From National to Regional Electricity Market in the Baltic States and Northern Europe

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Introduction

There exist comparatively good electric links (330 kV) connecting the Baltic States – Latvia, Lithuania and Estonia, as well Russia (see Figure 1. Baltic integrated power system - IPS). The energy companies (monopolies) of these countries ensure the electricity market because Lithuania and Estonia produce more electric power than they consume whereas Latvia imports up to 40% (on the average, a year). Each of the Baltic energetic companies has a dispatcher centre dealing with electricity. In addition there is a common Baltic dispatch centre in Riga, Latvia, that ensures the flows envisaged by interstate agreements.

Figure 1
Basic Power Network of the Baltic IPS and its Interconnection with other IPSs

The potential of the Baltic electricity market is characterised by the extent of electric power production in the Baltic States (see Table 1).

Table 1
Trends in Electricity Production in the Baltic States

	Estonia		Latvia		Lithuania	
	GWh	%	GWh	%	GWh	%
1995	8692	100	3972	100	13882	100
1996	9102	105	3123	79	16775	121
1997	9208	106	4502	113	14848	107
1998	8518	98	5797	146	17614	127

Perspective on a Liberalised Baltic Electricity Market

At the present time a model of the perspective free Baltic electricity market is being worked out that provides for free access to the power transmission networks both for the electricity producers and its consumers (qualified consumers). Further, restructuring and privatisation of monopoly energetic companies is going on in all three Baltic States, although according to different models and rates of their realisation, which complicates the solution of the problem. The most urgent task is to develop a model of the Baltic electricity market that could be included in the European electricity market, as well, first of all by implementing the project "Baltic Ring".

At the present time technical state of 330kV network in IPS Baltic can not assure all the requirements for fully opened electricity market. The following indicates some points that do not meet the requirements for passing to a completely open electricity market and create additional restrictions in the transmission network:

- reliability criteria (n-1) can only be satisfied considering emergency control,
- on power stations in IPS Baltic and UPS Russia, there is lack of primary frequency regulators with small dead zone by frequency. These primary regulators participate in regulation only outside the limit of 50±0.2 Hz. Only secondary regulators can be used to correct frequency deviations within the limit of 50±0.2 Hz and the correcting actions may lead to overloads in 330 kV network. In case of presence of primary regulation in the network these additional overloads are less probable.
- the absence of the required amount of means to compensate excessive reactive power under minimum operational conditions of the network that leads to necessity of constrained disconnection of large number of 330 kV lines. This presents additional limitations on electrical transmission over the network.

It seems that the move to a completely open electricity market will require detailing and toughening the requirements on technical updating of the transmission network in order to eliminate a majority of the obstacles for realisation of a free electricity market.

The main problems for the development of the perspective

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free Baltic electricity market are connected with:

- the creation of a market model,
- the market regulation measures,
- formation of the market tariffs,
- the operator functions of networks and the system,
- technical problems, and
- the protection of the consumers' interests.

One of the most complicated questions will be connected with the formation of electricity tariffs. The current electricity tariffs in the Baltic States are presented in Table 2.

Due to the growing competition among the producers under free electricity market conditions the electricity production costs should decrease. The consumers' electricity tariffs will depend on extra costs on electricity transmission, distribution and other services rendered to the consumers.

Table 2
The Existing Electricity Tariffs in the Baltic States (USD/kWh) (including 18% VAT).

	For population		For industry	
	1999	2000	1999	2000
Lithuania	0.0526	0.0660	0.0400	0.0500
Estonia	0.0518	0.0518	0.0505	0.0505
Latvia	0.0640	0.0640	0.0533	0.0533

The Grid Code

An important element in the formation of a liberalised Baltic electricity market is the grid code that has already been worked out in Latvia. It is a collection of documents designed to set the order for regulated management of co-ordinate operation of the electricity supply system. The purpose of the code is the application of the market mechanisms in the electricity supply system, with reliable and stable functioning of the system being considered as absolute priority.

The structure of the basic market requirements as to Latvian grid structure is the following:

- responsibilities of the market organiser,
- safety requirements,
- spot market,
- regions of the Baltic energy system,
- losses and restrictions in the networks,
- evaluation of the system adequacy,
- central dispatcher management and marketing,
- administration of spot market prices,
- extra services,
- market information,
- force majeure and shutdown of the market, and
- accounts

The use of the code in creating a joint Baltic electricity market depends on the other Baltic States – Lithuania and Estonia – as far as the principles included into the code are acceptable for them. It is important for the Baltic countries to come to an agreement on free, as low as possible, and joint price of electricity transmission avoiding any tariffs, customs on their borders, and the like.

The formation of the Baltic free electricity market is intended as a gradual process. It is envisaged to start its realisation with the market simulation during which the staff is trained and the market management is adjusted including the order of tariff calculation and financial accountancy. For the Baltic energy companies this will be a new process, different from the Western countries, considering the Baltic specifics, particularly in co-operation with the energy companies from the CIS that are hard to predict.

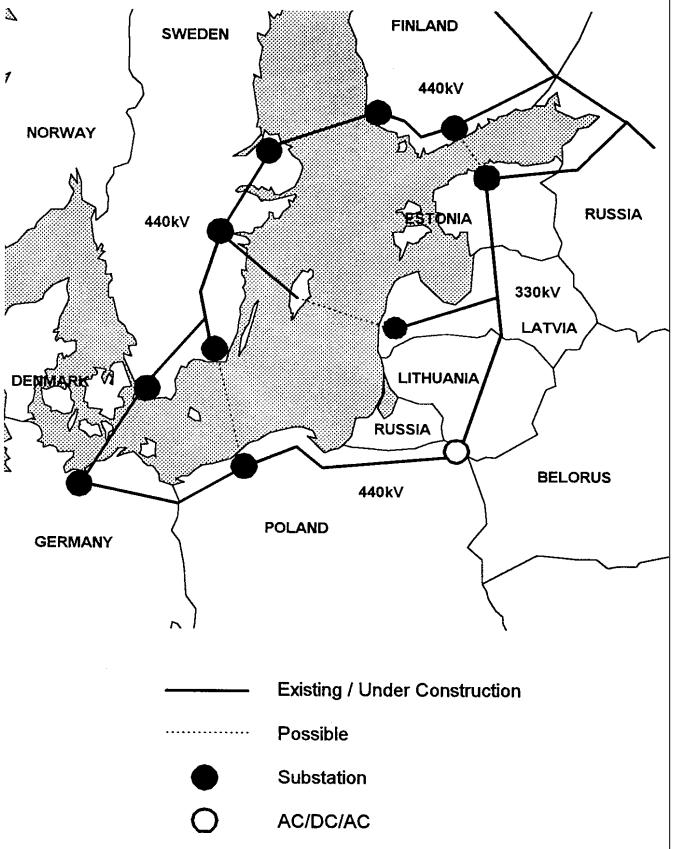
The Baltic Ring

There are several Baltic Ring variants for the creation of electric networks around the Baltic Sea forming an integrated North European power supply system in the future (see Figure 2). It concerns the connection of the Baltic power supply system by means of a deep-sea cable with Estonia and Finland, in the north, and forming an electric link with Lithuania and Poland, in the south. This variant entails great investments, and the investors should feel sure about sufficient flows of electricity through these links and their payback in quite a short time. Thus inclusion of the Baltic power supply system into the European power supply system (the NORDEL), a Scandinavian energy association in Finland, the CENTREL association in Poland under the conditions of a free European electricity market will bring severe competition for the producers of electricity in the Baltic States.

In this way the formation of the Baltic electricity market (Latvia, Lithuania and Estonia) is the first step towards further integration into the free European electricity market.

(continued on page 18)

Figure 2
Version of the "Baltic Ring" (Electricity)



Baltic Electricity Market *(continued from page 17)*

The Green Energy

Particular problems of the free Baltic and European electricity market will arise for the low-power energy producers who expand the use of renewable resources of energy (the small hydropower stations, wind generators, etc.) where the prime cost of electricity is higher than in the large electric stations with modern technology. Presently the power supply companies of the Baltic States support the producers of such "green energy" and purchase electricity at an increased price. The share of the "green energy" on the free electricity market is a special problem. A similar problem may build up around co-generation electric stations based on centralised heat supply systems widely spread in the Baltic countries. By simultaneous production of electricity and heat in co-generation electric stations a fuel economy is achieved with a correspondingly lower amount of harmful emissions into atmosphere. However the competitive power of co-generation electric stations (and of comparatively high efficiency) on the free electricity market will be limited as well.

In a number of countries there are methods developed on how to support and subsidise "green energy". To make it competitive, one of the most popular methods is that all the partners of the electricity market cover the cost difference for the production of low-power "green energy". Of course, this complicates the formation of the electricity market prices and their amount.

Conclusions

In the Baltic States transition from the existing national electricity market to the free electricity market in the Baltic region entails major and specific problems:

- the national electricity market in all the Baltic countries is at a developmental stage and proceeds according to different models and at a different rate;
- there are links with Russia and other CIS countries whose behaviour is hard to predict;
- there is no link with the European system; great investments are needed to develop it (the Baltic Ring project).

The regional integrated Baltic electricity market could start operation about the year 2002.

References

1. V. Zebergs, N. Zeltinsh, Yu. Pastors, G. Klavs un citi Energy Tariff Project - Latvia *// Edited by Niels J. Harne - Nelleman, Nilsen & Rauchenberger. Danish Energy Research Programme, 1996: 223 pp.*

2. V. Zebergs, N. Zeltinsh, A. Davis Integration of energy systems of Baltic States into the North - European system for the sustainable energy supply development // *20th Annual International Conference, Int. Ass. for Energy Economics. Vol. II, New Delhi, India, 1997: 561-570.*

3. H. Käär, J. Michna, V. Miskinis, N. Zeltinsh Actual energy efficiency problems in Baltic sea countries being in transition // *Energy Strategies in the Baltic States: From Support to Business (WEC Baltic Regional Forum, Riga, Latvia) Vol. II,1997: 59 - 64.*

4. V. Kreslinš, Yu. Pervušins, N. Zeltinš The Interconnected Baltic Power System: technical basement and development problems // *Latvian Journal of Physics and Technical Sciences, 1997, Nr.5: 17-63.*

5. V. Zebergs, N. Zeltinsh, V. Kreslinsh Latvian and East-European market: towards the EU Policy *// 21st International Conference of the IAEE "*Experimenting with Free Markets: Lessons from the Last 20 Years and Prospects for the Future" *Proceedings, Volume 1, Quebec, Canada, 1998: 233-242.*

6. K. Brinkis Development of common rules for transmission network and main power plant in the Baltic IPS under open electricity market conditions // *International seminar "Common operational rules for the Baltic power systems", Jurmala, Latvia, 2000.*

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