

ELECTRICITY MARKET LIBERALISATION IN THE EU-15 MEMBER STATES,
NEW ENTRANTS AND CANDIDATE COUNTRIES:
MEASURING THE PROGRESS BETWEEN 1999 AND 2001

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ABSTRACT

ELECTRICITY MARKET LIBERALISATION IN THE EU-15 MEMBER STATES, NEW ENTRANTS AND CANDIDATE COUNTRIES: MEASURING THE PROGRESS BETWEEN 1999 AND 2001

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Measuring the progress of the Member States of the European Union in liberalising their electricity markets has received considerable importance since the Electricity Directive 96/92/EC is introduced. In this thesis, first, a model based on the indicators-approach proposed by OXERA is developed to measure the degree of liberalisation in electricity markets. Then, the degree of electricity market liberalisation in the European Union-15, the New Entrants and Candidate Countries is measured in the years 1999, 2000 and 2001.

Measurement of electricity market liberalisation in the European Union-15 and the New Entrants and Candidate Countries brings about several important findings. It is seen that there is a progress in the degree of electricity market liberalisation in the European Union-15 between 1999 and 2001. Similarly, the New Entrants and Candidate Countries are, also, found to increase the degree of liberalisation in their national electricity

markets between 1999 and 2001 and to converge to the European Union's level of electricity market liberalisation. Furthermore, comparison of the state of liberalisation in electricity generation and supply markets in the European Union -15 Member States and the New Entrants and Candidate Countries suggests that their electricity generation market is not as liberalised as their supply market.

Keywords: electricity, liberalisation, measurement, competition, regulation

ÖZ

AVRUPA BİRLİĞİ-15 ÜLKELERİ İLE YENİ KATILAN VE ADAY ÜLKELERDE ELEKTRİK PİYASASININ SERBESTLEŞTİRİLMESİ: 1999 İLE 2001 YILLARI ARASINDAKİ GELİŞMENİN ÖLÇÜLMESİ

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96/92/EC sayılı Elektrik Direktifi'nin yayımlanmasıyla birlikte Avrupa Birliği üyesi ülkeleri elektrik piyasalarının serbestleştirilmesinde sağlanan gelişmenin ölçülmesi daha da önem kazanmıştır. Bu tezde, öncelikle OXERA tarafından öne sürülen göstergeler-yaklaşımı esas alınarak elektrik piyasalarındaki serbestleştirilme derecesini ölçmek için bir model geliştirilmiştir. Daha sonra, Avrupa Birliği-15 Ülkeleri ile Yeni Katılan ve Aday Ülkelerde 1999, 2000 ve 2001 yıllarında gerçekleşen elektrik piyasası serbestleştirilme derecesi ölçülmüştür.

Avrupa Birliği-15 ile Yeni Katılan ve Aday Ülkelerdeki elektrik piyasası serbestleştirilme derecesinin ölçülmesi birkaç önemli bulguyu ortaya çıkarmaktadır. 1999 ile 2001 yılları arasında Avrupa Birliği-15 Ülkelerindeki elektrik piyasası serbestleştirilme derecesinde bir ilerleme olduğu görülmektedir. Benzer şekilde, 1999 ile 2001 yılları arasında Yeni

Katılan ve Aday Ülkelerin de kendi ulusal elektrik piyasalarındaki serbestleştirilme derecesini arttırdıkları ve Avrupa Birliđi-15 düzeyine yaklařtırmakta oldukları tespit edilmiřtir. Ayrıca, Avrupa Birliđi-15 Ülkeleri ile Yeni Katılan ve Aday Ülkelerdeki elektrik üretim ve arz piyasalarının serbestleştirilme durumları karşılařtırıldıđında, elektrik üretim piyasasının arz piyasası kadar serbestleştirilmiř olmadığı görülmüřtür.

Anahtar Kelimeler: elektrik, serbestleştirilme, ölçme, rekabet, düzenleme

To my *wify*, *Yelda*

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TABLE OF CONTENTS

PLAGIARISM	iii
ABSTRACT	iv
ÖZ	vi
ACKNOWLEDGEMENTS	ix
TABLE OF CONTENTS	x
LIST OF TABLES	xiv
LIST OF FIGURES	xvi
LIST OF ABBREVIATIONS	xvii
CHAPTER	
1. INTRODUCTION	1
1.1 Electricity Directive of the European Parliament and of the Council	2
1.1.1 Electricity Generation	3
1.1.2 Electricity Transmission and Distribution	3
1.1.3 Electricity Supply and Market Opening	4
1.2 Background to Liberalisation	6
2. ELECTRICITY MARKET LIBERALISATION: IN THEORY AND PRACTICE	10
2.1 Electricity Economics: Monopoly, Regulation and Competition	10
2.2 Pricing Models in Competitive Electricity Markets	15
2.3 Some Electricity Market Liberalisation Practices and Motivations for Liberalisation	18
3. AN APPROACH TO MEASURING ELECTRICITY MARKET LIBERALISATION	21
3.1 Objectives of the OXERA Model and Basic Methodology..	22
3.1.1 Objectives of the OXERA Model	22
3.1.2 Basic Methodology of OXERA's Approach	23

3.1.3	Developing Liberalisation Indicators	23
3.1.3.1	Market Competition	24
3.1.3.1.1	Upstream and Wholesale Market ..	25
3.1.3.1.2	Downstream Market and Customer Impact	27
3.1.3.1.3	Method of Aggregation	31
3.1.3.2	Non-Competitive Activities	32
3.2	Modified-OXERA Approach to Measure Electricity Market Liberalisation	34
3.2.1	Scoring and Weighting of Liberalisation Indicators	37
3.2.1.1	Scoring of Liberalisation Indicators	37
3.2.1.2	Weighting of Liberalisation Indicators	39
3.2.1.3	Aggregation of Primary Indicators to Higher Levels	40
3.2.2	Data Collection	41
4.	STATE OF ELECTRICITY MARKET LIBERALISATION IN THE EU- 15 MEMBER STATES	43
4.1	State of Liberalisation in the EU-15 in 1999	44
4.2	State of Liberalisation in the EU-15 in 2000	50
4.3	State of Liberalisation in the EU-15 in 2001	54
4.4	Progress of Electricity Market Liberalisation in the European Union-15 Member States	60
5.	STATE OF ELECTRICITY MARKET LIBERALISATION IN THE NEW ENTRANTS AND CANDIDATE COUNTRIES	70
5.1	State of Liberalisation in 1999	71
5.2	State of Liberalisation in 2000	74
5.3	State of Liberalisation in 2001	78
5.4	Progress of Electricity Market Liberalisation in New Entrants and Candidate Countries	82
5.5	Comparing Electricity Market Liberalisation in the EU- 15 and New Entrants and Candidate Countries	88
6.	CONCLUSIONS AND RECOMMENDATIONS	91
	REFERENCES	96

APPENDICES

1. Competition Indicators for European Electricity Market in OXERA Model	100
2. Competition Indicators for European Electricity Market in Modified-OXERA Model for EU-15	101
3. Competition Indicators for European Electricity Market in Modified-OXERA Model for NEs & CCs	102
4. Scoring Method for Electricity Market Competition Indicators ...	103
5.1. Raw Data for Electricity Market Competition Indicators for EU-15 (1999)	104
5.2. Raw Data for Electricity Market Competition Indicators for EU-15 (2000)	106
5.3. Raw Data for Electricity Market Competition Indicators for EU-15 (2001)	108
6.1. Weighted Scores of Competition Indicators and Overall Competition Scores for EU-15 (1999)	110
6.2. Weighted Scores of Competition Indicators and Overall Competition Scores for EU-15 (2000)	111
6.3. Weighted Scores of Competition Indicators and Overall Competition Scores for EU-15 (2001)	112
7.1. Raw Data for Electricity Market Competition Indicators for NEs & CCs (1999)	113
7.2. Raw Data for Electricity Market Competition Indicators for NEs & CCs (2000)	114
7.3. Raw Data for Electricity Market Competition Indicators for NEs & CCs (2001)	115
8.1. Weighted Scores of Competition Indicators and Overall Competition Scores for NEs & CCs (1999)	116
8.2. Weighted Scores of Competition Indicators and Overall Competition Scores for NEs & CCs (2000)	117
8.3. Weighted Scores of Competition Indicators and Overall Competition Scores for NEs & CCs (2001)	118
9.1. Domestic Electricity Prices in the EU-15	119

9.2. Industrial Electricity Prices in the EU-15	120
10. Average Scores of Electricity Market Liberalisation in the EU-15, NEs & CCs	121
11. Population and GDP Data for the Countries	122

LIST OF TABLES

TABLES

1.1	Dates for Full Opening of Electricity Markets in EU-15	5
2.1	Classification of Goods in Terms of Their Characteristics	11
2.2	Welfare Analysis of Monopolistic and Regulated Electricity Markets	15
3.1	Areas and Weightings of Upstream and Wholesale Market	25
3.2	Areas and Weightings of Downstream Market and Customer Impact	28
3.3	Primary Indicators and Aggregated Intermediate Level Indicators of Non-Competitive Activities	33
3.4	Number of Indicators of Non-Competitive Activities Whose Scores are Subjectively Estimated by OXERA	36
4.1	Ranking of EU-15 in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact – 1999	47
4.2	Ranking of EU-15 in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact – 2000	53
4.3	Ranking of EU-15 in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact – 2001	58
4.4	Changes in Overall Score of Market Competition in the EU-15 (1999-2001)	61
4.5	Changes in Electricity Market Liberalisation in Portugal and Finland	62
4.6	Countries with Fluctuating Nature of Liberalisation.....	64
4.7	Changes in the Scores of Competition Indicators in the EU-15	66

5.1	Ranking of NEs and CCs in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact – 1999	73
5.2	Ranking of NEs and CCs in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact – 2000	76
5.3	Ranking of NEs and CCs in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact – 2001	80
5.4	Changes in Overall Score of Market Competition in New Entrants and Candidate Countries (1999-2001).....	83
5.5	Changes in Electricity Market Competition Indicators in the New Entrants and Candidate Countries	85
5.6	Comparison of Electricity Market Competition Scores of EU-15 and New Entrants and Candidate Countries	89

LIST OF FIGURES

FIGURES

2.1 Monopolistic, Regulated and Competitive Markets in Short-Run	13
3.1 Aggregation of Primary Indicators	24
4.1 Overall Score of Market Competition for EU-15 (1999)	49
4.2 Overall Score of Market Competition for EU-15 (2000)	54
4.3 Overall Score of Market Competition for EU-15 (2001)	59
4.4 Change of Electricity Market Liberalisation in the EU-15	67
5.1 Overall Score of Market Competition for NEs and CCs (1999)	74
5.2 Overall Score of Market Competition for NEs and CCs (2000)	77
5.3 Overall Score of Market Competition for NEs and CCs (2001)	82
5.4 Change of Electricity Market Liberalisation in NEs & CCs	86

LIST OF ABBREVIATIONS

CAEM	Center for the Advancement of Energy Market
CCs	Candidate Countries
D	Demand
Dc	Eurostat category of domestic prices for 3500 kilowatt hour consumption annually
DSO	Distribution System Operator
EU-15	European Union with 15 Members
GDP	Gross Domestic Product
Ib	Eurostat category of industrial prices for 50000 kilowatt hour consumption annually
MC	Marginal Cost
Med	Medium
MR	Marginal Revenue
MWh	Megawatt hour
ND	No Data
NEs	New Entrants
NN	Not Numeric
OXERA	Oxford Economic Research Associates
PPP	Purchasing Power Parities
TSO	Transmission System Operator
UK	United Kingdom

CHAPTER I

INTRODUCTION

In an attempt to have the world's most competitive and dynamic economy by the year 2010, the leaders of the European countries decided, in Lisbon in 2002, that the European Union (EU) needs to develop in a number of areas in which it is lagging behind the United States (Muir, 2002). Integration of European energy markets is one of those areas and receives utmost attention in furthering and completing the single market in the EU. For the EU to become competitive and dynamic in the global energy market, it is required that the electricity markets of the member states be competitive and dynamic, individually. In order to create a competitive and dynamic electricity market at both national and EU level, the European Commission obliges the EU Member States to open up and liberalise their electricity markets.

The Electricity Directive 96/92/EC of the European Parliament and of the Council of December 19, 1996 for Internal Market in electricity is the first attempt to create an open and competitive electricity market in the EU. It establishes the general rules for the organisation of electricity sector and the common rules for generation, transmission and distribution of electricity (OJL 27, 1997).

Implementation of the Electricity Directive 96/92/EC into national legislation by 19 February 1999 has been mandated by the European Commission. The Commission had several motivations in publishing this directive and bringing it into force. These motivations were as follows:

- i. to restructure the conventional natural monopolies in most of the EU countries into competitive markets
- ii. to reduce large differences of electricity prices in the Member States, which appeared as obstacles to the creation of Single European Market
- iii. to lower electricity prices to enable the firms to produce goods at lower costs
- iv. to connect the electricity transmission and distribution systems across Europe to be able to meet the peak demand for electricity power
- v. to make better use of resources which are inputs for electricity production and to prevent environmental pollution
- vi. to make the electricity suppliers improve their services.

1.1 Electricity Directive of the European Parliament and of the Council

Electricity Directive 96/92/EC is repealed from 1 July 2004 by the Directive 2003/54/EC of the European Parliament and of the Council (OJL 176, 2003). The Electricity Directive¹ 2003/54/EC, which aims to introduce competition into electricity generation and supply while maintaining an efficient regulation in transmission and distribution, outlines the common rules about the generation, transmission, distribution and supply of electricity.

¹ Throughout this thesis the term 'Electricity Directive' will be used to refer to the Electricity Directive 2003/54/EC unless otherwise stated.

1.1.1 Electricity Generation

Electricity generation is the process of producing electricity by the use of various resources such as coal, chemicals, water, wind and sunlight. The Electricity Directive states that from February 1999 onwards, any electricity generator is allowed to build a new power plant and generate electricity anywhere in the EU. Member States may choose between authorisation and tendering procedure or the mixes of the two for the construction of new generating capacity. Adopting the authorisation procedure requires that Member States lay down and publicise the authorisation procedures and criteria for the grant of authorisation. Any applicant which complies with the criteria for granting an authorisation may build and operate a new generation plant. These criteria could relate to the safety and security of electricity system, installations and associated equipment, protection of public health and the environment, use of public ground, energy efficiency, the nature of primary sources and technical, economic and financial capabilities of the applicant.

In the tendering procedure, on the other hand, an inventory of the need for future generation capacity is drawn up by the Member State on the basis of estimations carried out by a competent body appointed by the Member State. The new capacity to be constructed is allocated by a tendering procedure. To ensure objective and non-discriminatory decisions, an authority independent of electricity production, transmission and distribution carries out the organisation, monitoring and control of the tendering procedure. It should be noted that tendering procedure can only be employed if the generating capacity built by the authorisation procedure is not sufficient to ensure security of supply.

1.1.2 Electricity Transmission and Distribution

Electricity transmission is the process of transferring the high voltage electricity from the generators to the distributors through

transmission grids. According to Electricity Directive, Member States, taking into consideration of efficiency and economic balance, appoint a transmission system operator (TSO) to be responsible for the operation, maintenance and development of the transmission system in a given area. The TSO is the body responsible for operating the high voltage transmission grid. Distribution companies get electricity from this grid and decrease the voltage to distribution level. In order to ensure security of supply and efficient operation, the TSO needs to provide sufficient information to the operator of any other interconnected transmission system. The setting up of generating installations and the use of interconnectors on a non-discriminatory manner as required by the criteria set by the Member States are also the functions of the TSO.

Electricity distribution is the transfer of medium and low voltage electricity from transmission grids to the suppliers through the lines. Similar to the case of transmission, in electricity distribution, Member States designate a distribution system operator (DSO) responsible for operating, maintaining and developing the distribution system in a given area and its interconnectors with other systems. For protection of the environment, the DSO has to maintain a secure, reliable and efficient electricity distribution system. This may require that the DSO give priority to distributing the electricity coming from those generators who are using renewables and waste as the source of electricity production.

1.1.3 Electricity Supply and Market Opening

Electricity supply is the act of selling the electricity to final customers. These can be big or small industrial users and households. The Electricity Directive obliges the Member States to gradually open their electricity markets to choice of customers according to a minimum percentage share of the total market in three steps. The percentage of

the electricity consumed by the customers who are able to choose their suppliers as a proportion of total electricity consumption is defined as the degree of electricity market opening. It is required by the Electricity Directive that the electricity market should be opened at least 26% by February 1999, 28% by February 2000 and 33% by February 2003. It is also required that from 1 July 2004, at the latest, all industrial customers and from 1 July 2007 all customers should be able to choose their suppliers freely. These values are set by the Directive as threshold values and further opening before the deadlines, including a complete liberalisation, is also encouraged.

In order to ensure that varying degrees of market openings do not create unfair competition and access from generators of a highly protected member is limited, the Directive encourages the members to increase their degree of liberalisation to. Some of the members like Finland, Sweden, UK, Germany and Austria had already opened their electricity markets by the year 2001. The dates set by the political agreement reached on November 2002 for the full opening of electricity markets for the EU-15 Member States are given in Table-1.1 (Eurostat, 2003).

Table-1.1: Dates for Full Opening of Electricity Markets in EU-15

BELGIUM	2007	LUXEMBOURG	2007
DENMARK	2003	NETHERLANDS	2003
GERMANY	1999	AUSTRIA	2001
GREECE	2007	PORTUGAL	2003
SPAIN	2003	FINLAND	1997
FRANCE	2007	SWEDEN	1998
IRELAND	2005	UK	1998
ITALY	2007		

Source: Eurostat (2003: 12)

1.2 Background to Liberalisation

Over the last decade, electricity market liberalisation has been increasingly emphasised as a key factor in creating a single European energy market. There are a few case studies on the electricity market liberalisation for some EU Member States and New Entrants in the literature. Branston (2002), for example, studied the role of the new entrants into the electricity market in England and Wales since privatisation. Kulczycka (2003) carried out a case study on the problems in energy trading in Poland and offered suggestions to promote the liberalisation of the energy trade. Similarly, Bakos (2001) performed a study on Hungary discussing the results of asymmetric opening-up of the electricity market in terms of electricity suppliers and consumers.

It has also become important to be able to measure the progress of countries in liberalising their electricity markets to judge their performance amongst other countries and, when necessary, formulate policies that might enable markets to liberalise more quickly (OXERA, 2000).

There have been attempts to develop a range of electricity liberalisation indicators representing the activities in electricity markets and models to evaluate the degree of electricity market liberalisation. OXERA (Oxford Economic Research Associates), for instance, is one institution attempting to measure degree of liberalisation across Europe while CAEM (Center for the Advancement of Energy Market) is another one developing a deregulation index for electricity retail market for United States, Canada, New Zealand, and portions of Australia and the United Kingdom.

In 2000, OXERA developed a set of energy liberalisation indicators with the aim of analysing the progress of EU-15 Member States in implementing the Electricity Directive and tracking the development of market competition and regulation in each EU-15 Member State. The liberalisation indicators developed by OXERA also

allowed for the comparison of the performance of different countries across Europe. However, OXERA applied its liberalisation indicator approach to analyse the state of liberalisation in the EU Member States only for the year 2000. To be able to see the complete picture across the Europe, it is also necessary to see the general state and the progress made in electricity market liberalisation both in the EU Member States and New Entrants and Candidate Countries starting from the year 1999, when Electricity Directive 96/92/EC was started to be implemented, up to now. Nevertheless, there is no comprehensive study available in the literature on the overall state of electricity market liberalisation in the EU Member States and the New Entrants and Candidate Countries for the years between 1999 and 2004 .

Considering this need, the aim of this study is to analyse the progress of the EU-15 Member States and the New Entrants and Candidate Countries in liberalising their electricity markets between the years 1999 and 2001 using the model developed by modifying the OXERA's indicators approach. Therefore, this study sets out to answer the following research questions:

- i) What is the state of electricity market liberalisation in the EU-15 Member States between 1999 and 2001?
- ii) What is the state of electricity market liberalisation in the New Entrants and Candidate Countries between 1999 and 2001?
- iii) How do the EU-15 Member States and New Entrants and Candidate Countries differ from each other in terms of their performance in electricity market liberalisation?
- iv) In what areas do countries in question need to improve as far as the electricity market liberalisation indicators proposed by OXERA are concerned?

This study is limited to the set of electricity liberalisation indicators proposed by OXERA in 2000 in terms of the activities carried out in the European electricity market as they are the only available indicators in the field of electricity market liberalisation in Europe. However, this study takes the work of OXERA further by taking into account the years 1999, 2000 and 2001 instead of 2000 only and by analysing the state of electricity market liberalisation in the New Entrants and Candidate Countries in addition to the EU-15 Member States.

Chapter 2 describes the difference between the economics of monopolistic, regulated and competitive electricity markets and examines the welfare effects of regulation and monopoly, taking the competitive electricity market as the basis. In addition, pricing models in electricity markets and some electricity market liberalisation practices are also given in Chapter 2.

In Chapter 3, the approach proposed by OXERA to measure the electricity market liberalisation is explained first. By modifying this approach, a model is, then, developed to be able to measure the degree of electricity market liberalisation in the EU-15 Member States and in the New Entrants and Candidate Countries between 1999 and 2001.

Degree of electricity market liberalisation in the EU-15 Member States measured by using the modified-OXERA model in the years 1999, 2000 and 2001 is presented in Chapter 4. The state of electricity market liberalisation in each Member State and across Europe between 1999 and 2001 is also examined.

Chapter 5 gives the state of electricity market liberalisation in the New Entrants and Candidate Countries in 1999, 2000 and 2001, and investigates the state of electricity market liberalisation between 1999 and 2001. A comparison of the degree of electricity market liberalisation in the EU-15 Member States and in the New Entrants and Candidate Countries is also made in Chapter 5.

Finally, the main conclusions drawn about the state of electricity market liberalisation in the EU-15 Member States, the New Entrants and Candidate Countries by using the Modified-OXERA model are presented in Chapter 6. In addition, suggestions to measure the degree of electricity market in the enlarged EU more precisely are also included.

CHAPTER II

ELECTRICITY MARKET LIBERALISATION: IN THEORY AND PRACTICE

The European model of electricity market liberalisation is based, by the Directive 2003/54/EC, on a competitive restructuring in generation/production and supply while maintaining a naturally monopolistic structure in electricity transmission and distribution systems (OXERA, 2000). The objective of liberalisation in the European Union is, then, to separate the upstream (generation) and downstream (supply) markets and introduce competition, while enabling easy third-party access to the transmission and distribution systems through efficient regulation.

2.1 Electricity Economics: Monopoly, Regulation and Competition

The roles of government and the private sector in the market can be understood more clearly once the characteristics of goods and services are defined. Goods and services can be classified with respect to their availability to consumers. Goods and services are either available to consumers readily or their availability depends on the supplier. A further classification of goods and services can be made in terms of the way they are consumed. Goods and services are consumed either individually or jointly. The resulting classification of goods and services in terms of their availability and the way they are consumed are given in Table 2.1.

Table 2.1. Classification of Goods in Terms of Their Characteristics

	Availability Depends on the Supplier	Readily Available
Individual consumption	Private goods (food, clothing, etc.)	Common-pool goods (air, minerals in ocean, rivers, etc.)
Joint consumption	Toll goods (telephone, electric power, piped water, cable TV, etc.)	Collective goods (national defence, police patrol, etc.)

Source: Modified from Savas (1987: 56)

Classification of goods in terms of their characteristics, as illustrated in Table 2.1, results in four types of goods: private goods, toll goods, common-pool goods and collective goods. Private goods and collective goods are at the two extremes of the matrix. Allocation decisions of private goods are made by market mechanism while those of collective goods are made by political means and are, generally, supplied by state owned enterprises. However, it is also possible that some collective goods turn to be private goods through the process of privatisation if it is proved to be feasible economically. Common pool goods are those goods which are readily available to individual consumers without any interruption from market powers.

As for the toll goods, production or supply of some toll goods exhibits efficiency problems and therefore requires collective action for making them available to consumers. Network utilities like electric power, piped water and telecommunication are some examples of such goods, and their production or supply is usually performed by natural monopolies. However, the recent trend in the electricity power sector is that the transmission and distribution systems of previously monopolistic electricity sector are regulated in such a way that a competitive market is established in electricity generation and supply. Then, a fully liberalised electricity market is to be established by introducing competition in transmission and distribution systems, too. This, in fact, is what is aimed

by the Electricity Directive of the European Parliament and of the Council (OJL/176/2003).

Characteristics of monopolistic, regulated and competitive electricity markets are explained and their short-run welfare analyses are made in the following paragraphs of this section. In this analysis, it is assumed that demand and supply are in equilibrium in a competitive electricity market and characteristics of monopolistic and regulated electricity markets are examined based on the conditions of the competitive electricity market.

First, the conventional model for network utilities was that they were operated by vertically integrated natural monopolies, i.e., single owner for generation, transmission and supply (Newbery, 1997). In such a model, the natural monopoly controlled not only the supply market, but also generation and transmission markets, eventually minimising the total system costs of electricity power sector. The monopoly sets the prices to such a level that it earns a sufficiently high rate of return to recover its fixed costs and operating costs.

In order to maximise its profit, the monopolist sets the quantity (Q_m) where $MR=MC$ (See Figure 2.1). Since the monopolist has the power to set the price, it chooses the price (P_m) given by the demand curve. The theory of supply reveals that if the market price is greater than the equilibrium price (P_c), there, then, exists a producer surplus which is indicated by the rectangular area KLP_cP_m in Figure 2.1. However, producer is in loss in terms of the quantity it produces under monopoly. The output of the monopolist decreases from Q_c to Q_m resulting in loss of surplus indicated by the triangle LMN in Figure 2.1. As far as consumers are concerned, they are in loss by the amount KNP_cP_m . This is a loss because consumers are paying higher amount by consuming less. Consequently, when the price is set above MC curve, there is a loss of welfare equal to the sum of producer surplus and consumer surplus which is indicated by triangle KMN .

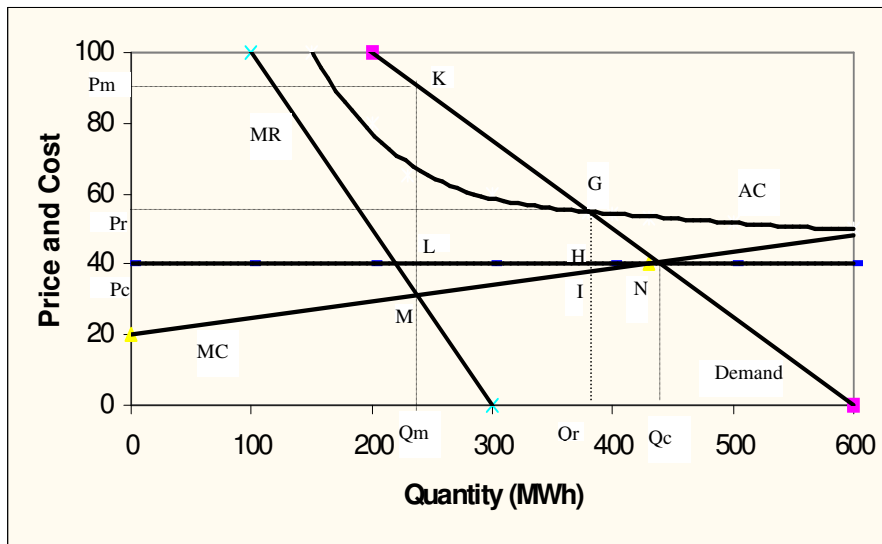


Figure 2.1: Monopolistic, Regulated and Competitive Markets in Short-Run

Source: Adapted from Rothwell & Gomez (2003)

Second, a change in the electricity industry took place in many countries throughout the world during the 1990s. This change has been in the form of a restructuring from a monopoly structure to a regulated market so as to obtain a competitive market eventually. Regulation can be thought as a transition stage from a natural monopoly to a fully competitive market. In the electricity sector, competition is usually attributed to generation and supply while maintaining an efficient regulation in transmission and distribution. It is also argued by some authors like Newbery (2002) that regulation is a necessity even in generation and supply markets of maturely competitive electricity markets. The aim of regulation in either private or state owned enterprises is to protect consumers through increased economic efficiency in electricity power industry, that is, to obtain maximum output for a given cost of production.

Assume that in a regulated market, the price is set above the marginal cost at P_r , where demand curve and average cost curve (AC)

intersect (point G in Figure 2.1). At this price, generators produce a quantity Q_r , which is less than the quantity (Q_c) they would produce if the market were in equilibrium in a competitive market at market price (P_c). When compared with the competitive market, producers are better off by $GHPcPr$ because they sell at a higher price (P_r) than the equilibrium price (P_c). They also produce less than the equilibrium quantity. However, producer is in loss in terms of the quantity it produces under regulation. The output of the regulated firm decreases from Q_c to Q_r resulting in loss of surplus indicated by the triangle HIN in Figure 2.1.

Consumers, on the other hand, are in loss by the amount $GNPcPr$. This is a loss because consumers are paying higher amount by consuming less. Consequently, when the regulated price is set above MC, there is a loss of welfare equal to the sum of producer surplus and consumer surplus which is indicated by triangle GNI.

Finally, the more recent trend in the national electricity markets is a competitive market.

Since;

- a) producers sell an identical good in the market, i.e., electricity is a homogeneous good,
- b) the price of electricity is determined by market conditions,
- c) any new firm is free to enter the market and any existing firm is free to cease production and leave from the market,

the electricity generation and supply markets are said to reveal the characteristics of perfect competition. Since marginal cost of production curve (MC) of a firm is characterised by its supply curve in a perfectly competitive market, market price is equal to the price where demand

curve (D) and marginal cost (MC) curve intersect (See Figure 2.1). Therefore, in a perfectly competitive market, a firm is producing an output Q_c , which is the output at equilibrium, and consumers pay an amount P_c , which is the price they are willing to pay to buy electricity. In such a market, since producers are just covering their expenses and consumers are paying what they are willing to, both actors of the market are neutral and there is no welfare loss or gain at all.

Results of short-run welfare analysis of monopolistic and regulated electricity markets taking the equilibrium conditions of the competitive market as basis are given in Table 2.2.

Table 2.2: Welfare Analysis of Monopolistic and Regulated Electricity Markets

	Monopolistic Market	Regulated Market
Producer Surplus	KLPcPm - LMN	GHPcPr - HIN
Consumer Surplus	- KLPcPm - KLN	- GHPcPr - GHN
Net Welfare (Loss)	KMN	GIN

See Figure 2.1 for references to letters and areas

2.2 Pricing Models in Competitive Electricity Markets

The form of restructuring and liberalisation and hence the degree of competition of various network utilities differs from each other depending on the nature of the goods and services produced and their availability in the market. Electricity, as one of the toll goods, can not be stored for use in case of excess demand. This characteristic of electricity makes it different from other goods and its excess capacity is, therefore, has a very low value in a competitive market. In order to avoid excess production and eventually reduction in profits, electricity demand and supply must be kept in equilibrium every hour and even every minute and this is achieved by trading electricity through the wholesale markets.

In a wholesale market, generators compete with each other to sell to distributors and to customers directly if it is allowed. Electricity trading in the wholesale market is managed either by a *market operator* or a *system operator*. A market operator performs all wholesale transactions that affect the flow of electricity. When generators are not allowed to sell electricity directly to distributors or to final customers, all market operations are carried out by the market operator. System operator, on the other hand, is the transmission system operator responsible for balancing the demand and supply, maintaining the system reliability through the control of ancillary services and managing the transmission congestion in a market where generators can sell directly to final customers. Sometimes, the market operator and the system operator are the same and, therefore, perform the functions of one another in many electricity markets (Rothwell and Gomez, 2003:104).

The price in a competitive electricity market is set according to the type of model employed to trade electricity from generators to final consumers. Rothwell and Gomez (2003) discuss three types of models for price determination in a competitive electricity market, namely the poolco market, contract for differences, and physical bilateral trading.

A poolco market or "mandatory pooling" market is the market where all of the electricity produced is sold to and traded in a pool. The pool trading process takes place in the stage of electricity transmission and the pool is operated by a centralised pool market operator. In a poolco market, all the buyers get electricity from the pool but not from the generators directly. If only the wholesale competition is allowed in the market, the buyers are the distribution companies who then sell electricity to industrial or household customers. If the market allows retail competition, buyers can also be the final consumers. Each generator selling to the pool defines a profit maximising supply schedule for each price for the next day and submits it to the operator (either market operator or system operator). The following day, the operator determines the actual market price at each period of trading, which could

be a day, hour or minute, based on the total demand from customers and the supply schedule collected from the generators for that period. The actual price determined in this way can be different at each period of electricity trading. In this model, a generator deviating from its predetermined supply quantity while the others continuing to supply as scheduled will be reducing his profits².

In contract for differences model, generators and consumers guarantee a price and quantity in the pool, that is the generator guarantees the consumer a schedule of power at an agreed price during the term of contract. In this model, the participants of the electricity trading market are generators, distributors or final industrial and household consumers. The buyer, or consumer, still gets the power from the pool and the pool operator determines the actual price at each period of trading as in the case of poolco market. The difference is that the buyer computes the difference between the contracted price and the price buyer paid to poolco and pay difference if contract price is higher and collect the difference if poolco price is higher. This model is physically the same as poolco market but differentiates in financial matters. This model is more competitive than the poolco market model because some of the output is determined by the contracting sides not by a central operator. It was demonstrated theoretically and empirically that contracts between generators and consumers reduce market power of generators and price of electricity decreases as the extent of contracts, that is the quantity contracted by the individual sides, is increased³.

Physical bilateral trading allows the generators and consumers to negotiate one to one for prices, quantity, terms of agreement and other conditions. If retail competition is allowed, generators can negotiate and make contracts with consumers directly. Although this

² See Green and Newbery (1992) for detailed analysis of this approach.

³ See Helm & Powel (1992) and Powel (1993) for details of theoretical and empirical studies.

model is the most liberalised and competitive one, it is subjected to power imbalances and eventually security of supply. Because buyers are free to choose sellers freely, it is probable that some generators would not be able to sell their electricity if their prices are sufficiently high. It is also possible that some buyers are not able to purchase at lower prices and have to pay for higher prices in case of increased demand. In order to overcome such imbalance problems, physical bilateral trading is usually accompanied by pool trading so that any possible electricity shortages are compensated by the pool at predetermined prices.

2.3 Some Electricity Market Liberalisation Practices and Motivations for Liberalisation

Many countries in the world started to liberalise their electricity markets during the 1990s. Before the 1990s, there were some attempts to introduce competition to the electricity markets. Rothwell and Gomez (2003) give some general information about the competitive electricity markets in the world and examine some countries in detail. Chile was the first in developing a competitive electricity generation system in the 1980s. In 1992, Argentina restructured its government-owned electricity sector by dividing it into generation, transmission and distribution, and introduced competition into generation. Bolivia, Peru, Columbia, Guatemala, El Salvador, Panama, Brazil and Mexico followed similar experiences to some extent.

Some deregulation attempts in electricity markets also took place in New Zealand, Australia and Canada aiming at achieving lower prices by increasing efficiency. In the USA, nearly half of the states passed the restructuring legislation; however, the move towards electricity deregulation was slowed down by the California electricity crisis of 2000 and 2001.

In Europe, England and Wales are the first countries moving towards electricity market liberalisation. Experience of these two countries were followed by Scotland and Northern Ireland. A Nordic electricity wholesale market was created gradually among the Scandinavian countries. Other members of the European Union and the Candidate Countries are gradually fulfilling the requirements of the Electricity Directive of the European Parliament and of the Council. The degree of electricity market liberalisation in the EU Member States, New Entrants and Candidate Countries is analysed in Chapter 4 and 5 in detail.

It is understood from the experiences given above that increasing importance has been given to introducing competition into electricity markets and eventually achieving full liberalisation in the sector. However, the motivations which drive nations into liberalising their electricity markets should also be examined in order to understand the liberalisation process fully.

First, activities in the electricity sector used to be performed by government owned enterprises due to the high cost of capital investment. However, technological developments in electricity generation methods made it possible to produce electricity even by small sized firms. This enabled small firms to have access to some of the facilities through privatisation of government-owned activities. It is known that private enterprises respond more rapidly to global changes and competitive markets. In addition, electricity market liberalisation is expected to decrease the burden of the governments through the process of privatisation.

Second, as the main input to almost all industries, any decrease in the price of electricity could lead to lower costs of production of goods and services. One way of decreasing the electricity prices is establishing a competitive electricity market.

Third, competition in the sector could discourage generators who are not producing efficiently while encouraging those who are able to produce at lower costs. Liberalisation is, therefore, likely to lead to new entries and new employment opportunities in the sector given that building over-capacity plants is prevented by the regulatory bodies.

A more comprehensive review of the driving forces behind the electricity market liberalisation can be found in Rothwell and Gomez (2003), Brennan et al. (2002), Newbery (2002) and Stern (2000).

CHAPTER III

AN APPROACH TO MEASURING ELECTRICITY MARKET LIBERALISATION

Many countries in the world have been restructuring their electricity markets to obtain a competitive market. One aim this restructuring is to liberalise their electricity markets by opening the markets to the choice of both national and international customers and eventually to obtain a single market in a region or world-wide. Establishing a single electricity market, however, requires that all the countries that are members of the single market have their market liberalised to some extent so that competition is not distorted in the single market. The extent of liberalisation can be estimated by assessing the activities in the electricity market qualitatively. However, quantitative assessments, whenever possible, yield better results in comparing two or more articles.

There have been attempts to measure the degree of electricity market liberalisation by using a range of electricity liberalisation indicators that represent the activities in electricity markets. Review of literature indicated that Oxford Economic Research Associates (OXERA) and Center for the Advancement of Energy Markets (CAEM) are the two institutions working on measuring the degree of electricity market liberalisation in the world. These two institutions employed the same technique and similar indicators in measuring the degree of electricity market liberalisation. The method developed by OXERA considers the European electricity market structure and it takes account the clauses given in the Electricity Directive of the European Parliament and of the Council. Since this study aims at measuring the degree of electricity

market liberalisation in the members and potential members of the European Union, the model developed by OXERA is decided to be more suitable for this purpose. Thus, in this chapter, electricity liberalisation indicators and the model proposed by OXERA are explained first. Next, the approach the researcher used to measure the degree of liberalisation in EU-15 Member States and New Entrants and Candidate Countries between 1999 and 2001 is described. Finally, the data collection technique used in this study is given.

3.1 Objectives of the OXERA Model and Basic Methodology

3.1.1 Objectives of the OXERA Model

The governments of the UK and the Netherlands, hoping that it would provide a basis for the Commission and all Member States, commissioned a joint study from OXERA, a consultant company in the UK, for measuring the degree of competition in European electricity (and gas) markets. Having developed a set of liberalisation indicators, OXERA then published a consultation paper in 2000 that describes a model for measuring the degree of liberalisation in electricity markets of the EU Member States.

In developing the liberalisation indicator approach OXERA (2000) aimed to:

- i) determine the progress of countries in implementing the Electricity Directive
- ii) track the developments in market competition and regulation

- iii) compare the performance of different countries and evaluate the strengths and weaknesses of liberalisation strategies of these countries

3.1.2 Basic Methodology of OXERA's Approach

The liberalisation indicators used to assess electricity market liberalisation is of both quantitative and qualitative nature. Quantitative indicators are used to represent objective and easily quantifiable data while qualitative indicators of liberalisation are used to summarise more subjective influences on liberalisation.

For aggregating liberalisation indicators into higher levels, a score between zero and 10 and a weighting factor are assigned to each liberalisation indicator. Each indicator is weighed by multiplying its score by the decimal of its weighting factor and the resultant scores of indicators are summed up to obtain the score of the higher level indicator. Weighting and scoring process for each indicator is described in detail in this chapter.

3.1.3 Developing Liberalisation Indicators

Electricity markets are, in general, structured as being composed of different elements such as generation, transmission, distribution and supply. As it is known that production and supply markets are potentially competitive while transmission and distribution markets are naturally monopolistic, OXERA divides electricity market into two parts (See Figure 3.1):

- i) Market Competition, and
- ii) Non-competitive Activities

Market Competition and Non-competitive Activities are called as high level indicators of electricity market in OXERA's terminology. These high level indicators are obtained by aggregating the primary indicators to intermediate level indicators first, and then by further aggregating these intermediate level indicators to high level indicators. High level indicators indicate the degree liberalisation in electricity market in terms of competitive and non-competitive activities. Dividing the electricity market into two parts, indeed, matches with the objective of electricity market liberalisation, which is to separate the upstream (generation) and downstream (supply) markets and introduce competition into these markets while ensuring easy entries to non-competitive areas through efficient regulation (OXERA, 2000:5).

3.1.3.1 Market Competition

Following the description of indicator approach, this part explains the intermediate and primary level indicators of Market Competition high level indicator. As its name implies, this high level indicator represents the competitive part of electricity market. As it is illustrated in Figure 3.1, there are two important areas in Market Competition which are known as intermediate level indicator of electricity market liberalisation: a) upstream and wholesale market, and b) downstream market competition and customer impact.

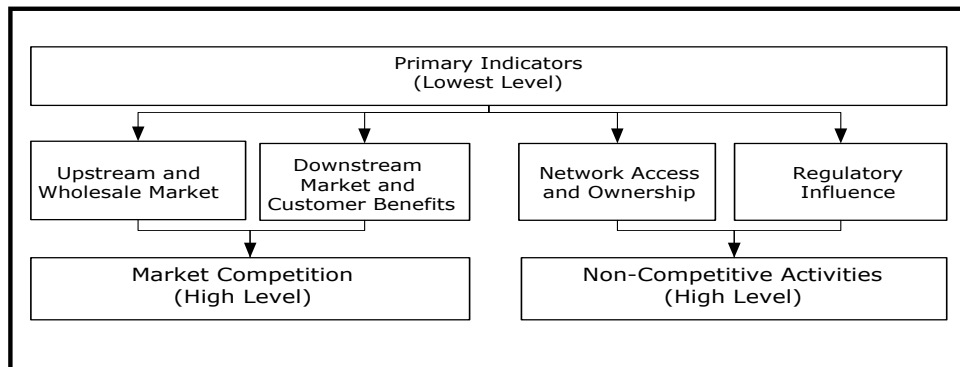


Figure 3.1: Aggregation of Primary Indicators (Source: OXERA, 2000:7)

3.1.3.1.1 Upstream and Wholesale Market

The primary indicators of Upstream and Wholesale Market are classified into four main groups. These are, namely, compliance with the electricity directive, market shares of the main generators/producers, wholesale market existence and effectiveness and barriers to entry. The activities included in these four main groups and their corresponding weightings are illustrated in Table 3.1. Each indicator in Upstream and Wholesale Market is weighted in accordance with its importance in a competitive electricity market. Weightings for each primary and intermediate indicators are allocated by OXERA, based on the structure of the electricity market and their knowledge of experience in this market. OXERA (2000) places most weight on market shares of main generators and potential barriers to new entry, as these are assumed to be the most influential indicators for a competitive electricity market.

A further classification of the four main groups into primary indicators and the weighting of each indicator is given in Appendix 1.

Table 3.1 Areas and Weightings of Upstream and Wholesale Market

Area	Weighting (%)
Compliance with the directive	15
Market shares of the main generators/producers	30
Wholesale market existence and effectiveness	25
Barriers to entry	30

Source: OXERA (2000:10)

The first primary indicator of Upstream and Wholesale Market, which is compliance with the electricity directive, measures the extent to which the directive is implemented. This indicator is used to record whether countries opened their generation market to competition or not. No distinction is made between authorisation and tendering procedures

and countries who comply with the directive through any of these procedures score 10, while countries score zero for non-compliance. Scoring method for this indicator and for all primary indicators of Market Competition is given in Appendix 4.

Market shares of the main generators/producers indicator defines the degree of competition between the upstream market participants. Two primary indicators are defined in terms of the shares of upstream market generators: share of the largest generator and share of the largest three generators. It is given by OXERA that share of the largest participant in a liberalised electricity market should be 25% or less and that any share of participants of 80% or greater indicates the presence of significant market power. Hence, score of a country increases between zero for an 80% market share and 10 for 25% market share. Similarly, for the share of the largest three producers, scores increase between zero for a 100% market share and 10 for a 50% market share.

Similar to what is done for the compliance with the electricity directive indicator, a simple 'yes' or 'no' indicator is assigned for the existence of wholesale market indicator, where a score of 10 is assigned for a 'yes' and zero for a 'no'. Existence of wholesale market scores 10 because wholesale markets make the electricity markets more transparent eventually making new entries to the market easier. Apart from this, a qualitative indicator of effectiveness of wholesale trading is also included in Upstream and Wholesale Market intermediate level indicator. The rationale behind this is that for the upstream market to be competitive, the wholesale market that links the upstream and downstream markets needs to be liberalised. If there are vertically integrated companies in the electricity market, that is, the same company is the owner of a company operating in both upstream and downstream market, the market is less transparent and new entry is very difficult. Depending on the volume traded, the number of participants and complaints from generators and customers about

gaming in the market, a low, a medium and a high score is assigned for this indicator where low scores zero, medium scores 5 and high scores 10. High volumes traded, large number of participants and small number of complaints from generators and customers signal for the development of competition in the wholesale market.

Finally, new entry in generation and the capacity constraints on the interconnectors are the two qualitative indicators used to measure barriers to entry which might stand as a potential obstacle to market competition in electricity generation. A low, a medium and a high score is assigned for new entry in generation indicator where low scores zero, medium scores 5 and high scores 10. The score gets higher as the proportion that the new entrant gains from a large generator in the market increases. Similarly, a low, a medium and a high score is assigned for capacity constraints on the interconnectors indicator, where low scores 10, medium scores 5 and high scores zero. Since high capacity constraints on the interconnectors makes the market more protected and less competitive, it stands as a barrier against new entry and therefore scores zero.

3.1.3.1.2 Downstream Market and Customer Impact

The primary indicators used to measure the competition in Downstream Market and Customer Impact intermediate level indicator also focus on four areas as in the case of Upstream and Wholesale Market. These areas are; compliance with the electricity directive and degree of market opening, market shares of the main suppliers, barriers to entry and customers switching suppliers, and price impact of liberalisation. The four main groups and their corresponding weightings are illustrated in Table 3.2.

Table 3.2 Areas and Weightings of Downstream Market and Customer Impact

Area	Weighting (%)
Compliance with the directive and degree of market opening	20
Market shares of the main suppliers	20
Barriers to entry	15
Switching and price impacts of liberalisation	45

Source: OXERA (2000:13)

Each indicator is weighted according to its importance in driving liberalisation in the electricity market. It is seen from Table 3.2 that most weight is placed on customers switching supplier and price changes in electricity supply market with a 45% weighting. A further classification of these main groups into primary indicators and the weighting of each indicator is given in Appendix 1.

Unlike the Upstream and Wholesale Market, Downstream Market and Customer Impact indicator reflects price changes in supply market and customers behaviour in response to changes in electricity prices.

The first main area of Downstream Market and Customer Impact indicator, which is compliance with the electricity directive and degree of market opening, measures the implementation of the minimum requirements of the directive and the percentage of the electricity market open to choices of customers. The first indicator of this main area is used to record whether a country satisfies the minimum market opening requirement. If it does, a score of 10 is assigned to the indicator and if not the indicator gets a zero. The second indicator in this main area is the degree of market opening. Degree of market opening refers to the proportion of consumers who are able to choose their electricity suppliers freely. For example, 50% market opening means half of the national electricity supply is open to the choice of consumers. Full market opening

scores 10 while no market opening scores zero and any degree of opening between zero and 100% scores linearly between zero and 10. Scoring method for this indicator and for all primary indicators of Market Competition is given in Appendix 4.

Market shares of the main electricity suppliers are scored in a similar way as for the market shares in the Upstream and Wholesale Market. Again, two primary indicators are defined in terms of the shares of market suppliers: share of the largest supplier and share of the largest three suppliers. It is given that share of the largest supplier in a liberalised electricity market should be 25% or less and that any share of supplier of 80% or greater indicates the presence of significant market power. Hence, score of a country increases between zero for an 80% market share and 10 for 25% market share. Similarly, for the share of the largest three suppliers, scores increase between zero for a 100% market share and 10 for a 50% market share.

There are two primary indicators in barriers to entry main area: new entry to supply market and potential for foreclosure through vertical integration. Both of these indicators measure the potential obstacles to supply market competition and are assessed qualitatively. New entry to the supply market is measured in terms of number of new licences and a low, a medium and a high score is assigned for this indicator, where low scores zero, medium scores 5 and high scores 10. Potential for foreclosure through vertical integration indicator is measured in terms of the degree of vertical integration between upstream and downstream markets and the resultant market distortions. A low, a medium and a high score is assigned for this indicator, where low scores 10, medium scores 5 and high scores zero. When there is a vertical integration between upstream and downstream markets, a single company may have a dominant power over the small sized companies facilitating foreclosures.

Finally, the fourth main area in Downstream Market and Customer Impact, namely switching and price implications of liberalisation, is composed of six primary indicators:

- proportion of eligible industrial customers switching supplier
- proportion of eligible domestic customers switching supplier
- change in industrial consumer prices
- change in domestic consumer prices
- European rank in prices; and
- tariff proliferation.

For proportion of eligible industrial customer switching supplier, it is assumed that switch rate in a liberalised electricity market should be 50% or greater and that no switch at all shows no competition in the market. Hence, score of a country increases between zero for no switch at all and 10 for 50% switch rate. The situation is the same for the proportion of eligible domestic customer switching supplier indicator except that the switch rate of domestic customers for a liberalised market is assumed as 25%. Customers switch their suppliers when they are not satisfied with the price, quality, security, schedule of delivery, etc. of the service supplied. The higher the rate of customers switching their supplier is, the more competitive the market is.

Change in industrial consumer prices is measured in terms of electricity price cuts or price increases and a score of 10 is assigned if prices decrease by 20% or more and zero is assigned if prices increase or remain unchanged. Therefore, score of a country increases between zero for no price change or price increase and 10 for 20% or more price cuts. Scoring of the indicator change in domestic consumer prices is done in the same way as for change in industrial consumer prices in industrial

electricity market. Consequently, score of a country increases between zero for no price change or price increase and 10 for 20% or more price cuts in domestic electricity market. Price cuts show that suppliers are about to lose their shares in the market and they decrease electricity prices to maintain their customers from switching to another supplier which is an indication of the presence of a competitive electricity market.

European rank in prices is another indicator in the main area of switching and price impacts of liberalisation. This indicator is measured in terms of the place of a country in the European ranking list. The list is sorted so that the country where electricity price is lowest is placed at the top while the one where electricity price is highest is placed at the bottom. The list is divided into three groups and the five countries in the first group are assigned a score of 10, the next five are assigned a score of 5 and the remaining five score zero.

As for the tariff proliferation indicator, a low, a medium and a high score is assigned depending on the number of tariff options, payment methods and specialised tariffs, where low scores zero, medium scores 5 and high scores 10. Suppliers offer options for tariffs and payment methods to retain their customers from switching to another supplier as the market becomes more competitive. In addition, specialised tariffs, like green tariffs, grow in the market as the market becomes more liberalised. Thus, high tariff proliferation means more competition in the market and therefore score higher.

3.1.3.1.3 Method of Aggregation

The final stage in the process of developing a method for measuring the electricity market liberalisation is the aggregation of the primary indicators into higher levels so as to obtain overall scores of Market Competition and Non-Competitive Activities.

Having set up all the primary indicators and their corresponding scores and weightings, OXERA aggregates the scores of primary indicators to intermediate level first and then to high level score of Market Competition and Non-Competitive Activities through further aggregation (See Figure 3.1 for the relation between primary, intermediate and high level indicators).

Aggregation to higher level is achieved by weighting the score of each primary indicator. This is done by multiplying the score of each indicator by its corresponding weighting factor and summing up the weighted scores of each indicator in that level to obtain a combined score for the level, which ranges between zero and 10. For example, in order to calculate the combined score of Upstream and Wholesale Market, one should multiply the score of compliance with directive indicator by decimal percent of its weighting which is equal to 0.15 (See Table 3.1). This procedure is followed for the other primary indicators of Upstream and Wholesale Market and the resultant scores are summed up to get the combined score of Upstream and Wholesale Market intermediate indicator, which is between zero and 10. Similar procedure is followed to calculate the combined score of Downstream Market and Customer Impact intermediate indicator. Finally, these two intermediate level indicators are aggregated to the Market Competition high level indicator by multiplying each of them by the decimal percent of their weightings, which is 0.5, and summing up the resultant scores.

3.1.3.2 Non-Competitive Activities

The second high level indicator used to measure electricity market liberalisation is termed as the Non-Competitive Activities. As it is shown in Figure 3.1, the Non-Competitive Activities focus on two main areas: a) network access and ownership, and b) regulatory influence.

The primary indicators of network access and ownership emerge from the assumption that a competitive upstream and downstream market can be established as long as a fair and transparent access to the networks is allowed. Account unbundling, ownership separation, compliance with the directive on third party access, effectiveness of third party access arrangements and access of foreign firms to domestic networks are the primary indicators of network access and ownership. The five primary indicators of intermediate level network access and ownership indicator and their corresponding weightings are given in Table 3.3 and in Appendix 1.

Another intermediate level indicator, namely the regulatory influence, reflects the effects of government and industry and the impact of political interventions on electricity market liberalisation. Namely, impact of state subsidies, level of social obligations and regulatory independence are the primary indicators of regulatory influence intermediate level indicator. The three primary indicators of regulatory influence and their corresponding weightings are given in Table 3.3 and in Appendix 1.

Table 3.3 Primary Indicators and Aggregated Intermediate Level Indicators of Non-Competitive Activities

Non-Competitive Activities	Weighting (%)
Network Access and Ownership	70
Account unbundling	20
Ownership separation	20
Compliance with the directive on third party access	15
Effectiveness of third party access arrangements	25
Access of foreign firms to domestic networks	20
Regulatory Influence	30
Impact of state subsidies	33
Level of social obligations	33
Regulatory independence	33

Source: OXERA (2000:17, 18)

Detailed analysis of Non-Competitive Activities is beyond the scope of this thesis. This thesis analyses electricity market liberalisation in terms of Market Competition high level indicator only, due to unavailability of data for Non-Competitive Market Activities from national and international institutions as centralised data sources⁴.

3.2 Modified-OXERA Approach to Measure Electricity Market Liberalisation

This section describes the approach used to measure the degree of electricity market liberalisation in the EU-15 Member States, the New Entrants and Candidate Countries between 1999 and 2001 taking the approach developed by OXERA as the basis.

The work carried out by OXERA to measure the degree of European electricity market liberalisation in 2000 can be considered as a rather detailed analysis in that it includes most of the possible indicators of both competitive and non-competitive activities. The present study aims at complementing the work of OXERA because it attempts to measure the degree of electricity market liberalisation in the New Entrants and Candidate Countries in addition to the EU-15 Member States. Furthermore, the present study measures the degree of electricity market liberalisation in the EU-15 Member States, the New Entrants and Candidate Countries by using the Modified-OXERA indicator approach and assesses the state of electricity market liberalisation and performance of countries against each other between 1999 and 2001.

Nevertheless, although the present study employs the same approach launched by OXERA, it excludes all the liberalisation indicators in Non-competitive Activities and some of the primary liberalisation

indicators in Market Competition. The sets of liberalisation indicators used to measure the electricity market liberalisation in the EU-15 Member States and in the New Entrants and Candidate Countries are displayed in Appendix 2 and Appendix 3, respectively.

A few reasons may be given for the exclusion of all the liberalisation indicators in Non-competitive Activities and some of the primary liberalisation indicators in Market Competition in measuring the degree of electricity liberalisation. First, a closer examination of the work carried out by OXERA in 2000 indicates that data related with the Non-Competitive Activities is rather scarce. This is understood from the number of subjective estimations made by OXERA while measuring the aggregated score of Non-Competitive Activities. The number of indicators in Non-Competitive Activities whose scores are estimated subjectively by OXERA are counted and displayed in Table 3.4. It is seen from this table that scores of 5 indicators out of 8 indicators in Non-Competitive Activities were estimated subjectively in measuring the electricity market liberalisation in 13 European countries. In two European countries, scores of 4 indicators out of 8 indicators were estimated subjectively, and no estimation was made for the UK at all. Consequently, due to unavailability of objective data for scoring most of the indicators in Non-Competitive Activities, this high level indicator is excluded from the set of electricity liberalisation indicators. This study may be furthered so as to include the indicators of Non-Competitive Activities when objective data become available in the literature.

⁴ It is recommended that the interested readers should see OXERA (2000) for further information about how primary indicators of this category are developed and weighted.

Table 3.4: Number of Indicators of Non-Competitive Activities Whose Scores Are Subjectively Estimated by OXERA

	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERLANDS	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK
Number of subjective estimations (out of 8)	5	5	5	5	5	4	5	4	5	5	5	5	5	5	0

Source: OXERA (2000)

Second, unavailability of data for several primary indicators of Upstream and Wholesale Market and Downstream Market and Customer Impact intermediate level indicators necessitated further reductions in the number of primary indicators. Therefore, electricity market liberalisation in the EU-15 Member States was measured in the absence of two indicators in both Upstream and Wholesale Market and Downstream Market and Customer Impact categories. The missing indicators in Upstream and Wholesale Market are effectiveness of wholesale market and capacity constraints on the interconnectors, and those in Downstream Market and Customer Impact are; potential for foreclosure through vertical integration and tariff proliferation. The complete set of indicators used in measuring the degree of electricity market liberalisation in the EU-15 Member States is given in Appendix 2.

Third, it became necessary to further reduce the number of primary indicators in Upstream and Wholesale Market and in Downstream Market and Customer Impact, due to unavailability of data for New Entrants and Candidate Countries. Since the New Entrants and Candidate Countries are not obliged to comply with the Electricity Directive for the years between 1999 and 2001, no score could be assigned to this

indicator. Therefore, compliance with the directive indicators which are present in both Upstream and Wholesale Market and Downstream Market and Customer Impact categories were excluded from the set of indicators used to measure the degree of electricity market liberalisation in New Entrants and Candidate Countries. Furthermore, existence of wholesale market indicator in Upstream and Wholesale Market high level indicator; and customers switching supplier and price impact of liberalisation indicators in Downstream Market and Customer Impact high level indicator could not be included in measuring the electricity market liberalisation due to unavailability of centralised data for these indicators. The complete set of indicators used in measuring the degree of electricity market liberalisation in the New Entrants and Candidate Countries is given in Appendix 3.

3.2.1 Scoring and Weighting of Liberalisation Indicators

3.2.1.1 Scoring of Liberalisation Indicators

Scoring method of the approach used in this study to measure the electricity market liberalisation between 1999 and 2001 is the same as that of the approach used in the work carried out by OXERA to measure the electricity market liberalisation in the year 2000, with a few exceptions. Scoring method used in this thesis and that used in the work of OXERA (2000) are given in Appendix 4. As can be seen from Appendix 4, there are some differences between these two methods of scoring the liberalisation indicators.

First, new entry in generation and new entry to the supply market indicators are assigned a high, a medium and a low score where high scores 10, medium scores 5 and low scores zero, according to the scoring method used by OXERA (2000). However, OXERA does not specify what a high, medium or low score correspond to in terms of the number of new entries to the market. For new entry in generation

indicator, OXERA states that this indicator "takes account of change in ownership of existing plant by a new entrant. A high/medium score could be given if a new entrant succeeds in acquiring a (significant) stake in one of the large generators on the market" (OXERA, 2000: 11). Similarly, for new entry to the supply market indicator it is said that new entry "includes number of new licences issued since market liberalisation" (OXERA, 2000: 14). As it is understood from these illustrations, scoring method used by OXERA is not clear enough for making an objective scoring. In the present study, the scoring method used by OXERA was modified so as to assign a zero score for exits and no entries, 10 for the number of 10 or greater entries, and a score changing linearly from zero to 10 for any entries between zero and 10.

Second, it is clear by the quotation from OXERA (2000) which is given in the previous paragraph that OXERA assesses the number of entries which has taken place since market liberalisation. It is also stated in OXERA's comments that primary liberalisation indicators related to switch rates and price changes are also assessed from the start of liberalisation. Such assessments seem to be logical in OXERA's work, because it is the only study carried out for the purpose of measuring the degree of electricity market liberalisation from the start of the process of liberalisation in the European electricity markets. In this thesis, however, scoring is performed for the indicators related with the number of new entries or exits, switch rates and price changes for the years 1999, 2000 and 2001. Therefore, it is necessary to determine the exact values of each indicator for each year.

Third, for scoring the primary indicator of European rank in prices, OXERA does not specify whether industrial or domestic consumer prices are used in ranking the European countries. However, the exact source of prices should be specified for the scoring to be reliable. The present study uses the unweighted average of domestic and industrial consumer prices for ranking the EU-15 Member States, New Entrants and Candidate Countries.

3.2.1.2 Weighting of Liberalisation Indicators

The indicator approach developed by OXERA uses the weighting of each indicator to aggregate the primary indicators into higher level indicators. Each indicator is weighted according to its importance in driving liberalisation in the electricity market. Since the number of indicators in the present study are different from the one in the work carried out by OXERA, it is required that the weighting of each indicator is also changed, accordingly.

As explained in the previous paragraphs, the number of indicators in Market Competition high level indicator is reduced by two from both Upstream and Wholesale Market and Downstream Market and Customer Impact indicators in measuring the degree of electricity market liberalisation in the EU-15 Member States. Similarly, the number of indicators in Market Competition high level indicator is reduced by four from Upstream and Wholesale Market and by eight from Downstream Market and Customer Impact in measuring the degree of electricity market liberalisation in the New Entrants and Candidate Countries. Therefore, weighting factor of each indicator is changed in such a way that the ratio of the weightings of any particular two primary indicators in OXERA's approach is equal to the ratio of the weightings of the same primary indicators for the EU-15 Member States and for the New Entrants and Candidate Countries, given that the same indicators are present in the set of indicators reduced for the EU-15 Member States and the New Entrants and Candidate Countries. For example, in Downstream Market and Customer Impact indicator, the weightings of degree of market opening and new entry to supply market indicators are 10% and 5%, respectively, in OXERA's study. The ratio of the weighting of the degree of market opening indicator to the weighting of new entry to supply market indicator is $10/5=2$. In the present study, the weightings of the same indicators are 11.76% and 5.88%, respectively (See Appendix 2).

Their ratio is equal to $11.76/5.88=2$ again. Similarly, when the same procedure is followed for the New Entrants and Candidate Countries, the ratio of the weighting of degree of market opening to the weighting of new entry to supply market is calculated to be $28.6/14.2=2$ (See Appendix 3).

3.2.1.3 Aggregation of Primary Indicators to Higher Levels

The final stage in the process of measuring the electricity market liberalisation in the present study is the aggregation of the primary indicators into higher levels to obtain the overall score of Market Competition.

Having set up all the primary indicators for EU-15 Member States, New Entrants and Candidate Countries and their corresponding scores and weightings, the scores of primary indicators are aggregated to intermediate level first and then to high level score of Market Competition through further aggregation.

Aggregation to higher level is achieved by multiplying the score of each indicator by its corresponding weighting factor and summing up the weighted scores of each indicator in that level to obtain a combined score for the level, which ranges between zero and 10. For example, in order to calculate the combined score of Upstream and Wholesale Market for Belgium in the EU-15 Member States, one should multiply the score of compliance with directive indicator, given as 10.0 in Appendix 6-1, by decimal percent of its weighting which is equal to 0.1875 (See Appendix 2). This procedure is followed for the other primary indicators of Upstream and Wholesale Market and the resultant scores are summed up to get the combined score of Upstream and Wholesale Market. A similar calculation is performed for obtaining the combined score of Downstream Market and Customer Impact category. The combined scores of Market Competition and Downstream Market and Customer Impact categories,

each having 50% weight, are, then, weighted to obtain the overall score of Market Competition or degree of electricity market liberalisation in Belgium. The degree of electricity market liberalisation in other EU-15 Member States, New Entrants and Candidate Countries are then calculated in the same way as it is done in the example given for Belgium.

3.2.2 Data Collection

In this study, the data for scoring each primary indicator of electricity market liberalisation were gathered from: i) centralised data sources like national or international institutions and their publications, and ii) decentralised data from various publications.

Centralised data sources included the publications of Statistics Institution of European Communities (Eurostat) and European Commission's Benchmarking Reports on the Implementation of Internal Electricity and Gas Market. Eurostat started, in 1999, to gather data, through questionnaires, from Member States and Candidate Countries to monitor the developments in their electricity markets. Through these annual surveys carried out between 1999 and 2001, statistical figures were obtained from the countries and these statistical data were published in 2003 (Eurostat, 2003). Questionnaires of Eurostat distributed in the survey consist of major indicators of electricity markets selected from generation, transmission and retailing activities.

First Benchmarking Report on the Implementation of the Internal Electricity and Gas Market (European Commission, 2001), Second Benchmarking Report on the Implementation of the Internal Electricity and Gas Market (European Commission, 2002), and Third Benchmarking Report on the Implementation of the Internal Electricity and Gas Market (European Commission, 2003) were the other useful data sources used in measuring the degree of electricity market

liberalisation in the EU-15 Member States, New Entrants and Candidate Countries.

Where the centralised data were not sufficient to gather all the data required to score the primary liberalisation indicators, decentralised data sources were consulted to be able to score the primary liberalisation indicators. Decentralised data sources comprise various reports, articles and subjective estimations. The OXERA Report (OXERA, 2000) appeared to be the most frequently consulted decentralised data source for the years 1999 and 2000. Articles published in the field of electricity market liberalisation were also found to be very useful. Finally, when the gap could not be filled by any means of data collection technique, subjective estimations based on logical reasoning were made and the rationale was given.

CHAPTER IV

STATE OF ELECTRICITY MARKET LIBERALISATION IN THE EU-15 MEMBER STATES

This chapter presents the results obtained by using the Modified-OXERA model for the EU-15 Member States. The state of liberalisation in the EU-15 Member States is determined and performance of the countries are discussed for the years between 1999 and 2001. In addition, the areas where countries are not performing well are determined and new policy suggestions are made for furthering the electricity market liberalisation in those countries.

The raw data obtained from various sources for the scoring of each primary liberalisation indicator of the EU-15 Member States are tabulated in Appendix 5-1, Appendix 5-2, and Appendix 5-3 for the years 1999, 2000 and 2001, respectively. The sources of the data, whether they are gathered from a centralised or decentralised source or they are subjective estimations by the researcher, are given at the bottom of each table.

Each primary indicator is scored based on the method described in Chapter 3 (also see Appendix 4) and the scores of all primary indicators are given in Appendix 6-1, Appendix 6-2, and Appendix 6-3 for the years 1999, 2000 and 2001, respectively. The scores of intermediate level indicators, namely the Upstream and Wholesale Market and the Downstream Market and Customer Impact, and that of high level indicator, which is Market Competition, are also

given in Appendix 6-1, Appendix 6-2, and Appendix 6-3 for the years 1999, 2000 and 2001, respectively.

The following sections analyse degree of liberalisation in each year for each country in the EU-15. It should be noted that the raw data rather than the score of each primary indicator is referred, where raw data is considered to be more appropriate. This is because, it is possible that the score of the indicators be equal for different countries while performance of one of the countries is better than the other with respect to raw data. For example, in 1999, both the UK and Sweden score 10 in market share of largest supplier indicator, while market share of the largest supplier in the UK and Sweden is 14% and 20%, respectively.

4.1 State of Liberalisation in the EU-15 in 1999

Based on the scores of electricity market liberalisation indicators, it is possible to make some observations about the state of liberalisation in the EU-15 in 1999. The results suggest that all of the EU-15 Member States implemented the Electricity Directive in their upstream (generation) markets.

In addition, the findings indicate that, in some countries across Europe such as Belgium, Greece, France, Ireland and Luxembourg, electricity generation market is highly concentrated and displays similar characteristics to that of monopolistic market structure. This is indicated by the fact that more than 90% of electricity generation is performed by a single producer (See Appendix 5-1). On the other hand, the least concentrated electricity markets are in the UK, Austria and the Netherlands where the market share of the largest generator is 21%, 21.4% and 22%, respectively (See Appendix 5-1). The average of the share of the largest generators in the EU-15 is calculated to be 58%.

It is seen from Appendix 5-1 that wholesale market is present only in Denmark, Spain, the Netherlands, Finland and Sweden in 1999. Existence of wholesale market is important because standardised electricity trading increases transparency and makes new entries easier. However, as it is clearly seen from Appendix 5-1 that not all countries having wholesale markets have high rate of new entry. Therefore, existence of wholesale market is not the only parameter affecting new entries.

Appendix 5-1 also shows that, rate of new entry, which is another primary indicator in Upstream and Wholesale Market, is high in Italy, the Netherlands and the UK while there is no new entry to generation in countries where concentration is high. These countries are Belgium, Greece, France, Luxembourg and Portugal.

Considering the primary indicators of the Downstream Market and Customer Impact category, a similar analysis can be made. Two countries, namely France and Luxembourg, failed to comply with the Electricity Directive in their downstream (supply) markets.

Degree of market opening is highly dispersed among the EU-15 Member States in 1999. Degree of market opening, that is the percentage of the customers allowed to choose their supplier, varies between zero percent to 100% across Europe. Customers are not allowed to choose their electricity suppliers in Greece, France and Luxembourg while the market is completely open to choices of customers in Germany, Finland, Sweden and the UK. Moreover, the average of degree of market openings in the EU-15 is 43.7% in this year (See Appendix 5-1).

Data of market share of largest suppliers given in Appendix 5-1 demonstrate that supply market concentration is very high in Greece, France, Ireland, Italy and Portugal while it is quite low in Denmark, Germany, Austria, Finland, Sweden and the UK. Appendix 6-1 indicates that all countries in the former group score zero in terms of market share

of largest supplier indicator while those in the latter get full score in terms of the same indicator.

Appendix 5-1 also displays the rate of customers switching their suppliers in 1999. The UK has the highest rate of switching in both industrial and domestic markets. The switch rate in the UK is 25% and 12% in industrial and domestic supply market, respectively. It is only in Greece and Spain that customers are not eligible to switch in neither industrial nor domestic electricity supply market. In industrial market all the other EU-15 Member States have the opportunity to switch between suppliers except Greece and Spain. Domestic customers, on the other hand, switch between suppliers only in Germany, Finland and the UK in this year. Across Europe, the average switch rate for the industrial and domestic customers is 5.8% and 1.2%, respectively. An examination of Appendix 6-1 also reveals that the rate of domestic and industrial customers switching is quite low across Europe in 1999.

Data on the price changes in the EU-15 show that industrial and domestic consumer prices decreased by approximately 2% on average in 1999. This could be because it takes some time for the effects of liberalisation in upstream and downstream markets to be reflected to the electricity prices. Industrial consumer prices increased in Greece, Luxembourg, the Netherlands and Austria and decreased in all of the other EU-15 Member States. The greatest increase in industrial consumer prices is 1.85% and 1.86% in Greece and the Netherlands, respectively. The greatest decrease is observed in Portugal and Sweden with percentages of 9.13% and 10.4%, respectively. As regards the changes in domestic consumer prices, it is seen that the highest price increase is in Germany with a percentage of 2.02%, while the highest price decrease is in Finland with a percentage of 8.31%. Because lower consumer prices is one of the most important motives behind the introduction of Electricity Directive, it is expected that prices fall and customer switches increase as liberalisation proceeds. European rank in prices is a rather relative indicator and related with the state of countries with respect to

others. There is no requirement in the Directive as regards the level of electricity prices. Appendix 5-1 reveals that prices are lowest in Italy, Portugal, Finland, the Netherlands and the UK while highest prices are seen in Denmark, Germany, Greece, Luxembourg and Austria in 1999.

As far as the new entry to supply market indicator is considered, data indicate the presence of high level of entries to supply market in Germany and the UK in 1999. No or low level of entries are observed for all of the other EU-15 Member States in this year (See Appendix 5-1).

Ranking of the EU-15 Member States in terms of i) Downstream Market and Customer Impact, ii) Upstream and Wholesale Market, and iii) Overall Score of Market Competition is given in Table 4.1. The Overall Scores of Market Competition of the EU-15 Member States are also illustrated in Figure 4.1.

Table 4.1: Ranking of EU-15 in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact - 1999

Overall Score of Market Competition		Upstream (Generation) and Wholesale Market		Downstream Market and Customer Impact (Retailing)	
UK	7.76	NETHERLANDS	9.78	UK	7.39
NETHERLANDS	6.81	UK	8.13	SWEDEN	6.12
FINLAND	6.71	DENMARK	7.34	FINLAND	6.10
GERMANY	6.02	FINLAND	7.32	GERMANY	5.75
SWEDEN	5.68	GERMANY	6.29	BELGIUM	4.01
DENMARK	5.66	AUSTRIA	5.63	AUSTRIA	3.99
AUSTRIA	4.81	SWEDEN	5.24	DENMARK	3.98
SPAIN	4.10	ITALY	5.17	NETHERLANDS	3.85
ITALY	3.93	SPAIN	5.05	SPAIN	3.15
BELGIUM	3.01	PORTUGAL	3.12	PORTUGAL	2.70
PORTUGAL	2.91	IRELAND	2.13	ITALY	2.69
IRELAND	2.03	FRANCE	2.06	IRELAND	1.93
GREECE	1.53	BELGIUM	2.00	GREECE	1.18
FRANCE	1.31	GREECE	1.88	FRANCE	0.57
LUXEMBOURG	1.17	LUXEMBOURG	1.88	LUXEMBOURG	0.46

Examination of the intermediate level indicators reveals that the Netherlands is the most liberalised country in Upstream and Wholesale Market with a score of 9.78. In this intermediate level indicator, the Netherlands is very close to the state of full competition. The only primary indicator in which it is lagging behind is the share of the largest three generators. In the Netherlands, market share of three largest generators is 6 percentage points above the limit value of 50% which OXERA sets for a competitive electricity market (See Appendix 5-1). The UK is the second most competitive country in Upstream and Wholesale Market with a score of 8.13, and the only area in which it performs poorly is the existence of wholesale market. The UK does not have a wholesale market in 1999. Luxembourg, Greece and Belgium are at the bottom of the list for the Upstream and Wholesale Market.

In Downstream Market and Customer Impact intermediate level indicator, although the UK has the most competitive electricity market with a score of 7.39, it is far from the level of full market competition. This is mainly because of its poor performance in the indicators related with electricity prices and switch rates. Although the UK has the highest score in customers switching suppliers indicator among the Member States, it gets approximately half of the full score in terms of this indicator, which is 10 (See Appendix 6-1). Similarly, the UK gets 1.4 and 2.6, over 10, for the change in industrial consumer prices and domestic consumer prices, respectively. Luxembourg and France are at the bottom of the list with scores of 0.46 and 0.57, respectively, in Downstream Market and Customer Impact.

As long as the overall score of Market Competition is concerned, the UK is the most liberalised country in 1999 with a score of 7.76. The overall competition scores of the Netherlands, Finland, Germany, Sweden, Denmark and Austria follow that of the UK in a descending order. Luxembourg, France and Greece are the three countries of the EU-15 at the bottom of the list and, therefore, have the least liberalised electricity markets in 1999.

Looking at the year 1999 in general, it can be said that the degree of liberalisation in electricity market is highly dispersed across Europe. This situation is illustrated in Figure 4.1.

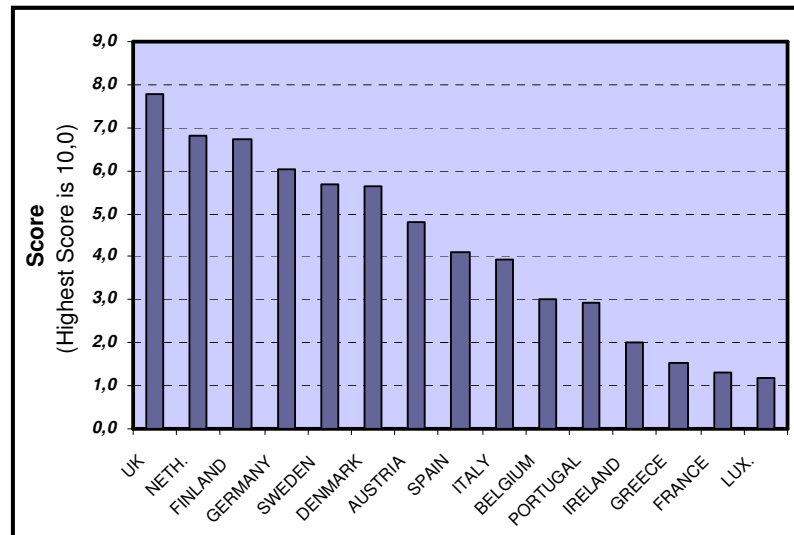


Figure 4.1: Overall Score of Market Competition for EU-15 (1999)

In addition, a closer look at the scores of Upstream and Wholesale Market and Downstream Market and Customer Impact intermediate indicators reveals that the degree of liberalisation in Upstream and Wholesale Market is higher than that of liberalisation in Downstream Market and Customer Impact in the EU-15 Member States. Therefore, it would not be wrong to suggest that the EU-15 Member States should seek and employ policies necessary for further liberalisation in Downstream Market and Customer Impact as required by the Electricity Directive. Furthermore, the place of Member States in the ranking list in each of the intermediate level indicators differs considerably. For example, while the Netherlands and Denmark are located in the top three in Upstream and Wholesale Market, they are in the middle in Downstream Market and Customer Impact category (See Table 4.1).

4.2 State of Liberalisation in the EU-15 in 2000

Similar observations can be made about the state of liberalisation in the year 2000. First of all, all of the EU-15 Member States comply with the Electricity Directive in their upstream electricity markets.

Findings suggest that electricity generation market is still highly concentrated in the year 2000 in the same countries, namely Belgium, Greece, France, Ireland and Luxembourg. The least concentrated electricity markets are in the UK, the Netherlands and Finland where the share of the largest generator is 20.6%, 22% and 23%, respectively (See Appendix 5-2). The average of market share of the largest generators in the EU-15 is 55.8% in 2000. The share of the three largest generators indicator shows similar behaviour to that of the share of the largest generator, except that the share of the three largest generators in the Netherlands is 79.1, which is a bit higher when compared with the share of the largest generator.

As for the existence of wholesale market indicator, Germany and the UK also established a standard electricity trading system in 2000, in addition to the countries which already had wholesale markets in the year 1999.

Data given in Appendix 5-2 illustrates that electricity generation markets in Denmark and Italy accepted considerable new entries in 2000. These countries, therefore, get full score, which is 10, in terms of this indicator (See Appendix 6-2). There are also exits from generation market in this year. In Sweden, 31 companies and in Austria one company had to leave the electricity generation market in 2000.

For the Downstream Market and Customer Impact intermediate level indicator, all of the EU-15 Member States comply with the Electricity Directive in their downstream electricity markets.

Appendix 5-2 shows that the degree of market opening is still dispersed among the EU-15 Member States in 2000. Furthermore, electricity market is completely opened to choices of customers in Austria this year. Degree of market opening in Greece, France, Ireland and Portugal is 30%. This percentage is slightly above the value of 28%, which is the minimum degree of market opening required by the Electricity Directive in 2000. The average of degree of market opening in the EU-15 is 57.8% in this year.

Findings on market share of suppliers show that supply market is highly concentrated in Greece, France, Ireland and Portugal, while a competitive level of concentration seems to be established in Denmark, Austria, Finland, Sweden and the UK. The former group get no score for the share of largest supplier and the share of three largest supplier indicators, while the latter have full score for both indicators (See Appendix 6-2).

In terms of the customer switching supplier indicators, Appendix 5-2 shows that the rate of domestic and industrial customer switching are still low in 2000. The average of the industrial and domestic customer switching across Europe is calculated to be 6.8% and 1.5%, respectively. These values indicate a one percentage point increase in the rate of industrial customers switching suppliers and 0.3 percentage point increase in that of domestic customers switching suppliers as compared to the rates in the previous year. The UK has the highest rate of switching in both industrial and domestic markets. Rate of the industrial customers switching and that of the domestic customers switching in the UK is 25% and 12%, respectively. In Greece, on the other hand, customers are not eligible to switch in neither industrial nor domestic electricity markets. Domestic customers switch between suppliers only in Germany, Finland, Sweden and the UK in this year.

As indicated in Appendix 5-2, industrial consumer prices decreased by 1% and domestic consumer prices remained constant, on

average, in the year 2000. Industrial consumer prices increased in the Netherlands, the UK, Italy and Denmark, and decreased in all of the other EU-15 Member States, except in Spain and Ireland where prices remained unchanged. The greatest increase is observed in the Netherlands and the UK by 13.6% and 9.91%, respectively. The greatest price decreases are observed in Germany, Austria and Sweden with percentages of 15%, 13% and 11%, respectively. As for the changes in domestic consumer prices, it is seen that the highest price increase is in the Netherlands while the highest price decrease is observed in Greece in 2000. Appendix 5-2 reveals that prices are lowest in Germany, Greece, Luxembourg, Austria and Sweden, while highest prices are seen in Denmark, Ireland, Italy, the Netherlands and the UK in 2000.

As far as the new entry to supply market indicator is considered, findings do not indicate high level of entries to supply market in 2000. Medium level of entries took place in Ireland, Italy, the Netherlands, Portugal and Finland, while considerable exits are seen in Denmark, the UK and Austria in this year (See Appendix 5-2).

Ranking of the EU-15 Member States in terms of i) Downstream Market and Customer Impact, ii) Upstream and Wholesale Market, and iii) Overall Score of Market Competition is given in Table 4.2. The Overall Scores of Market Competition of the EU-15 Member States are also illustrated in Figure 4.2.

An analysis of the Upstream and Wholesale Market reveals that Denmark and the UK are the most liberalised countries in terms of this intermediate level indicator with a score of 8.79 and 8.75, respectively. In Denmark, the two indicators whose scores are not full points are the share of the largest generator and the share of the largest three generators. The score of Denmark is 8.7 and 4.8 for the share of the largest generator and the share of three largest generators, respectively (See Appendix 6-2). In the UK, although the degree of market concentration in generation is low, the rate of new entries to the market

is moderate which decreases the score of the UK in Upstream and Wholesale Market. Luxembourg, Ireland and Greece are at the bottom of the ranking list in terms of Upstream and Wholesale Market in 2000.

Table 4.2: Ranking of EU-15 in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact - 2000

Overall Score of Market Competition		Upstream (Generation) and Wholesale Market		Downstream Market and Customer Impact (Retailing)	
UK	7.30	DENMARK	8.79	GERMANY	6.49
FINLAND	6.50	UK	8.75	SWEDEN	6.23
DENMARK	6.42	FINLAND	7.43	AUSTRIA	6.10
GERMANY	6.41	NETHERLANDS	6.91	UK	5.86
SWEDEN	5.80	ITALY	6.71	FINLAND	5.58
AUSTRIA	5.70	GERMANY	6.33	BELGIUM	4.12
NETHERLANDS	5.13	SPAIN	6.18	DENMARK	4.06
SPAIN	4.76	SWEDEN	5.38	NETHERLANDS	3.35
ITALY	4.72	AUSTRIA	5.31	SPAIN	3.35
BELGIUM	3.04	PORTUGAL	3.45	LUXEMBOURG	3.05
PORTUGAL	2.87	FRANCE	2.06	ITALY	2.74
LUXEMBOURG	2.46	BELGIUM	1.97	GREECE	2.68
GREECE	2.28	GREECE	1.88	PORTUGAL	2.29
FRANCE	2.09	IRELAND	1.88	FRANCE	2.12
IRELAND	1.91	LUXEMBOURG	1.88	IRELAND	1.94

In terms of the Downstream Market and Customer Impact intermediate level indicator, Germany has the most competitive electricity market with a score of 6.49. Although Germany is the best performer in the EU-15 Member States, its poor performance in switch rates, change of domestic consumer prices and new entry to supply market reduces its combined score in this intermediate level indicator. Germany scores approximately 1.5 for switching rate, 3.5 for change in domestic consumer prices and zero for new entry to supply market indicators (See Appendix 6-2). It is clear from Table 4.2 that three of the least liberalised countries in Downstream Market and Customer Impact are Ireland, France and Portugal in 2000 with scores of 1.94, 2.12, and 2.29, respectively.

As for the overall score of Market Competition high level indicator, the UK has the most liberalised electricity market in 2000, too. The score of the UK is 7.30. Table 4.2 illustrates that Ireland, France and Greece are the three members at the bottom of the list, and therefore have the least liberalised electricity markets in 2000.

In general, it can be said that, although not as much dispersed as it was in 1999, the degree of liberalisation in electricity market in 2000 is still highly dispersed (See Figure 4.2). The degree of liberalisation in Upstream and Wholesale Market is higher than that of liberalisation in Downstream Market and Customer Impact. The reason for this is anticipated to be the time lag between liberalising the electricity generation market and its reflection on the supply market.

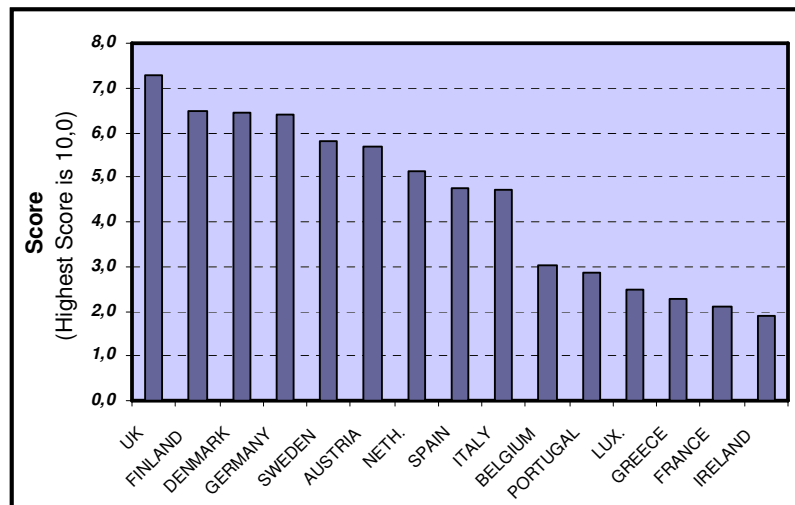


Figure 4.2: Overall Score of Market Competition for EU-15 (2000)

4.3 State of Liberalisation in the EU-15 in 2001

All of the Member States had already implemented the Electricity Directive in electricity generation market in 2000, therefore in 2001 they also comply with the Electricity Directive in generation market.

Data given in Appendix 5-3 for the indicator of market share of the largest generator and the market share of three largest generators display that electricity generation market is still highly concentrated in Belgium, Greece, France, Ireland and Luxembourg in the year 2001. The share of the largest generator in these countries is either equal to or greater than 90%, making the generation market highly concentrated. The least concentrated electricity markets are in the Netherlands, the UK and Finland with the shares of largest generator of 22%, 22.9% and 23%, respectively. These relatively low level of market shares of generators lead to full competition scores in the share of the largest generator indicator, and close to full competition scores in the share of three largest generators indicator in these countries (See Appendix 6-3). Calculation of the average of market share of the largest generator indicator across Europe yields that largest generators have 56.6% share in the European electricity markets (See Appendix 5-3). This value is calculated to be 78.5% for the share of three largest generators indicator.

As regards the establishment of wholesale markets, which leads to transparency in electricity trading system, France and Austria also set up wholesale markets in 2001. The remaining six EU-15 Member States, namely Belgium, Greece, Ireland, Italy, Luxembourg and Portugal do not have their wholesale markets established in 2001.

Appendix 5-3 shows that, rate of new entry, which is another primary indicator in Upstream and Wholesale Market, is very low in almost all of the EU-15 Member States, except in Italy where there are large number of entries. It is found that there are 1198 new entrants into the Italian electricity generation market in 2001. Denmark, the Netherlands and Austria are three countries where exits from generation market took place in this year.

For the Downstream Market and Customer Impact category, all of the Member States had already implemented the Electricity Directive

in supply market in 2000, therefore in 2001 they also comply with the Electricity Directive in terms of their supply market.

Appendix 5-3 indicates that degree of market opening converged further to the level of full opening state in 2001. The average of the degree of market opening in the EU-15 is 63.7% in 2001. This value is calculated to be 57.8% in 2000 and 43.7% in 1999. Electricity market is fully open to customer choices in Germany, Austria, Finland, Sweden and the UK as it was in 2000.

In addition, share of the largest supplier and share of three largest suppliers indicators show that concentration in supply market is very high in Greece, France, Ireland and Portugal in 2001, too. This is understood from the scores of these countries for these indicators. Appendix 6-3 reveals that score of these countries is either zero or very close to zero for these indicators. On the other hand, share of the largest supplier in the electricity market is 8%, 20%, 12%, 20% and 20% in Denmark, Austria, Finland, Sweden and the UK, respectively (See Appendix 5-3). These figures are considered, by OXERA (2000), to be low enough for an electricity market to have the characteristics of a competitive structure. These countries, therefore, have full score in terms of this indicator. Similarly, these countries are the best performers in terms of the share of largest three supplier indicator, too.

Furthermore, Appendix 5-3 indicates that the average rate of industrial customer switching increased considerably from 6.8% in 2000 to 23.9% in 2001, while that of domestic customer switching increasing from 1.5% in 2000 to 3.2% in 2001. In Sweden, all the industrial customers switched in 2001. The UK, on the other hand, has the highest rate of switching in domestic electricity market with a rate of 26%. It is understood from Appendix 5-3 that in Greece, customers are not eligible to switch in neither industrial nor domestic electricity market. It is also important to note that domestic customers are eligible to switch between

suppliers only in Germany, Austria, Finland, Sweden and the UK in the year 2001.

As far as the electricity prices are concerned, industrial consumer prices dropped by 6.1%, on average, in 2001 (See Appendix 5-3). This can be considered as a substantial decrease as compared to the level in the previous years. Domestic consumer prices, on the other hand, increased by 0.8% during the year 2001. Appendix 5-3 also demonstrates that industrial consumer prices increased in Denmark, Greece and Portugal, and decreased in all of the others except in Spain and Ireland where prices remained stationary. The greatest increase in prices is observed in Denmark by 16.3% and the greatest decrease is seen in Italy with a percentage of 33.4%. As far as the changes in domestic consumer prices are concerned, it is seen that the highest price increase is in Denmark with a price increase of 11.6%, while prices decreased the most in the Netherlands by 7.4% in 2001. Appendix 5-3 illustrates that prices are lowest in Belgium, Italy, the Netherlands, Austria and Sweden, while highest prices are observed in Denmark, Greece, Ireland, Portugal and Finland in 2001.

Findings indicate that there are high level of exits in many countries in 2000. Across Europe, 12 exits are seen in 2001, on the average (See Appendix 5-3). Luxembourg is the country attracting the largest number of entries, while Germany is the one where largest number of exits is observed in this year.

Ranking of the EU-15 Member States in terms of i) Downstream Market and Customer Impact, ii) Upstream and Wholesale Market, and iii) Overall Score of Market Competition is given in Table 4.3. The Overall Scores of Market Competition of the EU-15 Member States are also illustrated in Figure 4.3.

Table 4.3: Ranking of EU-15 in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact - 2001

Overall Score of Market Competition		Upstream (Generation) and Wholesale Market		Downstream Market and Customer Impact (Retailing)	
UK	7.69	UK	8.00	SWEDEN	8.01
SWEDEN	6.73	FINLAND	7.71	UK	7.38
FINLAND	6.50	NETHERLANDS	6.98	AUSTRIA	6.40
AUSTRIA	6.45	ITALY	6.92	GERMANY	5.39
GERMANY	5.88	AUSTRIA	6.50	FINLAND	5.29
NETHERLANDS	5.84	GERMANY	6.36	BELGIUM	5.15
ITALY	5.57	DENMARK	6.24	NETHERLANDS	4.71
DENMARK	5.24	SPAIN	5.88	DENMARK	4.25
SPAIN	4.83	SWEDEN	5.45	ITALY	4.22
BELGIUM	3.55	FRANCE	4.23	SPAIN	3.78
FRANCE	3.18	PORTUGAL	3.35	LUXEMBOURG	3.72
LUXEMBOURG	2.92	LUXEMBOURG	2.13	IRELAND	3.05
PORTUGAL	2.55	BELGIUM	1.96	FRANCE	2.14
IRELAND	2.46	GREECE	1.88	PORTUGAL	1.76
GREECE	1.73	IRELAND	1.88	GREECE	1.58

Regarding the intermediate level indicators of electricity market competition, it is observed that the UK is the most liberalised country in Upstream and Wholesale Market with a score of 8.00. The only indicator in which the UK is lagging behind is the rate of new entry in generation market. In 2001, there are two new entries into electricity generation market and the UK scores 2, out of 10, in terms of this indicator. Finland is the second most competitive country in this intermediate level indicator and it performs slightly less than the UK, in terms of share of three largest generators and rate of new entry indicators (See Appendix 6-3). Greece and Ireland, on the other hand, are at the bottom of the list and they get a score only from compliance with electricity directive indicator.

In downstream market & customer impact category, although Sweden has the most competitive market, it performs weaker with regard to domestic customers switching supplier, change in domestic consumer prices and new entry to supply market indicators. Since the performance of the UK in change in industrial consumer prices is far behind that of Sweden, the UK occupies the second place in the ranking

list. Greece and Portugal are at the bottom of the list. The only two indicators in which Greece gets score are compliance with the electricity directive and degree of market opening. In addition to those indicators from which Greece gets score, Portugal also gets a score of 0.5 out of 10 from industrial customers switching indicator in 2001 (See Appendix 6-3).

With a score of 7.69 in terms of overall score of Market Competition, the UK still has the most liberalised electricity market in 2001. Portugal, Ireland and Greece are the three members at the bottom of the list and therefore have the least liberalised electricity markets in 2001.

In general, an assessment of liberalisation indicators in 2001 demonstrates that no considerable harmonisation has yet been achieved in Europe since the launch of Electricity Directive. The dispersion is still considerably high (See Figure 4.3). The gap between the performances of Upstream and Wholesale Market and Downstream Market and Customer Impact categories is not closed and the former performed better in 2001, too.

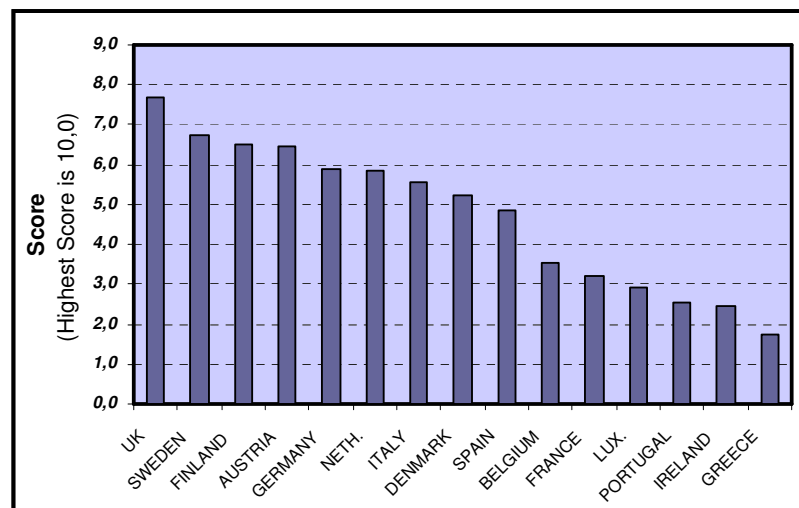


Figure 4.3: Overall Score of Market Competition for EU-15 (2001)

4.4 Progress of Electricity Market Liberalisation in the European Union-15 Member States

It is known that the ultimate aim of the Electricity Directive of the European Parliament and of the Council is to introduce competition for the purpose of decreasing electricity prices and to harmonise the electricity markets of the EU Member States for establishing a single electricity market as part of Single European Market (OJL 176, 2003). This section examines a) the state and progress in electricity market liberalisation in the EU-15 Member States between 1999 and 2001, and b) Europeanwide changes in;

- i) the overall Market Competition,
- ii) Upstream and Wholesale Market,
- iii) Downstream Market and Customer Impact, and
- iv) detailed primary indicators.

It is expected that each Member State of the European Union increases the degree of its electricity market liberalisation progressively, for the purpose of eventually establishing a fully competitive and harmonised electricity market in the European Union. The overall score of electricity market competition, which can also be referred to the electricity market liberalisation score, between 1999 and 2001 is given in Table 4.4 for each Member State.

Scrutinising Table 4.4 reveals that it is possible to classify the EU-15 Member States in terms of their tendencies in electricity market liberalisation between 1999 and 2001. The first group is composed of the countries which show increasing tendency in electricity market liberalisation between 1999 and 2001. The second group contains countries which demonstrate decreasing degree of liberalisation and the

third group includes the countries which show fluctuating character in electricity market liberalisation between 1999 and 2001.

Table 4.4: Changes in Overall Score of Market Competition in the EU-15 (1999-2001)

	1999	2000	2001
BELGIUM	3.01	3.04	3.55
DENMARK	5.66	6.42	5.24
GERMANY	6.02	6.41	5.88
GREECE	1.53	2.28	1.73
SPAIN	4.10	4.76	4.83
FRANCE	1.31	2.09	3.18
IRELAND	2.03	1.91	2.46
ITALY	3.93	4.72	5.57
LUXEMBOURG	1.17	2.46	2.92
NETHERLANDS	6.81	5.13	5.84
AUSTRIA	4.81	5.70	6.45
PORTUGAL	2.91	2.87	2.55
FINLAND	6.71	6.50	6.50
SWEDEN	5.68	5.80	6.73
UK	7.76	7.30	7.69

The reason for progress in the degree of electricity market liberalisation of the EU-15 Member States is obvious and can be attributed to introduction of Electricity Directive. However, some countries are worth discussing here. Luxembourg and France, for example, increased the degree of liberalisation of their electricity markets between 1999 and 2001 considerably. The reason for this increase is different for each country. In Luxembourg, for instance, degree of market opening, market share of largest supplier, industrial customers switching rate and industrial consumer prices are the major indicators whose scores increased from the year 1999 to 2001. Similarly, France increased its score in terms of existence of wholesale market, compliance with Electricity Directive in supply market and degree of market opening indicators.

Overall score of market competition of Portugal and Finland shows decreasing tendency between 1999 and 2001. Changes in the

degree of electricity market liberalisation in Portugal and Finland are given in Table 4.5.

Table 4.5: Changes in Electricity Market Liberalisation in Portugal and Finland

	Portugal			Finland		
	1999	2000	2001	1999	2000	2001
Overall Score of Market Competition	2.91	2.87	2.55	6.71	6.50	6.50
Upstream and Wholesale Market	3.12	3.45	3.35	7.32	7.43	7.71
Downstream Market and Customer Impact	2.70	2.29	1.76	6.10	5.58	5.29

Level of Portuguese electricity market competition decreased from 2.91 in 1999 to 2.55 in 2001. In order to explain the reason for this decrease it will be helpful to look at the changes in intermediate level indicators of Market Competition. Upstream and Wholesale Market category gives no idea because scores of this category for 2000 and 2001 are higher than overall scores of the corresponding years. Since scores of Downstream Market and Customer Impact category are less than the overall scores of corresponding years it can be said that decreasing tendency of Portuguese electricity market liberalisation is caused by the scores of indicators of this category. Examination of primary indicators of this category yields that there is a considerable decrease in consumer prices in Portugal in 1999 (See Appendix 5-1). Consumer prices in Portugal remained nearly stationary (0.6% decrease) in 2000 and increased slightly (1.3% in industrial market and 0.5% in domestic market) in 2001. In addition, Portugal is in the top five in European price rank in 1999, in the middle in 2000 and in the bottom five in 2001. Consequently, it can be concluded that the increasing consumer prices in Portugal from 1999 to 2001 resulted in decreasing tendency in Portuguese electricity market liberalisation.

A similar analysis can also be conducted for Finland. Again Downstream Market and Customer Impact category has a dominant effect on decreasing tendency of Finnish overall market competition

scores in 2000 and 2001. Consumer prices in Finland decreased considerably (5.21% in industrial market and 8.31% in domestic market) in 1999. Although not as much as in 1999, electricity prices in Finland dropped further in 2000 (2.5% in industrial market and 1% in domestic market). In 2001, score is further depressed by increasing domestic consumer prices (1.2% increase) while industrial consumer prices decreasing by 1.3%. Moreover, Finland is in the top five in European price rank in 1999, in the middle in 2000 and in the bottom five in 2001. Therefore, as in the case of Portuguese electricity market, it was found that the decreasing tendency of Finnish electricity market liberalisation is caused by increasing consumer prices in the country.

Group of the EU-15 Member States with fluctuating character of market liberalisation can be further divided into two subgroups according to behaviour of liberalisation scores for the purpose of simplicity in explaining the reasons for changes. First subgroup is composed of countries whose change of state of liberalisation forms a concave (U shaped) curve and the other subgroup contains those with convex (\cap shaped) curve. Nature of overall market scores of Ireland, the Netherlands and the UK falls within first subgroup while that of Denmark, Germany and Greece demonstrating characteristics of second subgroup. Overall score of market competition and scores of each intermediate level indicator are given in Table 4.6 for both subgroups.

Table 4.6 illustrates that decrease in overall score of market competition in Ireland in 2000 is due to the state of activities in Upstream and Wholesale Market. Examination of primary indicators shows that this is because no new participants entered electricity generation market in 2000. The most influential effect for the increase of liberalisation score of Ireland in 2001 came from the high rate of industrial customer switching, which is 58%.

Table 4.6: Countries with Fluctuating Nature of Liberalisation

	Ireland			Netherlands			UK		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Overall Score of Market Competition	2.03	1.91	2.46	6.81	5.13	5.84	8.69	7.30	7.69
Upstream and Wholesale Market	2.13	1.88	1.88	9.78	6.91	6.98	10.00	8.75	8.00
Downstream Market and Customer Impact	1.93	1.94	3.05	3.85	3.35	4.71	7.39	5.86	7.38

	Denmark			Germany			Greece		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Overall Score of Market Competition	5.66	6.42	5.24	6.02	6.41	5.88	1.53	2.28	1.73
Upstream and Wholesale Market	7.34	8.79	6.24	6.29	6.33	6.36	1.88	1.88	1.88
Downstream Market and Customer Impact	3.98	4.06	4.25	5.75	6.49	5.39	1.18	2.68	1.58

Similarly, overall score of market competition in Dutch electricity market decreased in 2000 due to increased level of market concentration and low rate of new entry into generation market. Share of the three largest generators increased from 56% in 1999 to 79.1% in 2000. The rate of new entry is high in 1999, while only 2 new companies entered the generation market in 2000. In 2001 degree of electricity market liberalisation in the Netherlands increased because of low prices and increased level of market opening.

Overall score of market competition and scores of both intermediate level indicators decreased in the UK in 2000. Considering Upstream and Wholesale Market, British electricity market faced lower rate of new entry into generation market in 2000. As for Downstream Market and Customer Impact category, electricity prices increased (9.91% in industrial and 5.32% in domestic market) considerably in 2000 and no new participant entered electricity supply market. In contrast to its tendency in 2000, degree of liberalisation in UK's electricity market increased in 2001 due to high rate of customer switching and diminished electricity prices in the UK.

Denmark, a country in second subgroup, improved its overall score of market competition in 2000. It can be said that main contribution to this improvement came from Upstream and Wholesale Market intermediate level indicator because the score of Downstream Market and Customer Impact increased by 0.06 point only. Inspection of primary indicators of Upstream and Wholesale Market shows that concentration in Danish electricity market decreased slightly and enormous amount of new participant entered the Danish electricity generation market. Opposite to the situation in 2000, degree of electricity market liberalisation in Denmark decreased in 2001. The only reason for this decrease is the large number of exits of previously participated generators from the Danish electricity market.

Degree of liberalisation of German electricity market improved in 2000. Yet different from the situation in Denmark, development of German electricity market is dominated by Downstream Market and Customer Impact intermediate level indicator. It is seen that prices in Germany decreased significantly in this year and Germany became one of the five cheapest countries across Europe. Although there is no entry to supply market in this year, price reductions surpassed this situation and overall score of market competition increased in 2000. Overall score of market competition dropped in Germany in 2001 because of low score of Downstream Market and Customer Impact intermediate level indicator. Decrease in score of this category is solely caused by increased electricity prices in Germany in this year.

The last country in this subgroup is Greece and behaviour of electricity market liberalisation in this country is similar to that of Germany. The only reason for increased competition score in 2000 is low electricity prices and the reason for decreased competition in 2001 is high prices in Greek electricity market.

Changes in the EU-15 in terms of electricity market liberalisation between 1999 and 2001 is illustrated in Table 4.7.

Table 4.7: Changes in the Scores of Competition Indicators in the EU-15

	1999	2000	2001
MARKET COMPETITION SCORE (WEIGHTED AVERAGE OF COUNTRIES)	4.73	5.03	5.33
MARKET COMPETITION SCORE (SIMPLE AVERAGE OF COUNTRIES)	4.23	4.49	4.74
STANDARD DEVIATION	2.18	1.88	1.86
UPSTREAM AND WHOLESALE MARKET (WEIGHTED AVERAGE)	5.41	5.76	5.98
UPSTREAM AND WHOLESALE MARKET (SIMPLE AVERAGE)	4.87	4.99	5.03
Quantitative:			
Compliance with Generation Directive	10.0	10.0	10.0
Market Share of largest upstream generator	4.82	5.20	5.10
Market share of three largest generators	4.15	4.17	4.21
Existence of wholesale market	3.33	4.67	6.00
Qualitative:			
New entry in generation/production	2.73	1.93	1.13
DOWNSTREAM MARKET & CUSTOMER IMPACT (WEIGHTED AVERAGE)	4.05	4.30	4.67
DOWNSTREAM MARKET & CUSTOMER IMPACT (SIMPLE AVERAGE)	3.59	4.00	4.46
Quantitative:			
Compliance with Directive	8.67	10.0	10.0
Degree of market opening	4.37	5.78	6.37
Market share of largest supplier	5.65	5.82	5.96
Market share of three largest suppliers	5.02	5.02	5.10
Industrial customers switching	1.16	1.37	3.61
Domestic customers switching	0.48	0.60	1.25
Change in industrial consumer prices	1.27	1.72	2.95
Change in domestic consumer prices	1.20	1.02	0.55
European rank in prices	5.00	5.00	5.00
Qualitative:			
New entry to the supply market	1.67	1.67	0.93

Close examination of Table 4.7 helps attain several important points about the state of liberalisation in the European Union. First, the degree of liberalisation in the EU is progressing positively. Simple average score of liberalisation in electricity markets in the EU is 4.23 in

1999; 4.49 in 2000 and 4.74 in 2001 while weighted average score of liberalisation in electricity markets in the EU is 4.73 in 1999, 5.03 in 2000 and 5.33 in 2001. Calculation of weighted average is based on population and GDPs of the EU-15 Member States. Here, population is assumed to represent the extent of electricity consumption while GDP is assumed to represent the extent of electricity generation. Calculation of weighted scores of the EU-15 in 1999, 2000 and 2001 is given in Appendix 10. Population and GDPs of each Member State used in calculating the weighted average scores are tabulated in Appendix 11. Average scores of Market Competition imply that some progress has been achieved with the introduction of Electricity Directive. Change in the scores of Market Competition between 1999 and 2001 is given in Figure 4.4.

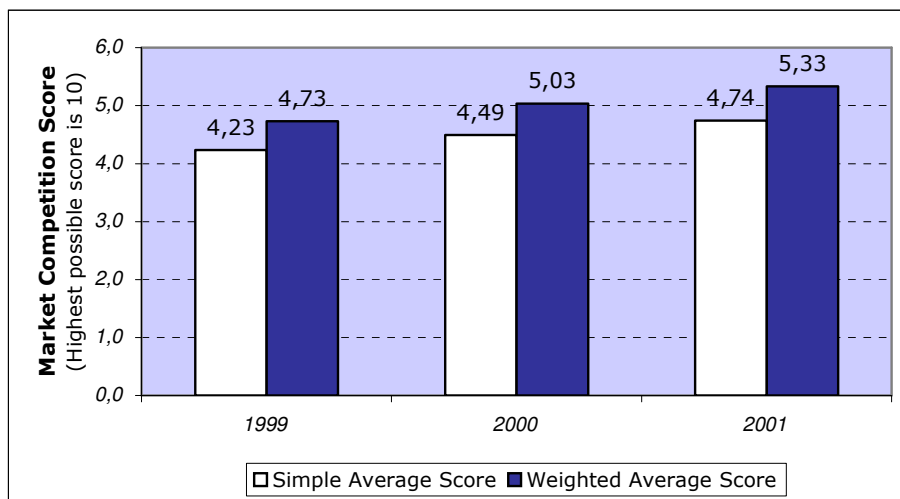


Figure 4.4: Change of Electricity Market Liberalisation in the EU-15

It is seen from Figure 4.4 that weighted average score of Market Competition is higher than the simple average score for the same year. This is because in the case of simple average, whether a country contributes a lot to the final score or not, that is its population or GDP is high or low, its weight is assumed to be equal to the weight of the

country with the highest population or GDP. In weighted average, on the other hand, the countries whose population or GDP is low has less contribution to the overall score of market competition of the EU-15. Therefore, weighted average can be said to reflect more accurate results than the simple average. Figure 4.4 also shows that state of electricity market liberalisation in the EU-15 between 1999 and 2001 displays a progress in terms of Market Competition scores calculated by any averaging technique.

Second, competition scores of both Upstream and Wholesale Market and Downstream Market and Customer Impact intermediate level indicators increased between 1999 and 2001. It is obvious from the scores of each intermediate level indicator that Upstream and Wholesale Market is more competitive than Downstream Market and Customer Impact in these years. This is because competition is first introduced to activities of this category and it takes some time for the benefits of competitive activities of this category to be reflected to downstream market.

Third, range of degree of electricity market liberalisation in Europe is quite wide in the years examined. This is understood from the large differences between the degrees of liberalisation in Member States. For example, overall score of market competition in the UK is 7.69 in 2001 while that of Greece is only 1.73 in the same year. However, it is informative that in the three successive years of 1999, 2000 and 2001 an obvious harmonisation is taking place throughout Europe. This view is supported by the standard deviation of overall scores of liberalisation in each year. Standard deviation of scores of the EU-15 is 2.18 in 1999, 1.88 in 2000 and 1.86 in 2001.

Fourth, it is clear that the EU is performing poorly in i) attracting new participants to generation and supply markets and ii) decreasing prices for the benefit of domestic consumers. Since one aim of the Electricity Directive is to lower electricity prices for European

citizens it can be argued that the progress in electricity market liberalisation is not yet satisfying.

Finally, one of the motivations behind the Electricity Directive was to reduce the large differences in the electricity prices in the Member States although this item is not taken into consideration in the indicators developed by OXERA. OXERA considers the rank of the countries in terms of electricity prices and change in prices, but not the level of actual prices. Scores of the Member States differ from year to year in terms of European rank in prices and changes in prices. This gives some information about the changes in prices but does not tell us the situation of the large price differences in the EU-15. It is seen from Appendix 9 that large deviations in domestic and industrial electricity prices continued to exist in 2001 in the EU-15 Member States. The largest difference in domestic electricity prices in the EU-15 in euro/MWh is 9.53, 9.92 and 9.41 in 1999, 2000 and 2001, respectively (See Appendix 9-1). Similarly, the largest difference in industrial electricity prices in the EU-15 Member States in euro/MWh is 10.97, 9.02 and 9.23 in 1999, 2000 and 2001, respectively (See Appendix 9-2). Furthermore, Appendix 9-1 and Appendix 9-2 also show that electricity prices for domestic consumers did not drop between 1999 and 2001 while those for industrial consumers decreased slightly between 1999 and 2001, on average.

CHAPTER V

STATE OF ELECTRICITY MARKET LIBERALISATION IN THE NEW ENTRANTS AND CANDIDATE COUNTRIES

This chapter presents the results obtained by using the Modified-OXERA model for the New Entrants and Candidate Countries. The state of liberalisation in the New Entrants and Candidate Countries is determined and performance of the countries are discussed for the years between 1999 and 2001. In addition, the areas where countries are not performing well are determined and new policy suggestions are made for furthering the electricity market liberalisation in those countries. Finally, the performance of the New Entrants and Candidate Countries is also compared with that of the EU-15 Member States for the years examined.

The raw data for each indicator for the New Entrants (NEs) and Candidate Countries (CCs) was obtained from Eurostat (2003) and subjective estimations were made if a score could not be obtained from this centralised data source. The raw data, for each primary indicator, are given in Appendix 7-1, Appendix 7-2, and Appendix 7-3 for the years 1999, 2000 and 2001, respectively.

Each primary indicator is scored based on the method described in Chapter 3 (also see Appendix 4) and the scores of all primary indicators are given in Appendix 8-1, Appendix 8-2, and Appendix 8-3 for the years 1999, 2000 and 2001, respectively. The scores of intermediate level indicators, namely the Upstream and Wholesale Market and the Downstream Market and Customer Impact, and that of high level indicator, which is Market Competition, are also

given in Appendix 8-1, Appendix 8-2, and Appendix 8-3 for the years 1999, 2000 and 2001, respectively.

The following sections analyse degree and nature of liberalisation in each year for each country in the New Entrants and Candidate Countries. It should be noted that the raw data rather than the score of each primary indicator is referred, where raw data is considered to be more appropriate. This is because, it is possible that the score of the indicators be equal for different countries while performance of one of the countries is better with respect to raw data. For example, in 1999, both Turkey and Poland score 10 in market share of largest upstream generator indicator, while the share of largest generator in Turkey and Poland is 8.7% and 20.8%, respectively.

5.1 State of Liberalisation in 1999

Data about each indicator of Market Competition for NEs and CCs are given in Appendix 7-1 for 1999. It is observed from Appendix 7-1 that electricity generation market is highly concentrated in all of the NEs and CCs except in Turkey and Poland, and in Hungary to a certain degree. Market share of the largest generator in Turkey and Poland is 8.7% and 20.8%, respectively. The share of largest generator is 38.9% in Hungary. In all of the other countries, market share of the largest generator is above 70%. Another indicator related to electricity generation market concentration is the share of largest three generators. Turkey and Poland are again the best performers in terms of this indicator. Market share of three largest generators is 23.4% in Turkey and 36.5% in Poland.

Appendix 7-1 also depicts the rate of new entry to electricity generation market. Since, the centralised data source (Eurostat, 2003) for NEs and CCs does not contain any information about the number of new entries in electricity generation market in 1999, subjective

estimations are made for this indicator. These estimations are based on the data from the year 2000. Given that there is a very low rate of entry in 2000, no entry is assumed for 1999 for none of the countries.

Data for Degree of Market Opening indicator is not available for NEs and CCs in 1999. Therefore no score is assigned for this indicator.

Electricity supply market is also concentrated in NEs and CCs although it is not as concentrated as the generation market is. The most dominant suppliers are present in Cyprus, Estonia, Latvia, Lithuania, Malta and Romania, where share of largest supplier is greater than 90%. Concentration of electricity supply market is the lowest in Poland and Turkey. The share of largest supplier is 11.3% and 14.5% in Poland and Turkey, respectively. Similarly, market share of three largest generators is again smallest in Poland and Turkey, where the shares are 21.8% and 29.5%, respectively.

The last primary indicator in Downstream Market and Customer Impact category for NEs and CCs is the new entry to the supply market. Subjective estimations based on the previous and next year's entries yield that no new participants entered the electricity supply market in 1999.

Ranking of NEs and CCs in terms of i) Downstream Market and Customer Impact, ii) Upstream and Wholesale Market, and iii) Overall Score of Market Competition is given in Table 5.1. It is obvious that Poland and Turkey have the most liberalised electricity markets in terms of Upstream and Wholesale Market intermediate level indicator. They both have the same level of liberalisation in this indicator with a score of 6.0. Other countries are lagging behind these two countries. There is no evidence of liberalisation in Cyprus, Latvia and Malta for this category.

Table 5.1: Ranking of NEs and CCs in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact - 1999

Overall Score of Market Competition		Upstream (Generation) and Wholesale Market		Downstream Market and Customer Impact (Retailing)	
POLAND	5.86	POLAND	6.00	CZECH REP.	5.72
TURKEY	5.86	TURKEY	6.00	POLAND	5.72
HUNGARY	4.30	HUNGARY	3.85	TURKEY	5.72
CZECH REP.	3.86	CZECH REP.	1.99	HUNGARY	4.74
BULGARIA	3.01	BULGARIA	1.31	BULGARIA	4.71
SLOVENIA	2.67	LITHUANIA	1.07	SLOVENIA	4.34
SLOVAK REP.	2.05	SLOVENIA	0.99	SLOVAK REP.	3.80
LITHUANIA	0.53	ROMANIA	0.31	ESTONIA	0.17
ESTONIA	0.18	SLOVAK REP.	0.30	CYPRUS	0.00
ROMANIA	0.16	ESTONIA	0.18	LATVIA	0.00
CYPRUS	0.00	CYPRUS	0.00	LITHUANIA	0.00
LATVIA	0.00	LATVIA	0.00	MALTA	0.00
MALTA	0.00	MALTA	0.00	ROMANIA	0.00

Czech Republic, Poland and Turkey are at the top and have the same score of 5.72 in Downstream Market and Customer Impact intermediate level indicator. Scores of Hungary, Bulgaria, Slovenia and Slovak Republic are close to each other and are around 4.0. The remaining countries, namely Cyprus, Latvia, Lithuania, Malta and Romania, have no scores at all in this indicator.

As far as the overall Market Competition scores are concerned, Poland and Turkey are the most liberalised countries in 1999. However, degree of their electricity market liberalisation is quite far from full state of liberalisation. Their overall score of market competition is equal to 5.86 out of 10.0, which is the full score. These two countries are followed by Hungary, Czech Republic, Bulgaria, Slovenia and Slovak Republic. Degree of electricity market liberalisation in Lithuania, Estonia and Romania is very low and there is no liberalisation at all in the electricity markets of Cyprus, Latvia and Malta.

Overall, it can be inferred from Table 5.1 that the degree of liberalisation in electricity markets of NEs and CCs is highly dispersed

(also see Figure 5.1). Furthermore, score of each category reveals that the degree of liberalisation in Downstream Market and Customer Impact is higher than that in Upstream and Wholesale Market. Therefore, it is suggested that NEs and CCs should seek and employ policies that will yield further liberalisation in Upstream and Wholesale Market.

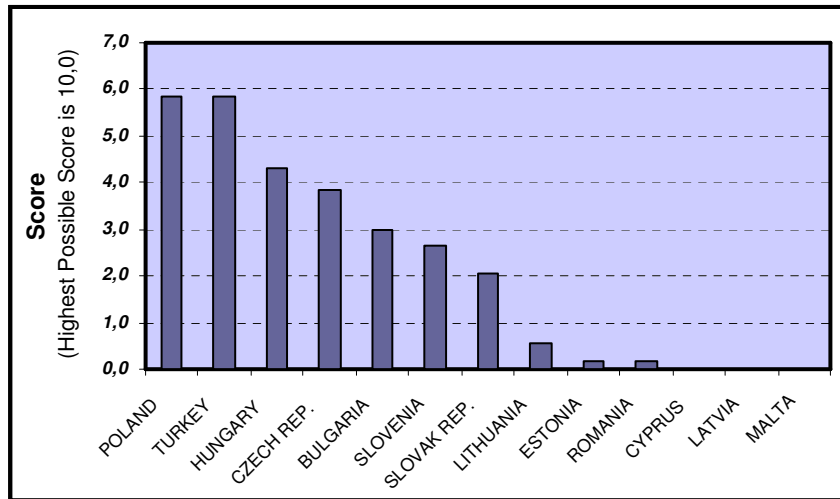


Figure 5.1: Overall Score of Market Competition for NEs and CCs (1999)

5.2 State of Liberalisation in 2000

Data about the electricity markets of NEs and CCs in 2000 are given in Appendix 7-2. Appendix 7-2 reveals that electricity generation market is still highly concentrated in the year 2000 in all of the countries except Turkey, Poland and Hungary. It is seen that market share of the largest generator is 8.4%, 19.5% and 41.3% in Turkey, Poland and Hungary, respectively. Although the share of largest generator in Bulgaria is quite high compared to that of Turkey, Poland and Hungary, the share of the largest generator decreased from 78% in 1999 to 58% in 2000 in Bulgaria. The average of market share of the largest generators is calculated to be 69.3% in Nes and CCs in 2000. In addition, share of the largest three generators, which is another indicator in Upstream and Wholesale Market category, is the smallest in Turkey and

Poland in 2000. Share of the largest three generators in electricity market is 23.1% in Turkey and 34.9% in Poland.

As can be seen from Appendix 7-2, there is no new entry at all in electricity generation market in most of the NEs and CCs in 2000. Turkey is the country where the highest rate of entry to electricity generation market is observed. The number of new entries in Turkey is 3 in 2000. Appendix 7-2 also depicts that there is only one new entry in Hungary, Poland and Romania in this year. It should be noted that there are exits from electricity generation market. Six companies left the Bulgarian electricity generation market while only one company left the market in Slovak Republic in 2000.

As for the Downstream Market and Customer Impact intermediate level indicator, all the countries are assigned no market opening in the year 2000.

An examination of Appendix 7-2 also reveals that electricity supply market is also concentrated in NEs and CCs in 2000 although it is not as concentrated as the generation market is. The most concentrated electricity supply markets are in Cyprus, Estonia, Latvia, Lithuania, Malta and Romania where share of largest supplier is greater than 90% in all of these countries in 2000. The least concentrated supply markets are seen in Poland, Turkey and Czech Republic where the share of largest supplier is 11.3%, 14.5% and 16.0%, respectively. As far as the share of largest three suppliers is concerned, electricity markets of these three countries have the smallest share of three largest suppliers among the others. The figures for the market shares of three largest suppliers for NEs and CCs are presented in Appendix 7-2.

As for the last indicator in Downstream Market and Customer Impact category, namely new entry to supply market, data suggest that no participants entered the supply market in any country except Poland, where 63 new suppliers joined the electricity supply market in 2000.

Ranking of NEs and CCs is given in Table 5.2 for the year 2000 in terms of Market Competition high level indicator and intermediate level indicators of Downstream Market and Customer Impact and Upstream and Wholesale Market. As for the Upstream and Wholesale Market category, it is obvious from Table 5.2 that Turkey and Poland performed best in liberalising their electricity markets. Score of Turkey is 7.20 and that of Poland is 6.40 in this intermediate level indicator. Furthermore, Hungary and Bulgaria are the other two countries who are performing well as compared to other countries. Scores of these two countries are 4.14 and 3.54, respectively. Finally, Cyprus, Latvia and Malta show no evidence of liberalisation in terms of Upstream and Wholesale Market intermediate level indicator in 2000.

Table 5.2: Ranking of NEs and CCs in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact - 2000

Overall Score of Market Competition		Upstream (Generation) and Wholesale Market		Downstream Market and Customer Impact (Retailing)	
POLAND	6.77	TURKEY	7.20	POLAND	7.14
TURKEY	6.46	POLAND	6.40	CZECH REP.	5.72
HUNGARY	4.43	HUNGARY	4.14	TURKEY	5.72
BULGARIA	4.34	BULGARIA	3.54	BULGARIA	5.15
CZECH REP.	3.84	CZECH REP.	1.97	HUNGARY	4.73
SLOVENIA	2.73	LITHUANIA	1.18	SLOVENIA	4.34
SLOVAK REP.	2.17	SLOVENIA	1.11	SLOVAK REP.	3.73
LITHUANIA	0.59	ROMANIA	0.66	ESTONIA	0.29
ROMANIA	0.33	SLOVAK REP.	0.60	CYPRUS	0.00
ESTONIA	0.20	ESTONIA	0.12	LATVIA	0.00
CYPRUS	0.00	CYPRUS	0.00	LITHUANIA	0.00
LATVIA	0.00	LATVIA	0.00	MALTA	0.00
MALTA	0.00	MALTA	0.00	ROMANIA	0.00

As can be observed from Table 5.2, in the year 2000 Poland is at the top of ranking list of Downstream Market and Customer Impact category and has a score of 7.14. Poland is followed by Czech Republic, Turkey and Bulgaria whose scores are 5.72, 5.72 and 5.15, respectively. In addition, scores of Hungary, Slovenia and Slovak Republic are around

4.0. Table 5.2 also demonstrates that Cyprus, Latvia, Lithuania, Malta and Romania show no progress in liberalising their electricity markets in terms of Downstream and Customer Impact indicator.

Based on the overall score of market competition, Table 5.2 reveals that Poland and Turkey are the most liberalised countries in 2000. Scores of Poland and Turkey are 6.77 and 6.46, respectively. The same table also depicts that degree of electricity market liberalisation in Lithuania, Estonia and Romania is very low in 2000. In addition, similar to the situation in 1999, there is no liberalisation at all in electricity markets of Cyprus, Latvia and Malta in the year 2000.

In general, examination of Table 5.2 yields that degree of liberalisation in electricity markets of NEs and CCs is still highly dispersed (also see Figure 5.2). Furthermore, score of each category reveals that the degree of liberalisation in Downstream Market and Customer Impact is higher than that in Upstream and Wholesale Market. Therefore, it is suggested that NEs and CCs should seek and employ policies that will yield further liberalisation in Upstream and Wholesale Market.

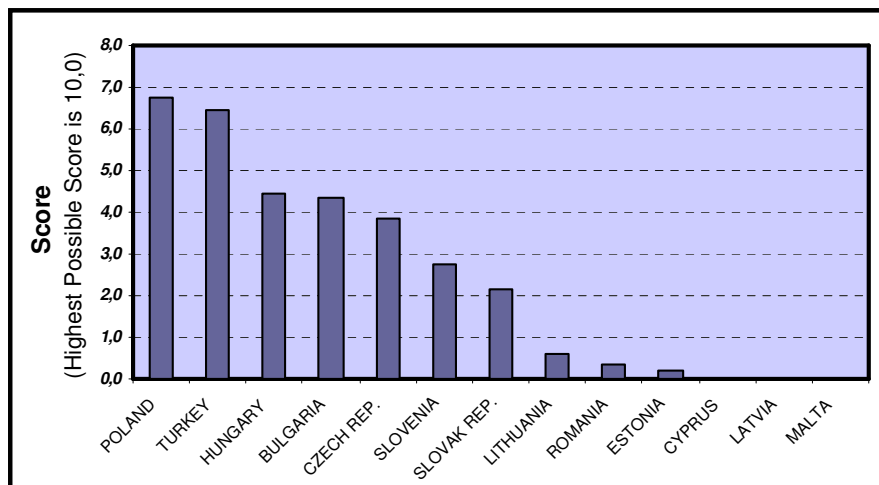


Figure 5.2: Overall Score of Market Competition for NEs and CCs (2000)

5.3 State of Liberalisation in 2001

Data about the electricity market in NEs and CCs for the year 2001 are given in Appendix 7-3. Close examination of Appendix 7-3 depicts that electricity generation market is still highly concentrated in all countries except Turkey, Poland and Hungary in the year 2001. It is seen that market share of the largest generator in Turkey, Poland and Hungary is 10.2%, 19.8% and 39.5%, respectively. These figures indicate that there are very slight changes in the shares of largest generators as compared to previous year's figures. Share of the largest generator increased by nearly 2 percentage points in Turkey and slightly in Poland, while that of Hungary increased by nearly 2 percentage points in 2001. In addition, Appendix 7-3 also illustrates that the average of market share of the largest generators in NEs and CCs increased from 69.3% in 2000 to 71.5% in 2001. Moreover, market concentration is also related with the share of the three largest generators. Similar to the case of share of the largest generator indicator, Turkey and Poland are the best performers in terms of this indicator, too. Market share of the three largest generators is 26% in Turkey and 43.5% in Poland.

As for the last indicator in Upstream and Wholesale Market category, namely new entry in generation, Appendix 7-3 gives the number of entries to and exits from the electricity generation market in 2001. It is clear from Appendix 7-3 that the number of new entries to electricity generation market in 2001 are 3, 2 and 1 in Hungary, Romania and Slovak Republic, respectively. The same Appendix also shows that there are exits from electricity generation markets of NEs and CCs in 2001. Twenty producers left the generation market in Bulgaria while this number is 5 and 2 for Poland and Turkey, respectively.

Data given in Appendix 7-3 suggest that the average of degree of market opening in NEs and CCs is 25.7% in 2001. Examination of status of individual countries in terms of electricity market opening yields that Slovenia and Poland have the most open markets in NEs. Degree of

opening in Slovenia is 64% and that of Poland is 51% in 2001. In contrast, electricity markets in Cyprus and Malta is not open to choices of customers as illustrated in Appendix 7-3.

As far as the Downstream Market and Customer Impact intermediate level indicator is concerned, Appendix 7-3 also reveals that electricity supply market in NEs and CCs is concentrated in 2001. Electricity supply markets in Cyprus, Latvia, Lithuania, Malta, Estonia and Romania are the most concentrated markets in terms of share of largest supplier. Electricity supply market is the least concentrated in Poland, Turkey and Czech Republic. The share of the largest supplier in these countries is 9.9%, 14.3% and 16.7%, respectively. The same order is obtained when countries are sorted in terms of shares of three largest suppliers. The average of the largest supplier and that of the three largest suppliers in Downstream and Customer Impact category is 56.7% and 73.5%, respectively. Comparison of concentration in supply market and that in generation market depicts that electricity supply market is less concentrated than electricity generation market in 2001 (See Appendix 7-3).

Finally, the number of new entries to supply market in NEs and CCs are given in Appendix 7-3 for 2001. As can be seen, 29 new participants entered the electricity supply market in Poland in 2001. In addition, the number of new entrants is 3 for Slovak Republic and 1 for Romania. Appendix 7-3 also shows that Estonia is the only country where there are exits from the electricity supply market. Twelve suppliers left the Estonian electricity market in 2001. The number of total suppliers in electricity markets of all the other countries remained unchanged during 2001.

Ranking of NEs & CCs in terms of Overall Score of Market Competition and intermediate level indicators, namely Downstream Market and Customer Impact and Upstream and Wholesale Market, is given in Table 5.3 for the year 2001.

Table 5.3: Ranking of NEs and CCs in Terms of Overall Score, Upstream & Wholesale Market and Downstream Market & Customer Impact - 2001

Overall Score of Market Competition		Upstream (Generation) and Wholesale Market		Downstream Market and Customer Impact (Retailing)	
POLAND	7.30	POLAND	6.00	POLAND	8.60
TURKEY	6.19	TURKEY	6.00	CZECH REP.	6.58
HUNGARY	5.46	HUNGARY	5.24	TURKEY	6.38
CZECH REP.	4.46	CZECH REP.	2.35	SLOVENIA	6.23
SLOVENIA	3.70	SLOVENIA	1.17	BULGARIA	5.69
BULGARIA	3.27	ROMANIA	1.10	HUNGARY	5.68
SLOVAK REP.	3.13	BULGARIA	0.84	SLOVAK REP.	5.56
ROMANIA	1.09	LITHUANIA	0.81	ROMANIA	1.09
LITHUANIA	0.70	SLOVAK REP.	0.70	LITHUANIA	0.60
ESTONIA	0.35	ESTONIA	0.18	ESTONIA	0.51
LATVIA	0.16	CYPRUS	0.00	LATVIA	0.31
CYPRUS	0.00	LATVIA	0.00	CYPRUS	0.00
MALTA	0.00	MALTA	0.00	MALTA	0.00

As far as the Upstream and Wholesale Market is concerned, it is apparent from Table 5.3 that Poland, Turkey and Hungary performed best in liberalising their electricity market in terms of electricity generation and wholesale activities. Scores of both Poland and Turkey in Upstream and Wholesale Market are 6.00 and that of Hungary is equal to 5.24 in 2001. In addition, Table 5.3 suggests that Slovenia, Romania, Bulgaria, Lithuania, Slovak Republic and Estonia have very low scores which indicate a very low degree of electricity market liberalisation in terms of Upstream and Wholesale market. Finally, there is no signals of liberalisation in terms of Upstream and Wholesale Market in Cyprus, Latvia and Malta in 2001.

As for the Downstream Market and Customer Impact category, Poland is at the top of ranking list in the year 2001 and has a score of 8.60. Czech Republic, Turkey and Slovenia form a group of countries which have scores approximately 2 points lower than that of Poland. A similar group can be formed to include Bulgaria, Hungary and Slovak

Republic whose scores of Downstream Market and Customer Impact category are approximately 3 points lower than that of Poland. Moreover, it is seen from Table 5.3 that scores of Romania, Lithuania, Estonia and Latvia in Downstream Market and Customer Impact category are very low. Cyprus and Malta, on the other hand, have no scores at all in terms of this intermediate level indicator.

Table 5.3 illustrates that Poland and Turkey are the most liberalised countries in 2001 in terms of overall score of market competition. Scores of Poland and Turkey are 7.30 and 6.19, respectively. It is observed that overall score of market competition of Poland is 1.11 points higher than that of Turkey in 2001. It should be noted that overall score of market competition of Poland was equal to that of Turkey in 1999, and was 0.31 point higher than that of Turkey in 2000. The same table also depicts that degree of electricity market liberalisation in Romania, Lithuania, Estonia and Latvia is very low in 2001. Furthermore, there is no indication of electricity market liberalisation at all in Cyprus and Malta in 2001.

In general, analysis of Table 5.3 tells us that degree of liberalisation in electricity markets of NEs and CCs is highly dispersed (also see Figure 5.3). Furthermore, score of each intermediate level indicator reveals that the degree of liberalisation in Downstream Market and Customer Impact is higher than that in Upstream and Wholesale Market. Therefore, NEs and CCs should seek and employ policies that will yield further liberalisation in Upstream and Wholesale Market.

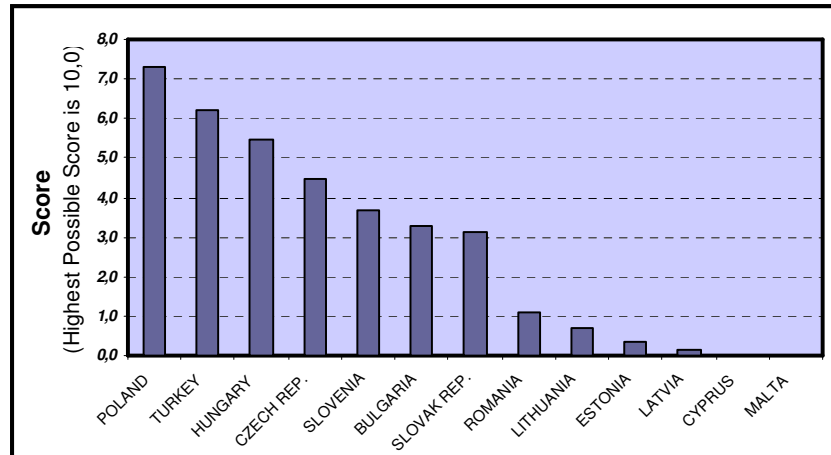


Figure 5.3: Overall Score of Market Competition for NEs and CCs (2001)

5.4 Progress of Electricity Market Liberalisation in New Entrants and Candidate Countries

As potential EU Members, New Entrants and Candidate Countries are also expected to comply with the Directive requirements and adopt appropriate policies that will lead to liberalisation in their national electricity markets. This section analyses the state and progress of liberalisation in NEs and CCs between 1999 and 2001 in terms of:

- i) overall Market Competition,
- ii) Upstream and Wholesale Market,
- iii) Downstream Market and Customer Impact, and
- iv) detailed primary indicators.

The general state and progress of liberalisation in each country of NEs and CCs are best understood by examining the overall market competition scores of their electricity markets. Table 5.4 depicts overall

score of market competition between 1999 and 2001 for each country of NEs and CCs.

Table 5.4: Changes in Overall Score of Market Competition in New Entrants and Candidate Countries (1999-2001)

	1999	2000	2001
BULGARIA	3.01	4.34	3.27
CYPRUS	0.00	0.00	0.00
CZECH REPUBLIC	3.86	3.84	4.46
ESTONIA	0.18	0.20	0.35
HUNGARY	4.30	4.43	5.46
LATVIA	0.00	0.00	0.16
LITHUANIA	0.53	0.59	0.70
MALTA	0.00	0.00	0.00
POLAND	5.86	6.77	7.30
ROMANIA	0.16	0.33	1.09
SLOVAK REPUBLIC	2.05	2.17	3.13
SLOVENIA	2.67	2.73	3.70
TURKEY	5.86	6.46	6.19

When Table 5.4 is examined carefully, it is seen that NEs and CCs can be classified into three groups in terms of their tendency in electricity market liberalisation between 1999 and 2001. First group is composed of those countries which show increasing tendency in electricity market liberalisation between 1999 and 2001. Second group contains countries which demonstrate no change in state of liberalisation and third group includes the countries whose state of electricity market liberalisation show fluctuating character between 1999 and 2001. Fluctuation is a n shaped tendency in this case.

The reason for progress taken in the degree of electricity market liberalisation of NEs and CCs can be attributed to the requirement that they are expected to harmonise their national policies with those of the EU. Therefore, progress in electricity market liberalisation is expected from NEs and CCs and the reason for this is clear. However, there are some countries whose progress is not as expected. Turkey and Bulgaria,

for example, are the two countries whose performance increased from 1999 to 2000 but decreased in the following year. This situation is clear from Table 5.4. This table illustrates that overall score of electricity market competition in Bulgaria increased from 3.01 in 1999 to 4.34 in 2000 while it decreased from 4.34 in 2000 to 3.27 in 2001. Similarly, overall score of electricity market competition in Turkey increased from 5.86 in 1999 to 6.46 in 2000 while it decreased from 6.46 in 2000 to 6.19 in 2001. It is argued that it will become difficult for Turkey to increase the degree of liberalisation in its electricity market in the next decade due to high cost of production that will result from guaranteed long-term natural gas purchase agreements (Ercan & Öz, 2004:203).

Table 5.4 also shows that Czech Republic is another exception to the progress expected from NEs and CCs in that overall score of electricity market competition decreased slightly from 3.86 in 1999 to 3.84 in 2000. In addition, Cyprus and Malta are the two countries who could not make any progress in liberalising their national electricity markets.

Change in electricity market liberalisation scores in the NEs and CCs between 1999 and 2001 is illustrated in Table 5.5.

An examination of Table 5.5 reveals some important points about the progress of electricity market liberalisation in NEs and CCs. First, there is a development in the state of electricity market liberalisation in NEs and CCs between the years 1999 and 2001. Simple average score of liberalisation in electricity markets in the NEs and CCs is 2.19 in 1999; 2.45 in 2000 and 2.75 in 2001 while weighted average score of liberalisation in electricity markets in the NEs and CCs is 4.33 in 1999, 4.87 in 2000 and 5.11 in 2001. Calculation of weighted average is based on population and GDPs of the NEs and CCs. Here, population is assumed to represent the extent of electricity consumption while GDP is assumed to represent the extent of electricity generation. Calculation of weighted scores of the NEs and CCs in 1999, 2000 and 2001 is given in

Appendix 10. Population and GDPs of each country used in calculating the weighted average scores are tabulated in Appendix 11.

Table 5.5: Changes in Electricity Market Competition Indicators in the New Entrants and Candidate Countries

	1999	2000	2001	2001*
MARKET COMPETITION SCORE (WEIGHTED AVERAGE OF COUNTRIES)	4.33	4.87	5.11	4.64
MARKET COMPETITION SCORE (SIMPLE AVERAGE OF COUNTRIES)	2.19	2.45	2.75	2.39
STANDARD DEVIATION	2.24	2.51	2.56	2.39
UPSTREAM (GENERATION) AND WHOLESALE MARKET (WEIGHTED AVERAGE)	4.09	4.78	4.30	
UPSTREAM (GENERATION) AND WHOLESALE MARKET (SIMPLE AVERAGE)	1.69	2.07	1.88	1.88
Quantitative:				
Market Share of largest upstream generator	2.43	2.71	2.36	2.36
Market share of three largest generators	3.22	3.58	3.28	3.28
Qualitative:				
New entry in generation/production	0.00	0.46	0.46	0.46
DOWNSTREAM MARKET & CUSTOMER IMPACT (WEIGHTED AVERAGE)	4.56	4.95	5.92	
DOWNSTREAM MARKET & CUSTOMER IMPACT (SIMPLE AVERAGE)	2.69	2.83	3.63	2.90
Quantitative:				
Degree of market opening	0.00	0.00	2.57	0.00
Market share of largest supplier	5.11	5.14	5.15	5.15
Market share of three largest suppliers	4.28	4.38	4.45	4.45
Qualitative:				
New entry to the supply market	0.00	0.77	1.08	1.08

* Scores for 2001 excluding Degree of Market Opening indicator.

Average scores of Market Competition suggests that NEs and CCs started to liberalise their national electricity markets in order to

converge to the EU's level of electricity market liberalisation. However, it should be noted here that overall scores of competition for NEs and CCs are very low. This means that degree of liberalisation in NEs and CCs is far behind the level of EU and there is a lot to do for establishing a fully competitive electricity market. Change in the scores of Market Competition between 1999 and 2001 is given in Figure 5.4.

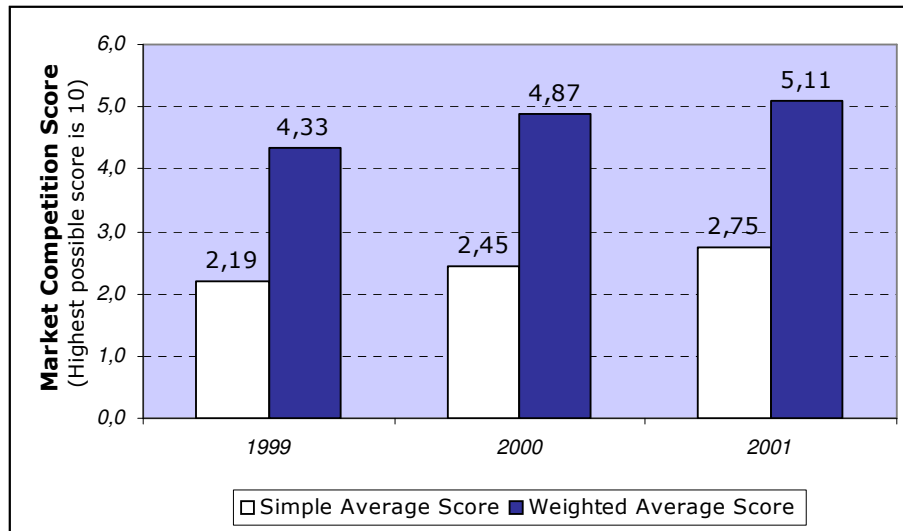


Figure 5.4: Change of Electricity Market Liberalisation in NEs & CCs

It is seen from Figure 5.4 that weighted score of Market Competition is higher than the average score of the same year. This is because in the case of simple average, whether a country contributes a lot to the final score or not, that is its population or GDP is high or low, its weight is assumed to be equal to the weight of the country with the highest population or GDP. In weighted average, on the other hand, the countries whose population or GDP is low has less contribution to the overall score of market competition of the NEs and CCs. Therefore, weighted average can be said to reflect more accurate results than the simple average. Figure 5.4 also shows that the change of liberalisation of the NEs and CCs between 1999 and 2001 displays a progress in terms of market competition scores calculated by any average.

Second, the competition score of Upstream and Wholesale Market, calculated by simple averaging, increased from 1.69 in 1999 to 2.07 in 2000 while it decreased to 1.88 in 2001. Similarly, the score of Upstream and Wholesale Market, calculated by weighted averaging, increased from 4.09 in 1999 to 4.78 in 2000 while it decreased to 4.30 in 2001. Score of Downstream Market and Customer Impact, on the other hand, increased between 1999 and 2001. Furthermore, it is clear from Table 5.5 that score of market competition in the Downstream Market and Customer Impact category increases from the year 2000 to 2001. This is because of the effect of one additional indicator, namely Degree of Market Opening, which is not available in 1999 and 2000 but was introduced in the year 2001 in measuring the score of Downstream Market and Customer Impact category. Since data for this indicator is not available for the years 1999 and 2000, no market opening was assumed for NEs and CCs in these years. If this indicator were not introduced in 2001, score of Downstream Market and Customer Impact category, calculated by simple averaging, would be calculated to be 2.90 and eventually score of overall market competition would be calculated as 2.39. We would not, then, see a progress in the degree of liberalisation in electricity markets of NEs and CCs between 1999 and 2001 but would do so between 1999 and 2000, only.

Third, range of degree of electricity market liberalisation in NEs and CCs is quite wide in the years examined. This is understood from the large differences between the overall scores of electricity market competition in NEs and CCs. For example, it is given in Appendix 8-1 that overall score of electricity market competition in Poland is 5.86 in 1999 while that of Malta is zero in the same year. This is not different in the year 2000 and 2001. Overall score of electricity market competition in Poland is 6.77 and 7.30 in 2000 and 2001, respectively while that of Malta is zero in both 2000 and 2001 (See Appendix 8-2 and 8-3).

In addition, Table 5.5 also depicts that no harmonisation is taking place in the three successive years 1999, 2000 and 2001. This is

indicated by standard deviation of overall scores of market competition in each country for each year. Results of calculation of standard deviation are given in Table 5.5 for the years 1999, 2000 and 2001. Standard deviation of overall scores of electricity market competition for NEs and CCs is 2.24 in 1999, 2.51 in 2000 and 2.56 in 2001 (2.39 in 2001 if score of Degree of Market Opening indicator is excluded).

Finally, based on the average of the liberalisation score of each country, it can be seen from Table 5.5 that NEs and CCs are performing well in i) attracting new participants to generation and supply markets and ii) decreasing electricity supply market concentration between 1999 and 2001.

5.5 Comparing Electricity Market Liberalisation in the EU-15 and New Entrants and Candidate Countries

It was explained in the previous sections that the two groups of countries in Europe, namely the EU-15 Member States and the NEs and CCs, exhibit progress in the degree of electricity market liberalisation. This section compares the performances of these two groups in terms of the liberalisation indicators which are common in both groups. It is mentioned in Chapter 3 that indicators for NEs and CCs were obtained by reducing the number of indicators of EU-15. Since the indicators used for measuring the degree of electricity market liberalisation in the NEs and CCs are also the indicators used for measuring the degree of electricity market liberalisation in the EU-15 Member States, the same set of indicators can be used in comparing performances of these two groups.

Since the method of scoring is the same for both the EU-15 and the NEs and CCs, scores of indicators are taken directly from Appendix 6-1, Appendix 6-2 and Appendix 6-3 for the EU-15 Member States and from Appendix 8-1, Appendix 8-2 and Appendix 8-3 for the

NEs and CCs. Calculation of scores of each category, however, normalised for the EU-15 by using those weightings determined for the NEs and CCs, so that the scores can be calculated on the same basis. This enables us to make a comparison about the scores of overall market competition, the intermediate level indicators and detailed primary indicators of the EU-15 Member States and the NEs and CCs between 1999 and 2001. Results of scores of each intermediate level indicator and score of overall market competition are given in Table 5.6.

Table 5.6: Comparison of Electricity Market Competition Scores of EU-15 and New Entrants and Candidate Countries

	Weighting Factor (%)	1999		2000		2001	
		EU15	NEs & CCs	EU15	NEs & CCs	EU15	NEs & CCs
OVERALL SCORE OF MARKET COMPETITION (WEIGHTED AVERAGE)		5.21	4.33	4.90	4.87	4.76	5.11
OVERALL SCORE OF MARKET COMPETITION (SIMPLE AVERAGE)		4.16	2.19	4.29	2.45	4.18	2.75
UPSTREAM AND WHOLESALE MARKET (WEIGHTED AVERAGE)		5.08	4.09	4.48	4.78	4.30	4.30
UPSTREAM AND WHOLESALE MARKET (SIMPLE AVERAGE)	50	3.78	1.69	3.58	2.07	3.25	1.88
Market Share of largest upstream generator	30	4.82	2.43	5.20	2.71	5.10	2.36
Market share of three largest generators	30	4.15	3.22	4.17	3.58	4.21	3.28
New entry in generation	40	2.73	0.00	1.93	0.46	1.13	0.46
DOWNSTREAM MARKET AND CUSTOMER IMPACT (WEIGHTED AVERAGE)		5.35	4.56	5.32	4.95	5.22	5.92
DOWNSTREAM MARKET AND CUSTOMER IMPACT (SIMPLE AVERAGE)	50	4.54	2.69	4.99	2.83	5.12	3.63
Degree of market opening	28.6	4.37	0.00	5.78	0.00	6.37	2.57
Market share of largest supplier	28.6	5.65	5.11	5.82	5.14	5.96	5.15
Market share of three largest suppliers	28.6	5.02	4.28	5.02	4.38	5.10	4.45
New entry to the supply market	14.2	1.67	0.00	1.67	0.77	0.93	1.08

Examination of Table 5.6 reveals a few important points. First, Table 5.6 indicates that, both the EU-15 and the NEs and CCs perform better in Downstream Market and Customer Impact category and, therefore, both needs to develop new policies to increase the degree of liberalisation in Upstream and Wholesale Market.

Second, it is seen that both the EU-15 and the NEs and CCs show progress in liberalising their electricity markets in terms of Downstream Market and Customer Impact Category.

Third, the degree of liberalisation in the EU-15 shows a decreasing tendency between 1999 and 2001 in terms of Upstream and Wholesale Market category while that of the NEs and CCs shows a fluctuating tendency in the same years.

Finally, it is also seen from Table 5.6 that the NEs and CCs are converging to the EU-15 in terms of overall market competition score. This is understood from the ratio of the average score of market competition of the NEs and CCs to that of the EU-15. This ratio is calculated as 0.53, 0.57 and 0.66 by using the simple average scores and 0.83, 0.99 and 1.07 by using weighted average scores in 1999, 2000 and 2001, respectively. It is seen that the pace of convergence of the NEs and CCs to the EU-15 is considerably high. Moreover, the extent of convergence of the NEs and CCs to the EU-15 level is calculated to be different depending on the method used to calculate the score of Market Competition in each year. Electricity markets of the NEs and CCs are found to be more liberalised than those of the EU-15 Member States in 2001 when weighted averaging technique is used to calculate the average degree of liberalisation based on the indicators given in Table 5.6 or Appendix 3. However, it should not be disregarded that indicators used in this comparison do not take into account all of the activities in European electricity market. However, it is worth mentioning that NEs and CCs are more liberalised in terms of some of the activities taking place in electricity markets.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

This chapter gives the main conclusions drawn from the assessment of the results obtained by measuring the electricity markets of the EU-15 Member States and the New Entrants and Candidate Countries based on the Modified-OXERA model. It also includes suggestions for furthering the present study in measuring the degree of electricity market liberalisation in the European territory more accurately.

The European Commission's model of electricity market liberalisation aims at restructuring the previously monopolistic electricity markets of the Member States in such a way that competition is introduced in electricity generation and supply markets while an efficient regulation is maintained in transmission and distribution.

In a monopolistic electricity market, prices are set by the monopoly power because it is the sole owner and operator of all activities in generation, transmission, distribution and supply markets. Prices are determined by an independent operator, based on the supply schedule proposed by generators and the demand of customers, in a market where transmission and distribution market are regulated while generation and supply are competitive. In a fully competitive or liberalised electricity market, on the other hand, generators are allowed to sell directly to customers. Therefore, prices are determined by the relation between demand and supply. Moving from a monopolistic market structure to a competitive one, or vice versa, brings about some welfare changes in terms of suppliers and customers due to changes in prices and quantity generated. Overall welfare effects of moving from a

competitive market to a monopolistic market and from a competitive market to a regulated market were analysed in Chapter 2. It was found that the net welfare loss is higher in moving to a monopolistic electricity market than to a regulated electricity market. Obviously, moving to a competitive market from the case of a monopolistic market or from a regulated market would bring about welfare gains, the gain being higher in the former case.

Measuring the degree of electricity market liberalisation in each of the EU Member State and Candidate Country is very important in tracking the harmonisation of electricity markets. However, literature is rather scarce in terms of the number of studies done to monitor the degree of electricity market liberalisation in European countries. In this thesis, the indicators approach developed by OXERA to measure the degree of electricity market liberalisation was modified and the Modified-OXERA model was used to measure the degree of electricity market liberalisation in the EU-15 Member States, the New Entrants and Candidate Countries between 1999 and 2001. The present study contributes to the electricity market liberalisation literature in that it broadens the work carried out by OXERA in terms of the number of countries analysed and the period of time covered. OXERA measured the degree of electricity market liberalisation in the EU-15 in 2000 only while this study measured the degree of electricity market liberalisation between 1999 and 2001 in the EU-15, the New Entrants and Candidate Countries. Moreover, using simple and weighted averaging techniques, performance of the EU-15 and the New Entrants and Candidate Countries between 1999 and 2001 was compared against each other. Weighted average was taken based on population and GDPs of the countries analysed.

Electricity market competition activities, i.e., primary indicators, were grouped under two intermediate level indicators in the Modified-OXERA Model. These are 'Upstream and Wholesale Market' which represents the electricity generation market and 'Downstream

Market and Customer Impact' which includes the activities in electricity supply market. The score of each primary indicator was aggregated to intermediate level indicators by multiplying the score of each indicator by its corresponding weighting factor which represents its importance in the market. These intermediate level indicators, namely 'Upstream and Wholesale Market' and 'Downstream Market and Customer Impact' were then further aggregated to obtain the overall score of electricity market competition.

Measurement of the electricity market liberalisation in the EU-15 Member States, the New Entrants and Candidate Countries by using the Modified-OXERA model led to several important findings.

First of all, electricity market liberalisation in the EU-15 is in progress. Average score of electricity market liberalisation was found to be 4.23 in 1999; 4.49 in 2000 and 4.74 in 2001 by using the simple averaging technique. Weighted averaging technique yielded different liberalisation scores but the same tendency between 1999 and 2001. Weighted average score of electricity market liberalisation was found to be 4.73 in 1999; 5.03 in 2000 and 5.33 in 2001. The results obtained by using both simple and weighted averaging techniques suggest that some progress has been made with the introduction of Electricity Directive.

Secondly, it is seen that there is a progress in the state of electricity market liberalisation in the NEs and CCs between the years 1999 and 2001. Average electricity market liberalisation score of the NEs and CCs was calculated to be 2.19, 2.45 and 2.75 in 1999, 2000 and 2001, respectively, by simple averaging technique. Weighted average of the electricity market liberalisation scores of the NEs and CCs, was found to be 4.33, 4.87 and 5.11 in 1999, 2000 and 2001, respectively. Results of both techniques indicate a progress for the NEs and CCs in liberalising their electricity markets. This progress suggests that the NEs and CCs started to liberalise their national electricity markets in order to catch up with the EU's level of electricity market liberalisation.

Thirdly, the NEs and CCs are getting closer to the EU-15 in terms of the state of electricity market liberalisation. This is understood from the ratio of the score of electricity market liberalisation of the NEs and CCs to that of the EU-15. This ratio was calculated to be 0.53 in 1999; 0.57 in 2000 and 0.66 in 2001 when simple averaging is used to calculate the average score of the NEs and CCs in each year. The ratio was calculated as 0.83, 0.99 and 1.07 in 1999, 2000 and 2001, respectively, by using weighted averaging technique. It is seen that the pace of liberalisation in the NEs and CCs is faster than that of the EU-15. Moreover, based on the indicators used for comparison, electricity markets of the NEs and CCs were found to be more liberalised than those of the EU-15 Member States in 2001 when weighted averaging technique is used to calculate the average degree of liberalisation. This is anticipated to result from the high population and GDP of Turkey and Poland associated with their high scores of market competition. Exclusion of some of the indicators in the calculation of market competition scores could also be another reason for the higher scores of liberalisation obtained using weighted averaging technique. The average of the degree of liberalisation of countries in each year obtained by weighted averaging technique would not have been so high if other indicators of the market competition had been included in calculations.

Finally, both the EU-15 Member States and the NEs and CCs perform better in Downstream Market and Customer Impact intermediate level indicator and, therefore, both need to develop new policies to increase the degree of electricity market liberalisation in Upstream and Wholesale Market. Moreover, findings also indicated that the EU is performing poorly in attracting new participants to generation and supply markets and in decreasing prices for the benefit of consumers. Since one aim of the Electricity Directive is to lower the electricity prices for the consumers, it can be argued that electricity market liberalisation has not been fully achieved yet. As far as the NEs and CCs are concerned, they performed well in attracting new participants to generation and supply

markets and in decreasing concentration in electricity supply market between 1999 and 2001.

Measuring the degree of electricity market liberalisation by making use of the indicators approach is a rather new field of research and is open to development in terms of primary indicators and their corresponding weightings. In this thesis, the OXERA's indicators approach was taken as the basis and modified for measuring the degree of electricity market liberalisation. However, new primary indicators can be incorporated as reliable and centralised data become available and new weightings can be set based on the relative importance of the corresponding indicator.

This study attempted to measure the degree of electricity market liberalisation in the EU-15 Member States, the New Entrants and Candidate Countries between 1999 and 2001 only; however, as up to date data become available from centralised and reliable data sources, further studies can be carried out to measure the degree of electricity market liberalisation in the subsequent years.

It is hoped that the findings of this study will be beneficial to scholars and researchers who are interested in electricity market liberalisation, leading to further inquiry in the field.

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APPENDICES

APPENDIX 1: Competition Indicators for European Electricity Market in OXERA Model

ELECTRICITY MARKET LIBERALISATION							
MARKET COMPETITION				NON-COMPETITIVE ACTIVITIES			
UPSTREAM (GENERATION) AND WHOLESALE MARKET (%50)		DOWNSTREAM MARKET AND CUSTOMER IMPACT (%50)		NETWORK ACCESS AND OWNERSHIP (%70)		REGULATORY INFLUENCE (%30)	
Quantitative:	%	Quantitative:	%	Quantitative:	%		%
Compliance with Electricity Directive	15	Compliance with Electricity Directive	10	Account unbundling	20	Impact of state subsidies	33
Market Share of largest upstream generator	15	Degree of market opening	10	Ownership separation	20	Level of social obligations	33
Market share of three largest generators	15	Market share of largest supplier	10	Compliance with the directive on Third Party	15	Regulatory independence	33
Existence of wholesale market	15	Market share of three largest suppliers	10				
		Industrial customers switching	10				
		Domestic customers switching	10				
		Change in industrial consumer prices	7,5				
		Change in domestic consumer prices	7,5				
		European rank in prices	5				
Qualitative:		Qualitative:		Qualitative:			
New entry in generation	20	New entry to the supply market	5	Effectiveness of Third Party Access arrangements	25		
Effectiveness of wholesale trading	10	Potential for foreclosure through vertical integration	10	Access of foreign firms to domestic networks	20		
Capacity constraints on the interconnectors	10	Tariff proliferation	5				

APPENDIX 2: Competition Indicators for European Electricity Market in Modified-OXERA Model for EU-15

MARKET COMPETITION			
UPSTREAM AND WHOLESALE MARKET	%50	DOWNSTREAM MARKET AND CUSTOMER IMPACT	%50
Quantitative:	%	Quantitative:	%
Compliance with Electricity Directive	18,75	Compliance with Electricity Directive	11,76
Market Share of largest upstream generator	18,75	Degree of market opening	11,76
Market share of three largest generators	18,75	Market share of largest supplier	11,76
Existence of wholesale market	18,75	Market share of three largest suppliers	11,76
		Industrial customers switching	11,76
		Domestic customers switching	11,76
		Change in industrial consumer prices	8,82
		Change in domestic consumer prices	8,82
		European rank in prices	5,88
Qualitative:		Qualitative:	
New entry in generation	25	New entry to the supply market	5,88

**APPENDIX 3: Competition Indicators for European Electricity Market in Modified-OXERA Model for
NEs & CCs**

MARKET COMPETITION			
UPSTREAM (GENERATION) AND WHOLESALE MARKET	%50	DOWNSTREAM MARKET AND CUSTOMER IMPACT	%50
Quantitative:	%	Quantitative:	%
Market Share of largest upstream generator	30	Degree of market opening	28,6
Market share of three largest generators	30	Market share of largest supplier	28,6
		Market share of three largest suppliers	28,6
Qualitative:		Qualitative:	
New entry in generation	40	New entry to the supply market	14,2

APPENDIX 4: Scoring Method for Electricity Market Competition Indicators

MARKET COMPETITION	SCORING METHOD IN OXERA	SCORING METHOD IN THIS THESIS
UPSTREAM (GENERATION) AND WHOLESALE MARKET		
Quantitative:		
Compliance with Electricity Directive	Yes=10; No=0	Yes=10; No=0
Market Share of largest upstream generator (%)	<25%=10;>80%=0; linear in between	<25%=10;>80%=0; linear in between
Market share of three largest generators (%)	<50%=10;100%=0; linear in between	<50%=10;100%=0; linear in between
Existence of wholesale market	Yes=10; No=0	Yes=10; No=0
Qualitative:		
New entry in generation	High=10;medium=5; low=0	Exit and no Entry = 0; 10 and higher entry=10; 0-10 entry scored linearly (High=10;medium=5; low=0 assessment is preferred when data source is OXERA (2000))
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)		
Quantitative:		
Compliance with Electricity Directive	Yes=10; No=0	Yes=10; No=0
Degree of market opening (%)	100%=10;0%=0; linear in between	100%=10;0%=0; linear in between
Market share of largest supplier (%)	<25%=10;>80%=0; linear in between	<25%=10;>80%=0; linear in between
Market share of three largest suppliers (%)	<50%=10;100%=0; linear in between	<50%=10;100%=0; linear in between
Industrial customers switching (%)	>50%=10;0%=0; linear in between	>50%=10;0%=0; linear in between
Domestic customers switching (%)	>25%=10;0%=0; linear in between	>25%=10;0%=0; linear in between
Change in industrial consumer prices (%)	>20% reduction=10;0% reduction or increase=0; linear in between	>20% reduction=10;0% reduction or increase=0; linear in between
Change in domestic consumer prices (%)	>20% reduction=10;0% reduction or increase=0; linear in between	>20% reduction=10;0% reduction or increase=0; linear in between
European rank in prices (average of domestic and ind. prices)	First tier=10;second tier=5; third tier=0	First tier=10;second tier=5; third tier=0
Qualitative:		
New entry to the supply market	High=10;medium=5; low=0	Exit and no Entry = 0; 10 and higher entry=10; 0-10 entry scored linearly (High=10;medium=5; low=0 assessment is preferred when data source is OXERA (2000))

Source: Adapted from OXERA (2000).

APPENDIX 5-1: Raw Data for Electricity Market Competition Indicators for EU-15 (1999)

104

	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERL.	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK	AVERAGE
UPSTREAM (GENERATION) AND WHOLESALE MARKET																
Quantitative:																
Compliance with Electricity Directive	Yes	Yes	Yes	Yes	Yes ¹	Yes ¹	Yes	Yes ¹	Yes	Yes	Yes	Yes	Yes	Yes	Yes ¹	NN
Market Share of largest generator (%)	92,3	40,0	28,1	98,0	51,8	90,2	97,0	71,1	100 ¹	22,0 ¹	21,4	57,8	26,0	52,8	21,0	58,0
Market share of three largest generators (%)	96,6	74,0	62,7	100	91,0	95,2	100	87,0 ¹	100 ¹	56,0 ¹	37,1	87,0	54,0	84,9	40,0 ¹	77,7
Existence of wholesale market	No ¹	Yes	No	No ¹	Yes	No	No ¹	No ¹	No ¹	Yes	No	No ¹	Yes	Yes	No	NN
Qualitative:																
New entry in generation	0 ²	med ¹	med ¹	0 ³	low ¹	0 ⁴	1 ⁵	high ¹	0 ⁶	high ¹	low ¹	0 ⁷	low ⁸	low ⁹	high ¹	NN
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)																
Quantitative:																
Compliance with Electricity Directive	Yes ¹	Yes ¹	Yes ¹	Yes ¹	Yes	No	Yes ¹	Yes	No ¹	Yes	Yes ¹	Yes ¹	Yes ¹	Yes ¹	Yes ¹	NN
Degree of market opening (%)	28 ¹	26 ¹⁰	100 ¹	0,0 ¹	54 ¹	0,0 ¹	26 ¹⁰	35 ¹	0,0 ¹	28 ¹	33 ¹	25 ¹	100 ¹	100 ¹	100 ¹	43,7
Market share of largest supplier (%)	38,0 ⁹	17,7	25,0 ¹	100	46,1	100 ¹	100 ¹¹	90,0 ¹	64,0	35,5 ¹²	17,8	99,0	10,0 ⁹	20,0 ⁹	14,0 ¹	51,8
Market share of three largest suppliers (%)	50,0 ⁹	31,5	40,0 ¹	100	96,5	100 ¹	100 ⁹	95,0 ¹	100 ¹³	80,0 ¹	30,0 ¹	100 ¹	25,0 ⁹	52,1	33,6	68,9
Industrial customers switching (%)	3,0 ⁹	5,0 ⁹	10,0 ⁹	0,0 ¹	0,0 ¹	5,0 ¹	5,0 ⁹	5,0 ⁹	5,0 ⁹	10,0 ⁹	3,0 ⁹	3,0 ⁹	3,0 ⁹	5,0 ⁹	25,0 ⁹	5,8
Domestic customers switching (%)	0,0 ¹	0,0 ¹	3,0 ⁹	0,0 ¹	0,0 ¹	0,0 ¹⁴	0,0 ¹⁵	0,0 ¹⁶	0,0 ¹⁵	0,0 ¹	0,0 ¹	0,0 ¹	3,0 ¹⁷	0,0 ¹	12,0 ¹	1,2
Change in industrial consumer prices (%)	-0,24	-0,57	-1,96	1,85	-2,30	-2,43	-0,24	-2,83	1,026	1,86	0,87	-9,13	-5,21	-10,4	-2,85	-2,2
Change in domestic consumer prices (%)	-1,30	1,42	2,02	1,06	-3,00	-1,21	-0,62	-3,44	1,321	-2,30	0,93	-3,92	-8,31	-6,79	-5,19	-2,0
European rank in prices	5	0	0	0	5	5	5	10	0	5	0	10	10	10	10	5,0
Qualitative:																
New entry to the supply market	0 ⁹	0 ¹⁸	high ¹	low ¹	0 ⁹	low ¹	0 ⁹	0 ⁹	0 ⁹	0 ⁹	0 ⁹	0 ⁹	0 ⁹	0 ⁹	High ¹	NN

APPENDIX 5-1: Raw Data for Electricity Market Competition Indicators for EU-15 (1999)-Continued

Med: medium, NN: Not Numeric

Source is Eurostat (2003) unless otherwise stated.

1 OXERA (2000)

2 Estimation (No entry in 2000 and 2001. OXERA estimates a "low" rate of entry for 2000)

3 Estimation (OXERA (2000) states that monopoly power still continues to exist in 2000. Therefore in 1999 no entry is estimated)

4 Estimation (OXERA (2000) assumed low rate of entry in 2000)

5 Estimation (OXERA (2000) states IVO Group started to built, own and operate power station in 1998)

6 Estimation (OXERA (2000) states that a new plant is to be commissioned in 2001)

7 Estimation (OXERA (2000) states that Portugal's first official entry took place in march 2000)

8 Estimation (OXERA (2000) estimates "low" rate of entry for 2000 therefore a low rate is estimated for 1999)

9 Estimation (Based on OXERA (2000))

10 Subjective Estimation (This value is the minimum requirement in Electricity Directive)

11 Estimation (OXERA (2000) gives 98% for 2000)

12 Estimation (OXERA (2000) reports that small suppliers merged in 2000. Share of largest supplier in 2000 36%)

13 Largest two

14 Estimation (Domestic customers are not eligible to choose supplier even in 2001)

15 European Commission (2002). Second Benchmarking Report on the Implementation of the Internal Electricity and Gas Market

16 Estimation (No switching in 2000 and 2001)

17 Estimation (3% switching in 2000 and 2001. Therefore 3% switching assumed in 1999)

18 Estimation (OXERA (2000) assumed low level of entry for 2000. Therefore no entry is estimated for 1999)

APPENDIX 5-2: Raw Data for Electricity Market Competition Indicators for EU-15 (2000)

	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERL.	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK	AVERAGE
UPSTREAM (GENERATION) AND WHOLESALE MARKET																
Quantitative:																
Compliance with Electricity Directive	Yes	Yes	Yes	Yes	Yes	Yes ¹	Yes	Yes ¹	Yes	Yes	Yes	Yes	Yes	Yes	Yes ¹	NN
Market Share of largest upstream generator (%)	91,1	32,0	34	97	42	90	97	47	100 ¹	22,0 ¹	32,6	58,5	23	49,5	20,6	55,8
Market share of three largest generators (%)	97,6	76	73	100	76	95	100	68	100 ¹	79,1 ²	51,6 ³	84,1	52	84,2	36,0 ⁴	78,2
Existence of wholesale market	No ¹	Yes	Yes	No ¹	Yes	No	No ¹	No ⁵	No ¹	Yes	No ¹	No ¹	Yes	Yes	Yes ¹	NN
Qualitative:																
New entry in generation	0	267	0	0	1	low	0	53	low	2	-1	1	0	-31	5	NN
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)																
Quantitative:																
Compliance with Electricity Directive	Yes	Yes	Yes	Yes	Yes	Yes	Yes ¹	Yes	Yes	Yes	Yes ¹	Yes ¹	Yes ¹	Yes ¹	Yes	NN
Degree of market opening (%)	35,0 ⁶	35,0	100 ⁶	30,0 ⁶	54,0 ⁶	30,0 ⁶	30,0 ⁶	45,0 ⁶	45,0 ¹	33,0 ⁶	100 ⁶	30,0 ⁶	100 ⁶	100 ⁶	100 ⁶	57,8
Market share of largest supplier (%)	39,8	16,7	31,3 ⁷	100	40,0	90,0 ¹	98,0 ¹	65,0	63,0	35,5 ¹	20,0 ¹	99,5	11,0	20,0 ¹	14,0 ⁸	49,6
Market share of three largest suppliers (%)	52,5	37,5	50,0	100	94,0	100 ¹	100 ¹	90,0 ⁹	100 ¹⁰	87,0 ¹	42,9	100 ¹	27	47,0 ¹¹	42,3	71,3
Industrial customers switching (%)	5,0 ¹	5,0 ¹	10,0 ¹	0,0 ¹	5,0 ¹	5,0 ¹²	5,0 ¹	5,0 ¹	5,0 ¹	10,0 ¹	5,0 ¹	5,0 ¹	2,5 ¹	10,0 ¹	25,0 ¹	6,8
Domestic customers switching (%)	0,0 ¹	0,0 ¹	3,0 ¹	0,0 ¹	0,0 ¹	0,0 ⁴	0,0 ⁴	0,0 ¹	0,0 ⁴	0,0 ¹	0,0 ¹	0,0 ¹	2,5 ¹	5,0 ¹	12,0 ¹	1,5
Change in industrial consumer prices (%)	-2,3	5,6	-15	-2,7	0	-2,3	0	8,2	-4,2	13,6	-13	-0,6	-1,5	-11	9,91	-1,0
Change in domestic consumer prices (%)	-0,8	5,5	-7	-10	-2,9	-1,9	0	-1,5	-2	18,4	-2,9	-0,6	-1	0,94	5,32	0,0
European rank in prices	5	0	10	10	5	5	0	0	10	0	10	5	5	10	0	5,0
Qualitative:																
New entry to the supply market	low ¹	-12	0	0	low ¹	0	med ¹	med ¹	0	med ¹	-5	med ¹	Med ¹	0	-7	NN

APPENDIX 5-2: Raw Data for Electricity Market Competition Indicators for EU-15 (2000)-Continued

Med: medium, NN: Not Numeric

Source is Eurostat (2003) unless otherwise stated.

1 OXERA (2000)

2 Total share of companies with at least 5% of generation

3 Share of the second largest company is defined as confidential in Eurostat (2003). Therefore a 10% share is estimated.

4 European Commission (2002). Second Benchmarking Report on the Implementation of the Internal Electricity and Gas Market, Brussels, 1.10.2002, SEC(2002) 1038.

5 OXERA (2003)

6 European Commission (2001). First Benchmarking Report on the Implementation of the Internal Electricity and Gas Market. Brussels, 3.12.2001, SEC(2001) 1957.

7 Estimated by using the previous year's ratio of the market share of largest supplier to that of the three largest supplier.

8 Estimation (Because the largest three is 42,3. Dividing this by 3 gives approx. 14 for each)

9 Estimation (Largest 2 is given as 72% in Eurostat (2003))

10 Largest two

11 Aggregated share of suppliers with at least 5%

12 Estimation (Industrial customer switching is 5% in 1999 and 6% in 2001. Therefore 5% switching is estimated in 2000)

APPENDIX 5-3: Raw Data for Electricity Market Competition Indicators for EU-15 (2001)

	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERL.	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK	AVERAGE
UPSTREAM (GENERATION) AND WHOLESALE MARKET																
Quantitative:																
Compliance with Electricity Directive	Yes	Yes	Yes	Yes	Yes	Yes ¹	Yes	Yes ¹	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NN
Market Share of largest upstream generator (%)	92,6	39,0	32,0	98,0	43,8	90,0	96,6	45,0	100 ²	22,0 ²	34,4	61,5	23,0	48,5	22,9	56,6
Market share of three largest generators (%)	97,7	71,0	74,0	100	82,9	94,0	100	64,0	100 ²	64,0 ³	68,0 ³	84,2	51,0	83,3	44,0 ³	78,5
Existence of wholesale market	No	Yes	Yes	No	Yes	Yes	No ¹	No ⁴	No	Yes	Yes ⁴	No	Yes	Yes	Yes ¹	NN
Qualitative:																
New entry in generation	0	-709	0	0	1	1	0	1198	1 ¹	-10	-8	1	1	0	2	32
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)																
Quantitative:																
Compliance with Electricity Directive	Yes	Yes	Yes ¹	Yes	Yes	Yes	Yes ¹	Yes	Yes	Yes	Yes	Yes	Yes ¹	Yes ¹	Yes	NN
Degree of market opening (%)	52,0	35,0	100	34,0	55,0	30,0	40,0	45,0	57,0	63,0	100	45,0	100	100	100	63,7
Market share of largest supplier (%)	38,4	8,0	33,1 ⁵	100	40,0	87,0	78,0	60,0	62,0	32,2 ¹	20,0 ²	97,1	12,0	20,0 ²	20,0 ²	47,2
Market share of three largest suppliers (%)	51,0	8,0	53,0	100	92,0	96,0 ³	97,0 ³	93,0 ³	100 ⁶	80,0 ³	42,0 ³	100 ⁷	29,0	52,0 ³	53,2	69,7
Industrial customers switching (%)	2,6	13,0	15,0 ³	0,0	19,0 ⁸	6,0	58,0	15,0 ³	8,2 ⁹	15,0 ³	8,6	2,4	16,4	100 ³	80,0 ³	23,9
Domestic customers switching (%)	0,0	0,0	3,7	0,0	0,0 ³	0,0 ³	0,0 ¹⁰	0,0 ¹⁰	0,0 ¹⁰	0,0 ¹	0,17	0,0	3,0	15,0 ³	26,0	3,2
Change in industrial consumer prices (%)	-12,5	16,3	-2,6	2,7	0,0	-1,1	0,0	-33,4	-9,3	-0,9	-24,6	1,3	-1,3	-25,7	-0,8	-6,1
Change in domestic consumer prices (%)	1,24	11,3	2,3	2,7	-4,0	-0,8	0,0	-2,3	7,4	-7,4	-0,5	0,5	1,2	1,8	-1,6	0,8
European rank in prices	10	0	5	0	5	5	0	10	5	10	10	0	0	10	5	5,0
Qualitative:																
New entry to the supply market	2	-15	-100	0	-12	0	2	-1	10	-4	-17	0	0	-38	-3	-12

APPENDIX 5-3: Raw Data for Electricity Market Competition Indicators for EU-15 (2001)-Continued

m medium, NN: Not Numeric

Source is Eurostat (2003) unless otherwise stated.

1 OXERA (2000)

2 Estimated on the basis of 1999 and 2000 data.

3 European Commission (2001). First Benchmarking Report on the Implementation of the Internal Electricity and Gas Market. Brussels, 3.12.2001, SEC(2001) 1957.

4 OXERA (2003)

5 Estimated by using the ratio of previous year.

6 Largest two

7 Subjective estimation (One company's share is 97,1%)

8 Datamonitor (2003). Competitor Tracking, Supplier Performance in the Spanish Major Power User Sector. Pub ID: DFMN905098, June 24, 2003

9 Customers switching one company which represents only 38% of national market.

10 European Commission (2003). Second Benchmarking Report on the Implementation of the Internal Electricity and Gas Market. Brussels, 7.4.2003, SEC(2003) 448.

APPENDIX 6-1: Weighted Scores of Competition Indicators and Overall Competition Scores for EU-15 (1999)

	Weighting Factor	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERL.	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK	AVERAGE
MARKET COMPETITION SCORE		3,01	5,66	6,02	1,53	4,10	1,31	2,03	3,93	1,17	6,81	4,81	2,91	6,71	5,68	7,76	4,23
UPSTREAM AND WHOLESALE MARKET	50	2,00	7,34	6,29	1,88	5,05	2,06	2,13	5,17	1,88	9,78	5,63	3,12	7,32	5,24	8,13	4,87
Quantitative:																	
Compliance with Electricity Directive	18,8	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Market Share of largest upstream generator	18,8	0,0	7,3	9,4	0,0	5,1	0,0	0,0	1,6	0,0	10,0	10,0	4,0	9,8	4,9	10,0	4,8
Market share of three largest generators	18,8	0,7	5,2	7,5	0,0	1,8	1,0	0,0	2,6	0,0	8,8	10,0	2,6	9,2	3,0	10,0	4,2
Existence of wholesale market	18,8	0,0	10,0	0,0	0,0	10,0	0,0	0,0	0,0	0,0	10,0	0,0	0,0	10,0	10,0	0,0	3,3
Qualitative:																	
New entry in generation/production	25	0,0	5,0	5,0	0,0	0,0	0,0	1,0	10,0	0,0	10,0	0,0	0,0	0,0	0,0	10,0	2,7
DOWNSTREAM MARKET & CUSTOMER IMPACT	50	4,01	3,98	5,75	1,18	3,15	0,57	1,93	2,69	0,46	3,85	3,99	2,70	6,10	6,12	7,39	3,59
Quantitative:																	
Compliance with Electricity Directive	11,8	10,0	10,0	10,0	10,0	10,0	0,0	10,0	10,0	0,0	10,0	10,0	10,0	10,0	10,0	10,0	8,7
Degree of market opening	11,8	2,8	2,6	10,0	0,0	5,4	0,0	2,6	3,5	0,0	2,8	3,3	2,5	10,0	10,0	10,0	4,4
Market share of largest supplier	11,8	7,6	10,0	10,0	0,0	6,2	0,0	0,0	0,0	2,9	8,1	10,0	0,0	10,0	10,0	10,0	5,7
Market share of three largest suppliers	11,8	10,0	10,0	10,0	0,0	0,7	0,0	0,0	1,0	0,0	4,0	10,0	0,0	10,0	9,6	10,0	5,0
Industrial customers switching	11,8	0,6	1,0	2,0	0,0	0,0	1,0	1,0	1,0	1,0	2,0	0,6	0,6	0,6	1,0	5,0	1,2
Domestic customers switching	11,8	0,0	0,0	1,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,2	0,0	4,8	0,5
Change in industrial consumer prices	8,82	0,1	0,3	1,0	0,0	1,2	1,2	0,1	1,4	0,0	0,0	0,0	4,6	2,6	5,2	1,4	1,3
Change in domestic consumer prices	8,82	0,6	0,0	0,0	0,0	1,5	0,6	0,3	1,7	0,0	1,1	0,0	2,0	4,2	3,4	2,6	1,2
European rank in prices	5,88	5,0	0,0	0,0	0,0	5,0	5,0	5,0	10,0	0,0	5,0	0,0	10,0	10,0	10,0	10,0	5,0
Qualitative:																	
New entry to the supply market	5,88	0,0	0,0	10,0	0,0	0,0	0,0	0,0	0,0	0,0	5,0	0,0	0,0	0,0	0,0	10,0	1,7

APPENDIX 6-2: Weighted Scores of Competition Indicators and Overall Competition Scores for EU-15 (2000)

	Weighting Factor	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERL.	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK	AVERAGE
MARKET COMPETITION		3,04	6,42	6,41	2,28	4,76	2,09	1,91	4,72	2,46	5,13	5,70	2,87	6,50	5,80	7,30	4,49
UPSTREAM AND WHOLESALE MARKET	50	1,97	8,79	6,33	1,88	6,18	2,06	1,88	6,71	1,88	6,91	5,31	3,45	7,43	5,38	8,75	4,99
Quantitative:																	
Compliance with Electricity Directive	18,8	10	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Market Share of largest upstream generator	18,8	0,0	8,7	8,4	0,0	6,8	0,0	0,0	6,1	0,0	10,0	8,6	3,9	10,0	5,5	10,0	5,2
Market share of three largest generators	18,8	0,5	4,8	5,4	0,0	4,8	1,0	0,0	6,4	0,0	4,2	9,7	3,2	9,6	3,2	10,0	4,2
Existence of wholesale market	18,8	0	10,0	10,0	0,0	10,0	0,0	0,0	0,0	0,0	10,0	0,0	0,0	10,0	10,0	10,0	4,7
Qualitative:																	
New entry in generation/production	25	0,0	10,0	0,0	0,0	1,0	0,0	0,0	10,0	0,0	2,0	0,0	1,0	0,0	0,0	5,0	1,9
DOWNSTREAM MARKET & CUSTOMER IMPACT	50	4,12	4,06	6,49	2,68	3,35	2,12	1,94	2,74	3,05	3,35	6,10	2,29	5,58	6,23	5,86	4,00
Quantitative:																	
Compliance with Electricity Directive	11,8	10	10	10	10	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Degree of market opening	11,8	3,5	3,5	10	3	5,4	3,0	3,0	4,5	4,5	3,3	10,0	3,0	10,0	10,0	10,0	5,8
Market share of largest supplier	11,8	7,3	10,0	8,9	0,0	7,3	0,0	0,0	2,7	3,1	8,1	10,0	0,0	10,0	10,0	10,0	5,8
Market share of three largest suppliers	11,8	9,5	10,0	10,0	0,0	1,2	0,0	0,0	2,0	0,0	2,6	10,0	0,0	10,0	10,0	10,0	5,0
Industrial customers switching	11,8	1,0	1,0	2,0	0,0	1,0	1,0	1,0	1,0	1,0	2,0	1,0	1,0	0,5	2,0	5,0	1,4
Domestic customers switching	11,8	0,0	0,0	1,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	2,0	4,8	0,6
Change in industrial consumer prices	8,82	1,2	0,0	7,3	1,4	0,0	1,1	0,0	0,0	2,1	0,0	6,4	0,3	0,8	5,3	0,0	1,7
Change in domestic consumer prices	8,82	0,4	0,0	3,5	5,0	1,4	0,9	0,0	0,7	1,0	0,0	1,5	0,3	0,5	0,0	0,0	1,0
European rank in prices	5,88	5	0	10	10	5,0	5,0	0,0	0,0	10,0	0,0	10,0	5,0	5,0	10,0	0,0	5,0
Qualitative:																	
New entry to the supply market	5,88	0	0	0	0	0,0	0,0	5,0	5,0	0,0	5,0	0,0	5,0	5,0	0,0	0,0	1,7

APPENDIX 6-3: Weighted Scores of Competition Indicators and Overall Competition Scores for EU-15 (2001)

	Weighting Factor	BELGIUM	DENMARK	GERMANY	GREECE	SPAIN	FRANCE	IRELAND	ITALY	LUXEMBOURG	NETHERL.	AUSTRIA	PORTUGAL	FINLAND	SWEDEN	UK	AVERAGE
MARKET COMPETITION		3,55	5,24	5,88	1,73	4,83	3,18	2,46	5,57	2,92	5,84	6,45	2,55	6,50	6,73	7,69	4,74
UPSTREAM AND WHOLESALE MARKET	50	1,96	6,24	6,36	1,88	5,88	4,23	1,88	6,92	2,13	6,98	6,50	3,35	7,71	5,45	8,00	5,03
Quantitative:																	
Compliance with Electricity Directive	18,8	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Market Share of largest upstream generator	18,8	0,0	7,5	8,7	0,0	6,6	0,0	0,0	6,4	0,0	10,0	8,3	3,4	10,0	5,7	10,0	5,1
Market share of three largest generators	18,8	0,5	5,8	5,2	0,0	3,4	1,2	0,0	7,2	0,0	7,2	6,4	3,2	9,8	3,3	10,0	4,2
Existence of wholesale market	18,8	0,0	10,0	10,0	0,0	10,0	10,0	0,0	0,0	0,0	10,0	10,0	0,0	10,0	10,0	10,0	6,0
Qualitative:																	
New entry in generation/production	25	0,0	0,0	0,0	0,0	1,0	1,0	0,0	10,0	1,0	0,0	0,0	1,0	1,0	0,0	2,0	1,1
DOWNSTREAM MARKET & CUSTOMER IMPACT	50	5,15	4,25	5,39	1,58	3,78	2,14	3,05	4,22	3,72	4,71	6,40	1,76	5,29	8,01	7,38	4,46
Quantitative:																	
Compliance with Electricity Directive	11,8	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Degree of market opening	11,8	5,2	3,5	10,0	3,4	5,5	3,0	4,0	4,5	5,7	6,3	10,0	4,5	10,0	10,0	10,0	6,4
Market share of largest supplier	11,8	7,6	10,0	8,5	0,0	7,3	0,0	0,4	3,6	3,3	8,7	10,0	0,0	10,0	10,0	10,0	6,0
Market share of three largest suppliers	11,8	9,8	10,0	9,4	0,0	1,6	0,8	0,6	1,4	0,0	4,0	10,0	0,0	10,0	9,6	9,4	5,1
Industrial customers switching	11,8	0,5	2,6	3,0	0,0	3,8	1,2	10,0	3,0	1,6	3,0	1,7	0,5	3,3	10,0	10,0	3,6
Domestic customers switching	11,8	0,0	0,0	1,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	1,2	6,0	10,0	1,2
Change in industrial consumer prices	8,82	6,2	0,0	1,3	0,0	0,0	0,6	0,0	10,0	4,7	0,4	10,0	0,0	0,6	10,0	0,4	2,9
Change in domestic consumer prices	8,82	0,0	0,0	0,0	0,0	2,0	0,4	0,0	1,2	0,0	3,7	0,2	0,0	0,0	0,0	0,8	0,6
European rank in prices	5,88	10,0	0,0	5,0	0,0	5,0	5,0	0,0	10,0	5,0	10,0	10,0	0,0	0,0	10,0	5,0	5,0
Qualitative:																	
New entry to the supply market	5,88	2,0	0,0	0,0	0,0	0,0	0,0	2,0	0,0	10,0	0,0	0,0	0,0	0,0	0,0	0,0	0,9

APPENDIX 7-1: Raw Data for Electricity Market Competition Indicators Scoring for NEs & CCs (1999)

	BULGARIA	CYPRUS	CZECH REPUBLIC	ESTONIA	HUNGARY	LATVIA	LITHUANIA	MALTA	POLAND	ROMANIA	SLOVAK REPUBLIC	SLOVENIA	TURKEY	AVERAGE
UPSTREAM (GENERATION) AND WHOLESALE MARKET														
Quantitative:														
Market Share of largest upstream generator (%)	78,0 ¹	100	71,0	93,0	38,9	96,5	73,7	100	20,8	85,0 ²	83,6	75,0 ²	8,7	71,1
Market share of three largest generators (%)	80,0 ³	100	75,0 ⁴	97,0 ⁵	73,2	100	87,9	100	36,5	94,8	95,0 ²	88	23,4	80,8
Qualitative:														
New entry in generation	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)														
Quantitative:														
Degree of market opening (%)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Market share of largest supplier	28,0 ²	99,7	18,0 ²	91,0	27,1	100	100	100	11,3	100	29,5	35,0 ²	14,5	58,0
Market share of three largest suppliers	65,0 ²	100	46,0 ²	97,0 ⁷	65,2	100	100	100	21,8	100	79,5	65,0	29,5	74,5
Qualitative:														
New entry to the supply market	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0 ⁶	0

ND: No data is available in any source

Source is Eurostat (2003) unless otherwise stated.

1 Aggregated share of companies producing at least 5%

2 Estimation (Based on the share of largest or that of the three largest producers or suppliers of which data is available. If data is not available for any of these, estimation is then based on data of 2001)

3 Estimation (For 5 generating companies producing at least 5% of national net electricity)

4 Estimation (Share of the largest is 71%. A 75% share is estimated for the three largest because there are 21 companies, totally)

5 Estimation (Share of the largest is 93%. A 97% share is estimated for the three largest)

6 Estimation (The number of new entrants is calculated by subtracting the present and the previous year's entrants. Yet no data is available for 1998)

7 Largest two

APPENDIX 7-2: Raw Data for Electricity Market Competition Indicators Scoring for NEs & CCs (2000)

	BULGARIA	CYPRUS	CZECH REPUBLIC	ESTONIA	HUNGARY	LATVIA	LITHUANIA	MALTA	POLAND	ROMANIA	SLOVAK REPUBLIC	SLOVENIA	TURKEY	AVERAGE
UPSTREAM (GENERATION) AND WHOLESALE MARKET														
Quantitative:														
Market Share of largest upstream generator (%)	58,0 ¹	100	69,2	91,0	41,3	95,8	72,8	100	19,5	85,0 ²	85,1	75,0 ²	8,4	69,3
Market share of three largest generators (%)	61,0 ³	100	77,0 ³	98,0 ³	72,9	100	86,9	100	34,9	95,7	90,0 ³	86,0	23,1	78,9
Qualitative:														
New entry in generation	-6	0	0	0	1	0	0	0	1	1	-1	0	3	0
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)														
Quantitative:														
Degree of market opening (%)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Market share of largest supplier (%)	25,0 ²	99,6	16,0 ²	90,0	27,3	100	100	100	11,3	100	30,1	35,0 ²	14,5	57,6
Market share of three largest suppliers (%)	60,0 ⁴	100	40,0 ²	95,0 ⁵	65,3	100	100	100	22,1	100	80,1	65,0	30,3	73,7
Qualitative:														
New entry to the supply market	0 ⁶	0	0 ⁶	0	0	0	0	0	63	0	0	0	0	5

ND: No data is available in any source

Source is Eurostat (2003) unless otherwise stated.

1 Aggregated share of companies producing at least 5%

2 Estimation (Based on the share of largest or that of the three largest producers or suppliers for which data is available. If data is not available for any of these, estimation is then based on data of 2001)

3 European Commission (2003). Second Benchmarking Report on the Implementation of the Internal Electricity and Gas Market. Brussels, 7.4.2003, EC(2003) 448.

4 Estimation (64,5% is given for top four suppliers)

5 Largest two

6 Estimation (The number of new entrants is calculated by subtracting the number of present and the previous year's entrants. Yet no data is available for 1999)

APPENDIX 7-3: Raw Data for Electricity Market Competition Indicators Scoring for NEs & CCs (2001)

	BULGARIA	CYPRUS	CZECH REPUBLIC	ESTONIA	HUNGARY	LATVIA	LITHUANIA	MALTA	POLAND	ROMANIA	SLOVAK REPUBLIC	SLOVENIA	TURKEY	AVERAGE
UPSTREAM (GENERATION) AND WHOLESALE MARKET														
Quantitative:														
Market Share of largest upstream generator (%)	83,5 ¹	100	69,9	90,0	39,5	95,0	77,1	100	19,8	85,0 ²	84,5	75,0 ²	10,2	71,5
Market share of three largest generators (%)	86,0 ³	100	70,0 ⁴	97,0 ⁵	69,5	100	89,2	100	43,5	95,0 ⁶	95,0 ²	85,0	26,0	81,2
Qualitative:														
New entry in generation	-20	0	0	0	3	0	0	0	-5	2	1	0	-2	-2
DOWNSTREAM MARKET AND CUSTOMER IMPACT (RETAILING)														
Quantitative:														
Degree of market opening (%)	15	0	30	10	35	11	21	0	51	33	41	64	23	25,7
Market share of largest supplier (%)	23,0 ²	100	16,7	91,0	27,8	100	100	100	9,9	90,0 ²	29,3	35,0 ²	14,3	56,7
Market share of three largest suppliers (%)	58,0 ⁷	100	43,8	96,0 ⁵	65,7	100	100	100	20,8	100	76,8	64,0	30,1	73,5
Qualitative:														
New entry to the supply market	0	0	0 ²	-12	0	0	0	0	29	1	3	0	0	2

Source is Eurostat (2003) unless otherwise stated.

1 Aggregated share of companies producing at least 5%

2 Estimation (Based on the share of largest or that of the three largest producers or suppliers of which data is available.

3 Estimation (For 5 generating companies producing at least 5% of national net electricity)

4 Estimation (Share of the largest is 69.9%. A 70% share is estimated for the three largest because there are 21 companies, totally)

5 Largest two

6 Estimation (Share of largest two is 88.1%)

7 Estimation (Share of top 4 is 62.8%)

APPENDIX 8-1: Weighted Scores of Competition Indicators and Overall Competition Scores for Nes & CCs (1999)

	Weighting Factor	BULGARIA	CYPRUS	CZECH REPUBLIC	ESTONIA	HUNGARY	LATVIA	LITHUANIA	MALTA	POLAND	ROMANIA	SLOVAK REPUBLIC	SLOVENIA	TURKEY	AVERAGE
MARKET COMPETITION SCORE		3,01	0,00	3,86	0,18	4,30	0,00	0,53	0,00	5,86	0,16	2,05	2,67	5,86	2,19
UPSTREAM (GENERATION) AND WHOLESALE MARKET	50	1,31	0,00	1,99	0,18	3,85	0,00	1,07	0,00	6,00	0,31	0,30	0,99	6,00	1,69
Quantitative:															
Market Share of largest upstream generator	30	0,4	0,0	1,6	0,0	7,5	0,0	1,1	0,0	10,0	0,0	0,0	0,9	10,0	2,4
Market share of three largest generators	30	4,0	0,0	5,0	0,6	5,4	0,0	2,4	0,0	10,0	1,0	1,0	2,4	10,0	3,2
Qualitative:															
New entry in generation/production	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DOWNSTREAM MARKET & CUSTOMER IMPACT (RETAIL)	50	4,71	0,00	5,72	0,17	4,74	0,00	0,00	0,00	5,72	0,00	3,80	4,34	5,72	2,69
Quantitative:															
Degree of market opening	28,6	0	0	0	0	0	0	0	0	0	0	0	0	0	0,0
Market share of largest supplier	28,6	9,5	0,0	10,0	0,0	9,6	0,0	0,0	0,0	10,0	0,0	9,2	8,2	10,0	5,1
Market share of three largest suppliers	28,6	7,0	0,0	10,0	0,6	7,0	0,0	0,0	0,0	10,0	0,0	4,1	7,0	10,0	4,3
Qualitative:															
New entry to the supply market	14,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 8-2: Weighted Scores of Competition Indicators and Overall Competition Scores for Nes & CCs (2000)

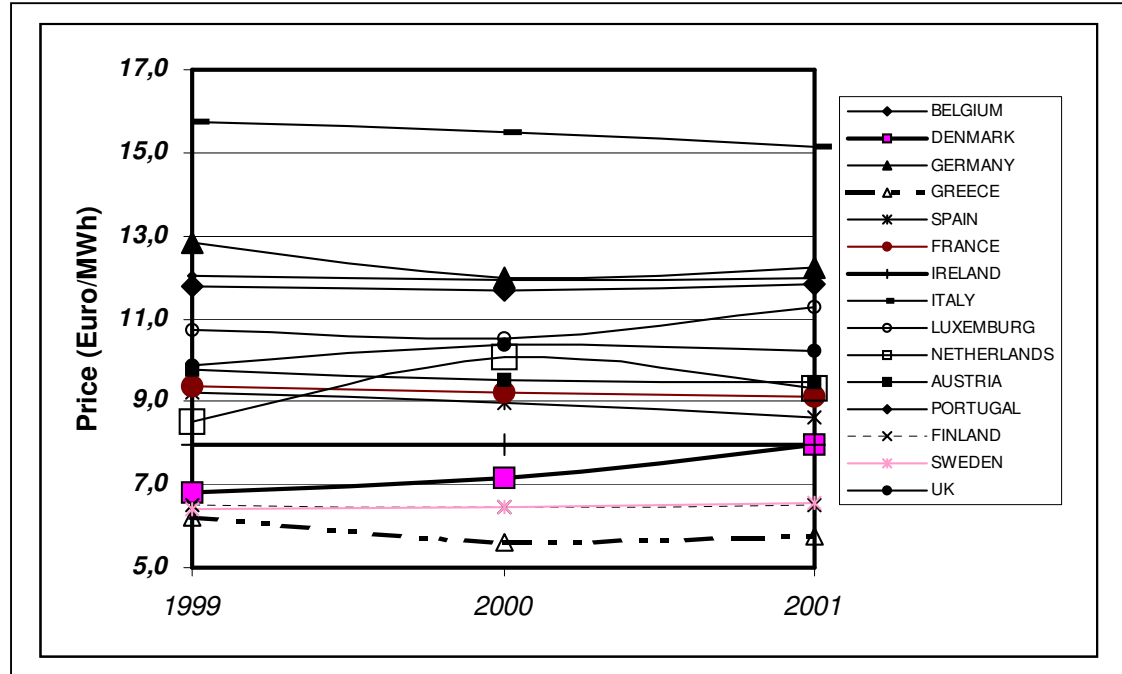
	Weighting Factor	BULGARIA	CYPRUS	CZECH REPUBLIC	ESTONIA	HUNGARY	LATVIA	LITHUANIA	MALTA	POLAND	ROMANIA	SLOVAK REPUBLIC	SLOVENIA	TURKEY	AVERAGE
MARKET COMPETITION SCORE		4,34	0,00	3,84	0,20	4,43	0,00	0,59	0,00	6,77	0,33	2,17	2,73	6,46	2,45
UPSTREAM (GENERATION) AND WHOLESALE MARKET	50	3,54	0,00	1,97	0,12	4,14	0,00	1,18	0,00	6,40	0,66	0,60	1,11	7,20	2,07
Quantitative:															
Market Share of largest upstream generator	30	4,0	0,0	2,0	0,0	7,0	0,0	1,3	0,0	10,0	0,0	0,0	0,9	10,0	2,7
Market share of three largest generators	30	7,8	0,0	4,6	0,4	5,4	0,0	2,6	0,0	10,0	0,9	2,0	2,8	10,0	3,6
Qualitative:															
New entry in generation/production	40	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	1,0	1,0	0,0	0,0	3,0	0
DOWNSTREAM MARKET & CUSTOMER IMPACT (RETAIL)	50	5,15	0,00	5,72	0,29	4,73	0,00	0,00	0,00	7,14	0,00	3,73	4,34	5,72	2,83
Quantitative:															
Degree of market opening	28,6	0	0	0	0	0	0	0	0	0	0	0	0	0	0,0
Market share of largest supplier	28,6	10,0	0,0	10,0	0,0	9,6	0,0	0,0	0,0	10,0	0,0	9,1	8,2	10,0	5,1
Market share of three largest suppliers	28,6	8,0	0,0	10,0	1,0	6,9	0,0	0,0	0,0	10,0	0,0	4,0	7,0	10,0	4,4
Qualitative:															
New entry to the supply market	14,2	0	0	0	0	0	0	0	0	10	0	0	0	0	1

APPENDIX 8-3: Weighted Scores of Competition Indicators and Overall Competition Scores for Nes & CCs (2001)

	Weighting Factor	BULGARIA	CYPRUS	CZECH REPUBLIC	ESTONIA	HUNGARY	LATVIA	LITHUANIA	MALTA	POLAND	ROMANIA	SLOVAK REPUBLIC	SLOVENIA	TURKEY	AVERAGE
MARKET COMPETITION SCORE		3,27	0,00	4,46	0,35	5,46	0,16	0,70	0,00	7,30	1,09	3,13	3,70	6,19	2,75
UPSTREAM (GENERATION) AND WHOLESALE MARKET	50	0,84	0,00	2,35	0,18	5,24	0,00	0,81	0,00	6,00	1,10	0,70	1,17	6,00	1,88
Quantitative:															
Market Share of largest upstream generator	30	0,0	0,0	1,8	0,0	7,4	0,0	0,5	0,0	10,0	0,0	0,0	0,9	10,0	2,4
Market share of three largest generators	30	2,8	0,0	6,0	0,6	6,1	0,0	2,2	0,0	10,0	1,0	1,0	3,0	10,0	3,3
Qualitative:															
New entry in generation/production	40	0,0	0,0	0,0	0,0	3,0	0,0	0,0	0,0	0,0	2,0	1,0	0,0	0,0	0
DOWNSTREAM MARKET & CUSTOMER IMPACT (RETAIL)	50	5,69	0,00	6,58	0,51	5,68	0,31	0,60	0,00	8,60	1,09	5,56	6,23	6,38	3,63
Quantitative:															
Degree of market opening	28,6	1,5	0	3	1	3,5	1,1	2,1	0	5,1	3,3	4,1	6,4	2,3	2,6
Market share of largest supplier	28,6	10,0	0,0	10,0	0,0	9,5	0,0	0,0	0,0	10,0	0,0	9,2	8,2	10,0	5,1
Market share of three largest suppliers	28,6	8,4	0,0	10,0	0,8	6,9	0,0	0,0	0,0	10,0	0,0	4,6	7,2	10,0	4,5
Qualitative:															
New entry to the supply market	14,2	0	0	0	0	0	0	0	0	10	1	3	0	0	1

APPENDIX 9-1: Domestic Electricity Prices in the EU-15 (Euro/MWh)

	Domestic Prices (Eurostat Category Dc) Euro/MWh		
	1999	2000	2001
BELGIUM	11,80	11,70	11,84
DENMARK	6,80	7,17	7,98
GERMANY	12,86	11,96	12,24
GREECE	6,22	5,59	5,74
SPAIN	9,22	8,95	8,59
FRANCE	9,39	9,21	9,14
IRELAND	7,95	7,95	7,95
ITALY	15,74	15,51	15,15
LUXEMBOURG	10,74	10,52	11,30
NETHERLANDS	8,50	10,07	9,33
AUSTRIA	9,79	9,51	9,46
PORTUGAL	12,01	11,94	12,00
FINLAND	6,51	6,45	6,52
SWEDEN	6,39	6,45	6,56
UK	9,86	10,39	10,22
AVERAGE	9,58	9,56	9,60
LARGEST DIFFERENCE	9,53	9,92	9,41



Source: Eurostat (2003)

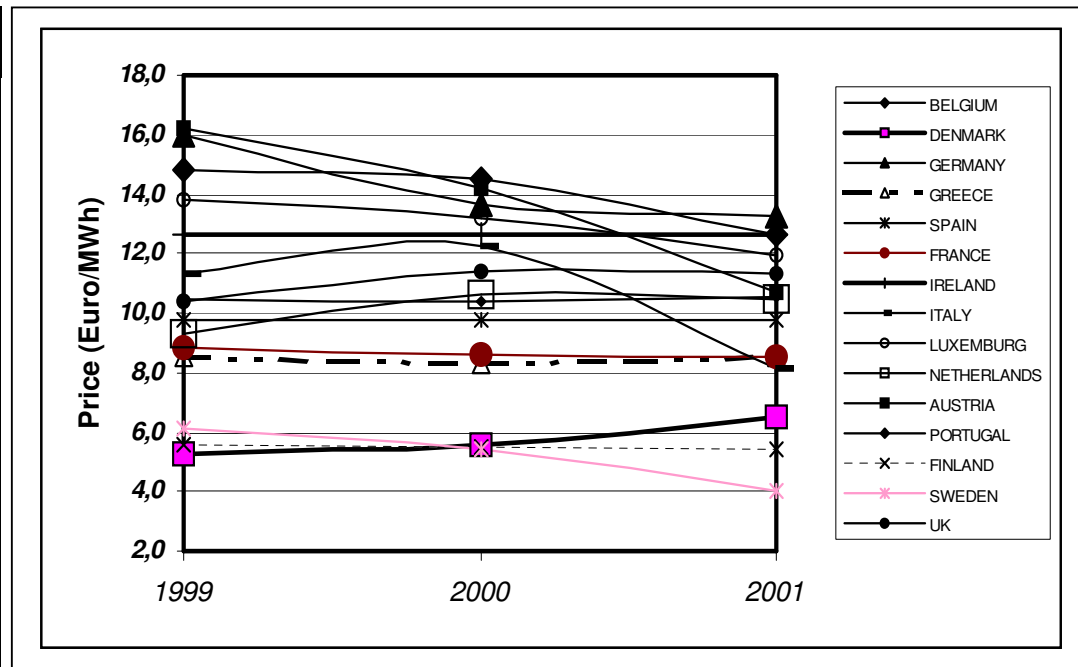
Dc: Eurostat category of domestic prices for 3500 kilowatt hour consumption annually

MWh: Megawatt hour

APPENDIX 9-2: Industrial Electricity Prices in the EU-15 (Euro/MWh)

120

	Industrial (Eurostat Category Ib) Euro/MWh		
	1999	2000	2001
BELGIUM	14,82	14,47	12,67
DENMARK	5,27	5,57	6,47
GERMANY	15,98	13,64	13,29
GREECE	8,56	8,32	8,55
SPAIN	9,77	9,77	9,77
FRANCE	8,83	8,63	8,54
IRELAND	12,62	12,62	12,62
ITALY	11,32	12,25	8,16
LUXEMBURG	13,79	13,21	11,98
NETHERLANDS	9,32	10,59	10,50
AUSTRIA	16,24	14,16	10,67
PORTUGAL	10,45	10,39	10,52
FINLAND	5,55	5,46	5,39
SWEDEN	6,10	5,46	4,06
UK	10,40	11,43	11,33
AVERAGE	10,16	9,94	9,20
LARGEST DIFFERENCE	10,97	9,02	9,23



Source: Eurostat (2003)

Ib: Eurostat category of industrial prices for 50000 kilowatt hour consumption annually

MWh: Megawatt hour

APPENDIX 10: Average Scores of Electricity Market Liberalisation in the EU-15, NEs & CCs

	1999				2000				2001			
	Simple Average	Weighted Average			Simple Average	Weighted Average			Simple Average	Weighted Average		
		Population Based	GDP Based	Combined		Population Based	GDP Based	Combined		Population Based	GDP Based	Combined
EU-15	4,23	4,70	4,76	4,73	4,49	5,00	5,05	5,03	4,74	5,30	5,35	5,33
NEs & CCs	2,19	4,33	4,32	4,33	2,45	4,88	4,85	4,87	2,75	5,10	5,12	5,11

121

NOTE 1. Weighted average scores for the EU-15 are calculated by multiplying the percent contribution of population or GDP of each Member State within the EU-15 by the market competition score of that Member State and summing up the resultant weighted scores of all Member States.

NOTE 2. Weighted average scores for the NEs & CCs are calculated by multiplying the percent contribution of population or GDP of each country within the group by the market competition score of that country and summing up the resultant weighted scores of all countries.

NOTE 3. In calculating the combined weighted scores, population and GDP are assumed to have equal weights.

APPENDIX 11: Population and GDP Data for the Countries

Population, total	1999	2000	2001
<u>Austria</u>	7,992,000	8,012,000	8,032,000
<u>Belgium</u>	10,226,000	10,252,000	10,287,000
<u>Bulgaria</u>	8,211,000	8,170,000	7,913,000
<u>Cyprus</u>	754,000	757,000	761,000
<u>Czech Republic</u>	10,283,000	10,273,000	10,224,000
<u>Denmark</u>	5,319,000	5,340,000	5,359,000
<u>Estonia</u>	1,376,000	1,370,000	1,364,000
<u>Finland</u>	5,165,000	5,172,000	5,188,000
<u>France</u>	58,620,000	58,893,000	59,191,000
<u>Germany</u>	82,087,000	82,210,000	82,333,000
<u>Greece</u>	10,538,000	10,560,000	10,591,000
<u>Hungary</u>	10,068,000	10,024,000	10,187,000
<u>Ireland</u>	3,762,000	3,813,000	3,865,000
<u>Italy</u>	57,646,000	57,690,000	57,705,000
<u>Latvia</u>	2,390,000	2,372,000	2,359,000
<u>Lithuania</u>	3,531,000	3,505,000	3,482,000
<u>Luxembourg</u>	432,000	438,000	440,000
<u>Malta</u>	388,000	390,000	395,000
<u>Netherlands</u>	15,805,000	15,919,000	16,039,000
<u>Poland</u>	38,658,000	38,648,000	38,641,048
<u>Portugal</u>	10,097,000	10,130,000	10,157,000
<u>Romania</u>	22,458,000	22,435,000	22,408,000
<u>Slovak Republic</u>	5,395,000	5,391,000	5,379,000
<u>Slovenia</u>	1,986,000	1,989,000	1,977,000
<u>Spain</u>	40,202,000	40,500,000	40,734,000
<u>Sweden</u>	8,857,000	8,869,000	8,894,000
<u>Turkey</u>	66,293,000	67,420,000	68,529,000
<u>United Kingdom</u>	58,732,000	58,880,000	59,050,000

GDP,PPP (\$)	1999	2000	2001
<u>Austria</u>	212,204,257,280	224,409,485,312	232,100,659,200
<u>Belgium</u>	256,129,761,280	271,009,775,616	280,375,492,608
<u>Bulgaria</u>	46,742,081,536	50,891,468,800	54,055,940,096
<u>Cyprus</u>	12,024,383,488	12,949,783,552	13,813,203,968
<u>Czech Republic</u>	136,084,971,520	143,788,507,136	153,608,142,848
<u>Denmark</u>	146,446,188,544	156,493,611,008	161,657,503,744
<u>Estonia</u>	12,587,445,248	14,080,403,456	15,515,255,808
<u>Finland</u>	121,041,567,744	130,101,231,616	133,240,061,952
<u>France</u>	1,403,410,972,672	1,491,064,979,456	1,559,089,774,592
<u>Germany</u>	2,044,482,027,520	2,143,006,359,552	2,213,102,223,360
<u>Greece</u>	164,401,479,680	175,898,591,232	188,543,188,992
<u>Hungary</u>	118,439,182,336	126,528,503,808	134,492,913,664
<u>Ireland</u>	102,146,129,920	114,773,041,152	125,548,093,440
<u>Italy</u>	1,363,770,474,496	1,438,567,235,584	1,497,860,407,296
<u>Latvia</u>	16,755,648,512	18,062,743,552	19,917,312,000
<u>Lithuania</u>	28,992,126,976	30,550,896,640	33,199,020,032
<u>Luxembourg</u>	20,623,824,896	24,655,079,424	25,860,757,504
<u>Malta</u>	6,233,692,160	7,072,853,504	6,858,706,944
<u>Netherlands</u>	411,858,960,384	430,947,926,016	456,587,706,368
<u>Poland</u>	360,259,846,144	383,972,081,664	408,034,967,552
<u>Portugal</u>	164,548,837,376	175,348,170,752	183,360,389,120
<u>Romania</u>	125,312,376,832	128,217,661,440	138,132,144,128
<u>Slovak Republic</u>	59,065,733,120	61,704,953,856	65,451,028,480
<u>Slovenia</u>	30,901,504,000	33,042,380,800	34,767,822,848
<u>Spain</u>	760,386,093,056	808,572,354,560	852,639,285,248
<u>Sweden</u>	204,629,016,576	217,515,884,544	225,441,185,792
<u>Turkey</u>	383,041,142,784	421,168,283,648	406,510,698,496
<u>United Kingdom</u>	1,389,024,641,024	1,453,971,734,528	1,508,849,876,992

Source: Worldbank, *World Development Indicators Database*, retrieved, September, 11, 2004 from <http://devdata.worldbank.org/dataonline>.