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Risk Management by Annual Financial Futures and PHELIX Options on the European Energy Exchange EEX - Alternative for the Development of the Bulgarian Electricity Market

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ABSTRACT

The price of electricity in the Republic Bargariya was always a topic and permanent food for thought for both businesses and households as final consumers. The paper aims to show the specificity of trade in electricity - in principle and in chasnost features and imbalances on the Bulgarian market. To demonstrate the need for organized and working stock market for electricity and the need for their daily work transparent.The accession of Bulgarian electricity market to the European Energy Exchange EEXwould be the best alternative for solving problems. To present the main opportunities for time bargains to influence the price of electric energy and the possibility to protect (hedging) an occupied position with the help of fixed-term contracts for annual financial futures and PHELIX options on electric energy.

Keywords: Market Pricing; electric energy market, Energy Prices; European Energy Exchange – EEX

INTRODUCTION

A sector for sale of electric energy became operational in August 2000 with the Group of the German Exchange (Gruppe Deutsche Börse) in Frankfurt. The exchange is called European Energy Exchange – EEX). Transactions are made on EEX with all primary-energy sources: electric energy, natural gas, coal, oil and harmful emission quotas.

Cash power exchange market – **EPEX SPOT** is the cash power market uniting the markets of France, Germany, Austria and Switzerland. Together these countries represent more than a third of electricity consumption in Europe. The seat of the company is in Paris with offices in Leipzig, Bern and Vienna. It was established in 2008 based on the merger of the power exchanges Powernext SA of France and EEX AG in Germany. Gradually integrated to the market of these four countries are the markets of Italy, Spain, Czechia, Slovakia, Poland, Hungary, Greece and Romania.

The exchange mechanism allows the arrangement of offers as legally binding agreements for purchase or sale of a particular quantity of electric energy in a given zone, for supply at a determined price (the so-called market clearing price).

Completed deals are forwarded immediately to the central counterparty for each transaction – the European Commodity Clearing (ECC). It is a central counterparty for all buyers and sellers who, as a rule, do not know each other. The clearing organization will always step in as a universal intermediary between buyer and seller, i.e. it provides for both the liabilities of buyer versus seller (payment for the electric energy), and for those of seller to buyer (the delivery of electricity).

As an important result of the exchange trade EPEX SPOT publishes daily exchange prices which are determined in a direct meeting of demand and supply. As such transactions are the result of extensive, open and transparent competition between orders by members of the Exchange they reflect the best available information as at this point of time in the market environment. Usually the cash market is organized ‘a day ahead’ and ‘within the day’.

The number of players on the EPEX SPOT cash market is continuously growing and at this point of time they are 236 firms from 24 countries, and there are licensed traders including from Romania and Greece. It is enough to look at the map with the geographical location of players in trade on the

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European Energy Exchange and the legitimate question will arise – why no Bulgarian participation on this market. While the exchange market guarantees:

a. fair and adequate behaviour of members of the Exchange;
b. safe delivery and payment for the traded electric energy;
c. anonymity of transactions – producers do not know to whom they sell and buyers do not know from whom they will buy actually;
d. Transparency in determination and variation of the price in accordance with demand and supply for every moment of the day.

Calculated by the cash market of the EEX exchange are also the respective indexes by which graphically presented is the variation in electricity price from various sectors of the market:

Phelix – index for physical delivery (Physical Electricity Index) – reporting on a daily basis a published price for base load (Phelix Base) ad the peak load (Phelix Peak) on the market of electric energy for the area of Germany and Austria market. The index is calculated from prices on the EPEX SPOT cash market (the exchange acronym for such market). It is calculated as unweighted arithmetic average in two variants: with *base load* and with *peak load*. The index is used as a base (underlying) asset for Phelix futures and options traded actively on the European Energy Exchange.

Daily PHELIX index for base load (Phelix Day Base) is the unweighted arithmetic average price of electric energy for the hours from 1 to 24 traded on the spot market. It is calculated for all calendar days of the year.

Daily PHELIX index with peak load (Phelix Day Peak) averages the prices of electric energy traded on the spot market for the hours from 9^{th} to 20^{th} hour for all business days of the year.

Monthly PHELIX index for base load (Phelix Month Base) is calculated as an arithmetic average of all day values of the index for all calendar days of the month.

Monthly PHELIX index with peak load (Phelix Month Peak) is calculated as the average (unweighted) of all values of the PHELIX Day for all days from Monday to Friday of the respective month.

The wholesale price of electric energy varies within wiled limits yet it is always the result of the momentary ratio of electricity demand and supply.

In line with the cash transactions also possible are three main types of term transactions – futures with physical delivery, financial futures and options. They feature a similar method of determining the price – in auction or an ongoing price fixation. Traded on the European Energy Exchange are also options, yet for the territories of Germany and Austria only. They are called PHELIX options as they are based on the PHELIX index and have a possible maturity – month, quarter, year.

Futures contracts for supply of electric energy are two main types – futures with physical delivery and financial futures.

Traded on the European Energy Exchange are futures with physical delivery of electric energy for the territories of France, Belgium and Denmark. Such futures come to an end with physical delivery of the whole quantity of electric energy for the entire period of the contract. Calculated in the last trading day (for week futures) and two exchange days before the period of delivery for the months futures is an 'ending price' for the futures. Usually this is the last price at closure of the trade in such futures. The buyer of a futures contract is obliged to receive the entire contracted quantity of electric energy for the whole period of the contract and to pay it at the ending price. The seller of the futures contract is obliged to deliver the contracted electric energy at constant parameters for each day and hour of the period of supply. Generally the contracts make provision for delivery of 1 MWh of electricity per each astronomical hour of the period of supply.

Financial futures admitted for trading are for the territories of Germany/Austria, France and Italy:

Review will be made here only of financial futures for the territory of Germany and Austria based on the PHELIX index:

1. Financial futures on the Phelix index for base load (daily, weekend, weekly, monthly, quarterly and yearly) – Phelix-Base-Day/Weekend/Week/Month/Quarter/Year-Futures;

2. Financial futures on the Phelix index for peak load (daily, weekend, weekly, monthly, quarterly and yearly) – Phelix-Peak-Day/Weekend/Week/Month/Quarter/Year-Futures;
3. Financial futures on the Phelix index without peak load (monthly, quarterly and yearly) – Phelix-Off-Peak-Month/Quarter/Year-Futures;

Starting February 2015 French and Italian futures will be released for the days and for the weekend, as well as financial futures for the territories of Spain and Switzerland.

The ending price for financial futures is determined on the calculation after a particular index which averages the prices from auctions for each hour of the day/night on the cash market 'day forward' per each discrete market territory. Usually prices are determined for base load, for peak load and for off-peak load, respectively. Ending of financial futures takes place only with equalization of the position with payment. i.e. there is no physical delivery of electric energy here. On maturity day the buyer of the financial futures is obliged to pay the difference between futures price and the fixed lower ending price. Where the ending price is higher than the futures price the difference is then paid by the seller of the futures contract. Such payment shall be effected until two days after maturity of clearing.

Options are another type of term transactions in which a right is being bought. Rights are two types: in the case of Call-option the right is 'to buy' at the price of exercise and in the case of Put-option the right is 'to sell' at exercise price. The buyer of a put option is entitled to receive a short position in a respective futures at the option exercise price on the last trading day. The seller of a put option receives, when exercising a long position in the respective futures, *an Option Premium* – this is the exchange price, which is paid at buying the right. *Types of options* – they are European type, which means that options are exercised on the last day for trading only. *Option series* – these are all call and put options on one and the same base asset with same exercise prices and one and the same maturity period. Offered for the first trading day for each maturity period are at least three series with different exercise prices – one of them shall be 'cash' (in-the-money), the second one - 'on money' (at-the-money) and the third price must be 'out of money' (out-of-the-money).

Traded maturity periods – in the case of Phelix year options there are four possible contracts with possible maturity coming in the end of each quarter of the current year:

- maturity at the end of March – April Phelix year option for base load (Phelix-Base-Year-Apr-Option);
- maturity at the end of June – July Phelix year option for base load (Phelix-Base-Year-Jul-Option);
- maturity at the end of September – October Phelix year option for base load (Phelix-Base-Year-Oct-Option);
- Maturity at the end of December – January Phelix year option for base load (Phelix-Base-Year-Jan-Option).

Option exercise – such exercise shall only take place during the last day for trading at the time of the so-called 'Exercise phase'. The Exchange determines an exercise market price (Intraday-Fixing-Preis) and publishes it at 14:00 hours before the exercise phase has started. Options that are 'cash' against the published price (Intraday-Fixing-Preis) are exercised automatically.

In principle, term transactions are concluded between members of the clearing corporation. If the transaction is realized by a buyer or a seller who is not member of the clearing corporation the transaction then shall be conducted as a must by a member of the clearing corporation who has the obligation to bring the deal to an end. The authorized member of the clearing corporation stands as intermediary in the transaction, i.e. the member shall stand as buyer vis-à-vis the seller of the electric energy and as seller vis-à-vis the buyer of electric energy. Guaranteed thus is the liquidity of the transaction and the fact that buyer and seller will carry out the assumed commitments under the transaction made on the exchange.

Term transactions (derivatives) for delivery of electric energy are particularly interesting. The sale of electricity on the day before its physical delivery and the conclusion of term transactions for delivery in the future provide the real opportunity for accurate reporting of demand and supply, as well as great opportunities for risk management by making use of the specific potential of derivatives concerning electric energy. Each producer may choose to either sell at loss in a particular time zone or to accept the losses from a forced outage of its capacity because the system operator has nowhere to sell such

electric energy owing to the fact that at this point of time no one is willing to buy and consume that quantity.

I have to mention in conclusion that the European Energy Exchange EEX is indeed providing a perfect market mechanism for determining the exchange prices of primary-energy sources in Europe and in particular – of electric energy. The process of transformation from state monopoly in the energy sector to a free efficient market will end when players in the trade begin to conclude transactions among them under transparent exchange rules and guaranteed equality for all players in the market. Such market shall also make provision for the conclusion of term transactions (futures and options) under a perfect regulation because with an appropriate selection of term transactions the interest can be defended of each participant in the trade in electric energy against a risk unacceptable therefore. It is also evident that only the territory of Bulgaria is staying out of the market of the European Energy Exchange which, to my opinion, does not deserve high esteem.

The price of electric energy in the R of Bulgaria has always been a topical theme and a permanent reason for reflection for the business and the households, both of them as end consumers. The present article is intended to show the specifics of trade in electric energy – in principle and in particular the peculiarities and disproportions of Bulgarian market, these actually being an obstacle for the development of a normal competition on this market. Still observed in the Bulgarian electric energy market are multiple restrictions on participants in this trade that prove the limitation on competition when transactions are made in electric energy thus delaying actually the transformation of the market from state monopoly to an efficient market.

The issues relative to Bulgarian energy sector and the trade in electricity in particular, have been a topical and morbid theme for years now. This is in consequence of the disproportions superimposed with time and contradictory rights and obligations of players in the Bulgarian electric energy market. Most generally they boil down to the following:

- In September 2008 the Bulgarian government decided to amalgamate the energy companies of Bulgaria into Bulgarian Energy Holding (BEH), which includes NEK, Kozloduy NPP, Maritsa – East 2 TPP, Maritsa-East Mines, Bulgargaz, Bulgartransgaz and Bulgartel;
- The development of the electric energy market over the period 2004-2014 is schematically presented in the following table (2014 data are estimations):

Table1.

year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
electric energy producers	4	6	6	7	7	7	6	7	7	9	9
wholesale consumers	7	14	31	62	57	61	65	77	105	2096	2100
wholesale traders	0	2	10	24	20	26	35	46	47	52	55

Annual generation of electricity over the period varies between 45 and 50 terawatt-hours (TWh) which is indicative of fluctuations in the yearly consumption under 10% against the previous year.

The increasing number of wholesale consumers and traders purchasing and selling electric energy on the Bulgarian market is a sure sign of the improved market environment and the increased opportunities for competition. Yet I need to immediately note that the 'free market' occupies a mere 9.2% of the trade in electric energy for 2013 [8, p. 23], while the expectations for 2014 are that the quantities of electric energy sold on the free market will be some 10% of the total quantity for the year.

Electric energy consumption is irregular during the different hours of the day and this forces the System Operator of the respective territory to temporarily disconnect particular producers (the time of forced outage of capacity varies from several hours for HPP and TPP to 2-3 days for NPP, with at least the same time needed to put them back into generation mode), or to connect new capacities to the system as it must be balanced all the time – to have just as much electric energy generated as will be consumed. The classical example of balancing the electric energy system are hydropower plants which generate electricity in peak hours and then become consumers and start pumping the water back upwards so that it can be used again in the generation of electric energy. (See Art. 108.(1) of the

Energy Law (EL): *'Single operational planning, coordination and control of the electric energy system is performed by the operator of the electric transmission network and by the operators of each of the electricity distribution networks.'*)

The main regulatory body is the State Energy and Water Regulatory Commission (SEWRC). A total 13 principles are set forth in Art. 23 of EL by which the Commission shall be guided in performing its regulatory powers. Such principles are in full compliance with the requirements of European Directive 2009/72/EC, yet their application is usually accompanied by contradictory comments and opinions of various experts from the sector.

Contracts concluded for long-term purchase of energy with Contour Global Maritsa East 3 and AES 3C Maritsa East 1 EOOD from 2001 make the provision that they will sell all their production to NEK at a price guaranteeing the return of their investment for a period of 10 years. It is noted in the SEWRC report that the total costs for 'non-generated energy' that are paid to the two power plants amount to 274 mill. Levs for 2013 because there was no consumption in Bulgaria and the price of the generated electric energy is significantly higher and can not be sold in neighbouring markets. [7, 16]

The main large consumers of electric energy, i.e. those selling to the end consumers – the three power distribution enterprises – EVN, CEZ and Energo-Pro are purchasing all the electric energy they need at a fixed price which shall guarantee a profit of 8% to them, in accordance with the regulations of SEWRC and the signed privatization contracts;

The differences in prices of individual producers also are specified by SEWRC and they are speaking in their own way when exemplifying the disproportions laid down in time:

Prices of energy and availability of producers of electric energy for the regulated market	price in Levs per MWh
Kozloduy NPP	30
Maritsa East 1 TPP	90.35
Maritsa East 2 TPP	68.30
Maritsa East 3 TPP	70.88
factory power plants	128.65
district heating plants	183.46
renewable sources of energy	299.05
hydro-power plants property of National Electric Company	63.64
approved price for the National Electric Company as 'Public supplier'	110.58

The price of electric energy from the thermal power plants in Maritsa East is two to three times higher that that from NPP and this is mainly due to the commitment assumed for purchasing the entire quantity of electric energy produced by the two TPPs;

The process of transformation from state monopoly in the energy sector to a free efficient market is accomplished when participants in this dealing begin to make transaction among them at transparent exchange rules and guaranteed equal treatment of all players in the market. This market shall also imply the striking of term deals (futures and options) under perfect regulation because the interest of each participant in the trade in electric energy can be protected with the appropriate selection of term deals against risks unacceptable therefor.

In order to discontinue this Bulgarian paradox to pay the lowest price for electric energy in Europe and at the very same time such price to be the greatest burden for Bulgarian households **we must join, as soon as possible, the European Energy Exchange** and to see generated electricity sold in a transparent manner. NEK obligations as a public supplier and the agreed rights of other players in the trade in the Bulgarian market shall be regulated and compensated by the government beyond any market relations. Most probably this again will be tax and non-tax burdens in the price for end consumers yet the state must intervene on its part in shouldering the burdens in our energy system as all this had happened with the collaboration or inaction of the ruling government structures.

Moreover, as of January 2015 there are monthly, quarterly and yearly futures sold in the European Energy Exchange for electric energy with base load for the market of Greece and for the market in Rumania.

Should Bulgaria decide to join the European Energy Exchange this will be a definite sign that new disproportions will not accumulate and bills of consumers will become transparent and predictable.

Otherwise the territory of Bulgaria will remain an isolated and non-transparent electric energy market with bad consequences for all of us.

In conclusion I must note that the European Energy Exchange EEX indeed provides a perfect market mechanism of determining the exchange prices of primary energy sources in Europe and for electric energy, in particular. It is also evident that Bulgaria's territory is the only one still remaining outside the market of the European Energy Exchange and this does not deserve any high esteem, as far as I am concerned.

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