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ELECTRICITY TRADE AND THE ROLE OF THE REGULATOR

Issue Paper

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ELECTRICITY TRADE AND THE ROLE OF THE REGULATOR

Chapter 1. Background

1.1 Regional Energy Regulatory Program

With the assistance of the U.S. Agency for International Development (USAID), the National Association of Regulatory Utility Commissioners (NARUC) coordinates an information exchange program among the new energy regulatory bodies in Central and Eastern Europe and Eurasia. The core of the program is the work done by two committees: the Licensing/Competition Committee and the Tariff/Pricing Committee.

At the 3rd Annual Energy Regulatory Conference in Budapest, Hungary on 7-9 December 1999, the Licensing/Competition Committee decided to form an Export Import Working Group chaired by Maria Manecuta, Director of the Licenses and Technical Regulations Department of the Romanian National Energy Regulatory Authority (ANRE). The Working Group included regulators from the Tariff Committee as well.

The Export Import Working Group was created to address issues concerning import, export, and transit among groups of countries. The member countries of the Working Group cover a large area stretching from Hungary, in the west, to Kazakhstan, in the east. This area is subject to new developments in exports, import and transit as a result of political and economic changes such as the development of competitive regional and international markets.

The Export Import Working Group held its first meeting in Riga, Latvia on 17-18 June 2000 and developed an outline of this report. The purpose of this report is:

1. To define the role of the regulator to facilitate international electricity trade
2. To facilitate the creation of conditions in each country that are essential for expanded trade
3. To support the creation of competitive regional and international electricity markets.

The Working Group agreed that the first draft would be prepared by Dr. Charles Zimmermann, an energy economist with experience in electricity tariff studies and regional electricity trade arrangements.¹ This report will be discussed at the next meeting of the Working Group in Moscow, Russia on 8-9 October 2000. A revised draft will be submitted for discussion at the 4th Annual Energy Regulatory Conference in Bucharest, Romania on 11-13 December 2000 and the Working Group will either

¹ Dr. Zimmermann is a Senior Consultant at Nexant, Inc. (<http://www.nexant.com>) and his participation is funded under an Energy Indefinite Quantity Contract (IQC) between USAID and Bechtel National, Inc.

approve it as the final draft or identify the specific changes needed to produce a final draft immediately after the conference.

1.2 Why are electricity exports and imports important?

There are four reasons why regulators should support the development of a legal and regulatory framework for import, export, and transit among a group of countries:

1. *Generation cost savings.* Over the whole region composed of a group of countries, the development of electricity trade enables each country to meet hourly electric load and customers' annual requirements using a least-cost mix of generating sources. Because generating resources are varied, including hydroelectric resources, electricity trade usually enables power systems to lower their generation costs over any 12-month period. The cost savings should be reflected in lower prices to the consumer or greater capital expenditure on measures needed to reduce losses, reduce theft, and improve system reliability. In either case the customer should receive a benefit.
2. *Macroeconomic benefits.* Lower electricity costs enable suppliers to provide electricity at lower prices to the customer. When electricity trade results in lower prices, the economic development of the region is promoted. The countries that have a comparative advantage in electricity generation – for example, countries with surplus hydroelectric power or high-quality coal reserves – will export electricity to countries that have a comparative advantage in other types of economic activity. International trade is normally beneficial to economic development when import and export prices are not artificially manipulated by governments.
3. *Power sector reform.* It is easier to create a competitive electricity market in a group of interconnected countries, or in a large country with a highly interconnected grid, than in a small country. The larger the number of generating stations and producers connected to the grid, the greater the chances that the consumer will benefit from a competitive electricity market. This consideration is particularly important for small countries, and countries in which generating resources are controlled by a company with monopoly power.
4. *Participation in the internal market of the EU.* For the EU accession countries, interconnection with UCTE and Nordel will accelerate the process of power sector reform by subjecting transmission system operators to European Transmission System Operator rules and by introducing the principle of reciprocity. The accession countries, under the principle of reciprocity, may not export electricity to the EU unless they open their markets to producers from the EU.²

² See Appendix C for information on the EU accession status of Central European countries.

There are three possible conditions of electricity trade among interconnected power systems:

- *Import, export, and transit among a group of countries.* In this situation it is possible for a country to import electricity from a country that is not a neighboring country. When a large geographic area is involved, the number of possible import and export transactions is very large; this is the most favorable condition for a competitive electricity market to develop. To facilitate energy flows over a large number of possible physical paths it is necessary to have one large synchronous interconnected system. A small number of physical paths can be implemented by asynchronous interconnections. To create a single market for electricity in a large geographic area, normally both synchronous and asynchronous interconnections are needed.
- *Export-import trade between neighboring countries.* These transactions can be implemented with either AC or DC interconnections. Asynchronous (DC) interconnections are used where it would be very difficult to achieve a high degree of coordination or to implement uniform standards for network construction and operation. When a country imports electricity from its neighbor, in some cases the electronic energy flows over a short physical path (for example, 100 km). Perhaps the simplest example of import-export trade between neighbor countries is the connection of a small "island" to a large neighbor country.³
- *Synchronous interconnection with no export-import trade.* The interconnections among high-voltage networks of neighboring power systems make it easier to stabilize frequency and voltage and reduce the cost of instantaneous reserves and spinning reserves for the power systems that are joined together. It is possible to achieve these benefits without import, export or transit. Synchronous interconnection requires a high degree of coordination and cooperation among dispatch centers, and requires the acceptance of uniform standards for construction and operation of high-voltage networks to ensure system reliability.⁴

³ For example, Uralsk and Aktyubinsk are located in Kazakhstan but connected to the Russian power system because they are far from the main interconnected power network of Kazakhstan. In 1999 the unified power system of Russia operated in an island mode with the power systems of Kazakhstan, Finland, Norway, China, and Mongolia. <http://www.cdo.org>

⁴ For example see UCPTE, *Summary of the current operating principles of the UCPTE*, October 1998. This document is available from http://www.ucte.org/Publikationen/English/Default_Pub_E.htm and is listed among Publications as "UCTE-Principles of Network Operation."

Chapter 2. Current Conditions

2.1 *Current condition of energy regulators in Central Europe and Eurasia*

In Central Europe and Eurasia (CE&E) there is a general trend toward restructuring of electricity markets to promote competition among generators and suppliers, and a trend toward privatization of generation and distribution companies. Both of these trends establish power sector structures in which there is a need for an independent regulatory authority. In general the countries that have made the most progress toward restructuring and/or privatization are the countries that have made the most progress in establishing politically independent regulatory agencies. The independence of the regulator, the ability of the regulator to initiate tariff hearings and set tariffs, and the ability of the regulator to issue licenses and enforce license conditions vary from country to country. The legal framework for government supervision and regulation of electricity export, import, and transit also varies from country to country.

One of the purposes of this Issue Paper is to define the role of the regulator to facilitate international trade. Under current conditions this role is undefined because:

- Generally, policies and rules on export, import and transit are not well-established and not transparent
- The roles of the key organizations (Ministry, Regulator, Transmission Company, Generation and Distribution Companies) are inadequately defined.
- Legal and regulatory frameworks are inadequate.
- Policies concerning confidentiality of information and documents are not clear.
- Situations in each country vary with regard to the regulator's authority to license exporters and importers, and the regulator's authority to approve or regulate transit fees.
- Power sector reforms needed to facilitate optimal imports and export are not complete. For example, the regulator may have authority to license new (restructured) companies, approve Market Rules, and approve a Grid Code but the regulator may be waiting for other players to implement the necessary reforms.
- Situations vary with regard to excise taxes on electricity exports and imports. Some countries have VAT on electricity sales to final customers and therefore VAT on imports.

When a regulatory agency is created, elected officials agree that a regulator is needed to protect domestic consumers. In most countries, however, there is a political coalition in favor of privatization, and that coalition tries to establish a regulatory framework that will make the to-be privatized companies attractive to investors. For example, privatization may require an increase in electricity tariffs, a tough policy toward debtors,

and other politically unpopular measures. The regulator in this situation must balance the interest of investors against the interests of consumers.

In trying to resolve the conflicting interests of investors, consumers, and energy sector workers the Parliament, President, and Cabinet of Ministers may be unable to establish a clear policy on government supervision and regulation of electricity export, import and transit. Although consumers will benefit from any trading arrangements that reduce costs and improve efficiency of the power sector, consumers typically do not understand export-import issues and would prefer to leave these questions to specialists. Investors will have competing interests – some will favor competition among generators, other will favor long-term power purchase agreements, and it will not be easy for the regulator to decide which policy will attract more foreign investment.

Because export-import issues touch on questions of “state policy” it is not possible for regulators to use their legal authority over domestic matters as a justification for taking complete control over export-import issues. If a country becomes dependent on imported electricity, and loses the ability to meet electricity demand from domestic generating stations, there is either a real or perceived threat to national security. If electricity is either exported or imported and the importing country is unable to pay for it in hard currency, there is a need for a government-to-government barter agreement. If a lot of money or a lot of jobs are involved in electricity import, export, and transit there is a tendency for political authorities to look at electricity trade as a foreign policy issue affecting relations with neighbor countries. All of these considerations tend to support the idea that the regulator is not qualified to deal with export-import issues and therefore the regulator should wait for instructions from some Ministry or perhaps the entire Cabinet of Ministers.

In the absence of a clear policy on government supervision and regulation of export, import and transit, the power sector may end up in one of the following situations:

- *Deregulation.* Export, import and transit become unregulated activities conducted by transmission system operators and other companies in the power sector. In this situation management will try to figure out what is in the national interest, or in the company’s best interest, and then negotiate agreements with entities in neighbor countries.⁵
- *Ministry control.* The Ministry that is considered the “owner” of the power sector controls export, import, and transit. International agreements are prepared by energy specialists in the Ministry and signed by the Minister in charge (or perhaps the President of the country).

From the regulator’s standpoint, neither situation is satisfactory. If domestic trade is regulated, then why should international trade be without a regulatory framework? If trading results do not favor the consumer - for example, if export revenues are lower than forecast and imported electricity costs are higher than forecast – should the

⁵ The dispatch center DC Baltija is an example of partial deregulation. It was formed as a joint stock company owned by three vertically integrated power systems, who sign contracts with each other. The supervisory board, which holds quarterly meetings, includes representatives of the three Ministries of Economy as well as the three power companies. Energy regulators do not license DC Baltija.

regulator immediately and automatically raise electricity tariffs to the consumer? If domestic generating stations are licensed, then why should importers be unlicensed?

2.2 Trade restrictions

From the consumer's standpoint, the best trade policy is usually the least restrictive trade policy. Consumers benefit from international competition among producers and from having a market with access to a large network with many possible physical paths available to implement buy-sell transactions. However, some countries have adopted policies that inhibit electricity trade:

- Some countries have selected a power sector structure in which the transmission company has a monopoly over all purchases from producers and all sales to distribution companies. This is sometimes called a "Single Buyer" system although that phrase is not correct because monopolistic control over the wholesale electricity market is not a form of market opening under the EU Electricity Directive.⁶
- Existing long-term power purchase agreements (PPAs) with domestic producers are an impediment to expanded competitive export, import, and transit. These PPAs are also an impediment to spot market development and where generation is privately owned, potential losses may create serious legal problems and costly settlements.
- Some countries restrict imports to protect the jobs of workers in the power sector and/or the coal mining sector. These restrictions are inhibiting electricity trade.
- Some national policies and practices, such as the disconnection of a national power system from the power system of another country, impede transit of electricity.

One of the complex questions for Central European countries is the opening of their electricity markets to competition with the member countries of the European Union. Because the EU countries have the financial resources needed to construct modern, efficient, power stations meeting strict environmental requirements, Central European generating companies will eventually have difficulty paying for fuel at world prices and selling electricity at competitive market prices. Consumers will benefit from international competition among producers, but the financial weaker generating companies and coal producers will be threatened by competition. As long as Central Europe has a surplus of generating capacity, the generating companies can keep their production costs below long-run marginal cost. Eventually the capacity surplus will be used up and it will be necessary to build new power stations or import electricity. The

⁶ Under the Electricity Directive one of the possible forms of market opening in an EU member country is a Single Buyer system in which the Single Buyer purchases energy from producers and suppliers and resells electric energy to qualified customers and distribution companies but buyers and sellers in the wholesale market nevertheless have the right to negotiate contracts with each other. This is not a form of monopolistic control but an alternative way to achieve the same economic results that regulated third party access or negotiated third party access would achieve.

new power stations, and the stations that have been rebuilt according to strict environmental standards, might have difficulty competing in the internal EU market.

In Central Europe and Eurasia, competition may also come from other countries in the region (for example Russia and Ukraine). To the extent that thermal power export prices are based on artificially low fuel costs, or nuclear power export prices exclude the true cost of waste disposal, fuel storage, and decommissioning, there is a valid basis for domestic generating companies to ask for protection from competition with imported power. On the other hand, opening the market to competition may demonstrate that countries such as Russia and Ukraine have a true comparative advantage in electricity generation.⁷ It is necessary to ensure that electricity trade is founded on long-term agreements for the mutual benefit of all of the countries involved.

In some countries of Central Europe and Eurasia the transmission system has a surplus of transmission capacity, relative to the amount of capacity needed to serve domestic customers. A country in this situation will benefit from electricity trading arrangements that increase the utilization of the transmission network. When transit service and exports are added to other transmission services, a portion of the fixed costs of the existing transmission network can be recovered from transit customers and export customers, thereby reducing costs that must be recovered from tariffs to domestic customers. If transit and export require new investment in the transmission network, however, transmission tariffs to all customers will probably need to be increased.⁸

2.3 Emergence of regional electricity trade

In Central Europe and Eurasia there was a sharp drop in electricity demand in 1990-92 which led to a general reduction of international trade in electricity. Electricity importing countries typically responded to the fall in electricity demand by reducing the level of imports, not by reducing the level of domestic power generation. Because the level of trade declined, and because some countries (or regions within countries) had difficulty maintaining frequency and voltage within reasonable limits, the pattern of interconnections among power systems of Central Europe and Eurasia began to change. Toward the end of the 1990s the benefits of regional trade were recognized and a revival of regional electricity trade began to develop.

At present there are four groups of countries in Central Europe and Eurasia in which electricity export, import and transit agreements are being developed:

- Poland, Hungary, Czech Republic, Slovak Republic (the countries that have already formed an association called Centrel)

⁷ If country X has high prices for generation and country Y has low prices for generation, restrictions on electricity trade will hurt consumers in X and help consumers in Y but the economic development of the whole region will suffer. For example, if Russia generates electricity that is truly low-cost and is sold to Russian consumers at very low prices, electricity exports would bring benefits the Russian economy but higher prices to Russian consumers. To promote economic development, the best policy is to allow trade.

⁸ When generation, distribution, or transmission assets are fully utilized and demand is growing, there is nothing wrong with tariff increases based on true economic costs. It is better for customers to have higher tariffs and reliable electric service than face electricity shortages.

- Estonia, Latvia, Lithuania (the countries that have agreed to form a Common Baltic Electricity Market)
- Romania, Bulgaria, FYR Macedonia, Greece, Albania, and Bosnia-Herzegovina (the countries that signed the Thessaloniki Agreement on 10 September 99 calling for a regional electricity market by 2006)⁹
- Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan (the countries which drafted a Central Asia interconnection agreement in 1997).

Additional information about the current situation is presented in Appendix E.

2.4 Rules for international exchanges of electricity

The following five international organizations are involved in developing the legal and regulatory frameworks for electricity export, import, and transit in Central Europe and Eurasia:

- *Energy Charter Conference*, which implements a treaty signed by 51 countries including all of Europe and Eurasia but. A Chinese translation has been issued to help China to consider signing the Treaty.¹⁰ Although the Treaty deals with energy in a very general way and is not focused on electricity, disputes concerning electricity transit should be resolved according to the terms of the Treaty. The Energy Charter Conference has the legal authority to write regulations such as *Rules Concerning the Conduct of Conciliation of Transit Disputes*.¹¹ Twelve countries, including the United States, have an Observer status.
- *European Commission*, Directorate B (Transeuropean Networks, Energy & Transport or DG TREN) and the Council of the European Union. With regard to electricity trade the EU's principal focus is the implementation of Directive 96/92/EC concerning common rules for the internal market in electricity,¹² but the EU is also interested in facilitating development of

⁹ Five of the six countries that signed the Thessaloniki Agreement - Romania, Bulgaria, FYR Macedonia, Greece, and Albania - maintained synchronous operation during most of 1999. Bosnia-Herzegovina was not synchronously connected, however. The Federal Republic of Yugoslavia did not sign the Thessaloniki Agreement despite the fact that in 1999 its network was synchronously connected to the first five signatories.

¹⁰ Mongolia, Japan and Australia are signatories but China and India are not signatories. The home page is <http://www.encharter.org>. Documents are available in English and Russian.

¹¹ These rules are published at <http://www.encharter.org/English/General/conciliation/Rules.html> but you must go to the home page before you can reach this web site.

¹² The home page is http://www.europa.eu.int/comm/energy/en/elec_single_market/index_en.html. Most documents are available in English, German, or French. The home page of the European Commission is in Spanish, Danish, German, Greek, English, French, Italian, Dutch, Portuguese, Finnish, and Swedish.

electricity networks and implementing Directive 90/547/EEC on transit.¹³ Every member country must follow Directives and similar regulations, and therefore the accession candidates must get ready to follow the Directive.

- *European Electricity Regulation Forum*, which was initiated by the European Commission but involves the national regulators, national ministries, transmission system operators, university professors, and industry organizations such as Eurelectric. Representatives of the European Commission take part in drafting the decisions of the Electricity Regulation Forum.¹⁴ Moreover, the decisions taken by the Forum are supported by decisions of the Council of the European Union.¹⁵ The result is that the Forum looks like a discussion group and acts like a regulator. It regulates cross-border transactions including export and import between EU countries and non-EU countries.
- *Council of European Energy Regulators*, which has been established very recently. It provides a forum for the national regulators of EU member countries to exchange information and discuss policy issues.
- *European Transmission System Operators*, which represents the TSOs of the 15 member countries of the European Union.¹⁶ ETSO is the official source of information on Net Transfer Capacity for cross-border transactions including export and import between EU countries and non-EU countries. ETSO gives advice to the European Electricity Regulation Forum and participates in the Forum. ETSO is governed by a Steering Committee with representatives of the 15 countries and by a Council with representatives of UCTE, Nordel, the United Kingdom TSO Association (UKTSOA) and the Association of TSOs in Ireland (ATSOD).
- *Union for the Co-ordination and Electricity Transmission (UCTE)*, which represents the TSOs of a group of European countries that operate synchronously.¹⁷ UCTE establishes technical standards for synchronous operation. It does not regulate export, import or transit but it collects and publishes statistics on import and export. A TSO on the border of UCTE may request permission to operate synchronously in parallel with UCTE;

¹³ The home page is http://www.europa.eu.int/comm/energy/en/tn_2_en.html. The electricity transit Directive is published in European Commission, *Energy in Europe: Compendium of Legislation and Other Instruments Relating to Energy* (Special Issue, February 1995), pages 344-346.

¹⁴ The most recent decision is entitled "Conclusions: Fifth Meeting of the European Electricity Regulation Forum, Florence, 30-31 March 2000." Download from the Florence process web site: http://www.europa.eu.int/comm/energy/en/elec_single_market/florence/index_en.html

¹⁵ See "Council Conclusions: Internal Electricity and Gas Markets," May 2000. Download from the Florence process web site.

¹⁶ The home page is <http://www.etso-net.org>. Documents at this site are available only in English.

¹⁷ The home page is <http://www.ucte.org>. Most documents are available in English, German, and French.

after parallel operation is established, the TSO may submit an application to become a member of UCTE. EU membership is not required.¹⁸

From the perspective of a country wishing to become a member of the EU, these organizations are already developing the legal and regulatory framework that will be applied to the accession countries. From the perspective of a country that has not applied for EU accession, practically speaking the EU is creating a regulatory framework that may be useful to non-EU countries.

From the perspective of countries which have not applied for accession such as Russia, Belarus, Ukraine, Moldova, and others, there are major technical and financial obstacles to synchronous operation between Europe and them. The accession countries which theoretically will be conducting cross-border trade with Russia, Belarus, Ukraine and Moldova according to European Electricity Regulation Forum rules or ETSO rules are not members of the EU, and therefore they have not been asked to discuss the application of EU laws and regulations to the "future EU border." The regulatory framework for trade between EU accession candidates and their non-EU neighbors has not been defined. There is no Electricity Treaty between the EU and Eurasia, although high-voltage power lines are already located along the national borders which someday may become the border of the EU. The operation of these interconnections will require cooperation between the TSOs on the European side and TSOs in non-accession countries.

2.5 Organizations promoting co-operation between Europe and Eurasia

There are two key organizations that sponsor conferences and issue technical reports regarding the electricity market in Europe and Eurasia. They are not regulators and they have no legal authority, but they promote co-operation between Europe and Eurasia:

- *CDO*, which is similar to UCTE but does not operate synchronous interconnections.¹⁹ The members of CDO are Russia, Ukraine, Romania, Bulgaria, Poland, Hungary, Czech Republic and a German company, Vereinigte Energiewerke AG (VEAG) which is the TSO in eastern Germany. CDO is an open international organization prepared to co-operate with TSOs interested in parallel operation.
- *Eurelectric*, an industry association whose full members include the TSOs of western European countries plus Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.²⁰ The European affiliate members include TSOs in Albania, Bosnia-Herzegovina, Croatia,

¹⁸ Since 1997 the UCTE zone of synchronous operation has included Morocco, Algeria and Tunisia (forming part of the COMELEC network). See UCPTE *Annual Report 1998*, page 41.

¹⁹ The home page is <http://www.cdo.org>. Documents are available in English and Russian.

²⁰ The home page is <http://www.eurelectric.org>. Documents at this site are available only in English.

FYR Macedonia, and Russian Federation. Additional TSOs can be invited to become affiliate members.

These organizations support the creation of competitive regional and international markets.

2.6 Different visions of the electricity market

At present there is a conflict between the vision of the EU Electricity Directive and the vision of the Energy Charter Treaty.²¹

- The basic concept of the Electricity Directive is that EU member countries must be separated from non-members, and the EU must establish an internal market which is open to EU members only. The legal foundation of the Electricity Directive is the Treaty of Rome, which established the European Community. Trade with non-members is restricted. In effect the European Parliament and the Council of the European Union said in December 1996, "Since we have already agreed to define the European Union as an area without internal frontiers in which the free movement of goods, persons, services and capital is ensured, we have written the Electricity Directive to remove barriers to electricity trade within this area."²²
- The basic concept of the Energy Charter Treaty is that energy sector trade is beneficial to all of the countries in Europe and Eurasia, but a treaty is needed to establish a common legal framework that will promote investment in the energy sectors of the economies in transition. The countries signed the Treaty on 17 December 1994 because they were "wishing to implement the basic concept of the European Energy Charter initiative which is to catalyze economic growth by means of measures to liberalize investment and trade in energy."²³ All countries in Europe and Eurasia were invited to sign (see Appendix D).

What is actually happening in Europe is that electricity markets are expanding across national borders and investors are beginning to find similar "rules of the game" both inside and outside the EU. Inside the EU, most Members have decided that TSOs should publish transmission and distribution service ("use of network") tariffs, and that

²¹ At the Euroelectric conference in Brussels, 20 January 2000, energy sector lawyer Leigh Hancher argued that the EU's "reciprocity" requirements are a violation of GATT Rules and a violation of Energy Charter Treaty provisions. Representing the European Commission, Karl Falkenberg argued that the EU has a right to insist on reciprocity and the GATT Rules and Energy Charter Treaty do not take away this right. See the Euroelectric press release, *Cross-Border Trade in Electricity: Speakers Signal the Importance of Reciprocal Market Access*, download file name 2000-030-035-1.pdf.

²² This is not the exact wording, of course. See the first two pages of Directive 96/92/EC concerning common rules for the internal market in Electricity.

²³ This exact wording appears in the Preamble of the Energy Charter Treaty, on the first page.

tenders are not necessary to determine which generating companies should receive permits to build new power stations.²⁴

Congestion management is the set of actions needed to cope with shortages of Available Transmission Capacity.²⁵ When there is not enough cross border transmission capacity to implement all of the buy-sell transactions desired by electricity market participants, some kind of rationing or some form of price control may be needed temporarily. Through the European Electricity Regulation Forum, all EU members are seeking a common set of rules for cross-border transmission tariffs and for congestion management. However, the electricity industry does not want to put a "wall" around the EU and restrict electricity trade with non-EU countries. Norway and Switzerland are participating in the electricity market despite the fact that they are outside the EU.

An example of an industry viewpoint is the following vision statement, which was submitted to the European Electricity Regulation Forum in November 99 by the European Federation of Energy Traders (EFET):

Future Vision of a common European electricity transmission and trading market. A common vision, shared among market participants, transmission system operators (TSOs) and regulatory authorities about the long term possibilities to transport and trade electricity is a necessity, if a smooth process of market development is to transpire. The ultimate vision is of transparent and liquid markets in electricity as a commodity throughout Europe, facilitated through trading unimpeded by national borders or other boundaries. The future European integrated transmission network would then allow transportation of electricity independently of network ownership, local temporary congestion problems or country differences in culture or attitudes. The rules for operation of networks and markets would be clear and simple, yet at the same time designed to stimulate the development of one - or several integrated - marketplaces.²⁶

This "vision" does not include a definition of the geographic boundary of Europe. Recognizing that "the extension of synchronous operation might also contribute to the opening up of new markets for all the undertakings concerned," the UCTE decided in 1998 to continue to invite TSOs to be interconnected with the UCTE grid, without defining any border or limit to UCTE expansion:

The UCPTE should also be open to any form of cooperation, in terms of system operation and the exchange of experience with third parties. To this end, the principle of reciprocity should be applied. In particular, any undertakings who have applied for the synchronization of their networks or UCPTE membership

²⁴ See "Implementation of the Internal Electricity Market Directive in the EU Member States," available from <http://www.eurelectric.org> . The 9 March 2000 draft will be updated with a new draft.

²⁵ See Appendix B for a definition of Available Transmission Capacity.

²⁶ EFET, *European Electricity Trading an a Single Market in Electricity*. Final version, 9 November 99. Available at <http://www.efet.org> "Position Papers."

should facilitate and support analyses for the extension of the zone of synchronous operation beyond their own network.²⁷

Therefore the European electricity industry is beginning to support the basic concept of the Energy Charter Treaty. The electricity industry favors a step-by-step process of eastward expansion of the marketplace rather than a rapid expansion into Eurasia. Unfortunately, no one has developed a future vision of a common Eurasian electricity transmission and trading market.

²⁷ UCPTE, *Annual Report 1998*, page 49. This statement is the conclusion of the report on "Extension of the UCPTE and its zone of synchronous operation – Strategic considerations."

Chapter 3. Measures Needed to Support Export, Import and Transit

It is important to facilitate the creation of conditions in each country that are essential for expanded trade, and also support the creation of competitive regional and international electricity markets. New institutional arrangements and reforms are needed at three levels: national, regional, and international (across Europe and Eurasia). Activities at the national level provide the basic foundation for establishment of competitive electricity markets. The transformation of vertically integrated power companies into separate generation, transmission, and distribution companies can only happen at the national level, for example. To obtain generation cost savings and to increase the competitiveness of the electricity market it is necessary to establish cooperation at the regional level and form regional markets. Finally it is important to develop a long-term vision of the possible integration of various regional markets into an international market covering a very large geographic area.

This chapter begins with a discussion of measures needed to support export, import and transit at the national level, and then proceeds to the regional and international levels.

3.1 Energy strategy at the national level

At the national level it is useful to develop a strategy on how to achieve an electricity market that is truly competitive, and how to strengthen competition. In small countries the creation of a competitive national electricity market will be difficult when most of the thermal generation is provided by a small number of generating stations and most of the national hydroelectric generation is provided by one or two rivers.²⁸ If the country has only a few major cities there may be a small number of commercially viable distribution companies. If the wholesale market will not have many buyers and many sellers at the national level, the solution is to join a market formed by several countries, or possibly to join the electricity market of a neighboring country that is large enough to have many buyers and many sellers.

A nation that would like to participate in an international electricity market may choose one of the following strategies:

1. *Start with a national market.* If possible and appropriate, establish a competitive market and related rules at the national level, and then see whether an international market can be developed. The essence of this strategy is to implement reforms as soon as possible, without waiting for neighbor countries. The assumption is that the regional electricity market may develop slowly and that addressing competition issues will facilitate regional cooperation.
2. *Form a club.* Join a group of countries and negotiate an international agreement to form a regional electricity market with one grid code, one set of market rules,

²⁸ A cascade of hydro stations cannot be divided into competing companies because the upstream reservoirs control the amount of water flow available to the downstream reservoirs. Revenues are maximized when all of the reservoirs on the river are operated in a coordinated dispatch schedule.

and so forth. The essence of this strategy is to avoid duplication of effort and ensure that the legal and regulatory framework will be harmonized among all the countries in the region.

3. *Join a club.* Join an electricity market that is already operating in a group of countries, by accepting the market rules and industry structure already established by that group. The essence of this strategy is to wait for the western European countries or the high-income countries to invest in the development of a competitive market and set up electricity exchanges. For example, the Baltic countries could try to join the Nordic electricity market (Norway-Sweden-Finland-Denmark).
4. *Develop national rules that could become regional.* A fundamental requirement is the establishment of a sound legal and regulatory framework. Therefore one strategy is to establish the legal and regulatory framework at the national level, even if the national market is not competitive, and then try to establish a regional electricity market. The essence of this strategy is to be the first in the region to prepare for an electricity market that will develop sooner or later. Being first to have a TSO, grid code, market rules, and so forth will give a competitive advantage. For example, Latvia is the first Baltic country with a grid code.

A nation that has only a weak commitment to participate in an international electricity market might establish a competitive market at the national level, and then invite other countries to participate only if it is advantageous to let them join the market. For example, one idea is to let producers in neighbor country X have access to customers in country Y only when producers in Y have access to customers in X. Until there is *reciprocity*, X and Y operate independent national markets. Although this strategy might be beneficial for producers, it is not likely to serve the interests of consumers. Normally consumers will benefit from expanding the market geographically.

Some of the member states of the EU have suggested a need to restrict trade between an EU country and any non-EU country in which electricity market access conditions relating to unbundling, transmission fee, grounds for refusal of access, and dispute settlement are not equivalent to the market access conditions prevailing inside the EU. This concept has never been clearly defined, because access conditions vary considerably within the EU. Nevertheless, in April 1999 the European Commission recommended that "bilateral agreements or understandings could be concluded between the EU and third countries enabling the establishment of a reciprocity-based framework ensuring equivalent market opening and a level playing field."²⁹ The first test of this concept is the negotiation of a bilateral agreement between the EU and Switzerland. If this approach were fully implemented, Hungary, for example, would trade with Austria

²⁹ European Commission, *Second Report to the Council and the European Parliament on Harmonization Requirements: Directive 96/92/EC concerning common rules for the internal market in electricity*, Page 24. Download at http://www.europa.eu.int/comm/energy/en/elec_single_market/florence/index_en.html. See also Angus Johnston, *The EC Energy Law 1999: Reciprocity and the Gas and Electricity Directives*, 4 CEPMLP 21 (1999). Available at <http://www.dundee.ac.uk/cepmlp/journal/html/article4-9.html>

on the basis of a reciprocity agreement between the EU and Hungary. This approach might not be consistent with the trade provisions of the Energy Charter Treaty.³⁰

3.2 Actions that can be implemented at the national level

To create the conditions essential for expanded trade and to support the creation of competitive regional and international markets, the different entities involved in electricity market (Ministry, Regulator, Transmission Company, Generation and Distribution Companies) should work together to establish:

- A legislative framework that will support the creation of competitive regional and international markets
- A regulatory framework to implement the basic principles defined by legislation
- A clear understanding of who is responsible for writing the electricity market rules, and who is responsible for implementing the market rules, at the national, regional, and international levels.

Reforms at the national level are the foundation for the development of competitive electricity markets at the regional and international levels. If competition is possible in the domestic electricity market, then it will be only natural to expand the geographic scope of the marketplace to the regional level so that buyers and sellers may be located in neighbor countries with a similar legal and regulatory framework. On the other hand, if reforms are not implemented at the domestic level it is less likely that consumers will benefit from the development of regional or international markets. To establish a competitive electricity market it is necessary to have an energy law or electricity law, an independent regulatory agency, and a transmission system operator that is independent of generating companies and distribution companies, in management terms.

3.2.1 Legislative framework

The legislative framework must clarify who is supposed to sign and negotiate international agreements dealing with the electricity market.³¹ For example, the simplest kind of international trade is annual export-import agreements with power systems in neighbor countries. It is important to know whether producers and consumers may trade with entities in neighbor countries. A common problem is a situation in which the government decides that the power sector will be restructured, but there are no laws or regulations on trade with neighbor countries and therefore the vertically integrated power system tries to maintain "single buyer" control over exports and imports. When a law requires a transmission company or transmission division to

³⁰ This issue was debated in a Eurelectric conference held in January 2000.

³¹ The Final Act of the European Energy Charter Conference was signed on 17 December 1994 by ministry officials such as the Minister of Energy of Estonia. For each Contracting Party the process of ratification of the Treaty demonstrated that the Parliament agreed with the person who signed the document. Perhaps there were no Regulators involved in the process, but Parliaments were involved.

be formed, the legislative framework must clearly separate the supply function (buying and selling electric energy) from the network service function (ownership and operation of the "wires business").

The legislative framework should establish authority for approval of electricity market rules. The best approach is to give this authority to an independent energy regulatory agency. In some countries the legislative framework also establishes a timetable for providing different categories of customers with open access to the transmission network.

If there is a need to form a regional interconnection, a regional spot market, or a regional electricity market operator, the legislative framework should clearly define who has the authority and responsibility to negotiate the necessary agreements. If the legislation states that approval is needed at the highest level (the Parliament, the Cabinet of Ministers, or the President) then it will be necessary to clarify who will write the documents that will be submitted for approval. Because electricity networks are technically complex, it is not reasonable to expect politicians to resolve all of these questions; a lot of the work must be done by Regulators and Transmission System Operators.

Each country participating in international electricity trade should provide its trading partners with information on the legislative framework for electricity trade. Normally the legislative framework may be defined as the set of laws passed by the Parliament. In some countries, however, the Parliament allows the President to make key decisions on power sector restructuring and privatization. This situation can occur when a weak Parliament and a strong President face an urgent need for reform. Under these conditions the legislative framework may be defined as the combination of laws and Presidential decrees.

3.2.2 Regulatory framework

The regulatory framework consists of regulations and decisions made by government organizations such as the energy Regulator, the Ministry responsible for the power sector, and the Cabinet of Ministers. This framework must include:

- Licensing of all participants in the domestic market, including participants in export, import, and transit agreements.
- License conditions designed to establish the reliability and quality (and sometimes, the price) of electric service to domestic and international customers. For example, the regulator may choose to set conditions under which both groups are affected by a sudden loss of generating capacity. The load shed plan might include export customers as well as domestic customers.
- Guidelines for access to national-level information about market transactions. Spot market prices must be available via Internet on a daily basis and perhaps even on an hourly basis. The guidelines may also describe

access to information from international organizations such as ETSO although this information will be regulated at the international level.³²

- Guidelines to protect confidentiality of contracts and other documents. The TSO must not release contracts, contract prices, and other sensitive commercial information to other parties such as companies affiliated with the TSO.
- Tariff issues, which are described below.

The following tariff issues should be addressed:

1. *Network service tariffs.* For regional and international electricity markets the most important tariff issue is the definition of network service and the structure of the network service tariff. Perhaps the best solution is to define network service as access to all producers and consumers in the wholesale market regardless of national borders. The tariff can be structured as an energy charge plus a connection fee, with different connection fees for producers and consumers. Then the TSOs must agree on a system of compensation among each other. Under this approach the producer or customer does not have to pay transit tariffs to two or more countries. When he pays the TSO serving his network, that TSO might share the revenue with TSOs in other countries but the producer or customer does not have to worry about the sharing formula.
2. *Transmission costs borne by domestic consumers.* Transmission services offered by a TSO can be grouped in four categories: transit of electric energy from domestic producers to domestic consumers, from domestic producers to other TSOs (export), from other TSOs (import) to domestic consumers, and from one TSO to another TSO (transit). Obviously it would not be fair to ask domestic consumers to pay for all of these services. The TSO should reach agreement with other TSOs to determine how much of the cost of transmission will be paid by foreigners (including producers, consumers, and transit customers). At the national level the regulator must develop tariff methodologies to ensure that the allocation of transmission costs is fair to domestic consumers.
3. *Bundled tariffs.* In some countries the vertically integrated power system exports electric energy under a flat tariff per kWh so that generation, transmission, and ancillary services (balancing and reserves) are bundled together. Under this approach it is impossible to measure the portion of transmission costs borne by domestic consumers. This approach to export pricing should be rejected.
4. *Generation costs borne by domestic consumers.* If a country exports electricity, some of the generating resources are used to serve to domestic customers and some of the resources are used to serve export customers.

³² For EU member countries, Available Transfer Capacities in winter and summer are published at <http://www.etso-net.org>.

Obviously it would not be fair to ask domestic customers to pay for all of the generating resources, or more than they consume. At the national level the regulator must develop tariff methodologies to ensure that the allocation of generating costs is fair to domestic consumers.

5. *Ancillary service costs borne by domestic consumers.* Any country interconnected with other countries must participate in a coordinated system of dispatch to ensure that customer load is balanced with generation plus net imports. Generating capacity reserves are needed to ensure that load and generation can be balanced at all times. At the national level the regulator must develop tariff methodologies to ensure that the allocation of the cost of ancillary services (including capacity reserves) is fair to domestic consumers. These costs may be significant when a small country must maintain a large amount of reserve capacity to support exports of electricity generated at nuclear stations.

If the legislative framework does not contain a timetable for providing different categories of customers with open access to the transmission network, then this issue must be addressed by the regulatory framework.

3.2.3 Market rules

At the national level it is necessary to ensure that rules for electricity market operation are conducive to export, import, and transit. The method of preparing market rules depends on the strategy for participating in an international electricity market:

1. *Develop national rules.* If the strategy is to establish a competitive market at the national level, and then see whether an international market can be developed, the draft and final market rules should be prepared at the national level. Later, if an international electricity market develops, the country may consider revising the market rules to suit the needs of its trading partners.
2. *Develop regional rules.* If the strategy is to join a group of countries and negotiate an international agreement to form a regional electricity market, then the market rules should be developed first by an international committee or working group and then adapted (if necessary) to local conditions. It will be necessary to ensure that the rules developed at the regional or international level are consistent with the national legal framework. It may be necessary to harmonize the national legislative and regulatory frameworks of the countries in the group, by introducing new legislation in each country.
3. *Use existing rules.* If the strategy is to join an electricity market that is already operating in a group of countries, then it is necessary to accept the market rules already established by that group. It may be necessary to revise the national legislative and regulatory framework to comply with the international treaty or commitment (for example, EU membership).
4. *Develop national rules that could become regional.* If the strategy is to be the first in the region to prepare for an electricity market that will develop sooner or later, then the draft market rules should be developed at the national level and submitted to a committee or working group responsible for developing the

regional market rules. If it is impossible to develop a competitive electricity market at the national level, the final version of the market rules should be developed at the regional level.

3.3 Actions that can be implemented at the regional level

Every country needs to coordinate electricity import, export, and transit with countries to which it is connected. If a country is a member of a regional association such as Centrel then the country has an obligation to coordinate activities with all of the other members of the association. Three kinds of coordination are essential:

- *Coordination of national policies.* Governments need to establish compatible national policies that facilitate export, import and transit.
- *Coordination among transmission system operators.* From a purely technical perspective this is necessary to ensure reliable operation of the power system. The rules and procedures for TSO coordination in UCTE and Nordel are already well defined. An interconnection agreement should be signed by all of the TSOs in an area of synchronous operation.³³
- *Coordination among energy regulators.* To promote international electricity trade among a group of countries it is necessary for the energy regulators to try to harmonize the regulatory framework in those countries. Regular meetings of a committee of energy regulators can be held.

To support a competitive electricity market, a TSO should be independent in management terms from generating companies, distribution companies, large customers, and the government. The simplest and most transparent method of preserving the independence of the TSO is to make it a separate legal entity with transparent operations and broad governance. For example, in Central Europe the first TSO formed as a separate company is CEPS, a.s., which serves the Czech Republic. CEPS management is not independent from the parent company CEZ.³⁴

The European Federation of Electricity Traders (EFET) has complained that some of the participants in ETSO are not TSOs but vertically integrated companies and are not

³³ Unfortunately in April 1999 the Lithuanian Power Company did not sign the interconnection agreement with its neighbor power companies in Estonia, Latvia, Russia, and Belarus. The Defense Council of Lithuania decided that the power company should not sign an agreement with Russia, but the government did not prohibit the power company from signing agreements about interconnection with Poland.

³⁴ Transmission system assets were transferred from the parent company to CEPS on 1 August 99. The CEPS Annual Report 1999 is available at http://www.ceps.cz/english/vyrocnj_zprava/index.htm. CEPS is governed by a Board of Directors and a Supervisory Board. The Board of Directors of CEPS consists of the CEO of CEPS; the Finance Director of CEPS; and the former Director of Transmission System Development of CEZ. The Supervisory Board of CEPS consists of the 1st Deputy of the CEO of CEZ; the Director of the Electricity and Gas Department of the Ministry of Industry and Trade; and the Chairman of the trade union branch committee.

releasing Available Transfer Capacity to the market.³⁵ EFET supports the independence of TSOs:

TSOs need to be organized as separate legal entities (or divisions) from their supply and generation affiliates. For the sake of full transparency different ownership may even be preferred. We advocate that wherever a TSO is in the same ownership as a company or business generating and/or supplying power, the TSO should act entirely independently.³⁶

Some countries may choose to establish a regional Independent System Operator (ISO) to coordinate the work of the TSOs in the region. If there will be a regional Market Operator responsible for both contract and spot transactions then this is a logical solution. However, it is possible to operate a regional spot market (in Nord Pool, for example) without a regional ISO.

3.4 Rules for International Exchanges of Electricity

3.4.1 Vision of electricity market development

The first step in preparing rules for international exchanges of electricity is to have a vision of the future development of the electricity market in Central Europe and Eurasia. Countries in the region face a choice among four policy alternatives:

1. *Modified EU rules.* A single set of rules for international exchanges of electricity could be developed for use by all of the non-EU countries, and could be based upon EU rules for international exchanges of electricity. Modifications can be written by a working group or coordinating body representing the non-EU countries. The working group could approve modifications required to apply the rules to non-EU countries.
2. *Non-EU rules.* A single set of rules for international exchanges of electricity could be developed for use by all of the non-EU countries, without waiting for the EU to resolve its internal political differences. The new rules could be written by a working group or coordinating body representing the non-EU countries.
3. *Regional rules.* The countries outside the EU could form regional associations for the purpose of writing rules for international exchanges of electricity. For example there could be a Centrel region, a Baltic region, a Balkan region, and so

³⁵ For example, EFET's comment on the France-Spain interconnection is that "the available capacity on this interconnector (350 MW), which is to be allocated on a first-come, first-served basis, has already been reserved by EdF (250 MW) and Electrabel (100 MW) under long-term take-or-pay contracts." See EFET, "Further Development of the European Single Market in Electricity," <http://www.efet.org> Position Papers.

³⁶ European Federation of Energy Traders, *European Electricity Trading and a Single Market in Electricity*, presented at the European Electricity Regulation Forum, Florence, November 1999, page 3. See <http://www.efet.org> Position Papers.

forth. In each region new rules could be written by a working group or coordinating body representing the member countries.

4. *National rules.* Each country outside the EU should develop its own electricity market rules without any coordination at the international level.

Option 1 is conceptually the simplest approach to the development of rules for the whole region covered by the Energy Charter Treaty. From the standpoint of the accession countries, option 1 is attractive because it eliminates the need for a transition from non-EU rules to EU rules. However, there is a practical difficulty with option 1: the EU does not yet have a clear set of rules. The Electricity Directive ignores the development of spot markets; the EU does not have a clear policy on congestion management; the harmonization of use-of-network tariffs is still in an early stage of development; and there are no rules for electricity trade with non-EU countries, other than the principle of reciprocity and the release of information on Available Transfer Capacity. If the non-EU countries must wait for the 15 member countries of the EU to reach a consensus on these issues, reforms in the non-EU countries could be delayed.

If the EU member countries accept this vision of a broader electricity market, they will eventually need to expand membership of the institutions involved in developing the legal framework for electricity trade. Option 1 does not create an "internal market" defined by EU borders; it creates an even larger "area without internal frontiers" for the electricity market.³⁷

Option 2 offers the non-EU countries a chance to propose rules that suit their needs, without waiting for the EU to negotiate a clear set of rules. On the other hand option 2 may be unrealistic because it would require a large group of countries to have similar levels of expertise and interest. Moreover, option 2 might create some transitional problems for the EU accession countries. Option 2 tends to separate the EU members from non-members.

Option 3 represents a phased approach to market development, first establishing separate regional markets and later developing links among the regions. Option 3 enables each country and subregion to proceed at its own pace. For example, countries that have been invited to negotiate EU accession could draft rules for electricity trade, and in the second phase of market development the non-accession countries could join. Although Option 3 requires more working groups and more meetings and more documents than options 1 or 2, the working groups would be smaller and easier to organize. Countries could develop expertise at the regional level that would be valuable when the linkages among regions are developed in a later phase.

Option 4 is certainly the simplest from a political standpoint but it will not promote electricity trade and it will not result in substantial investment in the power sectors of non-EU countries.

³⁷ Option 1 may give a competitive advantage to companies that are already involved in the electricity market of the EU. However, these companies are already foreign investors in non-EU countries.

3.4.2 Rules needed to protect grid stability

Because all countries in a synchronous interconnection have an interest in maintaining the reliability and stability of the network, the issue for which it is easiest to reach international agreement is the issue of network security. Even if neighbor countries have different approaches to power sector restructuring and privatization, the TSOs should be able to agree on the following issues:

- Rules for communication and exchange of data among dispatch centers
- Procedures for metering cross-border flows of electric energy
- Conditions under which spinning reserve and short-term (up to one hour) reserves can be made available to a neighbor country
- Identification of regional or “high-level” dispatch centers (if any)
- Procedures for enforcing dispatch instructions given to generating stations
- Procedures for reviewing applications to connect new countries to the high-voltage network
- Procedures for connecting new generators or new loads to the high-voltage network.

Normally all of these rules are written and enforced by TSOs and their associations such as UCTE and Nordel. To support competitive electricity market development the regulator may want to have the legal right to approve these rules, to ensure that these rules are not used to restrict trade. If there is a trade restriction, however, it is not likely that the problem will be overcome by rewriting the rules that protect grid stability. The source of the problem is likely to be inadequate metering equipment, inadequate SCADA, or control of the TSO by a vertically integrated company, or inadequate TSO transparency and governance.

3.4.3 Rules needed to define access rights to networks

Because there are already many interconnections among the high-voltage networks of countries in Central Europe and Eurasia, rules are needed to define access rights to these interconnections. If each country had a vertically integrated power system with a monopoly on import and export, the number of buyers and sellers would be relatively small and therefore the rules would be relatively simple. For example, some interconnections could be regulated by bilateral agreements. If each country restructures its power sector to create a competitive electricity market, however, there will be a large number of potential buyers and sellers who have the right to import and export. Three basic questions must be answered:

- Who has access rights to the interconnections?
- If congestion develops, how should it be managed? What is the least damaging way to allocate interconnection capacity when there is not enough of it?

- If existing interconnections are inadequate, given the demand for transfer capacity, who has the responsibility to make investments in new transmission facilities to increase the available transfer capacity?

These questions have to be answered by all countries, with or without restructuring, and with or without privatization.

The European Union is discussing these issues and has not found a simple solution.

- *Access rights* are defined by the EU Electricity Directive, by national regulations that define qualified customers, by long-term contracts for use of transmission capacity, and by EU rules concerning competition. On one hand the Electricity Directive gives a large number of producers and qualified customers and distribution customers the right to negotiate supply agreements involving import and export. On the other hand the Directive does not explicitly give them access to available transfer capacity. If long-term contracts give available transfer capacity to a small number of market participants and competition is restricted, then the EU has the right to prohibit those agreements on a case-by-case basis.³⁸ The EU hopes that owners of interconnectors will voluntarily make capacity available to the market.
- *Congestion management* is being considered by the European Electricity Regulation Forum in cooperation with ETSO. On 31 March 00 the Forum agreed that the European Commission “will put forward a document outlining the proposals for the most appropriate regulatory approaches towards the allocation of interconnection capacity in the EU.”³⁹ In general market-based approaches are preferred but no decision has been taken.
- *Investments in new interconnection capacity* are being influenced by the Trans-European Energy Networks (TEN) program, which subsidizes interconnection projects proposed by TSOs and national governments.⁴⁰ However, no one is specifically responsible for making sure that there will

³⁸ “Agreements between undertakings which may affect trade between Member States and which have as their object or effect to prevent, restrict or distort competition within the common market are prohibited under Article 85 EC Treaty. Furthermore, any abuse by an undertaking of a dominant position is a substantial part of the common market is prohibited under Article 86 EC Treaty. The Commission ... will examine the contracts governing the use of interconnectors with a view to evaluate to what extent these restrict competition within the meaning of Article 85 or 86.” European Commission, *Second Report to the Council and the European Parliament on Harmonization Requirements: Directive 96/92/EC concerning common rules for the internal market in electricity*, 16 April 99, page 10.

³⁹ *Conclusions of the Fifth Meeting of the European Electricity Regulation Forum*, Florence, 30-31 March 2000, pages 5-6.

⁴⁰ See http://www.europa.eu.int/comm/energy/en/tn_2_en.html

be enough transfer capacity. The Commission assumes that the private sector will invest in interconnection capacity when it is needed.⁴¹

It is possible that these issues will be simpler to resolve in non-EU countries because long-term transmission contracts are less common in the formerly socialist countries.

On its web site the ETSO publishes Available Transfer Capacity (ATC) for all EU countries, together with definitions of ATC, and there appears to be a consensus among European organizations that this information is accurate and useful. It would be useful to publish ATC for non-EU countries, according to the same procedures.

For the governments of Central Europe and Eurasia, the preparation of rules concerning access rights and congestion management will appear to be a "low-cost" activity. For example a government could give access rights to a small number of generating companies and large industrial customers, and manage congestion by rationing capacity, giving first priority to long-term bilateral agreements and second priority to the spot market. If the rules are unnecessarily restrictive, they will have a negative effect on economic development but they will not cause a direct expenditure from the state budget. On the other hand, investments in new interconnection capacity are obviously expensive. It is unlikely that Ministry energy strategies or five-year plans will result in any real investment. The financial resources can come only from electricity tariff increases or from long-term financing made by possible by long-term import and export agreements or by a very favorable financial outlook for interconnection projects.⁴²

There are two basic approaches to the problem of attracting new investment needed to remove capacity bottlenecks in transmission networks. The ownership structure of the transmission sector can take one of the following forms:

- *Monopoly.* The national transmission company may be given a long-term monopoly on the ownership of all existing and future transmission networks, so that no other company is permitted to construct interconnections or improvements to the horizontal network. This monopoly may be stated as a license condition, for example. However, the transmission company must also be given an obligation to construct transmission capacity to meet the needs of the electricity market, even if that new capacity will adversely affect a generating company or distribution network affiliated with the transmission company.
- *Multiple ownership.* The existing transmission company may be given ownership of the existing transmission network and the right to be a TSO, but the transmission company and other qualified companies and consortia may be given an opportunity to construct interconnections and

⁴¹ European Commission, *Second Report to the Council and the European Parliament on Harmonization Requirements*, 16 April 99, page 13.

⁴² To promote economic development the World Bank, the EBRD, and the Asian Development Bank may choose to approve loans for interconnection projects that are not backed by long-term import and export agreements. For such projects the forecast level of transmission service revenue would have to be high enough to persuade the banks that their financial risk will be acceptably small.

improvements to the horizontal network. In Europe it is normal to allow new consortia to own and construct undersea cables linking countries. The same principle could be applied to interconnections on land (for example, Lithuania-Poland). Any company that hopes to make a profit by removing a transmission capacity bottleneck will be invited to submit a license application. The result is that a country will have two or more transmission companies, but only one TSO.

The choice between these two options depends in part on the way citizens and customers regard the existing transmission company. If the company has failed to complete interconnections that were promised years ago, or if it has provided unreliable service, it has not "earned" the right to be a monopoly.

The rules for investments in new interconnection capacity must address four questions:⁴³

- *Planning.* Who should plan the new interconnections or the improvements to the horizontal network that are needed to support electricity trade? Who is responsible for transmission system planning when international trade is involved?
- *Approval.* What government agencies or institutions should approve plans for new interconnections or improvements to the horizontal network? Who should issue a license or permit to build new lines, cables, and substations?
- *Investment.* Who will be the owner(s) of the new interconnections or improvements to the horizontal network? Who is responsible for arranging sources of financing, managing the construction project, and owning the new assets?
- *Operation.* Who will be responsible for day-to-day operation and maintenance of the new interconnection? Although dispatch is the responsibility of the TSO, maintenance could be the responsibility of the owner of the interconnection (when an undersea cable or non-synchronous connection is involved, for example).

There is no question that tariff-setting will ultimately be the responsibility of the energy regulators. If the regulators are excluded from the planning and approval process, electricity customers will have a legitimate concern that they should not support tariff increases needed to pay for transmission investments that were never approved by the regulators. From the investor's point of view, therefore, it make sense to include regulatory agencies in the planning and approval process and not simply in the tariff approval process.

The Energy Charter Conference met in Brussels on 5 June 2000 and discussed a draft Energy Transit Protocol dealing with access rights to grids as well as pipelines. This

⁴³ Similar questions arise when new generating facilities are needed to provide ancillary services for the benefit of two or more countries.

document is not available on the Internet. The gas pipeline provisions deal with sensitive issues and therefore it might take a long time to negotiate this Protocol:

Among the key issues in the negotiations are the principle of non-discriminatory access to available transit capacity, prevention of unlawful taking of energy in transit, and transparent criteria for tariff-setting.⁴⁴

3.4.4 Rules for network service tariffs

At a minimum, the rules for international exchanges of electricity must include a definition of network service tariffs (see section 3.2.2) and a procedure to enable TSOs to recover the cost of cross-border transactions. The international rules should provide a commercial framework under which a qualified customer or distribution company in country A can purchase energy from a producer in country B. However, it is not necessary to establish a full set of market rules at the international level for all of the countries in Central Europe and Eurasia. Market rules can be developed at the national level or at the regional level. For example, consider the example of an international electricity market in countries A and B. There are three kinds of transactions:

- *Transactions among market participants other than TSOs.* Producers, qualified customers, distribution companies, and independent suppliers may participate in the spot market and may sign bilateral contracts. The buyers may purchase electric energy under bilateral contracts or from the spot market. Participants may also trade in futures and forwards⁴⁵ without making payments to TSOs. Distribution network users make payments for the use of distribution networks.
- *Payments made by transmission network users to their TSOs.* Transmission network users are the producers, distribution companies, and qualified customers with access to the transmission network (either through a direct connection to the high voltage grid or through the distribution network). Payment to a TSO gives the network user access rights to the combined transmission networks of A and B. Network users in country A pay the TSO in country A, and network users in country B pay the TSO in B.
- *Payments among TSOs.* The TSOs in A and B should make payments to each other so that the total amount of transmission service revenue collected by them is fairly distributed, given the costs incurred by the two TSOs.

The international rules must define the payments among TSOs and must identify the *regional network users* – the transmission and distribution network users who have access rights to the combined transmission and distribution networks of A and B. The

⁴⁴ Energy Charter Conference, *Charter News*, Issue No. 4 (Summer 2000), page 1.

⁴⁵ In a forward contract, the buyer agrees to sell energy to the seller and the period of delivery begins in the future (for example, a one-month period beginning 2 years from now). Both parties expect to see a physical delivery of energy. In a futures contract the potential buyer has an option to buy at some future date, or the potential seller has an option to sell at some future date. The parties to a futures contract are very interested in spot market prices but they do not really care how much energy is physically delivered.

list of regional network users will include producers, distribution companies or public utility suppliers,⁴⁶ large industrial customers, and perhaps independent electricity suppliers. The international rules must establish a single definition of network service for regional network users, and a single tariff structure. For example, the rules may state that every regional network user pays a monthly connection fee per kW and every purchaser pays an energy charge per kWh delivered to the customer. Countries A and B must have similar tariff methodologies defining the payments made by regional network users to their TSOs.

The *horizontal network* is the part of the transmission system which is used to transmit electricity between countries and within the country.⁴⁷ Ideally, the tariffs for access to the horizontal network in countries A and B should have not only a similar structure, but the same tariff level. In that way the horizontal network would be equally available to all regional network users without discrimination. The tariffs for access to distribution networks may vary from one location to another, according to the cost of distribution and the extent to which rural networks are cross-subsidized by urban networks (in accordance with policies established by the relevant Ministry and energy regulatory agency).

When a regional electricity market is just getting started, it is not necessary for the regional network users in A and B to have exactly the same tariffs for access to the horizontal network. The electricity market can begin to work even when users in country A have low-cost network service and users in B have high-cost network service. Once a decision is made to create a regional electricity market, however, the ultimate goal of regulators in A and B should be the harmonization of all rules and tariff methodologies concerning transactions between regional network users and their TSOs, and a common tariff for access to the horizontal network.

The international rules could be written so that transactions among market participants other than TSOs are based on different market rules in different countries or regions. Because the payments made by transmission network users to their TSOs should include an energy charge per kWh, the TSOs in each country will need to know how much energy was produced by each producer and how much was consumed by each transmission network user (distribution company or qualified customer). However, the terms and conditions of transactions among market participants other than TSOs, may be considered a "national" or "regional" issue.⁴⁸

⁴⁶ In most Central European countries the distribution company will have both a network service function and a supply function. However, it is possible to have completely separate companies - network service companies and public utility suppliers.

⁴⁷ See Appendix B for the definition issued by ETSO.

⁴⁸ A rough analogy could be made to mobile telephone networks. A mobile telephone user must pay a network service provider in his home country. If the customer is qualified to receive international service, he can travel from country to country without negotiating any agreements with network service providers outside his home country. The network service providers must compensate each other, and they all need to know which customers have paid for access to the international network, but each customer simply makes payments to his home network. There are no international rules about telephone rates to customers.

The European Energy Regulatory Forum is planning to implement a system of payments among TSOs in EU member countries, beginning 1 October 2000. The EU is trying to encourage cross-border trade and create a payment system that will be understood by the participants in the European electricity market. Organizations such as EFET are trying to improve the transparency of cross-border trade. Therefore it should be very easy for non-EU countries to learn from EU experience in setting up a system of payments among TSOs.

If the non-EU countries are able to harmonize their national and regional rules for transactions among market participants other than TSOs, the national and regional electricity markets will eventually merge into a kind of single market based on modified EU rules or non-EU rules.

Chapter 4. Role of the Energy Regulator and Others in Electricity Imports, Exports, and Transit

4.1 Energy regulator

4.1.1 National level and international level

Every energy regulator conducts activities that can be implemented at the national level. At the national level the regulator must comply with domestic laws and regulations but he is not obligated to implement international agreements. For example, the regulator listens to the concerns of regulated companies and consumers (and perhaps other interest groups such as potential investors and energy sector workers) and issues licenses and tariff decisions that affect the activity of regulated companies within the borders of one country. In Central Europe and Eurasia the regulated companies in the energy sector typically are legally registered and managed from offices located inside the country, and do not make investments outside the country. Therefore the regulator does not need to separate the “domestic” assets of the regulated company from its “foreign” assets and there company does not report income earned from foreign investments. However, the regulator has to address licensing and tariff issues related to export, import, and transit. For example if there is a vertically integrated company with a monopoly on export, import, and transit, the regulator may decide that the total cost of domestic electricity generation plus domestic network operation plus electricity import is borne by domestic customers, but these costs are offset by the total revenues earned from export sales and from transit service. Although the regulator collects information from a domestic company about revenues from international transactions, he approves a tariff based on national laws and regulations. This is an example of “national level” activity.

To facilitate international electricity trade, however, an energy regulator should also conduct activities that can be implemented at the international level. The regulator may have one or more of the following responsibilities:

- To interpret and enforce the terms of international agreements, such as the Energy Charter Treaty, that have been signed by the regulator’s country
- To negotiate agreements with other regulators and participate in negotiations with other countries so that regional or international electricity and gas markets will be properly regulated
- *[For countries invited to join the EU]* To prepare for EU accession by interpreting and enforcing the Electricity Directive and other regulations concerning the internal market for electricity
- *[For countries invited to join the EU]* To participate in one or more chapters of the screening exercise under which the European Commission evaluates the readiness of countries for accession.

Activities at the international level are not based on domestic laws and regulations. For example, it is impossible to measure ATC at the national level, with a single TSO. One

of the principles of ATC measurement is that at each national border, estimates of transfer capacity for must be collected from both TSOs and compared.

Most energy regulators in Central Europe and Eurasia today lack the explicit legal authority to play a regulatory role on the international level. Because their budgets and resources are small, some regulators may allow Ministries and TSOs to take the lead in international activity. However, a strong regulator is perceived by foreign investors, international financial institutions, and the EU as an essential part of the development of competitive electricity markets. This point is particularly important for the regulators in countries that have applied for EU accession and started the screening process on Chapter 14, Energy.⁴⁹ If the country has formed a regulatory agency it will be practically impossible for the government to negotiate the energy chapter of the screening exercise without involving the regulator in the process.

Under international law the actions of a regulator are subject to international agreements, such as the Energy Charter Treaty, that have been signed by the regulator's country. Although the energy regulator may be independent in the sense that he is "above" national political influence, the regulator is "below" the authorities that enforce the Energy Charter Treaty and other international agreements affecting the energy sector. Therefore it would be logical for the regulator to have some responsibility to interpret and enforce the terms of these agreements.

In principle, an international legal framework or some form of international cooperation might be needed to ensure that companies or divisions under the regulator's jurisdiction (for example, distribution and transmission) are properly separated from companies or divisions that are unregulated (for example, generation and supply) or located in another country.⁵⁰ In practice, regulators in Central Europe and Eurasia try to deal with this issue at the national level. The possibility that a regulated company will shift profits to an unregulated business through transactions with an offshore company is a more serious question in the natural gas import/export business than in electricity import/export, but it may become an issue when the supply business is deregulated. The proposal to include "transparent criteria for tariff-setting" in the Energy Charter Transit Protocol indicates a possibility that this issue will be addressed by the Energy Charter Conference.

4.1.2 Activities that can be implemented at the national level

In some countries the legal framework requires the energy regulator to "share" licensing authority or tariff-setting and pricing authority (for example, regulation of prices charged by independent power producers) with Ministries and other agencies. Under ideal conditions, however, the energy regulator has full responsibility for licensing and tariff activities described in section 3.2.2 including:

⁴⁹ The home page for the enlargement process is <http://www.europa.eu.int/comm/enlargement>

⁵⁰ For information on how the EU competition rules are enforced in the power sector, see Angel Tradedete, *The Role of EC Competition Policy in the Liberalization of EU Energy Markets*, download file [sp2000_003_en.pdf](http://www.europa.eu.int/comm/energy/index_en.html) from http://www.europa.eu.int/comm/energy/index_en.html

- Licensing of all participants in the domestic market, including participants in export, import, and transit agreements.
- Setting license conditions designed to establish the reliability and quality of electric service to domestic and international customers
- Approving the definition of network service
- Approving the structure of the network service tariff and the level of network service tariffs
- Developing electricity tariff methodologies to ensure that the allocation of transmission costs and the allocation of generating costs and the allocation of the cost of ancillary services (including capacity reserves) is fair to domestic consumers
- Developing guidelines for confidentiality of information contained in license applications and tariff applications.

The energy regulator should also advise the Government on the policy and legal framework for the electricity market. The regulator should have an opportunity to participate in drafting energy sector legislation and commenting on draft laws. The regulator should participate in the development of a national strategy on how to achieve an electricity market that is truly competitive, and how to strengthen competition (see section 3.1). If the legislative framework does not contain a timetable for providing different categories of customers with open access to the transmission network, then this timetable will need to be set by someone else, possibly the regulator and/or the institution responsible for the energy sector.

Market rules may be developed at the regional level or the national level, depending on the choice among alternative strategies for participation in an international electricity market. If market rules and the grid code are developed at the national level, there should be a working group in which the regulator is a participant. In any case the draft market rules and the grid code should be submitted to the regulator for approval.

A number of entities, at the national and international level, may be involved in developing guidelines for access to information regarding confidentiality of contracts and other documents. For example, a stock exchange issues regulations that give buyers and sellers of stock (in effect, everyone) access to financial information about the companies whose shares are traded on the exchange. The issue of confidentiality should be covered by electricity market rules, which should be subject to regulatory approval. Normally an electricity exchange gives buyers and sellers access to information about closing prices but not individual bids. The regulator should establish guidelines regarding the confidentiality of documents that are prepared for license and tariff applications and are not required for any other purpose.

4.1.3 Activities that can be implemented at the international level

The rules for international exchanges of electricity include three major components:

- Rules needed to protect grid stability

- Rules needed to define access rights to networks, to select methods of managing congestion, and to assign responsibility for planning and investments in new interconnection capacity
- Rules for network service tariffs, including payments among TSOs and payments made by transmission network users to their TSOs.

Because there needs to be a harmonization of the legal and regulatory framework and electricity market structures among all countries participating in international electricity trade, there is a need for international cooperation to develop modified EU rules or new, non-EU rules (see section 3.4.1). The role of the regulator varies, depending on the type of rules to be developed:

- *Grid stability.* This is a task for TSOs and there is no need for the regulator to get involved except to ensure that the TSOs do not use these rules to restrict the development of a competitive electricity market.
- *Access rights, congestion, interconnection.* These questions must be discussed by Ministries, regulators, and TSOs at the international level. The regulators from individual countries have an advisory role. An international agreement could give authority to publish Available Transfer Capacities to an entity such as ETSO. An international treaty could be used to create a single regulatory authority that is “above” the national regulators; although this approach was chosen by the EU, it might not be practical for the non-EU countries.
- *Network service tariffs.* The rules defining payments among TSOs and payments made by transmission network users to their TSOs should be resolved by cooperation among national regulators. Tariff issues are best addressed by regulators rather than Ministries. Ideally a single set of rules could be established through cooperation among all the countries of Central Europe and Eurasia. The rules defining transactions among market participants other than TSOs can be established in each country at the national level, or established in regional electricity trading arrangements.

4.2 Ministry

In every country there is one ministry with primary responsibility for the electric sector, and in some countries this ministry is also regarded as the “owner” of power sector assets. It may be a Ministry of Economy, Ministry of Energy, or Ministry of Industry and Trade. This Ministry should play a key role in developing the policy framework for the electricity market. For example, the Ministry has primary responsibility for drafting energy sector legislation and commenting on draft laws. The Ministry should also take the lead in developing a national strategy on how to achieve an electricity market that is truly competitive. If the legislative framework does not contain a timetable for providing different categories of customers with open access to the transmission network, then the Ministry should take the lead.

Unless an independent TSO has already been formed, the Ministry will play a key role in establishing a TSO either as an independent company or as a daughter company in

which the management of the TSO is not controlled by the holding company. If market rules and the grid code are developed at the national level, the working group may be led by the Ministry and at a minimum the Ministry should be a participant. The Ministry should support domestic power sector reform to facilitate competition, including competition for exports and imports. Government policy in the electric sector should encourage a transition toward electricity trade among companies or commercialized enterprises and away from trade based on government-to-government involvement. Design of the reformed power sector should consider the historical government control of transmission and dispatch operations for political purposes.

The Ministry conducts activities that can be implemented at the international level and has several responsibilities in the electricity sector:

- To interpret and enforce the terms of international agreements, such as the Energy Charter Treaty, that have been signed by the Ministry's country
- To participate in negotiations with other countries to establish regional electricity markets
- *[For countries invited to join the EU]* To prepare for EU accession by interpreting and enforcing the Electricity Directive and other regulations concerning the internal market for electricity
- *[For countries invited to join the EU]* To participate in one or more chapters of the screening exercise under which the European Commission evaluates the readiness of countries for accession.

In the development of rules for international exchanges of electricity, the Ministries of different countries can play a key role in drafting the rules that define access rights to networks. The role of the Ministries may be summarized as follows:

- *Grid stability.* There is no need for Ministry involvement because this is a task for TSOs in cooperation with international associations such as UCTE and Nordel.
- *Access rights, congestion, interconnection.* The Ministries of non-EU countries need to establish a forum for resolution of these issues at the international level, and then invite regulators and TSOs to participate. Because decisions concerning interconnection (or disconnection) with neighbor countries involve energy security, it is appropriate for Ministries to make policy recommendations and participate in bilateral negotiations on new interconnections.
- *Network service tariffs.* Ministries may be involved in establishing an international forum for discussion of these issues, but tariff issues are best addressed by regulators.

In some countries the Ministry may collect and disseminate data on electricity sector statistics, including export, import, and transit, but this role is not essential; the task of data collection and dissemination may be given to an international organization such as UCTE.

4.3 Transmission System Operator

The TSO should have the primary responsibility to prepare a Grid Code. If the TSO is organized as an independent company it should also have input into the preparation of Market Rules. One of the difficulties facing regulators in Central Europe and Eurasia, however, is the fact that in many countries the TSO is part of a vertically integrated company or has a management that is controlled by a holding company with generation and distribution assets. If the TSO is not independent, and if Market Rules must be prepared at the national level, the rules can be prepared by a Ministry or regulatory body with assistance from foreign advisors. If Market Rules must be prepared at the regional level it is possible to establish a working group in which TSOs, regulators, and ministries are represented.

TSOs should play a key role in developing rules for international exchanges of electricity:

- *Grid stability.* These rules should be developed by TSOs and made available on the Internet.
- *Access rights, congestion, interconnection.* These questions must be discussed by TSOs together with Ministries and regulators. The data needed to calculate Available Transfer Capacities must be provided by TSOs to an international entity such as ETSO.
- *Network service tariffs.* An international organization representing TSOs should prepare draft rules defining payments among TSOs, and submit the draft rules to a council representing the national regulators. On the basis of information provided by ETSO and the European Electricity Regulation Forum, the council of national regulators should draft rules for payments made by transmission network users to their TSOs. The TSOs should have an opportunity to comment on these draft rules before they are finally approved.

Because ETSO is already established and has experience with these issues, it would be logical for ETSO to either expand its membership to non-EU countries or form a sister organization with the participation of UCTE and all of its non-EU members.

TSOs are the key players in the day-to-day operation of an international electricity market. Once the rules for international exchanges of electricity are approved, it is largely up to the TSOs to implement cross-border transactions.

GLOSSARY OF TERMS USED BY THE EXPORT IMPORT WORKING GROUP

Term	Definition	Proposed by -
Electricity trade	Scheduled flows of active power between two countries or among three or more countries, and payment for imported energy and transit services based on signed contracts for electricity export, import, and transit.	Zimmermann
Electricity transit	Scheduled flows of active power among three or more countries, based on an agreement in which at least one of the countries is neither an exporter nor an importer. The country which neither exports nor imports power, under the agreement, is a transit country and is compensated for making possible the physical flows of energy necessary for other countries to export or import power. Electricity transit is one form of <i>electricity trade</i> .	Zimmermann
Swap agreement	An international agreement to provide <i>electricity transit</i> services which are defined by the delivery and receipt of energy at national borders, regardless of physical flows within the transit country. For example, if transit country A receives electricity from B and delivers it to C, a swap agreement enables A to collect payment for transit service even when there is no physical flow of electrons from B to C.	Manecuta and Zimmermann
Bilateral contract	Any contract which is signed by only two parties. Such a contract may include a description of services to be provided by a third party, which did not sign the agreement.	Manecuta and Zimmermann
Open access	Any procedure approved by the government of a country or a group of countries, which enables electricity producers and consumers to negotiate contracts with each other.	Zimmermann
Producer	(a) an independent company that generates electricity and has no transmission or distribution activities or (b) an undertaking that generates electricity and is independent, in management and accounting terms, from undertakings involved in transmission and distribution activity.	Manecuta and Zimmermann (based on Directive 96/92/EC)
Grid Code	A document containing the minimum technical rules for connection to the network and maintenance of network stability, security and reliability, mandatory for all market participants. This document must be prepared by a transmission system operator and approved by a regulatory body (independent regulatory agency or ministry) representing the government of the country in which the TSO is located.	Manecuta and Zimmermann
Market Rules	A document containing rules for the operation of an open electricity market. This document must be prepared by a committee representing the interests of different market participants, and must be approved by the regulatory bodies (independent regulatory agency or ministries or both) representing the governments of all of the countries in which the electricity market is located. If the electricity market exists in only one country then it is approved by only one regulatory body.	Manecuta and Zimmermann

Term	Definition	Proposed by -
Open electricity market	An electricity market with open access.	Manecuta and Zimmermann

**GLOSSARY OF TERMS USED IN THE EU ELECTRICITY DIRECTIVE,
REPORTS ISSUED BY THE EUROPEAN TRANSMISSION SYSTEM
OPERATORS,
THE STATISTICAL YEARBOOK OF THE UCTE,
AND THE ENERGY CHARTER TREATY**

Term	Definition	Source of definition
Generation	The production of electricity	Directive 96/92/EC
Producer	A natural or legal person generating electricity	Directive 96/92/EC
Autoproducer	A natural or legal person generating electricity essentially for his own use	Directive 96/92/EC
Independent producer	(a) a <i>producer</i> who does not carry out electricity transmission or distribution functions in the territory covered by the system where he is established; (b) in [EU] Member States in which vertically integrated undertakings do not exist and where a tendering procedure is used, a <i>producer</i> corresponding to the definition of point (a), who may not be exclusively subject to the economic precedence of the interconnected system	Directive 96/92/EC
Transmission	The transport of electricity on the high-voltage <i>interconnected system</i> with a view to its delivery to final customers or to distributors	Directive 96/92/EC
Distribution	The transport of electricity on medium-voltage and low-voltage distribution systems with a view to its delivery to customers	Directive 96/92/EC
Customers	Wholesale or final customers of electricity and distribution companies	Directive 96/92/EC
Wholesale customers	Any natural or legal persons, if the Member States recognize <i>their existence</i> , who purchase or sell electricity and who do not carry out transmission, generation or distribution functions inside or outside the system where they are established	Directive 96/92/EC
Final customer	A customer buying electricity for his own use	Directive 96/92/EC
Interconnectors	Equipment used to link electricity systems	Directive 96/92/EC
Interconnected system	A number of transmission and distribution systems linked together by means of one or more <i>interconnectors</i>	Directive 96/92/EC
Direct line	An electricity line complementary to the <i>interconnected system</i>	Directive 96/92/EC
Economic precedence	The ranking of sources of electricity supply in accordance with economic criteria	Directive 96/92/EC
Ancillary services	All services necessary for the operation of a transmission or distribution system	Directive 96/92/EC

Term	Definition	Source of definition
System user	Any natural or legal person supplying to, or being supplied by, a transmission or distribution system	Directive 96/92/EC
Supply	The delivery and/or sale of electricity to customers	Directive 96/92/EC
Integrated electricity undertaking	A vertically or horizontally integrated undertaking	Directive 96/92/EC
Vertically integrated undertaking	An undertaking performing two or more of the functions of generation, transmission and distribution of electricity	Directive 96/92/EC
Horizontally integrated undertaking	An undertaking performing at least one of the functions of generation for sale, or transmission or distribution of electricity, and another non-electricity activity	Directive 96/92/EC
Tendering procedure	The procedure through which planned additional requirements and replacement capacity are covered by supplies from new or existing generating capacity	Directive 96/92/EC
Long-term planning	The planning of the need for investment in generation and transmission capacity on a long-term basis, with a view to meeting the demand for electricity of the system and securing supplies to customers	Directive 96/92/EC
Single buyer	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	Directive 96/92/EC
Small isolated system	Any system with consumption of less than 2500 GWh in the year 1996, where less than 5 % of annual consumption is obtained through interconnection with other systems	Directive 96/92/EC
Regulated third party access	A regulated system of access procedure, giving eligible customers a right of access, on the basis of published tariffs for the use of the transmission and distribution systems, that is at least equivalent, in terms of access to the system, to the negotiated access procedure and the single buyer procedure described in Chapter VII of Directive 96/92/EC.	Directive 96/92/EC (wording based on Article 17, paragraph 4)
Qualified customers	<i>Customers</i> who have the legal capacity to conclude supply contracts with supply undertakings, in accordance with Articles 17 and 18 of Directive 96/92/EC. Each Member State shall publish by 31 January each year the criteria for the definition of qualified customers inside the territory of that Member State.	Directive 96/92/EC (wording based on Article 19, paragraphs 3 and 4)
Eligible customers	<i>Qualified customers</i>	Directive 96/92/EC

Term	Definition	Source of definition
Offsetting or superimposing counterdirected flows	If over an electricity line between A and B one contract is concluded to transport e.g. 100 MW in direction A and a second contract over the same time is concluded to transport e.g. 80 MW in direction B, then only 20 MW have to be physically transported in direction A. Thus, counterdirected contractual flows can be superimposed in order to cancel each other out. Consequently, the contractual capacity of an electricity line can be significantly higher than its physical capacity.	2 nd Harmonization Report on 96/92/EC
Dispatching of generation	As the total capacity of power plants is not necessary to cover electricity demand, except during absolute peak hours, some mechanism has to be set up to decide which power plant should operate and which plant should be idle or on stand by. The selection or drawdown of the power plants for generation is called dispatching. Usually, it is the independent system operator that makes this decision according to objective and non-discriminatory criteria (merit order).	2 nd Harmonization Report on 96/92/EC (Annex: Definitions)
Countertrading	If despite superimposing of counterdirected flows the resulting physical flow reaches the capacity of the transmission line, a situation of congestion or bottleneck exists in the resulting direction. Any further contractual transaction in the congested direction can only be carried out, if at the same time e.g. the system operator arranges a corresponding contractual flow in the opposite direction. To achieve this the system operator has to purchase or sell electricity from generators, or even consumers, that are willing to increase or decrease generation/consumption.	2 nd Harmonization Report on 96/92/EC (Annex: Definitions)
Redispatching	This is an alternative to resolve an existing bottleneck, similar to <i>countertrading</i> . In case of redispatching the system operators of the concerned areas do not engage in offsetting trading contracts, but directly change the dispatching order of the power plants to create overall electricity flows which remain within the limits of the transport line constraints.	2 nd Harmonization Report on 96/92/EC. See also ETSO, <i>Evaluation of congestion management methods for cross-border transmission</i>
Market splitting	This is another alternative to deal with a bottleneck, usually applicable in systems which already have a common spot market. As a reaction to the occurrence of congestion, the market operators provide for the possibility that there are different spot market prices on either side of the bottleneck. Thus, electricity in the area which is oversupplied becomes cheaper than electricity in the undersupplied area. Consequently fewer market participants are interested to purchase from the area which becomes more expensive, and the resulting flow over the bottleneck is reduced.	2 nd Harmonization Report on 96/92/EC (Annex: Definitions). See also ETSO, <i>Evaluation of congestion management methods for cross-border transmission</i>
Transaction oriented tariff	Equivalent to <i>point-to-point tariff</i> , this method of tariffication calculates a transmission fee on the basis of information about entry point (<i>source</i>) and exit point (<i>sink</i>) of the electricity contract. Thus, if an eligible customer shifts from supplier A to supplier B, the parties would have to recalculate the transmission fee depending on the location of the new supplier.	2 nd Harmonization Report on 96/92/EC (Annex: Definitions)

Term	Definition	Source of definition
Non transaction oriented tariff	Equivalent to <i>point of connection tariff</i> or <i>nodal tariff</i> , this tariffication methodology divides the overall transmission system costs exclusively to separate connection fees (or network access fees) for the producer and the consumer. Thus, the connection fee for an eligible customer remains the same, irrespective of a change of supplier.	2 nd Harmonization Report on 96/92/EC (Annex: Definitions)
Point-to-point tariff	Transaction oriented tariff	2 nd Harmonization Report on 96/92/EC
Point of connection tariff	Non transaction oriented tariff	2 nd Harmonization Report on 96/92/EC
Nodal tariff	Non transaction oriented tariff	2 nd Harmonization Report on 96/92/EC
Counterdirected flows	Offsetting or superimposing counterdirected flows	2 nd Harmonization Report on 96/92/EC
Total Transfer Capacity (TTC)	The maximum feasible power exchange which can be transmitted between the systems A and B reliably and without affecting the system security.	ETSO, <i>NTC and ATC in the Internal Market of Electricity in Europe</i>
Transmission Reliability Margin (TRM)	A portion of <i>Total Transfer Capacity</i> that is reserved to cover the forecast uncertainties or tie-line power flows due to imperfect information from market players and unexpected real time events.	ETSO, <i>NTC and ATC in the Internal Market of Electricity in Europe</i>
Net Transfer Capacity (NTC)	<i>Total Transfer Capacity</i> minus <i>Transmission Reliability Margin</i> : $NTC = TTC - TRM$	ETSO, <i>NTC and ATC in the Internal Market of Electricity in Europe</i>
Notified Transmission Flow (NTF)	In a studied time frame, the portion of <i>Net Transfer Capacity</i> that is occupied by already accepted transfer contracts	ETSO, <i>NTC and ATC in the Internal Market of Electricity in Europe</i>
Available Transfer Capacity (ATC)	<i>Net Transfer Capacity</i> minus <i>Notified Transmission Flow</i> : $ATC = NTC - NTF$	ETSO, <i>NTC and ATC in the Internal Market of Electricity in Europe</i>
Horizontal Network	That part of the transmission system which is used to transmit electricity between countries and within the country. It contains the transmission system elements that are influenced significantly by cross-border exchanges.	ETSO, <i>Cross-border Tariffs for the Internal Market of Electricity in Europe</i>
Vertical Network	That part of the transmission system which is used to provide access of the generation to the Horizontal Network and provide access of the load to the Horizontal Network	ETSO, <i>Cross-border Tariffs for the Internal Market of Electricity in Europe</i>

Term	Definition	Source of definition
Imports/exports (GWh)	Values that take into account the physical exchanges on the cross-frontier transmission lines, but in addition also exchange values on lines ≤ 110 kV outside of the interconnected transmission system and on the other hand values resulting with regard to international contracts (water claim). For presenting the operation of the interconnected transmission system only interconnected transmission lines, which are registered in these terms, are taken into consideration.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 2.15)
Electrical energy supplied to the network (GWh)	Energy that has to be delivered to ensure the required supply to meet the <i>national electrical consumption</i> . In the special case of a national network this is equal to the sum of the net electrical energy supplied by all power stations within the country, reduced by the amount used simultaneously for pumping and reduced or increased by exports to or imports from abroad.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 2.3)
Own consumption (GWh)	The electricity absorbed by the auxiliaries of the power stations and the losses in the main transformers of the power stations, and that consumed for pumping and the network losses. These consumptions are commonly called "consumptions of the electricity sector."	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 2.1)
Electrical energy absorbed by pumping (GWh)	The electrical energy absorbed by the motor-pumps in raising the water into the upper reservoir for the generation of electrical energy. It should include the electrical energy consumed by the auxiliary equipment and transformer losses during pumping.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 2.4)
National net electrical consumption (GWh)	The sum of: (1) the amount of electrical energy supplied by the electricity service utility to ultimate consumers of the network under consideration, (2) the amount of net electrical energy produced or directly imported from abroad by industrial or commercial concerns on the network and used directly for their own needs or to directly supply ultimate consumers, and (3) the amount of electrical energy consumed by establishments (offices, workshops, warehouses etc.) of the electricity service utilities, but excluding the electricity absorbed by the auxiliaries of the power stations and the losses in the main transformers of the power stations, and that consumed for pumping and the network losses.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 2.1)
Network losses (GWh)	The network losses occurring in transmission and distribution networks are calculated as the difference between the <i>electrical energy supplied to the network</i> and the <i>net electrical consumption</i> .	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 2.18)
National electrical consumption (GWh)	<i>National net electrical consumption plus network losses.</i>	UCTE, <i>Statistical Yearbook 1998</i> (wording based on Terminology paragraph 2.2)
Physical load flow between neighbor countries (MW)	The balance of the physical load flows, measured at 3 and 11 a.m. (Central European Time) at the cross-frontier substations of transmission lines (≥ 110 kV). In general, a unique metering point is used, in agreement between the partners.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 3.6)

Term	Definition	Source of definition
Contractual net balance of exchanges (MW)	The difference between the contractual power from other countries (import) and the contractual power to other countries (export). These values include only medium-term and long-term exchange contracts with firm dispatchability of power during the high load hours. Contributions from power stations with joint operation are regarded as contractual power from other countries or to other countries. In any case of indispatchability of contractual power from other countries or to other countries, whatever the reason may be, it must not be taken into account within the contractual exchanges. The total of contractual exchanges represents the exchange balance with third countries.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 3.9)
Operating transmission line	An internal 400 kV network connection of a country, and/or an interconnected line ≥ 100 kV.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 4.9)
Interconnection	A connection (lines, cables and equipment, including transformers, etc.) that may be used to convey electrical energy in either direction between networks, between power stations, or between power stations and networks. An interconnection may exist within the limits of a single undertaking or among several undertakings, within one geographical area or among several geographical areas, within one country or among several countries.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 4.10)
Interconnected network	All <i>interconnected lines</i> , without regard to voltage, included within the limits of a single undertaking or among several undertakings, within one geographical area or among several geographical areas, within one country or among several countries.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 4.10)
Interconnected line	A line providing an <i>interconnection</i> .	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 4.10)
Interconnected countries	Countries that are linked together by one or more <i>interconnections</i> .	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 4.10)
Networks in parallel	Interconnected networks functioning in synchronism, which is the usual condition.	UCTE, <i>Statistical Yearbook 1998</i> (Terminology paragraph 4.10)
Transit of electricity	A transaction for the transport of electricity under the following conditions: (a) transmission is carried out by the entity or entities responsible in each Member State for a high-voltage electricity grid, with the exception of distribution grids, in a Member State's territory which contributes to the efficient operation of European high-voltage interconnections; (b) the grid of origin or final destination is situated in the Community; (c) the transport involves the crossing of one intra-Community frontier at least.	Directive 90/547/EEC on the transit of electricity through transmission grids

Term	Definition	Source of definition
Transit of energy materials and products	(i) The carriage through the <i>Area</i> of a <i>Contracting Party</i> , or to or from port facilities in its <i>Area</i> for loading or unloading, of Energy Materials and Products originating in the <i>Area</i> of another state and destined for the <i>Area</i> of a third state, so long as either the other state or the third state is a <i>Contracting Party</i> ; or (ii) the carriage through the <i>Area</i> of a <i>Contracting Party</i> of Energy materials and Products originating in the <i>Area</i> of another <i>Contracting Party</i> and destined for the <i>Area</i> of that other <i>Contracting Party</i> , unless the two <i>Contracting Parties</i> concerned decide otherwise and record their decision by a joint entry in Annex N of the Energy Charter Treaty.	Energy Charter Treaty (Article 7, paragraph 10)
Contracting Party	A state or <i>Regional Economic Integration Organization</i> which has consented to be bound by the Energy Charter Treaty and for which the Treaty is in force.	Energy Charter Treaty (Article 1, paragraph 2)
Area	<p>With respect to a state that is a <i>Contracting Party</i>: (a) the territory under its sovereignty, it being understood that territory includes land, internal waters and the territorial sea; and (b) subject to and in accordance with the international law of the sea: the sea, sea-bed and its subsoil with regard to which that <i>Contracting Party</i> exercises sovereign rights and jurisdiction.</p> <p>With respect to a <i>Regional Economic Integration Organization</i> which is a <i>Contracting Party</i>: the Areas of the member states of such Organization, under the provisions contained in the agreement establishing that Organization.</p>	Energy Charter Treaty (Article 1, paragraph 10)
Regional Economic Integration Organization	An organization constituted by states to which they have transferred competence over certain matters a number of which are governed by the Energy Charter Treaty, including the authority to take decisions binding on them in respect of those matters.	Energy Charter Treaty (Article 1, paragraph 3)

Additional definitions may be found in UCTE, *Statistical Yearbook 1998* (Terminology).

Appendix D

Information About the Energy Charter Treaty:

List of Signatories and Status of Ratification

The table on the following page is an excerpt of the Energy Charter Treaty and Related Documents (at page 130). The tables on Status of Ratification were downloaded directly from <http://www.encharter.org> "Latest news and background."

The full text of the Energy Charter Treaty and Related Documents can be obtained from <http://www.encharter.org> by selecting "Full text of official documents adopted by the Energy Charter Conference" and then "Download the Treaty (Zipped Word version)."

The texts or excerpts of the Energy Charter Treaty and Related Documents may be copied freely or used as part of reports, contracts, descriptions of the Treaty and similar documents, provided reference is made that the material used is "an excerpt of the Energy Charter Treaty and Related Documents" published by:

The Energy Charter Secretariat
Boulevard de la Woluwe, 56
B-1200 Brussels
Belgium

**SIGNATORIES TO THE EUROPEAN ENERGY CHARTER
AS OF 1st OCTOBER 1996**

	<i>FA</i>	<i>ECT</i>	<i>P</i>		<i>FA</i>	<i>ECT</i>	<i>P</i>
The Republic of Albania	●	●	▲	The Republic of Kyrgyzstan	●	●	●
The Republic of Armenia	●	●	●	The Republic of Latvia	●	●	●
Australia	●	●	●	The Principality of Liechtenstein	●	●	●
The Republic of Austria	●	●	●	The Republic of Lithuania	●	▲	▲
The Azerbaijani Republic	●	●	●	The Grand Duchy of Luxembourg	●	●	●
The Kingdom of Belgium	●	●	●	The Former Yug. Republic of Macedonia	✓	✓	✓
The Republic of Belarus	●	●	●	The Republic of Malta	●	●	●
The Republic of Bosnia-Herzegovina	▲	▲	▲	The Republic of Moldova	●	●	●
The Republic of Bulgaria	●	●	●	The Kingdom of the Netherlands	●	●	●
Canada	×	×	×	The Kingdom of Norway	●	▲	▲
The Republic of Croatia	●	●	●	The Republic of Poland	●	●	●
The Republic of Cyprus	●	●	●	The Portuguese Republic	●	●	●
The Czech Republic	●	▲	▲	Romania	●	●	▲
The Kingdom of Denmark	●	●	●	The Russian Federation	●	●	●
The Republic of Estonia	●	●	●	The Slovak Republic	●	●	●
The European Communities	●	●	●	The Republic of Slovenia	●	●	●
The Republic of Finland	●	●	●	The Kingdom of Spain	●	●	●
The French Republic	●	●	●	The Kingdom of Sweden	●	●	●
The Republic of Georgia	●	●	●	The Swiss Confederation	●	●	●
The Federal Republic of Germany	●	●	●	The Republic of Tajikistan	●	●	●
The Hellenic Republic	●	●	●	The Republic of Turkey	●	●	●
The Republic of Hungary	●	▲	▲	Turkmenistan	▲	▲	▲
The Republic of Iceland	●	●	●	Ukraine	●	●	●
Ireland	●	●	●	The United Kingdom of Great Britain and Northern Ireland	●	●	●
The Italian Republic	●	●	●	The United States of America	×	×	×
Japan	●	▲	▲	The Republic of Uzbekistan	▲	▲	▲
The Republic of Kazakhstan	●	●	●				

Notes

FA: Final Act of the European Energy Charter Conference

ECT: Energy Charter Treaty

P: Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects

● signed at the Lisbon Signature Ceremony on 17 December 1994

▲ signed in accordance with Article 38 of the Energy Charter Treaty or Article 14 of the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (i.e. from 17 December 1994 to 16 June 1995)

× did not sign

✓ in the process of acceding

STATUS OF RATIFICATION

Contracting Parties to the Energy Charter Treaty (dates of Treaty's entry into force) as of 12 May 2000

16.04.1998	Austria Azerbaijan Bulgaria Croatia Cyprus Czech Republic Denmark European Communities Finland Georgia Germany Greece Italy Kazakhstan Kyrgyzstan Latvia Liechtenstein Luxemburg Moldova Netherlands Portugal Romania Slovakia Slovenia Spain Sweden Switzerland Tajikistan Turkmenistan United Kingdom Uzbekistan
19.04.1998	Armenia
13.05.1998	Albania
25.06.1998	The Former Yugoslav Republic of Macedonia
07.07.1998	Hungary
02.08.1998	Estonia
06.08.1998	Belgium
13.12.1998	Lithuania
27.01.1999	Ukraine
14.07.1999	Ireland
27.12.1999	France
17.02.2000	Mongolia

STATUS OF RATIFICATION

Status of ratification of the Energy Charter Treaty, 26 July 2000

I. Energy Charter Signatories which have deposited instruments of ratification/accession of the Treaty with the Depositary:

1	12.07.1995	Georgia
2	16.10.1995	Slovakia
3	15.01.1996	Latvia
4	12.03.1996	Uzbekistan
5	17.06.1996	Czech Republic
6	22.06.1996	Moldova
7	06.08.1996	Kazakhstan
8	19.09.1996	Switzerland
9	15.11.1996	Bulgaria
10	25.06.1997	Tajikistan
11	07.07.1997	Kyrgyzstan
12	17.07.1997	Turkmenistan
13	12.08.1997	Romania
14	04.09.1997	Greece
15	10.09.1997	Slovenia
16	27.11.1997	Luxemburg
17	09.12.1997	Croatia
18	12.12.1997	Liechtenstein
19	16.12.1997	Austria
20	16.12.1997	Denmark
21	16.12.1997	Finland
22	16.12.1997	Germany
23	16.12.1997	Italy
24	16.12.1997	Netherlands
25	16.12.1997	Portugal
26	16.12.1997	Spain
27	16.12.1997	Sweden
28	16.12.1997	United Kingdom
	16.12.1997	European Communities
29	23.12.1997	Azerbaijan
30	16.01.1998	Cyprus
31	19.01.1998	Armenia
32	12.02.1998	Albania
33	27.03.1998	The Former Yugoslav Republic of Macedonia
34	08.04.1998	Hungary
35	04.05.1998	Estonia
36	08.05.1998	Belgium
37	14.09.1998	Lithuania
38	29.10.1998	Ukraine
39	15.04.1999	Ireland
40	28.09.1999	France
41	19.11.1999	Mongolia

STATUS OF RATIFICATION

Status of ratification of the Energy Charter Treaty, 26 July 2000

II. Charter Signatories which have not yet deposited instruments of ratification/accession of the Treaty with the Depositary:

- a. and the Parliaments of which have approved ratification of the Treaty**
 - 42 Turkey
 - 43 Bosnia And Herzegovina*
 - 44 Poland
- b. and the Parliaments of which have not approved ratification of the Treaty**
 - 45 Australia
 - 46 Belarus*
 - 47 Iceland
 - 48 Japan
 - 49 Malta
 - 50 Norway
 - 51 Russian Federation*

* apply the Treaty provisionally

COUNTRIES IN CENTRAL AND EASTERN EUROPE AND EURASIA

Country	Neighbor countries	EU accession status	Located on the eastern border of EU today	Border of EU after 1 st & 2 nd tier accession	Memberships	Regional Energy Regulatory Program	Export Import Working Group
Northern Europe region							
Czech Republic	Germany, Poland, Slovak R., Austria	1 st tier	Yes	No	UCTE, Centrel, CDO	Observer	No
Estonia	<i>Russia, Latvia</i>	1 st tier	No	Yes	DC Baltija	Yes	Yes
Hungary	<i>Slovak R., Ukraine, Romania, F.R.Yugoslavia, Croatia, Slovenia, Austria</i>	1 st tier	Yes	Yes	UCTE, Centrel, CDO	Yes	Yes
Latvia	<i>Estonia, Russia, Belarus, Lithuania</i>	2 nd tier	No	Yes	DC Baltija	Yes	Yes
Lithuania	<i>Latvia, Belarus, Poland, Russia</i>	2 nd tier	No	Yes	DC Baltija	Yes	Yes (invited)
Poland	<i>Russia, Lithuania, Belarus, Ukraine, Slovak R., Czech R., Germany</i>	1 st tier	Yes	Yes	UCTE, Centrel, CDO	Yes	No
Slovak Republic	<i>Poland, Ukraine, Hungary, Austria, Czech R.</i>	2 nd tier	Yes	Yes	UCTE, Centrel	Observer	No
Southern Europe region							

COUNTRIES IN CENTRAL AND EASTERN EUROPE AND EURASIA

Country	Neighbor countries	EU accession status	Located on the eastern border of EU today	Border of EU after 1 st & 2 nd tier accession	Memberships	Regional Energy Regulatory Program	Export Import Working Group
Albania	<i>F.R. Yugoslavia, F.Y.R. Macedonia, Greece</i>	Not an applicant	Yes	Yes	Thessaloniki REM	Observer	Yes
Bosnia-Herzegovina	<i>Croatia, F.R. Yugoslavia</i>	Not an applicant	No	No	Thessaloniki REM, UCTE	No	No
Bulgaria	<i>Romania, Turkey, Greece, F.Y.R. Macedonia, F.R. Yugoslavia</i>	2 nd tier	Yes	Yes	Thessaloniki REM, CDO	Yes	Yes
Croatia	<i>Hungary, F.R. Yugoslavia, Bosnia, Slovenia</i>	Not an applicant	No	Yes	UCTE	No	No
FYR Macedonia	<i>Bulgaria, Greece, Albania, F.R. Yugoslavia</i>	Not an applicant	Yes	Yes	Thessaloniki REM, UCTE	Observer	No
Romania	<i>Ukraine, Moldova, Bulgaria, F.R. Yugoslavia, Hungary</i>	2 nd tier	No	Yes	Thessaloniki REM, CDO	Yes	Yes
Federal Republic of Yugoslavia	<i>Hungary, Romania, Bulgaria, F.Y.R. Macedonia, Albania, Bosnia, Croatia</i>	Not an applicant	No	Yes	UCTE	No	No
Slovenia	Austria, Hungary, Croatia, Italy	1 st tier	Yes	Yes	UCTE	No	No
Turkey	Greece, Bulgaria, Georgia, Armenia, Iran, Iraq, Syria	Applicant, not invited	Yes	Yes		No	No
Eurasia interconnection							

COUNTRIES IN CENTRAL AND EASTERN EUROPE AND EURASIA

Country	Neighbor countries	EU accession status	Located on the eastern border of EU today	Border of EU after 1 st & 2 nd tier accession	Memberships	Regional Energy Regulatory Program	Export Import Working Group
Belarus	<i>Russia, Ukraine, Poland, Lithuania, Latvia</i>	None	No	Yes		No	No
Kazakhstan /North	<i>Russia</i>	None	No	No		Yes	Yes
Moldova	<i>Ukraine, Romania</i>	None	No	Yes		Yes	Yes
Russia	<i>China, Mongolia, Kazakhstan, Ukraine, Belarus, Latvia, Estonia, Finland, Norway</i>	None	Yes	Yes	CDO	Yes	Yes
Ukraine	<i>Belarus, Russia, Romania, Moldova, Hungary, Slovak R., Poland</i>	None	No	Yes	CDO	Yes	Yes
Caucasus interconnection							
Armenia	<i>Georgia, Azerbaijan, Iran, Turkey</i>	None	No	No		Yes	Yes
Azerbaijan	<i>Russia, Iran, Armenia, Georgia</i>	None	No	No		No	No
Georgia	<i>Russia, Azerbaijan, Armenia, Turkey</i>	None	No	No		Yes	Yes
Iran	<i>Turkmenistan, Afghanistan, Pakistan, Iraq, Turkey, Armenia, Azerbaijan</i>	None	No	No		No	No
Central Asia interconnection							
Kazakhstan	<i>China, Kyrgyzstan, Uzbekistan</i>	None	No	No	DC Energija	Yes	Yes

COUNTRIES IN CENTRAL AND EASTERN EUROPE AND EURASIA

Country	Neighbor countries	EU accession status	Located on the eastern border of EU today	Border of EU after 1 st & 2 nd tier accession	Memberships	Regional Energy Regulatory Program	Export Import Working Group
/South							
Kyrgyzstan	<i>Kazakhstan, China, Tajikistan, Uzbekistan</i>	None	No	No	DC Energija	Yes	No
Tajikistan	<i>Kyrgyzstan, China, Afghanistan, Uzbekistan</i>	None	No	No	DC Energija	No	No
Turkmenistan	<i>Uzbekistan, Tajikistan, Afghanistan, Iran</i>	None	No	No	DC Energija	No	No
Uzbekistan	<i>Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan, Turkmenistan</i>	None	No	No	DC Energija	No	No
EU accession countries that are islands							
Cyprus		1 st tier	No	No		No	No
Malta		2 nd tier	No	No		No	No

CURRENT CONDITIONS OF REGIONAL ELECTRICITY TRADE

The interconnection of high-voltage electricity networks over large areas such as Central Europe is a global phenomenon which was largely realized between 1950 to 1980. In Central Europe the first interconnection transmission line was put into operation between Hungary and Czechoslovakia in 1953. The first ring interconnection of Hungary, Poland, Czechoslovakia, German Democratic Republic and the Lviv power system of Ukraine SSR was started in March 1962. Central Europe was linked with the Unified Power System of the USSR when parallel operation of the 750 kV transmission line between the Ukraine SSR and Hungary was started in 1979. This interconnected system began to be divided in the 1990s, after the reunification of Germany and the breakup of the Soviet Union.¹

Following the collapse of the centrally planned economies, there was a sharp drop in electricity demand in 1990-92 and a general reduction of international trade in electricity. Electricity importing countries typically responded to the fall in electricity demand by reducing the level of imports, not by reducing the level of domestic power generation. For example, there was a sharp reduction in exports from Ukraine to Poland and from Ukraine to Hungary along the 750 kV lines that were designed to export power from the Soviet Union.² At the same time there were problems with frequency and voltage regulation which led to the breakup of interconnected power systems. Shortages of natural gas and heavy fuel oil made it difficult to regulate frequency within recommended limits. Military activity created damage to the power grids of Bosnia-Herzegovina, Federal Republic of Yugoslavia, and Croatia but there are now attempts to re-connect all of the countries in the Balkan region.

In 1999 the Central Europe and Eurasia region was divided into many parts, as follows:

- Poland, Hungary, Czech Republic, and Slovak Republic operated as a group of countries (Centrel) in parallel operation with UCTE.³ A high standard of power system reliability was achieved in 1999. The Burshtin power station of Ukraine was connected to Poland, creating a small island inside Ukraine.
- Slovenia and Croatia operated in parallel operation with UCTE, through interconnections with Italy. A high standard of power system reliability was achieved in 1999.

¹ According to CDO the division into non-synchronously operated parts began at the end of 1993. See <http://www.cdo.org/en/eindexd.htm> "The CDO History."

² According to CDO, "electricity supply from the former USSR diminished from 34 TWh in 1988 to 4 TWh, i.e. decreased 8 times." <http://www.cdo.org>

³ See <http://www.centrel.org>

- Romania, Bulgaria, FYR Macedonia, Greece, Albania, and Federal Republic of Yugoslavia operated in parallel during most of 1999.⁴ Various transmission line failures (6 March 99, 13th May 99, 16 June 99) plus the Greek earthquake on 7 September 99 led to the isolation of one or more countries in the region.⁵ Moreover as a result of damage to the power grid in Serbia it was not possible to isolate Romania and Bulgaria from the other countries for the purpose of testing the readiness of these two countries to connect to UCTE via Hungary. It appears that parallel operation with Hungary will permit Romania and Bulgaria to connect with other countries only when UCTE reliability standards are preserved.
- Bosnia-Herzegovina actually operated as an island system in 1999 although it was a member of UCTE.⁶
- Russia (excluding Siberia), Belarus, Estonia, Latvia, and Lithuania operated an AC interconnection and the Northwest, Center, Middle Volga, and Urals regions of Russia remained interconnected during most of the year 1999. Frequency control in the Northwest and Center regions remained within reasonable limits. Under emergency conditions the Baltics can disconnect from the main portion of Russia and most of Belarus, while maintaining a supply to Kaliningrad, but island operation was not necessary in 1999. The serious low frequency problems that existed in Russia in September-October 1998 did not develop in 1999. However, the northern Caucasus portion of Russia was disconnected from the rest of Russia and operated in parallel with Ukraine, from 1 January to 23 April and from 30 June to 8 September 99.
- The power system of Ukraine was internally divided during half of the year 1999. The northern portion of Ukraine (excluding Burshtin power station) operated in parallel with Russia, but was disconnected from the rest of Ukraine, from 1 January to 23 April and from 30 June to 8 September 99. The northern and southern portions of the Ukraine power system were unified and operated in parallel with Russia from 23 April to 30 June and from 8 September to 27 November 99. From 27 November 99 through the end of the year, the power system of Ukraine was entirely disconnected from Russia. The southern portion of Ukraine operated in parallel with Moldova during all of 1999. The Burshtin power station operated in parallel with UCTE via a connection to Poland, during all of 1999.
- Georgia, Azerbaijan, and Armenia and the northern Caucasus portion of Russia operated a very high voltage interconnection (500 kV, 330 kV, 220 kV) in 1999 but

⁴ Both UCTE and ETSO maps show Albania as an island system that is not operated in parallel with its neighbors. Albania's response to the Export Import Working Group questionnaire shows that this information is incorrect, and Albania actually operates in parallel with UCTE.

⁵ For details see UCTE *Annual Report 1999*, pages 67-69. A free copy can be ordered from <http://www.ucte.org> Publications.

⁶ See the map of "Interconnected AC transmission systems in Europe" in the report by Dr.-Ing. Hans-Jurgen Haubrich and Dr.-Ing. Wolfgang Fritz, *Study on Cross-Border Electricity Transmission Tariffs*, Final Report (Aachen, April 1999), page 11.

This 108 page report is available as a PDF file from the Florence process web site, which is http://www.europa.eu.int/comm/energy/en/elec_single_market/florence/index_en.html

there were serious problems with frequency and voltage control in the Caucasus region at 110 kV and lower voltages. The northern Caucasus portion of Russia (normally a part of the Middle Volga interconnected power system) was disconnected from the rest of Russia and operated in parallel with Ukraine, from 1 January to 23 April and from 30 June to 8 September 99.

- Armenia maintained an interconnection with Iran in 1999.
- The power system of Kazakhstan operated separately from the unified power system of Russia in 1999. A very weak interconnection was maintained between north Kazakhstan and the southeastern part of Kazakhstan. The southeastern part operated a very high voltage interconnection in parallel with Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan but there were problems with frequency and voltage control in the Central Asian region at 110 kV and lower voltages.
- The Siberia region of Russia operated as an island in 1999, because Kazakhstan did not operate in parallel with Russia. Despite the existence of a high voltage transmission interconnection linking western Siberia with the Urals, the power system of Kazakhstan operated separately from the unified power system of Russia. The Far East region of Russia has always operated as an island.

The UCTE system is the only part of western Europe with AC interconnections to Central Europe or Eurasia. Except for very small portions of Finland and Norway, along the Russian border, the Nordel system has no AC interconnection with Central Europe or Eurasia. In 1999 Russia continued to operate a DC interconnection with Finland which has been used to export energy to Finland. Moreover, Turkey is not connected with Central Europe and Eurasia. Greece has a DC connection to Italy by an undersea cable but there is no interconnection between Greece and Turkey.

Despite the difficulties of re-establishing electricity trade, four groups of countries are successfully developing electricity export, import and transit agreements:

- Poland, Hungary, Czech Republic, Slovak Republic (the Central group)
- Estonia, Latvia, Lithuania
- Romania, Bulgaria, FYR Macedonia, Greece, Albania, and Bosnia-Herzegovina
- Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, and Tajikistan.

There are proposals to construct a new 400 kV DC interconnection between Poland and Lithuania, and to restore operation of the existing 220 kV AC line between Hungary and Romania, and to strengthen the Hungary-Romania interconnection. Therefore it is possible that all of the countries invited for EU accession, from Estonia to Bulgaria, will eventually join a single European electricity market. If UCTE's expansion plans are successful, several southeastern European countries that have not been invited for EU accession talks will have the interconnections needed to support electricity trade.

The experience of 1979-1990 demonstrates that from a technical standpoint it is possible to interconnect a large number of countries. Today there are indications that the area of synchronous operation of UCTE will expand into southeastern Europe and

that electricity trade will continue along the north-south line marking the western border of Russia, Belarus, Ukraine and Moldova. After accession of all of the countries that are now candidates for EU membership, this north-south line will become the eastern border of the EU. It is safe to assume that electricity trade will continue along the western border of Russia and Belarus because there already exists a ring interconnection linking Estonia, Latvia, and Lithuania with St. Petersburg and Moscow.

Appendix F

Maps and Diagrams

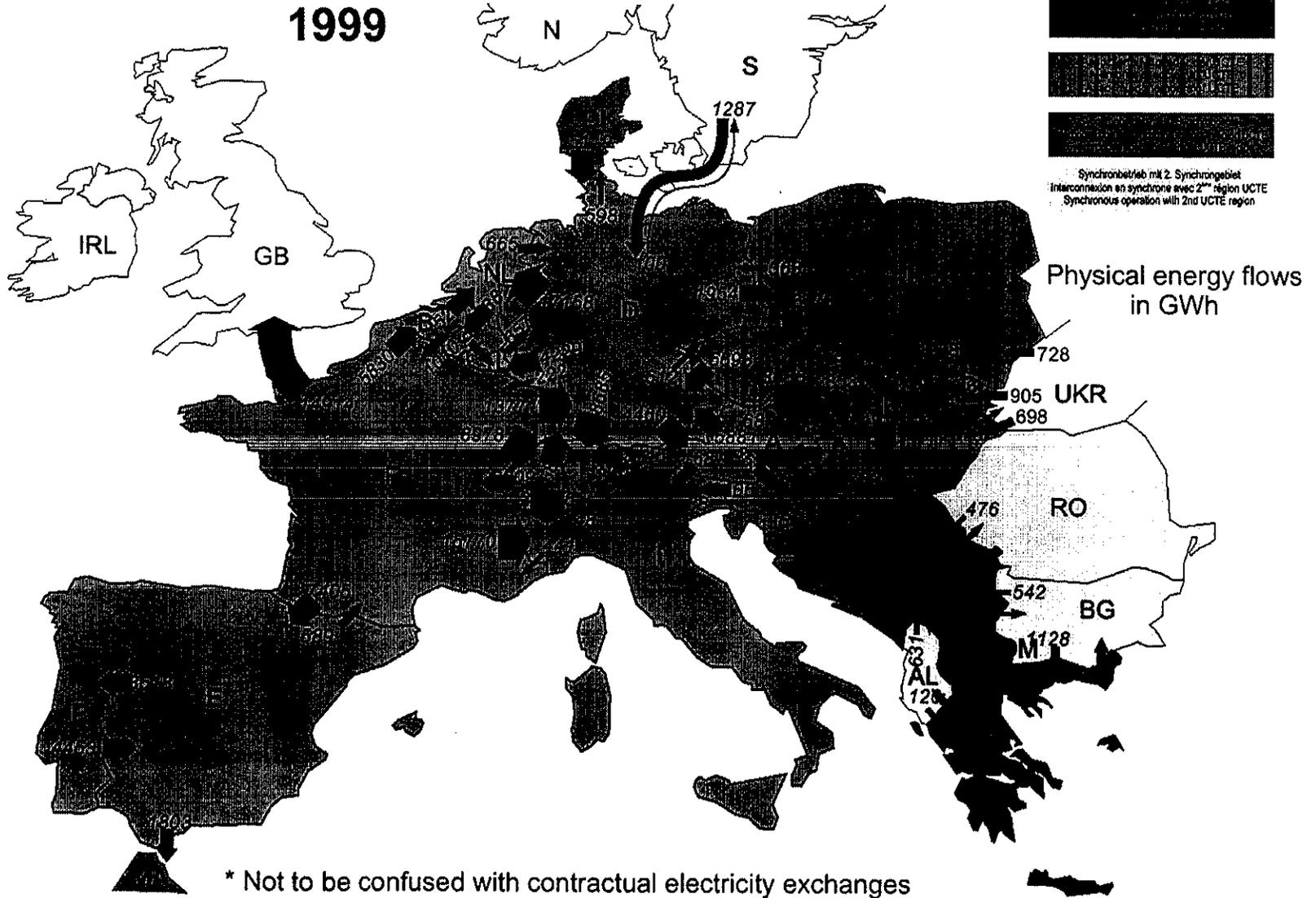
The map of physical electricity exchanges in 1999 is published by UCTE and is included in the file *exchanges_e.pdf* which can be downloaded from [http://www.ucte.org/Statistik/English/Default Stat E.htm](http://www.ucte.org/Statistik/English/Default%20Stat%20E.htm)

The load flow diagram is published by UCTE and is included in the file *memo1999.pdf* which can be downloaded from [http://www.ucte.org/Publikationen/English/Default Pub E.htm](http://www.ucte.org/Publikationen/English/Default%20Pub%20E.htm)



Physical electricity exchanges *

1999



* Not to be confused with contractual electricity exchanges

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LOAD FLOWS ON THE 3RD WEDNESDAY OF DECEMBER 1999

1. Synchrongebiet der UCTE
1^{re} région synchrone UCTE
1st synchronous UCTE region

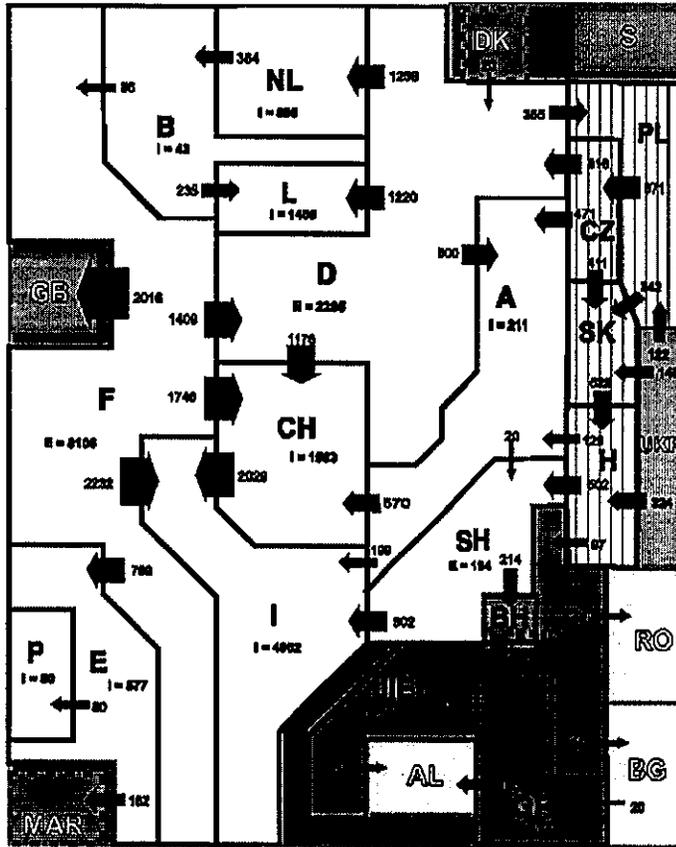
2. Nicht-synchrones UCTE-Region
2nd asynchronous UCTE region

Assoziierte Mitglieder der UCTE
Members associés de l'UCTE
Associated members of UCTE

Synchronbetrieb mit 2. Synchrongebiet
Interconnexion en synchrone avec 2^e région UCTE
Synchronous operation with 2nd UCTE region

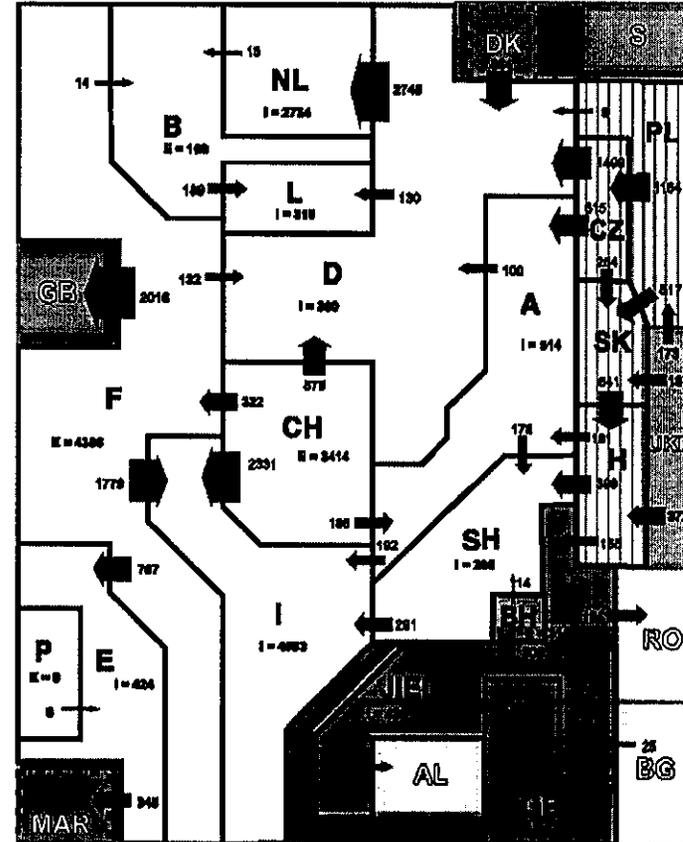
Synchronbetrieb mit 2. Synchrongebiet
Interconnexion en synchrone avec 2^e région UCTE
Synchronous operation with 2nd UCTE region

Nacht / nuit / night 15-12-1999, 3:00 ¹



Summe der Leistung des Energieflusses Somme des puissances des flux d'énergie = Sum of load flows	UCTE 18362	UCTE+CENTREL 22890	TOTAL 26651
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Tag / jour / day 15-12-1999, 11:00 ¹



Summe der Leistung des Energieflusses Somme des puissances des flux d'énergie = Sum of load flows	UCTE 17850	UCTE+CENTREL 23162	TOTAL 27548
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¹ GMT + 1

I = Importsaldo - Solde importateur - Import balance

E = Exportsaldo - Solde exportateur - Export balance

Werte in
Valeurs en MW
Values in