	16.5	14.8	12.6	10.7	11.5	10.1	8.3	13.3	15.8	16.1	15.0	16.9	13.4
2000	16.2	12.9	11.8	12.8	9.5	10.4	6.4	9.8	14.2	15.4	16.8	16.9	12.4
2001	20.5	27.1	25.9	26.5	24.1	25.3	22.6	21.4	20.9	19.1	21.4	23.6	22.3
2002	24.5	20.3	18.6	17.4	15.3	16.4	15.7	20.3	24.7	31.3	43.2	74.4	30.2

Source: Elspot monthly prices at www.nordpool.com

The development of the spot market during the period between 1999 and 2002 shows an increasing trend in electricity prices. During the last two months in 2002, the highest pool prices were reached with 74.4 EUR/MWh (43.2 EUR/MWh) in December (November) 2002 compared to previous highest of 39.8 EUR/MWh in September 1996. The average price was still above 70 EUR/MWh in January 2003. One of the reasons was the very low rain fall; the lowest rain fall for the last 70 years is reported for the period between August and November 2002 for Norway.

Table 4.3 Spot market on Nord Pool for different areas in 2002 (EUR/MWh)

Month	Oslo	Sweden	Finland	DK-West	DK-East	System
January	24.23	24.89	24.91	23.49	27.14	24.53
February	20.25	20.40	20.41	20.12	20.45	20.30
March	18.61	18.62	18.62	18.96	18.66	18.60
April	17.39	17.39	17.39	22.01	22.39	17.39
May	15.05	15.76	15.85	18.06	16.01	15.27
June	14.66	19.83	19.93	22.88	20.22	16.43
July	14.59	17.00	18.39	19.44	18.98	15.66
August	19.43	22.52	22.76	23.61	24.77	20.27
September	24.15	25.82	25.81	28.72	26.67	24.65
October	31.29	31.63	31.54	29.68	31.70	31.34
November	43.14	43.25	43.25	35.85	43.25	43.22
December	75.23	73.42	67.68	42.50	71.91	74.43
Annual	26.57	27.62	27.28	25.47	28.59	26.91

Source: Elspot monthly prices at www.nordpool.com

A special feature of the Nord Pool electricity exchange is the creation of so-called notification areas, which are of crucial importance in the case of network limitations. Sweden and Finland is each one such notification area, Denmark is split in two and Norway consists of several such

notification areas. In the case of network limitations a price mechanism is applied to regulate the flow of power. In the area with existing surplus of electricity the price will be reduced, while the price increased in the shortfall area until the transmission requirement matches the capacity limit. Table 4.3 presents the development of the spot market for the main notification areas.

Electricity retail prices in the Scandinavian countries have been quite low compared to the situation in other EU member states (see Figures 4.1 – 4.3 and the tables in the annexes). This is not surprising and is based on the fact that the Nordic generation market is established on low marginal cost generation capacities of hydro and nuclear. These generation capacities are used for base load. A potential increase in generation capacity will probably be based on conventional thermal plants with higher marginal costs and on renewables which could lead to an increase in retail prices.

Table 4.4 Largest electricity generators in the Nordic countries in 2001

Generator	Energy generated in 2001 (in TWh)	Share on national market (in %)	Share in Nordic countries (in %)
Sweden	157.8		41
Vattenfall	76.6	49	20
Sydkraft	32.7	21	8
Norway	121.9		31
Statkraft	33.3	27	9
Norsk Hydro	9.8	8	3
Finland	71.6		18
Fortum	40.4	56	10
Pohjolan Voima Oy	15.9	22	4
Denmark	36.0		9
Elsam	16.1	45	4
Energy E2	11.8	33	3
Largest Nordic generators	236.6		61
Total electricity generated	387.8		

Source: Swedish Energy Agency (2002) p. 40

An area causing difficulties in creating a competitive electricity market is the existence of operators with dominant market shares as documented by the European Commission in the second benchmarking report. As a consequence of integration of the four national markets a slightly different approach has to be applied for this analysis. The largest Nordic electricity generators, by the share of their national and Nordic market, are presented in Table 4.4. This illustrates that the electricity generation is largely concentrated with a few companies in Sweden, Denmark and Finland but not in Norway. This picture of high concentration slightly changes when the Nordic market is analysed as a whole. The biggest generator, the Swedish Vattenfall, has a share of 20% while the next two biggest of 10% and 9%. This statement has to

be taken with some care because of the regionalisation of electricity markets, as it is the case in the Nordic region. For example, Sydkraft, the second biggest generator in Sweden, is owned by the German E.ON (a stake of 55%) and by the Norwegian Statkraft (44%). Furthermore, the Swedish Vattenfall is the fifth largest operator in Europe and is an important player on the Finnish market (see also Table 4.4). Therefore, a simple calculation of national market shares does not necessarily say anything about market power as it was already discussed above. Furthermore, market power, which can impede competition on the electricity markets, does not only exist on the generator level but also on the supply/retail level. It can, additionally, be present as a combination between these two levels of the electricity chain as it can be observed in the Nordic region: 'The three big companies Vattenfall, Fortrum/Birka Energi and Sydkraft also dominate on the electricity trading market. The three together account for around 70% of sales to end customers'[60].

The experience gained in the Nordic countries so far has been summarised by Bergman (2001):[61]

'that an electricity market with vertical separation between generation and transmission can work without supply interruptions; "the lights did not go out". Moreover the experience suggests that competition, and in particular retail competition, can lead to lower prices and higher productivity in the electricity supply industry. …. The overall evaluation of the electricity market reforms in the Nordic countries is quite positive. The benefits of increased competition are obvious, and few problems have emerged. However, the markets were deregulated and integrated in a situation with considerable overcapacity both in generation and transmission. Thus there have been few problems related to congestion management and the availability of reserve capacity'.

These overall positive comments regarding the creation of a competitive Nordic electricity market are supported by the result of the study 'Konkurrensen pa elmarknaden' (Competition on the electricity market) commissioned by the Swedish Government. The study reports that: 'there are risks of ineffective competition, although there is no evidence that companies use their market power to further their own ends. The opinion of the study is that competition performs relatively well'.[62] Furthermore, the study sums up that 'no evidence could be found to indicate that prices on the end customer market have been manipulated'.[63] The overall conclusion is that competition is functioning quite satisfactory. However, the market has to be

[60] Swedish Energy Agency (2002) p. 41.
[61] Bergman L. (2001) p. 10.
[62] Swedish Energy Agency (2002) p. 41.
[63] Swedish Energy Agency (2002) p. 42.

critically studied in the future because of the accusation 'that the differences between purchase price and sale price have increased during last year'.[64]

Johnsen (2003) comes to a similar conclusion analysing the Norwegian electricity market: 'While there are no clear signs of market power in the Norwegian market today, increased concentration may lead to higher prices in the future. Dominant generators may apply market power in various ways'.

4.3 The UK electricity market

The UK electricity market is structured differently. Distinction should be made between the markets in England and Wales and the market in Scotland. While the former has undergone a big transformation starting in the 1990s, the latter has not experienced such a process. Furthermore, the Scottish market remains regulated meaning that the wholesale prices of electricity are administered by using the price development in England as a benchmark.

The generation mix in terms of generated output is different from the situation in the three northern countries of the Nordic regions. In 2000/01, gas fired generation (CCGT) accounted for 40% of total output, coal and oil for 30%, nuclear for 22% and imports for around 8% (see Table 4.5). The generation mix is similar to the situation in Denmark with thermal convention contributing around 70% in England and Wales compared to 80% in Denmark.

Table 4.5 Generation Output by Fuel Type in EU Member States (in %)

	UK (2000/01)	Germany (2000)	Spain (2000)	Italy (2000)	Netherlands (1999)
Nuclear	22	34	30		5
Hard coal and lignite		52	38		25
Coal & oil	30			9	
Oil					8
Oil, gas & others		9	5	37	
Gas	40			2	56
Hydro		5	14	17	
Cog. & Renewables			13	20	6
Imports	8			15	

Source: Morgan Stanley Equity Research (2002).

Interesting enough is the fact that the huge increase in gas generation capacity – from a market share close to zero in the early 1990s - happened during the last 10 years thus displacing coal fired generation capacity under the 'dash for gas' programme stipulated by the UK Government.

[64] Swedish Energy Agency (2002) p. 42.

The liberalisation process started in the UK with the electricity industry privatisation in 1990. During the privatisation process the UK Government created a very small number of companies dominating the generation market. Two of these generators, Powergen and National Power, were able to influence the price setting in the English Pool (wholesale market) until the mid of the 1990s although new players entered the market investing in new gas fired generation and increased imports from France. The situation changed when 'the regulator adopted a highly interventionist approach – initially obliging the two companies to set prices not exceeding a specific level for two years, then forcing the companies to divest themselves of a significant proportion of their capacity on two occasions, and finally replacing the Pool with New Electricity Trading Arrangements (NETA). The original structural decision to create only a small number of generating companies at privatisation took over a decade to put right. The England and Wales wholesale generation market is now, at last, exhibiting conditions representative of a competitive market – innovative contracting, price transparency and falling prices'.[65]
Some of the driving forces behind this development are the occurrence of new entrants investing mainly into CCGT generation technology, strong regulatory interventions and the changes in the market rules by moving away from the centrally administered Pool System to NETA in 2001. This new trading system holds more features associated with the idea of a more normal commodity trading market than the previous Pool System. However, the share of electricity traded through this balancing system is only around 3% which is much lower compared to the situation in the Nordic countries.

As a consequence of these policies an increase in competition between generators took place and, accompanied with the increase in gas-fired generation capacity, led to an oversupply of electricity and to a sharp reduction in the wholesale price for electricity. The result of these developments - oversupply of electricity followed by a sharp drop in wholesale prices as a consequence of NETA - was the mothballing of some capacities and the financial crises of many generators, such as the nuclear electricity generator British Energy (September 2002). The UK generation and supply market is highly fragmented compared to the situation in other EU member states where no generator has a market share of more than 15%. This development is insofar significant implying that no participant has market power mothballing further capacity with the aim of increasing the wholesale prices. Such situation is in strict contrast to the development on the German electricity market discussed below. Future investments in CCGT plants are planned thus implying that the evolution of the gas price will have considerable influence of the wholesale electricity price in the medium- to long-term.

UK electricity consumers have enjoyed a fall in electricity retail prices during the last years (see Table 2.3). Slightly different results can be found studying the end-user prices, in particular for

[65] Morrison M.B. (2002) p. 4.

private households, as they have been almost stable in nominal terms during the last four years. Interesting to mention are the findings of a report published by the National Audit Office (NAO) in January 2001 arguing that around 80% of the savings in UK electricity bills are the consequence of regulatory price controls rather than increased competition in the electricity generator and supply sectors.

4.4 The German electricity market

The generation mix of the German electricity market shows some similarities to the UK market considering that the major share of electricity is generated in thermal convention with a heavy dependency on lignite (27%) and hard coal (25%) in 2000 (see Table 4.5). One of the reasons for such high share is certainly the German Government's promotion of coal and lignite use in the electricity generation. It is also worthy noting that the Electricity Directive indirectly supports such a policy by enabling member states to give some sort of priority for using indigenous primary energy sources up to a limit of 15% in the generation of electricity. Nuclear power accounts for 34% of electricity generated, hydro power for 5% and gas, oil and others for the remaining 5%.

The future generation mix is directly influenced by political decisions. The financial support for the domestic coal industry will further be reduced over the coming years almost certainly influencing the use of coal in electricity generation. Additionally, the nuclear closure programme, which foresees the closure of all nuclear power plants during the period from 2002 until 2022, will affect the electricity generation. Considering the long-term facet of the programme, this policy will not, on the short-run, lead to any severe consequences.
Electricity trading in Germany has a shorter history compared to the UK and the Nordic countries. Trading began in 2000 on two different exchange places at the European Energy Exchange in Frankfurt and at the Leipzig Power Exchange. Both exchanges agreed to merge during 2002. Table 4.6 shows the development of the spot prices since the start of the electricity trade in Germany. The high volatility in spot prices as seen at the Nordic Power Exchange (shown in Table 4.3) have not occurred in Germany.

Table 4.6 Spot market prices on the European Energy Exchange (EUR/MWh)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual average
2000							14.6	15.7	20.8	18.2	22.2	42.6	22.4
2001	23.0	22.7	21.4	23.4	21.0	20.5	19.2	20.3	22.6	22.5	29.6	42.6	24.8
2002	31.7	19.0	21.1	20.2	17.7	21.2	29.7	19.8	27.9	23.8	19.7	23.7	22.9

Source: www.eex.de

Quite a high concentration of electricity generators can be found on the German market compared to the conditions prevailing at the UK electricity market. The two biggest operators, existing in this form only since 2000,[66] have the shares of installed capacity of around 30% (RWE) respectively 24% (E.ON), with Vattenfall following with a share of 16% and EnBW with 10%.

At the start of electricity trading in the mid of 2000, spot prices have been around 15 EUR/MWh indicating that they were close to the short-run marginal costs. This development can be tracked back to the increase in price competition between market players following the start of the deregulation process, and as a consequence of the oversupply of electricity at that time.

One of the outcomes of the above mentioned mergers was the announcement of a capacity closure programmes by the two biggest market players of almost 10 GW capacity compared to the national generation capacity of around 106 GW. That resulted in an increase of the spot prices, particularly in the second half of 2001 (see Table 4.6). The trend of retail prices reduction has also stopped (see Figures IV.1-3). The German experience corresponds to the theoretical derived findings that strategic behaviour of the dominant market players can influence the electricity market and the price development, in particular, when there is excess capacity and the dominant player owns the mid-merit power plant.
A further difference is a higher rate of interconnection capacity of Germany as compared to the UK (see Table A.1). Sufficient interconnection capacity has to be seen as a necessary prerequisite for a Community-wide electricity market providing consumers with a wider choice of suppliers.

4.5 The Spanish electricity market

The liberalisation process in Spain started already in 1997, with market opening from January 1, 1998. The complete opening of the market has not been achieved yet, but is planned for 2003 (see Table 2.1). Generation mix in Spain is similar to Germany: nuclear power plants account for 30% of total electricity generated in 2000 while hard coal accounts for the biggest share, i.e. 38%. Hydroelectric accounts for 14%, cogeneration / renewables for 13% and the remaining output is generated in oil and gas power plants (Table 4.5). One of the main characteristics of the Spanish market is its location, at the fringe of the EU, having some implications regarding the interconnection capacity. The total import capacity is around 5% of total installed capacity, which is very low compared with EU member states. An exception is the UK with an import capacity in the same range.

[66] The two companies Veba and Viag merged, creating E.on in June 2000. The merger of RWE and VEW was finalised in July 2000 and the new company is called RWE.

The relevance of cross-border trade of electricity in the context of establishing a competitive European electricity market has been addressed on several occasions. For example, the European Commission concluded in the second benchmarking report that the figure of only 8% of total electricity consumption traded between EU member states in 2000 'leaves the EU far from a real, competitive internal market'.[67] The European Commission proposes a target of interconnection capacity of at least 10% of installed capacity. The European Council in Barcelona agreed to this target which should be achieved by 2005.
Spain was one of the first EU member states that established a standardised wholesale market for electricity, OMEL, in 1998[68]. Since then, the generation prices are established via a pool, i.e. the marginal plant determines the system price. Prior to this date, the Spanish market was completely regulated and the generation price was around 45 EUR/MWh. Compared to this administered price, the past spot market prices are quite low. A trend of slightly increasing spot prices can be observed on the Spanish power exchange.

The Spanish OMEL, similar to the electricity exchanges in Germany (EEX), in Scandinavia (Nord Pool) and in the Netherlands (APX) is a voluntary market which, in addition has a bilateral contract market[69]. The former type of market, generally in competition with the bilateral contract market, is different from an obligatory power pool on which all generated electricity is traded, as it was the case in the UK before NETA, a voluntary scheme, was implemented. However, the Spanish market, in theory a voluntary power exchange, can practically be classified as a pool considering that 90% of electricity is traded.

In spite of this, a type of administrative regulation survived in the Spanish electricity market implicating a mandatory fixed capacity and an ancillary service payment of around 6 EUR/MWh closely connected to the issue of stranded cost[70]. This administrative regulation, in place for some time, known as 'Cost of Transit to Competition (CTC)' was introduced with the aim of incumbents recovering old investment costs that cannot be recovered under free market conditions. Such a policy approach affects the development of the pool price as it leads to an implicit price cap of 39 EUR/MWh. Any pool price above this ceiling will reduce the individual generators CTC allowance, meaning that the generators cannot receive more than 39 EUR/MWh for generated electricity. In cases where the pool price is above this cap the regulator receives the excess revenue. Such a policy seriously distorts price competition. Important to mention is that only incumbents are eligible for receiving CTCs. The actual effect of this policy is that in the case of a pool price of 35 EUR/MWh the incumbents will receive a CTC allowance of 4 EUR/MWh.

[67] European Commission (2002a) p. 22.
[68] see for further information www.omel.es.
[69] Energy Research Foundation (ECN) (2002).
[70] See for further information regarding stranded costs: European Commission (2000)

Spain is, together with Germany, France and the UK, the only EU member state still producing coal. The coal industry in Spain, Germany and France is not competitive and crucially depends on public aid. The Spanish regulatory framework laid down a support instrument of providing generators using domestic coal with a subsidy of around 6 EUR/MWh. Furthermore, the Spanish generator market is highly concentrated by the two incumbents; i.e. Endesa with a market share of 39% of installed capacity and Iberdrola with 29%.

High degree of market concentration and a number of other administrative and regulatory conditions, such as the issue stranded costs via the CTC mechanism, will affect the future development of electricity prices in the totally liberalised Spanish electricity market of 2003 as pronounced by the Spanish Government. Every domestic consumer will have the freedom of choosing energy supplier. However, the new electricity pricing rules that came into force at the beginning of 2003 are not necessarily in accordance with the idea of a competitive market due to the control of future increase in prices. In January 2003, it has been announced that Spanish electricity price will rise by an average of 1.69 percent next year and that the prices can only rise by a maximum of 2 percent a year in the period 2003 to 2010[71].

Recent developments do not reveal that the situation regarding the high concentration will change dramatically, particularly in the light of quite limited number of new entrants during the recent years. Additionally, the discussed expansion of the Spanish market by including the Portuguese and forming an Iberian market would not alter the current situation and the two companies would remain the dominant players[72] partly because of the missing interconnection capacity and the political regulation of allocating capacities to market players.
It is certainly correct to argue that the Spanish electricity market is far from being a competitive one. All these regulatory interventions are against the idea of establishing a level playing field between the different actors.

[71] World Environmental News (2003).
[72] Morrison M.B. (2002).

4.6 The Italian electricity market

The Italian electricity market shows some interesting features being one of the least open markets within the EU in terms of eligible customer, i.e. it is expected that the number of eligible customers free to choose their supplier will raise to two thirds in 2003 (also compare Table 2.1). This is not the only aspect that makes the Italian market different from the others studied in this report. For example, Italy is still in the process of establishing a competitive generation market by creating the national electricity exchange, the Italian pool, which has been approved by the Italian legislature already in 1999.[73] As it can be observed in other EU member states, the formation of an electricity exchange is essential for the set up of a competitive, transparent and flexible electricity market. This is essential in the Italian case, as it would replace the current practice of regulating electricity prices, and only allowing that a fall in the high electricity prices can be anticipated.

Regulated electricity prices are based on two components: the first one is a fixed component that was 20.5 EUR/MWh in 2001 and 2002 compared to 25.6 EUR/MWh in 2000. The second, variable component is linked (indexed) to the development of prices of a basket of other energy fuels and on a year average was around 40 EUR/MWh leading to an average price of 60 EUR/MWh for the year 2002. The variable component closely oscillated around the international fuel price trends. Compared to the spot prices set at the electricity exchanges in EU member states this price is very high (as shown above). It is, therefore, of no surprise that the retail prices in Italy are by far the highest in the EU (see Figure 4.1-3) and among the highest when the end-user prices, i.e. retail price including all taxes, are studied (Figures 4.4-6).[74]

Another feature of the Italian market worthwhile mentioning while reviewing the differences between EU member states: Italy heavily relies on oil- and gas-fired power plants and their contribution to the total output is around 37%. Hydropower makes a sizeable contribution (17%) and imports account for 15%. Imports are insofar of interest –for the formation of the electricity price - because of current generation mix in France and Switzerland, countries where the majority of Italian electricity imports originate. France and Switzerland are countries with relatively low generation costs, owing mainly to nuclear technology in France and hydropower in Switzerland. The main reason for not importing more electricity into Italy, considering an

[73] The opening of the Italian electricity exchange was postponed several times during the last years. According to Italian sources it was expected that the exchange should have been opened in October 2002 but it seems that it is still not operational during writing the report (February 2003); i.e. no information can be found at the webpage of the company responsible www. mercatoelettrico.org

[74] However, a special pricing regime applies for households consuming less than 1,200 kWh – their electricity price is one of the lowest compared to consumers in other EU Member states in the relevant consumption brackets (see the Eurostat publications mentioned above).

oversupply of electricity in the domestic markets of these two countries, is a lack of interconnection capacity.

Another obstacle for a competitive market is the structure of the Italian electricity generation market. Enel remains the dominant market player on the Italian market even after a divestment programme implemented by the Italian Government which reduced the market share from 74% in 2000 to about 50% in 2002. However, the strong position of Enel is also based on the fact that the Enel group accounted for 59% of electricity available on the Italian market including their purchases of the imported electricity. It can be expected that the dominant position of the Enel group will change after opening the electricity exchange because the mid-merit plants, decisive in the price setting, are almost entirely owned by the Enel group.[75] In addition, Enel is the dominant player in the supply sector having had a share of almost 90% in the past which slightly decreased during the most recent years.
The Italian situation shows the significance of trade in electricity. Cross-border trade in electricity allows earning arbitrage profits as the result of the price divergence between the low price countries, such as France and Switzerland, and Italy as the high price country.

4.7 The Dutch electricity market

The Dutch situation is, in terms of market concentration, somewhat different from the development in other EU member states considering the rather low market share of three largest electricity generators as shown in Table 3.2. However, three of the four largest Dutch generators have recently been acquired by foreign multinationals including the German E.ON and the Belgian Electrabel which is one of the remaining monopolists in EU member states responsible for more than 90% of electricity generated in its domestic market[76].
The process of liberalisation of the electricity market started in 1999 and is planned to be concluded with a completely open and competitive market in 2004. Interesting enough is the fact that the market was regulated with regard to price formation until 2000: 'the so-called Protocol, which is an agreement between the four major generators and the distribution companies (utilities), stipulating from 1997 till the end of 2000 mandatory sales of electricity at fixed prices. Furthermore, the contracting of additional volumes via the spot market and thus by imports was limited due to cross-border capacity made available from long-term contracts between producers and foreign companies'.[77] During the same time period the Amsterdam Power Exchange (APX) was established in 1999. The development of the spot prices at the APX (see Table 4.7) shows high volatility during the existence of the power exchange with the highest monthly price in January 2000. Since then a slight tendency of lower monthly spot

[75] Ranci P. (2002).
[76] Energy Research Foundation (ECN) (2002).
[77] Oostvorn F. van and M. Voogt (2002) p. 7.

prices as well as annual averages is perceived. This reduction is accompanied with a steady increase in the amount traded at APX corresponding to around 15% of net Dutch electricity consumption in 2002.

The Dutch electricity market can not be analysed in isolation from the markets of the neighbouring Belgium and Germany. The Netherlands is a net importer receiving the biggest share from Germany, while the trade with Belgium is almost balanced. However, the interconnector capacity, quite high in this region, particularly when compared to the situation at the fringes of the EU, is still not adequate meaning that the 'demand significantly exceeding available import capacity in the last two years'.[78] One of the reasons is the price difference between the markets. Another important factor not impeding the creation of a real internal market is to guarantee access rights to the interconnection capacity in a transparent and non-discriminatory manner. However, the rules and regulations adopted by EU member states are a long away from conditions which would correspond to them.[79]

Table 4.7 Spot market price at the APX - Netherlands (EUR/MWh)

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual average
1999					18.1	18.8	21.5	21.7	23.9	24.1	25.4	28.0	22.7
2000	109.7	52.0	34.4	38.4	57.1	35.0	32.7	58.5	36.0	37.0	40.7	48.0	43.1
2001	33.3	27.0	27.2	25.5	28.7	32.2	50.0	31.3	34.8	26.5	34.7	49.4	33.6
2002	29.0	22.4	20.0	22.0	20.6	33.8	24.1	40.3	41.0	44.1	35.3	27.8	30.1

Source: www.apx.nl

4.8 Conclusion

This overview describing the electricity market in some EU member states is far from exhaustive. It clearly reveals the different developments and current status of these markets and consecutively the obstacles faced by European politicians aiming to create a Community-wide and competitive electricity market. The list of such barriers stretches from the low interconnection capacity between EU member states, to the different speed in opening the domestic markets, to diversity in the electricity generation mix, to various levels of concentration, and to national regulatory frameworks which are still in place in some of the member states. Nevertheless, progress has been made to eliminate or, at least, to reduce the effects of these obstacles with regard to creating competitive electricity markets in the EU. Examples include the numerous recently established electricity exchanges leading to transparent

[78] Energy Research Foundation (ECN) (2002) p. 80.

[79] See for an overview of the allocation procedures currently in place: Morrison M.B. (2002) and in addition the discussion at the European Electricity Regulatory Forum (Florence Regulatory Process) – see the website of DG TREN for further information: http://europa.eu.int/comm/energy/en/elec_single_market/florence/index_en.html.

pricing and liquid markets of the commodity electricity, the rules and regulations laid down in the Electricity Directive itself and further policy initiatives launched by the European Commission.
The Italian regulator for electricity and gas[80] expressed a slight criticism backing our analysis regarding the approach chosen for establishing a common-wide competitive electricity market:

When the liberalisation process was launched in Europe great attention was paid to the demand side: liberalisation is measured by the degree of market opening, defined as the percentage of total consumption accounted for by customers who are free to choose their suppliers. The supply side has been somewhat neglected thus far, in the belief that the transition from fifteen national markets to one single, larger European market would be sufficient in itself to eliminate market power. This is not the case. The move towards a competitive European market has come up against two obstacles.
The first is the headlong process of industrial concentration, which is creating companies capable of exercising power over significant portions of the European market, thanks not least to their vertical integration, which has barely affected by the separations imposed on them. A European electricity oligopoly, made up of five principal companies; these include Enel, which has less of a presence outside its won national territory than the others. ….
The other obstacle is the continuing existence of physical, legislative and commercial barriers to free circulation on the European networks.

The political decision makers are undoubtedly facing a huge task to overcome difficulties and to remove these obstacles so that the necessary conditions for establishing competition are guaranteed.

[80] Ranci P. (2002) p. 8.

5 The Natural Gas Market

5.1 Similarities between the gas and electricity market – is a transfer of results possible?

Developments in creating a single European market for electricity are slow but some progress can be observed. Probably the main question remaining unanswered thus far is when would this, European-wide market, be achieved. Closely connected question is whether the competition of the electricity market can, at all, be achieved in the same way as on markets of other commodities and services. The same question is raised within the strategy for economic reform of the European Council adopted at the Lisbon European Council in the spring of 2000. The rationale behind the Gas Directive is almost a complete reflection of the objectives laid down in the Electricity Directive. Therefore, it is quite straightforward to ask whether the findings of our analysis identifying these obstacles, hindering the creation of a Community-wide electricity market, are the same in the case of the development of the gas market. The following chapter will try to answer this question.

The process of liberalising these two markets reveals differences between the two commodities – electricity and gas. The main difference between the commodities is the fact that gas is storable, while the ability to store electricity is very limited. The transport infrastructure for gas between EU member states is already established what differs from the trade volume in electricity. Nevertheless, capacity constraints remain one of the barriers of trading gas between EU member states. Furthermore, the prospect of physical capacity constraints is still grimmer considering the expected increase in the demand for gas by around 40% in the EU member states and doubling of the gas consumption in the candidate countries by 2020.

A further obstacle for the creation of a competitive market is associated with the issue of cross-border trade, namely the question of tarification. The same result can be found both for the electricity and the gas market. The current tarification of cross-border trade and capacity allocation mechanisms are hampering the development of a single European market for gas because of non-cost reflective tariffs and capacity constraints[81]. This issue is also mentioned by Stern (2002) discussing that network capacity has an increasing importance for the development of gas prices. Stern (2002) adds that information relating to network capacity is still not in public domain.

Many of these findings were already commented by the European Commission in the first benchmarking report: ‘Different tariff structures in member states and in particular the cumulative application of distance related tariffs mean that it is unlikely that cost reflective

[81] See for example European Commission (2002a). A comparison of the network tariffs can be found in this publication.

network access is available across borders'.[82] Proper functioning co-ordination schemes implemented between EU member states could reduce the cross-border transmission tariffs[83]. The significance of networks tariffs in the formation of end-user price, as found in the electricity market, can also be transferred to the gas market[84]: The share of transmission and distribution costs both for electricity and gas is not negligible in the total price.

Another important issue in the context of competition is a lack of transparency. Full information is generally perceived as one of the main preconditions for competition. This precondition is currently not guaranteed either on the gas or on the electricity market.
Another potential obstacle in liberalisation of the gas market into a competition-orientated one is the high degree of concentration in the gas supply industry. The same phenomenon observed in the electricity market, regarding a further increase in market concentration is present in the gas market (see Table V.1). The most recent example was the acquisition of Ruhrgas by E.ON in Germany. This acquisition is not only significant for the retail market but also on the import level resulting that E.ON has the dominant position on different levels of the gas supply chain (import, wholesale and retail). Vertical integration (the link between producer, importers and retailer) can reduce some economical and financial risks as the supply of gas can be guaranteed to the end markets. However, it can also impede the occurrence of competition because of limiting access of new players on the market as well as in the form of strategic pricing behaviour.

Table 5.1 Main European gas players in 2000

Top ten European suppliers	Total amount unit: Bcm)	Share of the European market (in %)
Gasunie (NL)	73.0	17
SNAM (Italy)	63.3	15
Centrica (UK)	59.0	14
Ruhrgas (Germany)	51.4	12
Gaz de France (France)	43.6	10
Distrigaz (Belgium)	18.4	4
Gas Natural (Spain)	16.9	4
BEB (Germany)	16.1	4
VNG (Germany)	14.1	3
Wingas (Germany)	10.5	2
Top ten total	366.3	87
Europe total	421.9	

Source: Cedigaz (2002)

[82] European Commission (2001a) p. 107.
[83] See for example: Energy Research Foundation (2001) p.38; and the webpage of the Madrid Regulatory Process http://europa.eu.int/comm/energy/en/gas_single_market/madrid.html.
[84] see for example the indicative structure for the end-user price for gas in Energy Research Foundation (2001).

Compared to the evolution on the electricity market, the analysis so far shows that similar features are hampering the development of competition on the gas market. Main findings can easily be transferred, while one of the main obstacles for the development of competitive markets is related to the high and still increasing degree of concentration on both energy markets. Progress has been made, although the development of the gas market is slower and factors hampering the creation of the competitive internal energy market have not been cleared away. This development can have far-reaching consequences reaching from allowing strategic pricing behaviour of the incumbents to negatively affecting the entry of new market players. These features will undoubtedly have an effect on the price forming processes of both commodities, particularly for the end user. However, the price formation of gas follows a commodity-specific characteristic not in accordance with the concept of a price formation under competitive condition.

5.2 Contracts and price formation on the gas market

5.2.1 The price development in several EU member states

Before the special features of the price formation of gas and the historical background are studied, the development of the gas prices in some EU member states are briefly shown. A distinction is made between the development of retail prices before taxes (Figures 5.1 and 5.2) shown for the period from 1995 to 2002 and distinguished between two different consumer categories and end-user prices (including all taxes) for the period from 1999 to 2002 (Figures 5.3 and 5.4).

Figure 5.1 Gas retail prices before tax (nominal prices EUR/GJ) – Eurostat category I4-1 – Consumption of 418.6 TJ/year – industrial users

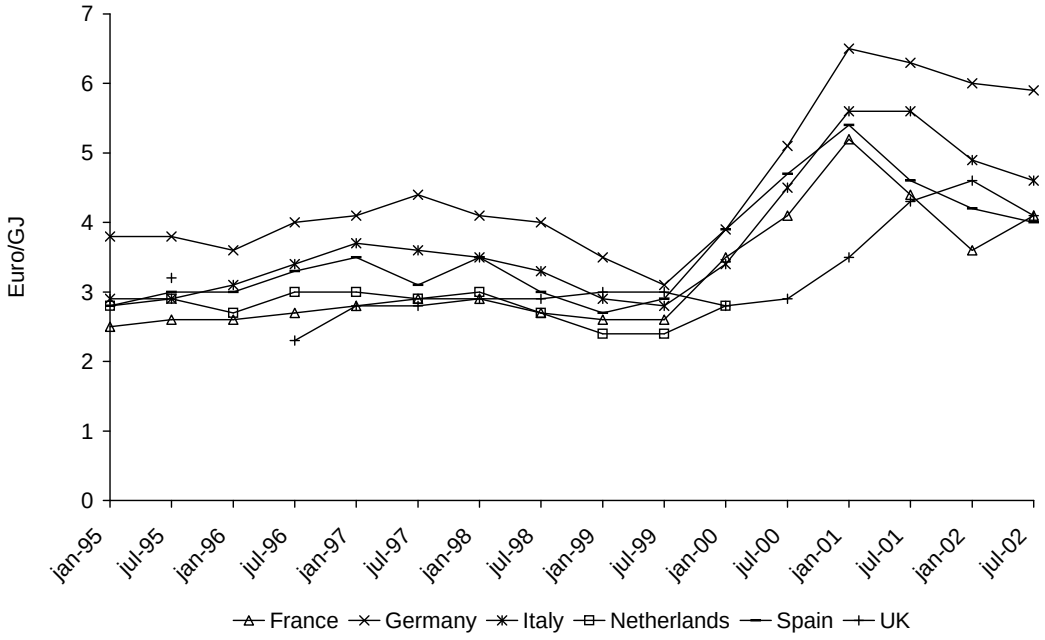
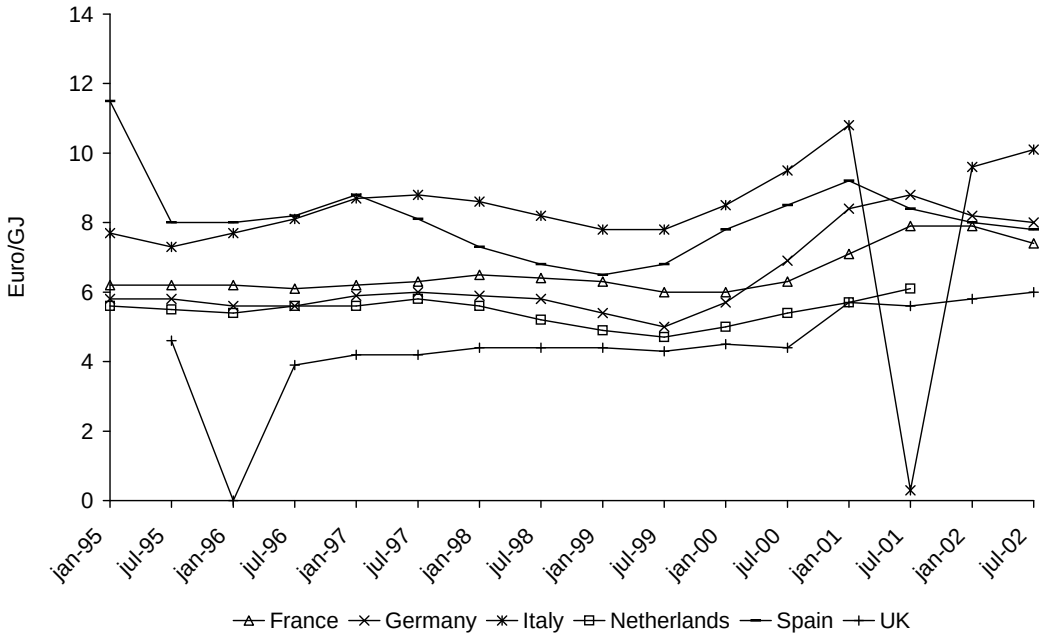
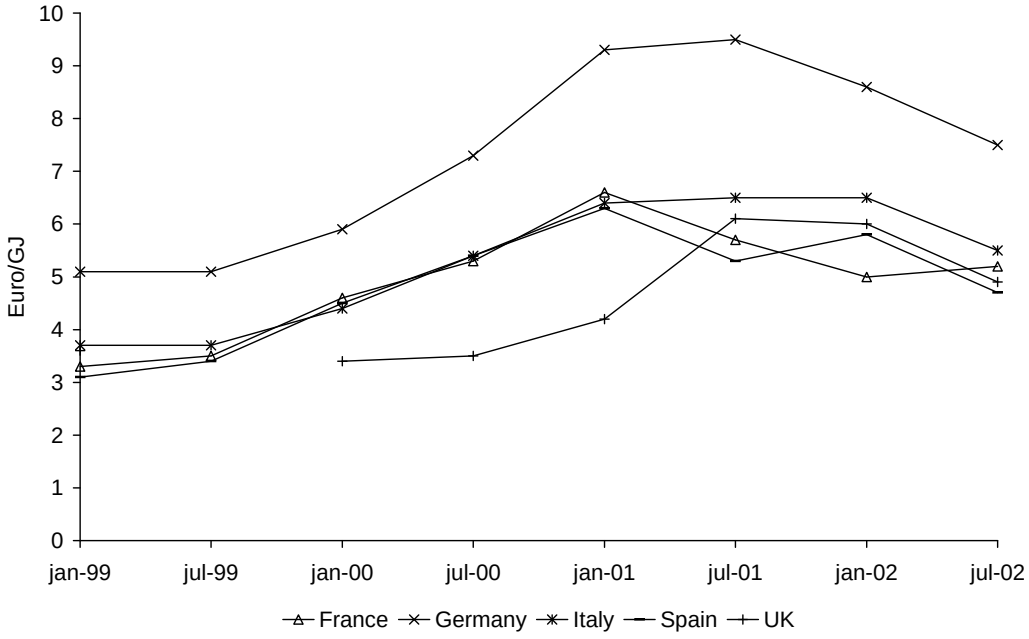


Figure 5.2 **Gas retail prices before tax (nominal prices EUR/GJ) – Eurostat category D2 – Consumption of 16 GJ/year – household users**



Source: European Commission (2002a) and Eurostat

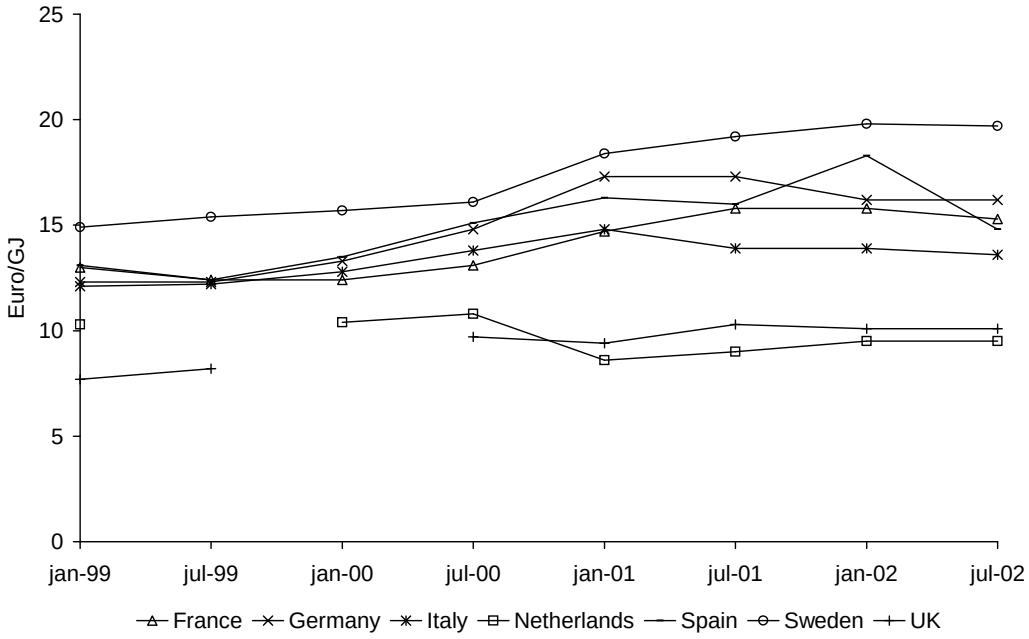
Figure 5.3 **Gas end-user prices including all taxes (nominal prices EUR/GJ) – Eurostat category I4-1 – Consumption of 418.6 TJ/year – industrial users**



Source: Eurostat.

Development of the gas retail prices is different compared to the retail prices for electricity considering that there is a clear trend of increased prices discernible between 1999 and 2001. This trend comes along with the transposition of the Gas Directive into national law. However, this development must be uncoupled from this event because it depends on the formula on which the setting of the gas price is based.

Figure 5.4 **Gas end-user prices including all taxes (nominal prices EUR/GJ) – Eurostat category D2 – Consumption of 16 GJ/year – household users**



Source: Eurostat

The graphs in Figures 5.3 and 5.4 reveal that the nominal prices for the end user shown in both these graphs have been higher in July 2002 than at the beginning of 2000, the year of implementation of the Gas Directive in EU member states. The only exception was Netherlands where the household end-user price was 9% lower.

Worthwhile commenting is the fact that the range of gas prices is smaller compared to that of electricity, meaning that the process of converging the gas prices is already underway. This point is of some relevance as it was one of the reasons for launching the Gas Directive.

5.2.2 The price formation on the gas market

An interesting feature of the natural gas market is the price formation. The majority of gas contracts and the determination of gas prices are still based on the, so called, 'market-value' principle in EU member states. The same is regularly referred to oil-price linkage or oil indexation of gas prices, and has first been introduced in the Netherlands after the introduction of the Groningen gas fields in 1959. This approach established the pricing structure of gas

contracts: ‘the price for gas to be sold to the various types of consumers was linked to the price of alternative fuels most likely to be substituted, viz. to gas oil for small-scale users and to fuel oil for large-scale users’.[85] This pricing policy was suggested by Exxon, one of the concession holders for extracting gas from the Groningen field. Such a policy allowed, both the concession holders and the Dutch state, to generate higher revenues compared to the situation in which the price would have been related to the actual – quite low – production costs. The specific characteristics of this pricing principle lies in the fact that consumers do not pay more for gas than for alternative energy fuel products, but also not less. Another characteristic of the gas market is the role the ‘long-term take-or-pay contracts’ are playing. This form of contract is seen as a central factor for the build-up and development of the European gas market and a decisive factor for the development of gas deposits outside of the EU including the construction of required transport infrastructure.

The price formation and contractual agreements are regularly being seen as features not directly in accordance with the conditions of establishing an internal energy market leading to competition between market players on the different levels of the supply chain. These characteristics are essential when the future development of this market is analysed. Main aspects are therefore to present the current situation and to assess the possibility of replacing long-term contract with short-or medium-term contracts, and assess whether the oil-price linkage will be maintained or whether gas-to-gas competition will be the prevailing factor for determining the gas price in the future.

5.2.3 The historical background

The consumption of natural gas rapidly increased in many EU member states during the last forty years; the share of natural gas of total EU primary energy supply grew from around 2% in 1960 to 16% in 1985 and to approximately 24% in 2000. Several studies forecast a further increase as a result of the growing number of household customers and of further investment in gas-fired electricity generation plants, so that a share of around 30% of primary energy supply seems quite realistic in the not too distant future. The situation concerning gas imports is more favourable compared to oil – the EU import dependency for oil is around 70% in 2000 and will increase to around 90% in 2030 compared to around 40% for gas in 2000 and around 70% in 2030[86]. It has to be noted that these figures are mainly based on estimates regarding future energy demand for the current formation of the EU; i.e. the 15 member states. This will have to be revised in the context of the EU enlargement process because it is generally expected that the growth rate for gas will be higher in the candidate countries than is in the current EU member states.

[85] Correlje A.F., P.R. Odell (2000) p. 19.

[86] See for a discussion of future energy demand: European Commission (1999a), European Commission (1999b), European Commission (2001d) and International Energy Agency (IEA) (2001).

The small number of supply countries in combination with the increasing import dependency resulting from the raising demand within the EU and dwindling own production is associated with some risks. The EU is facing the physical risks of exhausting its own energy sources as it already is the case in the UK which will, in the coming years, change the position from a net exporter of gas into a net importer. Additionally, when analysing gas market, it is important to take into consideration economic risks. These economic risks are stemming from the volatility of oil prices that will immediately affect the gas price via the oil-price linkage. Furthermore, some form of risks in the form of political instabilities in the major producer countries cannot be excluded. As discussed above, since the demand for natural gas for electricity generation is projected to increase substantially in the coming year, the risks of gas supply disruption would directly affect electricity generation.

The current situation regarding the price formation on the gas market and contractual agreements does not necessarily correspond with the concept of a competitive and liberalised market, which is on the forefront of EU energy policy. Energy market liberalisation would rather mean that the gas price would be determined via competitive forces and the demand and supply position. Such a price determining process would require the break-up of the oil-price linkage, meaning a decoupling of the gas price from the oil price. Additionally, the systems of long-term contracts between gas producer and importers/suppliers which, per se, are not hampering the development of a competitive gas market, ought to be reviewed. The strict conditions along these contractual agreements are expected to soften, as is already the case with Norwegian imports into EU member states.

The oil-price indexation has to be seen as a simple method for gas companies, which are often also involved in the oil business, to break into the energy market and increase its market share by ensuring that gas is always competitive with competing fuel. The price link was particularly advantageous for those integrated oil and gas companies aiming to extend their business by developing gas deposits and by financing the investment of the necessary production and gas transmission infrastructure. This is of particular interest for companies investing in deposits in countries, such as Russia and Algeria, which do not have good credit facilities with international financial institutions. ‘Indexing gas prices to oil product prices have proved a sensible risk-sharing approach and many think this meet this objective in future contracts as well’.[87]

Long-term take-or-pay contracts are, to some degree, advantageous both for producer and for consumer countries. For the latter, they provide some form of stability, although the widespread view is that they are more valuable for producer countries. Two of the main gas exporting countries, Russia and Algeria, can be described as countries in transition. It is expected that

[87] Eurogas (2001) p. 2.

future demand would partly be satisfied with imports from even less developed countries, such as countries around the Caspian Sea. They all have in common quite a poor credit ranking and limited access to the financial markets, because of associated political and economical risks and instability of the political system.

However, investments for developing new gas fields and the necessary transport infrastructure are very expensive and long-term contracts can provide the necessary security so that gas producers can get access to the credit market.[88]

5.2.4 The current situation

Based on the current situation regarding the contractual agreements, as shown in Table 5.2, it can be assumed that long-term contracts will continue to play the major role in the supply of gas into the European Union for some time.

The figures presented in this table reveal that with the exception of the UK and the Netherlands, the incumbents have secured their gas supply under long-term contracts. The situation in the UK differs from the rest of the EU because the liberalisation process started, already in the early 1990s, as compared to the situation in other EU member states. Additionally, the UK and the Netherlands are net-exporters of gas with the security of supply aspect playing a minor role there.

Table 5.2 Sum of annual contract volumes under currently running long-term contracts

	Gas consumption 2000 (BCM)	Long-term import contracts (BCM at plateau)	Domestic production 2000 (BCM)	Share of long-term import contracts
Austria	7.3	6.8	1.8	93%
Belgium	15.9	17.8	0.0	100%
Denmark	4.6	Exporter	8.1	Exporter
Finland	4.1	3.4	0.0	All under contract with Gazprom
France	42.4	43.7	1.7	100%
Germany	83.3	75.9	18.7	91%
Greece	2.0	5.5	0.0	100%
Italy	68.8	55.7	15.9	81%
The Netherlands	40.9	8.2	61.4	20%
Portugal	2.4	2.5	0.0	100%
Spain	18.1	20.3	0.2	100%
Sweden	1.0	1.1	0.0	100%
United Kingdom	97.2	1.6	110.1	2%

Source:European Gas Regulatory Forum (2002b)

The growing importance of new, short- or medium-run, contractual agreements is also questioned in a discussion document of the 5th meeting of the European Gas Regulatory Forum

[88] Komarov Y.A. (2000).

in 2002: ‘In the future, clearly long-term contracts will also be signed with new market entrants and provide for competition across borders. However, in the short- to medium term this is unlikely to amount to much real competition’.[89]

Based on the experiences gained during the market liberalisation process in the UK, Stern (2002) comes to a similar conclusion: ‘The reality appears to be that liberalized markets, despite their emphasis on short-term trading, do not signal to demise of long-term contracts. Even where markets have been completely liberalised for several years (such as in Britain), around 70% of gas supplies are still sold on long-term contracts. Neither market liberalisation nor the EU Gas Directives preclude the conclusion of new long-term take-or-pay contracts’.[90] Slight deviations from the usual experience with this type of contract are already happening as Stern reports:[91]

- ‘Contract length is shortening, such that henceforth ‘long-term’ will be more likely to mean 8-15 years, rather than 15-25 years.
- Take-or-pay obligations – traditionally 80-90% of the annual contract quantity - may be reduced, perhaps to 50-60%;
- Oil-linked pricing and indexation is changing in favour of floating indexation to a product with immediate relevance to the customer, e.g. a gas or electricity spot or future price in a relevant location. Such indexation guarantees the buyer that prices will remain competitive with other gas supplies. The emergence of a spot market assures buyers that they will be able to on-sell volumes surplus to their requirements, rendering take-or-pay obligations much less onerous’.

The importance of maintaining long-term contractual agreements are revealed as measures to ensure stability in security of supply and to uphold a risk-sharing approach between producer and consumers countries. However, a liberalised market certainly requires short-term contracts providing new market players with the necessary access to supply volumes and establishing transparent pricing mechanisms, i.e. gas-to-gas competition.

The process of developing short-term trading markets for gas does not depend solely on spot markets. Though it involves removal of anti-competitive conditions from long-term contractual agreements. These anti-competitive conditions are under investigation by the EC and the first steps for their removal have been agreed. For example, the Norwegian gas sales organisation (GFU) has given up its monopoly of being solely responsible for arranging contracts and supervising all Norwegian natural gas exports. Other anti-competitive clauses, which are regularly part of Russian and Algerian contracts, concern the ban of resale of gas to other market players within the EU.

[89] European Gas Regulatory Forum (2002b).
[90] Stern J. (2002) p. 9.
[91] Stern J. (2002) p. 9.

5.3 The emergence of gas-to-gas competition

5.3.1 The UK gas market

The liberalisation of the UK gas market started during the 1980s and was part of a wider scheme of privatisation. The initial process started with the privatisation of British Gas (BG) which has not changed much since all gas produced on the UK shelf was still contracted out to BG. Several gas release schemes were initiated by the regulator and BG was in 1996 divided into two companies: Centrica - the gas production, sales and supply company, and BG PLC - the transportation and storage company which includes Transco - the part of the company responsible for the gas infrastructure. Finally in 1998, the UK gas market was open so that all consumers could choose their gas suppliers.[92] With the opening of the gas market de-linkage of gas prices from the oil indexed price widely employed in long- term contracts have partly emerged as result of the existence of the gas-to-gas competition.

The UK gas market is currently described as 'the most competitive in the world. All gas consumers in Great Britain are able to choose their gas suppliers from a large number of competing companies. All parts of the gas chain are competitive with a large number of gas producers operating offshore'[93]. However, slightly contradicting the findings of Stern (2002) mentioned above, this report further states that around 85% of gas production is sold under long-term contracts and with only around 15% sold via the wholesale spot market in the UK. The introduction of competition has seen a fall of gas prices from 1995, which can be attributed to the beginning of the gas-to-gas competition during a period of relatively stable oil prices. As discussed above, a small share of gas is traded either on the spot gas market in the form of over-the-counter (OTC) wholesale spot market (mainly based on standardised agreements made either bilaterally or via a broker) or on the on-the-day commodity market (OCM) or the futures gas market. The volume of OCM is smaller compared to OTC, while an independent market operator operates the trade.

The most recent development of the gas price is discussed by ILEX as follows: 'In recent years, gas prices in the UK have generally been determined by the forces of gas supply and demand for the various market segments within the UK. Competition among gas suppliers has determined the gas price with end users able to choose freely to obtain the lowest price. Spot market deals have emerged since 1995, and the spot price has been used as an indexation component for some new longer-term gas deals'[94]. It is certainly not exacerbated to say that the gas prices have dropped remarkably during this period.

[92] Further changes in this economic sector happened during the last years – the last merger happened in the first half of 2002 when National Grid (monopoly owner of the electricity transmission network) merged with Lattice which was the successor of BG PLC/Transco as the monopoly owner of the transmission network.
[93] ILEX (2001) p. ii.
[94] ILEX (2001) p. 11.

In the meantime, the wholesale gas prices in the UK have risen dramatically through 2000. Apart from the impact of the weather and seasonal influences, this change has been attributed to the UK-Continent Interconnector. The interconnector was opened in 1998 and facilitates trade between the UK and continental Europe. This process is of interest because it linked two different price formation schemes. In 1998, the UK gas market could have been described as a competitive market allowing each consumer to choose the supplier, and with a free access to the transportation system leading to gas prices, partly determined by the forces of supply and demand. The prevailing scheme in continental Europe for determining gas prices is based on the oil-price linkage. The opening of the interconnector provided some sort of arbitrage opportunity by supplying gas to the higher priced EU market. This happened in 2000 when the gas price in Europe increased following the steep rise in the oil price. The result was the massive increase in the wholesale gas price in the UK. The European Commission analysed this development and, as main reasons identified a different structure of the UK compared to Continental gas markets and, above all, the differences in the process of market opening.

5.3.2 The US gas market

High European gas prices have regularly been seen as a competitive disadvantage for the European industry when compared with the situation in other industrial nations, especially in the USA. The lower gas prices have often been attributed to the open and competitive gas market in the USA. The intention of the gas market liberalisation is, among others, to establish a level playing field between consumers and suppliers based on examples such as the US.
An analysis of the US gas market shows big differences compared to that of the EU. First of all, the US gas market can be characterised as almost self-sufficient, importing only around 16% compared to around 57% of total gas consumption in Europe in 1999. Another important difference is the geographical distance of these imports. The origin for US imports is North America implicating quite short distances, compared to the situation in Europe where longer distances have to be covered and requiring further huge investments to extend the pipeline network in the future. Another decisive reason for having gas-to-gas competition in the US is the big number of producers; i.e. around 5000 producers is located almost evenly across the whole country. Additional differences are more difficult geological conditions of gas fields in Europe compared to the USA, and the fast development of new gas fields in the USA. ‘New gas quantities can be delivered to North America’s consumers in 1 or 2 years, to the UK end users in 2 or 3 years. In continental Europe it usually takes not less than 5 to 7 years’.[95] The longer period of developing new gas fields is also associated with higher developing costs.

[95] Komarov Y.A. (2000) p. 3.

5.3.3 Conclusion

Several reasons can be identified as being responsible that the oil-price linkage will remain the basic mechanism for the formation of gas prices within Continental Europe for the time being. Most likely, the experiences gained in the US and the UK so far cannot be easily transferred because both countries are gas producers, meaning that their import dependency is rather low and the market concentration is too low. It seems that the policy interventions by the UK Government in the 1980s and 1990s have been successful in the context of breaking up almost monopolistic market structure in both the electricity and the gas sector at that time and establishing markets without dominant players. However, some of the biggest electricity and gas companies of the Continent started to acquire UK power companies, for example in the first half of 2002, RWE acquired Innogy (the second biggest company in terms of installed capacity in 2001) and EdF (Electricity de France) the smaller electricity company Seeboard[96]. Additionally, E.ON took over PowerGen, the third largest electricity generator in the UK. These takeovers do not have great consequences regarding the degree of UK market concentration. Nevertheless, they are part of the above mentioned regionalisation / Europaisation. Such developments, identified as factors hindering the development of a competitive electricity market, are also valid for the gas market.[97]

The possibility of gas-to-gas competition will be speeded up with the opening of the hubs (standardised exchanges) where excessive supply of gas will be traded on spot markets. Besides the National Balancing Point hub (NBP) in the UK and the Zeebrugge hub, two hubs have recently been opened: one at the German-Dutch border (Bunde-Oude) and another at Baumgarten in Austria. The low number of such trading places can be led back to the existence of the long-term contracts and their conditions (as discussed above) not providing an excess supply of gas which could actually be sold at these hubs; i.e. the liquidity is very limited[98]. The existence of such hubs is of great significance for the future development of the gas market because they increase the transparency of the wholesale market.

The recent experiences with respect to the development of the UK vs. Continental Europe gas prices shows some form of congruence. It seems that the UK gas prices are indirectly linked to oil via the Bacton–Zeebrugge gas interconnector. Prior to the opening of the interconnector, EU gas prices were high, due to the price linkage with oil, while UK gas prices were substantially lower due to downward price pressure of gas on gas competition. After opening of the interconnector in 1998, the UK suppliers had the opportunity to export cheap gas into the EU and make arbitrage profit.

[96] Financial Times, Energy Utilities go on $55bn takeover spree, Monday August 19, 2002.
[97] See for a discussion: European Commission (2001g).
[98] European Commission (2002a) p. 20.

It can be expected that de-linkage of gas prices from oil indexation in Europe will happen as a gradual process of transition. This would require the establishment of further spot markets / hubs as well as increased surplus gas volumes. This will enable suppliers to trade oil-indexed contracts and achieve some arbitrage profits between the traded volumes and their oil-indexed quantities. The opinion of the European Commission regarding the future of oil-price linkage is:

While this index-linking was presented at the time that natural gas was making a breakthrough on the markets as a means of gradually introducing this product, this mechanism now no longer has any economic justification and should ultimately be replaced by a price based on supply and demand for gas. This cannot happen until a genuinely integrated internal gas market is established which is not restricted to the liberalisation of national markets.[99]

This statement spells out some of the current problems with regard to establishing competition. The question of safeguarding security of natural gas supply has also to be seen in the context of opening up the gas market. However, there is a widespread agreement between all market players that the demand for natural gas will increase quite dramatically over the coming years. This will imply that the EU's import dependency on natural gas will grow during this period. Risks associated with a growing import dependency are addressed by the most recent EC policies proposing new measures ensuring the flexibility and security of supplies of natural gas.[100] Furthermore, this will require huge new infrastructure investments. According to a study commissioned by the European Commission and carried out by the Observatoire Mediterraneen de l'Energie, investments of more than USD 200 billion are necessary over the next 20 years to bring additional gas to Europe to meet this increasing demand.[101] Some financial support will probably be provided by the European Commission as well as national governments. However, the majority of these funds have to be borne by gas companies and there is some common understanding that long-term contracts are a valuable and necessary tool for securing the required financial means by reducing the financial risks for the producer because of securing long-term supply channels. These investment needs will probably have some consequences for the evolution of the gas price in the medium- to long-term: 'Some experts are predicting rises in the price of natural gas of close to 20% by 2010'[102]. Additionally, this development can further hamper the development of the internal gas market because long-term contracts are not necessarily seen as beneficial for the creation of spot markets through the completion of a Community-wide gas market.

[99] European Commission (2001d) p. 41.
[100] See for example: European Commission (2002e).
[101] Observatoire Mediterraneen de l'Energie (OME) (2001).
[102] European Commission (2001d) p. 41.

5.4 Conclusion

Transposition of the EU Gas Directive started a year later and, hence, the progress in accomplishing the underlying objective is lacking compared to the development with regard to the Electricity Directive. This outcome is visible when the shaded areas in Table 2.3 are compared with Table 2.2. Nevertheless, many of the findings and conclusions drawn from the analysis of the development of the electricity market are also applicable. Some of the barriers identified above as interferences with the creation of competitive markets are still prevailing on the gas market.

One of the main differences between the electricity market and the gas market is the price formation and the long-term contracting approaches. As discussed in some length above, both issues are a relic from the past and do not correspond to any form of competitive market conditions. The basic principles of this approach are well understood, but they no longer fit into the current timeframe. Political decision-makers and, in addition, market players are facing real challenges in overcoming this problem considering that the prevailing conditions are benefiting many of the market players, although probably not the European citizens.

6 The Electricity Market in the Accession Countries

The European Council in Copenhagen in December 2002 reached an agreement to invite 10 countries to join the European Union in 2004, which among others, means that these countries have to transpose EU Directives into national law. The situation in these countries with respect to the implementation of the Electricity Directive is of some interest for this report. The process of liberalisation of the internal electricity market does not only affect the current EU member states but also the accession countries aiming to integrate these countries into the Community-wide electricity market in the future. The institutional framework for this policy was laid down in the enlargement negotiations requiring the accession countries to transpose EU wide policies including the Electricity Directive into national legislation as part of the fulfilling the energy chapter of the *acquis*.

The process of implementing the legal and technical requirements of the Electricity Directive has begun in all accession countries. A number of differences as well as similarities between the progresses in implementing this Directive in the accession countries compared to EU member states can be reported. It can generally be said that the process of opening the electricity market is lacking behind the progress made in EU member states. Similar to the development within the EU, different levels of implementing the requirements of the Electricity Directive, in particular with regard to market opening, has been witnessed between the accession countries. All the countries are aiming to achieve the minimum requirement of 33% of eligible customers at the date of accession[103]. Since the beginning of 2002, the accession countries participating in the meetings of the Florence Regulatory Forum discussing issues relevant for the creation of a Community-wide market not addressed in the required details in the Electricity Directive, such as cross-border trade of electricity.

This brief overview regarding the implementation of the Electricity Directive in the accession countries reveals that the policy process is clearly underway. Table 6.1 presents a partial overview of the main features of the electricity market in accession countries . The information is undoubtedly not complete, although it certainly gives an impression about the situation of these markets.

The generation mix in the accession countries reveals various dependency on energy sources. While, thermal convention has the largest share in the generation mix in eight of these countries, thermal nuclear in three, one country relies on hydro power. A similar result has been found in EU member states. Slightly worrying is the situation in the three countries relying on

[103] The Electricity Directive of 1996 required a gradual opening of he electricity market to competition in three steps. In 2002, 28% of the domestic market should have been open to competition and the share should have be 33% in 2003. As discussed above, the timetable for opening up the markets have been revised in the meantime.

nuclear power, i.e. Bulgaria, Lithuania and Slovakia, where agreements to close down parts of their nuclear power capacity owing to the security risks of these installations have been reached during the negotiations with the European Union. The situation is in particular perturbing for Lithuania having the highest dependency rate of nuclear power. The situation with respect to the degree of concentration is very similar. The electricity markets in some of the accession countries are still monopolistic structures with the main player a state-owned vertically integrated company controlling the whole electricity supply chain. This situation already did or will change in the near future because of the legal requirements of the Directive. A new phenomenon taking place is that the electricity companies located in EU member states acquiring stakes in the former state-owned companies in the accession countries. This process obviously corresponds to the findings regarding the most recent developments in EU member states. As mentioned above, this evolution can come into conflicts with conditions generally identified as prerequisites for guaranteeing competition on electricity markets.

Table 6.1 Some characters of the national markets in the accession countries

Bulgaria	- Dominant player is the NEK (national electric utility) with 89% of the total generation capacity; share of independent power producers (IPP) is 11%. - NEK operates transmission lines, national dispatch centre and generates electricity. - It is planned to start decommissioning parts of the nuclear power capacity in 2003.
Cyprus	- Isolated power system requiring to have 20-40% electricity reserves - Electricity Authority of Cyprus (EAC) – monopolistic, independent and semi-Government institution. EAC is responsible for generation, transmission and distribution of electricity. - Cross subsidisation of domestic consumers by industrial and commercial users still exist. - There is a need to establish an independent regulator for electricity in due course. It is estimated that electricity demand will increase by 5% per annum requiring investments into new generating capacities.
Czech Republic	- The generating company CEZ has a dominant position accounting for around 70% of electricity generated in 2001. In the meantime CEZ took over some independent power producer and as CEZ is one of the biggest market player in Europe (see Table IV.4). - The opening of the market in 2002 for eligible consumers (above 40 GWh per annum) was accompanied with around 5% price reduction for them, and a price increase of around 10% for households. After this latest price increase cost recovery levels are reached. - Czech Republic is connected to the transmission network of EU member states (UCTE – Union for the Coordination of Transmission of Electricity).
Estonia	- Estonian electricity generation relies almost completely on oil shale (91% of electricity was generated via oil shale in 2001) and is dominated by the state-owned generator Eesti Energia AS. This company is also responsible for transmission and distribution but with account and management unbundling. - Proposals for restructuring and privatisation of the electricity industry have been discussed in the past and foreign investors are represented. - The process of opening of the Estonian electricity market started in 1999, one year after a energy sector regulator was established. Price distortions on the electricity market were abolished (no cross subsidisation). - Estonia is a net-exporter of electricity (Russia and Latvia). The three Baltic states, Estonia, Latvia and Lithuania, created a Common Baltic Electricity Market in 2000.

Hungary	- Regulated prices remain in force but only for public-utility consumers. Specific rules apply for export/import of electricity – eligible consumers have the right to import up to 50% of their own consumption. - Hungary is linked to the UCTE transmission system.
Latvia	- Latvia is net-importer electricity; domestic generation capacity can cover only between 50-70% of total consumption. - Latvia made good progress in implementing the internal market although some problems exist regarding the state-owned electric utility, Latvenergo, and unbundling of activities. Latvenergo is the owner of all big power plants supplying 97% of electricity and is the state monopoly for transmission and distribution. The Latvian Parliament decided in 2000 that Latvenergo assets are strategically important and the company was therefore excluded from privatisation.
Lithuania	- Lithuania is the largest electricity generator in the Baltic countries and a net-exporter. Links to the UCTE are planned (via Poland) but financial support from EU and other investors are required. - Nuclear power production accounted for 77% of total electricity generated in 2001 and is comparable to the situation in France. The Lithuanian Parliament agreed to a nuclear closure programme, scheduled to close all nuclear plants until 2009. - Further progress was made with respect to the privatisation of the electricity generating and distribution sector; i.e. different companies are responsible for generation, transmission and distribution.
Malta	- The situation in Malta is very different from other countries because of several reasons: - The electricity market is closed ; i.e. no connections to any other countries - Malta has no indigenous energy sources. One state-owned company completely dominates the electricity generation and distribution market. However, plans to unbundle this company are under way. - Malta lacks behind in implementing some of the requirements of the Electricity Directive (target date was December 2002). It is decisive for such an analysis to consider that Malta plans to transpose the Directive with regard to the principle of having a 'small isolated system' allowing for some derogation.
Poland	- Poland has substantial indigenous energy sources, hard coal and lignite. Consequently 97% of electricity is generated in coal-fired plants in 2001. - Transmission system operator responsible for activities around the transmission grid was established in 2001 with 33 companies representing the distribution sector (the majority of them are state-owned). - Electricity trade at the Polish Power Exchange started in 2001 via standard transactions or contracts concluded on power exchanges; day ahead exchange-based market, forward exchange-based market (www.polpx.pl) - Poland is linked to the UCTE transmission system
Romania	- The portfolio of the generation mix is balanced, a mix of coal, oil and gas, nuclear power and hydropower. In 1997, the restructuring of the electricity market began with the breaking up of the dominant player, a vertically integrated utility. Nowadays, several electricity generators exist as well a grid and market operator. Single distribution company was reorganised by establishing 8 regional distribution companies. Additionally, a regulator, the Electricity & Heat Regulatory Authority (ANRE) was set up in 1999. - Price regulations were partly lifted and a minimum price of 50 EUR/MWh were set leading to reduction in consumption and an increase in efficiency.
Slovakia	- Apart from Bulgaria and Lithuania, Slovakia also agreed to a plan of decommissioning nuclear power plants because of security risks of the installations. A reduction in electricity consumption is reported for the 1990s but since 2000 electricity consumption is increasing again probably exceeding the 1997 level by more than 30% in 2010. - The dominant player of the electricity market is Slovak Electric, plc. Providing 85% of yearly electricity production. In 2001, this company was separated into three joint stock companies (an independent operator of the power transmission system, a dominant electricity generator and a new independent CHP company) with separate management and accounting

	- The dominant electricity generator is a joint-stock company but around 96% of the shares are owned by a state institution. The Government plans to sell around 45% of the shares but still keeping the majority of the company as it is adopted in the legislation on privatisation of strategy enterprises. - The first restructuring activities started in 1990 by separating the distribution activities from generation and transmission activities. At that time, a vertically integrated state-owned utility was the monopolist on all market segments. An independent regulator (Regulatory Office for Network Industries) was established in 2001. - Slovakia is linked to the UCTE transmission system.
Slovenia	- Slovenia will play an important role in the Community-wide electricity market because of the geographical location. The Slovenian grid is connected to Austria, Italy and Croatia and a link to Hungary is planned. - The Slovenian electricity sector consists of 4 generation companies, 5 distribution companies and a state-owned transmission system operator (level of unbundling of TSO is 100%). An independent regulatory authority was appointed in 2000 and a market operator established in 2001 is responsible for the running of a day-ahead market for standardised products. - Electricity prices have increased with a higher rate than the inflation rate since independence. The pricing structure is still distorted because household prices are lower than electricity costs. However, industrial users have to pay higher tariffs as their competitors in EU member states. - Slovenia is linked to the UCTE transmission system.
Turkey	- Some significant progress with regard to competitiveness and the internal energy market was made in Turkey in the last years. The electricity market opened in 2002 and the criteria for eligibility are: direct connection to the transmission system and a minimum annual consumption of 9 GWh (i.e. share of open market is around 20%). - Some regulatory measures concerning imports and exports are still in place; for example, there are some limits for eligible consumers to get supplied from producers outside Turkey. - The Turkish power market is one of the fastest growing markets in the world, i.e. an annual average of 9%. It is predicted that this growth in electricity consumption will maintain until 2020 with an expected growth rate of 8% per annum. As a result of these forecasts, the Turkish generation capacity probably has to be doubled by 2010. - The vertically integrated monopolist was broken up into three independent generation, transmission and trading/contracting companies.

Source: Eurelectric (2002) and European Commission (2002f)

This overview reveals differences as well as similarities between the markets in the accession countries and EU member states. It can be recorded that less progress has been made in the former with regard to opening the domestic electricity markets to competition. This is not surprising considering that the process started earlier in EU member states. However, some discrepancies have to be turned up between the accession countries. All countries made steps to open their market giving the right to the largest electricity users to choose their own suppliers. Countries, such as Slovenia, Slovakia and Romania, have achieved rates of market opening almost comparable to the situation in the 'least opened' markets of EU member states (Denmark, France and Greece – see the opening rates in Table 3.1). The areas identified as potential obstacles in terms of the general functioning of the electricity market have been addressed in the legislative framework in the accession countries. The rules and regulations adopted in the accession countries controlling the access to transmission and distribution network are generally in line with the development in EU member states. Progress in unbundling of TSOs and DSOs can also be reported. A number of barriers are still existing in

the process of achieving a competitive market: end-user prices for electricity are still regulated in some accession countries, while a high degree of concentration in the electricity supply industry is quite often the rule and not the exemption. Many of these developments, demonstrating the changes on electricity markets in accession countries, are similar to the situation in EU member states.

7 Concluding observations

7.1 Introduction

This report has examined the process of creating common and competitive energy markets in the European Union. The starting point of this process was the launch of the Directives on Electricity and Gas in the late 1990s. This process is part of the strategy for economic reform aiming at increasing efficiency of allocation of resources and, hence, enhancing consumer welfare. More specifically, increasing competition within the energy markets should lead to a reduction of energy prices and to a convergence of prices among EU member states.

As the process of liberalisation has been on the road now for approximately five years, an analysis of past developments is a useful input for the policy debate on this issue. What are the results of the liberalisation process up to now? Are the policy goals within reach? Which factors hamper the creation of competitive European energy market? And finally, which challenges do governments face? The focus of the analysis has been the electricity market, albeit the natural gas market has also received some attention.

This report has looked into the development of energy prices within several EU countries and has answered the question whether prices declined and converged among EU countries. Moreover, we have analysed the main obstacles behind the establishment of competitive markets at European level. The summary of that analysis is given in Section 7.2. Section 7.3 offers a concise analysis of policy implications which could be drawn from these findings.

7.2 Summary of main findings

7.2.1 Main conclusions

From the cross-country analysis of past developments within electricity markets, several conclusions can be drawn:

- Liberalisation of electricity markets raises competition and hence decreases commodity prices, provided that institutional settings are organised well. The latter comprises full unbundling of production and transmission, sufficient independent suppliers, regulated third-party access to the networks, transparency about network tariffs, and well-developed spot markets. This conclusion follows from the experiences in the United Kingdom and the Scandinavian countries. In these countries, electricity prices have declined after the establishment of adequate institutional arrangements. Moreover, the introduction of a spot market in the Netherlands, the Amsterdam Power Exchange (APX), has been followed by slightly decreasing electricity prices.
- By contrast, in the absence of sound institutional arrangements, liberalisation of electricity market will not enhance competition. This conclusion follows from among others experiences

in Spain and Italy. Although the process of liberalisation in Spain already started in 1997 and a wholesale market has been established, electricity prices are still under government control aiming at protecting the incumbents, and domestic consumers. In Italy electricity prices are at the highest level within the European Union, which is caused by a high degree of concentration, non-existence of a spot market – proposals in this direction have already been approved -, and low capacities of the interconnectors.

- Differences in national policies regarding the electricity sector do not hamper competition provided that those policies are transparent and non-discriminatory. Currently, national policies are rather different and not completely transparent. This holds for among others the regulation of networks and environmental policies. To date, network charges differ significantly among European countries. Low voltage charges are relatively high in Austria, ranging from 50 to 80 euro per MWh, while the Nordic countries have much lower charges for low voltage transport. Medium voltage charges are of course lower, but do also differ among member states. Full transparency about tariffs of transport has not been achieved yet, impeding the entry of new traders. Moreover, lack of coordination among national methods of allocating the capacities of networks hinders access of third-parties. In addition, full transparency about national environmental policies does not exist due to the large range of different measures which have been implemented at the national level.
- Liberalisation of electricity markets could increase the risk of insufficient production in case of peak demand. Past experiences, in particular in the Nordic countries, show that market forces could fail in realising sufficient capacity. This market failure arises from the fact that private benefits of investing in peak capacity are lower than social benefits. The threat of an insecure future supply of electricity is increased by the fact that several countries have planned to phase out nuclear plants while demand of electricity will probably grow steadily.

7.2.2 Development of prices

Competition on energy markets affects only some components of the price of energy for end-users. In general, the end-user price is composed of the commodity price, transport costs, and taxes. The commodity price is determined at the wholesale market and depends on the costs of generating electricity and scarcity on that market. Costs of transmission and distribution of energy, including the mark up charged by energy traders, determine transport costs. The tax component, finally, comprises of a value-added tax (VAT) and, in most cases, environmental taxes.

The tax component in the end-user price depends to a large extent on national policy decisions. It appears that environmental taxes differ strongly among EU countries. In Denmark for instance, environmental taxes constituted 34% of households' electricity price in 2002. On the contrary, Greece, Ireland, Portugal and the United Kingdom had no environmental taxes at all

on the use of electricity by households in that year. In all countries except Italy, environmental taxes on the use of electricity by industrial users were low or zero.

End-user prices net of taxes have to be used in order to assess effects of competition between suppliers. The commodity price is the main object of competition on the market. Naturally, the mark up of traders is also determined by competition in most countries.

The development of end-user prices without taxes within the various European countries shows a highly mixed picture. In 8 of the 15 EU member countries, the retail electricity price for industrial users has declined since 1995. Industrial users in Germany have got the largest price cut (-29%), but also industrial users in Spain, Luxembourg, France, and Finland have faced prices declining by more than 15%. End-user prices of industrial users in other countries, however, have risen. In particular Italy (+46%) and Denmark (+29%) have shown strong increases of the retail price without tax. These huge differences in changes in prices within the European Union follow from large differences with respect to the characteristics of national electricity markets. Main factors explaining these differences are the composition of production by technique and fuels, the degree of competition among producers, and national energy policies.

Retail prices for industrial users in Germany were at a high level in 1995. The strong decline of the electricity price in this country afterwards resulted from the large excess generation capacity at that time, and the increase in efficiency following the restructuring of the industry. For a few years now, retail prices of electricity in Germany have been stabilising at a level above that in most European countries. Increasing concentration of producers and diminishing excess capacity are the factors behind this price development.

The strong increase of the electricity prices in Italy resulted from sharply rising fuel prices at the beginning of the current decade. Generation in Italy relies heavily on oil- and gas fired power plants: the contribution of these plants to the total Italian production is approximately 40%. Due to a rather limited interconnection capacity with the markets in the neighbouring countries, where prices have been much lower, arbitrage is restricted. Moreover, competition within the Italian market is still limited due to the dominant position of the incumbent.

The Netherlands have been confronted with rising electricity prices following the surge of oil and gas prices since 1999. Imports have increased strongly, but are restricted by the capacity of interconnectors. The introduction of the Amsterdam Power Exchange (APX) has increased competition significantly. Consequently, the volatility of prices has risen. The average monthly spot prices have shown a decreasing tendency. However, the small numbers of producers at the Dutch market constraints competition.

Electricity retail prices in the Scandinavian countries have been quite low compared to other European countries. Technical characteristics of the generation of electricity and the establishment of the Nordic generation market contributed to this result. Generation in the Nordic countries is to a large extent based on techniques as nuclear and hydro, with low marginal costs. Moreover, given these techniques, production costs are less vulnerable to volatility of fuel prices as they are in for instance Italy and the Netherlands. In addition, the establishment of the common Nordic electricity market for Norway, Sweden, Finland and Denmark has raised competition significantly. Components of this market are a full unbundling of production and transmission, regulated third-party access to the networks, and the existence of a spot market, called NordPool. Recently, the Nordic market appeared vulnerable to weather conditions, however. Due to extremely dry periods, production by hydro generators ceased. Consequently, prices at the spot market doubled, in particular in the winter period when demand for electricity is high due to the use of electric heating. This event, as did comparable events in other countries, initiated increasing attention for effects of market liberalisation on security of supply. Section 7.3 elaborates further on this issue.

Recently, electricity retail prices in the United Kingdom have declined strongly. This followed from increased competition, accompanied by a growth in (gas fired) generation capacity resulting in an oversupply of electricity. Due to the highly fragmented market – with no generator having a market share of more than 15% - , individual generators did not have the power to raise prices by temporarily mothballing capacity, as has been the case in for instance Germany. As a result of this development, several British producers, like the nuclear electricity generator British Energy, got in financial problems. Financial intervention by the government has saved this former state owned utility from bankruptcy and closure.

7.2.3 Development of conditions for competition

- Markets where fierce competition has been established already – the United Kingdom and the Scandinavian countries – show well functioning spot markets, unbundling of production and transmission, and low degrees of concentration among producers. In addition, it appears that peak generation capacity is a necessary condition for getting fierce competition among producers.
- To date, conditions for more competition have not been fully realised in most member states of the European Union. In among others Belgium, France, Italy, Spain, and Germany, the supply side is still dominated by a few players. In the Netherlands, concentration is smaller, albeit the three largest generators possess approximately 50% of total generation capacity. Although empirical evidence about concentration and commodity prices within the EU-countries does not generate unambiguous conclusions, indications about the content of the relation between

concentration and prices can be derived. In the United Kingdom, prices declined after the two dominating firms had been broken up in smaller companies. On the other hand, a rise in the electricity prices followed the merger between the two biggest electricity generators in Germany (E.ON and RWE).

- Market concentration is a key determinant of price evolution, particularly regarding to ownership of the mid-merit (average) plants because these are generally seen as price-shapers. Considering the latest developments, it can be expected that European utilities head for even larger market shares, enhancing oligopolistic characteristics of regional electricity markets. A similar process is underway in accession countries.
- Arbitrage of regional price differences is still subject to constraints due to the limited capacities of interconnectors, and imperfect coordination of activities of the national Transmission System Operators (TSO). In Spain for instance, the capacity of the interconnectors with the grid in other countries is no more than approximately 4% of total generation capacity installed in Spain. Moreover, a significant part of the existing capacity is not available for trade purposes due to existing long-term international contracts. This is illustrated by the interconnection between France and Belgium, where less than one fifth of the capacity could be used by traders recently. As a consequence, regional suppliers in several countries have opportunities to control the market, for instance by strategically mothballing generation capacity.
- Albeit competition among producers appears to be an important factor behind end-user prices, fiscal and environmental policies also have significant effects on those prices. In several European countries, taxes constitute approximately one third of the end-user prices for households, making those less sensitive to developments within the wholesale market. In some member states (Austria, Germany and Finland), tax increases have offset reductions in the commodity price.
- Competition on the Natural gas market is also hampered by several of the abovementioned factors. In particular, concentration at the supply side and characteristics of the transport grid (capacity, access) influence price of natural gas. In addition, the linkage of the price of gas to the price of oil, and the existence of long-term contracts hinder competition at the natural gas market.

7.3 Policy implications

7.3.1 Role of governments

The abovementioned developments challenge governments. Which opportunities do they have to overcome the factors hampering competition? Should the policy goal of fully integrated European markets be pursued at any price? This section offers a concise analysis of pros and cons of several routes within energy policies which could be followed by governments, including the European Union. We start with depicting the general framework of analysing the role of governments. In the next section, specific measures concerning the electricity markets

are discussed. This section ends with sketching the contour of the optimal route of government policy regarding the electricity market.

7.3.2 Market failure and regulatory failure

Governments may interfere with markets if market failure can be observed. The main source of market failure in energy markets is the existence of externalities, being costs or benefits which are ignored by markets in the determination of prices. If market failure exists, government intervention could improve welfare. However, if regulatory failure exists, intervention by governments in the functioning of markets decreases welfare. In general, regulatory failure results from insufficient information regarding the market within the government, diverging objectives between government and private firms, and non-welfare maximising objectives of the government (Helm, et al, 1988).

In the past, the existence of large regulatory failures within the electricity and natural gas sectors, which were fully ruled by governments, initiated the process of liberalisation. Looking at the current European energy markets, one has to determine to which extent market failure or regulatory failure exist.

The cross-country analysis of European electricity markets shows that imperfect competition among producers is one of the current shortcomings. This shortcoming follows partly from regulatory failures. As the process of liberalisation is still underway, full unbundling of production and transmission, sufficient capacity of interconnectors, free access to all networks, and well developed spot markets have not yet been established in all countries. When at the end of the process, these changes in the energy sector will have been realised, competition among producers is enhanced. However, competition is also hampered by market failures. The characteristics of the good ‘electricity’ – high demand volatility, limited storability, and connection of all producers to one network – offer producers the opportunity to behave strategically. Experiences in liberalised regions as the United Kingdom and the Nordic countries suggest that possible abuse of market power by generators remains a concern for governments.

Recent developments in these markets raise worries about the security of supply. In the Nordic market, the generation capacity was fully utilized last winter due to insufficient investments in peak production capacity. Profit maximising firms do not invest in capacity which will rarely be used. If end-user prices were allowed to reflect scarcity, and hence could surge when all capacity is utilised, investments in peak capacity would probably be profitable. From this point of view, insufficient investments in normal peak capacity in the current markets results from regulatory failure. However, insufficient investment in super-peak generation capacity, which is only needed in very occasional cases, can be seen as a market failure. This market failure arises

from the fact that the private benefits of investing in super-peak capacity are lower than the social benefits of preventing black-outs of the power network.

The analysis of policies within the several member states of the European Union shows that governments have implemented a broad range of environmental measures, as environmental taxes, financial support schemes for renewable production and standards regarding emissions. As far as international environmental problems are concerned, uniform policies in all countries contribute to achieving goals regarding environment efficiently. After all, as all firms will face equal marginal environmental costs, reduction of pressures on the environment will occur at those places where marginal costs are relatively low. However, if countries have different preferences regarding environmental issues, the optimal policy at European level could consist of different national schemes. Different national preferences regarding environmental issues are clearly reflected in the variety within the European Union in national policies on nuclear power generation. Some member states have decided to phase out the existing nuclear plants, as Germany and Belgium, while another (Finland) has planned to invest in a new plant. Differences in national policies could hinder competition at the European level if the measures are not transparent or discriminating between national and foreign firms.

7.3.3 Pros and cons of specific measures regarding the electricity market

In order to overcome the current imperfect competition on the European electricity market, governments have several options. In the recently published Acceleration Directive, the European Union acknowledges the current shortcomings in terms of insufficient competition, and proposes further unbundling of production and transmission, and the compulsory introduction of third-party access. In addition, the European Council wants to raise interconnection capacities above 10% of installed capacity in each country, and therefore increased the EU-budget for financially supporting investments in interconnection.

In general, competition could be enhanced by:

- diminishing market shares of dominant players, for instance by an enforced splitting up, as is done in the United Kingdom, Italy, and Spain;
- weakening factors which impede entry of new players, for instance by raising feed back fees for small-scale generators;
- increasing transparency within the market, for instance by the establishment of a spot market;
- extending capacities of interconnectors, and improving methods of allocating these capacities;
- encouraging transparency of national policies regarding the electricity business;
- harmonisation of methods of allocating capacities of transmission.

Implementation of each of these options can contribute to the realisation of competitive energy markets. On the other hand, implementation of each option induces costs.

Splitting up of large, established firms could lead to the destruction of capital, and would involve transaction costs. In addition, splitting up firms carries the risk of quickly diminishing mark ups needed for coverage of fixed generation costs.

Encouraging the entry of new players on the markets can be done by supporting small-scale generation. Financial support to certain types of small-scale generation, like wind turbines, is probably rather expensive given differences in generation costs between those techniques and the large-scale generation.

Transaction costs are the main costs of establishing a spot market. Experiences suggest that these costs are of a much smaller magnitude than the welfare benefits resulting from increased competition.

Increasing capacity of interconnectors demands huge investments, but could have significant effect on competition. The profitability of these investments depends on the initial situation regarding the capacity, and opportunities to increase the number of players in the domestic market.

Encouraging transparency of national policies regarding the electricity sector, among which tariffs of network access, improves opportunities for foreign suppliers to enter domestic markets. In addition, diminishing network tariffs would encourage third party access and probably level the playing field for suppliers. Costs of these measures consist mainly of transaction costs.

Finally, harmonisation of activities of the national Transmission System Operators (TSO) regarding capacity reservation and congestion management would increase the openness of the markets at the European level as it encourages access to the networks in the various member states. Costs of harmonisation of transmission comprise mainly transaction costs.

7.3.4 Conclusion

This report shows that liberalising electricity markets increases competition provided that adequate institutional arrangements have been made. This requires, in general terms, combating dominant positions of producers by splitting up large established utility companies and implementing adequate surveillance on mergers, increasing capacities of interconnectors among

the several member states, establishing spot markets at an international level, and encouraging transparency of national policies regarding production, transmission and trade.

Although these measures have to be organised at a European level, national governments have an important role in the implementing stage. From the cross-country analysis described in this report follows that several countries have a long way to go. Others, among the Netherlands, have already realised many of the necessary conditions for a European electricity market.

In order to cope with the issue of security of supply, governments could introduce market based instruments. One of the options is the establishment of a so-called capacity market beside the commodity market. Experiences outside Europe suggest that this instrument could be an efficient instrument for realising sufficient peak capacity. This measure could be accompanied by policies focussing at the demand side. If governments and societies in general, accept electricity prices to surge in reaction on shortages, electricity firms would get incentives to invest in peak capacity while consumers would be stimulated to lessen their power consumption.

Despite the evidence produced by the experiences up to now, several questions remain to be answered. Generally, those questions refer to the specific institutional arrangements needed for the realisation of competitive markets, and mutual relations between competition, environment and security of supply. In order to contribute to the debate on these issues, CPB organises, in close cooperation with the Dutch Energy Council (AER) and the Energy Research Centre of the Netherlands (ECN), a research symposium on European electricity markets. This symposium, which will take place in The Hague at September 26 this year, aims at offering insight in the main future policy issues and challenges for economic research.

References

Albers M., 2001, Energy Liberalisation and EC Competition Law, paper presented at the Fordham 28th Annual Conference of Antitrust Law and Policy, 26 October 2001.

Auer J., 2002, *Utilities*, Deutsche Bank Research, December 2002, Frankfurt.

Barker T. and J. Köhler (eds), 1998, *International Competitiveness and Environmental Policies*, Edward Elgar.

Bergman L., 2001, *Regulation and Competition on the Nordic Power Market*, paper presented at the 18th ECD Congress 2001, October 21-25, 2001, Buenos Aires.

Cedigaz, 2002, The European Gas Market Players – edition 2001, www.cedigaz.org (29 July 2002).

Correlje A.F., P.R. Odell, 2000, Four decades of Groningen production and pricing policies and a view to the future, *Energy Policy*, Vol. 28, pp. 19-27.

Department of Trade and Industry (DTI), 2003, *Energy White Paper Our energy future – creating a low carbon economy*, The Stationary Office, Norwich, England.

Ekins P. and S. Speck, 1999, Competitiveness and Exemptions from Environmental Taxes in Europe, *Environmental and Resource Economics*, Vol. 13, pp. 369-396.

Energy Research Foundation, 2002, *Energy Market Trends in the Netherlands 2001*, Amsterdam.

Eurelectric, 2002, *Towards a pan-European Energy Market: Electricity Sector Reform in the Candidate Countries, Balkan Countries and the Russian Federation*, Brussels.

Eurogas 2001, *Eurogas Study on Oil-Gas Price Linkage in the European Union*.

European Commission, 1998, *Opening up to choice – The single electricity market*, Brussels.

European Commission, 1999a, *Economic Foundations for Energy Policy*, Directorate General for Energy, Special Issue December 1999, Office for Official Publication of the European Communities, Luxembourg.

European Commission, 1999b, *European Union Energy Outlook to 2020*, Office for Official Publication of the European Communities, Luxembourg.

European Commission, 1999c, *Externalities of fuel cycles 'Externe' project*, Brussels.

European Commission, 2000, *Opening up to choice – Launching the single European gas market*, Brussels.

European Commission, 2001a, *First benchmarking report on the implementation of the internal electricity and gas market*, Commission Staff Working Paper SEC(2001)1957, Brussels.

European Commission, 2001b, *Electricity Liberalisation Indicators in Europe*, a report prepared by OXERA et al. for DG TREN, Brussels.

European Commission, 2001c, *Proposal for a Directive of the European Parliament and of the Council – Establishing a framework for greenhouse gas emission trading within the European Community and amending Council Directive 96/61/EC*, COM(2001)581, Brussels.

European Commission, 2001d, *Green Paper Towards a European strategy for the security of energy supply*, Office for Official Publication of the European Communities, Luxembourg.

European Commission, 2001e, *New research reveals the real costs of electricity in Europe*, Press release 2001 DG Research, Brussels.

European Commission, 2001f, *Directive 2001/77/EC Promotion of Electricity produced from renewable energy sources in the internal electricity market*, Brussels.

European Commission, 2001g, *Report for the European Commission Directorate General for Transport and Energy to determine changes after opening of the Gas Market in August 2000 Volume I: European Overview*, a report prepared by DRI WEFA for DG TREN, Brussels.

European Commission, 2002a, *Second benchmarking report on the implementation of the internal electricity and gas market*, Commission Staff Working Paper SEC(2002)1038, Brussels.

European Commission, 2002b, *Communication from the Commission to the Council and the European Parliament: Final report on the Green Paper "Towards a European strategy for the security of energy supply"'*, COM(2002)321, Brussels.

European Commission, 2002c, *Amended proposal for a Directive of the European Parliament and of the Council amending Directives 96/92/EC and 98/30/EC concerning rules for the internal markets in electricity and natural gas*, COM(2002)304 final, Brussels.

European Commission, 2002d, *Benchmark of Electricity Transmission Tariffs*, a report prepared by Universidad Pontificia Comillas for the European Commission, DG TREN, Brussels.
European Commission, 2002e, *The internal energy market: Improving the security of energy supplies*, Brussels.

European Commission, 2002f, the regular progress reports of the accession countries towards accession, accessible on the webpage of DG Enlargement at http:
http://europa.eu.int/comm/enlargement/candidate.htm

European Environment Agency, 2002, *Energy and environment in the European Union*, Environment issue report No 31, Office for Official Publications of the European Communities, Luxembourg.

European Gas Regulatory Forum, 2002a, *Discussion Document on long-term contracts, gas release programmes and the availability of multiple gas suppliers*, Draft of 22 January 2002, http://europa.eu.int/comm/dgs/energy_transport/index_en.html

European Gas Regulatory Forum, 2002b, *A long-term vision of a fully operational single market for gas in Europe A strategy paper*, Draft,
http://europa.eu.int/comm/dgs/energy_transport/index_en.html

Eurostat – 'Electricity prices for households and industry' and 'Gas prices for households and industry' for different years: www.europa.eu.int/comm/eurostat/

Financial Times, Energy Utilities go on $55bn takeover spree, Monday August 19, 2002.
Green R., 2001, Markets for Electricity in Europe, *Oxford Review of Economic Policy*, Vol. 17, No. 3, pp. 329-345.

Hass R. (ed), 2001, *Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries*, Vienna.

Haas R., 2002, *Why Liberalisation, Privatisation and Deregulation will not bring about Competition in Electricity Markets*, paper presented at the 25th Annual International Conference of the IAEE, Aberdeen June 26-29, 2002.

Helm, D., J. Kay and D. Thompson, 1988, Energy Policy and the Role of the State in the Market for Energy, *Fiscal Studies*, 9(1), February, pp. 41-61

Helm D., 2002a, Energy Policy: security of supply, sustainability and competition, in *Energy Policy*, Vol 30, pp. 173-184.

Helm D., 2002b, A critique of renewables policy in the UK, *Energy Policy*, Vol 30, pp. 185-188.

Huber, C., R. Haas, T. Faber, G. Resch, J. Green, J. Twidell, W. Ruijgrok, T. Erge, 2001, *Final Report of the project EIGreen (Organising a Joint European Green Electricity Market)*, Vienna.

ILEX, 2001, *What influences gas prices in the UK and why have they increased through 2000?* a report produced for Pilot; Report(2000)33b, London,

ILEX, 2002, *Quantifying the System Costs of Additional Renewables in 2020,* A report by ILEX Energy Consulting and in association with G. Strbac to the department of Trade & Industry, London.

International Energy Agency (IEA), 2001, *World Energy Outlook 2000*, Paris.

Johnsen T.A., 2003, Increased Concentration in the Norwegian Electricity Market: Is the Matket Sufficiently Open, or Can a Dominant Norwegian Power Company Raise Prices? *IAEE Newsletter 1st Quarter 2003,* pp. 18-23.

Kingma D., M. Lijesen and M. Mulder, 2002, *Gas-to-gas competition versus oil price linkage*, paper presented at the 25th Annual International Conference of the IAEE, Aberdeen June 26-29, 2002.

Komarov Y.A. 2000, *The prospects for long-term gas supplies in the present environment*, paper presented at the 14th International Conference and Exhibition Stavanger, Norway.

Mannaerts H. and M. Mulder 2003, *Emission Trading and the European Electricity Market*, CPB Memorandum V/2003/1, The Hague.

Morgan Stanley Equity Research, 2002, *Utilities*.

Morrison M.B., 2002, *European electricity market – the state of competition,* paper presented at the 25th Annual International Conference of the IAEE, Aberdeen June 26-29, 2002.

NERA, 2003, Consolidation in the EU Electricity Sector Report for the Dutch Ministry of Economic Affairs, London.

Newbery D., 2002, *Liberalising Electricity Markets*, paper presented at the 25th Annual International Conference of the IAEE, Aberdeen June 26-29, 2002.

Observatoire Mediterraneen de l'Energie (OME), 2001, *Assessment of Internal and External Gas Supply Options for the EU, Evaluation of the Supply Costs of new Natural Gas Supply Projects to the EU and an Investigation of related Financial Requirements and Tools – Executive Summary*, a report prepared for European Commission DG TREN.

Organisation for Economic Co-operation and Development (OECD), 2001, *Environmentally Related Taxes in OECD Countries Issues and Strategies*, Paris.

Oostvorn F. van and M. Voogt, 2002, Development of Electricity Wholesale Prices in NorthWest European Markets, *IAEE Newsletter Second Quarter 2002,* www.iaee.org

Ranci P., 2002, *Annual Report of the Autorita per l'energia electtrca e il gas*, Roma, 4. July 2002.

Stern J., 2002, *Security of European Natural Gas Supplies*, The Royal Institute of International Affairs Sustainable Development Programme, London.

Swedish Energy Agency, 2002, *The Electricity Market 2002*, Stockholm.

Turmes C., 2002, *Market Concentration in the Power Sector,* p. 1, http://www.Eu-Energy.com

US Department of Energy (EIA), 2002, *International Energy Outlook 2002,* Washington.

VDEW, www.vdew.de; report published on 29.04.2002

World Environmental News, 2003, 'Spain takes leap toward freer energy market' 2.1.2003, www.planetark.org

Annex

Table A.1 Overview of factors affecting the creation of an internal energy market in several European countries

	Belg	Den	Fin	Fr	Ger	Italy	Neth	Sp	Sw	UK	Nor
Electricity generation (in %)											
Conventional thermal	39.6	88.1	50.8	8.8	62.5	77.7	94.6	50.3	6.1	75.7	0.7
Thermal nuclear	58.2	0.0	30.6	76.3	30.5	0.0	4.1	28.8	43.9	22.6	0.0
Others & hydro	2.2	11.9	18.6	14.9	7.0	22.3	1.3	20.9	50.0	1.7	99.3
Amount of reserve generating capacity in %	2	1[a]	1[a]	16	5	9	7	16	1[a]	12	1[a]
Total net generation (TWh in 2001)	79.6	36.0	72.0	511.8	501.5	266.5	89.8	206.3	157.8	358.6	122.0
Import (TWh)	15.7			4.8	32.8	43.8	21.5	10.2		14.3	
Exports (TWh)	6.7			71.1	37.9	1.5	4.2	4.8		0.1	
Export/Import Balance	-9.0	1.0	-10.0	66.3	5.1	-42.3	-17.3	-5.4	7.3	-14.2	-4.0
Ratio: Import/total net generation	83.6	35.0	82.0	437.0	495.4	305.4	107.1	205.7	150.5		125.0
Import capacity/ installed capacity	25%	39%	22%	12%	11%	14%	19%	4%	29%	3%	
Pricing approach											
- via pool system (spot market, etc.)	no	yes	yes	no	yes		yes	yes	yes	yes	yes
- regulation in place	no	Nord pool	Nord pool	no	EEX	under prepa-ration	APEX	OMEL	Nord pool	NETA	Nord pool

[a] Nordel.

Source: Eurelectric www.eurelectric.org, Swedish Energy Agency (2002), European Commission (2002a)

Table 7.1 **Electricity retail prices (nominal prices EUR/MWh, before taxes) Eurostat category: Ig - Consumption of 24,000 MWh/year – industrial users**

	Jan 95	Jul 95	Jan 96	Jul 96	Jan 97	Jul 97	Jan 98	Jul 98	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01
Italy	52	49	52	56	59	58	60	54	53	54	60	69	79	71
Ireland	51	49	50	52	56	57	53	53	53	53	53	53	53	53
Belgium	60	61	60	59	58	58	56	57	55	55	55	58	57	59
Portugal	66	65	62	62	61	60	58	58	53	53	53	53	53	53
Germany	76	77	72	70	68	66	66	65	63	63	50	52	53	53
Austria	69	70	69	67	66	65	63	63	60					
Greece	48	50	49	50	49	49	49	47	49	49	48	47	48	50
EU	53	54	52	54	52	50	50	49	48	47	47	47	47	47
France	56	56	56	56	55	51	52	50	50	49	49	47	48	48
UK		62		59	60	50	54	51	59	49	54	54	51	48
Spain	62	63	64	63	59	58	52	52	53	53	54	54	49	49
Netherlands	48	48	49	48	48	47	47	48	48	49				
Denmark	40	42	43	43	43	42	47	45	44	43				
Luxembourg	48	49	49	49	49	48	46	46	47	47	45	43	38	38
Finland	44	40	42		37	36	36	37	35	34	34	34	33	34
Sweden			33	35	37	35	33	30	28	28	28	30	24	31

Table 7.2 **Eurostat category: Ib - Consumption of 50 MWh/year – industrial users**

	Jan 95	Jul 95	Jan 96	Jul 96	Jan 97	Jul 97	Jan 98	Jul 98	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01	Jan 02	Jul 02	Change Jan 99/ Jul 02
Italy	110	103	110	116	119	119	119	114	114	115	119	128	87	78	98	155	6%
Ireland	126	122	123	125	133	135	126	127	126	126	126	126	126	126	127	130	3%
Belgium	147	149	148	147	147	146	148	149	148	148	143	146	125	128	129	127	-14%
Portugal	127	127	121	121	121	118	115	115	105	105	104	104	105	105	100	122	-6%
Germany	180	183	176	171	165	162	163	163	162	158	139	134	133	133	131		
Austria	172	175	174	172	163	160	161	161	162	162	157	126	112	102	96	100	-38%
Greece	83	86	84	86	85	84	86	82	86	86	84	83	84	87	87	99	15%
EU	113	113	110	111	108	105	105	104	103	102	99	98	92	92	93	97	-6%
France	101	101	102	100	100	91	92	89	89	87	87	85	85	85	86	101	13%
UK	125	118	125	119	114	105	109	105	107	108	107	101	94	93	92		
Spain	118	120	122	120	111	109	100	100	98	98	98	98	98	98	99	86	-12%
Netherlands	93	94	95	92	92	91	91	92	92	94	78	101	104	106		87	-5%
Denmark	48	49	52	52	51	51	54	52	53	52	56	55	64	65	69	86	62%
Luxembourg	144	141	140	140	139	136	136	137	139	137	133	131	119	121	122	67	-52%
Finland	61	64	66	65	60	59	58	59	56	55	55	54	53	54	56	57	2%
Sweden			70	72	70	69	69	67	63	59	56	53	40	41	36	56	-11%

Source: European Commission (2002a) and Eurostat

Table 7.3 Eurostat category: Dc - Consumption of 3.5 MWh/year – household users

	Jan 95	Jul 95	Jan 96	Jul 96	Jan 97	Jul 97	Jan 98	Jul 98	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01	Jan 02	Jul 02	% Change Jan 99 / Jul 02
Italy	151	143	151	159	167	165	168	158	157	158	150	160	157	146	139	142	-10%
Ireland	73	71	72	77	82	85	80	80	80	80	80	80	80	80	88	125	56%
Belgium	123	125	124	122	119	119	119	120	118	118	117	117	118	118	114	122	3%
Portugal	126	126	126	125	128	125	125	125	120	120	119	119	120	120	122	112	-7%
Germany	130	132	132	129	127	125	126	126	128	129	119	120	122	123	126	111	-13%
Austria			103	102	98	97	97	97	98	98	95	95	95	95	93	97	-1%
Greece	65	62	61	63	62	61	63	60	62	62	56	55	57	58	58		
EU	98	99	101	99	99	96	98	96	95	94	93	94	97	95	96		-19%
France	101	102	102	102	101	95	96	94	95	93	93	91	91	91	92	92	-3%
UK	113	111	112	112	108	107	105	103	102	101	99	97	96	97	97	98	-4%
Spain	106	108	109	108	105	103	95	95	93	91	90	90	86	86	86	88	-5%
Netherlands	85	90	101	99	88	87	87	87	88	82	94	108	98	89	91	84	-5%
Denmark	61	63	65	64	64	63	67	67	68	68	72	72	78	82	87	86	26%
Luxembourg	107	109	109	109	107	105	106	106	108	107	106	105	112	114	115	69	-36%
Finland	70	74	77	76	73	72	71	71	66	65	65	64	64	67	70	70	6%
Sweden				66	68	67	67	70	65	62	64	65	63	67	70	58	-11%

Source: European Commission (2002a) and Eurostat

Table 7.4 Electricity end-user prices (nominal prices EUR/MWh, including all taxes; VAT and energy taxes) Eurostat category: Ig - Consumption of 24,000 MWh/year – industrial users

	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01	Jan 02	Jul 02	% Change Jan 99 and July 02
Italy	74	70	79	89	94	96	92	96	30
Ireland	60	60	60	60	60	60	73	73	22
Belgium	67	67	67	70	69	71	71	70	4
Portugal	55	55	55	55	56	56	58	58	5
Germany	69	82	55	55	62	62	62	62	-10
Austria	81								
Greece	53	53	52	51	52	54	54	54	2
France	59	57	57	55	64	56	57	58	-2
UK				67	62	68	62	57	
Spain	64	64	65	65	60	60	57	57	-11
Netherlands	57	57							
Denmark	84	82							
Luxembourg	50	50	47	46	42	42	43	42	-16
Finland	48	47	46	46	46	47	50	50	4
Sweden	35	35	35	38	30	39	33	32	-9

Source: Eurostat

Table 7.5 Eurostat category: Ib - Consumption of 50 MWh/year – industrial users

	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01	Jan 02	Jul 02	% Change Jan 99 and July 02
Italy	154	165	159	169	115	110	135	140	-9
Ireland	142	142	142	142	142	142	143	143	1
Belgium	180	179	175	179	153	157	158	159	-12
Portugal	110	110	109	109	111	111	105	105	-5
Germany	220	246	181	181	188	188	189	189	-14
Austria	204	204	197	169	150	138			
Greece	93	92	91	89	91	94	94	94	1
France	109	106	106	103	103	103	105	105	-4
UK	114		107	135	135	140	123	109	-4
Spain	119	119	119	119	119	119	120	120	1
Netherlands	137	137	121			158			
Denmark	94	94	98	97	109	110	115	112	19
Luxembourg	147	146	142	139	131	133	136	137	-7
Finland	73	73	72	72	71	72	74	74	1
Sweden	79	73	70	67	50	51	45	45	-43

Source: Eurostat

Table 7.6 Eurostat category: Dc - Consumption of 3.5 MWh/year – household users

	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01	Jan 02	Jul 02	% Change Jan 99 and Jul 02
Italy	211	212	201	211	204	197	190	195	-8
Ireland	89	89	89	89	89	89	99	99	11
Belgium	145	144	143	143	145	145	139	136	-6
Portugal	127	126	113	126	126	126	129	129	2
Germany	159	195	149	149	149	162	162	169	6
Austria	126	126	123	132	132	133	134	116	-8
Greece	88	67	61	60	61	63	63	63	-28
France	122	112	112	117	117	117	119	120	-2
UK	100	107	113	108	89	110	108	102	2
Spain	113	112	109	109	105	105	105	105	-7
Netherlands	124	107	139			159	164	173	40
Denmark	184	191	180	196	207	211	220	218	18
Luxembourg	114	114	112	111	124	126	129	130	14
Finland	89	87	87	87	86	90	94	94	6
Sweden	96	98	102	104	103	109	113	112	17

Source: Eurostat

Table 7.7 **Gas retail prices (nominal prices EUR/GJ, before taxes) Eurostat category: I4-1: Consumption of 418.6 TJ/year c.120 GWh – industrial users**

	Jan 95	Jul 95	Jan 96	Jul 96	Jan 97	Jul 97	Jan 98	Jul 98	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01
Italy	2.9	2.9	3.1	3.4	3.7	3.6	3.5	3.3	2.9	2.8	3.4	4.5	5.6	5.6
Belgium	3.3	3.3	3.2	3.2	3.4	3.6	3.5	3.2	2.7	2.7	3.6	4.5	5.5	4.9
Germany	3.8	3.8	3.6	4.0	4.1	4.4	4.1	4.0	3.5	3.1	3.9	5.1	6.5	6.3
Austria		4.0	4.0	4.0	3.8	3.7	3.7	3.7	3.7	3.6		4.4	5.5	5.6
EU	3.1	3.2	3.2	3.3	3.6	3.4	3.5	3.1	2.9	3.0	3.7	4.5	5.5	5.1
France	2.5	2.6	2.6	2.7	2.8	2.9	2.9	2.7	2.6	2.6	3.5	4.1	5.2	4.4
UK		3.2		2.3	2.8	2.8	2.9	2.9	3.0	3.0	2.8	2.9	3.5	4.3
Spain	2.8	3.0	3.0	3.3	3.5	3.1	3.5	3.0	2.7	2.9	3.9	4.7	5.4	4.6
Netherlands	2.8	2.9	2.7	3.0	3.0	2.9	3.0	2.7	2.4	2.4	2.8			
Denmark	3.2	3.2	2.9	2.8	3.3	2.9	2.9	2.5	2.1	2.8	3.7	5.0	4.9	4.3
Luxembourg	3.9	3.8	4.1	4.3	4.9	4.5	4.8	3.7	3.7	3.9	4.8	6.0	6.6	6.9
Finland	2.4	2.9	2.7	3.2	3.6	2.9	3.2	2.5	2.1	2.6	3.9	4.7	5.4	4.6
Sweden													7.3	5.5

Source: European Commission (2002a) and Eurostat

Table 7.8 **Eurostat category: D2: Consumption of 16 GJ/year c. 4.5MWh – household users**

	Jan 95	Jul 95	Jan 96	Jul 96	Jan 97	Jul 97	Jan 98	Jul 98	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01
Italy	8.7	8.1	8.6	9.1	9.1	9.0	8.9	8.9	9.0	9.0	9.7	10.7	12.0	11.3
Belgium	12.2	12.4	12.2	12.1	12.1	12.1	12.2	12.0	11.8	11.6	12.8	13.7	14.9	14.3
Germany	11.8	11.6	11.2	10.8	11.5	11.4	11.2	11.1	11.0	10.5	11.2	12.3	13.8	14.3
Austria			8.6	8.5	8.3	8.2	8.2	8.2	8.3	8.3	8.3	9.9	11.6	11.6
EU	10.9	10.8	10.7	10.7	10.9	10.8	10.7	10.6	10.0	9.9	10.5	11.2	12.2	12.2
France	11.3	11.3	11.3	11.2	11.3	11.5	12.0	11.6	11.4	10.8	10.8	11.5	13.0	13.9
UK	9.9	9.8	9.8	9.7	9.7	9.5	9.5	9.3	9.1	9.0	9.0	9.0	8.8	9.1
Spain	11.0	11.2	11.8	11.6	11.7	11.6	11.6	11.6	11.3	10.7	11.6	13.0	14.1	13.8
Netherlands	8.2	8.2	8.1	8.3	9.2	9.3	9.1	8.7	8.4	8.2	8.5	8.9	9.2	9.6
Denmark									6.0	6.8	9.0	9.7	11.0	9.1
Luxembourg	10.1	10.4	10.8	10.9	10.8	10.9	10.7	10.6	10.3	10.2	10.7	11.8	12.6	12.7
Finland														
Sweden				10.0	9.9	9.5	9.4	9.3	9.3	9.7	9.8	10.0	11.0	11.8
Ireland	15.0	14.5	14.6	15.0	16.0	16.1	15.1	15.2	14.4	14.4	14.4	14.4	14.4	14.4

Source: European Commission (2002a) and Eurostat

Table 7.9 **Gas end-user prices (nominal prices EUR/GJ, including all taxes) Eurostat category: I4-1: Consumption of 418.6 TJ/year c.120 GWh – industrial users**

	Jan 99	Jul 99	Jan 00	Jul 00	Jan 01	Jul 01	Jan 02	Jul 02	% Change Jan 00 and July 02
Italy	3.7	3.7	4.4	5.4	6.4	6.5	6.5	5.5	25
Belgium	3.3	3.3	4.4	5.4	6.7	5.9	5.3	5.2	18
Germany	5.1	5.1	5.9	7.3	9.3	9.5	8.6	7.5	27
Austria	5.8	5.7		6.6	8.0	7.3	7.0	7.1	
France	3.3	3.5	4.6	5.3	6.6	5.7	5.0	5.2	13
UK	3.6		3.4	3.5	4.2	6.1	6.0	4.9	44
Spain	3.1	3.4	4.5	5.4	6.3	5.3	5.8	4.7	4
Luxembourg	3.9	4.1	5.1	6.4	7.0	7.3	5.1	5.8	14
Finland	3.1	3.8	5.3	5.9	6.4	6.2	5.4	6.0	13
Sweden					10.3	10.2	9.7	6.8	

Source: Eurostat

Table 7.10 **Eurostat category: D2: Consumption of 16 GJ/year c. 4.5MWh – household users**

	jan-99	jul-99	jan-00	jul-00	jan-01	jul-01	jan-02	jul-02	% Change Jan 00 and July 02
Italy	12.1	12.2	12.8	13.8	14.8	13.9	13.9	13.6	6
Belgium	14.6	14.5	15.9	17.0	18.5	17.7	17.3	17.1	8
Germany	12.3	12.3	13.3	14.8	17.3	17.3	16.2	16.2	22
Austria	11.3	11.3	11.3	13.2	15.2	15.2		14.0	24
France	13.0	12.4	12.4	13.1	14.7	15.8	15.8	15.3	23
UK	7.7	8.2		9.7	9.4	10.3	10.1	10.1	
Spain	13.1	12.4	13.5	15.1	16.3	16.0	18.3	14.8	10
Netherlands	10.3		10.4	10.8	8.6	9.0	9.5	9.5	-9
Denmark	34.4	34.3	40.7	40.6	43.7	44.0			
Luxembourg	10.9	10.8	11.3	12.6	13.4	13.5	12.3	12.3	9
Sweden	14.9	15.4	15.7	16.1	18.4	19.2	19.8	19.7	25
Ireland	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	0
Portugal	15.8	15.8	15.8		18.5		16.7	15.8	0

Source: Eurostat

Abstract

This Document describes the background and the rationale of the European Union for pursuing liberalised energy markets, explains why this policy goal is not achieved yet, and discusses recent developments and some of the future challenges faced by political decision makers.

Five years after launching the process of electricity liberalisation, dominance of large utilities, lack of international transmission capacity, and national energy policies hinder the creation of competitive energy markets in Europe. Consequently, the expected downward convergence of electricity prices for EU business and EU consumers has only partly been realised.

Established utility companies still have a strong position on some national electricity markets. By means of (inter)national mergers, they increase their market shares at the European level. As a consequence, the price of electricity remains at a higher level than the costs of generating the electricity. In addition, producers lack strong incentives to decrease costs and to develop new techniques of generation owing to missing fierce competitive market forces.

The document shows that liberalising electricity markets increases competition provided that adequate institutional arrangements have been made. This requires, in general terms, combating dominant positions of producers by splitting up large established utility companies and implementing adequate surveillance on mergers, increasing capacities of interconnectors among the several member states, establishing spot markets at an international level, and encouraging transparency of national policies regarding production, transmission and trade.