

The Regulation of Cross Border Trading to Foster the Integration of National Electricity Markets

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The paper will first present the main concepts of the European regulation for cross border exchanges and the relevant implementation mechanisms defined by the *European association of Transmission System Operators (ETSO)*. Subsequently, a description of both the current situation and the forthcoming evolution of the electricity markets in the CIS states will be given, with particular attention to cross border exchanges. On the basis of this description, the paper will discuss the opportunity of the establishment of common rules for cross border exchanges between CIS states and the applicability of the rules in force in the European Union.

Introduction

In the recent years, the creation of an integrated *Internal Electricity Market (IEM)* has been one of the priorities in the European Union. Within this context, a first directive to establish common rules for the internal electricity market was adopted on 19th December 1996 (see [1]). This directive abolishes exclusive rights, requires unbundling of transmission activities from generation and supply activities and its fundamental objectives are transparency and non discrimination. Recently (26 June 2003), the directive has been updated (see [2]) and completed with a regulation on condition for access to the network for cross border exchanges of electricity (see [3]). This regulation defines:

- ! compensation mechanisms among Transmission System Operators for hosting cross border flows of electricity on their networks;
- ! charges applied by network operators for access to their networks;
- ! general principles of cross border transmission capacity allocation and congestion management;
- ! rules for access to new cross border interconnectors built by private investors ("*merchant lines*").

The implementation of the provisions of the regulation is expected to remove the barriers to electricity exchanges among the EU countries, as all commercial transactions will be subject to the same rules, independently of the injection and withdrawal points on the network. In the same period the electric power industry of the CIS states underwent a significant structural transformation. While a centralized management has been kept in some states, in other states the transformation resulted in the unbundling of the power system and the formation of wholesale electricity markets. These transformations pose the same integration problems faced by the national power systems in the European Union that led to the establishment of the aforementioned regulation.

Within this context, the paper will first present the main concepts of the European regulation for cross border exchanges and the relevant implementation mechanisms defined by the *European association of Transmission System Operators (ETSO)*. Subsequently, a description of both the current situation and the forthcoming evolution of the electricity markets in the CIS states will be given, with particular attention to cross border exchanges. On the basis of this description, the paper will discuss the opportunity of the establishment of common rules for cross border exchanges between CIS states and the applicability of the rules in force in the European Union.

The Cross-Border Trading (CBT) regulation in the EU

Objectives of the regulation

As above mentioned, the European Parliament and the Council recently (26th June 2003) approved the "*regulation on condition for access to the network for cross border exchanges in electricity*" (see [3]), also known as the regulation on Cross-Border Trading (CBT).

The objective of the regulation is setting fair rules for cross-border exchanges of electricity, thus enhancing competition within the Internal Electricity Market (IEM), taking into account the specificities of national and regional markets. This implies:

- ! the establishment of a compensation mechanism for cross-border flows of electricity;
- ! the setting of harmonized principles on cross-border transmission charges;
- ! the setting of harmonized principles on the allocation of available capacities of interconnections between national transmission systems.

In fact, the main concepts on which the regulation is based are “*cross-border flow*” and “*congestion*”.

“*Cross-border flow*” means a physical flow of electricity on a transmission network of a state that results from the impact of the activity of producers and/or consumers outside of that state on its transmission network. In practice, when a producer P belonging to a state S1 exchanges electric energy with a consumer belonging to a state S2, the exchanged energy, that distributes itself on the different lines according to Kirchhoff’s physical laws, may flow, either partially or completely, through states different from S1 and S2. This is obvious in case S1 and S2 are not neighboring countries but, even if they were neighboring, a part of the total flow could affect the networks of other states near S1 and S2, originating the so-called *parallel flows* (for instance, it is well known that a significant part of Italian imports from France flow through Switzerland). On the other hand, “*congestion*” means a situation in which an interconnection linking national transmission networks cannot accommodate all physical flows resulting from international trade requested by market participants, because of a lack of capacity of the interconnectors and/or of the national transmission systems concerned.

Compensations among transmission system operators

Concerning cross-border flows, the regulation establishes the principle that transmission system operators must receive compensation for costs incurred as a result of hosting cross-border flows of electricity on their networks. Moreover, compensations must be paid by the system operators of the national transmission systems from which cross-border flows originate and of the systems

where those flows end: therefore, such compensations must not be calculated and attributed to each energy transaction, but must be defined at an aggregate level for each transmission system operator. In practice, resuming the previously reported example, this means that the system operators of the states crossed by the flows originated by the exchanges between states S1 and S2 must be adequately compensated by the system operators of the states S1 and S2 themselves. Moreover, such compensations must not be calculated for each transaction performed by each couple producer P / consumer C, but in an aggregate way for the complete set of transactions performed under control of the system operators of the states S1 and S2.

The regulation prescribes also that the magnitude of cross-border flows hosted and the magnitude of cross-border flows designated as originating and/or ending in national transmission systems must be determined on the basis of the physical flows of electricity actually measured in a given period of time. This means that it is not possible to use methods like, for example, the “*contract path*”, according to which the energy object of a transaction flows through a conventional path, such as the shortest one between the injection and the withdrawal points, completely disregarding parallel flows.

Moreover, the costs incurred as a result of hosting cross-border flows must be established on the basis of the forward looking long-run average incremental costs of the network, taking into account losses, investment in new infrastructure, and an appropriate proportion of the cost of existing infrastructure, as far as the infrastructure is used for transmission of cross-border flows, in particular taking into account the need to guarantee security of supply.

Charges for access to networks

The aforementioned costs incurred must be recovered by charges for access to networks that must be transparent, non-discriminatory, take into account the need for network security and reflect actual costs. Such charges must not be calculated as a function of the distance between source and destination of each energy transaction (in the previous example, the distance between the injection point of producer P and the withdrawal point of consumer C) and the proportion of the total amount of the network charges borne by producers must, subject to the need to provide appropriate and efficient locational signals, be lower than the propor-

tion borne by consumers. *Locational signals* may be defined as those economic incentives that may be given to both buyers and sellers in an electricity market to reflect their relative geographical situation, thereby driving free decisions of trade and/or new establishment of facilities to contribute to the efficient operation and expansion of the overall electricity system. They may be both *short-term* signals, like geographical differentiation of energy prices due to congestion and losses¹, and *long-term* ones, like transmission charges.

The regulation prescribes that, where appropriate, the level of the transmission tariffs applied to producers and/or consumers must provide locational signals at European level, and take into account the amount of network losses and congestion caused, and investment costs for infrastructure. This must not prevent states from providing locational signals within their territory or from applying mechanisms to ensure that network access charges borne by consumers are uniform throughout their territory.

Provided that appropriate and efficient locational signals are in place, charges for access to networks applied to producers and consumers must be applied regardless of the countries of destination and origin, respectively, of the electricity, as specified in the underlying commercial arrangement, i.e. they must not be transaction-based.

Congestion management

As far as interconnection capacities are concerned, the regulation prescribes that transmission system operators must put in place coordination and information exchange mechanisms to ensure the security of the networks in the context of congestion management. They must also publish the calculation models of the *Total Transfer Capacity – TTC*² and of the *Transmission Reliability Margin – TRM*³, with reference to the real electrical and physical conditions of the network. On the basis of such models, transmission system operators must publish estimates of the *Available Transfer Capacity*⁴ – for each day, indicating any available transfer capacity already reserved. These publications must be made at specified intervals before the day of transport and must include, in any case, week-ahead and month-ahead estimates, as well as a quantitative indication of the expected reliability of the available capacity.

One of the fundamental points of the regulation is the prescription that network congestion problems must be addressed with non-discriminatory market based solutions which give efficient economic

signals to the market participants and transmission system operators involved, aimed at incentivizing investments in generation or network facilities in the most suitable places. Moreover, network congestion problems must preferentially be solved with non-transaction based methods, i.e. methods that do not involve a selection between the contracts of individual market participants. The regulation supports a combination of *market splitting*, or other market based mechanisms, for solving permanent congestion and *counter-trading*⁵ for solving temporary congestion.

Market splitting (applied, for instance, in the Scandinavian electricity market) consists of a partitioning of the transmission network belonging to a single market into aggregates of lines and nodes called “zones”, interconnected by the lines that are most frequently congested. In case a market session (e.g. the *day-ahead market*) causes congestion between two or more lines, the market splits into two or more sub-markets characterized by different prices: prices higher than the one that would have cleared the market without congestion in import zones (so as to increase generation / decrease load) and prices lower than the one that would have cleared the market without congestion in export zones (so as to decrease generation / increase load). The prices in the different zones (and the related variations of generation and load) are set at levels such that the corresponding flows in the congested lines are equal to the available transfer capacity.

It must be taken into account that market splitting can be applied to a multi-national context only in case all of the countries involved (corresponding to the main market “zones”) belong to a single market, managed on the basis of uniform rules by a single market operator⁶.

Such a high level of integration is difficult to reach in the short term for the countries

¹ Think, for instance, about markets like PJM (Pennsylvania, New Jersey and Maryland), where electric energy prices are differentiated for each network node.

² The *Total Transfer Capacity* corresponds to the maximum exchange between two areas, compatible with the security standards (e.g. “N-1”) adopted by the electric systems involved, that can be calculated assuming that network conditions, generation and load profiles are perfectly known.

³ The *Transmission Reliability Margin* is the security margin that accounts for uncertainties in the calculation of TTC, due to unintentional deviations of physical flows and to emergency exchanges between system operators performed to tackle in real-time unforeseen unbalances.

⁴ The *Available Transfer Capacity* corresponds to the maximum exchange compatible with the security standards adopted by the interconnected electric systems, taking into account the technical uncertainties on future network conditions; is calculated as the difference between TTC and TRM.

⁵ When a system operator performs a *counter-trading action*, it buys additional energy from some generators (thus increasing their production) located in the area towards which the flow on the congested line is directed and resells the same amount of energy to some generators (thus reducing their production) in the area from which the flow on the congested line comes. The counter-flow generated in this way makes available an additional amount of transmission capacity in the direction of the congestion. The generators involved are selected on the basis of the economic bids they submitted to offer their availability to vary the amount of energy produced when needed.

⁶ Just like in Scandinavia, where Norway, Sweden, Finland and Denmark belong to a single electricity market, operated by Nord Pool ASA (<http://www.nordpool.no/>).

belonging to the European Union, or even for some subset of them: in order to avoid such difficulties, the regulation, as an alternative to market splitting, takes into account also the *explicit auction*, that obviously does not imply particular homogenization requirements concerning the rules in force in the interconnected countries.

As far as explicit auction is concerned, the regulation prescribes that the auction system must be designed in such a way that all available capacity is being offered to the market. This may be done by organizing a composite auction in which capacities are auctioned for differing durations and with different characteristics (e.g. with respect to the expected reliability of the available capacity in question). Total interconnection capacity must be offered in a series of auctions, which, for instance, might be held on a yearly, monthly, weekly, daily or intra-daily basis, according to the needs of the markets involved. Each of these auctions must allocate a prescribed fraction of the available transfer capacity plus any remaining capacity that was not allocated in previous auctions. To promote the creation of liquid electricity markets, capacity bought at an auction must be freely tradable until the system operator is notified that the capacity bought will be used. Moreover, in order not to risk creating or aggravating problems related to any dominant position of market participants, capping of the amount of capacity that can be bought/possessed/used by any single market participant in an auction must be considered by the competent regulatory authorities in the design of any auction mechanisms.

As far the allocated transmission capacity is concerned, the regulation prescribes that transaction curtailment procedures must only be used in emergency situations where the transmission system operator must act in an expeditious manner and redispatching or counter-trading is not possible. Any such procedure must be applied in a non-discriminatory manner. Except in cases of “force majeure”, market participants who have been allocated capacity must be compensated for any curtailment. Moreover, market participants must inform the transmission system operators concerned a reasonable time ahead of the relevant operational period whether they intend to use allocated capacity. Any allocated capacity that will not be used must be reattributed to the market, in an open, transparent and non-discriminatory manner.

Any revenues resulting from the allocation of interconnection capacity must be used for one or more of the following purposes:

- ! guaranteeing the actual availability of the allocated capacity;
- ! network investments maintaining or increasing interconnection capacities;
- ! as an income to be taken into account by regulatory authorities when approving the methodology for calculating network tariffs, and/or in assessing whether tariffs should be modified.

New interconnectors (“merchant lines”)

New direct current interconnectors may, upon request, be exempted both from the aforementioned provision concerning the destination of the revenues resulting from the allocation of the related interconnection capacity and from the general principle of regulated third-party access to the transmission network prescribed by the new European directive 2003/54/CE (see [2]), concerning common rules for the internal electricity market, approved by the European Parliament and by the Council, together with the cross-border trading regulation. In practice, this means that the additional transmission capacity deriving from the new interconnectors can be assigned, either partially or completely, to those who invested for building them, so that they can get the revenues due to differentials of energy prices between the interconnected countries. The aforementioned exemptions can be granted under the following conditions:

- ! the investment must enhance competition in electricity supply;
- ! the level of risk attached to the investment is such that the investment would not take place unless an exemption is granted;
- ! the interconnector must be owned by a natural or legal person which is separate at least in terms of its legal form from the system operators in whose systems that interconnector will be built;
- ! charges are levied on users of that interconnector;
- ! since the partial market opening referred to in Article 19⁷ of Directive 96/92/EC (see [1]), no part of the capital or operating costs of the interconnector has been recovered from any component of charges made for the use of transmission or distribution systems linked by the interconnector;
- ! the exemption is not to the detriment of competition or the effective functioning of the internal electricity market, or the efficient functioning

⁷ It is the rule that prescribed the progressive liberalization of the European electricity market, starting from an eligibility threshold initially corresponding to an annual consumption of 40 GWh.

of the regulated system to which the interconnector is linked.

What above specified applies also to significant increases of capacity in existing interconnectors and, in exceptional cases, to alternating current interconnectors, provided that the costs and risks of the investment in question are particularly high when compared with the costs and risks normally incurred when connecting two neighboring national transmission systems by an alternating current interconnector.

The national regulatory authority is in charge of granting the exemption that may cover all or part of the capacity of the new interconnector, or of the existing interconnector with significantly increased capacity. In deciding to grant an exemption, the authority may impose conditions regarding the duration of the exemption and non-discriminatory access to the interconnector. Anyway, any exemption decision must be taken after consultation with other states or regulatory authorities concerned, and notified to the European Commission, that may request that the regulatory authority or the state concerned amend or withdraw the decision to grant the exemption.

Mechanisms for CBT implementation

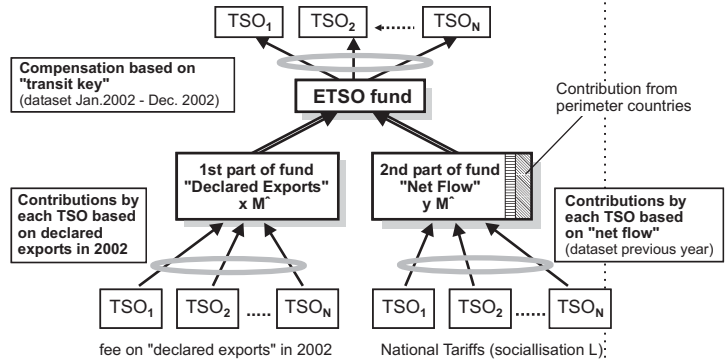
This section describes the mechanisms for CBT implementation that have been in force in the European *Internal Electricity Market (IEM)* during the last few years.

During the year 2001 ETSO (the *European association of Transmission System Operators*) issued a proposal (see [4]), applied during year 2002, for a temporary CBT mechanism aimed at compensating countries for hosting cross-border flows of electricity on their networks. Even if limited (as explained in the following), this mechanism constitutes a first concrete attempt to provide an answer to the problem. Moreover, the mechanism implements some fundamental principles of a sound CBT tariff. In fact:

- ! it implements CBT in the form of inter-TSO compensations, providing a long term locational signal;
- ! it is not transaction-based (even if some aspects have elements that show a dependency from an average of the performed transactions);
- ! compensations depend on the real network costs.

Fig. 1 shows a synthesis of the ETSO mechanism for compensation. The key points of the mechanism are the following:

Fig.1. Scheme of inter-TSO compensations for CBT



Source: Comillas University

1. Calculation of contributions – For the year 2002 an ETSO fund was created, amounting to 200 M€ and collected by receiving two types of contributions from the national TSOs:

- ! **First part (“declared exports”)** – constituted by a payment of 1€/MWh on the estimated value of declared exports for the year 2002.
- ! **Second part (“net flow”)** – constituted by a payment on the net flow of cross-border trades (difference between imports and exports). The entity of this payment is such that, added to the one coming from the first part, it produces the whole ETSO fund (200 M€).

The “net flow” payment includes the following contributions:

- ! contributions coming from the national TSOs of all the countries belonging to the IEM,
- ! financed by socializing part of the national tariffs paid by loads; contributions of 1€/MWh collected from the neighboring electric systems (NORDEL, UK, Centrel, Morocco e Slovenia) on the basis of export volumes towards IEM countries⁸.

2. Mechanism of compensation – based on the concept of transit, defined as the minimum value between imports and exports measured in each hour on the interconnection lines between IEM countries. Being:

- ! T_{km} the transit of country k during the month m,
- ! L_{km} the load supplied in country k during the month m (inner consumption),

⁸ The vice versa is valid, too: the neighboring countries are entitled to ask for the payment of a charge on the basis of the declared energy imports coming from IEM countries.

! C_{HNk} the annual costs of the so called *horizontal network* of the country k , defined as the set of the national transmission lines significantly affected by cross-border trading⁹, the compensation provided to country k is expressed as:

$$\text{Compensation}_k = C_{HNk} \frac{\sum_{m=1}^{12} T_{km}}{\sum_{m=1}^{12} T_{km} + \sum_{m=1}^{12} L_{km}} = C_{HNk} \xi_k$$

The ratio ξ_k (called transit key) provides an “averaged” percentage of utilization of country k ’s network for international transits.

It is clear that the explained mechanism is quite “raw”, but more refined mechanisms should take into account data concerning the single transactions and would thus be “transaction-based”.

For the year 2003, ETSO proposed a few modifications of the above described mechanism. The modifications, detailed in the document [5], concern the following aspects:

1. Definition of a standard criterion to select the lines belonging to the *horizontal network*¹⁰. This is carried out using the *Allocation of Transit Flow (ATF)* algorithm:

! a national network is isolated and its inner lines and cross-border interconnection nodes are highlighted;

! a standard 100 MW flow is applied between every couple of cross-border interconnection nodes (*standard transit*);

! the *horizontal network* consists of all the national lines such that at least one standard transit generates in them a power transit greater than or equal to 1MW.

2. Slight modifications to the mechanisms for compensation and financing of the ETSO fund:

! the ETSO fund for 2003 is expected to be lower than 200 M€ (the exact amount is still not known at the time of writing this paper).

rical data) of the quotas constituting the ETSO fund:

! reduction of the tariff on “*declared exports*” to 0.5 €/MWh (whilst the tariff on exchanges with the neighboring countries remains 1 €/MWh).

! setting up of a *third part of the ETSO fund* (in addition to those on “*declared exports*” and “*net flows*”), activated in case the amount collected with the first two parts does not cover the whole amount of the ETSO fund. The difference is charged to the exporting nations.

b. Ex-post settlement of the differences:

the contributions to the ETSO fund must be paid in function of the actual 2003 data. From ex-post evaluations it can result that the mechanism, based on ex-ante evaluations (on the basis of historical data), has brought to:

! *under-financing of the fund*: in this case the negative difference is carried forward to the mechanism of the next year;

! *over-financing of the fund*: in this case the fund is limited to the a priori defined amount and the surplus is carried forward to the mechanism of the next year.

The discipline on CBT is going to change in the year 2004. In fact, ETSO presented a proposal (see [6]), that was accepted, to eliminate the 0.5 €/MWh fee on “*declared exports*” starting from January 1st 2004 (while an injection fee of 1 €/MWh will be maintained for the perimeter countries). ETSO emphasizes that removing such explicit fee requires setting up by the end of 2004 adequate market-based methods such as, for example, auctioning or market splitting, for the allocation of capacity at all concerned constrained borders, as well as the implementation of long-term locational signals.

The new mechanism is applied by all European continental countries that put in place the 2002 – 2003 mechanism but also by all TSOs from NORDEL, Hungary and Slovakia. Poland will join as from 1st July 2004.

As in the previous CBT mechanism, a harmonized methodology is applied by each TSO to determine the extent of the *horizontal network* of each country. The determination of the *horizontal network* costs is based on the regulated costs agreed by the respective regulators and published. Moreover, the cost claim for the 2004 CBT mechanism does also include costs of losses potentially induced by transits.

! the compensation mechanism based on transit key has been retained with the following modifications:

a. Ex-ante calculation (on the basis of histo-

⁹ The official algorithm (introduced since the year 2003) for determining the lines belonging to a country’s horizontal network will be described in the following.

¹⁰ To be rigorous, because of the parallel flows phenomenon, every transaction affects nearly all the lines. However, to define in an unambiguous way the part of the transmission network whose costs are to be recovered through inter-TSO compensations, it is important to “skim” the lines that are significantly affected by cross-border trading.

The ETSO compensation fund is 370M€ and is divided in two parts:

A first part that takes into account the contribution from the perimeter countries. This is raised from an explicit injection fee of 1 €/MWh on the declared exports from exporters/traders of these countries to the networks served by the signatories of the new 2004 CBT mechanism.

A second (main) part called "net flow" part of the fund. The charge for net flow (difference between imports and exports) is the same irrespective of whether it is in the export or import direction. It is raised from the contribution resulting from the national tariffs charged to both loads and generators; the share between loads and generators is left to subsidiary and therefore to the decision of the individual TSO and its Regulatory Authorities.

Current situation of electricity markets and CBT in the CIS

The electric power industry of the CIS states underwent a significant structural transformation. While a centralized management has been kept in some states, in other states the transformation resulted in the unbundling of the power system and the formation of wholesale electricity markets (see [8]). These transformations pose the same integration problems faced by the national power systems in the European Union that led to the establishment of the CBT regulation.

A large work has been carried out on developing and strengthening the integrating processes between CIS states in the area of electric power industry. Some fundamental interstate documents, which are necessary for the organization of joint operation of power systems was prepared and approved. In addition a series of bilateral and multilateral agreements between power companies and state bodies was signed.

These active actions have helped to stabilize the situation and to begin to restore the interconnected power system of Commonwealth of Independent States, which was divided in 1998-1999 into a few separately working parts. Thus, the power systems of 11 out of 12 CIS countries are now working in parallel as one interconnected power system, together with the power systems of Lithuania, Latvia, Estonia and Mongolia. Electricity transmission and exchange is also carried out with power systems of other neighboring countries: Norway, Finland, Poland, Slovakia, Hungary, Turkey, Iran and China.

The amount of electricity exchanges between CIS states during the last years has been about 6-7% of total electricity demand. At present CIS states exchange electricity in accordance with the existing transfer capability, therefore congestion is not a significant problem. As far as CBT regulation is concerned, the current situation in the different CIS States is described hereinafter (see [8]).

Azerbaijan

The management of interstate transactions is carried out on the basis of bilateral intergovernmental agreements and concluded contracts. The export-import tariffs in the case of crossing national borders as well as the tariffs for electricity transits are established on the basis of concluded contracts. These tariffs can be a subject of negotiations. Import and export of electricity are not subject to customs duties. Only the fees for customs clearing are taken in the size of 0.15-0.3% of declared electricity cost.

Armenia

Import and export of electricity are subject to license. A license for electric energy export is given only in case the internal load is fully served, when there is no risk of damaging the interests of internal consumers. Prices for exports are not regulated.

Belarus

Transit of electricity through the national transmission network is carried out in accordance with specific transit tariffs. Tariffs for electricity import, export and transit are subject to negotiations between the involved parties and are established in the corresponding agreements. Customs duties are not paid for all exports, as well as for imports coming from other CIS states. Only the fees for customs clearing are taken in the size of 0.15% of declared electricity cost, with the exception of import/export from/to Russia.

Georgia

The management of interstate transactions is carried out on the basis of interstate agreements and concluded contracts.

Kazakhstan

There is a tariff applied by the system operator for dispatching to consumers the imported energy. Separate import/export tariffs concerning electric energy exchanges crossing national borders are not foreseen.

Kirghizstan

Export/import tariffs are established in the contracts on the basis of intergovernmental agreements. According to the Methods of calculating electricity transit tariffs in interconnected power system of Central Asia excluding the Kazakhstan power system, a transit tariff of 0.418 Cent/kWh is applied when the transit network length is 1000 km and more; a proportional recalculation of the tariff is carried out for shorter transit networks. Customs duties are not paid for both imports and exports. Only the fees for customs clearing are taken in the size of 0.15% of declared electricity cost.

Moldova

The management of interstate transactions is carried out on the basis of bilateral agreements. In case of insufficient transmission capacity, transactions are curtailed proportionally to the volumes declared in bilateral contracts.

Russia

Import/export of electricity is carried out in accordance with legislation on regulations of foreign trade activity, by means of bilateral agreements. Tariffs for interstate transactions are determined by means of negotiations. Customs duties are not paid for both imports and exports from/to CIS states.

Ukraine

All import/export of electricity is regulated through bilateral contracts. Customs duties are paid only for imports and fees for customs clearing are applied.

Possible application of the European CBT regulation and mechanisms in the CIS

An Interstate electricity market is going to be formed within the frameworks of free trade zone in accordance with Statement of CIS states heads' Council that was adopted in June 21, 2000. The constantly active Working Group "Formation and development of Interstate electricity market" was established accordingly to decision of the 19th meeting of the Electric Power Council. The representatives of power engineering organizations and companies of Commonwealth States became the members of this Working Group.

In March 22, 2002 the Protocol "On deepening the integration of CIS countries' power systems" has been signed by the members of the Electric Power Council (see [9]). According to this Proto-

col the Working group was given the responsibility to develop the draft "Basis principles of organizing the Interstate electricity market of States-CIS participants". A group of experts of the Executive Committee and the Working Group of Council on electricity market have developed the Basic principles of Interstate electricity market, taking into account the remarks and proposals of States-CIS participants.

The main propositions of the basic principles of Interstate electricity market are presented below (see [8]).

1. The Basic principles of organizing the Interstate electricity market of States-CIS participants (CIS IEM) determine the basic rules of organizing CIS IEM and are based on the active Interstate documents of States-CIS participants regulating the Interstate relations in the area of electric power industry. They take into account the international documents used as the basis for formation of the European electricity markets.
2. The objective of CIS IEM is to create a unified electricity market place based on parallel operation of power systems of States-CIS participants. It is aimed at improving efficiency and reliability of power supply to customers. It should also promote the coordination of the reform processes ongoing in the electric power industry of States-CIS participants, the creation of technical, legal and economic basis for unification of electricity markets of CIS and European countries and, furthermore, of the countries of South-East Asia.
3. The participants of CIS IEM are those who carry out activities concerning the electricity production, transmission and distribution, operative-technological control, organization of electricity trade, electricity purchase and/or sale and obtain the access to CIS IEM according to the internal legislation of States-CIS participants.
4. The States-CIS participants are free to choose an organizational and legal form of managing the electric power industry in their countries. The participants of CIS IEM have the same rights and the right of equal access to the electrical networks of States-CIS. The States-CIS participants create the efficient mechanisms of regulations and control and ensure the transparency of monopoly structures, i.e. the systems of operative-dispatching control, electricity transmission and distribution.
5. Each potential investor has a right to construct and operate new electric power stations in any

place of the Commonwealth of Independent States on the basis of both permission and tender procedures and according to the internal legislation of States-CIS participants.

6. The States-CIS participants establish the minimal technical requirements for connecting generating facilities to the transmission system of the State, for distribution systems, for the intersystem lines and for the equipment of directly connected consumers. These requirements must provide the interaction of CIS states' transmission systems, be objective, not discriminatory and officially published.
7. The States-CIS participants appoint the system operators in their countries. These operators provide the operative-dispatching control and are responsible for providing the reliable operation of the control zones as well as the control of electricity exchanges with other control zones. The system operators carry out the on-line control of intersystem lines on the basis of rules coordinated by the States-CIS participants.
8. The States-CIS participants appoint or require from the owners of electricity transmission systems as well as from the owners of distribution networks the appointment of the operators of the corresponding networks, which should provide the safe, reliable and efficient operation of the electrical networks and their development.
9. The vertically integrated enterprises carry out the accounting in their reports and have a separate financial documentation for the different kinds of activity (electricity production, transmission and distribution). If it is necessary they have also the general documentation on other kinds of activity not connected with the electric power industry, according to the internal legislation of the country.
10. The States-CIS participants make the necessary measures promoting the opening of internal electricity markets with the gradual reduction of the eligibility threshold.
11. In the limits of available technical possibilities the States-CIS participants provide the electricity transit through their territories independently of the place of origin and destination and of the owner of the electric energy exchanged; transits are performed on the basis of coordinated tariffs in accordance with the CIS IEM Rules and the concluded agreements. The electricity transits are carried out by the operators of

transmission networks, according to the lists of transmission lines, transit routes and points of customs control of electricity, which were approved by States-CIS participants.

12. The economic relations in CIS IEM are carried out on the basis of rules and agreements concluded between market participants. Interstate electricity market of States-CIS participants includes:
 - a) a market of bilateral agreements concluded between the participants. These agreements can be concluded by means of direct negotiations between the participants as well as by means of juridical and physical persons organizing the assistance in carrying out the negotiations;
 - b) a power exchange, composed of:
 - ! a spot market, dealing with physical power supplies for each hour of the next day;
 - ! a financial market (forward, futures, option contracts);
 - c) a balancing market, for providing the balance of electricity production and consumption in real time, ensuring the agreed standards of reliability and quality of electric energy supply.

The principles of pricing at CIS IEM, including the pricing for electricity transmission and transit (taking into account country of origin and country of destination) and the payment for system services as well as the principles of controlling network congestion are determined by the Rules of CIS IEM.

13. The work of interconnected power systems of States-CIS participants under conditions of CIS IEM is regulated by technological rules and normative documents, which are developed and coordinated in the established procedure. When the documents are developed, it is necessary to be guided by the following main principles:
 - ! Ensuring the electricity generation and consumption balance, taking into account the necessary power reserve at any time of day and any period of year, is carried out in each control zone by means of its own electric power stations and/or power deliveries from other control zones on the contractual basis. The reserve, which is sufficient for covering the emergency disconnection of any power unit or generating installation in each control zone, as well as the emergency viola-

tion in power delivery from any neighboring control zone, should be provided in each control zone. The quantities of power reserve, its characteristics, and the order of using it are established on the basis of agreements between the CIS IEM participants.

- ! Support of frequency level in the acceptable range in the interconnected power systems of States-CIS participants is carried out by regulating the power balance of each control zone, which is coordinated taking into account the agreements in CIS IEM.
- ! A support of voltage levels in the controlled points of the electrical network in the control zone is primarily a local problem and should be provided by economic subjects belonging to the zone.
- ! The planning of regimes in each controlled zone and in the interconnected power system of States-CIS participants in the whole is carried out taking into account the agreements between CIS IEM participants for delivery, purchase, transmission and transit of electric energy as well as the transactions at the power exchange. The coordinated daily schedules of electricity exchanges, which are formed by system operators and can't be changed in unilateral order, represent the main working documents.
- ! Deviations in electricity exchanges between control zones from the values foreseen by daily schedules should give rise to subsequent payments or compensations.
- ! The structure and operating regimes of electrical networks in the interconnected power system of States-CIS participants must be developed in such a way that they should exclude the appearance in a control zone of not coordinated operating restrictions due to losing any one element (transmission line, transformer, power unit) in other control zones. In this case the sufficient transmission capacity should be provided for delivery the primary power reserve in the control zones, where the emergency deficits can appear.
- ! The control zones are equipped with a set of automatic control and relay protection devices providing the reliable and selective disconnection of emergency elements of electrical networks or power stations with the rate sufficient for preventing the development of emergency processes. The principles of constructing the systems of relay protection and

anti-emergency automatics (including the automatic frequency shedding) in all control zones must be identical.

- ! The power systems of Commonwealth States can have electric ties and operate in parallel with power systems of neighboring States not being members of the interconnected power system of States-CIS participants. A widening of the space of parallel operation must not decrease the reliability of the interconnected power system of States-CIS participants and must be coordinated with the CIS Electric Power Council.
 - ! The participants of CIS IEM exchange all operative-technological, accounting, statistical and other information, which is necessary for realizing their functions. The kinds of this information, the frequency and forms of its presentation are determined in the established procedure.
 - ! The control zones are equipped by automatic systems of hourly accounting of electricity and rendered services as well as by certified systems of collection, transfer and processing of accounting information that provides the full-fledged functioning and development of market.
- 14.** The coordination of functioning and development of CIS IEM is carried out by the CIS Electric Power Council and its structures, which exist and are created new for these purposes. This activity is carried out in the following main directions:
- ! choice of optimal CIS IEM structure and prospects of its development;
 - ! development of the rules for CIS IEM;
 - ! coordination of the programs for developing the internal markets of States-CIS participants within the frameworks of CIS IEM;
 - ! solution of technical problems of securing the reliable and stable work of CIS IEM.

At the 23rd meeting of the Electric Power Council it was decided to continue the work on the concept of CIS electricity market.

As far as CBT is concerned, as reported in section 4, transactions between CIS states are carried out, in most cases, on the basis of inter-governmental and bilateral agreements.

Moreover, in the aforementioned propositions for the creation of CIS IEM it is clearly stated that:

- ! the basic principles of organizing the Interstate electricity market must take into account the international documents used as the basis for formation of the European electricity markets;
- ! one of the main objective of CIS IEM is to create technical, legal and economic basis for unification of electricity markets of CIS and European countries;
- ! the system operators must carry out the on-line control of intersystem lines on the basis of rules coordinated by the States-CIS participants;
- ! transits must be performed on the basis of coordinated tariffs in accordance with the CIS IEM Rules and the concluded agreements;
- ! the principles of pricing at CIS IEM, including the pricing for electricity transmission and transit (taking into account country of origin and country of destination) and the payment for system services as well as the principles of controlling network congestion are determined by the Rules of CIS IEM.

These statements clearly highlight:

- ! the need of a tight coordination among CIS states in the definition of general regulations, transmission and transit tariffs and transmission capacity allocation concerning cross border electricity transactions;

- ! the objective of a progressive integration of CIS IEM with EU IEM.

This suggests that European experiences and regulations, in particular in the field of Cross Border Trading, can be a valuable reference for the creation of an efficient CIS Interstate Electricity Market.

Conclusions

The paper has analyzed the main concepts of the European regulation for cross border exchanges and the relevant implementation mechanisms defined by the European association of Transmission System Operators (ETSO). Subsequently, a description of both the current situation and the forthcoming evolution of the electricity markets in the CIS states has been given, with particular attention to cross border exchanges. The analysis clearly highlights that there is a need of a tight coordination among CIS states in the definition of general regulations, transmission and transit tariffs and transmission capacity allocation concerning cross border electricity transactions. Furthermore the CIS IEM has to be developed in view of a forthcoming progressive integration with the EU IEM.

This suggests that European experiences and regulations, in particular in the field of Cross Border Trading, can be a valuable reference for the creation of an efficient CIS Interstate Electricity Market.

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