REGIONAL ELECTRICITY MARKETS

IN THE ECT AREA

Energy Charter Secretariat

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FOREWORD

There is growing recognition of the benefits of energy market liberalization and the need to further integrate regional markets in Europe and other parts of the world. The Energy Charter has been advocating greater liberalization and market integration, focusing its recent activities on the electricity and gas markets in Eurasia. In this context, the Energy Charter Conference has mandated the Secretariat to undertake a study of regional electricity markets within the Charter's constituency, focusing on their structures and existing barriers to inter-regional trade in electricity.

This study has been developed to fulfill the above mandate. Its aim is to contribute to an informed debate on how the barriers to trade in electricity can best be reduced or eliminated in order to increase power exchanges and, consequently, stimulate greater integration of Eurasian markets. The work has been carried out under the Secretariat's Work Programmes for 2002 and 2003 and has benefited from extensive discussions in the Group on Trade as well as comments from Member States, Eurelectric and the CIS Electric Power Council.

The study is organized in two parts. The first five chapters discuss the structure of electricity markets in Eurasian countries that are Signatories of the Energy Charter Treaty, the present physical and economic conditions of electricity trade, as well as the potential for future trade based on supply/demand projections. The remaining chapters identify the trade and regulatory measures in these countries that may distort trade in electricity and assess these measures against the relevant WTO/ECT provisions.

The study has been prepared by the Trade and Transit Directorate of the Energy Charter Secretariat, headed by Mr. Leif Ervik. The main authors are Janusz Bielecki and Andras Lakatos for the two parts respectively. Andrew Ellis (from ECON) and Frederik Schutyser (formerly a consultant to the Energy Charter Secretariat) contributed extensive and valuable research assistance.

The study is published under my responsibility as Secretary-General and is without prejudice to the positions of Contracting Parties or to their rights or obligations under the Energy Charter Treaty or the WTO Agreements.

Dr. Ria Kemper
Secretary General

Brussels, October 2003

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List of Abbreviations

AC	Alternating Current
CAPS	Central Asia Power System
CCGT	Combined Cycle Gas Turbine
CDO	Central Dispatch Office
CENTREL	Regional group of four power companies: EPS, a.s. (CZ); Magyar Villamos Művek Rt. (HU); Polskie Sieci Elektroenergetyczne SA (PL); Slovenské elektrárne, a.s. - (SK)
CHP	Combined Heat and Power
CIS	Commonwealth of Independent States
DC	Direct Current
EBRD	European Bank for Reconstruction and Development
EC	European Communities
ECJ	European Court of Justice
ECT	Energy Charter Treaty
EdF	Electricité de France
EEA	European Economic Area
EU	European Union
GATT	General Agreement on Tariffs and Trade
GATS	General Agreement on Trade in Services
GW	Gigawatt
GVA	Gigavolt ampere
GWh	Gigawatt hour
HS	Harmonized Commodity Description and Coding System
HVDC	High-Voltage Direct Current
Hz	Hertz
IEA	International Energy Agency
IPP	Independent Power Plant
kV	Kilovolt
kWh	Kilowatt hour
MFN	Most Favoured Nation
MHz	Megahertz
MVA	Megavolt ampere
MW	Megawatt
MWh	Megawatt hour

NAFTA	North American Free Trade Agreement
NORDEL	Organisation for Nordic Power Co-operation
Nord Pool	Power exchange jointly owned by TSOs from Denmark, Finland, Norway and Sweden
OECD	Organisation for Economic Co-operation and Development
PPMs	Processes and Production Methods
PSO	Public Service Obligation
RES	Renewable Energy Sources
RTA	Regional Trade Agreement
RWE	Rheinisch-Westfälisches Elektrizitätswerk AG
SB	Single Buyer
TBT	Technical Barriers to Trade
TPA	Third Party Access
TSO	Transmission System Operator
TWh	Terawatt hour
UCPTE	Union for the Co-ordination of Production and Transmission of Electricity (now UCTE)
UCTE	The Union for the Co-ordination of Transmission of Electricity (former UCPTE)
UES	Unified Energy Systems of Russia
UPS/IPS	Unified Power System/Interconnected Power System
W	Watt
WCO	World Custom Organisation
WTO	World Trade Organisation

1 Executive summary

This study examines the current structure of the electricity industry in the Eurasian Energy Charter Treaty (ECT) area, focusing on existing and potential trade in electricity. The underlying premise is that there are several benefits of a more liberal trade regime. In general, these include improved security of supply thanks to a more diversified supply portfolio (both geographically and by fuel type) and improved economic efficiency due to the economies of scale. The technical benefits for the electricity sector are lower reserve margin requirements and reduced peak loads in integrated systems, as well as better financial opportunities for environmentally friendly development.

The study notes that current liberalisation of electricity markets has not yet resulted in significant inter-regional trade. Total electricity trade between Eurasian ECT regions remains small, accounting for only 2% of total electricity generation. Most of the trade involves Western Europe, which imports large quantities of electricity from Scandinavia and Central and Southern Europe. These regions in turn import some electricity from Russia. The overall trend is therefore a net flow from East to West.

Generally, trade is not limited by the existing interconnection capacity. Of the 63 giga-volt-ampere (GVA) of installed interconnection capacity between Eurasian ECT regions, an annual average of only 15% was utilised in 2000. Out of more than 37 interconnections only seven were utilised more than 30% of the time. The interconnection capacity is not being used, either because demand has declined and imports are no longer required, or because imports have been curtailed due to non-payment problems with some Commonwealth of Independent States (CIS) countries. Nonetheless, in certain areas the existing interconnection capacity does limit the scope for electricity exchanges. Examples of such bottlenecks are the links between France and some of its neighbours (notably Italy and Spain) or between Russia and the Central Asian republics.

Lack of synchronicity between networks and lack of market access have also had some impact on limiting the utilisation of interconnections. There is a growing awareness, however, of the substantial benefits of greater integration of the networks. This is resulting in a trend towards restoring previously existing, or creating new, synchronous operations. The examples include the creation of the United Central Asia Power System in 1991, the efforts of Southern Europe to join the Union for the Coordination of Transmission of Electricity (UCTE) or the plans of the Baltic States to create an integrated network called the Baltic Ring.

In most cases, electricity trade is associated with the availability of surplus generation capacity, with daily and seasonal variations in demand or with different cost structures. Existing large surplus generation capacities are therefore one of the most important indicators of possible increased physical trade in electricity. Currently, all ECT regions have excess capacity, with more than half of the total located in European Russia and Western Europe. However, projections indicate that this excess capacity may disappear in most ECT regions by 2006-2008 in the absence of substantial investment in existing and new power plants. European Russia may experience the most dramatic change, with the current excess capacity turning into a deficit by around 2005. This reflects the fact that half of the existing thermal capacity in European Russia is beyond its technical life and has to be refurbished.

Price differentials encourage trade, although historically this has not been the major driving force behind electricity transfers. UCTE prices are considerably higher than those in all the other regions, with the lowest prices in the Central Asian republics of Tajikistan, Turkmenistan and Kyrgyzstan. Although companies in countries with lower prices have the incentive to enter markets where prices are higher, such entry requires liberalised and open electricity markets. Liberalised markets and greater network integration could lead to a levelling out of prices between regions as a result of either the actual trade (mostly from East to West) or the possibility of trade. The remaining price differentials between regions would reflect mainly the transportation costs.

This analysis suggests that there is some short to medium term potential for increased electricity trade between Eurasian ECT regions. The existing interconnection capacity is considerably under-utilised and there is spare generating capacity that could facilitate increased electricity trade. In the longer term, excess capacity may decline gradually, thereby providing a constraint to increased trade flows. However, there is likely to be a substantial requirement over the next 15 years for investment in both new and refurbished generation plants. Creating the right climate for these future investments will bring major challenges but will also tend to encourage electricity trade in the long-term, particularly if it is accompanied by increased network integration.

Our analysis reveals that some forms of barriers to trade in electricity (de facto or de jure) exist in virtually all ECT countries. Such barriers range from technical and economic to legal and regulatory. The examples of technical or economic barriers are: lack of interconnections, lack of compatibility between the systems and high transmission losses over long distances. The most prevalent regulatory barriers include: monopolies and exclusive rights, lack of open access to grids, limited consumer choice of suppliers and explicit import restrictions (including those deemed related to environmental protection).

In markets characterized by vertically integrated utilities with exclusive territorial or functional rights, electricity trade is more the matter of decisions by governments or incumbents, rather than by the markets. This is an important consideration because vertical unbundling of monopolies and ownership separation of electricity operators with open access to investment and consumers are preconditions to free electricity trade.

In countries where the liberalization of domestic electricity markets is under way, or even already completed, measures or practices that restrict trade in electricity still remain. They are primarily related to insufficient unbundling or ownership separation. Such measures affect both electricity imports and trade in electricity-related services, and may result in discriminatory treatment of foreign countries.

As concerns network access, removing governmental trade restrictions is necessary, but not sufficient to ensure imports, exports and transit through the territory of third countries. Effective market access for electricity should be secured by pro-competitive rules that ensure non-discriminatory and transparent access conditions to grids, including transparent tariffs that are cost-based.

In order to stimulate future inter-regional trade in electricity, it will be necessary to eliminate or reduce many existing trade and investment barriers. This can be accomplished to a large degree simply through improved compliance with the existing international rules and obligations or through efforts by individual ECT countries to further liberalise their domestic power industries, for instance, by unbundling the incumbent national utilities or establishing independent regulations. The third, most complex and challenging, task would be to create and implement additional rules in the areas that are not at present covered by the existing body of international law. These include, inter alia, rules for third-party access, treatment of foreign companies at the pre-investment stage and internationally accepted environmental standards.

Noting strong public concerns about environmental and safety concerns relating to electricity generation, particularly from nuclear power plants, the study argues nonetheless that the environment-related import restrictions are often ineffective in addressing the stated environmental problems. Moreover, they do not provide incentives for exporting countries to improve their environmental policies.

Rather than using trade measures for environment protection purposes, it would be more constructive to address the negative environmental impacts of electricity generation through enhanced environmental co-operation at regional or global levels. Developing multilateral agreements to combat air pollution or to impose targets for refurbishing nuclear power plants would be in the interest of the global community. The resulting investment in the electricity sectors of the economies in transition could help to improve the safety of nuclear power plants located there, reduce harmful emissions through application of clean-coal technologies and raise thermal efficiency of power plants in general.

Parallel liberalizations of both electricity imports and investment regimes are key elements to better environment protection in countries with large export potential and investment needs. This should include transparent and non-discriminatory treatment of foreign investors both at the pre-entry and post-entry levels. Moreover, greater integration of regional markets and increased trade between these markets are conducive to reducing the equity investment risks in the power sector. Particularly important for this sector are the risks related to electricity prices and availability of customers given that investments in the power plants typically require long lead times, substantial financial commitments and long payback periods.

The study concludes that acceptance of the spirit of the multilateral trading system has far-reaching implications for the way liberalization of East-West electricity trade should proceed. Any future framework for electricity trade between ECT contracting parties should be developed and implemented in accordance with the principles of transparency, non-discrimination and equal participation in the multilateral trading system.

2 Introduction

This study reviews existing trade flows of electricity between ECT Signatories and analyses the potential for increased trade, as well as the necessary physical infrastructure and the economic and regulatory conditions. In particular, it evaluates the driving forces for such increased trade and identifies potential bottlenecks and trade barriers. In terms of geographical coverage, the study addresses these issues for the ECT area, with particular emphasis on those regional markets that are parts of interconnected systems in Eurasia.

Chapters 3 to 5 analyse economic aspects of regional electricity markets within the ECT area and electricity trade flows between these markets. The key issues considered are: the extent of current inter-regional electricity trade, the economic/physical factors limiting this trade, and the potential scope for inter-regional trade until the year 2020. More specifically, this part describes the existing electricity infrastructure, delineates key regional systems and markets, and quantifies the current extent of inter-regional trade vis-à-vis the inter-connector capacity. It also develops projections for regional energy supply/demand balances and estimates of the potential scope for inter-regional trade until 2020. The availability of spare generation and transmission capacity and the price differentials are identified and used to assess where and to what extent trade could increase.

Chapters 6 to 9 are devoted to reviewing existing trade policy and domestic regulatory measures affecting electricity trade in the ECT area. Trade barriers are identified as per policy instruments (e.g. customs duties, import restrictions or state-trading practices) and are exemplified by the ECT countries' practices. It needs to be noted that this study does not cover every existing barrier in every ECT country. Such an exhaustive screening of laws, regulations or administrative decisions would require more time and resources and greater availability of data. Instead, the paper provides only some examples of how selected barriers are applied in certain countries. This implies that the analysis should not be used for assessments of the overall trade-restrictiveness of the policies of any ECT country, or for cross-country comparison for any type of measure.

Chapter 10 summarizes the main conclusions of the analysis of regulatory barriers to trade and comments on future directions for the process of liberalizing trade in this sector.

3 Structure of electricity markets in the Eurasian ECT area

3.1 The nature of electricity

In physical terms, electricity is a form of external energy, i.e. directionally oriented motion energy or multidirectional energy, that can theoretically be entirely converted to directional energy in simple one-step mechanisms. Electrical energy is therefore the ability to do work sometime in the future (work being a force acting over a distance). Electrical energy is measured in joules (J), but some other units are also in general use (i.e. calories or British Thermal Units). The rate at which electricity works (i.e. the flow of power) is measured in watts (W), multiples of watt, such as kW (kilowatt, or one thousand watts), megawatt (MW, one million watts), or gigawatt (GW equals one billion watts)[1]. The quantity of electricity used over a period of time (mostly to do useful work, but also "used" through loss and dissipation) is measured in watt-hours (Wh) and multiples and fractions thereof, such as kWh, MWh, and GWh.

The ability to create electricity (i.e. "generating capacity") means, therefore, an ability to continuously provide a flow of electric power capable of doing work at a certain rate (watts of power), and, for that reason, is also measured in watts and multiples of watts. The value of electricity depends on the quantity of work that it can do over some period of time. A megawatt (MW) of capacity is worth little if it lasts only a minute, just as a MW of power delivered to an application for only a minute provides little value. But a MW of power or capacity that flows continuously for a year is valuable.

Because of its physical properties, electricity is a special product. Unlike other goods, electricity usually cannot be stored, and its delivery normally requires a network of grids[2] to which all actors of the value-added chain - from production to consumption - are connected at the same time. There is generally no direct physical relationship between a specific generator and a specific customer: once switched on to the pool of power in the grid, the power produced by a certain generator is indistinguishable from the power supplied by any other generator, since it is simply an ability to do work. Electricity is consumed within a tenth of a second of its production and less than a tenth of a second of power can be stored as electrical energy in the system.

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1 A power of one watt is equal to one joule per second, i.e. raising 100 g one meter in 1/10 s would demonstrate a power of just under 10 W.

2 One exception is distributed generation which does not need to rely on grids.

However, demand for electricity varies widely from hour to hour during an individual day and from day to day over the year. Since there is no storage for electricity, generation capacity must go up and down synchronously with power demand, and significant reserve generation capacity (in the form of idle generator sets at power plants) must be set aside to meet peaks in demand. Hence, electricity consumed at a specific point in time must be manufactured in a generating plant virtually contemporaneously with its consumption.

Electricity is the only commodity that is consumed continuously by essentially all customers and whose production always equals consumption. There is no way to curtail an individual customer's consumption when specific generators fail to perform. Since consumers continue to draw power as long as the circuits are closed and they are connected to the network, the aggregate generation of electricity and the consumption of electricity must be balanced continuously for the entire network to meet certain physical constraints (frequency, voltage, stability) on network operations.[3]

These physical properties result in a product with marginal costs of production and delivered costs that fluctuate rapidly. No other product has a delivered cost that fluctuates nearly this rapidly.[4]

3.2 Organisation of Electricity Markets

Trade between generating companies, traders, suppliers, distributors and customers that are directly connected to the transmission system takes place in wholesale markets. Electricity is either traded bilaterally between these market players or in the markets organized by electricity exchanges (pools). Wholesale markets include arrangements both for physical trade (spot markets) and for futures transactions (forward markets), which are purely trades in financial instruments but with a possibility of taking a physical delivery.

For international electricity markets, three models have been developed.[5] Under the *single buyer model,* a central entity purchases electricity from all generators and then resells it. This model, which does not necessarily require unbundling, limits competition. The *open access (third-party) model* has more competitive trading mechanisms. Transmission systems are open to all generators, who can sell directly to distributors or large customers. Currently, most trades continue to take place on the basis of long-term contracts. A precondition for such open access is the effective regulation of network access and, preferably, the unbundling of transmission systems. In other words, functioning cross-border power markets require complementary domestic reforms.

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3 Joskow, P. L.: Deregulation and Regulatory Reform in the U. S. Electric Power Sector, Brookings-AEI Conference on Deregulation in Network Industries, 1999. See also Stoft, S.: Power Economics, IEEE, 2002.

4 Stoft, S. *op. cit.*, 2002.

5 This section draws on Daniel Muller-Jentsch: "The Development of Electricity Markets in the Euro-Mediterranean Area", Recent World Bank Technical Paper No.491, The World Bank, Washington D.C., 2001.

The third type of international power market is the *power pool* or wholesale power exchange. Pools are electricity spot markets, where market clearing takes place at short time intervals (half an hour or one hour). Electricity spot prices are determined after each market clearing. The pool is co-ordinated by the system transmission operator or by an institution that works closely with the system operator. In a "mandatory pool", all electricity must be traded on the central spot market and bilateral contracts for the delivery of electricity are not allowed. In a "voluntary pool", generators and purchasers are free to trade either through the pool on a short-term basis or through long-term bilateral contracts.

The operation of a pool requires a well-developed regulatory framework and institutional structures (e.g. spot and future markets, power traders) as well as a sufficiently large number of generators, ideally of similar size, to permit effective competition.

Balancing and constraints are two problems distinguishing electricity from other tradable goods. They are the reasons why there is always a difference between the contracted and the actual quantities of electricity on the market.

Balancing refers to the requirement that the demand and the supply of electricity have to match at any point in time, while the market cannot respond that fast to changing electricity flows. Since electric power cannot be stored, an electricity network has to be in balance and must be kept in Europe at a standardized frequency (50 kHz) for electricity transport to be possible.

Constraints refer to the fact that not only consumption and production can fluctuate unexpectedly, but that there are also expected or unexpected technical grid constraints and losses (for example in the event of the sudden failure of a power plant or transmission line) which may reduce electricity exchanges.

Keeping balance between electricity production and consumption is achieved by the system operator through primary and secondary regulation, and production or consumption are regulated up or down in the regulation power market on the basis of the frequency. Primary regulation is regulation where the physical balance of the power system is regulated automatically when the frequency deviates from the nominal value. Secondary regulation means manual up-regulation or down-regulation.

To address "balancing" and "constraints" problems the system operator contracts generators and consumers, who are able to change their quantities fast and in a controllable way to provide "regulatory power". Such "regulatory power" allows the system operator to buy "down-regulation" (generators reduce their generation and/or consumers increase their consumption) when supply is too high or to buy "up-regulation" (generators increase their generation and/or consumers reduce their consumption) when the supply is too low.

The regulatory market is a tool that the system operator uses to maintain a stable frequency and a continuous balance between production and consumption of power. Regulatory power must be available at short notice. In Finland, for instance, regulation bids to the regulation power market maintained by the System Operator can be given for all capacity that is capable of carrying out a 10 MW power change within 10 minutes.

The services needed for the proper operation of electric supply and transmission systems are often called ancillary services. They may include black start capability, reactive power, voltage balancing and regulating, spinning reserves (the ability to immediately and automatically increase generation or reduce demand in response to a fall in frequency) and non-spinning reserves, as well as other services. Most of these services are provided by generators or the system operator and some can be provided through auction mechanisms.[6]

Where and how such regulatory power services are purchased depends on the organization of the market:

1. A system operator may contract generators and consumers who are able to change their quantities fast and in a controllable way to provide regulatory power.

2. Where generated power is grouped (in a single buyer system or in a power exchange/pool), it may be technically easier to keep a system in balance.

3. In a pool system (e.g. in Nord Pool), there may also be a separate financial market for balancing power.

In other words, ancillary services[7] in the electricity sector can be provided by market-based arrangements, as distinct from the main power market. Prior to the institution of such arrangements, these services need to be unbundled from the system operator and the major generators.

[6] In Nord Pool, spinning reserve and reactive power are not currently paid for by the grid company in Norway but are simply required to be provided by each major generator. In Sweden, Svenska Kraftnatt pays generators for spinning reserve.

[7] Such services include: performance of frequency control; short-term reserve generation; voltage control; and emergency generation.

3.3 ECT Regions

The focus of this study is on regional ECT markets that are parts of interconnected systems in Eurasia. For the purpose of this study, these regional markets have been divided into ten blocks based on a wide range of factors. The factors include not only the existing level of integration in terms of both trade and technical specifications (i.e. synchronicity), but also the legal status of countries (i.e. European Union (EU) members, EU candidates, non-EU countries). The latter affects relevant legislation and resulting regulatory barriers to trade that are analysed in Chapters 6 to 9 of the study. For this reason, it is useful to distinguish CENTREL[8] as a separate group of EU candidate countries striving to harmonise their legislation with that of EU, even though CENTREL is now fully integrated into UCTE.

Concerning Russia, the study covers only European Russia because parts of the non-European Russia are not well integrated with the European network. The United Energy System (UES) of Siberia operates in parallel (synchronously) with five other UES of Russia: the Centre, the North-West, the Middle Volga, the Northern Caucasus and the Urals whereas the UES of the East operates independently of the UES of Russia. The UES of Siberia is interconnected with the energy system of Mongolia, and electricity from UES of the East is transmitted to the northern regions of China (in the island regime). All Russian data presented in this study refer consistently to European Russia which accounts for almost three quarters of total Russian installed capacity and generation.

In most cases, these regional blocks are integrated electricity systems with limited connections with neighbouring blocks. In some cases, they are synchronous with neighbouring areas [the Unified Power System/Interconnected Power System (UPS/IPS) and UCTE systems)], while in other cases they are separate synchronous systems (NORDEL[9] and CENTREL[10]). Three countries – Ireland, the United Kingdom and Turkey – are not included in any of the blocks because of their limited degree of integration with these blocks. For the purpose of this study, the ten regions defined below will be referred to as the "Eurasian ECT".

[8] Regional group of four power companies: EPS, a.s. (CZ); Magyar Villamos Művek Rt. (HU); Polskie Sieci Elektroenergetyczne SA (PL); Slovenské elektrárne, a.s. (SK).

[9] Organisation for Nordic power co-operation.

[10] CENTREL operates in parallel with the UCTE system and western Denmark is synchronous with the UCTE.

Box 1 **Regional blocks in the Eurasian ECT Area**

- **Baltic States:** Estonia, Latvia, Lithuania
- **Bulgaria & Romania:** Bulgaria, Romania
- **Transcaucasus:** Armenia, Azerbaijan, Georgia
- **Central Asia:** Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
- **CENTREL:** Czech Republic, Hungary, Poland, Slovak Republic
- **Eastern Europe:** Belarus, Moldova, Ukraine
- **NORDEL:** Denmark, Finland, Norway, Sweden
- **European Russia:** Central, Middle Volga, North Caucasus, North West, Urals
- **Southern Europe:** Bosnia & Herzegovina, Croatia, Macedonia, Slovenia, Yugoslavia (Serbia & Montenegro)[11]
- **Western European UCTE:** Austria, Belgium, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, Spain, Switzerland.

Figure 1 **Map of Eurasian ECT Regions**

1	**UCTE**	**5**	**CENTREL**	**9**	**Transcaucasus**
2	**NORDEL**	**6**	**Eastern Europe**	**10**	**Central Asia**
3	**European Russia**	**7**	**Southern Europe**		
4	**Baltic States**	**8**	**Bulgaria & Romania**		

[11] This region also encompasses Albania which was not covered in the analysis of supply/demand balances due to the small size of its power market (production of only 3.6 TWh and consumption of 5.3 TWh in 2001), limited interconnections with other countries (one 400 kV line with Greece and two 220 kV lines with FYROM) and limited availability of data. However, this country was included in the analysis of trade barriers in chapters 8 and 9.

3.4 Overview of physical infrastructure

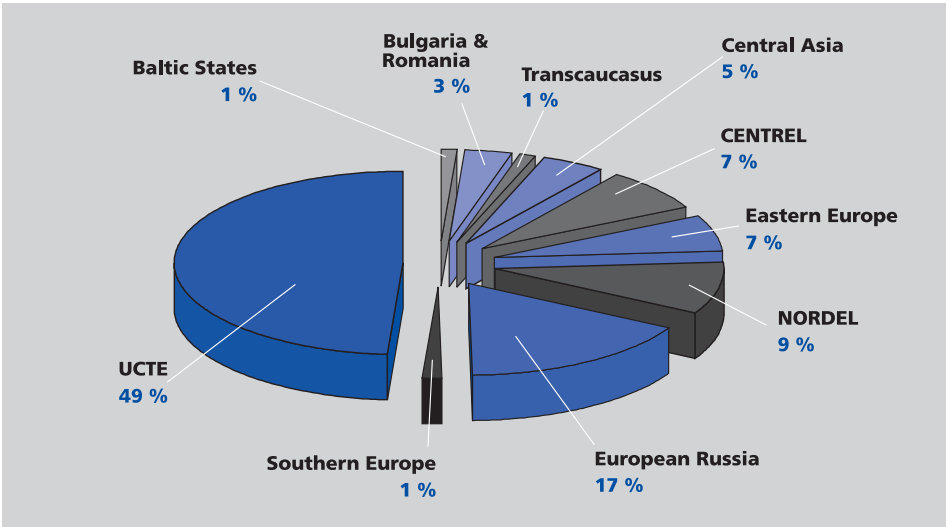
The ECT area covered by this study has an installed generating capacity of just over 890 GW, which represents almost 30% of the world's installed capacity. Table 1 shows the structure of installed capacity both by region and by type of generation capacity. Table 1 and Figure 2 show that the UCTE has by far the largest amount of installed capacity, accounting for almost half of the ECT total. European Russia is the second largest, followed by NORDEL, CENTREL and Eastern Europe, all with similar shares in the total.

Table 1 **Installed generating capacity of Eurasian ECT (2000)**

MW	Hydro	Nuclear	Thermal	TOTAL
Baltic States	2 418	2 500	4 140	9 058
Bulgaria & Romania	8 602	4 248	16 651	29 501
Transcaucasus	2 901	376	6 616	9 893
Central Asia	11 028	0	30 309	41 337
CENTREL	4 803	6 160	55 339	66 302
Eastern Europe	4 840	11 262	42 017	58 119
NORDEL	46 756	11 492	22 255	80 503
European Russia	13 476	19 799	116 623	149 898
Southern Europe	4 903	632	5 617	11 152
UCTE	105 125	101 024	230 533	436 682
TOTAL	**204 852**	**157 493**	**530 100**	**892 445**

Source: UCTE, CDO, CENTREL, NORDEL National sources

Figure 2 **Regional breakdown of total installed capacity (2000)**



The UCTE accounts for more than half of the installed hydro capacity, followed by NORDEL (24% of the total) and the Central Asian republics (5%). The UCTE accounts for 64% of the total nuclear capacity, with Russia accounting for a further 13%. NORDEL and Eastern Europe are the next largest nuclear regions and have similar levels of installed capacity (just over 11 GW). As far as thermal capacity is concerned, the UCTE is less dominant, although it still accounts for 44% of the Eurasian ECT total, ahead of European Russia (22%) and CENTREL (10%).

Figure 3 **Structure of total installed capacity for Eurasian ECT (2000)**

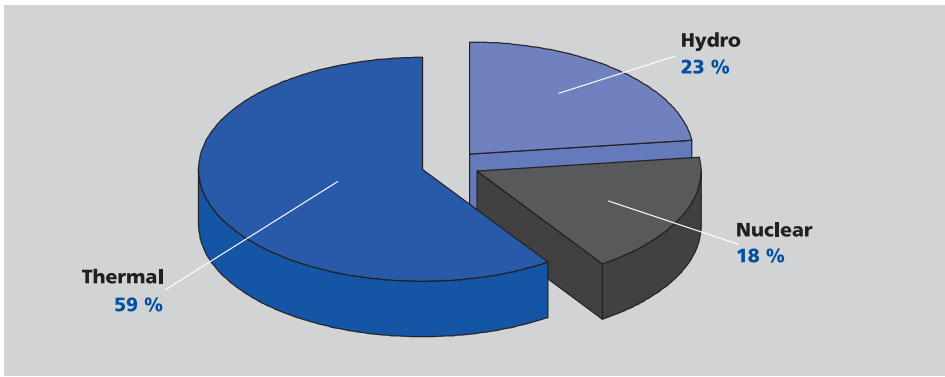


Figure 3 shows the shares of thermal, hydro and nuclear energy in the total installed capacity for the Eurasian ECT region as a whole. In almost all of the individual regions, thermal capacity represents at least 50% of the installed capacity and is as high as 83% in CENTREL. The exceptions are the Baltic republics, where thermal capacity represents 46% of the installed capacity, and NORDEL, where it accounts for just over a quarter of the total. Hydropower dominates the capacity in NORDEL, while in the Baltics the bulk of the installed capacity is split evenly between hydro and nuclear. The Central Asian region has no nuclear capacity, while the Baltic and UCTE regions are the most nuclear-intensive.

The Eurasian ECT region as a whole has a total of around 0.5 million kilometres (km) of transmission capacity (220 Kilovolt (kV) and above). Almost two-thirds of this length of transmission capacity is located in the UCTE and European Russia combined. In terms of the transmission capacity between the ten regions, there is a total of just over 60 megavolt ampere (MVA) which represents less than 10% of the total installed capacity for all the regions.

3.5 Regional electricity systems

The post World War II political divide between Eastern and Western Europe was also manifested in the separation of the electricity networks. The Unified Power System/ Interconnected Power System (UPS/IPS) comprised the countries in the former Eastern bloc, and the Union for the Co-ordination of Production and Transmission of Electricity (UCPTE) comprised most of those in Western Europe. In 1999, UCPTE changed the name and the scope of activity to Union for Co-ordination of Transmission of Electricity (UCTE). The UPS/IPS and UCPTE systems operated at the same frequency (50 Hertz (Hz), but they were not synchronous. The UPS/IPS system also had a wider frequency range than the UCPTE.

The end of the political separation has led to a movement towards greater integration of the Eastern and Western networks despite the fact that in the meantime the UPS/ IPS networks have been broken down into a number of regional systems. In 1998-1999, the power association of the Commonwealth of Independent States (CIS) got divided into a number of separately operating parts. In June 2000, the parallel operation of the UES of Russia and the northern part of the energy system of Kazakhstan was restored. In September 2000, the interconnection of the energy systems of the Kyrgyz Republic, the Republic of Tajikistan, Turkmenistan, the Republic of Uzbekistan and the southern part of the Republic of Kazakhstan, that had previously operated within the Central Asia United Energy System, was carried out for the first time for parallel operation with the UES of the CIS. In August 2001, the energy systems of Ukraine and Moldova joined the CIS power association for parallel operation. Thus, since autumn 2001 the energy systems of 11 CIS states operate in parallel within the power association of the Commonwealth states.

The most recent development is the preparation for parallel operation of the energy systems of the CIS and the Baltic states with the power association of the countries of the Western, Central and Southeast Europe (TESIS). This task was defined as the major strategic aim of the CIS Electricity Council which coordinates the CIS interstate relations in the electricity field. This task may be achieved through the operation of 11 existing 220-270 kV high-voltage transmission lines between the CIS and Eastern European States. The joint synchronous operation of the UCTE and CIS countries' power association through the existing interconnections could yield significant fuel saving and cost reductions for peak generating capacity. The Protocols signed by the Presidents of the CIS Electricity Council and EURELECTRIC envisage active work of the parties on practical implementation of the power systems' integration. Subsequently, two joint working groups have been established; one on electricity markets and the other one on environmental issues. The results of their work will be discussed in late 2003.

The NORDEL system developed independently from the UCPTE due to the high costs of sub-sea cables to connect the two systems. For the same reason, the UK networks operate in parallel to, but independently from, the UCPTE.

A number of countries in Southern Europe are now actively seeking membership of the UCTE in order to benefit from greater integration. A proposal for the creation of a regional electricity market in South East Europe (SEE) was brought forward in March 2002. By November 2002, a Memorandum of Understanding ("The Athens Memorandum") was signed at the Athens Ministerial by all the countries, with the Commission and the Stability Pact[12] acting as sponsors. The Athens Energy Regulation Forum comprises representatives of the Commission, governments, regulators and transmission system operators in Southeast Europe[13], the Council of European Energy Regulators (CEER), the European Transmission System Operators (ETSO), UCTE, representatives of donors, electricity producing companies, and consumers. The countries of the region made commitments to start opening their electricity markets by 2005, and to create Regulatory Bodies and Transmission System Operators by June 2003 and Distribution System Operators by January 2005. Eventually, the Regional Electricity Market will be integrated with the EU's Internal Electricity Market.

In Eastern Europe, the Baltics, the Transcaucasian region and Central Asia, a similar awareness of the benefits of integration is driving a move towards restoring synchronous operations.

In addition, the following network developments have occurred:

- CENTREL has been formed by the Central European countries of the Czech Republic, Hungary, the Slovak Republic and Poland. The objective of the CENTREL Group power system to be fully integrated into the UCTE system was achieved in October 1995. Since May 2001, four TSOs from CENTREL Group countries (CEPS, MVM Rt., PSE S.A. and SEPS) have become full members of UCTE. Power companies of the CENTREL system are members of UCTE.

- The Bulgarian and Romanian power system operates in parallel mode with that of Albania and the UCTE members (Greece and Yugoslavia). Bulgaria is working towards achieving the technical requirements to become a full member of the UCTE. The Romanian network also continues to prepare for integration with the UCTE under the auspices of the UCTE/Romania/Bulgaria Technical Committee. The Bulgarian and Romanian systems have delimited their networks from those of Moldova and Ukraine (excluding the Burstin Island) and are now testing the interconnections with UCTE's second synchronized zone.

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[12] The Stability Pact for South East Europe is an institution set up to create the political conditions for effective international assistance to the region by coordinating donors and presenting plans to the countries of the region; it is headed by Dr. Erhard Busek.

[13] The present signatories as of (May 2003) are Albania, Bosnia and Herzegovina, Serbia and Montenegro, Bulgaria, FYR of Macedonia, Greece, Italy, Turkey, Croatia, Romania and Kosovo (signatory pursuant to UN Resolution 1244). Observers include Moldova, Slovenia, Austria, and Hungary.

- In Southern Europe[14], prior to its dissolution in the early 1990s, the former Yugoslavia had a single electricity grid which operated in parallel with the Western European UCTE. The situation today is that Croatia, Slovenia, and Bosnia and Herzegovina have been partly reconnected to the Southern Europe, which now operates synchronously with the Western UCTE[15].

- The CIS countries of Belarus, Moldova and Ukraine (excluding the Burstin Island) function in parallel with other CIS countries.

- The power system of Hungary is linked to the UCTE system through Austria, Slovakia and Croatia. A future connection with Slovenia is contemplated. A high-voltage (750 kV) link with Ukraine is now disconnected. A 400 kV line and a double 220 kV line also exist. Further 400 kV links exist with Yugoslavia and Romania. These systems belong to the second synchronized zone of UCTE which is expected to be synchronized with the first zone of UCTE by 2004.

- Russia's far eastern regions are effectively isolated from the rest of the country, and much of Siberia is served by isolated networks. However, southern Siberia and western Russia are integrated and trade with neighbouring blocks.

- The United Central Asia Power System (CAPS) which covers the power systems of Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan, had been in existence until the collapse of the Soviet Union in 1991. After its subsequent break-up, the system was restored through a special arrangement concluded in 1997.

- The Transcaucasian Interconnected Power System has been reconstituted and comprises the power systems of Armenia, Azerbaijan and Georgia.

The UCTE is generally setting the standards that the rest of Europe is seeking to meet. The main requirements of the UCTE concern the level of network security and the primary and secondary controls. Under the UCTE rules, the electricity networks must be dimensioned at least in accordance with the N-1 criterion. That means that networks should be able to cope with an outage from the largest generating unit on the network, or from the largest injection of power from another transmission network, without exceeding the criteria operating frequency. The network frequency on the UCTE network is set at a frequency of 50 Hz, with deviations of ±50 Milihertz (mHz) considered compatible with normal operating conditions. Deviations of between 50 and 150 mHz are considered to impair operations, but do not pose any major risk. However, deviations greater than 150 mHz are considered to severely impair the system and represent a significant risk.

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[14] Countries of this region are members of UCTE and SUDEL (Regional Group for the Co-ordination of Electricity Transmission in the South-East European Interconnected Systems) which is not distinguished as a separate region in this report.

[15] Croatia and Slovenia are now full members of UCTE.

Primary controls on the UCTE system involve ensuring the availability of adequate spinning reserve (that is, capacity available instantly from constantly running turbines) and of units that can operate outside the standard power ranges, to cope with problems of system stability. The secondary controls are to ensure that back-up capacity can be brought on-line within 15 minutes of the dispatch order.

3.6 Key players, owners and regulators

3.6.1 Introduction

There is a wide variety of companies active in Eurasian ECT electricity markets, ranging from vast state-owned vertically integrated utilities to small private single plant IPPs. However, there are three very large utilities, Russia's Unified Energy Systems of Russia (UES), France's Electricité de France (EdF) and Italy's Ente Nazionale per L'Energia Elettrica (ENEL), that control over a third of the Eurasian ECT's total installed capacity (333 GW), and a further 17 large companies that account for 30% (274 GW).

The companies in Western European UCTE and in NORDEL have tended to be focused on merger activity in recent years, having privatised a large amount of their electricity sectors in the 1990s. These companies are now focused on coping with the development of competitive, open and integrated electricity markets. This has led to a great deal of merger and acquisition activity between the existing utilities, as companies try to consolidate positions and/or enter new markets.

The other regions within the Eurasian ECT tend to be focused on privatisation of the electricity sector as a way of injecting much needed financial resources into the sector. This is also being accompanied by the structural reforms, the liberalisation of electricity markets and the introduction of competition. In this environment, some of the large integrated utilities are being broken up and smaller, less powerful, private companies created.

3.6.2 Baltic States

The reform of the Lithuanian electricity sector was completed in 2001. AB Lietuvos Energija was reorganised according to the reorganisation plan approved by the Government on 29 October 2001. The company's electricity generating, transmission and distribution activities, as well as non-core activities, were seperated. On 1 January 2002, the newly established joint stock companies *Lietuvos Elektrinè* (Lithuanian power plant), power plant *Mažeikiu Elektrine,* distribution companies *Rytų Skirstomieji Tinklai* (East Electricity Distribution Company) and *Vakarų Skirstomieji Tinklai* (West Electricity Distribution Company) started their activities, while *AB Lietuvos Energija* continues with its activities in the area of electricity transmission.

The privatisation programmes of electricity distribution companies is to be implemented during 2003. After the privatisation, the state should own 34% of shares in these companies.

Esti Energia is a state-owned utility that accounts for almost all of Estonia's electricity sales. The sector is now being restructured ahead of Estonia's accession to the EU. A new company, Narva Power, was formed out of the two largest power stations in Estonia with the intention of partial privatisation. Esti Energia at one time was contemplating a merger with Latvia's Latvenergo, but talks broke down in August 2000. State-owned Latvenergo is responsible for generation, transmission and distribution in Latvia. There are plans to partially privatise Latvenergo's generation assets and to unbundle its seven distribution companies.

In Lithuania, the national power utility, Lietuvos Energija (LE), is due to be restructured and privatised. As part of a general liberalisation of the electricity sector, LE is to be split into two generation companies, two distribution companies and a single transmission company.

3.6.3 Bulgaria & Romania

In Bulgaria, the electricity sector was reorganised in 2000 in the wake of the Energy and Energy Efficiency Act (1999). The former National Electricity Company (NEK-EAD) has been broken up into six independent power generators, a national transmission company (Natsionalna Electricheska Kompania - NEK) and seven distribution companies. NEK has been reorganised as a single buyer of electricity from the generators and a single supplier to the distribution companies. NEK also has the monopoly on imports and exports of electricity.

The Romanian power sector was also reformed following the government decision (no.627) of July 2000. Three 100% state-owned utilities have been created: Termoelectrica (thermal generation units), Hidroelectrica (hydro units) and Electrica (distribution). These supplement the existing Nuclearelectric (nuclear generation stations) and Govora IPP. At the same time, the 100% state-owned National Electric Power Transmission Company (Transelectrica) was created to own and operate the transmission network. The Romanian government has also begun to liberalise the power sector and by late 2001 opened up 15% of the market (19 consumers) to competition.

3.6.4 Transcaucasus

Armenergo is the state-owned utility in Armenia. In 2000, the Armenian parliament approved a law that cleared the way for the privatisation of power transmission lines while keeping most of the generation under government control. In addition, the law established four distribution companies split into two main distribution networks, one covering Yerevan and the north of the country, and the other covering the central and

southern regions. The European Bank for Reconstruction and Development (EBRD) took a five-year 20% stake in the Yerevan, Northern, Southern and Central networks in an effort to support the privatisation process. This proved unsuccessful, however, as no bids were received for a 75% offering in all four companies.

In 2001, in order to improve the efficiency of management, four distribution companies were merged into one which was privatised in August 2002. The independent Republican Energy Commission for the regulation of the sector was also established. With a view to attract private capital, the Ministry of Energy launched privatisation of the sector. In 2002, to settle the state debt, Razdan TPP was transferred to Russian investors. Construction and assembly divisions and a number of auxiliary enterprises have been privatised.

In Azerbaijan, the state power company, Azerenergy, was transformed in 1996 into a state-owned joint-stock company, and at the same time a five-year privatisation programme was introduced. However, an initial attempt to privatise 16 distribution networks was cancelled due to an insufficient number of bids. Plans to privatise generation assets have been put on hold, while new attempts are made to sell the national grid.

The plans for development of the Azeri electricity sector until 2010 and for the sectoral restructuring have been elaborated. Under a Presidential decree, the electrical networks of Baku, Gyanja and Sumgait, which had previously been within the jurisdiction of municipal authorities, were transformed into joint stock companies for the purpose of their subsequent privatisation. The management of Baku electrical networks has been transferred a Turkish energy company.

Georgia is pursuing a privatisation policy towards the state-owned utility Sakenergo. With support from the World Bank and the EBRD, most of Georgia's hydro and thermal generation units have been restructured as joint-stock companies, and the Georgian Ministry for the Management of State Property is proceeding with privatisation in three stages. In the first stage, AES purchased 75% of the Tbilisi State Regional Power Plant (Gardabani), and 75% of the Relasi distribution power company in Rustavi, and signed a 25-year management contract for the Khrami I and II hydroelectric power stations (223MW of combined capacity). The second stage of privatisation will offer 75% of the shares in the Kutaissky distribution company (Kalasi), and management of 100% of the shares in 5 hydroelectric plants (Ladjanuri, Tkibuli, Shaori, Gumati, Rioni). The third stage will offer 75% of the shares in the remaining 58 distribution companies. To date, nine regional distribution companies have been created. The "AES" company (USA) acquired 75% of shares of the "Telasi" distribution company. AES-Mtkvari purchased two power generating units of Tbilisi TCPP of 300 MW capacity each.

3.6.5 Central Asia

Kazakh electricity sector had been run be the state-owned enterprise "Kazakhstanenergo" until 1997 when the unbundling of generation, transmission and distribution activities was introduced. Power stations were separated from energy systems, acquired new owners and became the entities operating on open competitive electricity market. On the basis of inter-regional and inter-state electricity transmission networks of high voltage, the Kazakhstan Electricity Grid Operating Company (KEGOC) was created. The remaining power plants are being privatised along with the regional distribution companies.

At present, Kazakhstan's electricity market resembles those existing in England and Wales or in the NORDEL countries. The market of bilateral contracts is operating; creation the electricity exchange is underway for tender on the 24-hours in advance, one-hour in advance and real time bases. In February 2002, a 24-hour electricity exchange started operation.

In Uzbekistan, four thermal power plants, including the largest Syr Darya plant, nine regional electricity distribution and trading enterprises, 18 enterprises responsible for design, construction, maintenance and other activities in the electricity sector, have been reorganised into joint stock companies. The ownership changes are expected to be completed by end-2003 for the electricity network enterprises and by 2005 for the thermal power plants.

In Kyrgyzstan, the state-owned Kyrgyzenergo was reorganised in September 2001 into the open JSC "The National Power Network of Kyrgyzstan" (the open JSC "NES Kyrgyzstana"), the JSC "Power Plants" of Kyrgyzstan, four distribution power network companies of the JSC "Electro" and one heat network company - the JSC "Bishkekteploset". The state has retained the 93.72% equity stakes in the JSC "NES Kyrgyzstana" and the JSC "Power Plants". The sale of major blocks of shares (up to 70%) of power distribution companies into private ownership is envisaged.

In Tajikistan, the Ministry of Energy was established which comprises the electricity sector (the state joint stock holding company "Barki Tochik") and the oil and gas sector (state enterprises "Tajikgas", "Tajiknefteproduct", "Tajik-neftegas"). The Ministry of Energy is responsible for the energy policy and elaboration of standards. The programme of electricity sector's reform has been developed. The consumers will be given an opportunity to choose among competitive electricity suppliers. At present, 24 energy companies - ten distribution and fourteen construction and repair companies - have been converted into joint-stock companies. Preparatory work was carried out for launching the process of making investments in the energy sector following the disposal of shares of the newly established joint stock companies.

In Turkmenistan, the power sector is controlled by the Ministry of Power Engineering and Industry. Electric power is supplied by the Turkmen state energy and technological corporation "KUVVAT" which comprises five regional industrial associations, power plants, as well as repair services, planning and other entities.

3.6.6 CENTREL

In the Czech Republic, generation is dominated by Ceske Energeticke Zavody (CEZ) which controls 70% of the country's total generation.

In 1992, the Hungarian Electricity Trust MVMT was transformed into a two-level system of incorporated joint-stock companies, where the upper level - named Hungarian Power Companies Ltd. (MVM Rt.) - fulfilled its functions as an owner and as the supervisor at the same time. The power plants, the distribution companies and the grid company formed the second level.

The Electricity Act of 1994 prepared the sector for privatisation. A single buyer system was created and at the end of 1995 all six regional distribution companies and most of the thermal power plants were privatised. MVM Rt. has remained a state owned company. Since February 2002, the Independent System Operator MAVIR Rt. (the former National Power Control Centre) has been separated from MVM Rt. Its new owner is the Ministry of Economy. In 2001, the Hungarian Parliament accepted a new electricity law which opens the Hungarian electricity market from 1st January 2003.

The Hungarian Energy Office is responsible for licensing energy supply and sales, supervising adequate supply to consumers, the standard of service provision and protection of consumer interests. The new Electricity Act gives more autonomy to the Hungarian Energy Office and increases its duties and areas of competence.

In the Slovak Republic, the electricity sector is dominated by the state-owned generation company Slovenske Elektrane (SE). In January 2002, SEPS was registered as a separate state-owned transmission company in Slovakia. The Slovak government intends to privatise SE during 2002.

In Poland, unbundling of generation, transmission and distribution activities has been achieved. The generation sector has been liberalised and new legislation passed to overcome some of the obstacles created by existing long-term contracts. The Polish Power Grid Company (Polskie Sieci Energetyczne - PSE) operates the national grid and holds some of the long-term contracts with the generators. These contracts were aimed at ensuring that producers recovered their capital costs and avoided their assets becoming stranded. Legal unbundling of Transmission System Operator (TSO) activity has also been reached. Moreover, there is an independent Energy Regulatory Authority (ERA) that is responsible *inter alia* for approving electricity tariffs and issuing concessions for the activities of power companies.

3.6.7 Eastern Europe

Since 1996, the Ukrainian electricity system has operated a competitive pool system based on the British model. At the same time, the industry was split into separate generation, transmission, distribution and supply activities, and an independent regulator was established (National Electricity Regulatory Commission - NERC). Mintopenergo is the government agency that oversees Ukraine's fossil fuel-fired power plants, as well as its transportation and distribution systems. Goskomatom is the state committee responsible for the country's use of nuclear power. Ukraine is making efforts to privatise its regional electricity distribution companies (oblenergos). Seven of the oblenergos were partially privatised in 1998, followed by a further six in April 2001. However, plans to sell controlling shares in 12 more oblenergos, as well as in the country's thermal power-generating units, have been put on hold, pending a presidential review of the recent privatisations and reforms of the sector.

In Moldova, the state owns the monopoly generator, although there are plans to privatise three of the six major generation stations. An independent regulator (National Energy Regulatory Agency - NERA) oversees the tariffs charged by Moldtranselectro, the transmission company. Moldova has five distribution companies. In 1999, the Spanish firm Union Fenosa bought three of the Moldovan distribution companies. The remaining two companies are expected to be privatised soon. Draft Electricity Market Regulations have been developed which envisage the formation of a balancing market.

In Belarus, Belenergo is the managing entity for industrial and economic activities of the sector's enterprises. This concern is composed of six national power enterprises as well as the R&D, design and construction companies. The national power enterprises are vertically integrated companies owned by the State and comprising the power plants and electricity and heat networks.

The Ministry of Energy was established in 2001. The Board of the Ministry has examined a draft plan of restructuring of the electricity sector. Four stages of reforms are envisaged. There are plans to: divide the electricity sector by activity (generation, transmission and distribution), create market structures and wholesale electricity market and reorganize the electricity enterprises into distribution and sales companies. Both structures may be converted into joint-stock companies with various shares of mixed ownership. The transmission lines will remain in public ownership and will not be corporatised. Moreover an independent regulatory body will be created to exercise control over the wholesale trade in electricity and the rules of interrelations between electricity producers and consumers.

3.6.8 NORDEL

The NORDEL group of countries operates an integrated electricity market. There is a large number of generators and distribution companies active in the region (several hundred), most of which are very small. Six large companies dominate the region, controlling about 55% of the total NORDEL installed capacity. Rationalisation of the number of electricity companies has been an on-going feature of the NORDEL markets in recent years, as some of the small companies are acquired by the larger players and new market entrants. At the same time, the larger NORDEL companies have been venturing into other European markets and acquiring shares in capacity in those countries. For example, Vattenfall has moved into the Danish, Finnish and Norwegian markets and has also taken major equity stakes in German HEW (Hamburgische Elektrizitäts-Werke AG), Polish companies (distribution plant GZE in Silesia and CHPs in Warsaw) and Baltic companies.

3.6.9 European Russia

Until 1992, the electricity sector was organised into over 70 vertically integrated companies called Energos, with one for each oblast or administrative region. The government then created a new company, RAO EES Rossii (also referred to as the Unified Energy Systems, or UES) that contained the large thermal and hydro power plants plus the transmission grids, while the Energos were left with the small generating units and distribution networks. Rosenergoatom was created to own and operate the country's nine nuclear power stations. The State owns 100% of Rosenergoatom and 52% of UES. UES owns between 49% and 100% of the Energos.

UES controls about 70% of Russia's electricity production and is the world's largest electricity generator, with an installed capacity of almost 170 GW. The government intends to restructure the UES, partly in an effort to entice more private finance into the sector to fill the emerging investment gap. The UES estimates that it lacks the necessary finances to maintain the current generation infrastructure and needs additional revenues that are not available from the public sector. According to the "5,000 MW programme", the UES would be split into ten generating companies and the whole electricity sector would be gradually liberalised.

At present, there are over 100 wholesale market players, including regional joint stock companies of the JSC-Energo, major thermal and hydropower plants, NPPs, as well as major consumers who were granted access to the market. The principal lines of reform include: transformation of the federal wholesale power market into a competitive market and creation of: retail electricity markets, a federal network company, a number of power generating companies, the system operator and the trade system administrator. It is also planned to carry out reforms of the regional joint stock companies through separation of the functions of electricity generation from its transmission and sale.

In February 2003, the State Duma passed a package of laws aimed at restructuring the Russian power sector and eventually transforming it into a free market. The laws envisage splitting the existing structure into a Federal Grid Company and regional generators and subsequently spinning off or consolidating these generators. The laws call for the abolition of government control over generation and supply, while maintaining state regulation over the national grid and some other aspects of the market. The approved compromise version of the package empowers the government to significantly influence the specific measures and the timing of the transition process.

The package includes the new Electricity Law which stipulates that a fully competitive market will be created not earlier than 2005, but permits the government to run a scaled-down transitional version prior to that date. According to recent government announcements, such transitional competitive market may be launched by October 2003. It will apply to 15% of wholesale energy sold while the rest of power supply will continue to be traded at regular prices. To be able to implement the 2005 deadline, the government will have to issue a number of key regulatory acts, including the transitional market rules and the rules on non-discriminatory access.

3.6.10 Southern Europe

In Slovenia, the power sector is being restructured and liberalised. The former state-owned monopoly Elektro-Slovenija (ELES) now faces competition in supplying the large industrial consumers who have been free to choose their suppliers since April 2001. In January 2003, the liberalised market will be extended to households. On the generation side, the three state-owned hydropower producers have been rolled into one holding company (Slovenske Hidroelekrarne) that was established in June 2001. The Slovene Energy Agency is responsible for regulating the market.

The electricity monopoly ELES, has been split into a transmission company and transmission system operator, but is still 100% state-owned. A market operator has been established as a daughter company. The new established holding company, covering all hydropower and thermopower companies, was established in June 2001.

The electricity market has been opened for all eligible customers for domestic production. Since January 2003, it is also fully opened for electricity produced outside Slovenia.

All customers with connected load 41 kW and more are declared as eligible customers. They present approximately 66% of Slovenian electricity market.

In Bosnia and Herzegovina, there are three vertically integrated utilities. Elektroprivreda of Bosnia and Herzegovina (EPBiH) has the largest installed capacity and is about twice the size of the other two utilities. In Croatia, the state-owned Hrvatska Elektroprivreda (HEP) dominates the sector and supplies about 95% of the country's requirements. The remainder is supplied from industrial co-generation units. HEP also owns and operates the transmission grid and 21 distribution companies.

State-owned Elektrostopanstvo Na Makedonija (ESM) is the sole utility in Macedonia.

In Yugoslavia, most of the electricity production, transmission, and distribution is carried out by two state-run companies: Elektroprivreda of Serbia (EPS) and Elektroprivreda of Montenegro (EPCG). These have been slated for privatisation.

3.6.11 Western European UCTE

There are a large number of electricity companies active in the Western European UCTE region, but nine companies dominate the market. In 2002, these nine accounted for just over two-thirds of the UCTE's total installed capacity. The companies are:

- EdF (France) – 105 GW of installed capacity;
- ENEL (Italy) – 60 GW;
- E. ON (Germany) – 34 GW;
- RWE (Germany) – 33 GW;
- Endesa (Spain) – 20 GW;
- Iberdrola (Spain) – 16 GW;
- Electrabel (Belgium) – 14 GW;
- VEAG (Vereinigte Energiewerke AG) (Germany) – 14 GW;
- EnBW (Energie Baden-Württemberg AG) (Germany) – 10 GW

Within the Western European UCTE region, most of the recent activity has focused on mergers between utilities in the wake of the EU's Electricity Directive. The Directive calls for greater openness of Europe's electricity markets and the end to national and regional monopolies. The electricity companies fear that this openness will result in a lack of control and the possibility that the current capacity surplus could be used to drive down prices. In an attempt to offset this threat, companies have engaged in a round of mergers and acquisitions. These include: the German mergers between RWE and VEW and between VEBA and VIAG, and EdF's acquisitions of stakes in Germany's EnBW and in an Italian utility.

In 2000, the German companies VIAG and VEBA merged to form E. ON, and their respective utilities groups Bayernwerk and Preussen Elektra combined to form E. ON Energy. The group is expanding outside Germany and holds a majority stake in Sweden's second biggest energy utility (Sydkraft), and a 34% share in Espoon Sähkö, Finland's fourth largest energy utility. E. ON has also acquired the UK's Powergen plc. This acquisition has increased the group's generation capacity by 16 GW (approximately 50% in the UK and 50% in the USA).

4 Current inter-regional trade in electricity

4.1 Main trade flows

Electricity is not a primary energy source and the electricity industry is less bound by geography when it comes to the location of generation in relation to consumption centres, except for its hydro-based production. Electricity cannot be stored and its transportation is relatively expensive. Over long distances (over 1000 km), it is more costly to transport electricity than the corresponding volumes of energy as gas. Losses in electricity transmission are considerable. This makes it economical to produce electricity as close to consumption centres as possible. The possibility to choose between fuels may further facilitate this.

Furthermore, most countries have historically chosen, for reasons of self-sufficiency and security of supply, to install sufficient production capacity within their territory in order to meet domestic demand and allow for an adequate reserve margin. In many countries, this margin averages 20% of installed capacity. Consequently, there is generally less need for long distance transport and trade in electricity than in oil and gas.

The key driving factors behind the desire for more trade in electricity are: security of supply, economic efficiency, and environmental considerations. In many cases, it is more costly to maintain a required reserve margin through installation of additional capacity than through interconnections. Another potential benefit of supply security brought by trade is that imported power can diversify the energy portfolio geographically and by fuel type. Concerning economic efficiency, the investment in generation facilities can be optimised through economies of scale in the interconnected systems compared to independent power systems. Larger generation units often provide better quality and lower costs.

Moreover, the interconnected systems can reduce total required generation capacity when the daily or seasonal load curves among neighbouring countries are complementary. In such cases, interconnections facilitate peak load shaving, thereby reducing or eliminating the need for capacity expansion. Last but not least, large integrated power systems stimulate competition and may offer more opportunities for environment-friendly development of energy resources.

There are two basic formats for electricity trade among interconnected power systems. Bilateral trade between adjacent countries has traditionally been used by neighbouring countries for technical purposes (to attain certain system-required technical performances at lower cost) and to benefit from complementary production conditions. Multilateral or regional trade allows for imports of electricity via transit countries. When a large geographic area is involved, the scope for possible import and export transactions is multiplied, thereby creating the most favourable conditions for a competitive electricity market.[16]

Electricity is mostly traded on a regional basis, due not only to non-storability of electric power but also to the reliance on networks as the only means of transportation. Regional trade is therefore dependent on the existence of interconnections between national electricity grids.

International electricity trade is increasing in many regions of the world, including the EU and N. America. In Europe, France is by far the biggest exporter of electricity due to its excess of base-load nuclear power. In 1999, French net exports reached 66 Terawatt hour (TWh). The state-owned company Electricité de France(EdF) supplies 30 million clients in France, and through international partners more than 16 million outside France, mainly in Great Britain (London Electricity and South West Electricity), Hungary, Brazil and Argentina, but also in Austria, Swedenand some African countries.[17] Electricity trade between the EU and non-EU countries has been rather limited, with Norway and Switzerland being the only two countries exchanging significant amounts of electricity with the EU. This has been partly remedied by the linking up of Poland, Czech Republic and Slovakia to the main European grid.[18]

In Central Europe and Eurasia, there was a general reduction in regional electricity trade in the first half of the 1990s. However, the benefits of regional trade were recognized towards the end of the 1990s and a revival of regional electricity trade began to develop. At present, four countries of Central Europe - Poland, Hungary, the Czech Republic, and Slovakia - trade electricity on a regional basis.[19] These countries have formed their own association called CENTREL.

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16 Energy Regulators Regional Association (ERRA): "Electricity Trade and The Role of the Regulator", paper prepared by the Export Import Working Group for the 4th Annual Regional Energy Regulatory Conference for Central/Eastern Europe and Eurasia, December 2000.

17 Van Roy, P., Belmans, R., Pepermans, G., Proost, S., Willems, B., Conings, L.: "Opening of the European Market for Electricity", University of Leuven Energy Institute, Leuven, 2000. Please note that electricity generated by a foreign affiliate and sold on the market of the host country is not exportation.

18 WTO Secretariat: Energy Services, WTO Document S/C/W/52, Geneva, 9 September 1998.

19 Energy Regulators Regional Association (ERRA), *op. cit.*, 2000.

Estonia, Latvia and Lithuania have also agreed to form a Common Baltic Electricity Market. Romania, Bulgaria, the Former Yugoslav Republic of Macedonia, Greece, Albania, and Bosnia-Herzegovina have signed the Thessaloniki Agreement on 10 September 1999 calling for the creation of a regional electricity market by 2006[20]. Other regional electricity market groupings include: Ukraine and Moldova (countries that operate an interconnected power system that was originally developed in the 1970s and 1980s), Georgia, Armenia, and Azerbaijan (countries that share a high voltage network and may be able to form a Transcaucasian regional electricity market) and a group of five Central Asian countries (Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan) which reached a Central Asia interconnection agreement in 1997.

Russia trades electricity with a number of countries. The simplest form of trade - export-import between neighbouring countries - exists with Norway, Finland, and China. More advanced forms of trade, such as imports, exports and transit among a group of countries, exist between Russia and the Baltic and Transcaucasian regions. Since the high-voltage power system connecting the Ural with western Siberia passes through Kazakhstan, there are complex issues associated with Russia-Kazakhstan electricity trade.[21]

The way electricity is traded contrasts sharply with that of other commodities. The peculiar attributes of electricity demand, supply, and physical constraints associated with the operation of synchronized alternating current (AC) networks, are highly relevant for understanding the way it is traded and delivered from its place of production to the final consumer. These characteristics also impact on the organizational structure of the electricity sector, on the functions and characteristics of the wholesale and retail markets and on the relationship between the different actors of the electricity market taken as a whole.

Electricity networks are not switched networks, unlike railroad or telephone networks where a supplier makes a physical delivery of a product at point A that is then physically transported to a specific customer at point B. A free-flowing AC network is an integrated physical machine that follows the laws of physics, rather than the laws of financial contracting. Electricity produced by all generators goes into a common pool of electric energy and demand by consumers draws energy out of that common pool. The electric energy produced by a particular generator cannot be physically associated with the electricity consumed by a particular consumer.[22]

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[20] Bilateral power exchange has existed in the region since the 1970's, with Bulgaria recently being the main supplier. A 700 kV line to the Ukraine (itself linked to Russia) which was built in the early 1980's creates additional trade opportunities.

[21] Energy Regulators Regional Association (ERRA), *op. cit.*, December 2000.

[22] Joskow, P. L., *op. cit.*, 1999.

Table 2 shows the electricity trade flows between the regional groupings and Figure 4 shows the total electricity imports and exports to and from each region and their electricity trade balance in 2000. Total electricity trade between regions was 80.8 TWh in 2000, which represents just over 2% of these regions' total electricity generation. It is important to note that these figures do not include intra-regional trade, which in the case of the UCTE was about 160 TWh between various countries of the region, compared to that region's trade of 55 TWh (imports plus exports) with other regions. In most cases, the inter-regional trade represents less than 5% of individual regions electricity generation. The exceptions are Southern Europe (23%) and CENTREL (10%). Total electricity trade between the specific ECT regions is 62 TWh (78% of the total). This excludes the trade with countries/regions outside of the ten ECT regions. Such a trade is rather limited and involves primarily the flows between the UCTE and the UK, and between the UCTE and Morocco.

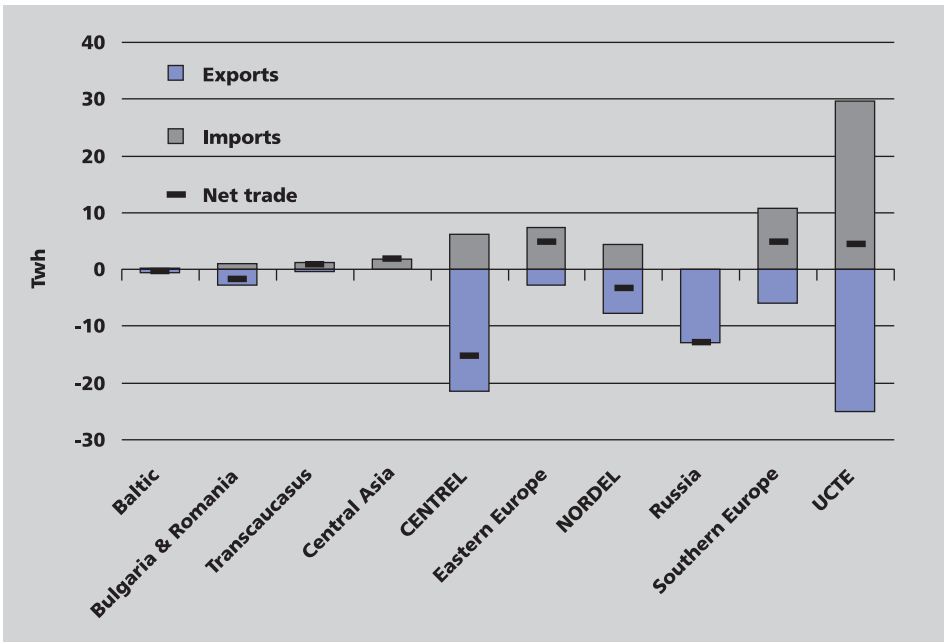
Table 2 **Electricity trade in 2000 (GWh)**

From\To	Baltic States	Bulgaria & Romania	Trans-cau-casus	Central Asia	CENTREL	Eastern Europe	NORDEL	Euro-pean Russia	Sou-thern Europe	UCTE	Other	Total Exports	Total Imports	Net Imports
Baltic States						600						600	323	-277
Bulgaria & Romania									1 648	1 065		2 713	962	-1 751
Trans-caucasus											300	300	1 169	869
Central Asia												0	1 848	1 848
CENTREL						209	26		5 237	15 943		21 415	6 229	-15 186
Eastern Europe	20				2 729							2 749	7 468	4 719
NORDEL					422					7 364		7 786	4 488	-3 298
European Russia	303		269	1 848		6 659	3 911					12 990	0	-12 990
Southern Europe		760								5 147	120	6 027	10 790	4 763
UCTE		202			3 078		551		3 732		17 545	25 108	29 568	4 460
Other			900						173	49		1 122	17 695	16 843
Total Imports	**323**	**962**	**1 169**	**1 848**	**6 229**	**7 468**	**4 488**		**10 790**	**29 568**	**17 965**	**80 809**	**80 809**	**0**

Sources: UCTE, CDO, National data and ECON

Figure 4 highlights the fact that the UCTE is by far the largest electricity trader (imports plus exports equal 55 TWh), although it is only a small net importer. The UCTE imports electricity from CENTREL, NORDEL and Southern Europe and exports to the UK and North Africa. The UCTE has a physical electricity trade deficit with CENTREL, NORDEL, Southern Europe and Bulgaria and Romania. CENTREL is the second largest electricity trader (imports plus exports equal 28 TWh) and overall is a net exporter. CENTREL trades as a net importer from Eastern Europe (Ukraine) and is a net exporter to the UCTE and Southern Europe[23].

Figure 4 **Electricity imports and exports by region (2000)**



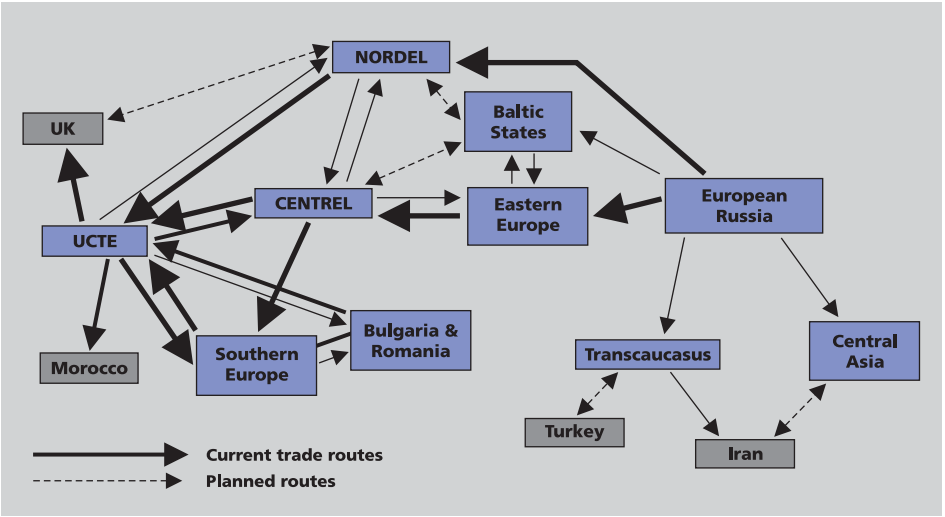
Southern Europe is the next largest electricity trader and the largest net importer. Southern Europe has a physical electricity trade deficit with CENTREL and Bulgaria and Romania and a trade surplus with the UCTE. European Russia, NORDEL and Eastern Europe all have similar levels of total electricity trade (10-15 TWh) but, while European Russia and NORDEL are net exporters, Eastern Europe is a net importer. Eastern Europe is a net importer from Russia and net exporter to CENTREL. However, Russian exports to Eastern Europe were lower in 2000 because of the halting of exports to Ukraine in response to the latter's accumulated debt. Russian exports to Ukraine resumed in August 2001. The remaining four regions have limited levels of total electricity trade (less than 4 TWh in 2000).

[23] In 2001, Hungary imported 8315 GWh from Slovakia (80%), 1856 GWh from Ukraine (18%) and 230 GWh from Austria (2%). During the same year, Hungarian exports totalled 7233 GWh. The main recipients were Croatia (4694 GWh), Austria (1167 GWh), Yugoslavia (1276 GWh) and Romania (95 GWh).

In 2001, total volume of exports/imports in the CIS amounted to approximately 5% of the CIS total electricity generation. The major exporter within this group is Russia which supplies electricity to the CIS energy systems and the Integrated Network of Baltic states, as well as to Finland, Norway, Poland, Mongolia, China, Turkey. Ukraine exported electricity to Moldova, Poland, Slovakia and Hungary, whereas Latvia exported electricity to Belarus and Russia. The energy systems of the Transcaucasian region exported and exchanged electricity with Iran, Turkey and Russia.

The overall trend that emerges from the trade data is a net flow from the East to the West. Net flows (as opposed to contracted flows) are from Russia via Eastern Europe and CENTREL to Western and Southern Europe, and from Russia via NORDEL to Western Europe. This is highlighted in Figure 5 which shows the electricity trade flows between the regions (the line widths reflect approximately the magnitudes of trade).

Figure 5 **Electricity trade flows between regions**



4.2 Inter-regional grid connections

Table 3 shows the interconnection capacities between the selected ECT regions. Transformer limitations mean that not in all cases the capacity is the same for imported and exported electricity. Overall, there is a total of 63 GVA of interconnection capacity. Eastern Europe has the largest import (16.7 GVA) and export (12.8 GVA) capacities. CENTREL has the next largest, followed by the UCTE and European Russia.

Table 3 **Interconnector capacity in 2000 (MVA)**

From\To	Baltic States	Bulgaria & Romania	Trans-cau-casus	Central Asia	CENTREL	Eastern Europe	NORDEL	Euro-pean Russia	Sou-thern Europe	UCTE	Other	Total
Baltic States						1 500		1 500				3 000
Bulgaria & Romania					150	3 470			780	600	216	5 216
Trans-caucasus											350	350
Central Asia												-
CENTREL		150				6 010	600		1 364	3 650		11 774
Eastern Europe	1 500	3 470			6 010			1 800				12 780
NORDEL					600			110		2 400		3 110
European Russia	1 500		800	500		5 700	1 210					9 710
Southern Europe		780			1 300					800	1 400	3 502
UCTE		700			3 200		2 000		1 350		3 070	10 320
Other			350						622	3 070		4 042
Total	**3 000**	**5 100**	**1 150**	**500**	**11 260**	**16 680**	**3 810**	**3 410**	**4 116**	**10 520**	**4 258**	**63 804**

Source: UCTE, CENTREL, CDO, IEA, national sources

Table 4 shows the average capacity utilisations[24] for all interconnections based on the 2000 trade data shown in Table 2. Overall, the average utilisation of this interconnection capacity is only around 15%. Interconnections with the UCTE tend to be the most heavily utilised, followed by those with Southern Europe, NORDEL and CENTREL. The interconnection capacities used the most are:

- Southern Europe to UCTE - 73%;
- UCTE to "Other" – mainly England – 65%;
- CENTREL to UCTE - 50%;
- CENTREL to Southern Europe - 44%;
- European Russia to NORDEL - 37%;
- NORDEL to UCTE - 35%;
- UCTE to Southern Europe - 32%

These relatively high utilisation rates reflect the fact that these interconnections are transferring significant amounts of base-load power. Some of the other connections are used to transfer power at peak demand, which means the flow of electricity is more intermittent and the overall utilisation factors lower. In other instances, the installed capacity is not being used at present either because domestic electricity demand has fallen sharply, reducing the need to import power (e.g. Hungarian exports to Romania), or because imports have been curtailed as a result of bad debt (e.g. Ukrainian imports from Russia).

The 42% rate for Russia to Central Asia is misleading, since the interconnection capacity reflects the transmission link between northern Kazakhstan, which is integrated into the Russian network, and the rest of Central Asia. The trade from Russia to Central Asia includes exports into northern Kazakhstan and does not include the use of the 500 MVA interconnector capacity shown in Table 3.

[24] This is the standard way of assessing capacity utilisation for DC lines which are used primarily to move base-load power. For AC connections, it may also be useful to assess capacity utilisation based on peak, rather than average, trade flows. Such an approach would result in significantly higher utilisation rates.

Table 4 **Utilisation of Interconnector Capacity (2000)**

From\To	Baltic States	Bulgaria & Romania	Trans-cau-casus	Central Asia	CENTREL	Eastern Europe	NORDEL	Euro-pean Russia	Sou-thern Europe	UCTE	Other	Total
Baltic States						4.6%		0.0%				2.3%
Bulgaria & Romania					0.0%	0.0%			24.1%	20.3%	0.0%	5.9%
Trans-caucasus											9.8%	9.8%
Central Asia												0.0%
CENTREL		0.0%				0.4%	0.5%		43.8%	49.9%		20.8%
Eastern Europe	0.2%	0.0%			5.2%			0.0%				2.5%
NORDEL					8.0%			0.0%		35.0%		28.6%
European Russia	2.3%		3.8%	42.2%		13.3%	36.9%					15.3%
Southern Europe		11.1%			0.0%					73.4%	1.0%	19.6%
UCTE		3.3%			11.0%		3.1%		31.6%		65.2%	27.8%
Other			29.4%						3.2%	0.2%		3.2%
Total	**1.2%**	**2.2%**	**11.6%**	**42.2%**	**6.3%**	**5.1%**	**13.4%**	**0.0%**	**29.9%**	**32.1%**	**48.2%**	**14.5%**

4.3 Economic incentives to trade

In most cases, electricity trade is associated with the availability of surplus generation capacity or with daily and seasonal variations in generation. In France, for example, the development of nuclear power has led to a large surplus capacity; much more than is warranted by base-load demand in France. Nuclear plants cannot easily follow the short-term changes in system load and are, therefore, normally used to provide base-load power. Hence, France was faced with the choice of either mothballing some of its new plants until base-load demand increased or of exporting base-load power. France chose the latter option and was able to do so because the marginal cost (i.e. variable cost) of nuclear generation is relatively low compared to the cost of fossil-fuel fired generation[25].

In other regions, there are large hydropower resources that could also provide cheap base-load power or quickly available peaking power. Countries with large amounts of hydro capacity have excess supplies at certain times of the year which they may want to export. This can often be the case in the summer months when domestic demand is lower and reservoirs may be full after spring thaws or late winter rainfalls.

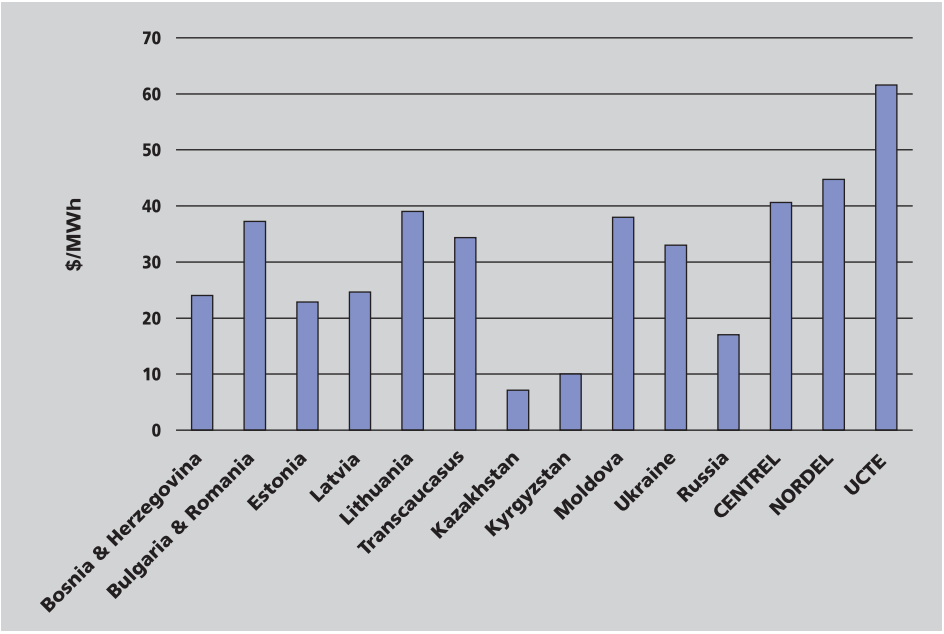
In other countries with a high dependence on CHP (Combined Heat and Power), such as the CENTREL region, the difference between summer and winter heating demands can create a surplus generation potential that could be exported. In the winter, a CHP plant will tend to optimise its heat output, which leads to a reduction in the maximum electricity output. In the summer, the opposite is true, resulting in excess power being available for exports. Surplus hydro power and CHP generation can feed into the base, intermediate or peak load of a neighbouring region. Nuclear power, however, is used primarily for the base-load. This highlights the fact that in certain instances an understanding of the load curve is required to assess the export potential, as well as the marginal costs of a specific generating technology or even a power plant.

Relative price differences generally encourage trade, though historically they have not been the main driving force behind electricity transfers. The shift towards liberalised, open electricity markets in the EU is supposed to encourage cross-border trade on the basis of cost and price differentials. Companies in countries with lower prices should have the incentive and opportunity to enter markets where prices are higher. In this manner, trade increases and overall prices are reduced. To date, liberalisation of the EU electricity markets has not resulted in significant cross boarder trade on this basis. However, expectations are for an increase in the intra-EU trade. Within most of the other regions, the development of integrated open access markets, necessary for this type of trade, has not taken place. Electricity trade continues to be dominated by utility-to-utility exchanges.

[25] Most of the cost of nuclear generation is bound up in the large fixed costs of constructing the nuclear reactors. The cost of the fuel and operating the units is relatively low, and generally lower than the fuel and operating costs of fossil-fuel plants.

Figure 6 shows average industrial prices in a number of the countries and regions within the Eurasian ECT area. Prices for NORDEL, CENTREL, UCTE and Bulgaria & Romania are weighted averages for the regions. UCTE prices are considerably higher than all the other regions, with the lowest prices in the Central Asian republics of Tajikistan, Turkmenistan and Kyrgyzstan. If there was a greater degree of liberalisation of electricity markets and integration of networks, then we might expect the countries with lower generation costs to want to sell electricity to consumers in countries with higher costs. Differences in generation costs, therefore, provide an indicator of potential trade opportunities, subject to transmission costs.

Figure 6 **Average industrial prices in selected Eurasian countries and regions (2000)**



Source: IEA, US DOE, national sources and ECON aggregates

In recent years, the development of electricity exchanges for both spot and forward supplies of electricity has encouraged trade flows. These exchanges bring together suppliers from a number of synchronous networks (e.g. the NORDEL system). The physical markets have been supplemented with financial markets offering a range of futures contracts. These markets encourage electricity trade based on cost differences within the context of an overall integrated system. In 2000, physical spot trades were 66 TWh on the Nord Pool (the electricity exchange for the NORDEL system), which represents 17% of NORDEL's total electricity generation. However, financial trades cover about 3000 TWh which is 30 times more than spot trades and almost eight times the level of total generation. Other electricity exchanges are being developed within Eurasia, mostly in Western Europe and in response to the greater integration of the EU electricity markets.

The development of these exchanges will encourage generation to be increasingly based on cost criteria, rather than on geography. Lower cost generation should be encouraged, which may well increase trade if cost differences are reflected in different networks. However, this requires the development of markets to encompass a large number of networks with harmonised market rules, especially covering the delivery of spot supplies (markets need to be linked to the dispatch and transmission system). So far, such markets have been developed within synchronous systems and where they are compatible with the dispatch organisation (i.e. spot trades are for half-hour periods which is the dispatch period).

Spot prices between two non-synchronous systems generally reflect the capacity constraints between the two systems. Nevertheless, trade can exceed these capacity constraints if supply swaps are taken into account (i.e. deliveries either side of a capacity constraint are swapped out). Where there is a high level of integration and transfers to and from different systems, this is possible and can expand trade without requiring additional interconnection capacity. However, if trade is only in one direction, or the two-directional trade is limited, then swaps will be limited and trade will remain largely dependent on additional interconnection capacity.

4.4 Technical and economic barriers to trade

The fact that the regional networks are not operating synchronously and experience wider frequency limits means in many instances that the links between regions need to be via High-Voltage Direct Current (HVDC) cables. Feed into the network from the transformer stations on the receiving end of the cables needs to be dispatched like any generation unit. This means that imports are generally required to conform to predetermined profiles, rather than being able to respond automatically, as is the case with AC connections. This may limit some of the peak power that can be exchanged between non-synchronous regions.

Regions that are not operating synchronously require Direct Current (DC) cable links, which are more expensive than the AC connections used for synchronous networks. The higher DC cable expenses may offset the cost advantage that would be realised in an AC synchronous system. Non-synchronous operation can therefore act as a barrier to trade. In general, a DC line can only be economically justified for high transit capacities and beyond certain distances (about 600 km for aerial lines and 50 km for underwater cables).

For shorter distances and smaller capacities, an AC connection is cheaper but that requires networks to be synchronous. The criteria for allowing synchronous operations can, therefore, also be used to limit trade opportunities. The UCTE's requirement that networks must operate within frequency limits of 49.95-50.05 Hz sets the standard for synchronous operations.

In addition, the requirement to be able to maintain normal power flows in the event of an outage (N-1 criterion) creates further standards that must be met before systems can be operated synchronously. These technical standards are designed to ensure a high quality product. In the past, the UPS systems have operated with wider frequency variation than the UCTE, and in 1998 the UPS system experienced a lot of difficulty with maintaining frequency within those limits. This has so far prevented synchronous operations with the UCTE (and at times with the Baltic and Eastern European networks) and required the electricity exchanges to occur via DC connections. One of the incentives to improve the operational standards of the UPS systems is the possibility of increased trade. In the meantime, expanding electricity trade based on HVDC interconnections is in part constrained by the HVDC interconnection capacity.

This process is further complicated by the 'flow' characteristics of electricity, which follows the line of least resistance and not necessarily the contractual line. As a result, a contractual trade between two networks within a wider synchronous system may actually involve electricity flows across a number of other networks. The consequence of this is the need for close co-operation and information exchanges between the networks. Lack of co-ordination can hamper electricity trade.

The lack of open access to electricity markets has restricted the ability of generators in one region to export to another. Generators must negotiate with utilities in other regions rather than seeking end-user markets. This means that trade is dependent on the attitude of utilities which can be driven by the desire of an incumbent utility to utilise its own capacity ahead of imports, especially when these utilities are able to pass on the higher cost to captive consumers precisely because their markets are not open. In addition, the utilities may be mandated by their governments to ensure national self-sufficiency in electricity supply and, therefore, to minimise electricity trade.

Another obstacle to trade is the physical location of import and export markets. Unless the importing market is adjacent to the exporter, trade will require the participation of a third market. The third market may be unwilling to wheel the power across its network, or it may charge a transit fee that removes the economic benefit of the transfer. Currently, the EU and the Florence Forum are attempting to resolve this issue in order to facilitate transfers between non-adjacent regions. Determining appropriate network charges is proving a difficult task, not least because of the vested interests of incumbent utilities. Terms and conditions for access to a transmission system can, therefore, be used to effectively block trade.

A further barrier to trade may arise through non-payment or even stealing of electricity. Trade between Russia and the Ukraine has only recently been resumed following a dispute over non-payment for previous exports. Differences over transit fees, accurate metering and tariff levels have all played their part in the dispute and led to the curtailment of supplies not only to Ukraine, but for re-exports to third countries. This serves to highlight the potential for contractual disputes that may restrict trade.

5 Scope for future inter-regional trade in electricity

5.1 Projected supply/demand balances until 2020

5.1.1 Overview

Surplus generation capacity is one of the most important indicators of possible increased trade opportunities. This study develops the estimates of future surplus capacities in the ECT regions based on a range of publicly available supply/demand balances and assuming that no new major investments are made in the existing or new power plants beyond those already underway.

As a result of this assumption the projections are rather static. However, this was necessary in order to illustrate the need for future investment in existing and new plants[26]. Future investment beyond that already underway will certainly take place in most regions, but its extent and pace will depend largely on the investment climate.

An analysis of the installed capacity and peak electricity demand provides an indication of excess capacity[27] available in each region and for the group as a whole. Total installed capacity for the ten regions covered in this study was just over 890 GW in 2000, of which 760 GW was guaranteed capacity available at peak load. The sum of the regional peak loads is put at 536 GW with an overall excess capacity of around 142 GW. Trade will not necessarily be limited to excess capacity at peak load. For example, a country could export more power at non-peak times, aided by the fact that different regions experience peaks at different times, in part due to time zone differences. Nevertheless, an examination of excess capacity as defined above provides a useful indication of the available scope for electricity trades.

Figure 7 shows the breakdown of excess capacity by region. None of the regions has a deficit, and more than half of the total excess is accounted for by two regions: European Russia and the Western European UCTE together have almost 72 GW of excess capacity. A further third of the total excess capacity (47 GW) is in Bulgaria, Romania, Central Asia and Eastern Europe. The remaining five regions account for just 15% of the total excess (24 GW), which represents more than 10% of their installed capacity. Total Eurasian ECT excess capacity is equivalent to 16% of the total installed capacity.

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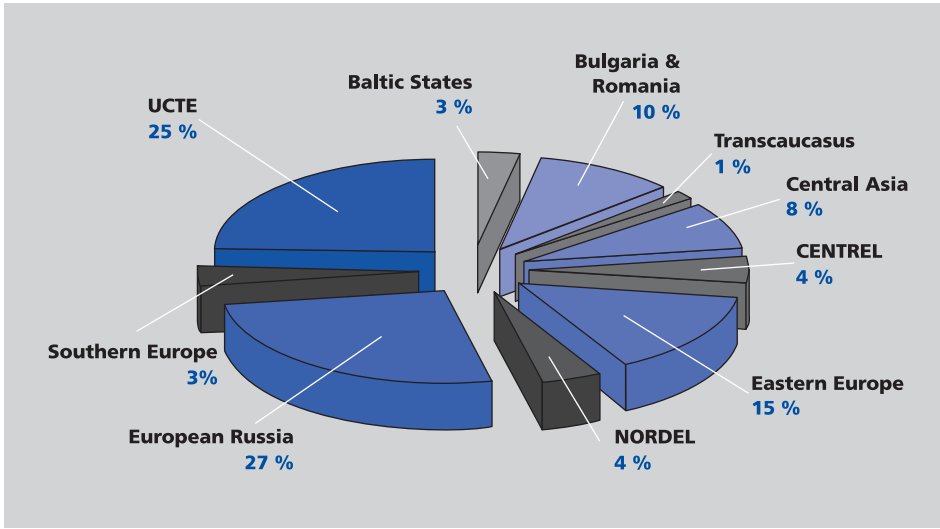
[26] It also reflected the resource and time constraints as more dynamic approach would require employing more data and sophisticated econometric techniques.

[27] Defined as the difference between the guaranteed capacity available at peak load and the minimum capacity required. The minimum capacity required is equal to peak demand plus a 15-20% reserve margin. Therefore, the excess capacity does not include the reserve margin. The guaranteed capacity takes account of the fact that not all installed capacity of CHP and some hydro power plants will be available at peak demand.

Figure 7 **Share of total Eurasian ECT excess capacity (2000)**



Source: ECON

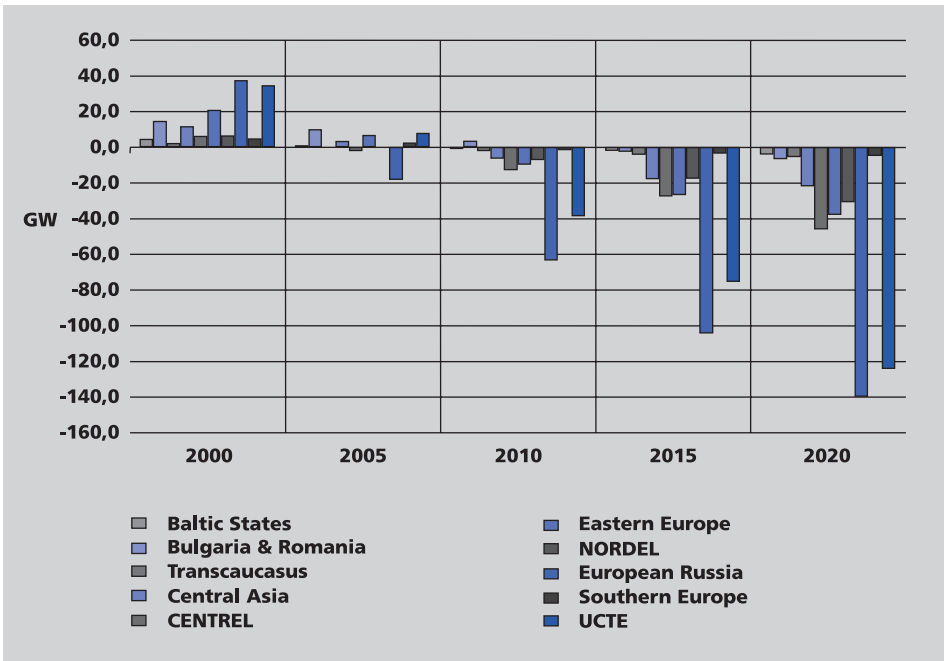
The excess capacity has occurred for several reasons. In the UCTE and NORDEL regions, excess capacity emerged as additions were made on the basis of forecast peak demand that proved to be too high due to slower than expected economic growth. The economic turmoil following the demise of the Soviet Union and the Eastern and Central European countries led to a collapse in electricity demand. It is unlikely that peak demand in these regions will return to its previous high levels in the short-term. In Southern Europe, the Balkan wars precipitated a collapse in demand, and although generation capacity was also affected, it was restored more speedily than demand. Consequently, surplus capacity has emerged there as well.

Future excess capacities for the regions were determined using projections for peak demand, age of existing plants and plants under construction in 2002. Regional peak demand projections were taken from the UCTE, CDO, CENTREL and national sources. Where aggregate regional projections did not exist, the regional peak demands were calculated based on the sums of the individual country peaks which were adjusted downwards given that the peak demand in one country does not necessarily coincide with the peak in another country.

The retirement of existing capacity is based on the technical life of the plant which for most thermal plants is assumed to be 30-35 years. Using the commissioning date and the technical life, the decommissioning date is obtained and the installed capacity profile produced for the projection period. Where plants have been refurbished, their technical life is extended. However, the profiles assume no further refurbishment of existing power plants. Hydro plants have a much longer technical life of 60-100 years (for the dams and main infrastructure) and are assumed to remain operational over the projection period.

Table 5 and Figure 8 show the development of installed capacity, peak demand and excess capacity by region if one assumes that no new capacity is constructed or refurbishments made beyond those that have been publicly announced by late 2001. Although this provides a rather static view of the projected capacity surplus/deficit, it is an important step in determining what effect the surplus or deficit may have on trade. In particular, this allows assessing whether the longer-term trade between regions depends on the availability of surplus capacity or on refurbishment of existing capacity or on the construction of new capacity.

Figure 8 **Development of excess capacity by region**



Source: ECON

Table 5 **Regional Network Outlook**

GW	2000	2005	2010	2015	2020
Baltic States					
Installed capacity	9.1	5.8	4.4	3.9	2.4
Peak demand	3.9	4.1	4.6	5.0	5.6
Excess capacity	4.4	0.8	-1.1	-2.2	-4.3
Bulgaria & Romania					
Installed capacity	29.5	26.2	21.6	17.8	16.0
Peak demand	12.9	14.2	15.8	17.7	19.8
Excess capacity	14.6	10.0	3.4	-2.5	-6.7
Transcaucasus					
Installed capacity	9.9	8.2	6.6	5.4	5.1
Peak demand	5.9	6.2	6.8	7.4	8.1
Excess capacity	2.1	0.0	-2.3	-4.4	-5.7
Central Asia					
Installed capacity	41.3	34.9	27.3	18.7	18.3
Peak demand	21.3	23.2	25.6	28.2	31.2
Excess capacity	11.5	3.4	-6.5	-17.9	-21.9
CENTREL					
Installed capacity	66.3	62.9	56.8	47.0	32.3
Peak demand	40.2	41.5	45.8	50.6	55.9
Excess capacity	6.2	-2.3	-12.9	-27.7	-46.1
Eastern Europe					
Installed capacity	58.1	45.3	32.6	19.8	13.3
Peak demand	32.5	33.6	36.9	40.5	44.6
Excess capacity	20.8	6.6	-9.8	-26.9	-38.0
NORDEL					
Installed capacity	80.5	78.1	74.9	66.9	55.8
Peak demand	54.0	57.8	61.7	64.8	68.1
Excess capacity	6.3	-0.1	-7.2	-17.7	-30.9
European Russia					
Installed capacity	149.9	99.9	65.8	38.5	17.8
Peak demand	97.8	102.9	112.5	124.2	137.2
Excess capacity	37.4	-18.4	-63.6	-104.4	-140.0
Southern Europe					
Installed capacity	11.2	9.9	6.9	5.8	5.5
Peak demand	5.6	6.5	7.4	8.1	9.0
Excess capacity	4.6	2.3	-1.7	-3.7	-5.0
UCTE					
Installed capacity	436.7	434.1	398.6	374.5	336.5
Peak demand	261.6	283.2	299.8	315.8	332.1
Excess capacity	34.5	7.9	-38.9	-75.6	-124.3
TOTAL					
Installed capacity	892.4	805.5	695.5	598.3	503.0
Peak demand	535.8	573.3	616.8	662.5	711.5
Excess capacity	142.4	10.1	-140.6	-283.0	-422.8

Table 5 and Figure 8 indicate that by 2010 the existing surplus capacity will disappear in almost all regions. In fact by 2005, current excess capacity in five regions will be absorbed through retirements and growth in peak demand. By 2005, the total combined excess capacity for all ECT regions is projected to fall to 10 GW. The most dramatic change will occur in European Russia, where the current excess capacity of 37 GW may turn into a deficit of almost 20 GW. This reflects the fact that half the existing thermal capacity is beyond its technical life and is in need of refurbishment, if it is to continue operating for much longer. Table 6 shows the dates when the excess capacity is eliminated in each region. For most of the regions, this will occur between 2004 and 2008. Only Bulgaria and Romania will maintain excess capacity beyond that time frame.

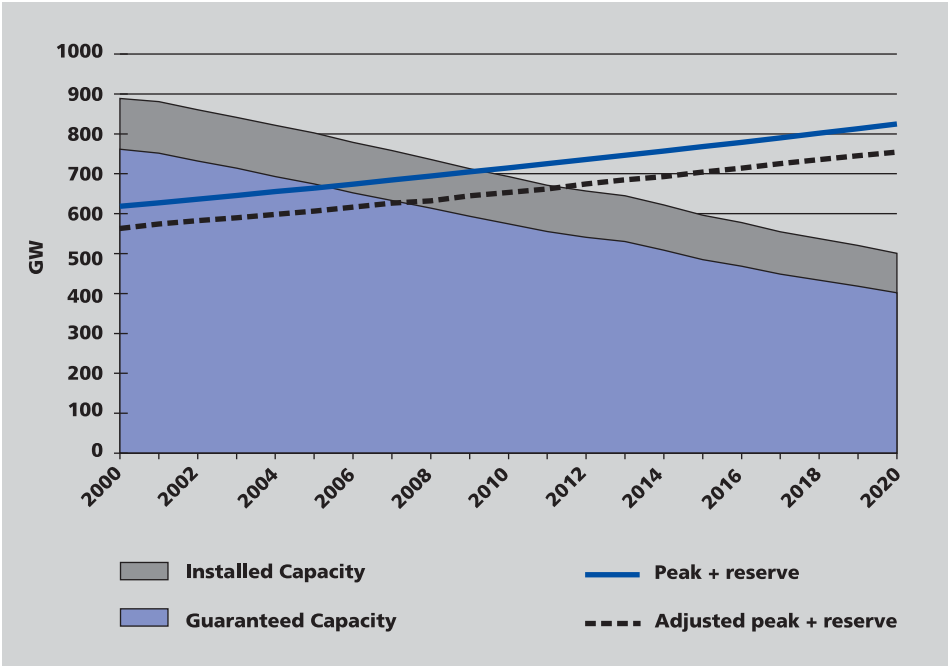
Table 6 **Projected years for elimination of excess capacity**

Regional Blocks	Year
Baltic States	2007
Bulgaria & Romania	2014
Transcaucasus	2006
Central Asia	2008
CENTREL	2004
Eastern Europe	2007
NORDEL	2005
European Russia	2004
Southern Europe	2007
UCTE	2006
Eurasian ECT	**2006**

The peak demand shown in Table 5 for the Eurasian ECT regions is the simple summation of all the individual regional peak demands. In reality, the regional peak demands are unlikely to coincide and the figure of 530 GW in 2000 is, therefore, higher than the integrated total network. The actual total peak could be around 40-50 GW lower, implying a total peak of 480-490 GW in 2000 and a surplus capacity of almost 200 GW. If this is the case, then the excess capacity will be eliminated in 2008 rather than in 2006.

Figure 9 shows the supply/demand balance for the Eurasian ECT region as a whole. The figure includes the summation of the regional peak plus reserve capacity requirements, as well as an estimate of the Eurasian ECT area's peak coincidence demand and reserve requirements (adjusted peak plus reserve). Figure 9 shows that the total installed capacity for that area falls by 400 GW, from just under 900 GW in 2000 to 500 GW in 2020. The growth in peak demand is expected to be around 165-185 GW over the same period, with the peak-plus-reserve requirement increasing by about a third between 2000 and 2020, from around 600 GW to between 700 and 800 GW.

Figure 9 **Supply/Demand balance for Eurasian ECT as a whole**



Source: ECON

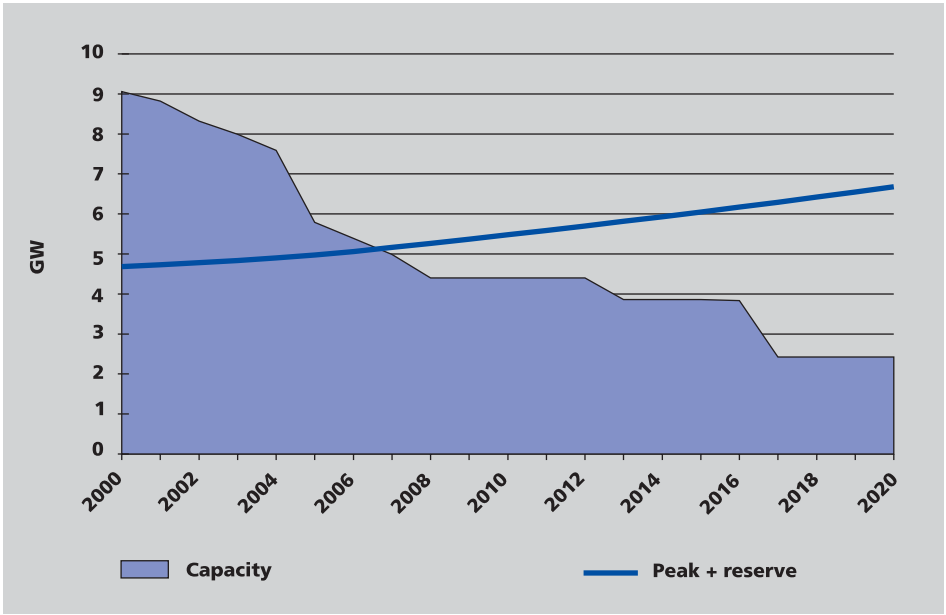
The supply/demand balance for the Eurasian ECT area as a whole is expected between 2006 and 2008. One advantage of integrating the regions is the ability to pool spare capacity and delay the need for additional new capacity in some regions. However, achieving this benefit is subject to having the necessary infrastructure in place to transfer power from regions with excess capacity to those with the deficits.

5.1.2 Baltic States

In the Baltic States, surplus capacity was 4.4 GW in 2000, almost half of the region's total installed capacity. Estonia, with an installed capacity of 2.8 GW, has some shale-fired capacity that is older than 30 years and in some cases older than 50 years. Almost all of Estonia's capacity is due to be retired by 2010. Latvia has just 2 GW of installed capacity, most of which is hydro power and is expected to remain in operation with on-going maintenance of the turbines. Lithuania has the region's largest installed capacity (4.2 GW), including the only nuclear station - the two-unit Ignalina plant. The 1200 MW Ignalina I is due to be decommissioned in 2005, ahead of schedule, in response to fears over the safety of the reactor design. It is yet unclear whether Ignalina II will remain operational for its full 30-year technical life, which implies retirement after 2017.

Peak demand for the region as a whole is expected to grow by an annual average of 1.2% between 2000 and 2005 and by 2.0% per annum thereafter. The current surplus capacity of 4.4 GW will be eliminated by 2007. A deficit of 1.1 GW may emerge by 2010 and grow to 4.3 GW by 2020.

Figure 10 **Supply/Demand balance for the Baltics**



Source: ECON

5.1.3 Bulgaria & Romania

Bulgaria and Romania have a combined surplus capacity of 14.6 GW, equivalent to half of their combined installed capacity. Electricity consumption and peak electricity demand have continued to fall and are only now expected to turn around and start to grow. As a result, the region has been left with a vast over-capacity. In addition, the amount of capacity that is due to be retired is fairly limited, with the region's installed capacity calculated to drop by just 3.3 GW between 2000 and 2005 and by a further 4.6 to 21.6 GW by 2010.

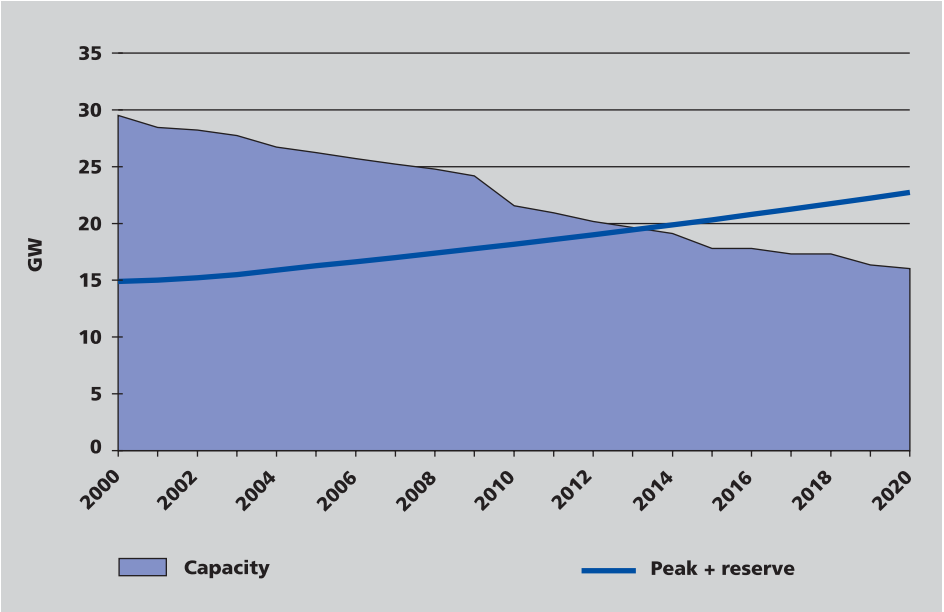
Peak demand is expected to grow at 1.8% annually between 2000 and 2005, accelerating to 2.2% between 2005 and 2010 and to 2.3% thereafter. As a consequence, the surplus capacity may persist until 2014. The long-term development of the Bulgarian electricity system is subject to considerable uncertainty. Therefore, two scenarios with minimum and maximum electricity demand have been elaborated. Each of them has four sub-scenarios depending on the schedules for decommissioning of Kozloduy NPP units 1 to 4 and two sub-scenarios depending on the minimum and maximum electricity exports. In the case of maximum electricity demand-decommissioning of units 1 and 2 by 2003, decommissioning units 3 and 4 by 2006 and minimum exports, -a 600 MW capacity will be needed in 2010. In the case of minimum electricity demand-decommissioning of Kozloduy NPP units after accomplishing 30 years of efficient operation and minimum exports, -a 600 MW capacity will be needed in 2015. Both Bulgaria and Romania have a large amount of hydro capacity that is expected to remain in operation with the required maintenance of the turbines.

Bulgaria has 13.2 GW of installed capacity, but the available capacity is only 10.2 GW. The 3 GW reduction is due to the following reasons:

- 30% of the installed thermal capacity has been operating for more than 30 years;
- 25% of the installed thermal capacity is for cogeneration in industrial and district heating plants which operate at 30% of their capacity;
- the change of hydro-technical conditions reduces the installed capacity in HPP and PSHPP from 2.86 GW to 1.8 GW.

In 2002, Bulgaria has an over capacity amounting to 1.48 GW which is 14.4% of the country's total available capacity. Electricity consumption has slowly increased in recent years and this tendency is expected to continue in the future.

Figure 11 **Supply/Demand balance for Bulgaria and Romania**



Source: ECON

5.1.4 Transcaucasus

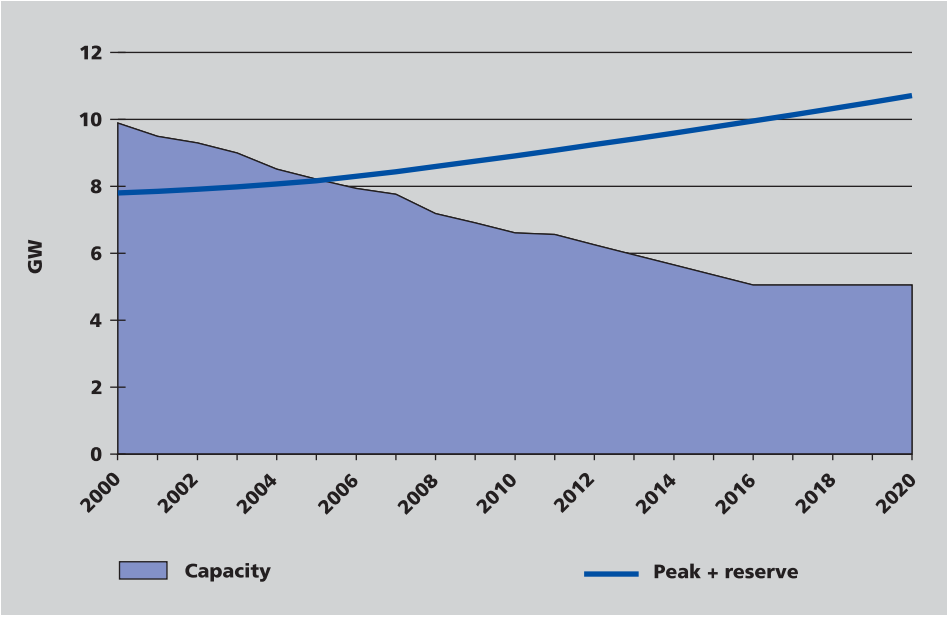
In 2000, total installed capacity in the three Transcaucasian countries was almost 10 GW, of which an estimated 2.1 GW (over 20%) has surplus capacity. Azerbaijan accounts for half of the installed capacity for the whole region, while Armenia and Georgia account for 27% and 22% respectively. The region is relatively rich in hydropower which accounts for 30% of total installed capacity.

Armenia and Georgia have an even higher hydro dependence on hydro, representing 35% and 40% of these countries' installed capacities respectively. Armenia also has the region's only nuclear station - the 376 MW Metsamor plant. The first 176 MW unit of this plant may be decommissioned in 2004 at the age of 33 years. The second 200 MW unit is five years younger and therefore may remain in operation until around 2010 or until there are sufficient funds to replace it with thermal units.

A 400-MW hydro facility was commissioned in Azerbaijan in 2000 and construction continues on the 850-MW Inguri hydro station in Georgia. The Inguri plant is due to be completed in stages with 150 MW due on-line in 2003 and the entire project completed by 2007.

Overall, the region's total installed capacity is expected to decline by just 1.7 GW between 2000 and 2005, with a further 1.6 GW retired by 2010. The region's peak demand is expected to increase at an average annual rate of 0.9% between 2000 and 2005, accelerating to an annual average of 1.8% from 2005 to 2010 and 1.9% per annum thereafter. As a result, the current surplus capacity would be eliminated by 2006 and a deficit of 2.3 GW would emerge by 2010.

Figure 12 **Supply/Demand balance for the Transcaucasus**



Source: ECON

5.1.5 Central Asia

In Central Asia, the surplus capacity is estimated at about 12 GW, or almost 30% of the total installed capacity of 41 GW. Kazakhstan and Uzbekistan have the largest installed capacities, representing 42% and 24% respectively of the region's total. The other countries account for 10-15% each of the total. The total installed capacity is expected to decline by almost 6 GW between 2000 and 2005 and a further 8 GW by 2010. Most of the declines will occur in Kazakhstan and Turkmenistan.

Most of Kazakhstan's capacity is located in the north where 70% of the country's electricity is consumed; almost all of this is coal-fired. Kazakhstan has the United Electricity System which unites networks of Northern and Southern Kazakhstan. These networks are connected via the 500 KV power lines. There are connections with Russia in the North and with Central Asia in the South. The system is self-sufficient and does not depend on imports. Moreover, it has export capacities. The power shortages and, consequently, imports occur only in Western Kazakhstan where networks are isolated from the United Electricity System and connected with Russia. For this region, it was more advantageous to buy electricity from Russia than to built expensive power stations. Imports from Russia help to meet peak demand in the north, while imports from Central Asia and deliveries from the north (through a 500 kV line) offset a deficiency of baseload power in the south. Kazakhstan had planned to build a 640 MW nuclear power station near Lake Balkash, but in September 2000 the government shelved the project.

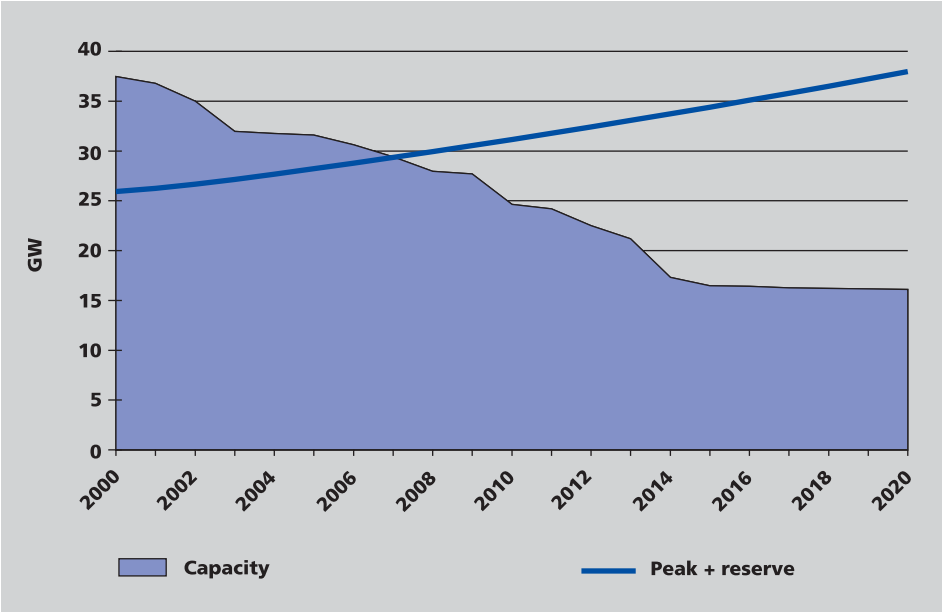
Uzbekistan has a large amount of gas and coal-fired capacity, and is in the process of building the first 800-MW unit of the Talimardjan gas-fired station which should come on-line in 2004. The Talimardjan project proposes the construction of eight units with a combined capacity of 6 400 MW. Only the first unit has been included in the projections of the region's installed capacity since commissioning dates for the other units are uncertain, as indeed is the number of units that will finally get built. The Ministry of Power Energy's "Plans for the Reconstruction and Development of Energy Generating Capacities" for the period 2001 to 2010 includes only the completion of the first unit at Talimardjan. Moreover, a new 370 MW coal-fired station in Tashkent is due on-line in 2005.

Turkmenistan relies entirely on very old thermal capacity. Almost the entire installed capacity will exceed its operational life by 2012 unless refurbishments are undertaken.

In Tajikistan, almost the entire capacity is in form of hydropower and is likely to remain operational over the next twenty years. In Kyrgyzstan, half the installed capacity is hydro with the rest made up of CHP units, the largest of which was installed in the mid-1990s and will remain operational beyond our projection period.

The peak demand for the region as a whole is expected to grow by an annual average of 1.7% between 2000 and 2005, accelerating to 2.0% per annum between 2005 and 2010 and settling at that growth rate thereafter. The surplus capacity for the region will be eliminated by 2008 and a deficit of 6.5 GW will emerge by 2010, widening to around 20 GW by 2015-20.

Figure 13 **Supply/Demand balance for Central Asia**



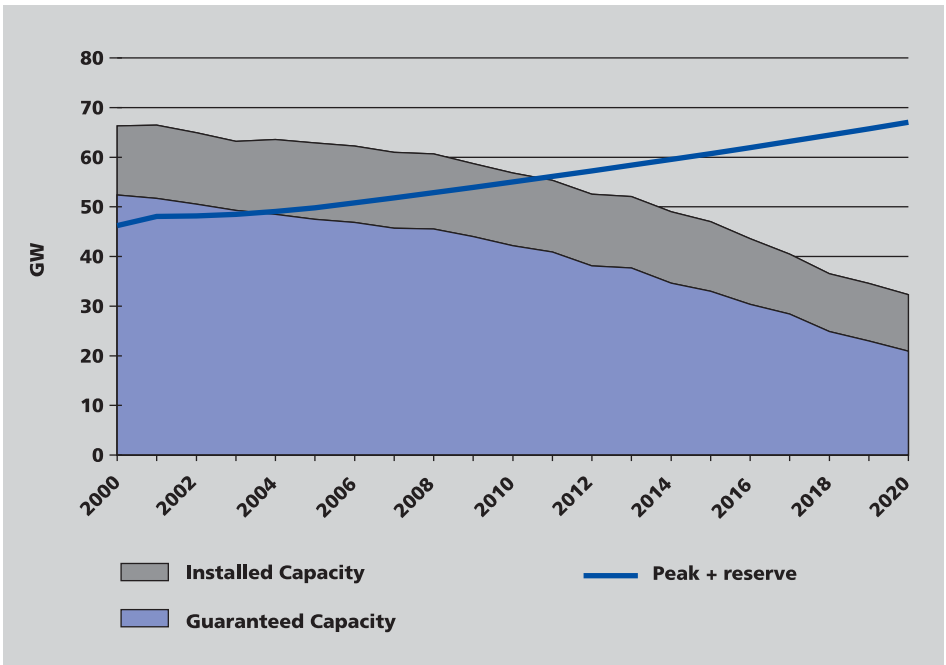
Source: ECON

5.1.6 CENTREL

The CENTREL region has an installed capacity of 66.3 GW, with CHP units accounting for 40% of this capacity. In the winter months, these units operate at maximum heat output and this reduces the amount of electricity they can produce. Data from CENTREL and the UCTE indicate that, in total, only 80% of the installed capacity is available at peak load because the CHP units operate at maximum heat output. In other regions, this is less of a problem because CHP units accounts for a much smaller share of the total installed capacity.

The impact of the lower guaranteed capacity can be seen in Figure 14 which shows the development of installed capacity, guaranteed capacity at peak load and the growth in peak load plus the reserve margin. The current capacity surplus is estimated at 6.2 GW (9% of the installed capacity) but, if all the installed capacity were available at peak load, the surplus would be 20 GW. The surplus capacity will be eliminated by 2004, but this would have been extended to 2011, if all the installed capacity were available at peak demand.

Figure 14 **Supply/Demand balance for CENTREL**



Source: ECON

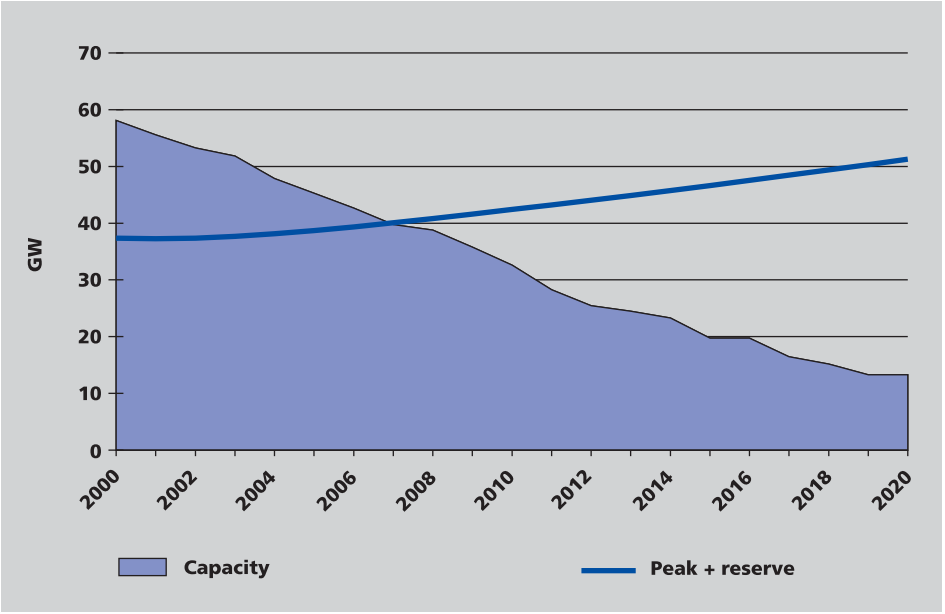
In the Czech Republic and Slovakia, new nuclear capacity is due to be commissioned in the near term. The Czechs have two 1 000 MW units at Temelin due to be on-line in 2001 and 2004, while the Slovaks have two 440 MW units due on-line in 2004 and 2005. Poland is the only country without nuclear generation capacity, but has the largest total installed capacity within the region - 35 GW, or just over half of the CENTREL total. Poland's capacity is dominated by coal-fired generation.

For CENTREL as a whole, there are only modest net capacity retirements between 2000 and 2005 (3.4 GW or 5% of the current installed capacity) and an annual rate of decline of 1.0%. There will be a slight acceleration between 2005 and 2010, with the loss of 6.1 GW and a rate of decline of 2.0%. By 2010, 85% of the 2000 installed capacity will remain operational, with the figure dropping to just under 50% by 2020.

5.1.7 Eastern Europe

Installed capacity in this region was 58.1 GW in 2000, with a peak demand of 32.5 GW and a surplus capacity of over 20 GW. The Ukraine is the largest source of installed capacity, accounting for 86% of the region's total (50 GW). Belarus has an installed capacity of 6.7 GW, while Moldova has only 1.3 GW. Belarus' capacity is ageing and, by 2005, only a third of its current installed capacity will be within its operating life. However, most of Moldova's capacity is expected to remain in operation until after 2010, while Ukraine's installed capacity is expected to be around 80% of its 2000 value by 2005 and 60% by 2010.

Figure 15 **Supply/Demand balance for Eastern Europe**



Source: ECON

A fifth of Ukraine's installed capacity is nuclear power and, while the last of the Chernobyl units was decommissioned in December 2000, there are two new stations under construction. These new plants, at Rovno 4 and Khmelnitsky 2, are 1000 MW each and are due to come on-line in 2003 and 2005 respectively.

Electricity consumption in Eastern Europe has fallen consistently since 1990, with a similar picture in all three countries. Consumption is expected to increase from 2002, with peak demand for the region as a whole increasing by an annual average of 0.7% between 2000 and 2005, and 1.9% between 2005 and 2010. The surplus capacity may disappear by 2007, and a deficit of 10 GW may open up by 2010. By 2020, a total of almost 40 GW of additional capacity is required, with just 23% of the current capacity remaining operational.

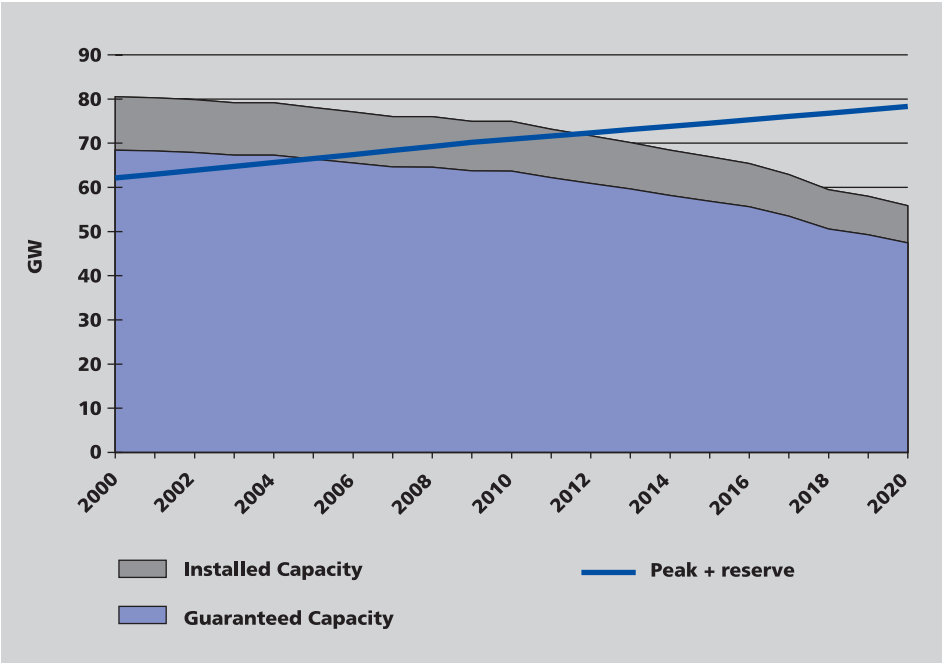
5.1.8 NORDEL

Installed capacity in NORDEL was 80.5 GW in 2000, with more than 50% hydropower capacity and 15% nuclear capacity. The heavy dependence on hydropower reduces the total amount of capacity that is available at peak load to about 85% of the total installed capacity. As a result, the surplus capacity is reduced to just over 6 GW, instead of almost 20 GW if all the installed capacity were available.

The major uncertainty concerns the timeframe for the decommissioning of Sweden's nuclear power stations. One of the two 600-MW reactors was closed at the Barseback station at the end of November 1999, with closure of the other unit occurring in July 2001. Sweden has three remaining nuclear stations with a combined capacity of 8.8 GW. Since the decommissioning of these stations remains uncertain, it is assumed here that they will remain operational for the duration of their technical life, that is, beyond 2020.

The Finnish authorities have been considering the construction of a fifth nuclear reactor. Since no decision has yet been taken, this reactor has not been included in these calculations.

Figure 16 **Supply/Demand balance for NORDEL**



Source: ECON

5.1.9 European Russia

In European Russia, installed capacity is 150 GW, out of a total of 205 GW for Russia as a whole. However, 50-70 GW of the installed capacity is already beyond its technical operating life and, without further refurbishment, around 50 GW may be decommissioned by 2005 and a further 34 GW by 2010. Given the age of the current installed capacity, only 18 GW will remain within its technical operating life by 2020.

Electricity consumption started to grow in 1999 and 2000. In 2000, it was almost 7% higher than in 1998, but peak demand was only 4% higher. This reflects the fact that the turnaround in electricity consumption has occurred in the industrial sector, which tends to contribute more towards base-load demand than to peak demand. The residential and commercial sectors, which contribute relatively more towards the peak than to base demand, are still experiencing a decline in demand, and this has led to a growth in peak demand that is slower than that of overall electricity consumption.

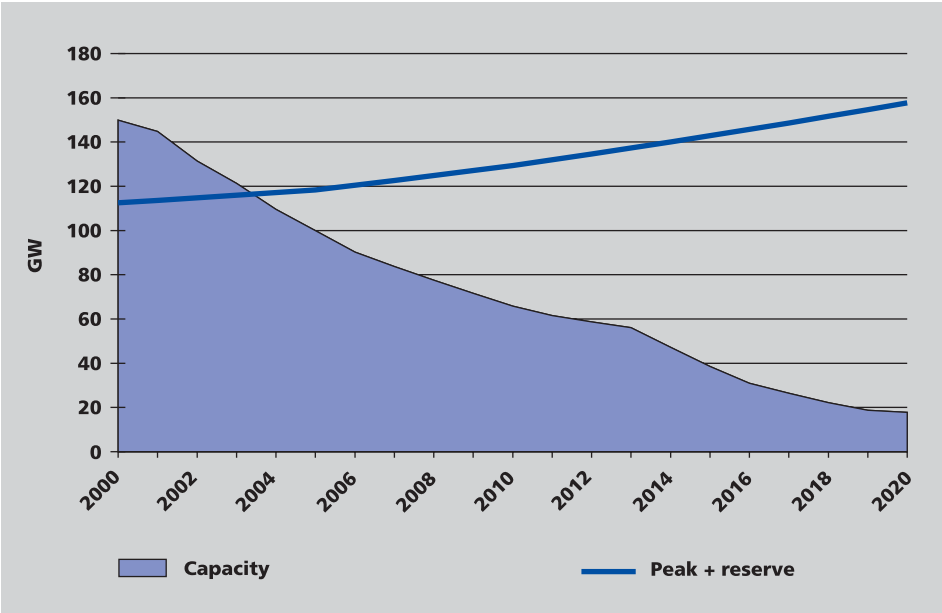
Changes in the tariffs for residential consumers are expected to ensure that peak demand does not increase in line with overall consumption in the short to medium term. Data from the CDO indicates that total European Russia electricity consumption is expected to grow by an annual average of 1.7% between 2000 and 2005, and by an annual average of 2.4% between 2005 and 2010. It is anticipated that peak demand will increase annually by 1.0% and 1.8% for the same periods respectively. After 2010, peak demand and overall electricity consumption are expected to increase at the annual rate of 2.0%.

The developments of installed capacity and peak demand plus the minimum reserve requirement are shown in Figure 17. The current surplus capacity of 37 GW is expected to be removed by 2004, primarily due to the retirement of capacity. A third of the installed capacity is over 30 years old and will need to be refurbished. Assuming that it is retired instead of being refurbished, a huge deficit will open up as decommissioning continues and peak demand increases. The deficit may reach more than 60 GW by 2010 and over 100 GW by 2015.

Offsetting this deficit could be achieved through some refurbishment of existing capacity, but in a number of instances the cost of refurbishment is likely to exceed the cost of building new capacity or of importing electricity. Reducing network losses could also help to delay the eradication of the existing surplus capacity, possibly to 2006 if losses were brought into line with the OECD average. Losses in the European Russian network are largely associated with old and inefficient equipment, as well as the long distances over which electricity is transmitted. Investing in new infrastructure will be expensive and the resources are currently not available.

UPS has estimated that it needs between $6 billion to $11 billion annually from 2001 and 2005 to carry out refurbishment of existing plants and new builds. In addition, Rosenergoatom intends to complete the three nuclear power stations that are only partially built, adding 3 GW of new capacity. These stations are included in the installed capacity profile for Russia and are expected to be commissioned by 2003. Of the existing nuclear plants, 2.5 GW will reach its 30-year operational life by 2005 and 4.7 GW between 2005 and 2010. Just 3.8 GW will remain within its 30-year operational life by 2020, out of a total nuclear capacity of 20 GW.

Figure 17 **Supply/Demand balance for European Russia**



Source: ECON

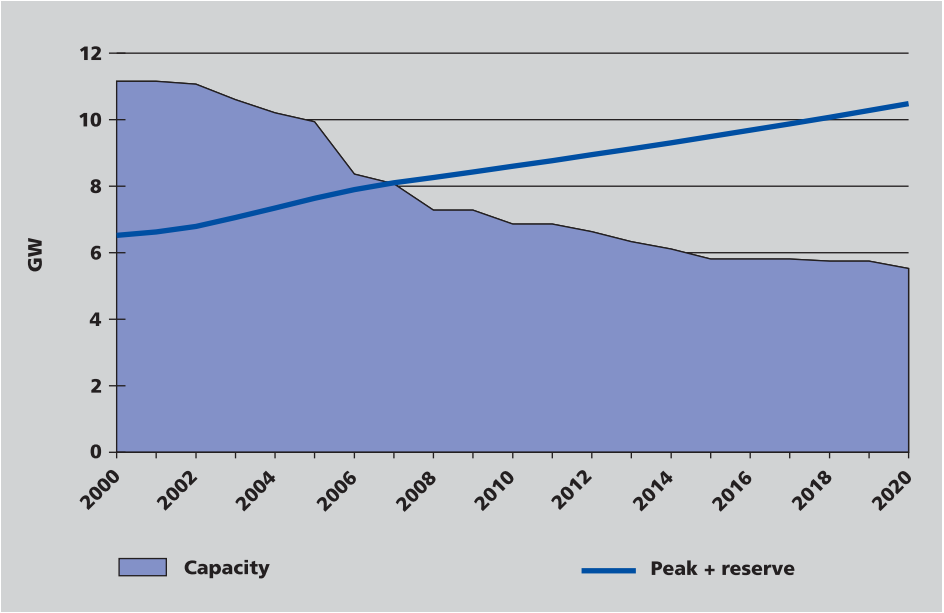
5.1.10 Southern Europe

In Southern Europe (excluding Yugoslavia[28]), the installed capacity was 11.2 GW in 2000 with a surplus capacity of almost 5 GW. The turmoil of the wars in the Balkans has sharply reduced peak demand. Rebuilding of the economies is expected to lead to a rapid rise in peak electricity demand, although structural changes will mean that the peak does not rise as fast as total electricity consumption. Peak demand is projected to increase by an annual average of 3.1% between 2000 and 2005, and by 2.4% from 2005 to 2010. Thereafter, peak demand will increase by an annual average of 2.0%. The growth in peak demand will be particularly strong in Bosnia and Herzegovina and less pronounced in Slovenia and Macedonia. In Croatia, structural changes are expected to limit the growth in peak demand.

[28] Data for Yugoslavia is of limited value given the destruction that occurred to power units. The UCTE indicated that installed capacity was 10 646 MW in 2000 and peak demand was 7 471 MW. Given that over a third of the installed capacity is hydro, the capacity available at the time of the winter peak is more or less equal to the peak demand plus reserve margin. It is uncertain as to how much capacity is still out of service. The Yugoslavian Minister of Energy estimated that the energy infrastructure needs were around $7 billion at the end of 2000. Currently, Yugoslavia is a net importer, but prior to the wars it was a net exporter. In the medium term, Yugoslavia could again become a net exporter. However, for the moment we assume that capacity additions will meet the growth in peak demand and that Yugoslavia has no surplus or deficit capacity.

There is a large amount of capacity that will either need to be replaced or refurbished by 2010. This figure is estimated to be around 4.3 GW, or 40% of the current total. Croatia and Slovenia both have about 1 GW that falls into this category. Bosnia and Herzegovina has over 1.5 GW and Macedonia has less than 0.5 GW. The region's surplus capacity is expected to disappear by 2007 and a deficit of almost 2 GW to emerge by 2010, expanding to 5 GW by 2020.

Figure 18 **Supply/Demand balance for Southern Europe**



Source: ECON

In Bosnia and Herzegovina, about half of the installed capacity was no longer in operation after the war. However, 80% of capacity had been restored by 2000, while demand remained 50% below its pre-war level. The utilities in Bosnia and Herzegovina expect electricity consumption to expand quickly through 2003, with growth rates averaging 11% per annum. Most of this growth is predicated on the assumption that heavy industry will also grow rapidly and lead to a large increase in base-load consumption. However, the utilities expect residential and commercial demand to also increase, and this should drive up peak load demand by 15-20% per annum between 2000 and 2005.

In Croatia, the power sector was not as badly affected as it was in Bosnia and Herzegovina, and pre-war capacity was quickly restored. The main controversy has surrounded Slovenia's Krsko nuclear power station, which Croatia helped to build. Slovenia and Croatia finally agreed to joint ownership of the plant, with supplies to the Croatian market expected from July 2002. The growth in peak demand in both Croatia and Slovenia is expected to reflect the more modest growth expectations for electricity consumption in these countries than in Bosnia and Herzegovina. Both Croatia and Slovenia have a large hydro power park, which is likely to remain operational over the next twenty years.

In Macedonia, there is a mix of hydro and lignite-fired capacity. The end of the war has seen a sudden increase in electricity consumption. The Macedonian utility Elektrostopanstvo Na Makedonija (ESM) has put forward an investment programme to meet the expected robust growth in demand. This foresees the commissioning of 809 MW by 2015 that, taking into account the expected retirement of existing capacity, would raise the installed capacity from 1 390 MW today to 1 420 MW in 2015. These plans have not been included in our outlook for installed capacity in the region since the programme is yet to be finalised and the finance is yet to be put in place. With this capacity included in the regional totals, the deficit foreseen in 2015 would be cut from 3.7 GW to less than 3 GW.

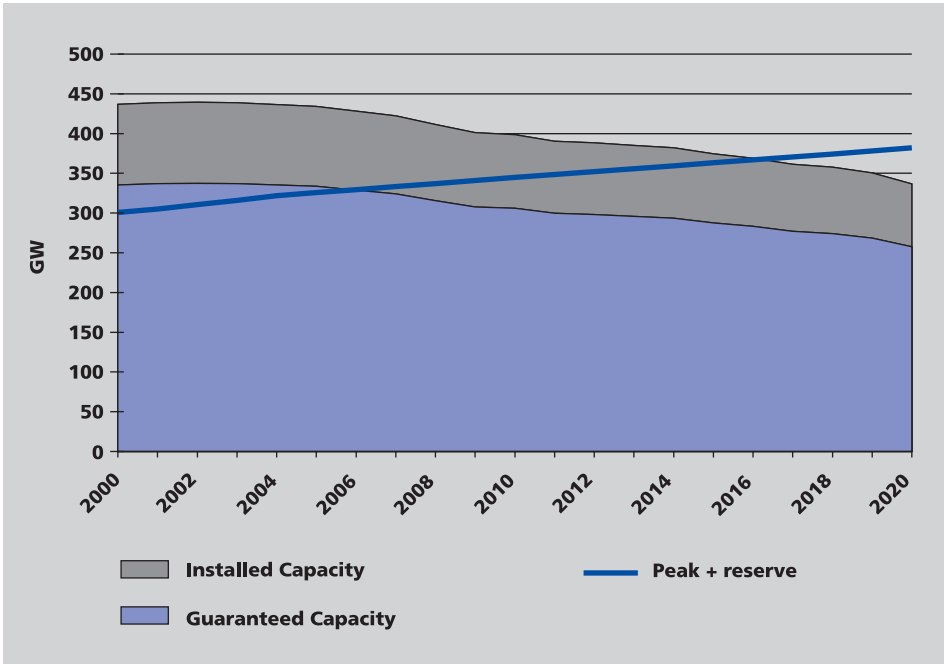
5.1.11 Western European UCTE

Total installed capacity in the UCTE was 436.7 GW in 2000, representing almost half of total installed capacity in the Eurasian ECT area. However, significant hydro and CHP capacities reduce the amount available at peak load by just over 100 GW. As a result, the capacity surplus is limited to 34 GW, which is equivalent to 8% of the installed capacity and over 10% of the available peak load capacity.

France, Germany and Italy account for the lion's share of total installed capacity, with a combined total of 290 GW (66% of the UCTE total). The largest capacity reductions are expected to occur in Germany where most capacity is based on coal-fired technology. Around 34 GW is expected to have exceeded its operating life by 2010, with a further 29 GW by 2020. In France, the dominance of nuclear capacity built up over the 1980s and early 1990s means that there is no net decline in the installed capacity between 2000 and 2010, and only a modest decline of less than 20 GW between 2010 and 2020. In Italy, a total of over 8 GW is expected to be retired by 2020. Overall, the installed capacity for the UCTE is expected to fall by 38 GW between 2000 and 2010, and by 62 GW from 2010 to 2020. In 2020, the existing capacity that remains within its operating life is estimated to be about three-quarters of the installed capacity in 2000.

Figure 19 shows the development of UCTE capacity and peak plus reserve margin. The current surplus of 34 GW will be eliminated by 2006 and a deficit of almost 40 GW will emerge by 2010. By about 2016, the peak demand plus reserve margin will exceed the installed capacity and in 2020 the deficit will exceed 100 GW.

Figure 19 **Supply/Demand balance for Western European UCTE**



Source: ECON

In Germany, there are plans to construct 4.4 GW of Combined Cycle Gas Turbine (CCGT) gas-fired capacity. However, the current overcapacity in Germany has meant that none of the proposed projects has moved into the construction phase. Hence, our projections do not include these units. Elsewhere in the UCTE, there is a planned dash for gas-fired CCGT in Italy (11.2 GW) and Spain (12.8 GW). In Italy, the projects are all in the planning stage and are subject to a high degree of uncertainty given the existing overcapacity in the Italian market. In Spain, the new CCGT capacity is part of a programme to adapt existing oil-fired stations to gas in the wake of the arrival of large amounts of piped gas into the country. The net effect is only a modest increase in the countries' total installed capacity.

For France, it is assumed that no new nuclear capacity is built before 2020. The current policy has been to defer the next phase of nuclear construction until the surplus capacity is absorbed sometime after 2010. It is not clear when any new capacity would be built, and rather than speculate on possible dates, we have not included any new French nuclear construction. Elsewhere, the 450 MW Borssele nuclear station in the Netherlands is scheduled to be decommissioned in 2004.

In Belgium, no decommissioning of nuclear stations is expected before 2015, but some 1.7 GW may be decommissioned between 2015 and 2020. In Germany, it is more difficult to foresee when the first units will be closed. This is because the German government has determined how much power can be generated from nuclear plants based on the existing installed capacity and an assumed life of 32 years and load factor of 80%. This total production is then divided between the plants and existing generation is deducted. The generators can then reallocate the production between stations in order to maximise their operations. This could mean that some older units will be closed earlier and the production reallocated to a newer nuclear plant. Based on the age of the units, it is expected that around 2 GW of German nuclear capacity may be decommissioned by 2015.

5.2 Planned expansions of generation capacity and interconnections

5.2.1 New generation capacity

Most of the additional new capacity under construction is for new nuclear and hydro stations that have relatively long lead-times. Thermal capacity additions, especially CCGT gas-fired capacity, can be built much more quickly, in some instances within two years. The current over capacity in all regions is limiting the need for new additions and, although there are plans to build new gas and coal-fired capacity, most of it has been postponed until the surplus declines. This is exemplified by an analysis of planned capacity additions in Western Europe, where at the beginning of 2001 there were proposals for the addition of 52 GW of gas-fired CCGT, although only just under 7 GW was actually under construction (mostly in the UK and Spain). It is expected that most of the 52 GW will be deferred until the current surplus capacity is absorbed. For the purposes of our supply/demand projections, we have included only capacity under construction (as opposed to planned capacity).

Capacity under construction (as of 2002) is as follows:

- Bulgaria - 600 MW Benene 1 nuclear reactor, due on-line in 2006;
- Georgia - 850 MW Inguri hydropower project, due on-line between 2001-2007;

- Kazakhstan - 2 680 MW of CHP units (initially due on-line between 2002-2005, but now delayed until after 2005);
- Uzbekistan - 800 MW Talimardjan gas-fired CCGT, due on-line 2004 (this is supposed to be the first of 8 x 800 MW units, though only the first is included in our calculations);
- Czech Republic - 2 x 1 000 MW Temelin nuclear station, due on-line in 2001 and 2004 (the first unit was completed at the end of 2000 and was initially scheduled to come on-line in July 2001);
- Slovak Republic - 2 x 440 MW nuclear station, due on-line in 2004 and 2005 (Mochovce 3 and 4);
- Ukraine - 2 x 1 000 MW nuclear capacity, due on-line in 2003 and 2005 (Rovno 4 and Khmelnitsky 2);
- Russia - 3 x 1 000 MW nuclear stations, due on-line 2001-2003 (Kursk 5, Kalinin 3 and Rostov 1).

In addition, Finland is considering whether to build a fifth nuclear reactor at one of Finland's two nuclear power stations. No decision has yet been taken and therefore this station has not been included in our calculations.

5.2.2 New Interconnections

A number of projects to expand interconnection capacities are in various stages of development. The Russian-Finnish interconnection between Viborg and Yllikkälä has recently been expanded from 1 000 MVA to 1 400 MVA. Russia is also developing an East-West electricity "bridge" based on the HVDC links in Russia, Belarus, Poland and Germany. These existing links need upgrading to accommodate significant amounts of electricity trade and closer co-operation between all four countries. In September 2000, the UES reached an agreement to export 165 GWh of electricity to Poland's PSE which in turn re-exported it to Germany. The contract was renewed for 2001 covering 550 GWh, but larger exports will depend on expanding the HVDC connections. This is being undertaken under the EU's Trans-European Energy Networks programme.

The EU is also funding pre-development work for connections between Germany and Poland, Greece and the other Balkan countries, Spain and Morocco, and the Baltic States. The Baltic Ring proposal involves linking the eleven countries in the Baltic Sea region (Estonia, Latvia, Lithuania, Belarus, Russia, Poland, Germany, Denmark, Norway, Sweden and Finland) and forming an integrated electricity market. A joint electricity and gas study is to be followed by an analysis of the necessary links required for completion of the Ring, though no new links are expected to be in place before 2005.

A planned new 400 kV DC link between Poland and Lithuania is in its pre-development phase with new studies for the 1 450 MVA line currently underway. The project finance has not been forthcoming and the development of the new line is contingent on obtaining EU backing for at least half the construction costs. The problem has centred on the need for DC converter stations, since Poland and Lithuania's networks are not synchronous. There are also some doubts about the longer-term availability of supplies from Lithuania, since the line is designed to export surplus power from the Ignalina nuclear station. One of the station's units (1 200 MW) is due to be decommissioned in 2005, thus removing much of the rationale for the line. If the line does get built, it would also form part of the Baltic Ring development.

In a view to guaranteeing the reliability of the electricity system operation and safe supply in the context of Ignalina NPP decommissioning, it is planned to build an electricity bridge connecting Polish and Lithuanian electricity systems allowing for future integration of energy systems of the Baltic States and West Europe.

On 31 December 2001, a contract concerning the Lithuania – Poland electricity transmission inter-connector feasibility study was signed between the EBRD and a consortium headed by a company *IPA Energy Consulting Ltd* (UK). The consortium also includes Swedish companies SEK Advisory Services and SwedPower Consulting. The study was completed in January 2003. The recommendations and conclusions of the study will serve as a basis for making a decision on further implementation of the project.

In Kazakhstan, there are plans to increase the transmission capacity from the northern to southern network from 500 MVA to 700 MVA by 2005. There is also the possibility that a new line will be added, raising the total transmission capacity to 1 300 MVA.

In addition to these projects, there are proposals for new links from Turkmenistan to Iran, and from Armenia to Turkey, as well as a sub-sea link between Norway and the UK. However, none of these projects has gone beyond the planning stage. The 200-kilometre transmission line to supply electricity to Iran from Turkmenistan has been discussed since the early 1990s, but so far has not moved into the construction phase.

5.3 Electricity demand and capacity utilisation

Table 7 shows the breakdown of generation, trade and consumption by region. The expected growth in peak demand, which mirrors the growth in consumption, has already been discussed.

Table 7 **Generation, trade and gross consumption (2000)**

GWh	Generation	Exports	Imports	Consumption*
Baltic States	27 400	600	323	27 123
Bulgaria & Romania	92 813	2 713	962	91 062
Transcaucasus	31 100	300	1 169	31 969
Central Asia	129 400	0	1 848	131 248
CENTREL	283 678	21 415	6 229	268 492
Eastern Europe	197 200	2 749	7 468	201 919
NORDEL	377 159	7 786	4 488	373 861
European Russia	638 938	12 990	0	625 948
Southern Europe	72 490	6 027	10 790	77 253
UCTE	1 790 600	25 108	29 568	1 795 060
TOTAL	**3 640 778**	**79 687**	**62 844**	**3 623 935**

** including transmission and distribution losses*
Source: UCTE, CDO, CENTREL, NORDEL, National sources

Table 8 shows the expected development of gross consumption over time. Total gross electricity consumption for the Eurasian ECT area as a whole was 3 624 TWh in 2000.

Total electricity consumption is expected to increase by an annual average of 1.7% between 2000 and 2010 and by 1.5% between 2010 and 2020. These relatively modest growth assumptions conceal different trends between the Western European regions and those of the former UPS/IPS networks. In the combined UCTE and NORDEL regions, gross consumption will grow by an annual average of 1.4% between 2000 and 2010, slowing to 1.0% from 2010 to 2020. In the other regions, the rate of growth will be 2.3% and 2.1% respectively.

Table 8 **Outlook for gross consumption**

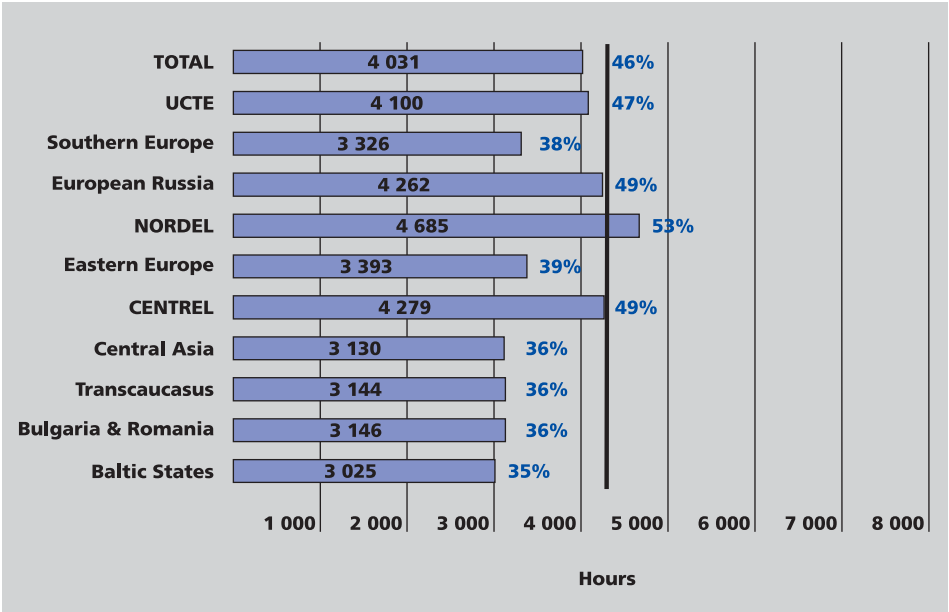
GWh	2000	2005	2010	2015	2020	% increase from 2000
Baltic States	27 123	29 219	32 657	36 057	39 809	46.8%
Bulgaria & Romania	91 062	104 545	116 562	128 694	142 089	56.0%
Transcaucasus	31 969	34 440	38 399	43 445	49 154	53.8%
Central Asia	131 248	148 495	172 146	194 768	215 039	63.8%
CENTREL	268 492	290 669	317 789	350 864	387 382	44.3%
Eastern Europe	201 919	213 272	241 297	269 034	299 959	48.6%
NORDEL	373 861	400 108	426 708	448 474	471 351	26.1%
European Russia	625 948	680 994	766 731	846 533	934 641	49.3%
Southern Europe	77 253	98 597	114 300	126 197	139 332	80.4%
UCTE	1 795 060	1 943 348	2 057 449	2 166 905	2 279 072	27.0%
TOTAL	**3 623 935**	**3 943 687**	**4 284 039**	**4 610 971**	**4 957 827**	**36.8%**

ECON estimates

In addition, the losses in the networks of the former UPS/IPS will be reduced, so that the delivered electricity consumption is expected to grow even faster. The IEA's World Energy Outlook (2000 edition) indicates that in 1997 network losses and own use accounted for 27% of electricity generation in the economies in transition (primarily the Baltic states, Transcaucasian region, Central Asia, Eastern and Southern Europe, Russia and Bulgaria and Romania). The IEA estimates that by 2020 these losses will be cut to 20%. The losses in OECD Europe are 15%, indicating that further reductions are possible in the economies in transition. This has important implications for electricity trade in the Eurasian ECT area as it could delay the elimination of existing excess capacity. If we assume that losses are reduced to the OECD average of 15%, then peak demand would be reduced by around 10% and excess capacity could be maintained for additional two to three years.

As far as electricity generation is concerned, if we assume that the UK and Morocco remain the only major destinations for exports from the Eurasian ECT area, then generation will need to increase by 660 TWh between 2000 and 2010, and by another 670 TWh by 2020.

Figure 20 **Capacity Utilisation (2000)**



Source: ECON, UCTE, CENTREL, NORDEL, CDO, US EIA, IEA

The low level of utilisation is a further indication of excess capacity. Figure 20 shows the level of capacity utilisation in various regions in terms of the average number of hours the installed capacity was used in 2000. In total, the combined installed capacity for all regions is used on average 46% of the time (just over 4 000 hours). There are two distinct groups of regions; those with utilisation below 3 500 hours (40%) and those above 4 000 hours (45%). The majority of the regions are in the former category, with the Baltic States' joint utilisation the lowest at 3 025 hours (35%), and those of Central Asia, the Transcaucasian region, Bulgaria and Rumania, Southern Europe and Eastern Europe between 3 100 hours and 3 400 hours. NORDEL has the highest utilisation at almost 4 690 hours (53%), followed by CENTREL, Russia and the UCTE where utilisation is between 4 100 hours and 4 300 hours.

5.4 Potential trade flows

There seems to be considerable potential for increased electricity trade between Eurasian ECT regions. The existing interconnection capacity is considerably under-utilised and there is spare generating capacity that could facilitate increased trade. The regional disparity in the level of surplus capacity and the period of time before it is eliminated will provide a significant driving force behind the development of electricity trade.

As Table 6 has indicated, the dates for likely elimination of surplus capacity vary by region. Russia and CENTREL have the earliest dates (2004), while Bulgaria and Romania have the latest date (2014). The opportunity for trade between Bulgaria and Romania and the CENTREL and European Russian regions is therefore a possibility. The main obstacle is the limited direct interconnection capacity between Bulgaria and Romania and these other regions. The main link is a 150 MVA line from Hungary to Romania. The lack of interconnection capacity can be overcome with new construction, while the absence of a common border between deficit and surplus regions will require power wheeling through third countries and a change in trading patterns.

The projections indicate that by 2005 there will be a deficit in Russia and CENTREL. CENTREL's deficit could be met through imports from UCTE using existing interconnection capacity: CENTREL's deficit is 2.3 GW, UCTE surplus is 7.9 GW and the interconnection capacity from UCTE to CENTREL is 3.2 GW.

The situation in Russia in 2005 will be much more complicated since the surplus capacity in Russia's neighbouring regions (11 GW) may be less than Russia's deficit (18.4 GW). In addition, the Russian deficit may be greater than the import capacity into Russia (3.4 GW). This implies that Russian production would have to be diverted from exports to domestic markets. Moreover, Russia's export transmission lines could be reversed to import power from other regions, but the capacity of these lines limits imports to only 10 GW.

For the Eurasian ECT area as a whole there remains a 10 GW surplus capacity in 2005, indicating that in theory the capacity is available to meet Russia's needs, though there is insufficient interconnection capacity between the surplus and deficit regions. The situation is further complicated by the absence of any surplus capacity in NORDEL where there is a large amount of interconnection capacity with Russia. To utilise this capacity, UCTE surplus capacity would need to be wheeled across the NORDEL network for onward delivery to Russia. The potential exports to Russia are therefore limited by these constraints.

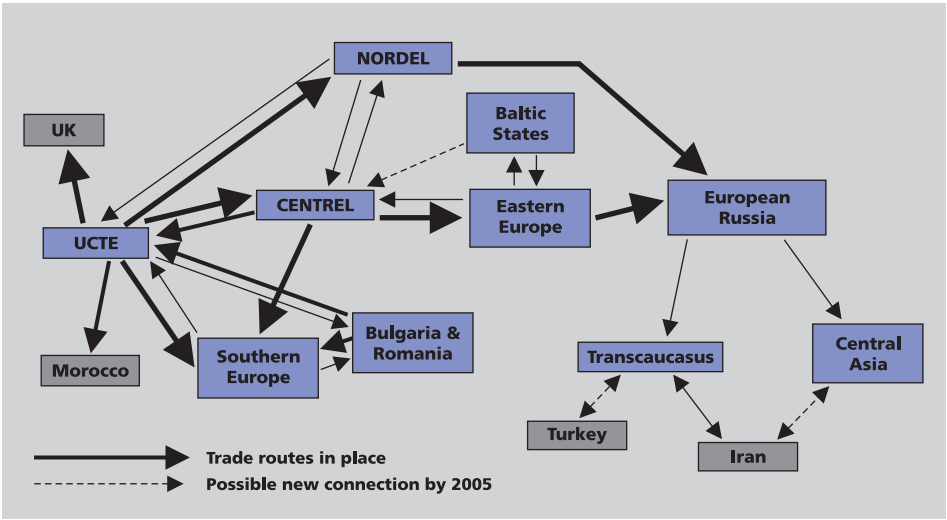
A more plausible option for Russia may be to expand interconnection capacity with Siberia or simply to build/refurbish its own generating capacity. There is a large amount of overcapacity in Siberia (around 10 GW made up of 6 GW of hydro and 4 GW of under-utilised coal-fired capacity). However, making it available to European Russia is complicated by the fact that the existing links go across northern Kazakhstan and are

outside the UES's direct control. In addition, the large distances involved to bring supplies to load centres in western Russia have prompted the UES to look eastwards (western China), for new outlets for its Siberian surplus. This provides an indication that the cost of moving the surplus to European Russia may be prohibitively high.

Elsewhere in the Eurasian ECT area, the surplus capacity that existed in 2000 will be absorbed to meet demand within the regions. By 2005, the Baltics, Transcaucasian region and NORDEL will all be more or less in balance. Only Bulgaria and Romania, the UCTE and Eastern Europe may have significant surpluses in 2005 (25 GW combined).

The existing "energy bridge" between Siberia and European Russia and passing through Kazakhstan was created as a key link of the Eastern part of the UES and consists of synchronised electricity transmission networks of 500 kV and electricity transmission network Siberia – Kazakhstan – Ural with voltage of 1150 kV. Due to the incomplete load of these networks and in order to decrease losses, the 1150 kV network is switched to 500 kV. But even under this regime the networks are under-utilised due to a fall in demand for electricity in the process of economic rebuilding in Kazakhstan and Russia.

Figure 21 **Potential electricity trade flows between regions (2005)**



By 2005, there may be a reversal in the East to West trade patterns of 2000. In the process, the Transcaucasian and Central Asian regions may become independent regions with the prospect of declining trade due to the curtailment of Russian exports. The hydro-rich Central Asian republics could develop new facilities for exports to Russia, but they are currently limited by the interconnection capacity between the Southern and the Northern Kazakhstan (500 MVA).

Beyond 2005, all regions but Bulgaria and Romania may have capacity deficits. The Bulgarian and Romanian surplus could be exported to the other Balkan states in Southern Europe and the UCTE. The constraint on these exports is the interconnection capacity, which would need to be increased from its 2000 level of 1 380 MVA to at least 2 000 MVA.

By 2015, even the Bulgarian and Romanian surplus is expected to disappear. Electricity trade will then depend on the relative cost of new capacity additions and the trade-off between electricity interconnection capacity and cost and fuel delivery systems. For example, new gas-fired capacity will have a lower marginal cost if it is based closer to the gas production fields. But this cost advantage may be offset by insufficient existing interconnection capacity and the high cost of new connections. It may well be cheaper to export gas using existing and new pipelines and build the generating capacity closer to the electricity demand. Experience suggests that the latter option is the least-cost one and, therefore, likely to be preferred. If this proves to be the case, the longer-term potential for electricity trade may be limited to inter-regional swaps based on differences in load profiles and seasonal changes in available generation.

The current surplus capacity may look attractive as a source of potential exports, but for that to occur a considerable amount of generation capacity will require refurbishing. However, in many cases the costs of refurbishment may exceed those of new construction. If the generation costs from refurbished units are also higher than the cost of new capacity in a potential electricity-importing region, then the units will not be viable and will be closed. How much of the existing generation stock is economically (as opposed to just technically) viable goes beyond the remit of this work. What is clear is that there is substantial investment requirement for new plants, refurbishment of existing plants and expansions of interconnection capacity over the next 15 years. Potential rewards from these investments will exceed those from increased trade.

Up to this point, the study reviewed the existing infrastructure and inter-regional trade in electricity and developed projections for excess generation capacity as an indicator of the potential scope for future trade. This economic analysis suggests that there is some near to medium term potential for increased electricity trade between Eurasian ECT regions. The existing interconnection capacity is considerably under-utilised and there is spare generating capacity that could facilitate increased trade. Longer term, excess capacity may decline gradually, thereby providing a constraint to increased trade flows. However, there will be a substantial requirement for investment in both new and refurbished generation plants. Creating the right climate for these future investments may bring opportunities for electricity trade in the long-term, particularly if it is accompanied by increased network integration.

The remainder of the study will review the most trade-restrictive governmental measures in the ECT area. This legal analysis will provide the basis for assessing whether the elimination of such barriers could contribute to creating more liberal trade and investment regimes in the future. An exhaustive screening of laws, regulations or administrative decisions was not feasible because of the resource and time constraints and limited availability of data. Instead, main regulatory barriers will be identified as per policy instruments (e.g. customs duties, import restrictions or state-trading practices) and will be exemplified by the practices of selected ECT countries.

6 How electricity is produced, traded and regulated

6.1 Definition of electricity: commodity or service?

Electrical energy is an intangible commodity that must be produced as it is consumed, which confers to it one of the typical characteristics of a service. On the other hand, electric energy has many functions of the same kind as oil or gas, the "goods" characteristics of which have never been questioned (and which compete directly with electricity). The distinction between a good and a service is crucial because international treaty rules for trade in goods differ from those for trade in services. Consequently, the treatment of electricity in an international trade dispute - under either the World Trade Organisation (WTO) or another instrument - varies depending on the classification of electricity as either a good or a service. This report concentrates on the goods component of the electricity sector, but barriers to trade in electricity as a service are also addressed in Chapter 9.

In the context of the WTO, the General Agreement on Tariffs and Trade of 1994 (GATT 1994) and other goods-related agreements[29] contain WTO members' obligations on trade in goods, while trade in services is governed by the General Agreement on Trade in Services (GATS). Should electricity not be defined as a good but as a service, foreign firms exporting electricity will enjoy rights under GATS, rather than under GATT 1994 and other Annex 1A Agreements. Similarly, should WTO members choose to define generation as a manufacturing process, foreign firms that seek to own or acquire power generation facilities will have no rights or privileges under either GATS or GATT.

The nature of electricity, i.e. the question of whether electric energy is a good and should be treated as any tangible product or a service, has long been subject to debate. The GATT - drafted in the 1940's - does not list the products to which its provisions apply. Nevertheless, it was clear from the outset that GATT was intended to provide rules and obligations on trade in goods and not services, with the exception of some aspects of services, such as transportation services, the treatment of which greatly affects the trading conditions of goods. The drafting history of GATT shows that, in the early years of GATT, electric power was not treated as a good[30] which might be explained by the non-storability of electricity.[31]

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[29] These other agreements are contained, together with the GATT 1994, in Annex 1A to the Marrakesh Agreement Establishing the World Trade Organization.

[30] See GATT, "Analytical Index. Guide to GATT Law and Practice", 6th Edition, Geneva, 1994, which quotes from the New York (Drafting Committee) Report noting that "As it seemed to be generally agreed that electric power should not be classified as a commodity, two delegates did not find it necessary to reserve the right for their countries to prohibit the export of electric power".

[31] WTO Secretariat, *op. cit.*, 1998.

Recent WTO debates regarding electricity show a tendency towards the general recognition that electrical energy, falls under the scope of the goods agreements (i.e. GATT and other Annex 1A agreements of the WTO), while the activities relating to electricity transmission, distribution and other related services fall under the scope of the GATS. This recognition is also reflected in the fact that many trading nations have undertaken WTO tariff bindings on electrical energy.[32]

Diverging views regarding the nature of electricity did not pose major problems as long as trade in electricity was occasional and reserved to national monopolies. Since the liberalization of the electricity sector in many countries and the consequential opening up of electricity markets for potential foreign suppliers, and also in the light of possible services trade liberalization under WTO, it has become essential to find a solution at the multilateral level to the longstanding goods vs. services debate concerning electric power.

In most European countries, electricity was always regarded as a good and most European customs tariffs contained a tariff line for electric energy. In the European Communities this issue was subject to several court proceedings where the European Court of Justice has consequently held the view that electricity constitutes a good and not a service.[33]

Electrical energy is classified in the Harmonized Commodity Description and Coding System (HS) of the World Custom Organization's (WCO) under Chapter 27.16. Electrical energy is an optional heading under HS, so that WCO Members are free to decide whether or not they accept to treat electricity as a good for tariff purposes. This optional character of electrical energy under the HS seems to reflect the fact that some countries do not regard it as a commodity but as a service.[34]

The status of electrical energy under the Energy Charter Treaty is unequivocal: it is listed in Annex EM of the Treaty (and in Annex EM I of the amended Treaty). This means that all GATT 1994 and other WTO Annex 1A agreements which have been incorporated by reference apply to the exportation and importation of electricity.

Since the ECT has only incorporated goods-related provisions of the WTO, the question of applicability of GATS to electricity trade does not arise. However, "economic activities

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[32] Electricity is included in the Schedule of Commitments to the GATT 1994 of most of the major trading partners (e.g. the United States, the European Communities and Canada). However, it is not included in Japan's and Mexico's Schedules. See Horlick, G., Schuchhardt, C. and Mann, H.: "NAFTA Provisions and the Electricity Sector", North American Commission for Environmental Co-operation, 2001.

[33] See for example ECJ Case C-158/94 Commission of the European Communities vs. Italian Republic. The Italian Government asserted that electricity does not constitute a "good" within the meaning of the EC Treaty and cannot therefore be covered by the Treaty provisions on the free movement of goods. It has contended that electricity displays much greater similarity to the category of "services" than to that of "goods" and therefore does not fall within the scope of Articles 30 to 37 of the Treaty *ratione materiae*. Italy has emphasized that electricity is an incorporeal substance that cannot be stored and has no economic existence as such, in that it is never useful in itself but only by reason of its possible applications. In particular, imports and exports of electricity are merely aspects of the management of the electricity networks which, by their nature, fall within the category of "services". The ECJ did not accept this reasoning and noted that "it is accepted in Community law, and indeed in the national laws of the Member States, that electricity constitutes a good within the meaning of Article 30 of the Treaty. It noted in particular that electricity is regarded as a good under the Community's tariff nomenclature (Code CN 27.16)".

[34] WTO Secretariat, *op. cit.* 1998.

in the energy sector", as defined in Article 1(5) of the ECT, fully cover energy services, including electric power services. Through its provisions on investments, the ECT regulates one of the four forms of trade in electricity-related services: trade through commercial presence, which – in broad terms – corresponds to the so-called Mode 3 supply under GATS (see chapter 9.1 for more detailed discussion).

6.2 Industry structure, regulation and competition

The electricity industry consists of four vertically related functions: generation, transmission, distribution, and supply. Generation is the production of electricity. It involves the transformation of primary energy sources such as coal or natural gas into electrical energy. Electricity production may use heating oil, natural gas, coal, nuclear power, hydro power (falling water), renewable fuels, wind turbines, and photovoltaic technologies. Transmission and distribution comprise the "wires" functions. Transmission is the high-voltage transport of electricity. However, transmission is not merely transportation, but it also involves the management of dispersed generators in a grid to maintain suitable voltage and frequency and to prevent system breakdown. Distribution is the low-voltage transport of electricity. Finally, supply of electricity is the sale of electricity to end-users. This includes metering, billing, and marketing, at the wholesale or retail levels.[35-36]

The regulation of the electricity supply industry is primarily motivated by the existence of natural monopoly conditions, externalities, and public good characteristics.[37] These conditions explain the traditional monopoly market structure of the industry as a whole. Traditionally, most countries treated the entire electricity industry as "natural monopoly" and in virtually all countries the electricity sector evolved with structures that were (and in many countries still are) vertically integrated generation, transmission, distribution and retailing. These vertically integrated structures were combined with either horizontal integration to include generators spanning an entire national network in a single firm, or with a complex set of cooperative arrangements linking individual control areas that are part of the same system.[38] In most countries – including in Europe – these vertically integrated companies were national monopolies – often state-owned – with exclusive rights to serve retail customers: electricity generation, transportation and distribution services were provided as a "bundle" to end-users.

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35 Steiner, F.: Regulation, Industry Structure and Performance in the Electricity Supply Industry, OECD Economics Department Working Papers No.238, 2000.

36 Though not a "business element" of the electricity sector, a fifth component may be added, which is system operation. System operation is the function performed in order to maintain the grid system in balance, as well as to maintain other quality attributes of electricity, by matching demand and supply equal at each moment in time. Behaviour by one user of an electricity system can change the costs of other users. These externalities imply that, at least up to relatively large geographic areas, system operation over a larger area is more effective than over a smaller area. This implies that system operation at any given geographic location is a natural monopoly activity and competition is not feasible. See OECD Reviews of Regulatory Reform: Regulatory Reform in Greece, OECD 2001.

37 On natural monopoly conditions, externalities and public good characteristics of the electricity supply industry, see Steiner, F., *op. cit.*, 2000.

38 Joskow, P. L., *op. cit.*, 1999.

However, natural monopoly conditions do not exist in some segments of the electricity supply industry. While transmission and distribution are often considered to be natural monopoly, generation and supply are potentially competitive.[39] Pooling (operation of the market) and dispatch are also considered natural monopolies, although some believe that these two are potentially competitive through decentralized contract trading.[40] As a consequence, regulatory reform has tended to functionally disaggregate ("unbundle") the industry at these levels and open some of these segments, typically generation and (retail and wholesale) supply, to competition.

One of the primary forces stimulating regulatory reforms, including privatisation and cross-border competition, resides in the historical record of poor economic performance of the electricity sectors in many countries, particularly those which traditionally relied on state-owned utilities. Regulatory reforms were additionally motivated by the general trends towards domestic economic liberalization and the need to not carve out the energy sectors from this process. In the ECT area, additional driving forces of electricity sector deregulation and liberalization include: the need for completing the European Union's single market; attracting foreign direct investment (FDI) by privatisation into transition economies' electricity generation and distribution and thus freeing public budget resources; progressive harmonization of national legislation of EU candidate countries with the EU's single market directives (the so-called "*acquis communautaire*").

As long as most countries operated their electricity industries through national monopolies, "trade in electricity" hardly occurred and, when it did, it was rather a physical exchange between adjacent countries' monopolists where interconnection lines were in place. Such physical exchanges were generally used to reduce the need for peak capacity in systems operating across several time zones, or to improve system reliability while decreasing the need for reserve capacity. Before the recent measures in many countries aiming at liberalizing the electricity sector and opening up the market for both domestic and foreign competition, there was no electricity "trade" in the full sense of that term, i.e. an immediate and competitive transaction between the buyer and the lowest-cost supplier, irrespective of geographic location.[41]

The most restrictive barriers to electricity trade are those, which relate to monopoly market structures, and hence raise competition policy and regulatory issues. The liberalization of trade in electricity as a good is linked to the liberalization of trade in electric power services and vice versa. The potential for international trade in electricity

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[39] For example electricity generation is no longer treated by regulators as part of the natural monopoly structure and is now open to competition in many countries. Indeed, electricity generation *per se* has never really been a natural monopoly, but rather, it is the attributes of the transmission network and it's ability to aggregate and facilitate the operation of generating facilities dispersed over wide geographic areas to achieve cost efficiency and reliability objectives over time frames from seconds to decades, that has played the most important role in defining the vertical and horizontal structure of the electricity industry. See Joskow, P. L., *op. cit.*, 1999.

[40] Klein, M.: "Competition in Network Industries", Policy Research Working Paper No.1591, The World Bank, 1996.

[41] Charpentier, J. P., and Schenk, K.: International Power Interconnections, in Public Policy for the Private Sector No.42, The World Bank, 1995.

greatly depends on the scope and depth of regulatory reforms. Access to electricity markets – both in terms of trade in goods and trade in services – is determined, largely, by policy measures relating to unbundling, competition in generation, non-discriminatory access to networks, and choice of suppliers. All these reform elements have a bearing on the extent of international trade.

While functional unbundling from generation, through transmission and distribution, to supply is a necessary precondition for contestable electricity markets, whether or not this is actually conducive to increased market access depends on the type of separation. For example, unbundling generation and transmission may be done either on the basis of an accounting separation within the existing incumbent or by legally separating the two activities into different companies. Generally, legal separation seems a better policy choice for ensuring market access than accounting separation which may not mitigate the advantage the integrated generator-transmission firm may have over potential entrants to generation by using discriminatory prices for use of the transmission grid.

A crucial market access issue in the opening of the electricity sector relates to the access to transmission and distribution networks. Without liberalized, non-discriminatory network access, liberalization of entry and termination of legal monopoly status is unlikely to lead to actual entry as potential entrants face discriminatory transmission rates or contracting hurdles imposed by incumbents. Non-discriminatory network access is achieved in most cases by introducing regulated third-party access (TPA), a legal obligation to provide network access under non-discriminatory and transparent conditions. An alternative is negotiated TPA, where the conditions of network access are subject to negotiations between the transmission operator on the one hand and suppliers and customers on the other hand. (Network access issues are further discussed in Chapter 8.8)

A further element of regulatory reform that has an impact on trade liberalization is access to consumers or - viewed from the opposite side - the freedom of consumers to choose suppliers. Full liberalization of trade assumes the absence of restrictions for foreign suppliers to sell directly to customers and also non-discrimination between consumers as to their choice of suppliers. Some countries have introduced consumer choice for large consumers phasing in full consumer choice gradually, while others introduced full consumer choice immediately upon adoption of electricity sector reform. Freedom of consumers to choose suppliers is further discussed in Chapter 8.4.

6.3 Trade policies in the sector

Trade policy in the electricity sector emerged with regulatory reforms, and more specifically with the gradual introduction of private participation and competition in the electricity industry.

Most of those countries that have already achieved full or almost full liberalization of their internal electricity markets tend to extend the liberalisation for their domestic regulation to the trade regulation with foreign countries.

However, ECT countries which are at the early stages of their internal liberalization tend to lean towards a more cautious opening of trade. Amongst the Central European countries, which have recently adopted new legislation in view of their future harmonization with EU membership requirements, some have adopted ambivalent policies concerning the conduct of electricity trade vis-à-vis non-EU (mainly CIS) countries. In Hungary for example, the legal possibility to apply future restrictions to imports from non-EU countries[42] has been prompted by concerns over security of supply.

Environment protection has recently become an important objective of electricity-related trade policies of some Western and Central European countries. Other ECT countries are also actively considering the use of trade measures for environment protection purposes. In countries which seek to achieve environmental objectives with trade policy instruments, bans and other quantitative types of border measures are used to prevent imports from unsafe nuclear power plants and highly polluting thermal plants, or to encourage exporting countries to adopt higher environmental standards.

The need to protect domestic producers against unfair trading practices of state-trading countries has been expressed in both the EU and some EU candidate countries. However, despite pressures for protection against alleged dumping practices by Central and Eastern European countries, no contingent trade remedies have ever been taken against them.

The question of "cheap" electricity imports is sometimes considered as a security issue. For example, when RAO UES Rossii began selling electricity to Belarus at a price that was reported to be US cents 1.1/kWh, this was perceived as potentially preventing the construction of new generating stations in the Baltics and, therefore, as a security risk to Estonia, Latvia, and Lithuania. It was suggested that "the best way to protect the independence of the electric sectors of Estonia, Latvia, and Lithuania would be to limit the total amount of net imports from Russia and Belarus to the Baltic countries".[43]

Trade policy objectives may also address exports, by relying on quantitative regulations. In the Russian Federation for example, the Federal Energy Commission sets export quotas; for the fourth quarter of 2001, there was an approximately 2 billion kWh export quota for nuclear power stations, while overall Russian electricity exports were fixed at 4.4 billion kWh.[44]

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42 Government Resolution No.2199/1999 (VIII.6.) states that "Security of supply requires that electricity supplies should only come from reliable sources. Unlimited imports from non-EU countries would imply supply security risks, and so there will have to be restrictions on such imports."

43 Charles F. Zimmermann: "Latvenergo and the Baltic Electricity Market", April 1999, found at http://www.erranet.org/library/baltics.htm.

44 Energo FSU/CE Power Report, 28 September 2001.

7 Treatment of electricity under multilateral and regional trade rules

7.1 Electricity trade in the WTO

7.1.1 Introduction

Though GATT has been in existence since 1947, no electricity related dispute has ever been raised under GATT or its successor, the WTO. A number of GATT/WTO countries have bound their tariffs for electricity imports in the Uruguay Round of Multilateral Trade negotiations, but this does not seem to be the result of tariff negotiations focusing specifically on electricity.[45] Similarly, regional free trade agreements, with the notable exception of the North American Free Trade Agreement (NAFTA), also seem not to be the reference for governments to resolve electricity trade issues. Only recently have GATT rules received a certain attention with respect to electricity trade.[46]

The fact that potential electricity trading nations and private traders seemed for a long time not to be concerned about existing multilateral trade rules may be explained by a series of circumstances. The historical reasons relate to insufficient cross-border interconnections and the lack of large, multi-country networks. As long as no physical infrastructure was in place, the debate on the treatment of electricity under the GATT lacked relevance. More importantly, as long as trade was limited to electricity exchanges between national, very often state-owned, monopolies, the terms and conditions of such dealings were negotiated between monopolists or governmental bodies without necessarily relying on GATT or other trade treaty rules. This may be observed even in cases where bilateral trade treaties exist between the respective countries. Energy monopolies and their national supervising authorities appear to have a propensity to decide on trade issues on an ad hoc basis, rather than on treaty rules of a non-sectoral nature. Very often this propensity survives the liberalization of the sector in the form of sectoral approaches by electricity regulators and interest groups to trade issues.

However, the liberalization of the electricity industry and the introduction of competition have more recently led countries to the recognition of the relevance of WTO rules.

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45 Only recently, with the new GATS 2000 round of services negotiations have some discussions started in the WTO on electricity trade. These discussions are meant to address the services aspects of trade in this sector - such as the definition of the scope and classification of energy services and give-and-take negotiations on specific commitments on market access and national treatment - and not the treatment of cross-border electricity flow, which remains under the GATT and other goods agreements of the WTO.

46 See Energy Charter Secretariat, "Trade in Energy: WTO Rules Applying under the ECT", Brussels, 2001, which discusses GATT rules in detail and explains their functioning with examples, among others, of electricity trade. For a detailed analysis of GATT Article XX and electricity trade under NAFTA see Horlick G., Mann H. and Schuchhardt Ch.: *op. cit.*, 2001.

7.1.2 Rules applicable to trade in electricity as a good (GATT/WTO and ECT)

This section briefly describes the most important GATT/WTO obligations with respect to trade in electricity as a good. Trade in electricity between Energy Charter Treaty signatories that are not members of the WTO, and trade between one such country and an ECT country that is a member of the WTO, is subject to the same rules pursuant to Article 29 of the ECT.[47]

WTO and ECT rules discipline governmental policies and measures affecting trade. "Governments" and "measures" have a broad meaning and in general include any type of measures such as laws, regulations, judicial decisions, administrative practices, governmental decisions, relevant to the operation of the WTO Agreements. Non-governmental measures are outside the scope of these disciplines, but governments may not escape their WTO obligations by conferring – either *de facto* or *de jure* – their trade regulatory authority to non-governmental entities.

Electricity as a good is fully subject to the provisions of GATT 1994 and other WTO agreements on goods.[48] As a consequence, the automatic and unconditional Most-Favoured National (MFN) Treatment obligation in GATT Article I, and the National Treatment (NT) obligation in GATT Article III fully apply to trade in electricity.

The MFN provisions contained in GATT imply that, with respect to any measure imposed on the import or export of electricity, any advantage or privilege accorded to one country should, ipso facto, be extended to electricity imported from or exported to any other country, and that no reciprocal conditions may be attached to such granting. (See Chapter 8.5 for more details).

The provisions of GATT Article III impose constraints on governments with respect to internal taxation and any other internal regulations concerning the sale, purchase, use or transportation of electricity; they prohibit any discrimination between domestic and imported electricity.[49] These national treatment provisions require, *inter alia*, that all internal taxes (VAT, excise duties, etc.) have to be the same for domestic electricity and imported electricity, whatever their primary energy sources or production conditions. For example, imposing an extra tax on electricity generated with non-renewable energy sources would be a tax discrimination between two types of electricity that are "like products" (an environmentally friendly one, and one that is not; but physically and in terms of end-uses both are identical and thus would seem to be "like products").

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47 A detailed discussion of GATT/WTO provisions under the ECT with many practical examples from the electricity trade may be found in Energy Charter Secretariat, *op. cit.*, 2001.

48 Since the obligations under the WTO and the ECT are substantially the same, any reference in this paper to a GATT/WTO provision is to be taken as a reference to the corresponding obligation under the ECT.

49 This discussion of national treatment heavily draws on Energy Charter Secretariat, *op. cit.*, 2001.

Given their "likeness", an exporter of "environmentally unfriendly" electricity could then claim that his imported electricity is being discriminated against (taxed higher), as opposed to domestic "environmentally friendly" electricity (subject to a lower tax). On that ground, a violation of GATT Article III could be sustained.

In respect of internal taxation, the national treatment obligation also applies to "directly competitive or substitutable" products. Thus, even if two types of electricity were not found to be "like", they could still be considered to be "directly competitive or substitutable". Indeed, it could even be argued that although electricity and gas are not "like products", perhaps they are nevertheless "directly competitive or substitutable". Once this is proven, any "dissimilar" taxation (a more than *de minimis* difference), which is in addition proven to be imposed "so as to afford protection to domestic production", could be found to be contrary to GATT Article III: 2, second sentence.

Another standard type of regulation that is outlawed by Article III are those that link an advantage (say, a subsidy, the right to import, or the right to give a certain name to a product) to a minimum amount of local content in the products concerned. Such local content requirements – for example, a subsidy for electricity if such electricity is produced for 20% with local coal or local renewable energy – clearly stimulate the purchase of domestic products over imported products, thereby negatively affecting the competitive opportunity of imports. These are prohibited under Article III:4. National treatment issues are discussed in more detail in Chapter 8.6.

A further important obligation under GATT is the prohibition of quantitative restrictions on imports and exports of electricity. This means that governments may not use policy instruments to regulate imports or exports other than customs duties. For electricity trade, these provisions – contained in GATT Article XI – have major implications: once traditional monopolies or other exclusive right-holders disappear and consumers with trade rights (eligible customers) emerge, governments are not entitled to introduce non-tariff measures to replace trade barriers implicitly applied by former vertically integrated monopolies. The combined application of GATT Articles III and XI implies that any internal liberalization measure affecting electricity trade should *ipso facto* be extended to the importing of foreign electricity.

A measure by a WTO Member (or by an ECT Contracting Party), which is inconsistent with the national treatment or other obligations under GATT, may still be acceptable if the country applying it is able to demonstrate that it falls within a legal exception. For trade in electricity, the most frequently referred exceptions that might justify[50] discriminatory trade measures are the general exceptions in Article XX of the GATT 1994. Under GATT, trade restrictive measures that aim at environmental protection

[50] Though there have been a number of disputed trade measures relating to electricity, no such case has ever been addressed under the dispute settlement mechanisms of the WTO and ECT. Therefore, they have not been "justified" under GATT Article XX before a dispute settlement panel.

can be justified either under Article XX(b) of GATT providing for the adoption or enforcement of measures "necessary to protect human, animal or plant life or health", or under Article XX(g) justifying measures "relating to the conservation of exhaustible natural resources".

However, even if a measure otherwise inconsistent with GATT is found to fall within Article XX paragraph (b) or (g), they are still "subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade". Existing WTO jurisprudence shows that it is very difficult to justify discriminatory trade restrictions introduced for environmental reasons under Article XX.

7.2 Rules applicable to regional markets

GATT Article XXIV permits contracting parties to deviate from the non-discrimination (MFN) obligations if they grant preferential treatment for their trading partners in the framework of a customs union or a free trade area. However, there are strict conditions attached to such preferential treatments. One of the conditions of customs unions or regional trade agreements (RTA) is that under the RTA trade restrictions between area members should be removed for "substantially all the trade" and – in the case of customs unions – the protection against imports from other countries should not be increased. The exact meaning of the "substantially all the trade" criterion has long been the subject of disagreement between GATT and WTO members, especially with respect to the exclusion of the agricultural sector from the scope of full liberalization under free-trade agreements. One view is that by excluding a whole economic sector from internal RTA trade liberalization, RTA members don't comply with the "substantially all the trade" criterion under Article XXIV. In contrast, others consider that the "substantially all the trade" criterion must be assessed quantitatively, i.e. in terms of the relative share of the excluded products in overall intra-RTA trade and/or qualitatively, i.e. taking account of the nature of RTA treatment reserved for such products, even if they don't mean full removal of intra-area trade restrictions. This debate is relevant for the assessment of RTAs that do not provide for free trade in energy products.

At present, there are more than seventy free-trade area agreements among ECT countries. All European and CIS countries are parties to at least one such agreement. These RTAs cover industrial products and do not exclude electrical energy. Furthermore, these RTAs do not seem to grant any special treatment to electrical energy relative to other products. Consequently, trade in electricity – from a legal viewpoint – is deemed totally free of any trade restrictions.

However, in practice this is far from reality. Despite free-trade agreements between European ECT countries, trade in electricity does not seem to take place in practice according to the provisions of the respective RTA. For example, under the Europe Agreements between the EU and candidate countries, quantitative restrictions on imports of electrical energy and measures having equivalent effect were to be abolished on the date of entry into force of the Agreement. This did not take place, since a number of restrictions to trade in electricity, including lack of customer's choice, continue to be in place in many Europe Agreement countries. In addition, recently adopted national electricity laws in some EU and Central European countries seem to disregard the free trade provisions of their respective Europe Agreements.

Unlike the Europe Agreements, the North-American Free Trade Agreement (NAFTA) between Canada, Mexico and the United States, explicitly addresses the liberalization of electricity trade, apparently because trade already occurred between the three countries before NAFTA. (The treatment of electricity trade under NAFTA is summarized in Box 2).

There also exist a number of non-preferential trade agreements among ECT countries. All contain provisions for MFN and National Treatment, which give parties the right to benefit from trade liberalization measures introduced by other parties, no matter whether such measures result from autonomous decisions or from contractual obligations.

Box 2 **The legal regime for electricity imports under NAFTA**

Treatment of Electricity as a Good

Under NAFTA electricity is treated as a good. Chapter 6 of NAFTA deals with Energy and Basic Petrochemicals and falls under Part Two of the NAFTA: Trade in Goods. Article 602 on scope and coverage provides in its third paragraph that energy and petrochemical goods and activities are governed by the provisions of NAFTA. The first paragraph of the same Article specifies that Chapter 6 "applies to measures relating to energy and basic petrochemical goods originating in the territory of the parties and to measures relating to investment and to the cross-border trade in services associated with such goods…" The specific goods subject to the provision are listed in paragraph 2 and include, inter alia, electrical energy by reference to its classification under Chapter 27.16 of the Harmonized System.

General Requirements Concerning National Treatment and Tariff Elimination for All Goods

Electricity treated as a good under Chapter 6 of NAFTA is subject to the provisions of NAFTA Chapter 3 on national treatment and market access for goods. As a result, trade in electrical energy benefits from national treatment under Article 301 and tariff elimination under Article 302 (to the extent that they originate from Canada, the US or Mexico). The national treatment requirement, as provided in Article 301 of the NAFTA stipulates that "Each Party shall accord national treatment to the goods of another Party in accordance with Article III of the General Agreement on Tariffs and Trade (GATT), including its interpretative notes."

The Legal Regime Specific to Energy and Basic Petrochemicals

By Article 603(1), the NAFTA parties incorporate the GATT provisions on prohibitions or restrictions on trade in energy and petrochemicals, thereby generally affirming the application of GATT-type obligations within NAFTA. Within the same provision, the parties note the importance of the GATT prohibition of quantitative restrictions, including the application of minimum or maximum export-price or import-price requirements. Under Article 604 duties, taxes or other charges on exports of energy (or petrochemical goods) to the territory of another party are only permitted when imposed on exports to all parties equally and when the same duty, tax or charge is applied to such good when consumed domestically. Parties are allowed, however, to apply trade restrictions on energy when such energy, "although traded with another NAFTA party, originates from or has as final destination the territory of a non-party against which the party maintains the trade restrictions". Thus, theoretically imports of non-party electricity coming from the territory of a NAFTA Party can be limited or prohibited.

Furthermore, a condition can be imposed on the exportation of a good (e.g. electricity), requiring it to be consumed within the territory of a party (e.g. not shipped through a party for consumption in a third party.

Article 603(5) allows the parties to maintain systems of import and export licensing for energy (and basic petrochemical goods), provided that they are operated in a manner consistent with the Agreement.

Parties may maintain export restrictions on energy products under certain conditions. First, the application of measures restricting exports is limited to the circumstances set out under Article XI:2(a) of the GATT 1994, which allows for temporary application of export prohibitions or restrictions to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting party. Moreover, export restrictions are allowed in principle in the NAFTA, if they are justified under GATT Article XX (g)(i) or (j).

Second, NAFTA establishes further prerequisites listed in Article 605 (a) to (c) that must prevail cumulatively and as a consequence of which parties may not impose export restrictions if they reduce the proportion of the total supply made available to the other NAFTA Parties below the level of the preceding three years or other agreed period; impose a higher price on exports to another NAFTA country than on domestic sales and disrupt normal supply channels or alter the normal mix of energy products. Article 605 only applies between the US and Canada. Mexico has entered reservation in Annex 605 to the effect that the limitations on the use of export restrictions shall not apply between Mexico and the other NAFTA Parties.

Finally, pursuant to Article 607, a Party may restrict imports or exports of energy or basic petrochemical goods for reasons of national security in certain stated situations, such as to supply a military establishment, fulfilling a critical defence contract, or responding to an armed conflict. Article 607 imposes no obligations and confers no rights on Mexico.

Source: Horlick G., Mann H. and Schuchhardt Ch.: NAFTA Provisions and the Electricity Sector, North American Commission for Environmental Co-operation, 2001.

8 Barriers to trade in electricity

8.1 Introduction

There are various types of barriers to trade in electricity. Some stem from technical or economic factors whereas others are the result of laws and regulations. Economic and technical barriers have been discussed in section 4.4. This chapter analyses government measures applied at various levels that directly or indirectly distort trade in electricity between ECT countries.[51] It also includes business practices restricting competition and thus cross-border trade, to the extent they are tolerated by competition authorities or result from domestic regulatory decisions.

These measures have the explicit objective of influencing or interfering with, cross-border dealings between exporters and importers of electricity. Examples are: import tariffs, discriminatory or discretionary authorization (licensing) procedures, network access barriers, reciprocity requirements, and explicit trade restrictions, whether or not discriminatory.

Compared to other economic sectors, the electricity sector is highly regulated, and barriers to trade in many instances don't result from the application of trade policy instruments, but from domestic regulatory policies, such as product regulations, network access conditions, and public service obligations. Therefore, the following discussion also includes a host of implicit trade restrictions, that is governmental regulations or practices which don't have the primary objective to restrain electricity imports, but which hinder trade by *de facto* distorting the competitive opportunities between imported and domestic electricity in favour of the latter.

The measures referred to in this chapter are exemplified by different ECT countries' practices. Time, resources and availability of data prevent a more exhaustive screening of laws, regulations or administrative decisions.

"Barrier to trade" is not a synonym of treaty breach. The mere existence of trade measures or domestic policies affecting trade that are perceived as barriers to trade in electricity does not mean that the country concerned is in breach of its obligations under the WTO or the ECT. There might be non-discriminatory trade measures that reduce trade, but still are permitted under the WTO.[52] Examples are high import duties or import or export monopolies.

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51 For the meaning of "governments" and "measures", see section 7.1.2.

52 WTO members can maintain trade barriers, either because the lifting of such barriers was never promised (for example, "unbound" customs duties or the levying of customs below the "bound" level), or are introduced as trade remedies against unfair trade practices by exporter, or because such barriers serve a legitimate objective (such as health or environmental protection or economic development in less developed countries) and fall under the exception clauses of the GATT. See Chapter III of Energy Charter Secretariat, *op. cit.*, 2001.

In addition to giving as wide a picture as possible of the regulations affecting electricity trade in the ECT area, the main function of the examples is to depict how and why the operation of the measures affect trade. For these reasons, no conclusion can be drawn from the examples as to the overall trade-restrictiveness of the policies of any ECT country and no cross-country comparison can be done for any type of measure. Moreover, the more a given country has liberalized its electricity sector and opens it for trade, the more the remaining barriers become visible.

Our review lends itself to the following tentative conclusions concerning the obstacles to trade:

- The electricity sector regulation of all scrutinized ECT countries contains some elements that may be trade-restrictive.
- An industry structure represented by a vertically integrated national monopoly with fully or predominantly state-ownership is itself a barrier to trade in electricity and seems to be the most trade-restrictive among all barriers.
- A somewhat less trade-restrictive power sector structure is when generation and distribution is open to private participation or fully private ownership, while the national transmission company retains full monopoly over purchases from producers and sales to distribution companies.
- At the early stages of sector liberalization, some consumers are granted the right to enter into direct commercial relationship with producers and suppliers. Until full liberalization, lack of access for non-eligible customers also means lack of full access to the market.
- Rights of eligible customers are sometimes limited to domestic transactions because cross-border trade still remains in the hand of a legal monopoly or must be made through a centralized trading organization.
- Explicit trade measures seem to emerge only when cross-border trade, at least for eligible customers, becomes liberalized. In many of the cases examined, such measures (e.g. reciprocity-based market access, and extraterritorial application of environmental requirements) have discriminatory elements.
- Most product regulations, which aim at promoting electricity produced from renewable energy sources or with specified technologies, may involve discrimination against foreign electricity.
- For fully liberalized markets, a crucial issue is the terms and conditions of access to the transportation network. The absence of non-discriminatory, transparent and predictable conditions of network access in itself renders full trade liberalization illusory.

There are a number of other trade barriers that are not analysed in this paper. These include, *inter alia*, specific subsidies (within the meaning of the WTO Agreement on Subsidies and Countervailing Measures) and lack of regulatory transparency both at the domestic and multilateral level.

8.2 Tariffs

Import duties do not appear to constitute serious market access barriers for electricity. Nevertheless, while applied and sometimes bound duty rates in all Western and most Central European ECT countries are zero, some ECT countries still attach some importance to such customs tariffs either as an instrument to regulate imports or as budgetary resources.

The following ECT countries still apply customs duties on electricity imports: Albania (5%), Azerbaijan (15%), Belarus (5%), Bulgaria (5%), Georgia (34.6%), Kazakhstan (5%), Kyrgyzstan (10%), Poland (3%), Romania (6% applied and 35% bound *ad valorem* duty rates), the Russian Federation (5%), Ukraine (2%), and Uzbekistan (3%) (see Annex 1).

Several ECT signatories that are WTO members have undertaken to bind their import duties within the WTO. This is a considerable advantage for those ECT countries that are not members of the WTO because they still benefit from those bindings through the MFN provisions of both their bilateral trade agreements (to the extent they have such agreements) and of the ECT.

8.3 State-trading

Import monopolies and state-trading enterprises traditionally have been prevalent in the electricity supply industry. Despite progressive liberalization of the sector, state trading is still present in many countries.

Vertically integrated firms with monopoly rights in their respective areas (in most cases on the whole national territory, or in designated areas) to buy from generators and to distribute and sell to customers, and/or import and export electricity, constitute "state trading" within the meaning of GATT Article XVII. With regulatory reforms of the electricity supply industry and progressive liberalization of one or more segments of the electricity business, state trading may no longer characterize the former incumbent or new entrants.

GATT does not prohibit state-ownership of trading entities or import monopolies or other forms of state trading. Rather it ensures that if such organizations exist, they abide by the obligations and the market access commitments that their governments have subscribed to. (See Box 3) The *raison d'être* of the GATT provisions on state-trading enterprises is to ensure Contracting Parties do not circumvent their obligations

in respect of governmental energy and other domestic policies. Indeed, if no disciplines would apply to such enterprises, a WTO member could easily delegate all or part of its policy-making powers to enterprises under its control, but avoid having to comply with GATT rules.[53]

As far as electricity import monopolies are concerned, two additional factors merit attention. Firstly, many WTO members, among which there are also ECT signatories, have bound their import duties at very low or zero levels. Secondly, GATT Article XI does not permit restrictions or prohibitions on imports, other than duties, taxes or other charges. These two elements together with the provisions of GATT Article II:4 seem to impose very tight obligations on countries with zero tariff bindings and import monopolies.

Government ownership is not the sole and decisive criterion in identifying state-trading enterprises. It is not ownership *per se* that matters, but the extent to which any organization has been bestowed exclusive or special rights by the government. Though it is the operation, rather than the ownership, of the enterprise, which determines whether a given entity is a state-trading enterprise, the links between governments and the enterprises they owned may be such as to create a hidden barrier to trade. The working definition for purposes of notifying state-trading enterprises agreed upon in the Uruguay Round is set out in the Understanding on the Interpretation of Article XVII. It reads: "Governmental and non-governmental enterprises, including marketing boards, which have been granted exclusive or special rights or privileges, including statutory or constitutional powers, in the exercise of which they influence through their purchases or sales the level or direction of imports or exports".[54]

The main concern of GATT about state trading is whether the business operations of such enterprises are conducted solely by commercial considerations, or whether the government does interfere with, or exercise direct control over its commercial practices in order to implement protectionist objectives. The emphasis here is on protectionism; indeed, governments and state trading enterprises may have other, non-trade legitimate interests in conducting their policies (e.g. environment protection or social services).

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[53] See Energy Charter Secretariat, *op. cit.*, 2001, page 47.

[54] Note that the working definition - which was adopted solely for notification purposes - does not interpret or alter GATT Article XVII, which continues to apply to both "State enterprises" and "enterprises that are granted, formally or in effect, any exclusive or special privileges".

The exercise of exclusive rights or special privileges by enterprises, whatever the ownership, may distort trade. McCorriston has identified six potentially anti-competitive effects in this regard:

1. Exclusive rights may create a dominant position that may inhibit market access for foreign competitors.

2. Exclusive rights may create monopsony power (a single buyer).

3. State trading enterprises may discriminate among trading partners.

4. Insofar as exclusive rights create enterprises with single desk status (i.e. enterprises with responsibility for domestic and export sales), state trading enterprises may be able to cross-subsidize sales in export markets.

5. Due to ties with governments, there may be hidden subsidies or other advantages that would not be available to private firms.

6. State trading enterprises may be insulated from bankruptcy by government, an important advantage over private companies.[55]

The above trade-distorting effects seem mainly, though not exclusively, the results of state-trading enterprises engaged in cross-border trade. It should be stressed however, that state-trading is a wider concept. The exclusive or special privileges should not necessarily be granted for imports or exports in order for an enterprise to qualify as state-trading; a state-trading enterprise is not necessarily an import or export monopoly. What is relevant is whether or not the enterprise has been granted exclusive rights or special privileges for any type of economic activity in the exercise of which it influences the level or direction of imports or exports. For example, a production monopoly may well constitute state-trading, even if the monopoly producer has no monopoly rights over imports of inputs necessary to the functioning of its production plants, but it influences through its purchases the level or direction of imports. Similarly, a state-owned enterprise that controlled most of the production of a traded product would have an effect on trade. For example, an electricity monopoly might have an impact on trade if electricity was traded.[56]

[55] McCorriston, S.: "State Trading Enterprises", Paper prepared fir the OECD Forum on Non-Member Economies, March 2000.

[56] This example was given at the November 1995 meeting of the WTO Working Party on State Trading Enterprises. See WTO document G/STR/M/2.

In GATT/WTO case law, it was pointed out that where a state-trading enterprise enjoys a monopoly of both importation and distribution in the domestic market, internal measures restricting distribution would lead to a restriction on importation contrary to Article XI that prohibits quantitative import restrictions.[57] Indeed, if the monopoly operator refuses, for example, to distribute the imported electricity, there is no way to get it distributed by other means. As a result, it is of no use to import the electricity in the first place. Thus, internal discriminatory practices or restrictions in these circumstances could also run afoul of Article XI (traditionally reserved for border measures only).[58]

State trading in the electricity sector was notified by few WTO members (France,[59] Poland[60] and the United States[61]), although many other WTO members evidently have electricity enterprises with monopoly or exclusive rights which influence the level and direction of trade. The notification of the US demonstrates that even electricity companies not involved in foreign trade might be "state-trading enterprises" if their operation affects imports or exports (see Box 3 which provides a summary of state-trading practices in the US electricity sector).

[57] Panel Report on *Canada – Import, Distribution and Sale of Alcoholic Drinks by Canadian Provincial Marketing Agencies*, adopted on 22 March 1988, BISD 35S/37, para. 4.24. See also the Panel Report on *Korea – Measures Affecting Imports of Fresh, Chilled and Frozen Beef*, WT/TPR/DS161 and 169R, para.751.

[58] See Energy Charter Secretariat, *op. cit.*, 2001, page 49.

[59] WTO Documents G/STR/N/1/EEC/Add.1 and G/STR/N/4/EEC.

[60] WTO Document G/STR/N/1/POL.

[61] WTO Document G/STR/N/1USA.

Box 3 **State-trading enterprises operating in the United States electricity sector**

Power Marketing Administrations

There are five power marketing entities in the US that market wholesale hydroelectric power within their respective areas: the Alaska Power Administration (APA), Bonneville Power Marketing Administration (BPMA), Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA).

APA owns two power generating facilities and markets their output. None of the two facilities have a monopoly position in their respective supply areas. The APA programme's objectives include maximizing energy production, and marketing power generated by APA in accordance with authorizing legislation, which accords a preference to public utilities and cooperatives.

BPMA markets and transmits the power produced by Bonneville Dam on the Columbia River. Congress has directed Bonneville to sell at wholesale the power produced at a total of 30 Federal dams in the Pacific Northwest, and to acquire non-Federal power and conservation resources sufficient to meet the growing needs of Bonneville's customer utilities.

SEPA markets wholesale power generated at the Army Corps of Engineers hydroelectric generating plants in an 11-state area to publicly and cooperatively owned distribution utilities using wheeling and pooling agreements. SEPA is structured to encourage widespread use of available Federal power; make power available at the lowest possible rates to consumers; give preference in the sale of power to public bodies and cooperatives. SEPA does not own or operate any transmission facilities.

SWPA is a marketing agent for hydroelectric power generated by Corps of Engineers dams in a six state area. SWPA operates and maintains high voltage transmission lines, substations and switching stations. It sells its power at wholesale primarily to publicly and cooperatively owned distribution utilities, and is responsible for scheduling and dispatching power, negotiating power sales contracts, and constructing facilities required to meet changing customer load requirements.

WAPA markets power at wholesale in 15 states from federally-owned power plants operated primarily by the Bureau of Reclamation, Corps of Engineers, and the International Boundary and Water Commission. WAPA operates and maintains high-voltage transmission lines and substations/ switchyards, and constructs additions and modifications to existing facilities.

Tennessee Valley Authority (TVA)

TVA produces and markets wholesale hydroelectric power. It was created by Congress "in the interest of the national defence and for agricultural and industrial development, and to improve navigation in the Tennessee River and to control the destructive flood waters in the Tennessee River and Mississippi River Basins". TVA was given the authority to both own and operate dams, transmission lines, and power plants along the Tennessee River and its tributaries. TVA provides power to approximately 110 municipal and 50 cooperative electric systems for distribution to customers. Although the TVA Act does not mention the generation of electricity as a primary purpose of TVA, Congress appreciated that TVA water control facilities would produce more power than the Authority needed to run its own flood control, navigation and research facilities, and the Act makes a specific provision for the sale and distribution of "surplus" electric power.

Source: Notification of State Trading Enterprise by the US, WTO document G/STR/N/1USA.

A particular form of state trading is the "single buyer". A single buyer is an entity which purchases all generation and imported electricity and sells all electricity purchased by distribution companies, exporters and other suppliers typically at a uniform bulk tariff.[62]

In general, both export state-trading enterprises (with authority over exports of electricity) and import state-trading enterprises (with authority over imports of electricity) raise concerns about their possible effects on international trade. They may use their market power to act as a monopolist (single-seller) to offer consumers higher prices or monopsonist (single-buyer) to offer producers lower prices than would otherwise be available. Most often a single buyer can exert market power or the ability to influence prices. This might also happen when there are only few buyers (oligopsony), or when many buyers aggregate to buy as a single unit (e.g. buyer cooperatives). The monopoly is able to exert its influence to keep prices higher than would be the case in a perfectly competitive industry and, as a result, less of the good is supplied. The same kind of inefficiency results with monopsony but this time the market price is set too low and too few resources are put into the industry in question.

Single buyers may also provide governments with ways to circumvent the restrictions on non-tariff barriers, such as the prohibition of quantitative import restrictions. For example, it is difficult to determine whether an import state-trading enterprise is restricting its purchases of a product because of lack of demand or because of government policies designed to restrict imports for protectionist purposes. Government support of export state-trading enterprises through direct payments or tax breaks may have an effect similar to export subsidies.

Within the ECT area, the most wide-spread form of state-trading appears to be:

- monopoly rights given to one single state-owned company to operate all segments of the industry, from generation to supply;
- designation of the network operator to purchase electricity from specified generators and resell it to distributors;
- area monopoly rights granted to suppliers in their respective areas;
- within partial liberalization: designation of one body as "single buyer";
- subjecting trade between producers and distribution companies to the agreement of the network operator;
- import and export monopoly rights.

[62] For discussions of the single-buyer model from a domestic competition perspective see: Lovei, L.: "The Single-Buyer Model: A Dangerous Path toward Competitive Electricity Markets", Public Policy for the Private Sector No.225, The World Bank, Washington, December 2000 and Asia Pacific Energy Research Centre, "Electricity Sector Deregulation in the APEC Region", Tokyo 2000.

The first situation - the state-trading format with monopoly rights on all electricity activities - can be considered as the "traditional one". In Albania, for example, the state-owned Albanian Power Corporation (APC) remains vertically integrated and has a monopoly situation in the electricity market in almost the whole country. APC controls all cross-border electricity transactions and is the only operator that generates and transmits electricity and, at the same time, has the authority for import and export of electricity. In addition, the State controls three other partially privatised electricity distributors through the 70% ownership of APC in these firms.[63]

Armenia operates a "single buyer and seller" model; direct agreements between producers and customers are not allowed.

In Azerbaijan, all enterprises operating in the energy sector, including those in the electricity generation, transportation and supply, are state-owned or state-established joint enterprises.[64]

Examples for items (2) and (5) on the above list may be found in Poland (1995).[65] Poland has notified to the WTO in 1995 the "Polish Power Grid Company" (PPGC) who had monopoly rights over electricity transmission via high-voltage grids and dispatch of electric power within the national power system. While direct purchase of electricity by distributors from industrial power plants and from small hydro power plants was, at the time of notification, liberalized and outside PPGC's control, trade in electricity between producers and distributors was, in general, subject to agreement of PPGC. The right to import and export electricity was a monopoly right reserved to PPGC. In subsequent notifications by Poland, PPGC was no longer considered a "state trading" enterprise.[66]

Full import/export monopoly is exemplified by Hungary, where the single buyer model dominates the market relations in the electricity sector. In this model, Magyar Villamos Művek (MVM), the incumbent company is the unique wholesaler and has been granted by law the exclusive right to import and export. As from 1 January 2003,[67] when

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63 Answers of the Albanian electricity regulator to the 2001 Questionnaire of ERRA Licensing & Competition Committee.

64 WTO document WT/ACC/AZE/5 dated 04 December 2001.

65 Notification of State Trading Enterprises by Poland. WTO document G/STR/N1/POL, dated 5 October 1995.

66 The notification of the Polish PPGC to the WTO as a state trading enterprise concerned the year 1995 and reflected the organizational structure of the Polish power sector at the stage of Poland's accession to the WTO. According to the Polish authorities, the current structure is fully in accordance with provisions of the relevant EU Directives.

67 The Hungarian Parliament adopted on 18 December in 2001 the new Electricity Act[67]. Certain provisions of the new Electricity Act – especially those related to the status and independence of the Hungarian Energy Office (the market regulator) and the independent system operator (MAVIR Rt.) – have already entered into force on 1 February 2002. The rest of the provisions will enter into force on 1 January 2003 which is the date of starting market opening. After that date there will be two parallel electricity markets: a public utility market and a competitive market. The public utility market with no competition will remain under the control of the present incumbents (MVM and the six regional public utility suppliers).

partial liberalization of the market and foreign trade is due to be introduced, MVM will retain exclusive export/import rights with respect to non-eligible customers and will be the sole "public utility wholesaler". Similarly, the six regional public utility suppliers will enjoy exclusive supply rights with respect to non-eligible customers within their respective supply areas.

In Bulgaria, the state-owned Natsionalna Electricheska Kompania (NEK) has traditionally been a full monopoly, integrating power generation and electricity supply. NEK has also been the country's single buyer of electricity from distributors and the only exporter. As far as foreign trade is concerned, legal monopoly rights of NEK over commercial transactions for electricity imports and exports are consolidated by the Energy Law of 1999.[68] The Bulgarian government foresees, however, on the basis of the Energy Law, a gradual liberalization after 2002 by – *inter alia* –approving consumers who would have the right to negotiate directly with suppliers for prices and quantities.[69]

In France, the import and export monopoly right was granted to Electricité de France (EdF) in 1946 and existed until the entry into force of a law implementing the EC Directive 96/92/EC.[70] Since that date, EdF no longer has exclusive rights over imports and exports by eligible customers, but it still has such rights with respect to non-eligible customers. This law states that eligible customers may conclude electricity purchasing contracts with producers or suppliers established in the territory of a European Community member State or, within the framework of the implementation of an international agreement, in the territory of another State.[71] A similar partial liberalization of import/export monopoly rights exists in other countries, for example in the Czech Republic, which have granted eligible customers the right to import or export without the involvement of the former monopolist.

In Georgia, the "Energy Market of Georgia" (WEM) is an association in which membership of energy sector licensees (i.e. generation, transmission, dispatch, distribution, export and import licensees) is mandatory. Only members of the WEM are allowed to be connected to the transmission grid. WEM has exclusive rights over all wholesale purchasing. Independent generators of energy have to sell their output

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68 Energy and Energy Efficiency Law of 1999, Article 82.

69 CEEBICnet Market Research, found at http://www.mac.doc.gov/eebic/countryr/bulgaria/market/bgenergyregs.htm.

70 Law No.2000-108 of 10 February 2000 on the modernization and development of the public electricity service.

71 Notification of State Trading Enterprises by the European Communities. WTO document G/STR/N7/EEC, dated 23 January 2002. Though EDF seems to retain exclusive rights over imports and exports to the extent non-eligible customers are involved, the French authorities informed the WTO that there is no further reason for notifications of information with regard to Electricité de France as a state trading company.

to a WEM which sells it to distribution companies. Except in case of individual exemptions, all electricity produced by generators in Georgia and imported into the country must be sold to WEM. All power purchases go through the WEM which is the sole authorized power wholesaler in Georgia.[72]

In Greece[73], the Public Power Corporation (PPC) is the state-owned electricity monopoly, which controls electric production, transmission, and distribution. PPC produces 99% of the country's total electricity. Since February 2001, the company has lost its monopoly on power generation, but would remain the sole distributor, in accordance with a two-year waiver from the EU regulations granted to Greece. After the transition period PPC will remain the sole distributor and will be the sole supplier in respect to non-eligible customers and the non-interconnected islands.[74]

In the Russian Federation, a 1996 presidential decree grants joint stock company "UES of Russia" the exclusive right to organize the export and the import of electricity.[75] The Russian submission to the WTO on state trading specifies that UES of Russia, which is controlled by the State, has been established and operated for the following purposes:

- management of production of an important domestic resource (electricity);
- expansion of the domestic output of electricity; and
- continuity and stabilization in domestic supplies of electricity.

Though the number of participants in the Swiss electricity sector is large compared to most European countries, the sector is characterized by state or private monopolies or exclusive rights. Some 1 200 companies are active in the electricity business. Of these six are vertically integrated and mainly active in generation, transmission and trade; 300 are active in production and distribution; 200 are mostly joint-owned by other utility companies and are active in production; and around 700 companies are mainly distributors and operate at municipal levels. Forty major firms account for more than 60% of total distribution. The branch is 72% owned by cantons and municipalities (mainly in the field of distribution). Related generation, transmission, and distribution activities are still under monopolies. Seven major electricity companies currently own the electricity grid. Competition is not forbidden by law, but it is prevented in practice by the absence of a third-party access obligation.[76]

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72 Baker and McKenzie: "Energy and Natural Resources – Georgia", July 2000, found at http://www.internationallawoffice.com.

73 This information is from 2000. Since then the legal or de facto situation might have changed. Source: U. S. Department of Energy, http://www.eia.doe.gov/cabs/greece.html.

74 Eugenia Papathanassopoulou: Community Law (including competition rules) affecting energy and its consequences, found at http://www.fidelaw.org/q2/greece.htm.

75 Energo FSU/CE Power Report, 9 November 2001.

76 WTO: "Trade Policy Review – Switzerland and Liechtenstein - Report by the Secretariat", document WT/TPR/S/77, Geneva, November 2000.

In Ukraine, Energorynok Government Company (GPE) is the operator of the integrated Wholesale Electric Power Market. The Law "On the Electric Power Industry" forbids other wholesale markets for electric power. GPE is government-owned, and reports to the Ukrainian Cabinet of Ministers. The functions of GPE are, *inter alia*, to purchase electric power from specified generators; to purchase electric power obtained through import contracts; and to provide wholesale supply of electric power.[77]

Box 4 Excerpts from GATT Articles II and XVII regarding import monopolies and state-trading enterprises

Article II
Schedules of Concessions

4. If any contracting party establishes, maintains or authorizes, formally or in effect, a monopoly of the importation of any product described in the appropriate Schedule annexed to this Agreement, such monopoly shall not, except as provided for in that Schedule or as otherwise agreed between the parties which initially negotiated the concession, operate so as to afford protection on the average in excess of the amount of protection provided for in that Schedule. The provisions of this paragraph shall not limit the use by contracting parties of any form of assistance to domestic producers permitted by other provisions of this Agreement.

Article XVII
State Trading Enterprises

1. (a) Each contracting party undertakes that if it establishes or maintains a State enterprise, wherever located, or grants to any enterprise, formally or in effect, exclusive or special privileges, such enterprise shall, in its purchases or sales involving either imports or exports, act in a manner consistent with the general principles of non-discriminatory treatment prescribed in this Agreement for governmental measures affecting imports or exports by private traders.

   (b) The provisions of subparagraph (a) of this paragraph shall be understood to require that such enterprises shall, having due regard to the other provisions of this Agreement, make any such purchases or sales solely in accordance with commercial considerations, including price, quality, availability, marketability, transportation and other conditions of purchase or sale, and shall afford the enterprises of the other contracting parties adequate opportunity, in accordance with customary business practice, to compete for participation in such purchases or sales.

   (c) No contracting party shall prevent any enterprise (whether or not an enterprise described in subparagraph (a) of this paragraph) under its jurisdiction from acting in accordance with the principles of subparagraphs (a) and (b) of this paragraph.

[77] Answers of the Ukrainian electricity regulator to the 2001 Questionnaire of ERRA Licensing & Competition Committee.

8.4 Access to foreign customers

One of the elements of progressively opening markets to competition and international trade is the granting to certain categories of electricity consumers the right to buy electricity from domestic suppliers and/or from foreign electricity exporters (producers and suppliers). For electricity exporters, the lack of access to those who do not qualify as eligible customers means lack of market access and, therefore, represents a trade barrier.

Within the European Union, Directive 96/92, which provides the framework for completing the single internal electricity market, requires that by the end of the transition process any consumer will have the right to choose its suppliers.[78] In few EU Member States all consumers have already been granted eligible customer status, while in some others the relevant time schedules and progressively decreasing eligibility thresholds have been defined.

At present Austria, Finland, Germany, Sweden and the United Kingdom have granted eligible status for all consumers, including household consumers, while Denmark has announced to do the same in 2003. In 2002, the following consumers are excluded from eligibility: Belgium: customers with annual consumption of 20 GWh or less; France: customers with annual consumption of 16 GWh or less; Greece: all those not connected to the high voltage grid; Ireland: customers with annual consumption of 4 GWh or less; Italy: customers with annual consumption of 9 GWh or less; Luxembourg: customers with annual consumption of 20 GWh or less; Netherlands: customers with annual consumption of 2 MW or less; Portugal: customers with annual consumption of 9 GWh or less; Spain: customers with annual consumption of 1 GWh or less and all those with connection less than 1 kV.

Among the Central European and CIS countries, Kazakhstan is the most liberal with respect to eligibility, where the threshold is only 5 MWh. Lithuania and Poland follow with thresholds of respectively 9 GWh and 10 GWh. The relevant Polish legal acts require the opening up of the market for customers with annual consumption of 1 GWh as of 1 January 2004 and to all remaining customers as of 1 January 2006. However, these rights will only apply to Polish electricity. After Poland's accession to the European Union, these rights will be extended to the purchase of electricity in EU countries but not to electricity generated in third countries.[79] In Croatia, the Czech Republic, Estonia, and Latvia consumers with annual consumption below 40 GWh are, for the time being, excluded from eligibility. The Czech Energy Act provides[80] that eligibility will be progressively extended to consumers with annual consumption of 9 GWh as from

[78] EC Directive 96/92 has been revoked and replaced by Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity (Official Journal of the European Union, L176 of 15 July 2003).

[79] OECD: "OECD Reviews of Regulatory Reform: Regulatory Reform in Poland – The Postal and Energy Sectors", Paris, 2002.

[80] Section 21, paragraph 2 of the Act of 28 November 2000 on Business Conditions and Public Administration in the Energy Sectors and on Amendment to Other Laws.

1 January 2003; to all end customers taking electricity from high networks and to the end customers connected to low voltage networks with annual consumption of 100 MWh or more as of 1 January 2005; and to all end customers starting from 1 January 2006. At present there are no eligible customers in Hungary, though the recently adopted Electricity Act will grant this status as from 2003 to the 15 largest consumers, representing 30–35% of the electricity market. However, the right of eligible customers with respect to electricity importation will be restricted by the legal requirement that they "shall acquire minimum half of the amount of their annual consumption from domestic production".[81] In Bulgaria, the "eligible customer" called for in the Energy Law is not defined. The Slovak electricity market was liberalized in 2002 for all customers with an annual consumption of 100 GWh or above. This limit will be lowered progressively to 40 GWh in 2003. Full liberalization, including allowing foreign suppliers, is envisaged for 2006 at the latest.[82]

Most CIS countries do not have the concept of eligibility in their legislation or market organization. Allowing customers, partially or fully, the freedom to choose their supplier is a necessary step to come to a market trade in electricity. The lack of eligible customers in those countries reflects the fact that traditional monopolies are still in place and often no significant progress has been made towards a competitive (internal and cross-border) electricity market.

8.5 Market access conditional upon reciprocal access level

8.5.1 Reciprocity conditions in EU countries

Some ECT countries that have recently opened their electricity markets made access to their market for foreign exporters dependent on reciprocal access conditions to the exporting country. The idea behind subjecting market access to reciprocal access conditions is that different paces of market openings lead to imbalances between access rights, and a country with more open market should be permitted to bilaterally "rebalance" these unbalanced access rights, thus avoiding "free riders" benefiting from their greater access levels.

[81] Article 46, paragraph 5 of the Act on Electricity (Act no. CX of 2001).
[82] WTO: "Trade Policy Review – Slovak Republic - Report by the Secretariat", document WT/TPR/S/91, Geneva, October 2001.

In the European Union, Article 19 of Directive 96/92 allows a Member State to refuse access to suppliers from another Member States on grounds of lack of reciprocity.[83] Since the final objective of the Directive is to complete the internal market for electricity, the possibility for Member States to require reciprocity as a market access condition was granted only for a transitional period of nine years from the entry into force of the Directive. The following Members States have availed themselves of this possibility and included such clause in their respective laws: Austria, Belgium, Germany, Italy, Luxembourg, the Netherlands, Portugal, Spain and United Kingdom.[84] (Relevant provisions are contained in Annex 2).

The reciprocity clauses adopted at national level are drafted differently, but all permit in one way or the other to block or restrict imports of electricity from those countries where domestic customers are not offered market participation rights identical to those of the importing country. Though the Directive, including its reciprocity provisions, only applies to intra-EU trade, some of the national reciprocity provisions have been extended to, or interpreted to include, imports from non-EU countries. The reciprocity clauses of the following EU countries' apply to both intra-EU and extra-EU imports: Austria, Germany, Luxembourg and the Netherlands. Italy applies specific reciprocity regulations to imports from non-EU countries, while the Belgian reciprocity clause only applies to imports from other EU Member States.

The Belgian Electricity Law seems to be unique in that it is the only one, which expressly made the application of the reciprocity requirement to trade with non-EU countries subject to international treaty obligations.

The Dutch Electricity Act of 1998 contains a general provision in its article 46 introducing the principle of reciprocity. This general provision has been rendered explicit in the rules published in December of 1999, mentioning the thresholds for imports from the other Member States, below which the Minister may decide not to allow imports from a specific other Member State. Foreign producers, consumers, traders and suppliers are allowed to buy and sell, but the reciprocity clause is applied to consumers under 20 GWh.[85]

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[83] Article 19, paragraph 5 provides that: "To avoid imbalance in the opening of electricity markets during the period referred to in Article 26:
(a) contracts for the supply of electricity under the provisions of Articles 17 and 18 with an eligible customer in the system of another Member State shall not be prohibited if the customer is considered as eligible in both systems involved;
(b) in cases where transactions as described in subparagraph (a) are refused because of the customer being eligible only in one of the two systems, the Commission may oblige, taking into account the situation in the market and the common interest, the refusing party to execute the requested electricity supply at the request of the Member State where the eligible customer is located. In parallel with the procedure and the timetable provided for in Article 26, and not later than after half of the period provided for in that Article, the Commission shall review the application of subparagraph (b) of the first subparagraph on the basis of market developments taking into account the common interest. In the light of experience gained, the Commission shall evaluate this situation and report on possible imbalance in the opening of electricity markets with regard to this paragraph."

[84] See, "Analysis of the Electricity Sector Liberalisation in European Union Member States pursuant to Directive 96/92/EC on the Internal Market in Electricity", EU-Japan Centre, Brussels, 2000.

[85] http://europa.eu.int/comm/energy/en/elec_single_market/implementation/index_en.html.

A practical use of the German reciprocity provision happened when in 2001 Germany threatened to "disconnect" Swiss suppliers if Switzerland decided not to open its own market in the referendum on the new Electricity Market Law.[86]

8.5.2 Reciprocity conditions in non-EU countries

Countries currently negotiating their accession to EU membership are expected to harmonize their legislation with the EU "*acquis communautaire*", including with the Electricity Directive. Recently adopted electricity laws of some Central and Eastern European countries have availed themselves of this opportunity to include provisions that condition access to their electricity markets upon reciprocity requirements. These countries are the following: Croatia, the Czech Republic, Hungary, Lithuania, Poland and Slovenia.

8.5.3 Practical uses of reciprocity clauses

Available information seems to suggest that the reciprocity clauses have been rarely used to restrict either intra-EU trade or trade with non-EU countries. One of the few recourses to reciprocity provisions that have been reported by the press relate to Italy and Austria. In the case of Italy, the existence of reciprocity conditions has been considered when scarce interconnection capacities allocating the Legislative Decree No.79 of 16 March 1999 delegated the power of regulate "economic reciprocity" to be applied to non-EU countries to *Autorità per l'energia elettrica e il gas* ("Electric Energy and Gas Authority"). The authority adopted[87] the following criteria for the definition of "economic reciprocity", which it implemented as of January 2001:

1. freedom of trade in, and transit of electric energy so that the interests of the national economy and of national enterprises operating in the electricity sector not be prejudiced; and

2. conditions of reciprocity as to the recognition to the final customer of its legal capacity of concluding bilateral electricity supply contracts with any producer, distributor or wholesaler.

[86] EU Energy, 23 July 2001.
[87] Autorità per l'energia elettrica e il gas: Decision No.162/99 of 28 October 1999.

In the context of addressing the traditional congestion problems at interconnections with the four neighbouring countries, the *Autorità per l'energia elettrica e il gas* has also drawn up reciprocity criteria which the foreign operators (EU and non-EU operators alike) are expected to meet in order to export electricity to Italy:

1. the cost of the transportation of electricity over the internal networks of the exporting countries concerned (France, Austria, Slovenia and Switzerland) cannot be "significantly greater" than the cost of transportation in Italy, and

2. access to the networks must be guaranteed for all operators, including third-country operators, under non-discriminatory conditions.[88]

8.5.4 Reciprocity and trade rules

Recent proposals for establishing a common EU electricity import regime tend to extend the concept of reciprocity in the EC Directive to trade with third countries. The idea is to negotiate electricity market-opening agreements with Central and Eastern European countries, under which the EU would commit itself to open its markets to imports from a given third country on the condition of equal market access and also compliance by third-country operators with EU environmental and safety standards.[89] The reciprocity requirements applied under the EC Directive are provisional measures taking place in a larger context of full liberalization of electricity trade in the framework of a customs union and might be permitted under GATT Article XXIV. However, applying the same or similar reciprocity-based market access conditions to extra-EU trade is not compatible with existing WTO and ECT provisions.

Conditioning a higher market access level on "reciprocity" needs to respect GATT Article I. It is, for that reason, impossible for country A to open its electricity market only to country B, which has a level of market liberalization similar to that of country A; but not to country C which still has a more protected market than country A. This is the whole idea of non-discrimination. It assumes that a market opening, albeit a unilateral one, will – through increased efficiency and lower consumer prices – benefit also the country offering the opening. A reciprocal opening would further increase overall welfare but is not a requirement. To avoid that only strong trading partners negotiate bilateral concessions with each other, all WTO members (ECT Contracting Parties) benefit from all of the market openings offered by any WTO member (ECT Contracting Party) to any other country. The idea behind the principle of non-discrimination embodied in the GATT's provisions on unconditional Most-Favoured Nation treatment is that trade conducted on an equal footing for all – not on the basis of a myriad of bilateral agreements brokered as a result of economic power struggles – will increase transparency, avoid inefficiencies and stimulate trade so as to achieve overall higher standards of living.[90]

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88 Autorità per l'energia elettrica e il gas: Press Release, dated 28 September 2000.
89 EU Energy Law, Wilmer, Cutler & Pickering, 29 June 2001.
90 See Energy Charter Secretariat, *op. cit.*, 2001, page 22.

Denying or limiting access to the electricity market by the importing country on the grounds that the exporting country does not grant similar market access level is a discriminatory trade practice and incompatible with the principle of Most-Favoured-Nation treatment, the cornerstone of both the WTO and ECT.[91] The discriminatory nature of reciprocity requirements need no detailed demonstration, since the MFN provisions in Article I of the GATT 1994 require that "with respect to all rules and formalities in connection with importation […] and with respect to all matters referred to in paragraphs 2 and 4 of Article III,[92] any advantage, favour, privilege or immunity granted by any contracting party to any product originating in […] any other country shall be accorded immediately and unconditionally to the like product originating in […] the territories of all other contracting parties."

The emphasis here is on "immediately and unconditionally". In other words, the difference in electricity market openness between an importing country and an exporting country, or between two exporting countries, is irrelevant, and must not be used as a pretext for different treatment of electricity imports of different origin.

Proponents of reciprocity clauses in sectoral trade agreements, and especially on electricity trade, often argue that reciprocity is not contradictory to GATT/WTO. This is true if reciprocity is considered as a negotiating technique, but wrong if seen as a condition for the implementation of concessions resulting from those negotiations.

The principle of reciprocity had always been central to the negotiating frameworks for the reduction of trade barriers since the inception of GATT 1947.[93] This principle refers to the overall balance of obligations and concessions resulting from negotiations and implies that each country participating in negotiations makes equivalent trade concessions. Different methods were developed and used to implement this principle during negotiating rounds, but reciprocity has never meant that for a given product bilateral reciprocity should apply between each pair of GATT/WTO members. Rather, equivalence of concessions (reciprocity) should be achieved at aggregated level, since the trade interests of different countries vary in terms of products, export markets and volumes.

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91 For example, when the US Congress considered lifting long-standing investment restrictions in the telecommunication sector on a reciprocal basis, the EU Commission argued that "the introduction of reciprocity-based market access is incompatible with the MFN principle."
See EU Commission Press Announcement: "Commission publishes its Barriers Report" found at: http://europa.eu.int/en/agenda/eu-us/pub/pr/t&e.html.

92 These matters are respectively: internal taxes or other internal charges of any kind, and all laws, regulations and requirements affecting internal sale, offering for sale, purchase, transportation, distribution or use.

93 For an extensive discussion of different reciprocity concepts used in the GATT/WTO system, see Yanai, A.: "Reciprocity in Trade Liberalization", APEC Study Center, Tokyo, 2001.

No guidance is provided in GATT/WTO on how to measure reciprocity, and it has been left to each government to determine for itself the economic benefits and advantages of the exchange of concessions. That the principle of reciprocity is indeed a central element of the GATT/WTO system is further demonstrated by the acceptance of the concept of non-reciprocity[94] as an exception since the 1960s in respect of trade negotiations among developed and developing countries, which means that developing countries should not be expected, in the course of trade negotiations, to make contributions which are inconsistent with their individual development, financial and trade needs.

Whilst reciprocity is a central element of trade negotiations, it is not an acceptable condition for the application of trade concessions or advantages, be they the result of contractual obligations or autonomous decisions. The principle of MFN treatment is entrenched in the WTO system and is codified in GATT and GATS articles and prevails over the principle of reciprocity as a negotiating technique. It is worth mentioning that, while the principle of reciprocity has substantially been applied to agreements concerning specific sectors, the results of those negotiations had to be *ipso facto* extended to countries that remained outside of the agreement. Examples are the agreement on pharmaceutical products reached during the Uruguay Round and Information Technology Agreement decided upon at the Singapore Ministerial Conference of the WTO.

8.6 Trade measures for environmental purposes

8.6.1 Introduction

The protection of the environment has been a growing public concern in most developed and many developing countries for the last two decades. This has led to various regulations at both national and international levels. In the field of energy, increasing energy efficiency and reducing environmental impact of energy generation and use have become policy priorities of many countries. While economic benefits of increased competition and trade in the electricity sector have become apparent, fears of negative environmental impacts of electricity sector liberalization have also been increasing in parallel with domestic policy debates about the desirable extent and scope of market opening.

The policy instruments used to address environmental concerns in the electricity sector are various, ranging from import restrictions through quantitative regulations promoting certain energy sources to subsidies and product regulations.

[94] Elaborated in Part IV of GATT 1994 as well as in the 1979 Decision of the CONTRACTING PARTIES (known as the Enabling Clause).

8.6.2 *Import restrictions aiming at improving the environment*

Reflecting growing public concern for potential regional and continental impacts of poor environmental governance in foreign countries, several ECT signatory states have adopted legal provisions potentially excluding electricity imports from targeted countries. Demand for government action in order to prevent negative environmental impacts of a liberalized import regime have been especially intense in those countries where nuclear electricity is prohibited.

The memory of the Chernobyl tragedy and the existence of other deemed unsafe nuclear plants in some Central and Eastern European countries have been important political ingredients in the debate. There has been significant pressure from civil society and some NGOs to prohibit electricity imports from countries whose industrial policies allow unsafe nuclear power plants and highly polluting thermal plants. This is the political context in which the first legal provisions allowing import prohibition were adopted. Austria and Luxembourg were the first countries to introduce such provisions in their laws, followed by Italy, the Czech Republic and Hungary (these legal provisions are contained in Box 5).

In the recent revision of the German energy law a chapter was included which could be read in a way similar to the Austrian and Luxembourg provisions.[95]

The environment-related trade provisions are often called "environmental reciprocity" or "green reciprocity". The main idea behind these measures is that environmental standards relating to power generation in the exporting country should be equivalent to the standards in the importing country. If those standards are not the same, imports may be curtailed.

The legal provisions for environment-related electricity import restrictions received broad support from NGOs and electricity producers in all five countries. Their relative success could be explained by the coincidence of genuine need for better protection of the environment and of industry interests. In Europe, the main driving force leading to the Austrian "environmental reciprocity" provisions was the concern about the Temelin nuclear power plant in the Czech Republic. The arguments of Czech and Austrian environmentalists not only opposed the project, accusing CEZ, the Czech electricity operator, of failing to conduct adequate safety checks, but also exerted pressure against importing "cheap" electricity from polluting power plants being "dumped" on Austrian and EU markets.

Ironically, one argument in favour of Temelin is an environmental one; specifically, that it will relieve the northern Czech Republic of continued environmental degradation. The ageing coal-burning stations and extensive strip mines have turned the area into one of Europe's most polluted regions.

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[95] Statement by Öko-Institut before the Committee on Industry, External Trade, Research and Energy of the European Parliament at the Public Hearing on the Completion of the Internal Market in Electricity and Natural Gas, Brussels, November 6, 2001, found at http://www.europarl.eu.int/hearings/20011106/itre/matthes.pdf.

Linking arguments for trade protection in the electricity sector to environmental concerns is not new. Referring to US/Canada electricity trade, the World Bank noted in 1992 that there was evidence that "when interest groups link demands for protection from import competition to environmental arguments, they enjoy a higher success rate in securing trade restrictions. The economic consequences of this kind of strategy are generally unfavourable and the environmental effects at best uncertain."[96]

While it is doubtful whether reciprocity trade provisions can be effective in protecting the environment either in the importing or the exporting country, their non-compatibility with WTO and ECT trade rules appears evident.[97]

When ECT Contracting Parties want to protect living resources (animals and/or human beings that can be affected by "non-green" electricity products) or clean air (that could be depleted by non-green electricity) they can do so under GATT Article XX(g) by introducing, for example, high environmental standards and banning all imports that do not meet these standards. Under GATT Article III, such standards may discriminate between products that are "like" (arguably, domestic "green" energy and imported "non-green" energy) and hence violate Article III. But under Article XX this violation can be justified on the ground that the discrimination is imposed not to protect domestic production, but to protect or conserve health or clean air.

It is undecided whether ECT Contracting Parties are allowed to impose restrictions in order to protect exhaustible natural resources (or, for that matter, the health of human beings, animals or plants under Article XX(b)) *outside of their territorial jurisdiction*.[98] Recent case law requires a "sufficient nexus" between the country imposing the measure and the resource protected.[99] Extra-territoriality becomes an issue if an ECT Contracting Party bans, for example, imports of nuclear energy, in order to protect the health of human beings or environment *in the country of origin*. Even if such extra-territorial protection would not be justified (an issue that is still left open in case law), the party imposing the measure could always attempt to establish a "sufficient nexus" between the production of "non-green" electricity and its own territory, for example, by pointing at the cross-border effects of nuclear disasters on its own nationals and on the air they breathe.

Even if an import ban on electricity can be justified as a measure "relating to the conservation of exhaustible natural resources" under GATT Article XX(g), the measure may still not find justification under Article XX if it is "applied in a manner which

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96 Low, P.: "International Trade and the Environment", The World Bank, Washington, 1992. One of the examples referred to was a proposal for a measure that would have banned imports of electricity from Canadian power plants that did not meet (at that time) new U. S. environmental standards.

97 The following discussion of GATT Article XX is taken from Energy Charter Secretariat, *op. cit.*, 2001.

98 In favour: the so-called Tuna I report (unadopted Panel Report on *US – Restrictions on Imports of Tuna*, dated 3 September 1991, DS21/R, 39S/155, paragraphs.5.26 and 5.33); against: the so-called Tuna II report (unadopted Panel Report on *US – Restrictions on Imports of Tuna*, dated 16 June 1994, DS29/R, paragraphs.5.15-5.17).

99 Appellate Body report on *US – Import Prohibition of Certain Shrimp and Shrimp Products*, adopted on 6 November 1998, WT/DS58/AB/R, paragraph.133.

would constitute a means of arbitrary or unjustified discrimination between countries where the same conditions prevail, or a disguised restriction on international trade" (the so-called chapeau of Article XX). This requirement intends to prevent that Article XX exceptions be abused (for example, by introducing so-called health measures that are, in effect, applied to restrict trade). It requires, in essence, that exceptions under Article XX be applied reasonably.[100]

In two of the three WTO cases that so far addressed Article XX, the contested measure was found to fall under one of the specific paragraphs of Article XX, but fell short of meeting the chapeau of Article XX. In the first case (*US – Gasoline*), this was so because there were alternative courses of action available to achieve the same objective. Support was also found in the fact that the country imposing the restriction had not pursued the possibility of entering into cooperative arrangements with the complainants in order to work out common standards. In the second dispute (*US – Shrimp/Turtle*), the chapeau was construed as an application of the principle of good faith and against abuse of rights. A measure was said to be inconsistent with the chapeau of Article XX if it amounts to an abuse or misuse of an exception of Article XX, i.e., when the detailed operating provisions of the measure prescribe arbitrary or unjustifiable activity or when a measure is actually applied in an arbitrary or unjustifiable manner.[101]

In that particular case, the fact that the restriction applied essentially the same policy, in a very inflexible way, to all exporting countries – a policy that required exporting countries to adopt essentially the same standards as those applied domestically by the US – even though the conditions in exporting countries may be very different, was found to constitute an unjustifiable and arbitrary discrimination.[102] The fact that the US had given different phase-in periods to meet its standards to different exporting countries and had made different levels of effort in transferring the technology to meet these standards to specific countries further supported the Appellate Body conclusion of discrimination in the sense of the chapeau of Article XX.

In a recent public debate, which addressed the question of reciprocity provisions to electricity imported from non-EU countries which do not meet EC environmental standards, an EC representative held the view that any application of the reciprocity clauses in Article 19 of the EC Electricity Directive to imports from non-EU countries could well infringe the MFN obligations in Article I of GATT 1994. Furthermore, it is questionable whether this violation could be justified under the general exceptions of GATT Article XX.[103]

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[100] Note, indeed, that the "discrimination" referred to in the chapeau of Article XX is of a different nature than the differential treatment of like products violating Articles I (MFN) or III (national treatment). The presence of the former type of discrimination (MFN or national treatment) does not prevent that the provisions in the chapeau of Article XX to be met (i.e., that there is *no* "discrimination" under the chapeau of Article XX). If this were not the case, Article XX would not be an exception to Articles I and III.

[101] Appellate Body report on *US – Import Prohibition of Certain Shrimp and Shrimp Products*, adopted on 6 November 1998, WT/DS58/AB/R, para.160.

[102] Ibid., paras.161-186.

[103] Presentation by Christopher Jones, Head of Unit, European Commission, DG TREN, at the CEPMLP/CEPS Seminar of 28-29 Sep 2000 on "Converging European Energy Markets: How to Make it Happen" found at: http://www.dundee.ac.uk/cepmlp/journal/html/vol7-9.html.

Box 5 **Import regulations related to environment protection**

Austria	**Section 13** Electricity Supply Contracts Involving the Purchase of Electric Energy from Third Countries (1) Electricity supply contracts involving the purchase of electric energy, with a view to covering domestic demand, from third countries 1. producing part of their electricity requirement in plants which do not comply with the state of the art or in plants the operation of which directly or indirectly jeopardizes the life or health of persons, animals or plants in the Federal territory, or 2. failing to furnish proof of the proper disposal of waste resulting from the generation of electric energy and to draw up a plan for the disposal of waste resulting from future generation shall not be permissible. (2) *Elektrizitäts-Control GmbH* shall issue an ordinance determining the third countries to which the conditions specified in paragraph 1 apply.
Czech Republic	**Section 44 of the Energy Act**[104] Electricity Imports Restriction (1) The Ministry may decide to limit electricity imports from other countries to individuals or legal entities in the event that: (c) the environmental effects of electricity generators in the country from where electricity is imported are not comparable with such effects of electricity generators in the Czech Republic.
Hungary	**Section 48 of the Electricity Act** Cross-border Transmission of Electric Energy (3) The system operator may – in accordance with the provisions of a separate legal act and taking into account the provisions of § 33, paragraph (1) – refuse the access to the public network and the cross-border importation of electricity, and may reduce its volume, if a) the importation occurs from such facilities the operation of which imposes directly or indirectly a danger to persons residing in the national territory or to their properties, or to the nature or the environment, or may impose such a danger.
Italy	**Legislative Decree No 79 of 16 March 1999** Article 10 3. "Autorità per l'energia elettrica e il gas" shall adopt provisions establishing norms on the environmental and economic compatibility of electric energy imported from countries not belonging to the European Union, account being taken of reciprocity conditions".
Luxembourg	**Law of 24 July 2000 on the Organisation of Electricity Market** Article 17 7. […] Within two months after the notification to the minister of a planned supply contract to be concluded with a supplier or a plant established in a third country that is not a member of the EU or the EEA, the minister can object to the conclusion of this contract if he comes to the conclusion that: - the supply will be done from installations that do not comply with the state of the art or whose operation constitutes a direct or indirect danger for persons or goods, or - the supply is done from installations of an enterprise that does not prove to dispose of waste from generation according to the state of the art, or that does not have a concept for future waste disposal."

[104] Act of 28th November 2000 on Business Conditions and Public Administration in the Energy Sectors and on Amendment to Other Laws (the "Energy Act").

In these various provisions the countries concerned apply their norms (Processes and Production Methods; see Box 6) outside their own jurisdiction. Furthermore, there is wide latitude and discretionary power given to implementing authorities in deciding when and against which countries/exporters to impose restrictions. Finally, there is no indication in any of these provisions whether the exporting countries' authorities or exporters would be given the opportunity to present their case and what administrative procedures would be followed.

It can be concluded that the mere existence of these regulations results in the lack of predictability in electricity trade and constitutes a barrier to market access. It should be added that only Italy has made public the criteria it will apply in order to assess "environmental compatibilities": existence of "environmental protection obligations equivalent to those assumed by Italy and the European Union concerning limitations of greenhouse gas emissions and other polluting agents".

The above-mentioned environment-related provisions can be differentiated from each other as follows.

First, while the Hungarian and Luxembourg provisions indicate that the assessment of facts would be done for each supplier and power plant on an individual basis and the possible restrictions would also apply to individual units, the Austrian law allows to generally prohibit electricity imports from a given country based on the mere fact that one of its production sites was deemed dangerous irrespective whether electricity imported to Austria was actually produced in such facility. In the case of the Czech legislation, it is not possible to determine whether it applies to the whole country or to individual power producers.

Second, as to the place where the negative environmental effects should occur in order to trigger the trade restrictions, the Hungarian and Austrian provisions link them to the importing country's territory. The Czech, Italian and Luxembourg provisions are not "territory-specific".

Finally, while the Austrian and Italian requirements do not apply to EU countries, the Luxembourg provisions exempt EU and other EEA countries.[105] The provisions of the Czech Republic and Hungary formally apply to all foreign countries.

Austria is the only one among these countries that have introduced import measures that actually prohibit all electricity imports from certain countries. As provided for by Section 13 of the Electricity Law, *Elektrizitäts-Control GmbH* has issued, in September 2001, an Ordinance listing twenty countries where sufficient conditions for import prohibition is deemed to exist. The Ordinance was valid for one month and replaced by successive monthly ordinances. The present Ordinance, in force until mid-2002, reduces the number of countries from which electricity importation is prohibited to twelve.

[105] The EEA countries not members of the EU are Iceland, Liechtenstein and Norway.

Whatever the environmental conditions formulated in the five countries' provisions, their compatibility with basic WTO norms is undecided.[106] Recently the European Parliament held a hearing on the completion of the internal energy market, where the question was whether the EU Commission or Member States should act to restrict import of energy from countries with lower environmental or social standards and, if so, what mechanisms that are compatible with WTO rules and with the ECT would be open to them to do so. Though positions diverged on the usefulness of such an EU policy, many experts on international trade law held the view that trade measures imposed on third countries in order to enforce the EU environmental standards are not WTO/ECT consistent. Under the Energy Charter, which incorporates WTO rules, "it is legally difficult to impose reciprocity requirements on trade between countries that are signatories of the Energy Charter Treaty".[107]

In their submission to the European Parliament, the *Bureau Européen des Unions de Consommateurs (BEUC)* and the UK National Consumer Council stated that "unilaterally restricting imports from countries with lower environmental or social standards is inappropriate. Our experience is that banning such imports does not in practice contribute to an actual increase in the environmental and/or labour 'performance' of the countries involved. Furthermore, this tactic is very much used as an excuse for cheap protectionism. The steps suggested by the question would be analogous to the US 'Super 301' provision which is arbitrary and contrary to multilateral agreements."[108]

Isolating plants (or whole countries) because of different environmental effects or standards is also counterproductive from an economic perspective. This is because this would tend to delay the necessary modernization of existing power plants and the construction of new power plants due to the lack of capital and technology. One can hardly expect plant operators to modernise infrastructure if they cannot sell electricity to generate the necessary income. Less income makes it likely that investments in safety will not be made, making plants potentially more dangerous in the future.

A much better strategy would be to engage these countries in constructive co-operation rather than to isolate them through import bans or other sanctions.

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106 For example, the legality of non-product related production and processes method requirements has not been accepted by WTO jurisprudence. More importantly, the MFN and non-discrimination principles do not seem to be followed in these regulations. Furthermore, the extra-territorial application of internal regulations might also be considered as contravening WTO rules.

107 Hancher, L., Catholic University Brabant, Tilburg - Replies to Questions for the Hearing on the completion of the internal energy market, found at: http://www.europarl.eu.int/hearings/20011106/itre/hancher.pdf.

108 Evidence from Robin Simpson, Director of Special Projects, National Consumer Council, UK appearing also on behalf of the *Bureau Européen des Unions de Consommateurs* (BEUC) found at: http://www.europarl.eu.int/hearings/20011106/itre/simpson.pdf.

Over the next decade, the need for investment in the power sectors of Russia and other countries of Eastern Europe will be massive. Russia's UPS has estimated that it needs between $6 to $11 billion annually from 2001 and 2005 to carry out refurbishment of existing plants and construction of new plants. This creates an opportunity for domestic and foreign investment in the ageing power infrastructure in Russia and other FSU countries. In addition to bringing potential economic benefits to host countries and power companies, such investment could help to improve the safety of their nuclear power plants, reduce harmful emissions through application of clean-coal technologies and raise thermal efficiency of power plants in general. After all, investment in new technologies is the main vehicle for improving the production processes and their products.

8.6.3 Internal quantitative regulations aiming at promoting certain energy sources

An increasing number of ECT countries have introduced, or plan to introduce, various internal regulations in order to promote environment-friendly production and consumption of electricity and, in particular, electricity produced from renewable energy sources (RES). The policy instruments used include price-based measures, such as subsidies (including investment incentives, tax exemptions or reductions, tax refunds and direct price support schemes) and taxes on other energy sources. They may also consist of quantitative measures fixing certain numerical quotas that are reserved for electricity produced from renewable energy sources within total electricity consumed or sold (portfolio requirements), or general performance requirements obliging market players to buy a certain type of domestically produced electricity. Tax/subsidy and quantitative measures may also be applied in combination with each other.

In the ECT area, most of the schemes relating to the promotion of electricity from renewable energy sources have been developed by the EU countries. Most of them include price-based measures (including subsidies) or contain a combination of such measures with quantitative regulations. In Central European countries, such schemes mainly have quantitative features. The following summarizes, on the basis of notifications to the European Commission[109] the different methods used by EU Member States to promote a larger market share of electricity produced from renewable energy sources (an asterisk indicates the most important policy measure used to promote RES electricity by the country concerned):

[109] Information from the EU Commission Staff Working Paper No. SEC(2001)1957.

Type of Measure	Country
Investment subsidy	Austria, Finland*, France*, Germany*, Greece*, Ireland*, Netherlands*, Sweden*
Guaranteed Price	Austria*, Belgium, Denmark, France, Germany*, Greece*, Italy, Luxembourg, Portugal, Spain, Sweden, Slovenia
Obligation to supply specified amount of renewables\Tender for Fixed Quantities	Austria, France, Ireland *, United Kingdom*, Poland
Green certificates market	Belgium*, Denmark*, Netherlands*
Green labelling and promotion to consumers	Finland*, Germany, Netherlands, Sweden, United Kingdom
Active taxation policy of non-renewables	Belgium, Denmark, Finland, Greece, Ireland, Italy, Netherlands, Poland, Spain, United Kingdom

In Sections 8.6.3.1 to 8.6.3.3 only regulatory measures with quantitative elements are addressed.

8.6.3.1 Mandatory portfolio requirements (quotas)

Though the measures applied under each of the above-mentioned mechanisms may contain trade restricting or trade distorting elements, especially specific subsidies, and may fall under the discipline of the WTO, the sections below only address quantitative measures and related regulations.

With mandatory portfolio requirements, governments oblige eligible customers and/or electricity traders and/or distributors that a certain percentage or amount of electricity purchased or consumed come from renewable energy sources. Their quota requirements are met by generating the required amounts of RES electricity from their own or independent power producers' sources. This system may be coupled with a system of tradable RES certificates, which are not analysed herein.

Mandatory portfolio requirements to reserve a market share for "green" electricity are used in several States of the US,[110] in Austria,[111] Denmark[112] and Italy[113]. Other countries in the EU were also reported[114] to plan to introduce RES quota requirements: Belgium in 2001 and Denmark[115] in 2002.

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110 Horlick G., Schuchhardt Ch. and Mann H., *op. cit.*, 2001.

111 Rheinhardt Haas (editor): "Report on Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries", Institute of Energy Economics, Vienna University of Technology, Vienna 2001.

112 SKM Energy Consulting: "Harmonisation of the electricity markets surrounding the Baltic Sea", Study performed for the Nordic Council of Ministers' Electricity Group Oslo/Copenhagen/Frankfurt a. M, 2000.

113 Gianfranco Puopolo and Riccardo Croce: "Green Certificates in Italy", ECO Services International, found at http://www.eco-web.com/editorial/02945-03.html.

114 Haas, R. (editor), *op. cit.*, Vienna 2001.

115 Without mentioning numerical ratios, the Danish legislation obliges all electricity consumers to purchase "a relative share" of the electricity that the grid companies and the system responsible companies are obliged to purchase "pursuant to Part 9 of the Act or rules or decisions taken pursuant to the Act.

Some other ECT countries have also included into their legislation framework provisions that allow or prescribe the future introduction of mandatory portfolio requirements, but without specifying numerical targets. Examples are: the Czech Republic, Hungary and Poland.

Though the new Hungarian Electricity Act does not contain specific targets, government officials have disclosed plans to gradually establish and increase RES portfolio requirements from 3% to 6% by 2010. Interestingly, government officials justified this by the country's EU accession ambitions and the need to reduce Hungary's energy imports.[116]

Various methods exist to enforce mandatory RES electricity purchase obligations: customers/dealers may be obliged to acquire RES certificates (e.g. Denmark's legislation provide for such an obligation on all electricity consumers), or suppliers/dealers may be required to show on the final customer's electricity bill the respective proportions of the different primary energy carriers used to generate the electric energy (Austria).

RES definitions

Mandatory portfolio requirements vary from country to country depending on the definition of RES[117]. For example, in Austria the RES portfolio includes all technologies except tidal power,[118] while Belgium and Denmark exclude waste-based electricity. RES measures also differ from each other in terms capacity or age of power plants. Italy, for example, allows meeting portfolio requirements by purchasing electricity from large hydropower plants, while other countries include in their RES definitions only the purchase from small hydro.

Quotas

As indicated above, mandatory portfolio requirements are currently in use in Austria, where there are two separate quota obligations: one for electricity purchased from small hydropower plants and another one for other RES electricity. The Austrian electricity law requires that 8% of the electricity delivered to final customers must come from domestic small-scale hydropower plants.[119] This was already in effect in 2001. A further legal requirement is that the utilities have to fulfil another, progressively increasing quota with "new" RES electricity (of 4% by 2007).

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116 Energo FSU/CE Power Report, 14 September 2001.

117 Renewable energy sources are defined in the EU Directive 2001/77/EC as meaning renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases); Biomass is defined as meaning the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

118 Austria is a landlocked country and cannot generate electricity by using tidal power. The exclusion of tidal from the Austrian definition of RES is consistent with the legal requirement that the mandatory quota be met only by purchasing domestic RES electricity.

119 Section 43 of the 1998 Austrian Electricity Law.

In Italy, Legislative Decree n.79/99 requires electricity users and operators that have imported or generated electricity from conventional sources in 2001 to inject in 2002 into the national grid at least 2% of the total amount of energy used in 2001 in form of electricity from renewables (solar, wind, hydro, geothermal, tidal, from waves and from the transformation of vegetal products, organic and inorganic waste).[120]

In Denmark, according to the new Electricity Act of 1999, all electricity consumers will have to buy an increasing share of RES electricity. Though the Act does not provide concrete targets, a political agreement requires that 20% of electricity consumption must be covered by renewables in 2003.[121].

In Belgium, a draft Flemish decree proposed to established RES portfolio requirements to be applied as from 2001 and consisting of a system of green certificates. The objective is to impose an obligation on electricity supply enterprises to purchase at least 3% of their supply in 2004 from RES. The decree requires that in order to qualify under the quota, the electricity should be produced in Flanders.[122]

In the Czech Republic, the distribution system operator is obliged to buy, "as far as technically possible", electricity from RES and from sources of combined generation of electricity and heat. The law also foresees that an implementing regulation will specify the quantities for the mandatory purchases.

In Poland, the Energy Law provides that the Economic Minister shall impose on electricity traders, electricity transmission operators and distributors the obligation to purchase RES electricity and electricity from "unconventional sources" or produced in co-generation with heat, and shall determine the detailed scope of this obligation taking into account energy generation technology and size of the eligible power plants.

8.6.3.2 Purchase obligations without specified amounts or proportions

Obligations to purchase domestically produced RES electricity without specified amounts or proportions are often imposed on electricity suppliers or distributors as part of their "public service obligation". Typically, RES-related public service obligations do not specify a numerical target, as is the case in RES portfolio requirements, but oblige electricity companies to purchase all electricity produced from RES in their supply or distribution area. What is common in this type of obligation and portfolio requirements is that both are quantitative import restrictions (they displace imports and the same

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120 "Green Certificates" in Elementi No.2, September/November 2001 found at: http://www.grtn.it/Elementi/Eng/procedure/Rivista02/evidenza-2.htm and Gianfranco Puopolo and Riccardo Croce: "Green Certificates in Italy".

121 Roggenkamp, M. M., Rønne, A., Redgwell, C. and Del Guayo, I. "Energy Law in Europe – National, EU and International Law and Institutions." Oxford University Press 2001, page 402.

122 P. Van Roy, R. Belmans, G. Pepermans, S. Proost, B. Willems, L. Conings, *op. cit.*, 2000. As a kind of explanation as to how such discrimination is accepted under EU rules, the study adds that: "The EU would accept a minimum percentage of green electricity to be produced in each country separately, despite the fundamental rules of open market."

opportunity is not given to imported electricity) and, to the extent that purchase obligations are limited to domestic or local production, they also alter the competitive situation for imported RES electricity relative to domestic production.

France has introduced provisions that oblige EdF and non-nationalized distributors to buy all electricity offered by producers from certain RES or by certain class of producers using energy efficient technologies.[123]

General purchase requirements also exist in Hungary and the Czech Republic. The Hungarian Decree No. 55/1996 (XII. 20.) IKIM establishes mandatory purchase requirement in relation of RES electricity generated by public service power stations.[124]

Germany has enacted RES electricity purchase obligations through three successive laws. The German purchase obligations[125] applied only to German RES electricity. Regional electricity distribution companies were required to purchase RES electricity generated in Germany (in their respective area of supply) at fixed minimum prices, while upstream suppliers of electricity from conventional sources partially were obliged to compensate the distribution undertakings for the additional costs caused by that purchase obligation. Companies concerned by these measures considered that the purchase obligation constituted quantitative import restrictions. The obligation to purchase a certain amount of electricity produced from RES produced in Germany affected their ability to import electricity from other countries.

Other trade-distorting measures exist in the Netherlands, Ireland and Greece, where customers are eligible to buy "green" power before they are eligible to buy conventional power.[126] In these cases, both domestic and imported electricity from conventional energy sources are displaced in favour of RES electricity.

8.6.3.3 Legal criteria regarding mandatory portfolio requirements and other purchase obligations

These measures differentiate between electricity according to the country of origin and/or sources of primary energy and/or types of RES electricity, and may contradict the national treatment obligations under the GATT 1994 and the ECT. It is recalled that the basic provision of GATT Article III:1 is that internal regulations cannot be applied to imported or domestic products so as to afford protection to domestic production.

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123 Roggenkamp, M. M., *et al., op. cit.,* 2001, para.7.175. Article 10 of Law 2000-108 of 10 February 2000 obliges distributors to purchase electricity offered to them by (1) installations using domestic or similar waste or installations feeding a heating network and (2) installations whose installed production capacity per site does not exceed 12 MW and that use renewable energy source or use energy efficiency techniques like cogeneration, when these installations cannot under reasonable economic conditions taking into account the market opening, find eligible customers.

124 "Hungarian Energy Policy Principles and The Business Model of the Energy Sector", Ministry of Economic Affairs, Budapest, 1999.

125 These purchase obligations were challenged before the German Court and later referred to the European Court of Justice. The subject matter before the ECJ was the Law *Stromeinspeisungsgesetz 1998* later replaced by the "Law for the priority of renewable energy sources" of 2000. As far as the quantitative aspects are concerned, bow laws were in substance identical.

126 EU Energy, 28 February 2002.

GATT Article III requires that imported products should, with respect to all internal regulations, receive a treatment no less favourable than that accorded to domestic like products. These internal regulations include internal taxes and other internal charges, and laws, regulations and requirements affecting the internal sale, offering for sale, purchase, transportation, distribution or use of products, and internal quantitative regulations requiring the mixture, processing or use of products in specified amounts or proportions. The purpose of Article III is to ensure that internal regulations do not provide protection to domestic production.

Paragraph 4 of Article III addresses internal regulations other than tax measures.[127] It requires that "the products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use".

Paragraph 5 specifically addresses internal quantitative regulations. It prohibits " any internal quantitative regulation relating to the mixture, processing or use of products in specified amounts or proportions which requires, directly or indirectly, that any specified amount or proportion of any product which is the subject of the regulation must be supplied from domestic sources. Moreover, no contracting party shall otherwise apply internal quantitative regulations in a manner contrary to the principles set forth in paragraph 1 of Article III.

The first question with respect to electricity is whether electricity produced from a specific primary energy is different from electricity produced from another energy source. Are they "like products" or not? For example, is non-RES electricity "like product" relative to RES electricity? Is electricity produced by using energy efficient technologies "like product" relative to RES electricity that is not produced with energy efficient technologies? The answer is that all these are "like products". [See Box 6]

It is also important to recall that while governments are free to treat domestic like products differently (discriminate between them), the treatment that should be applied to all like foreign products is the best of national treatments. Consequently, both foreign RES and foreign non-RES electricity should be treated in the same way and should be granted the best of treatments that benefit domestic RES or non-RES electricity.

The different national regulations concerning the purchase and use of RES electricity (and other similarly treated electricity) provide different definitions of the respective RES portfolios. None of the definitions provides, on the face of it, different and less favourable treatment of electricity based on the country of origin. Formally all foreign exporters of RES electricity are subject to the same definitions as domestic ones and the RES quotas also equally apply to both. Though non-discrimination seems to be

[127] Internal tax measures are addressed in GATT Article III:2. Though measures relating to RES electricity often relate to taxation and pricing or contain tax elements, this paper does not address them.

formally ensured (with the exception of Austria, as discussed below), the definitions in use in many of the jurisdictions reviewed seem to reflect the generating technologies, topography and other production conditions of the respective countries. This might result in *de facto* discrimination of foreign producers and exporters.

Box 6 **Processes and Production Methods of Electricity and Imported Like-Products**

The requirement that electricity must come from renewable resources and the definition of "renewable" are examples of what is often referred as a processes and production methods ("PPMs") measure. PPMs refer to the manner in which a product is manufactured or processed, as well as to information on natural resources that are extracted or harvested to produce that good. PPMs are frequently divided into two different categories. A process or production method can affect the product in such a way that the product itself pollutes or degrades the environment when it is consumed or used. This is considered a product-related PPM. A non-product-related PPM exists where the manufacturing of the product has a negative impact on the environment, but the product itself does not carry any potential environmental damage (for example, through the release of pollutants into the air or water.)

In the context of international trade rules and WTO law in particular, the question as to whether imports of a good can be regulated (i.e. restricted) on the basis of non-product related PPMs is systematically linked to the like-product issue. Legislation requiring that a portion of total electricity portfolios should be produced from renewableenergy, is an example of a non-product related PPM.

The prescribed use of renewable resources for electricity production means that certain fuels, technologies or processes for generating electricity must be used/applied which are considered to be more environmentally friendly than conventional electric power generation methods. The fact that renewable resources were used in the process, however, is not a perceptible characteristic of the resulting end product. Electricity produced from renewable resources has exactly the same qualities as electricity generated from other (conventional) resources and it is the same whether domestically produced or imported. More specifically, imported electricity generated with a renewable resource not included in a State's renewable resources portfolio is "like" electricity produced by a domestic producer within the renewables definition of that State. The process and production measure in this case is therefore not embedded in the product itself. Hence, domestic and imported electricity from renewable resources need to be given the same treatment under Article III:4 of the GATT 1994.

There are no specific provisions in the text of the GATT 1994 which plainly discipline countries from making a distinction between traded like products based on criteria on factors which are not physically embodied in the product. The only clear provision in the WTO in this regard is the definition of a "technical regulation" contained in the Agreement on Technical Barriers to Trade (TBT). The existing interpretations concerning the scope of application of trade rules to PPM-based measures have been based mainly on GATT jurisprudence and on the drafting history of GATT rules. The most common view has been that when a good subject to a trade measure is "like" a domestic product, GATT provisions do not permit treatment of an imported product less favourably than that accorded to the (domestic) like-product based on factors not related to the product as such. If an imported and a domestic product share the same physical qualities, that is are "like", the importing country cannot restrict or condition the internal offering for sale, purchase, transportation, distribution or use of imported products arguing that they must fulfil specific environmental standards.

Source: Horlick G., Schuchhardt Ch. and Mann H.: "NAFTA Provisions and the Electricity Sector", North American Commission for Environmental Co-operation, Montréal, 2001.

One example is hydropower. By setting a maximum capacity above which a hydropower plant cannot benefit from the advantages linked to RES electricity, foreign hydropower suppliers are *de facto* placed in a less favourable competitive situation. For example, Croatia excludes hydro plants whose capacity exceeds 5 MW, the Czech Republic and Denmark exclude hydro power plants of a capacity above 10 MW and the Netherlands those of a capacity above 15 MW. The Austrian regulation also limits access to the reserved 8% quota for small hydro power plants, a restriction which has been long criticized by provinces that have no small hydro capability.[128] With respect to differentiation between different sources of electricity, it needs to be emphasized, that while governments are free to discriminate between their suppliers, foreign electricity should be accorded the best of national treatments.

Some definitions of RES portfolios limit the eligibility to plants under a certain age ("new" plants) or to certain technologies ("efficient" technologies). The criteria used to determine what is "new" or "efficient" are not contained in the relevant laws and, in many cases, these are determined by competent ministries or agencies. It is, therefore, not possible to judge, whether the implementation of such provisions provides for national treatment of foreign electricity.

These examples illustrate that formally non-discriminatory regulations may *de facto* adversely modify the competitive opportunities of imported RES electricity and thus not comply with the national treatment provisions of GATT. Almost all the laws reviewed tend to favour – either deliberately or inadvertently – the local production and exclude foreign electricity from the RES portfolios. A notable exception is that of the Netherlands, whose Electricity Act provides for transferable "Green Certificates" showing that in a given year a producer has generated or will generate a certain amount of RES electricity. The Minister designated by the Act may require that customers use a specific number of certificates per year. Not only certificates for domestic RES electricity producers are foreseen, but also certificates of RES electricity that has been (or will be) generated and that has been or will be transported to a supplier or customer in the Netherlands. In other words, a certificate may also be awarded for RES electricity produced or consumed outside the Netherlands.[129]

There are few cases where access to reserved RES markets is *de jure* denied for foreign electricity. This is exemplified by the Austrian electricity law, which requires that the 8% quota reserved for small-scale hydro-plants must come from domestic producers. Such a provision may be challenged not only because it contravenes Article III of the GATT, but also for non-compliance with Article XI (prohibition of quantitative restrictions). Denmark was also reported to have similar practice. The Danish system of Public Service Obligation (PSO) requires all Danish customers to cover a certain percentage of their electricity consumption from domestic production deemed environmentally friendly. Similarly to the Austrian small hydro provisions, this system was also "often accused" of creating unfair competitive situations.[130]

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128 "The Viennese energy review" in EU Energy, 17 January 2002.
129 Roggenkamp, M. M., *et al., op. cit.,* 2001, page 710.
130 SKM Energy Consulting, *op. cit.*, 2000.

Finally, those regulations that require the purchase of all or an unspecified amount of domestic RES electricity (e.g. Hungary and France) also affect the competitive opportunities of imported electricity and may be challenged under GATT Article III: 5 as internal quantitative regulations applied in a manner so as to afford protection to domestic production.

8.7 Public service obligations

Another important aspect of regulation of the electricity sector concerns public service obligations. In some countries, electricity is perceived as a public good[131] rather than a commodity. The rationale behind this is that the guaranteed and reliable supply of electricity at reasonable prices to all customers is one of the most essential services to both households and industrial customers. In the context of electricity sector liberalization, some governments prefer to ensure the provision of services of general interest not through full market competition, but by imposing public service obligations (PSO) on previous incumbents.[132] In such cases, the issues behind public services become important for the liberalization of electricity markets.

Public service obligations typically fall in the domain of domestic regulation and primarily do not relate to foreign trade. Under both the WTO and the ECT, governments remain perfectly able, even in a fully liberalized environment, to apply universal-service obligations and similar measures on social policy grounds, provided that such obligations do not create a barrier to trade and do not discriminate against imported electricity relative to domestic electricity.[133] However, the scope of and exact functions under public service obligations are not always clearly defined or, if they are, they lend themselves to broad or discretionary interpretation. In such cases, it is possible for public authorities or the incumbent utility to use this concept to prevent competition from electricity imports. In addition, public service obligations often provide politicians,

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131 The "public" nature of a public good comes from the need to organize collective action to supply a public good, the organization of which is usually undertaken by government. Collective action is necessary because of the properties of a public good that cause it to be undersupplied or overused. Not all publicly provided goods and services are public goods. While the provision of security through a police force is an example of a publicly provided public good, the public supply of electricity is not. Durano, Marina: "Understanding global public goods and differentiating them from publicly provided goods", June 2001.

132 European Commission: "Services of General Interest in Europe", COM(2000) 580 final, Brussels, 2000. This paper defines the notion of "Services of General Interest" as covering "market and non-market services which the public authorities class as being of general interest and subject to specific public service obligations". Please note the tautological definitions of the two concepts.

133 See for example the pamphlet by the WTO Secretariat: "GATS: Fact and Fiction". Similarly, the ECT does not limit governments' right to impose public service obligation in the energy sector. It is worth mentioning that the right to impose PSOs is not a "carte blanche" to governments. For example, the WTO Agreement on Additional Commitments on Basic Telecommunication Services attaches some reasonable conditions to the use of public services obligations: "Any member has the right to define the kind of universal service obligations it wishes to maintain. Such obligations will not be regarded as anti-competitive per se, provided they are administered in a transparent, non-discriminatory and competitively neutral manner and not more burdensome than necessary for the kind of universal service defined by the member." Furthermore, in the context of trade in goods a PSO which would have the effect of barring electricity imports from a foreign supplier would be perfectly challengeable under Article XXIII:1(b) of the GATT ("Non-Violation Nullification or Impairment").

at all levels of government from local to national, with direct means to influence utility decisions,[134] including measures that may negatively affect the competitive situation of foreign electricity suppliers. Additionally, "imposing" public service obligations on incumbents might enable them to maintain their privileges, thus impeding effective opening of the market. Finally, PSOs may serve as a tool to interfere with management decisions of electricity utilities in order to achieve political or general economic objectives of the government, such as employment and inflation targets. This is often the case when the governments rather than an independent regulator exercises control over the fulfilment of PSOs. Public service obligations may, therefore, be inconsistent with free competition principles of market-based economies and require exceptional treatment with respect to competition laws.

Public service obligations often include requirements that give, directly or indirectly, preferential treatment to domestically produced electricity and thus competitive opportunities of imported electricity are prejudiced. For example, governments may impose public service obligations which require the purchase of electricity from certain domestic producers, which distorts trade by displacing imports. They may also oblige public service enterprises to grant priority access to networks for domestic electricity or obligates them to transport domestic electricity at preferential rates relative to imported electricity.

PSOs are also often associated with trade distorting subsidies.[135] Where only one or a limited number of all operators competing in a certain market are charged with public service obligations while the others are not, extra costs of the service are financed by either imposing additional charges on the other operators active in that market or through public funds. The OECD[136] states that competition (and market access) problems can arise when PSOs are not thoroughly separated from the incumbent's competitive activities. In such cases, it is difficult to distinguish between those revenues, which are intended to cover the cost of PSOs and those which are profits from commercial activities, or indeed to distinguish between costs incurred to comply with PSOs and costs of assets that also can be used to supply the competitive market. The OECD exemplifies this by the Greek Public Power Corporation (PPC) which cannot cross-

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134 Written statement by Walter Schulz, Energiewirtschaftliches Institut, University of Cologne, before the Committee on Industry, External Trade, Research and Energy of the European Parliament at the Public Hearing on the Completion of the Internal Market in Electricity and Natural Gas, Brussels, November 6, 2001, found at http://www.europarl.eu.int/hearings/20011106/itre/schulz.pdf.

135 In the European Union, a PSO is defined as any obligation imposed upon a service provider to ensure the provision of a service satisfying standards of continuity, regularity, capacity and pricing, which the service provider would not assume if it were solely considering its economic interest. The Commission considers that such compensation is not State aid if the PSO is subject to an open and transparent public tender procedure where the lowest bidder meeting the set quality standards wins the contract. Moreover, the aid amount must be limited to covering the operating losses, allowing for a normal return on capital employed. See: Simon, S.: "Recent developments in State aid policy" in State aid and the single market, European Economy, 1999, Number 3.

136 OECD: "OECD Reviews of Regulatory Reforms: Regulatory Reforms in Greece", Paris, 2001.

subsidize between eligible and captive consumers. However, the required accounting separation – between generation, transmission and distribution – is insufficient to detect this sort of cross-subsidy because many of the assets are used both to supply eligible and captive customers.[137]

Article 90 of the EC Treaty, which has played the most important part in determining the role of regulated public services in the European Union, ensures that undertakings responsible for operating services of general economic interest are subject to the rules on competition insofar as the application of such rules does not obstruct the performance, in law or in fact, of the particular tasks assigned to them. The concept of PSOs is also recognized in sectoral EC Directives such as the Directive 96/92on electricity. According to the Directive, Member States may impose public service obligations, which may relate to "security, including security of supply, regularity, quality and price of supplies and to environmental protection".[138] The Directive recalls, however, that Member States imposing such obligations are obliged to respect the relevant rules of the EC Treaty, which also include those relating to competition and free movement of goods. The Directive waives such Members States from certain obligations, including those relating to system access (i.e. the provisions in Articles 17, 18 and 21 relating to third party access and the single buyer) "insofar as the application of these provisions would obstruct the performance, in law or in fact, of the obligations imposed on electricity undertakings in the general economic interest and insofar as the development of trade would not be affected to such an extent as would be contrary to the interests of the Community".

The EC Directive gives Member States considerable leeway to adopt measures restricting market access, particularly access to the transmission network, if they consider access restrictions as necessary to protect the enterprises entrusted with power public service obligations. If a Member State wishes to derogate (or, in effect, to disregard) part of the Directive, it needs only to notify the EC.[139]

In the European Union, the concept of public service utilities has been traditionally most marked in France, and it is still also important in Spain, Italy, Portugal, Belgium and Greece, but was historically unknown in the other EU Member States.[140]

France, where the public service character of the national monopoly company has never been disputed since the nationalization of the electricity sector in 1946, gives an interesting example. The law on the "Modernization and Development of Public Service in Electricity"[141], adopted as a way of implementing the Directive, defines the concept of public service very broadly.[142] The concept of public service includes such broad

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137 OECD: "OECD Reviews of Regulatory Reforms: Regulatory Reforms in Greece", Paris, 2001.
138 Article 3 of the Directive 96/92/EC.
139 Hancher, L.: "European Electricity Deregulation Will Not Level the Playing Field" in IEEE Spectrum, July 2001, at http://www.spectrum.ieee.org/WEBONLY/resource/jul01/speak.html.
140 Koen Nomden: "Reconciling Liberalization and Public Service Obligations", EIPA, Maastricht, 1996.
141 Loi n° 2000-108 du 10 février 2000 relative à la modernisation et au développement du service public de l'électricité.
142 See Articles 1 through 5 of the law.

categories as guaranteeing electricity supply in the national territory as a whole while "respecting the general interest", meaning contributing to the independence and security of supply, to air quality and to the fight against greenhouse effects, to the optimal management and development of national resources, to the control of energy demand, to the competitiveness of the economy, to the control of choices between technologies of the future and to the rational use of energy. Public service also contributes to social cohesion by securing the right to electricity for all; fighting against exclusion; balanced development of the territory while respecting the environment; technological research and progress; national defence and public security.

While the obligation of providing public services rests with the electricity companies (e.g. EdF), the organization of public service is the task of the State, the local authorities and their public enterprises or co-operatives.[143] In addition to this very broad concept, the law further requires, in the interests of public service, that the "contractual framework" between an eligible customer and its foreign supplier must be for a minimum three-year period,[144] thus severely limiting the rights of both eligible customers and foreign suppliers to freely trade with each other.

According to the OECD, the scope for public service obligations is particularly wide in the Greek electricity sector, where a weak regulatory framework is coupled with strong political power over the electricity industry. It is "the Minister of Development, rather than the ERA [the Greek regulator] who makes regulatory decisions. The Minister controls authorizations, sets the tariffs, and can impose tariff and other conditions on all authorization holders under the rubric of 'public service obligations'. The concern is that ministers, whether in Greece or in other countries, tend to be subject to greater day-to-day political pressure, and to be replaced more frequently, than are regulators who are given a specific public mandate and appointed for fixed terms."[145]

Public service obligations may be used to limit the scope of certain activities of eligible customers (electricity importers) and foreign producers and suppliers of electricity. For example, in Bulgaria, the construction permits for direct electric lines are refused where granting of such a permit is "in contradiction with the public service obligations".[146]

In some other instances, public service obligation also includes, implicitly or explicitly, the general objective of reducing imports. An example of implicit import substitution policy achieved through public service is given by Bulgaria, where the concept of public service includes the obligation to maintain a ratio between volumes of production, imports and exports "in such a way as to ensure energy self-sufficiency".[147]

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143 All these concepts are listed in Article 1 of the law, and further developed or refined in Articles 2 through 5.
144 Article 22, paragraph III of the law.
145 OECD: "OECD Reviews of Regulatory Reforms: Regulatory Reforms in Greece", Paris, 2001.
146 Energy and Energy Efficiency Law of 1999, Article 35, paragraph 3.
147 Energy and Energy Efficiency Law of 1999, Article Art.57.

8.8 Access to the network

8.8.1 Introduction

The elimination of all possible physical, trade and regulatory barriers is in itself not sufficient to ensure the liberalization of the electricity market. To ensure effective liberalization, it is necessary to put in place new regulatory mechanisms aimed at ensuring, among the other things, access to networks.

Electricity trade is *par excellence* network-dependent and without free access by electricity producers, traders and consumers to transportation facilities, trade liberalization measures may not be fully effective. Free cross-border trade in electricity requires that transmission and distribution grids and cross-border interconnections be opened by operating companies to all market players on the basis of non-discriminatory, transparent and predictable terms.

Since transmission and distribution remain the natural monopolies, effective access for importers/exporters to pre-existing transportation facilities needs to be secured through pro-competitive regulations that ensure third parties the right to use such facilities on the basis of fair sharing of capacities, for a reasonable fee and on practical technical terms. Third-party access (TPA) is, therefore, a pre-condition not only for creating competitive national electricity markets, but also for ensuring undistorted cross-border trade. Without TPA, electricity trade is possible, but existing monopolies that operate the transportation facilities may tend to use their market power to erect tollgates or other barriers for new entrants.

TPA and its alternative, the single buyer (SB) system, as developed in the EC Electricity Directive, created the models for most ECT countries for organizing access to the transmission and distribution networks. However, modelling non-EU countries' access regimes on the EC Directive or adopting the same legal language, does not necessarily result in similar access conditions.

8.8.2 Third-party access

TPA can be regulated or negotiated. Under the negotiated TPA, electricity producers and consumers have to negotiate the terms and conditions of network access with the transmission operators. Therefore, the terms and conditions are likely to be different for different users.

In a regulated TPA system, customers have access rights under pre-established terms and conditions which are set by an external authority. Regulated TPA is generally recognized as more conducive to competition and undistorted trade relative to negotiated TPA because of the market power of transmission system operators and their economic incentives to limit fair access.[148]

8.8.3 Single buyer system

Under the single buyer (SB) system, all electricity purchasing and selling is done through one entity, which is often also the transmission system operator. The SB is obliged to purchase the electricity contracted by an eligible customer from another producer at a price which is equal to the sale price offered by the SB to eligible customers, less the cost of transport. The definition of SB in the EC Directive also includes "any legal person who, within the system where he is established, is responsible for the unified management of the transmission system and/or for centralized electricity purchasing and selling." The transportation charge is fixed in advance.

Within the EU, the SB model was originally proposed by France.[149] France's original proposals were amended to allow for more competition, and the SB model was included in Directive 96/92/EC as an alternative to TPA.[150] However, at this stage of the implementation of the Directive, no EU member state has opted for a purely SB model, adopting instead a form of TPA. This has led the Commission to delete the provision on SB in its proposed amended electricity directive.[151]

The assumption under the EC Directive is that the SB system creates similar economical results as regulated TPA. Though the single buyer model allows for the introduction of a certain degree of competition, it has been argued that its positive effects on competition would be less than those of TPA.[152] The SB system provides eligible customers with choice to arbitrage price differences between the SB supplier and other EU suppliers. They remain entirely a customer of the SB, with the same tariffs and same product offer but with the opportunity to receive payments through arbitrage. This could, therefore, be viewed less as an access regime and more as a mechanism to permit financial transactions to arbitrage price differences.[153]

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148 In their recent study, Wälde and Gunst explained that "because of the current natural monopoly situation, negotiated access usually proves ineffectual given the economic incentives of an integrated TSO (transmission system operator) to refuse and obstruct fair access, due to its better bargaining position and superior insight and intelligence as network operator. Intervention by an external authority in regulated TPA can help to balance bargaining powers, especially if the rules issued are legally binding, but it also has its shortfalls; it typically leads to protracted litigation – itself an obstruction tactic - and can be costly in countries with quite diverse ownership of networks." See: Wälde, T. W. and Gunst, A. J.: "International Energy Trade and Access to Energy Networks", Journal of World Trade, Vol. 36, Issue 2.

149 For more information on the different variations proposed and the negotiations within the EU, see Eising, R., "Bounded Rationality and Policy Learning in EU Negotiations: the Liberalization of the Electricity Supply Industry", RSC No.2000/26, European Forum Series, 2000, p.10.

150 ibid.

151 COM(2001) 125 final, p.39.

152 WTO Secretariat, *op. cit.*, 1998.

153 Organisation for Economic Co-Operation and Development and International Energy Agency: "Electricity Market Reform: An IEA Handbook", Paris, 1999.

As to the threshold for unbundling of the SB, the Directive requires that if a vertically integrated electricity undertaking (or any part of it) is designated as an SB, such an SB should operate separately from the generation and distribution activities of the integrated undertaking.

In the EU, almost all Member States have introduced a regulated TPA system. Germany has opted for a negotiated TPA, while in Belgium the two TPA systems co-exist. There is no EU country having SB as a unique access regime. However, Italy and Portugal have a system, which combines SB with regulated TPA. (See Annex 3).

Legal exceptions from equal access may exist even in a TPA system. As an example, in Germany the so-called brown coal protection clause allows eastern German grid operators to give priority access to companies seeking to transport power from brown coal through their grids. The clause was designed to protect the eastern German lignite and coal industry and is cited as cause for denying access to power from other sources.[154]

Most EU candidate countries that already have legal provisions for open network access have opted for a regulated TPA, with notable exception of Bulgaria, Hungary (regulated TPA will be introduced from 2003) and Slovakia, which at present operate a SB model (See Annex 3). Bulgaria is expected to introduce regulated TPA in 2003.[155] In Poland, there is now a TPA system in accordance with the 1997 Energy Law. According to a draft questionnaire reply submitted to the Energy Regulators Regional Association (ERRA), TPA is not guaranteed for generators not located on the Polish territory, but this rule may change to bring legislation in line with the EU. However, the OECD suggests[156] that the right to TPA might be further restricted in practice with respect to domestic electricity. According to the recent OECD regulatory review of Poland, a number of distribution companies proposing to supply eligible customers outside of their geographic area were unable to conclude access contracts because of "technical difficulties" or "legal" constraints. The OECD believes that it is also possible that some of these difficulties arise because of strategic behaviour by PSE and/or distribution companies to frustrate access. "While this is claimed by some market participants, it is not possible at this stage to make a firm assessment of the matter. Certainly, since PSE is a major supplier of energy as well as the transmission services supplier, it would have an interest to frustrate access so as to maintain the bundling of transmission and energy supply in order to keep its market share in energy supply."[157]

Many more non-EU ECT members have declared their access system as being SB, though the term covers very different situations, sometimes simply referring to a no-access regime. Some countries have opted for an industry structure in which the

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154 However, the German Economics Ministry was recently reported to plan to get rid of this clause as soon as possible. See, EU Energy, 28 February 2002.

155 EU Commission 2001 Regular Report on Bulgaria's Progress Towards Accession.

156 OECD: "OECD Reviews of Regulatory Reform: Regulatory Reform in Poland – The Postal and Energy Sectors", Paris, 2002.

157 OECD: "OECD Reviews of Regulatory Reform: Regulatory Reform in Poland – The Postal and Energy Sectors", Paris, 2002.

transmission system operator has a monopoly over all purchases from producers and all sales to distribution companies which is denoted as "Single Buyer".[158] Examples are Georgia and Hungary (until end 2002), where the "no open access to transmission networks" is called a single buyer.

Georgia's market operates as a SB system, where distributors and some large users can directly buy from local or foreign suppliers.[159] All power generated in Georgia or imported into the country must be sold to the SB (whose name is "Wholesale Energy Market" (WEM)). Despite this pure monopoly situation, the regulator (NERC) may allow direct power purchases, but apparently the exemptions are limited. Problematic is the fact that all electricity licensees (e.g. import licensees) in Georgia must be members of the WEM, and that only WEM members can get access to the transmission grid. Even consumers that are directly connected to the transmission grid must become WEM members and pay membership dues.

In the Hungarian SB system, there is no open grid access and all trade occurs through MVM, the state-owned foreign trade monopoly,[160] which is also the national transmission system operator. The SB model adopted in Hungary is merely an extension of the former state monopoly, leaving no room for competitive cross border trade. However, the new Electricity Act will introduce in 2003 a new system, in which the 15 largest consumers will have at least the right to directly negotiate with foreign suppliers.

The Armenian Energy Law states that "Generation and Import Licensees' access to transmission and distribution network shall be conducted pursuant to the procedure established by the Market Rules."[161] Though another source indicated[162] that an SB model generally applies, except for transit where TPA was adopted, it is not possible to assess the situation as the Market Rules mentioned in the law have not yet been adopted.

In Kazakhstan, the government intended to adopt the SB system, but failed because of non-payment problems.[163] This made it impossible for the SB to honour its purchase agreements. The market evolved towards a more open system, where the limit to become an eligible customer is as low as 5 MW.[164]

The effectiveness of third-party access is greatly dependent on the ownership structure in the industry. Even in a regulated TPA system, where the owners of the transmission operator continue to own parts of the generation and supply segments, they tend to prevent new entrants from obtaining access to their markets. Therefore, in order to

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158 Energy Regulators Regional Association (ERRA), *op. cit.*, 2000.
159 July 2000 overview of energy sector in Georgia, see www.internationallawoffice.com.
160 World Bank, "Privatization of the Power and Natural Gas Industries in Hungary and Kazakhstan" (WTP451), 1999, p.v.
161 Article 53 of the Law.
162 See the Armenian regulator's reply to a questionnaire of the ERRA Licensing and Competition Committee.
163 World Bank, "Privatization of the Power and Natural Gas Industries in Hungary and Kazakhstan" (WTP451), 1999, p.16.
164 World Bank, *op. cit.*, 1999, p.19.

create effective competition, regulated TPA needs to be coupled with mandatory ownership unbundling of transportation from supply. This is to ensure that incumbents' commercial objective be solely transport revenue maximization, with no interest in helping competitive position of other businesses with common ownership.[165]

In this regard, a recent EC study[166] has identified – among remaining key barriers to competition in the EU – two interrelated obstacles. The first one is excessively high network tariffs, which form a barrier to competition by discouraging third party access, and may provide revenue for cross subsidy of affiliated businesses in the competitive market. The second one is insufficient unbundling, which may obscure discriminatory charging structures, and possibly lead to cross subsidies. The study identified inadequate unbundling of transmission system operators in France, Germany and Greece. These are the only EU Members States, which unbundled their transmission system operators at the management level.

Formal granting of TPA rights may be meaningless in terms of market access for foreign suppliers if other policy barriers are nullifying competition from imports. One example is given by the OECD, which observes that in Greece competition from imports is prevented by burdensome supply authorisations. "An applicant must own adequate generating capacity, installed in an EU Member State, and provide 'satisfactory long-term confirmation' that it has access to sufficient transmission and interconnection capacity to transmit the electricity it will supply. These conditions foreclose supply from Greece's immediate neighbours. Requiring PPC to provide this reserve capacity, at a price reflecting the cost of providing it, would allow generators in neighbouring countries to overcome this near-absolute entry barrier. The weak links through the Balkan Peninsula and weak legal framework for transit make that route difficult for EU generators. Thus, competition from imports is virtually precluded, except from Italy."[167]

The examples of trade frictions due to lack of fair access to the networks are numerous. One example was the refusal of Russian electricity monopoly UES to allow Kazakh electricity to transit Russia.[168]

Another network access related measure concerned Swiss electricity exported to Italy. In late 2001, Swiss grid operators threatened legal action against the Italian energy regulator's decision to re-allocate more import capacity to French exporters and reduce the Swiss share. Switzerland claimed that the decision violated international agreements and forced Switzerland to cut its line capacity into Italy by 12.6%.[169]

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165 Wälde, T. W. and Gunst, A. J.: *op. cit.*

166 "First report on the implementation of the internal electricity and gas market", Commission Staff Working Paper No. SEC(2001)1957, Brussels, December 2001.

167 OECD: "OECD Reviews of Regulatory Reforms: Regulatory Reforms in Greece", Paris, 2001.

168 Energo FSU/CE Power Report, 14 June 2001. Commenting this issue to the Energy Charter Secretariat, KEGOC added: "One of the trade (transit) barriers stems from the difference in economic structures and different path of industrial transformations. In Kazakhstan we have independent energy producers, wholesale electricity market, companies transmitting electricity, tariffs on transmission. Our neighbours have vertically integrated companies, there is no clear tariff on transmission, and it is difficult to negotiate about transit, since on one side there is a company, on the other there is a State."

169 EU Energy 17 January 2002.

8.9 Long-term contracts

Long-term contracts between buyers and sellers are part of business practices and in themselves are not access barriers.[170] Whether or not long-term contracts restrain competition and trade greatly depends on many factors, including market power of former incumbents or exclusivity terms of the contracts. Though these issues are a matter for private parties to decide on, the concern from a trade-policy viewpoint is to avoid the situations where governmental barriers are replaced by private ones. In the absence of binding international rules on restrictive business practices, ensuring this remains a task for competition authorities.

8.9.1 Long-term power supply contracts

Before the de-monopolization, it has been the traditional practice of electricity suppliers to conclude exclusive long-term contracts with their customers. In some cases, when vertically integrated electricity utilities become aware that their market would be opened up to competition, they seek to preserve the substance of their old monopoly by concluding long-term contracts with would-be eligible customers. Such contracts may cover periods of ten to twenty years.

In the context of progressive market liberalization, such contracts can have the effect of a private barrier to the free choice of customers. If large shares of the production and supply market are tied up in pre-existing long-term contracts, or if a dominant firm obliges customers to purchase exclusively on a long-term basis from it, incumbents are capable of "foreclosing" competitive supply markets for entrants.[171] Such practices would amount to an abuse of dominant position, which is contrary to the competition rules of many ECT countries.

Long-term supply contracts are also associated with stranded costs. In Poland, for example, 35 long-term power supply contracts were concluded between 18 energy producers and the Polish Power Grid Company (PSE S.A.) in the years of 1993–1998 to ensure recovering of huge investment costs by generators. Currently, these contracts cover nearly 75 per cent of trade in electricity and this will continue until 2010-2012. The exclusive nature of these contracts, which provide for the sale/purchase of electricity at non-market prices, has the effect of perpetuating the single buyer characteristic of the pre-liberalization system[172] and significantly reduces the scope for competition. The EU compatibility of these long-term power supply agreements has been an issue at the accession negotiations, the European Union considering these contracts as

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[170] In this regard, it was noted, "Exclusive purchasing commitments on a long-term basis are certainly not restricting competition as such, even if frequently applied by suppliers. On competitive energy markets with sufficient liquidity such contracts are however rather the exception than the rule." See: Angel Tradacete: "The Role of EC Competition Policy in the Liberalisation of EU Energy Markets".

[171] See: European Commission: "Electricity Liberalisation Indicators in Europe", 2001 and Alexander Schaub: "Emerging competition in European energy markets", Institute of European Studies, Madrid, 2002.

[172] OECD: "OECD Reviews of Regulatory Reform: Regulatory Reform in Poland – The Postal and Energy Sectors", Paris, 2002.

imposing constraints in electricity trade.[173-174] In April 2001, the Polish government introduced a transitional system of compensation for long-term agreements (SOK), thereby enabling the recovery of stranded costs. In practice, implementing the SOK system proved difficult. The renegotiation of long-term contracts started in July 2001.[175]

8.9.2 Long-term reservation contracts on interconnectors

Long-term contracts may also restrict trade when access to cross-border interconnectors is restricted to those suppliers who are not long-term contract-holders. When there exists a dominant electricity producer and supplier in one or both adjacent markets, there is a possibility that preferential access to interconnectors will be granted to those who entered into long-term contracts.

When scarce interconnection capacity is allocated by vertically integrated incumbent operators, it is almost certain that access to interconnection capacities will not be offered on non-discriminatory terms. Allocation on a "first come, first served" basis[176] can, under certain circumstances, favour former monopolists over new entrants, for instance in a situation where the dominant firm concluded long-term reservation contracts before liberalization with the effect that newcomers are foreclosed to enter downstream electricity markets.[177]

In the European Union, congestion is at some borders further aggravated by the transmission capacity being permanently reserved for historical large import contracts concluded before liberalization."[178] In Western Europe, this retention allocation method is applied by the Swiss companies and is also used in practice for most of the long-term contracts concluded before liberalization, namely in France/Switzerland/Austria – Italy, Germany/France – Netherlands and France – Spain. It was reported that the southern Belgian border is practically blocked by long-term contracts.[179] Market-based allocation methods, such as the one based on generators' bids into the electricity spot market in the Nordic countries, are considered "fairer" solution by the European Commission.[180]

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173 European Commission: "2000 Regular from the Commission on Poland's Progress Towards Accession", Brussels, November 2000.

174 In the European Union, "the directive on internal market on electricity does not prohibit long-term contracts if they were concluded before the adoption of the directive. However, their validity remains to be considered under competition rules on a case by case basis taken into account foreclosure effects." See: "The Internal market for Electricity - The Florence process" found at: http://europa.eu.int/comm/energy/en/elec_single_market/florence-8/disc-congestion.pdf

175 European Commission: "2001 Report on Poland's Progress Towards Accession", Brussels, 2001, SEC(2001)1752.

176 It was said that the allocation of interconnector capacities on the basis of a "first come, first served" basis lacks transparency and increases significantly the risk of discrimination, if the allocating network has itself export interests. See Michael Albers: "Energy Liberalisation and EC Competition Law – Fordham 28th Annual Conference of Antitrust Law and Policy, New York City, October 2001.

177 Angel Tradacete: "The Role of EC Competition Policy in The Liberalisation of EU Energy Markets".

178 Alexander Schaub: "Emerging competition in European energy markets", Institute of European Studies, Madrid, 2002. Schaub adds that "DG Competition is hence investigating currently the import contracts and capacity reservations which incumbent operators enjoy at some of Europe's most congested borders, as they are considered to have a substantial foreclosure effect."

179 Institute of Power Systems and Power Economics and CONSENTEC Consulting für Energiewirtschaft und -technik GmbH: "Analysis of Electricity Network Capacities and Identification of Congestion - Final Report" commissioned by the European Commission, Aachen, December 2001.

180 Capacity is automatically allocated by the TSO so that price differences between the two areas in question are minimized. This procedure is carried out in real time for each settlement period. The advantage of this is that the TSO can ensure that all available capacity is used. See: European Commission: "European energy infrastructure – Communication from the Commission to the European Parliament and the Council", December 2001, COM(2001) 775 final.

9 Trade in electric power services

9.1 Introduction

The entire electricity sector combines production of goods and provision of related services. In the WTO context, commitments regarding trade in electrical energy as a good must be distinguished from restrictions and limitations to trade in electricity-related services. As seen in Chapter 6, electrical energy, i.e. the result of electricity production is treated as a good and therefore is subject to WTO rules on goods[181] under the ECT. On the other hand, all electric power services are subject to the General Agreement on Trade in Services (GATS). Therefore, different rules apply to trade in electricity as a good, and to trade in services relating to electricity.

The major components of the electric power services sector are fuel purchasing; construction of power plants; generation; construction of the transmission network (high-voltage and lower-voltage); management of the transmission network (transporting electricity through a high-voltage grid to large industrial consumers and distribution companies); management of the distribution network (delivery of electricity to final (retail) consumers through low voltage wires); wholesale trade in electricity; retail supply, metering, billing and customer service.[182]

However, there is no consensus in the WTO about the exact scope of energy services. Energy services as a whole, including gas and electricity related services, were outside the commercial preoccupations of the main players during the Uruguay Round. This explains why this sector and its components, with few exceptions, are missing from the list of services that was the basis for defining specific market access and national treatments under the GATS.[183] The GATS 2000 negotiations – now part of the Doha Agenda – have focused on the need to define what energy services are with a view to enable governments to engage in meaningful commitments in the sector. While a number of WTO delegations have submitted different proposals, no common view on the definitional issues has yet emerged.

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[181] These rules are contained in the GATT 1994 and the other Annex 1 A agreements attached to the WTO Agreement. Most of them are applicable under the ECT.

[182] Alexandra Sidorenko, Christopher Findlay, and Malcolm Bosworth: "Energy Sector Competition Policy: Australian and International Experiences in Market Policy Design with Implications for the Asian Developing Countries", Australian National University, Canberra, October 2002.

[183] The GATT Secretariat's services classification list, contained in document MTN/GNS/W/120, was developed during the Uruguay Round in order to help participants to make specific commitments for services as defined in the list. However, the list has never received strong legal status under the WTO.

However, proposals on classification generally include core electricity services, such as transportation, distribution and retail supply. They also tend to include many activities related to: supply (e.g. purchasing, transporting and storing fuel); constructing and operating generating stations and transport and delivery facilities; trading and marketing bulk power; and end-use services (e.g. metering, billing, accounting and energy management services).[184] As to production of electricity, views diverge on whether electricity production on a fee or contract basis would constitute a service, while "pure production" would not.

Using GATS definitions,[185] electric power services may be provided through cross-border mode (Mode 1 supply), through commercial presence (Mode 3 supply), and through presence of natural persons (Mode 4 supply). Mode 4 does not seem to be feasible on its own, but only in conjunction with Mode 3.

While geographic conditions severely constrain trade in electricity as a good, trade in electric power services through commercial presence is not affected by geographical distance and interconnection problems. On the other hand, Mode 1 supplies may be affected by distance and lack of interconnection between the country of origin of the service supplier and the destination country.[186]

Trade in electricity services can emerge in those countries that opened up their markets to competition. In general, this requires vertically unbundling various functions of monopoly providers and allowing new domestic and foreign entrants in the competitive market segments. The shift from an industry framework characterized by vertically integrated monopolies to a new framework where generation, transmission, distribution, and retail supply are unbundled and ownerships are separated creates the necessary conditions for participation by new entrants in these segments of the electricity industry. In the electricity generation segment, market access opportunities for foreign competitors result from allowing investment in new power plants or acquisition of existing facilities. In retail supply, the introduction of consumer choice may create a new marketing and customer relations function, which involves metering, billing, and the provision of additional services such as electricity management and advisory services.

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184 The communication of the EC and the Member States on energy services to the WTO Council for Trade in Services also includes, among others, ancillary service, services related to decommissioning and Installation, maintenance and repair of energy equipment. See WTO document S/CSS/W/60, dated 23 March 2001.

185 GATS Article 1 defines trade in services as the supply of a service: (a) from the territory of one Member into the territory of any other Member; (b) in the territory of one Member to the service consumer of any other Member; (c) by a service supplier of one Member, through commercial presence in the territory of any other Member; (d) by a service supplier of one Member, through presence of natural persons of a Member in the territory of any other Member.

186 WTO Secretariat, *op. cit.*, 1998.

ECT countries are in various phases of regulatory reforms and, as a result, the potential for trade in electric power services varies significantly from one country to another. Regulatory reforms in the EU and accession countries are greatly determined by their national programmes implementing the EC Electricity Directive 96/92.

Other ECT countries that have adopted a policy of private participation in their electricity industry have at least opened the generation sector to foreign investments. For example, Kazakhstan, which was one of the first Caspian states to open its domestic electricity market to foreign investors, began unbundling its former monopoly utility in 1997 by divesting it from power generation. In its effort to upgrade the power sector, Kazakhstan then proceeded with privatisation of power plants and regional electricity distribution companies, including granting management rights to foreign electricity companies. Today, most of the major generating stations and virtually all of the generating capacity is privately owned. Kazakhstan also has plans to privatise the electricity distribution system, but the process has moved slowly (despite the lack of obstacles in the existing legislation), and only a few networks are under private management.[187]

Turkey, which had long sought private sector involvement in the energy and infrastructure projects, has launched several waves of liberalization since 1983. This has led to a gradual opening of the electricity market. Turkey has made early and extensive use of financing models such as build-own-operate (BOO) and build-own-transfer (BOT), which allowed private companies to construct new power plants under concessions or as auto-producers. Also, private companies were allowed to operate existing power plants and distribution companies by receiving their operational rights through the Transfer of Operational Rights (TOR) scheme.[188] As yet, however, no decisive breakthrough has been achieved.[189]

In February 2001, Turkey passed the Electricity Market Law, which paves the way for a free market in power generation and distribution. Among other things, the legislation calls for Turkey's Electricity Generating and Transmission Corporation to be broken up into separate generation, distribution, and trade companies. Trade and generation companies are to be privatised, while transmission is to remain in state hands. Real liberalization foreseen by the new law will fade the dozens of BOT and TOR power projects.[190]

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187 http://www.eia.doe.gov/emeu/cabs/kazapriv.html#ELEC.
188 http://www.romturkonline.com/English/Turkey/chp10.htm.
189 IEA: "Turkey 2001 Review", http://www.iea.org/public/reviews/turkeysum.pdf.
190 US Department of Energy, Energy Information Administration's Country Analysis Brief on Turkey, found at: http://www.eia.doe.gov/emeu/cabs/turkey.html.

Japan started to develop plans in 1998 to partially liberalize its electricity market, starting with retail sale of electricity for large-scale consumers served by extra-high voltage networks (of 20 000 volts or higher). These users account for approximately 27 percent of total electricity consumption. In 2000, Japan took further significant steps towards further liberalization of its electricity sector. It abolished its antimonopoly exemption for natural monopolies, including electricity and gas. It also decided to:

(a) ensure fair, open, and non-discriminatory access to its electricity transmission grid;

(b) disclose information on the development of transmission rates by utilities so that new firms seeking to compete in the market can assess these rates; and

(c) establish a fair, transparent, and non-discriminatory framework for access to its natural gas sector.[191]

In other ECT countries, the sector remains to be organized under the vertically integrated monopoly model, or is characterized by the existence of a single company having a *de facto* monopoly situation and control over the activities of other companies. Some countries have opened up, or plan to open up, their monopoly providers to limited private participation but do not permit management rights.

9.2 Barriers to electric power services

9.2.1 Introduction

While in the case of non-network based energy trade, such as trade in oil and coal, it is easy to separate the goods and services components, in the case of electricity trade (as well as gas trade through pipelines) separating the goods component from the transportation and distribution services is difficult. Since electricity trade is network-bound most barriers to trade in electricity as a good is also a barrier to trade in electricity as a service. Similarly, barriers to trade in electric power services, especially those related to the access and use of the network are also obstacles to trade in electricity as a good. Therefore, the liberalization of trade in electric power services is linked to the liberalization of trade in electricity as a good and vice versa.

It is very difficult to identify all types of possible barriers to trade in electricity services. The main barriers to electric power services are those, which relate to monopoly market structures, and hence raise competition policy and regulatory issues. Generally speaking, the pattern of barriers that exist follows the three modes of supplies: barriers relating to cross-border supply, barriers to commercial presence and barriers to presence of natural persons.

[191] USTR: 2001 National Trade Estimate Report on Foreign Trade Barriers.

Typical obstacles to trade in electric power services are:[192]

- For cross-border supply: lack of, or discriminatory, access to networks;
- For commercial presence: exclusive rights and monopolies; restrictions on legal forms of doing business, restrictions on foreign investment, unclear licensing and approval requirements, unspecified economic needs tests; restrictions on the importation of primary energy carriers; restrictions on the entry of equipment and tools needed to provide the service; arbitrary business and licensing requirements;
- For presence of natural persons: residency and nationality requirements; restrictions for the entry and stay of energy services managers, professionals and experts;
- In general: non-transparent regulatory frameworks.

Activities connected to electricity are in almost all countries subject to some type of licensing or authorization by public bodies. Such authorization procedures are generally necessary to ensure that general policy objectives are met (e.g. regional planning, public health, and environment protection), and consumers and the integrity of the sector are protected.

In the Netherlands, electricity generation is free and no license requirements apply, except permits within the framework of planning and environmental laws.[193] A specific supply license is required to supply electricity to "protected customers", i.e. non-eligible customers. Such license is exclusive for a certain area, and valid until 1 January 2004. The requirements relate to elements necessary for an efficient supply (e.g. regarding the handling of complaints).[194]

In Denmark, all activities connected to electricity supply are subject to licensing: production, transmission and grid activities, system operation, and supply. In addition, new projects for electricity production and transmission grids designed for voltages of more than 100 kV and major changes in the existing installations are further conditional upon obtaining permission.[195]

In France, production of electricity from oil-fired generators is subject to authorization, in accordance with the new Electricity Act and the 1999 Decree implementing the Energy Savings Acts of 1974, 1977 and 1980.[196]

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192 See among others the communication of the European Communities and their Member States on energy services to the WTO Council for Trade in Services in WTO document S/CSS/W/60, dated 23 March 2001.
193 Roggenkamp, M. M., et al., o.c., page 699.
194 ibid., page 701.
195 ibid., page 398.
196 ibid., page 468.

In Germany, electricity supply is not regarded as an exclusively State or public function. Moreover, private supply entities do not perform State or public functions.[197] In principle, each new entrant who intends to conduct business in the energy supply sector needs a permit. Any person has the right to be granted a permit subject to some restrictions, which are generally of a technical or financial nature. However, discrimination between existing entities and newcomers may be introduced where a permit is not granted because the applicant "substantially impairs the existing supply of the supply area".[198]

In Italy, electricity production is free and subject to authorization for the construction and operation of new installations using conventional sources.[199]

In Spain, an authorization for electricity generation is required, but the criteria are objective, transparent and non-discriminatory.[200] However, producers whose generating capacity is more than 40 or 20 per cent of the national capacity will not be allowed to increase it within 5 or 3 years respectively.[201] The use of water and authorizations to generate hydroelectricity may fall within the competence of the Autonomous Communities or the central government, in the latter case they "may be subject to a special procedure."[202] An authorization procedure also exists for the construction and operation of transmission installations and for distribution. No authorizations shall be granted for distribution if this were to lead to a monopoly or provide any exclusive rights.

9.2.2 Exclusive rights and monopolies

No trade can take place when investment and operation are reserved for a national monopoly. Sometimes the stocks of State-owned utilities are partially open to portfolio investments by private parties. However, portfolio investments are not "trade in services" in GATS terms.

Concessions and Build, Operate and Transfer (BOT) and similar contracts provide more liberal market access. Under BOT contracts, private investors build and operate private sector generation facilities for a set number of years, after which they transfer ownership to the State. The models are the Build-Operate (BO) and the Transfer of Operational Rights (TOR) schemes. Under the latter, private companies are allowed to operate existing power plants and distribution companies by receiving their operational rights.

In France, electricity supply is a public monopoly and activities may be performed under concessions. EdF has monopoly over the distribution of 95% of electricity sold in France, while the remaining 5% is distributed by 194 non-nationalized local municipality-owned or mixed private/public companies with shares held by the State or by a local authority.[203]

197 ibid., page 547.
198 ibid., page 547.
199 ibid., page 613.
200 ibid., page 885.
201 ibid., page 896.
202 ibid., page 886.
203 ibid., page 482.

In Norway, the exploitation of natural resources is considered to be a national concern. Hydroelectricity production is therefore subject to concession procedure, and any project must first be cleared within the framework of the "Master Plan for Water Resources and the Protection Plan for Water Resources".[204] A concession is required for the use of waterfalls which can produce more than 736 KW. A concession can last up to 60 years and the State has the right to reversion (i.e. the right to take over the waterfall and any hydroelectric installation as part of the development without compensation, when the concession expires). A separate concession (also up to 60 years and with the right of reversion) is required for the use of water from a storage reservoir (watercourse regulation), for the generation of electricity.

Building, operating, altering or extending installations for high-voltage electricity are also subject to concession in Norway. A separate concession is required for each separate installation with a voltage higher than 22 kV. General concessions are possible for a set of installations with a lower voltage. Concessions can be given for up to 30 years. When plans are prepared for new electrical installations, public interests including "industry" and the "local communities", must be taken into account.[205]

Turkey has extensively relied on BOT, BO and TOR schemes in the electricity generation sector.

9.2.3 Denial of market access and/or national treatment

In Austria, the State Electricity Laws ("Landeselektrizitätsgesetze") contain a number of requirements that restrict market access for non-EEA nationals and companies. For example, juridical entities or commercial partnerships are required to be established under the laws of an EEA country. Furthermore, Burgenland, Carinthia, Styria, Lower Austria, the Tyrol and Vorarlberg require that such juridical entities or commercial partnerships have as members of their governing bodies only persons with an EEA nationality. In the case of Vorarlberg, such natural persons should be domiciled in Austria. During the OECD negotiations on the Multilateral Agreement on Investments, these measures were justified by the need to secure co-ordinated planning of the electricity economy; ensuring supply also to small or to distant clients; and ensuring priority of renewable energy sources.

In the Czech Republic, under the previous Energy Act,[206] authorizations for conducting business activities in the energy industries were only granted to natural persons with a permanent residence and legal persons with a seat in the territory of the Czech Republic. Since the new Energy Act[207] entered into force on 1 January 2001, all these limitations have been removed and no restrictions are applied for either natural persons or corporate bodies seeking licence for operating in the Czech energy sectors.

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[204] ibid., page 807.
[205] ibid., page 816.
[206] Act on the Conditions of Conducting Business Activities and State Administration in the Energetics Industries and the State Energetics Inspection No 222/1994.
[207] Act of 28 November 2000 on Business Conditions and Public Administration in the Energy Sectors and on Amendment to Other Laws

In Denmark, the State alone is entitled to use energy from water and wind in territorial waters and in the exclusive economic zone.

In Finland, a license to use nuclear energy may be granted only to the nationals, national entities or government authorities under the jurisdiction of a member state of the EU.[208]

In France, hydropower is considered a rare natural resource. Production of hydroelectric power under 8 000 kW[209] is not authorized for foreign investors from outside the EU.[210] However, during the unsuccessful negotiations on the Multilateral Agreement on Investments (MAI) it was planned to extend this right to any persons from OECD countries, which would have signed the MAI.

In Iceland, power production and power distribution are public utilities which, to a large degree, operate as public monopolies. Iceland's policy is that the utilization of hydroelectric power and geothermal power should be centrally administered through licensing and co-generation agreements. The right to harness hydroelectric and geothermal power is reserved to national citizens and domestic legal entities and citizens and legal entities from another EEA country. The same applies to investment in enterprises engaged in power production and power distribution.[211]

In Italy, distribution is subject to concession. However, entry into the distribution segment by newcomers seems impossible. Companies active upon the entry into force of the Bersani Decree are entitled to continue their distribution activities until 31 December 2030. The Ministry of Industry and *Autorità per l'energia elettrica e il gas* ("Electric Energy and Gas Authority") will determine by a specific regulation modalities, conditions and criteria for granting concessions after 2030. In addition, only one concession may be granted for each municipality. Concessions for the generation of hydroelectricity in Italy are now the competence of the regions. Anybody may apply for a concession, provided that organizational and financial requirements are fulfilled. However, because concessions granted to ENEL only expire 30 years after the entry into force of the Bersani Decree of 1999, access to, and competition in hydropower generation will only be introduced slowly.[212]

In the Russian Federation, currently the purchase of shares in UES and its subsidiaries by foreign investors is restricted: total foreign holding in the company may not exceed to 25% of the stock. It was reported that the restrictions were imposed after the combined foreign stake in the holding surpassed 25% (it is now running at about 30%), after which the quotations of UES shares have come down. The competent Russian ministry suggested scrapping the law altogether, "otherwise it may become a serious obstacle on the road to reforming the Russian energy sector."[213]

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208 Nuclear Energy Act 990/87 and the Act on Amending the Nuclear Energy Act 1420/94.
209 According to Roggenkamp, M. M., *et al., op. cit.,* 2001, p.479 the threshold is 4 500 kW.
210 Act of 12 March 1970.
211 Law No.34/1991 on Investments by Non-Residents in Business Enterprises.
212 Roggenkamp, M. M., *et al., op. cit.,* 2001, page 616.
213 Energo FSU/CE Power Report, 5 October 2001.

Slovakia restricts foreign branches in the energy sector and foreign equity participation in electricity companies is limited to 49%.[214]

In Switzerland, an authorization to construct and operate nuclear facilities may be refused to foreign legal entities in case the foreign country concerned does not grant reciprocity.[215]

9.2.4 Citizenship and residency requirements

Citizenship and residency requirements imposed on natural persons limit the freedom of foreign firms to establish and/or operate their commercial presence. They are by their very nature contrary to national treatment. When applied to some but not all foreign service providers, they are also contrary to most-favoured-nation treatment.

In Austria, it is possible that a natural person be licensed as a utility company but, by virtue of the State Electricity Laws ("Landeselektrizitätsgesetze"), this is generally reserved to persons of EEA nationality. In the case of Lower Austria, the natural person should be domiciled in an EEA member state and, in the case of Vorarlberg, he or she should be domiciled in Austria.

9.2.5 Domestic regulations

Domestic policies and measures, whose primary objective is not to regulate trade but to achieve other national policy objectives, may also have some trade-restrictive effects. For electric power services, the most relevant domestic regulatory issues having a direct effect on trade appear to be the degree of unbundling, network access and public service obligations and access to and use of natural resources, and environmental protection.[216]

Tight environmental, health and safety regulations are also widely applied in most countries, but those regulations tend to affect the production of electricity as goods more than services aspects such as transport, transmission and distribution.[217]

Electricity price regulation is widely used in many economies in transition, in order to pursue social policy (e.g. to ensure affordable prices for the consumers) or overall economic policy objectives (e.g. to contain inflation). Uncertainty over prices tends to undermine investors' confidence in the regulatory regime and deter long-term investment. However, price regulations may also put the costs of such policies onto electricity companies which, in extreme cases, may result in detrimental effects on investors. Anecdotal reports concerning legal complaints by electricity investors in some Central European and former FSU countries illustrate that, if not implemented in a proper manner, otherwise legitimate domestic policies may hinder the operation of foreign establishments in the electricity sector.

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214 WTO: "Trade Policy Review – Slovak Republic - Report by the Secretariat", document WT/TPR/S/91, Geneva, October 2001.

215 Article 13 of the Law on Nuclear Energy of 21 March 2003.

216 Some of these issues are dealt with in the respective sections under trade in electricity as goods.

217 See in more detail in WTO Secretariat, *op. cit.*, 1998.

9.2.6 Access to electricity trading

In the Netherlands, participation in the Amsterdam Power Exchange (APX) is subject to an accession procedure. It is important to note that this measure is not imposed by the government. How the accession procedure works in practice, and whether or not it differentiates between traders, cannot be judged because of lack of information.

In Norway, all utilities engaged in trading electricity or being in a monopoly position, had to hold a trading concession.[218] These concessions were granted for short periods, the last ones expired on 31 December 2001. As regards trading involving import and export, only the state may perform these activities without concession.[219]

[218] Roggenkamp, M. M., *et al., op. cit.,* 2001, page 812.
[219] ibid., page 812.

10 Concluding Remarks

The review of regulatory trade barriers in chapters 6 to 9 leads to the conclusion that the current levels of inter-regional trade in electricity within the ECT area are substantially constrained by explicit trade measures and regulatory barriers. Some forms of barriers to trade in electricity (*de facto or de jure*) exist in virtually all ECT countries. The most significant among them are: monopolies and exclusive rights, lack of open access to grids, limited consumer choice of suppliers, and explicit - often discriminatory - import restrictions.

In order to harvest substantial economic benefits in terms of more optimal allocation of resources, enhanced competition, price arbitrage and security of supply, it will be necessary to reduce some of the identified barriers or at least eliminate their discriminatory elements. In the resulting more liberal environment, the actual physical trade might still be rather modest but the price differentials would nonetheless start to vanish.

Trade in electricity could be liberalised to a large degree simply by full compliance with the existing treaty obligations such as MFN and national treatment under the WTO and the ECT. The second source of improvement could be the unilateral efforts by the ECT countries to further liberalise their domestic power industries, for instance, by unbundling the incumbent national utilities or ensuring independent regulation. The third, admittedly most complex and challenging, task would be to create and implement additional rules in the areas that are not at present covered by the existing body of international law. These include, *inter alia*, rules for TPA, treatment of foreign companies at the pre-investment stage, and internationally accepted environmental standards.

The existing rules of the multilateral trading system, particularly the WTO rules relating to goods, should be adhered to. From a legal point of view, the trade rules of ECT, which adopted the WTO rules on goods, are fully applicable to trade in electricity. This is so not only because the Treaty's relevant annex lists electrical energy among the goods it applies to, but also because the now prevailing view in the WTO is that electrical energy is a good. Therefore, the rules of GATT/WTO, as applicable under the ECT, should set a minimum standard for trade in electricity between ECT contracting parties. Firstly, governments are bound by their MFN and national treatment obligations when regulating the importation, exportation and transit of electricity. Secondly, they are prohibited from imposing quantitative restrictions to imports.

What lies ahead for the trade liberalisation process? The EC Electricity Directive and the Florence process are aiming at increasing competition and setting rules for trans-border transmission pricing for the intra-EU trade and transit. The internal liberalisation will likely be followed by the efforts by EU candidate countries to harmonise their

legislation with the EU *acquis* and by the EU's attempts to address trade and investment relations with non-EU countries. Furthermore, many CIS countries are already considering, and may soon be implementing, the reforms aiming at privatisation and unbundling of their utilities.

The CIS countries would need greater access to international (or regional) electricity markets in order to utilize their surplus capacity and gain export revenues required to finance major reconstruction and modernization of their power sectors. For this reason, Russia and other CIS countries have been demanding the negotiation of a multilateral electricity instrument since 1995 in the Energy Charter process. Another reason for such an instrument is that there are significant price and trade distortions among the electricity markets of the ECT countries. Thirdly, in Western Europe there is a need for consistency and compatibility between the EU's internal market rules and its approach to trade with non-EU countries.

Electricity is not traded globally for technical reasons. Trade in electricity is concentrated within the regions or between adjacent regions connected by land such as Eurasia. No electricity trade is technically or economically possible between Europe and North America or other even more distant continents. The only potential, but limited, opportunities for trade within the ECT regions are with North Africa and adjacent Asia. Hence, the ECT area constitutes a natural contiguous "region" for trade in electricity that could be further regulated through an appropriate international electricity instrument.

Another way forward would be to address concerns about environmental and safety issues relating to electricity, particularly from nuclear power plants. These concerns reflect not only the trans-boundary nature of pollution but also result from a growing preoccupation with global environmental issues. Developing multilateral agreements to combat air pollution, or to establish internationally accepted nuclear safety standards would be in the interest of the global community. This approach would allow harnessing all economic benefits from freer trade while meeting the criteria of legality, fairness and transparency. The resulting investment could help to improve the safety of nuclear power plants, reduce harmful emissions through application of clean-coal technologies and raise thermal efficiency of power plants in general.

Last but not least, efforts could be made to establish a transparent and non-discriminatory framework for international investment regime at the pre-establishment stage.

The acceptance of the spirit of the multilateral trading system has far-reaching implications for the way liberalization of East-West electricity trade should proceed. Any future framework for electricity trade between ECT Contracting Parties should be developed and implemented in accordance with the principles of transparency, non-discrimination and equal participation of the multilateral trading system.

Annex 1 **Import duties on electric energy in ECT countries**

Country	Applied MFN rate (%)	WTO-bound rate (%)
Albania	5	
Armenia	0	
Australia	n/a	
Azerbaijan	15	
Belarus	5	
Bosnia and Herzegovina	0	
Bulgaria	5	5
Croatia	0	0
Cyprus	0	
Czech Republic	0	
Estonia	no notification	
European Communities	0	0
Georgia	34.6	
Hungary	0	0
Iceland	n/a	
Japan	n/a	
Kazakhstan	5	
Kyrgyzstan	10	
Latvia	0	
Liechtenstein	0	0
Lithuania	0	
Malta	n/a	
Moldova	0	
Mongolia	no notification	
Norway	0	0
Poland	3	3
Romania	6	35
Russian Federation	5	
Slovakia	0	0
Slovenia	0	2
Switzerland	0	0
Tajikistan	no notification	
Macedonia (FYROM)	0	0
Turkey	0	
Turkmenistan	no notification	
Ukraine	2	
Uzbekistan	3	

Source: ECS documents T-48, T-53 and T-5.

Annex 2 **Market access: reciprocity requirements**

EU Countries		
Country	**Legal provisions**	**Source**
Austria	The implementing legislation shall provide that entitled parties may be refused access to the grid for the following reason[s]:if grid access is refused for electricity supplies to a customer who is not deemed to be an eligible customer in the grid from which these supplies are effected, or are to be effected.	1998 Electricity ActSection 20, paragraph 1(3).
Belgium	Art.19. § 1er.The King may authorize the Minister to limit or ban the access to the transport network for electricity imports from other Member States of the European Union and destined for eligible customers established in Belgium if:a) the degree of market openness of the originating Member State is, within the meaning of Directive 96/92, lower than that of the Belgian electricity market,andb) the customer, if established in the originating Member State, would not have the status of eligible customer in accordance with the legislation of that State.§2. Without prejudice to existing contracts and obligations undertaken by Belgium under international treaties, the King [..]. determines the extent to which and the conditions under which the provisions of the present Law apply to producers or traders who come under the jurisdiction of States not members of the European Union.	Law on the organisation of the Electricity Market of 29 April 1999.
Germany	TPA can be denied for imported electricity if in the export country the domestic customer cannot also be supplied by third parties.	Joachim Rudo: Introduction to German Energy Law, http://www.energylaw.de/energyl-awreport.htm
Italy	"Autorità per l'energia elettrica e il gas" shall adopt provisions establishing norms on the [environmental and] economic compatibility of electric energy imported from countries not belonging to the European Union, account being taken of reciprocity conditions.	Legislative Decree n°79 of 16 March 1999, Art.10, paragraph 3.
Luxembourg	Until 1/1/2006 electricity supply contracts concluded by on the basis of the provisions of Article 15 with an eligible customer from a network of another Member State cannot be prohibited if the client is considered eligible in both networks concerned.	Law on the Organization of the Electricity Market of 24 July 2000, Article 17, Paragraph 6.

Annex 2 **Market access: reciprocity requirements** *(continued)*

EU Countries		
Country	**Legal provisions**	**Source**
Netherlands	Article 29The importing of electricity into the Netherlands to comply with an obligation under an agreement ..shall be permitted only if Our Minister does not within two weeks of receipt of the notification issue any instruction as referred to in Article 30, Clause 2 under (b), according to which the transport of electricity may not take place from the country in which the other party to the agreement is established to the Netherlands.Article 301. Our Minister may issue an instruction to the manager of the national high voltage network if this is necessary in order to avoid a disequilibrium in the opening of the electricity markets.2. The instruction shall be to the effect:a. that the network manager shall notify immediately to Our Minister all applications to transport electricity from a country designated in the instruction to the Netherlands, orb. that transport of electricity from a country defined in the instruction to a category of customers defined in the instruction may not be carried out or may only be carried out under conditions to be laid down by Our Minister if that party to the agreement to supply electricity across national borders which is established in the Netherlands, supposing that it were established in the country where the other party to the agreement is established, would not be regarded under the law of that country as an eligible customer as referred to in Article 19, Clause 3 of the Directive.3. If the instruction relates to a country, which is not a Member State of the European Union, an eligible customer as referred to in Clause 2 sub (b) is understood as a customer or supplier, which under the law of that country is in a position to purchase electricity from another country.	Law containing rules on the production, transport and supply of electricity of 2 July 1998.
Portugal	Reciprocity clause	EU Commission
Spain	YES	EU-Japan Centre
UK	YES	EU-Japan Centre

Annex 2 **Market access: reciprocity requirements** *(continued)*

Non-EU Countries		
Country	**Legal provisions**	**Source**
Croatia	The System Operator may, upon the proposal of a power generator or the Ministry, refuse access to the electricity system to a power generator from a State where the level of opening of electricity market is lower than in the Republic of Croatia.	Law on Electricity Market, 19 July 2001.
Czech Republic	The Ministry may decide to limit electricity imports from other countries to individuals or legal entities in the event that the obligations and duties of electricity generators and eligible customers in the country from where electricity is imported, are not comparable with the rights and obligations of electricity generators and eligible customers in the Czech Republic.	Section 44 of the ACT of 28 November 2000 on Business Conditions and Public Administration in the Energy Sectors and on Amendment to Other Laws (the "Energy Act").
Croatia	The System Operator may, upon the proposal of a power generator or the Ministry, refuse access to the electricity system to a power generator from a State where the level of opening of electricity market is lower than in the Republic of Croatia.	2001 electricity market law, article 25.
Hungary	The system operator may refuse access to the public purpose network and the exporting or importing of electricity, and may reduce its volume under the provisions of separate rule of law if import would come from a country where a consumer eligible under Hungarian law would not be considered eligible.	Act CX of 2001 on Electricity,Section 48, paragraph 2.
Lithuania	The Government of the Republic of Lithuania or a body authorized by it shall grant authorizations for electricity import only on condition that other countries provide equal opportunities for their eligible customers and suppliers to import electricity from the Republic of Lithuania, and with account of the quotas for imported energy established by the Government or a body authorized by it.	2000 Electricity Law, article 32.5
Poland	The new amendment to the Energy Law of 10 April 1997 provides for reciprocity requirement. The amendmentwas passed on 24 July 2002.	Communication by the Polish Delegation.
Slovenia	Yes	1999 Energy act, article 28.

Annex 3 **Access to Transmission Network and TSO Unbundling**

Country	Access to transmission network	TSO unbundling
EU Member States and EEA		
Austria	Regulated TPA	Legal
Belgium	Regulated TPA andNegotiated TPA for large transit	Legal
Denmark	Regulated TPA	Legal
Finland	Regulated TPA	Ownership
France	Regulated TPA	Management
Germany	Negotiated TPA	Management
Greece	Regulated TPA	Management
Ireland	Regulated TPA	Legal
Italy	Single Buyer and Regulated TPA	Legal
Luxembourg	Regulated TPA	Management
Netherlands	Regulated TPA	Legal
Norway	Regulated TPA	No information available
Portugal	Single Buyer and Regulated TPA	Legal
Spain	Regulated TPA	Legal
Sweden	Regulated TPA	Ownership
United Kingdom	Regulated TPA	Ownership
EU candidate countries		
Bulgaria	Single Buyer	Account separation
Czech Republic	Regulated TPA	Account separation
Estonia	Regulated TPA	Account separation
Hungary	Single Buyer (2002)Regulated TPA (from 2003)	Legal
Lithuania	Regulated TPA	Account separation
Latvia	Regulated TPA	No information available
Poland	Regulated TPA. Until Poland's accession to EU, TPA is restricted to power generated in Poland	Account separation.Legal unbundling is expected in the next stage of restructuring of PPGC
Romania	Regulated TPA (planned)	Legal
Slovakia	Single Buyer	None
Slovenia	Regulated TPA	Legal
Turkey	TPA (not clear whether Reg/Neg)	Legal

Annex 3 **Access to Transmission Network and TSO Unbundling** *(continued)*

Country	Access to transmission network	TSO unbundling
Other non-EU countries		
Albania	No information available	None
Armenia	Single Buyer but TPA e.g. for transit	No information available
Croatia	Regulated TPA	Account separation
Georgia	No open access ("Single Buyer")	No information available
Kazakhstan	TPA is allowed through direct contracting between generators and large users	Account separation
Moldova	TPA (not clear whether Reg/Neg)	No information available
Russian Federation	None	None
Switzerland	None	None
Ukraine	TPA (not clear whether Reg/Neg)	No information available

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