

## **A comparison between the prices of electricity network services to the regulated and free market**

Jordanka Angelova

### **Abstract**

Sharing the costs for balancing the electricity system is an important step towards full liberalization of the market, in line with the other countries in the European Union, where all clients pay the costs for balancing energy system.

It can't be denied the indisputable progress of the liberalization process of the Bulgarian electricity market. The topic of "liberalization" is no longer unknown to stakeholders in the energy sector, from both the supply and in demand stand points.

**Keywords:** Electrical efficiency prices (EE); Balancing the electricity system; Price "Obligations to society."

### **Introduction**

The creation of a free market is one of the aims of the reforms in the energy sector. Transition from state monopoly to a competitive environment is a serious challenge for all energy companies. In a regulated market the costs going through the regulatory authority regardless how effective spending. Low energy prices and the lack of competition led to a lack of motivation to improve energy efficiency. The negative effect of the irrational use of resources transferred and replicated in other sectors of the economy and is reflected on the final price of each product. The result is reduced competitiveness and high energy efficiency. For these reasons, through the creation of a free energy market for a streamlining of production costs, improving the energy efficiency and introducing competition in the sector. This is done by passing the scheme "**Single buyer**" scheme to "**Bilateral agreements**" with many buyers and sellers.

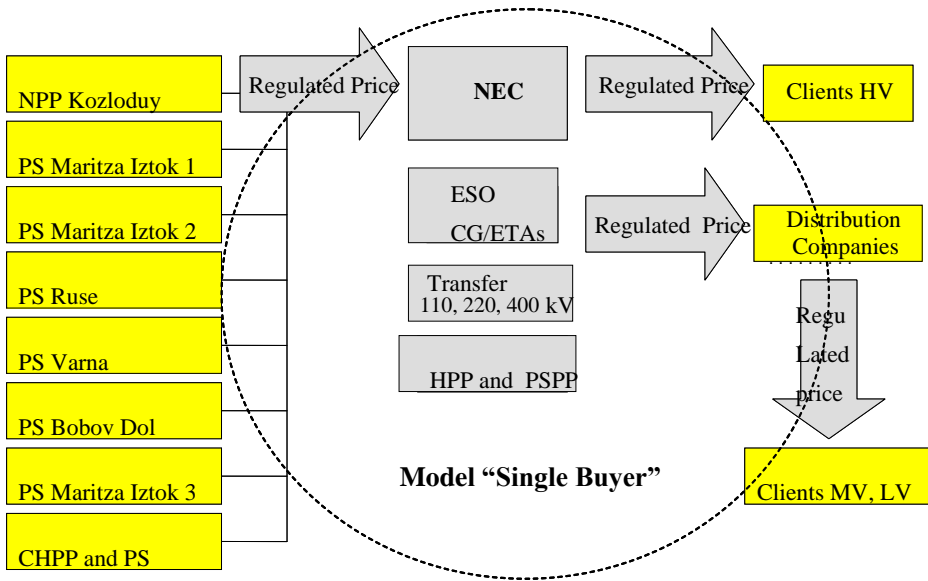
**Switching from scheme of "single buyer" to scheme "Bilateral agreements"**. Before the liberalization of the energy market in Bulgaria, has existed the so called model of "single buyer", under which manufacturers must sell their entire production of the Public Provider (National Electricity Company - NEC), which resells the energy efficiency of the electricity distribution companies. Characteristic is that the prices of energy efficiency throughout the chain of production, transportation to distribution and consumption are regulated and common, i.e. without clearly reported different costs of production and costs to operate and maintain the network. Consumers pay a total price for energy efficiency without being able to choose a supplier.

The free market of EE (Energy Efficiency) was launched in September 2004 by the first recording of the delivery of the first schedule at agreed prices between NPP "Kozloduy" and "Umicore Med". The selected market model provides for a phased opening from consumers through the introduction of minimum annual consumption starting from the largest industrial enterprises. These are representatives of the heavy industry in Bulgaria – mining, metallurgy, chemistry, cement. For the manufacturers, there have been introduced quotas, which divide the quantities in free prices and the quantities in regulated prices for the needs of small business and residential subscribers.

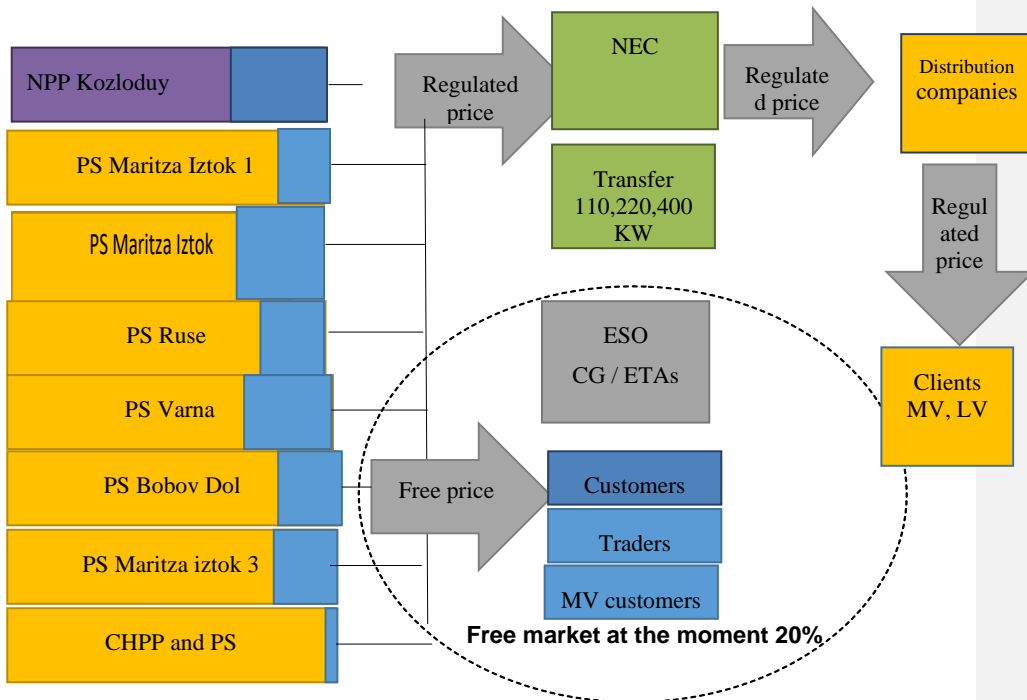
The following figure depicts the so called model of "Single Buyer".

The free market in Bulgaria operates on the basis of bilateral agreements between participants - producers, traders and consumers. The model allows for plant partially released availability to sell both in free prices of eligible consumers and regulated prices of the Public Service - NEC. Currently, all companies at the level of high voltage (HV) have the status of privileged users and can choose their own supplier. According Trading Rules EE [7] and Access rules [8] they must meet the conditions required - no obligations, technical means for measuring and reporting energy in settlement periods.

Model "Bilateral Agreements" and Free-negotiated prices are presented in Fig. 2.



**Fig. 1. Model of "Single Buyer"**



**Fig. 2. Model of "Bilateral Contracts" and "Free-negotiated Prices"**

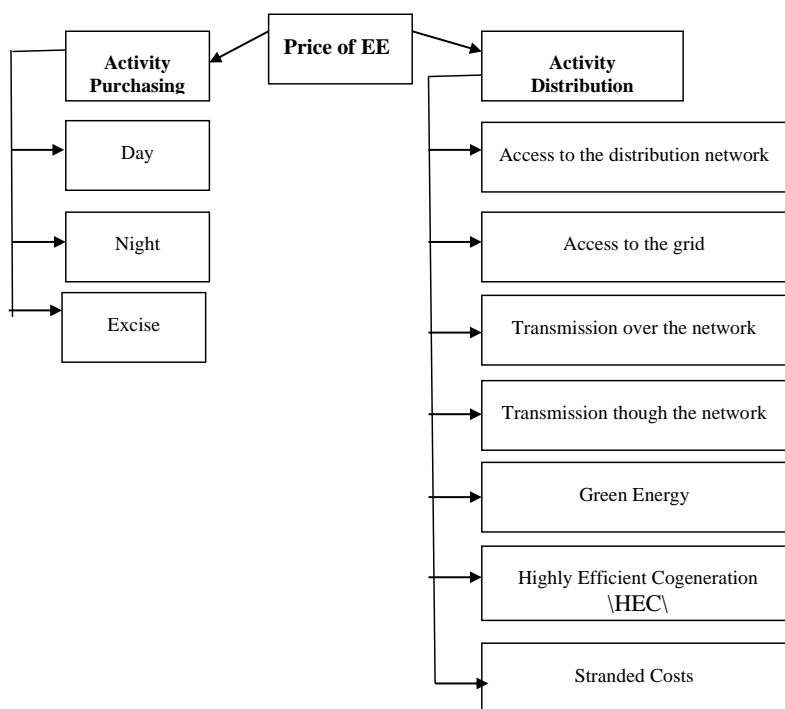
According to the Rules for access after 2007 all users, regardless of the voltage level to be supplied with energy efficiency in free prices. At this point at the free market there are registered more than 190 participants. They are divided into several groups - plants, HV clients, customers, medium voltage (MV) and traders. The number of producers is relatively constant - 6-7 number of plants, while the number of customers and merchants grow over time. In the first two years of the free market - 2004-2005, active participants are mainly plants and the largest representatives of the heavy industry in Bulgaria. These are companies with annual consumption of 100-400 GWh. They are characterized by continuous operation, continuous cycle of electricity regardless of price tariffs - peak, day, night. These enterprises have the resources - material and technical resources and trained personnel, who can meet the requirements for registration in the market. That is, providing access to the network by the Electricity System Operator (ESO), hourly measurement of electricity, preparation of weekly load profiles, analysis and management of the imbalances.

**Comparison between the prices of the network services in the regulated and free electricity market.** Network services are implemented by distribution companies (EDCs), which include: electricity supply and distribution of electricity. The sum of the values of the two components form the tax base on which value added tax is charged at the rate of 20%. The total transaction value is the sum of the tax base and the amount of tax charged.

By decision of the Regulator from 01.07.2012 the cost of supply for domestic customers is determined by the rates (day and night), depending on the type of measurement that the customer has chosen. For example, for household customers possibilities are single- or double-tariff measure, i.e. day and night tariff. The price of supply includes the so-called "Duty". It is a type of tax, the amount of which is determined by the Law on Excise Duties and Tax Warehouses [6]. It is calculated based on the total EE consumed by the customer for the period multiplied by the excise rate. For household customers it is equal to zero and for non-household it transfers from distribution companies of the State Agency "Customs".

The price for allocation is based on the prices for: access to the distribution network, access to grid electricity transmission over the

distribution network, transmission of electricity through the grid, green energy, additives for high efficiency cogeneration and stranded costs (Fig. 3).



**Fig.3. Formation of the price of electricity efficiency\***

\*Source: Data source (www.cez.bg)

- **Price for access to the distribution network** - this is the price for the service for the use of the distribution network. It is calculated as follows:

$$P_{AN} = P_A \times Q_E \quad (1)$$

where  $P_{AN}$  - the price of access to the distribution network;

$P_A$  - price of access;

$Q_E$  – total quantity of consumption of electrical energy.

- **Price for access to the grid** - this price is paid by all customers and is charged on the amount of consumed energy efficiency. It transferred by the electricity companies Electricity System Operator (ESO);

- **Price for transmission over the distribution network** – paid by all customers and it is charged on the amount of consumed energy efficiency. The price varies depending on the voltage level to which the customers are connected (medium or low), and includes the cost of reconstruction, modernization and maintenance of the network;

- **Price for transmission over the grid** - this price is paid by all customers and it is charged on the amount of consumed energy efficiency and transferred by the electricity of the National Electricity Company (NEC);

- **Price "Green energy"** – this price is paid by all customers and it is charged on the amount of consumed energy efficiency. By additive offset the costs of public service obligations for the purchase of energy efficiency from renewable energy sources at preferential prices. This price is transferred by distribution companies of NEC;

- **Price "High efficiency cogeneration"** (HEC) - and this price is paid by all customers and it is charged on the amount of consumed energy efficiency. It reflects the costs that are incurred to promote high efficiency cogeneration of heat and electricity in accordance with European Directive 2004/08 / EC. This price is translated by distribution companies of NEC;

**Price "Stranded/irretrievable costs"** - the price reflects the cost of NEC for the purchase of EE in long-term contracts under Article 35 of the Energy Law [5]. Transferred by the distribution companies of NEC.

In the process of liberalization of the energy market for consumers with regulated prices (domestic customers and small companies of low voltage) will share the costs for balancing the electricity system of Bulgaria. So already in the invoices for payment of consumed energy efficiency, are being added another two components: "Balancing energy supply system" and "Balancing the energy distribution system."

This change follows the launch of the balancing market in the country from June 1 2014, according to which already regulated companies are obliged to make hourly forecasts for the consumption of its customers day to day. Estimates are submitted to the ESO, which manages the electricity system.

When there are differences between estimates and consumption this creates an imbalance, which is to be paid by all users of the system. These costs shall be paid to ESO, and not remain for distribution and supply companies. ESO monitors whether there are differences in the projections, what is their size and price. The principle that will calculate the price for balancing for end customers is as follows: the total amount due to the ESO's monthly imbalance shall be divided by the total consumption of all customers of this month. This yields a price imbalance per kW/h, which is multiplied by consumption of each customer.

The maximum size of the deviations from estimates may be included in the final price of energy efficiency, is determined by the State Energy and Water Regulatory - SEWRC. He admits only part of the costs for companies to balance the system; they have the right to include in the price of energy efficiency. These are up to 1.5% of the variation in the forecasts of supply and to 0.5% of the variation in the forecast distribution. Other unrecognized costs shall be borne by businesses. At the same time, distribution companies and end suppliers will pay the entire cost to ESO for causing imbalance. Costs for balancing will be updated at least twice within a price period allowed by the Regulator's limits.

According to Decision № C-25 / 29.07.2013, the SEWRC [9], all clients in the free market of energy efficiency in Bulgaria, without the customers of the Provider of last resort (DPI) are obliged to pay a price for "public service obligations". It is paid based on actual recorded EE which is consumed. Determined by SEWRC, the price is 16.37 lev / MWh excluding VAT and it is valid for the new regulatory period from 01.08.2013 until 07.31.2014 the introduction of the price element "Liabilities to the public" on the customer's invoice is pursuant to Article 100, paragraph 4 of the Energy Act and the Rules for trading electricity [7]. In September 2014 customers will see for the first time this price in their invoices. After this change, however, it is important for customers to know that they will not pay network fees for green energy, High Efficiency Cogeneration (HEC) and stranded costs to their network operator.

Table 1 is a comparative table of the approved prices for network services for the free market and export of electricity for the price period 2012-

2013 and the new prices for the period of 2013-2014. In table 2 is presented the way to form the price "Liabilities to society."

**Table 1**

**Comparative table of the approved prices for network\***

<b>Comparative table of the approved prices for network services for the free market and export of EE rate period 2012-2013, and the new prices for the period 2013-2014</b>				
	<b>Measure</b>	<b>Established prices in 2012/2013</b>	<b>New prices in 2013/2014</b>	<b>Change</b>
Price for transmission through the transmission network	lev / MWh	9,47	9,73	<b>+0,26</b>
Price of access to the grid	lev / MWh	6,48	2,40	<b>-4,08</b>
Additive "Green energy"	lev / MWh	11,10	-	-
Additive VEKP	lev / MWh	3,83	-	-
Additive "Stranded costs"	lev / MWh	3,38	-	-
Price "obligations to society"	lev / MWh	-	15,20	-
Total cost of network services for the free market	lev / MWh	<b>34,26</b>	<b>27,33</b>	<b>-6,93</b>

\*Source: Data source SEWRC

**Table 2**

**Liabilities to society\***

<b>Price formation for public service obligations</b>	<b>Indicators</b>
Costs of compensation on mandatory purchase energy for customers in the free market in thousand leva	75 719
Energy intended to be sold on the domestic free market MWh	4 980 000
<b>Price of "public service obligations" in lev / MWh</b>	<b>15,20</b>

\*Source: Data source SEWRC



By 2013 the share of each energy source to the total amount of EE sold by the Public Provider NEC distribution companies, in their capacity as end supplier include:

1. NPP "Kozloduy"	37.08%
2. Condensing power plants (TPP) of coal	28.65%
3. Combined heating coal	5.15%
4. Combined heating gas	7.96%
5. Wind power	2.90%
6. Photovoltaic power plants	4.29%
7. Hydroelectric power plants (HPPs)	13.07%
8. Renewable biomass	0.17%
9. Purchased EE balancing market - surplus	0.73%
TOTAL:	100 %

### **Conclusion**

Quantities and costs for the purchase of EE to be offset, it is necessary to:

1. Have been approved by the Regulator for each type of production;
2. Recognized by the Regulator for different energy companies;
3. Fall within the regulatory framework.

Furthermore, the Regulator will approve individual quantities and costs of individual obligated to buy persons (end suppliers and NEC), which will be compensated in "within income received." The proposal for compensation will be drawn up by NEC as the recipient of the compensation income.

And at many levels the defined restrictions on the quantities and costs are likely to generate new legal complications and financial tension between supplier companies and company's buyers.

Assuming that there is another scheme active:

- A person is obliged to buy the entire quantity EE with preferential prices regardless of its type and the point of connection of the producers;
- That person is collecting revenue calculated in the final prices set by the Regulator's mechanism to be able to fulfill this obligation;
- Quantities bought are easily verifiable – they are measured by meters;
- The cost of buying are easily verifiable - they are set by the Regulator's prices and are multiplied by the corresponding quantities;

• After the completion of each rate period it may be necessary to adjust the revenue for deviations between forecasts and reports on quantities and costs for the purchase, which should be reflected in the revenue provided for the same purpose for next year.

After a ten year process of liberalization of the electricity market it is necessary to move the ideas to solve challenges in the sector.

### References:

1. Georgiev, A., Liberalizaciata – 10 godini po-kasno [Liberalization – 10 years later], Utilities Journal, Annual volume 7, Sofia, 2014.
2. Georgiev A. , Regulirani uslugi, Pazari i Ceni [Regulated services, Markets and Pricing], Textbook, In Editor, St.Kl.Ohridski, C., Sofia, 2014.
3. Stioliv, D., Analiz na pazara na elektricheska energia v Balgaria [Analysis of the electricity market in Bulgaria], In Editor Technical university - Sofia, 2013.
4. Shushulov K. and others, Ceni na elektricheskata energia v liberaliziran Pazar: perspektivi na regulatornata institucia [Electricity prices in a liberalized market: the perspective of the regulatory institution], Energy Forum-Varna, 2009.
5. Zakon za energetikata [Energy Law], Darjaven vestnik, N 56/24.07.2015, C.24-36.
6. Zakon za akcizite i danachnite skladove [Law on Excise Duties and Tax Warehouses], Darjaven vestnik, N30/24.04.2015, C.12-16.
7. Pravila za targovia s elektricheskata energia [Rules for electricity trading], Darjaven vestnik, N39/09.05.2014, In Editor Comission for Energy and Water Regulation, C. 9-16.
8. Naredba za regulirane cenite na elektricheskata energia, [Ordinance regulating electricity prices],Darjaven vestnik N 4/16.01.2015, In Editor Comission for Energy and Water Regulation, C. 3-12 .
9. Reshenie N C-25/29.07.2013 [Decision № C-25 / 29.07.2013], the EWRC, C.2-5.
10. <http://www.cez.bg/bg/tseni/tseni-na-el-energiya.html>

### Information about the author

**Commented [O1]:** It should formalized in accordance with the requirements

**Commented [O2]:** You have to add references to the SCOPUS articles

Jordanka Stamenkova Angelova – Assoc.Prof.Dr., Vice Dean Faculty of Management, Technical University – Sofia, Economic, Industrial Engineering and Management, Sofia, Bulgaria

Post address: Bulgaria, Sofia - 1000  
Kliment Ohridski Blv. 8  
Technical University  
Faculty of Management  
Assoc.Prof.Dr. Jordanka Angelova  
Vice Dean

e-mail: [j.angelova@abv.bg](mailto:j.angelova@abv.bg)