

# EXAMINATION OF THE MAIN CHARACTERISTICS OF THE ELECTRICITY MARKET IN HUNGARY

Imre KOCSIS<sup>1</sup>, Judit T. KISS<sup>2</sup>, Attila VÁMOSI<sup>3</sup>

<sup>1</sup>University of Debrecen Faculty of Engineering, [kocsisi@eng.unideb.hu](mailto:kocsisi@eng.unideb.hu)

<sup>2</sup>University of Debrecen Faculty of Engineering, [tkiss@eng.unideb.hu](mailto:tkiss@eng.unideb.hu)

<sup>3</sup>University of Debrecen Faculty of Engineering, [vamosi.attila@eng.unideb.hu](mailto:vamosi.attila@eng.unideb.hu)

**Abstract**—Energy efficiency measures and increasing use of renewable energy can contribute to the sustainable development at global level, to increase of the energy saving in any economy, and to decrease of energy dependence at global and macro level. In this paper we aim to investigate the amount of electricity produced and the development of price of electricity sold and purchased by the different actors in the Hungarian electricity market between 2008 and 2013. Moreover we analyse the rate of renewable energy sources in the production of electricity, look for the answer to the question whether the rate of renewable energy sources in electricity production increased or decreased in Hungary.

**Keywords**—sources of electricity production, supply of electricity, price of electricity

## I. INTRODUCTION

SUSTAINABLE development presents a significant challenge for the economic players. The state can have an impact on investments in renewable energy sources and on increasing energy efficiency to enhance the use of renewable energy sources. The increase of the rate of the renewable energy consumption in the gross final energy consumption can be conducive to the reduction of the carbon-dioxide emission and energy dependence. In any economy the electricity consumption is a determining factor in the structure of demand for energy. The share of renewable energy in gross final energy consumption increased in Hungary between 2004 and 2011, both the measure and tendency of the change is similar to the EU 27 average [1]. A report of the European Commission Joint Research Centre shows that the economic and financial crisis impacted the energy efficiency and the global investment in renewable energies in late 2008 and early 2009, and signs of a strong recovery appeared in the second quarter of 2009 [2].

The Directive on Electricity Production from Renewable Energy Sources (2001/77/EC, RES [3]) brought out targets for the promotion of electricity from renewable energy sources in member states. The

efficiency of the regulation was analysed in a number of publications, e.g. in [4] and it was shown that the legislative process resulted in confusion on both the nature and the subject of the RES targets that are being aimed for. In this paper we aim to examine the main characteristics of the electricity market by placing emphasis on the supply of electricity. The amount of electricity produced and change in the price of electricity in Hungary between 2008 and 2013 is also analyzed. Furthermore, the change of the electricity produced from renewable energy sources during the above mentioned period is also investigated.

## II. THE EXAMINATION OF THE AMOUNT OF THE ELECTRICITY PRODUCED

The source of the analyzed data is the database of the Hungarian Energy and Public Utility and Regulatory Authority [5].

The amount of electricity produced by power plants decreased by 25.8 percent in Hungary between 2008 and 2013 (Fig.1.). The use of the renewable energy for producing electricity significantly decreased (by 56.5 percent).

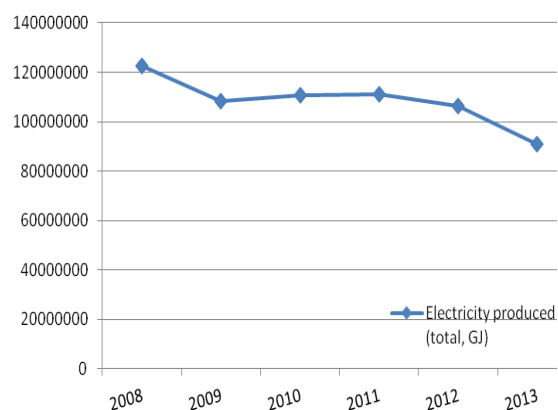


Fig. 1. The amount of the electricity produced in Hungary between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

The rate of renewable energy sources in the total electricity energy production was 12.9 percent in 2008, however this proportion decreased by 5.3 percentage points by the end of the investigated period (Fig. 2.). The Hungarian government expenditure on environmental protection was 0.7 percent of the GDP in 2012 [6]. In Hungary, the share of electricity from renewables as a percentage of total electricity consumption was the third lowest value (6.4%) among European Union (EU) countries in 2011 [7].

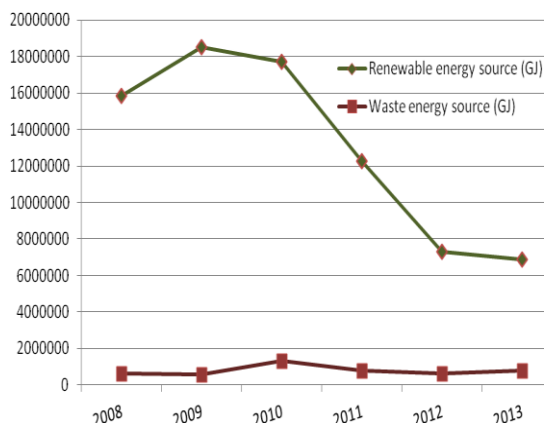


Fig. 2. The share of waste and renewable energy sources in the electricity produced in Hungary between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

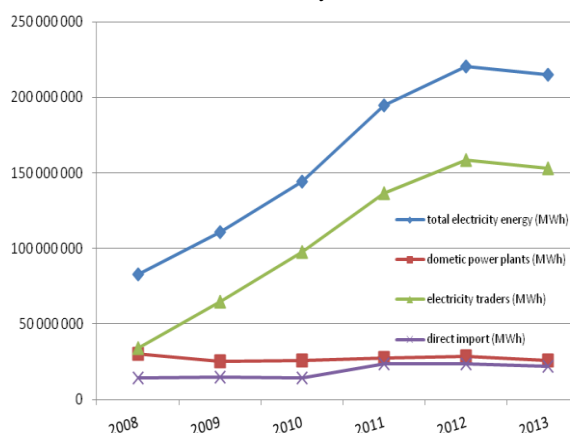


Fig.3. The amount of electricity purchased in Hungary between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

In any economy the increase of renewable energy consumption can aid the decrease of energy dependence and contribute to economic development. The EU Member States have high but varying levels of energy dependence, which means that they are vulnerable to energy price changes or energy supply disruptions [8]. In the developed countries waste neutralization and management of industrial and communal waste is essential from the point of view of environmental protection and energy production. In Hungary the electricity generated from waste was 0.5 percent in 2008

and it increased by 0.39 percentage points between 2008 and 2013.

Traders can purchase electricity from different sources, namely: power plants; transmission system operator (TSO); electricity traders; the organized electricity market; import.

The rate of the electricity produced in power plants, and coming from electricity traders and import give the majority of electricity supply.

The amount of electricity produced in domestic power plants plays only a small part in the electricity market. It was 36 percent in 2008 and decreased by 24 percentage points. The electricity sold by electricity traders represents the highest value in the wholesale and retail electricity market. Hungary imports electricity from Austria, Slovakia, Ukraine, Romania, Serbia, Croatia, and Slovenia (Fig.4.). The share of imported electricity energy was 17 percent in the total purchased electricity in 2008, and it decreased to 10 percent by 2013 (Fig. 3).

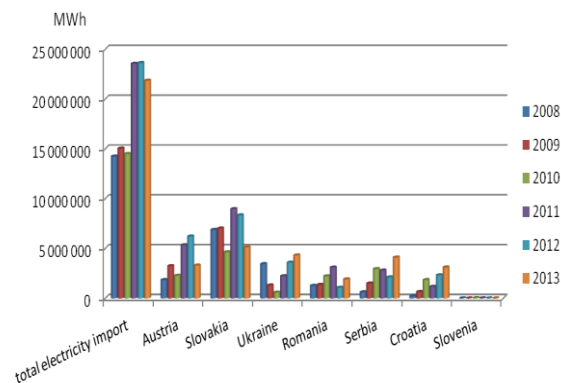


Fig.4. The amount of the Hungarian electricity import by exporter countries between 2008 and 2013 (MWh). Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

### III. THE DEVELOPMENT OF THE AVERAGE PRICE OF ELECTRICITY IN THE RETAIL AND WHOLESALE ELECTRICITY MARKET

The average purchase price of electricity equals the ratio of the value and the quantity of the total electricity purchased. The average prices at the wholesalers and retailers contain the effect of changes in the supply of the electricity (1). Electricity in Hungary is purchased in the largest amount and value from the domestic power plants, electricity traders and importing countries (Fig. 3.). The prices established by the above mentioned three sellers have the largest impact on the development of the average prices in the wholesale and retail market (Fig. 5.). The average price of the electricity produced by the Hungarian power plants was the lowest in 2008 and 2009 (Fig. 5.). However, the prices offered by the domestic power plants increased during the investigation period. The rate of increase of the price was 15.3 percent between 2010 and 2013 (Fig. 5.).

Although there was an increase in the price of electricity produced by domestic plants, the average price of electricity sold by electricity traders and coming from import fell. This means that the prices paid for electricity import was the lowest between 2010 and 2013.

The average selling price of the electricity is equal to the ratio of the value and the quantity of the total electricity sold. The potential buyers of electricity in the wholesale and retail electricity market are the following (Fig. 6.): end users; universal service providers; electricity traders and importing countries.

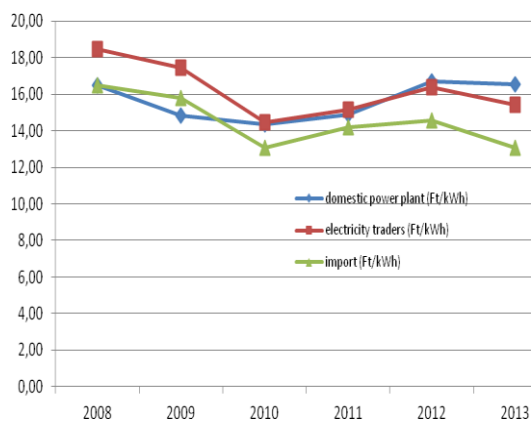


Fig.5. The average purchase electricity prices by sellers, between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

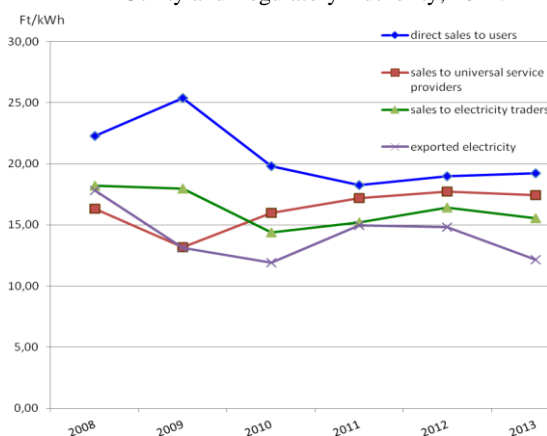


Fig.6. The average selling electricity prices in the retail and the wholesale market, between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

The average prices of the imported electricity exceeded the exported prices in 2009, 2010 and 2013. The change in the average price of electricity shows that the competition in the field retail and wholesale electricity is relatively strong. The average selling price to all potential purchasers decreased except for the universal service providers (Fig. 6.).

The difference between the average re-sales and purchase prices represent the average margin for the electricity wholesalers and retailers. In Hungary the above mentioned margin decreased between 2008 and 2013 (Fig.7.,8.). The average sales price of the electricity

was higher by 7.34 percent than the average purchase price in 2008. However, the margin decreased by 2013, the average sales price was higher by 3.55 percent than the average purchase price (Fig. 8.). This represents a rate of decline of 3.84 percentage points.

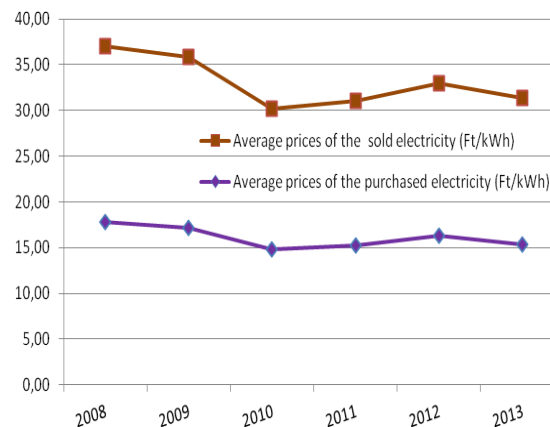


Fig.7. The changes in the average purchase and selling prices (Ft/kWh) of the electricity in Hungary between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

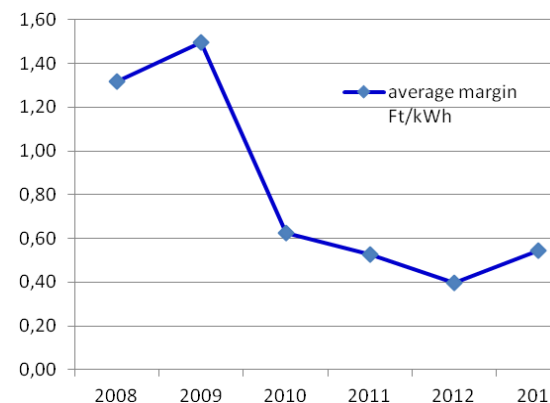


Fig.8. The development of the average margin in Hungary between 2008 and 2013. Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

#### IV. CHANGE OF THE AMOUNT AND PRICE OF ELECTRICITY SOLD TO USERS BY PROVIDERS OF UNIVERSAL SERVICE

The price of electricity is an important parameter of the energy market of a country. In the following of the paper the price of the electricity sold to users by universal service providers is investigated, moreover the connection between amount and price is also analysed.

The amount and the price of the electricity sold to users by universal service providers in Hungary can be seen in Fig.9. and Fig.10., in the period between 2008 and 2013.

The charts in Fig. 9. and Fig.10. show an increase in amount (from 2008 to 2009) and in price (from 2008 to 2010), respectively, however, the peak is followed by decreasing trend to 2013.

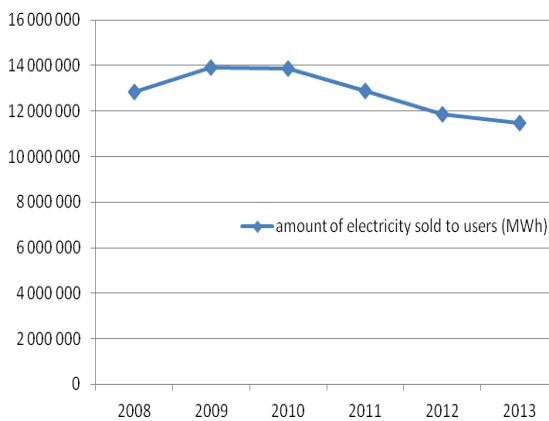


Fig. 9. Amount of the electricity sold to users by universal service providers in Hungary 2008-2013

Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

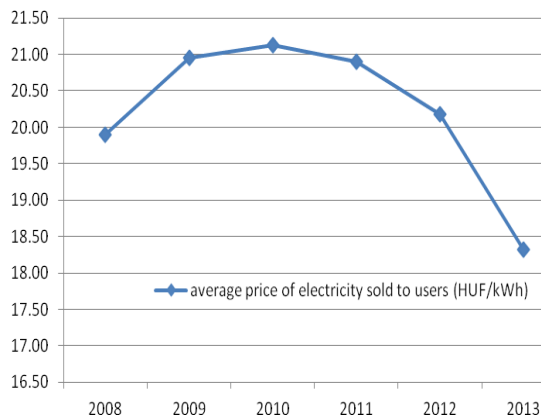


Fig. 10. Price of the electricity sold to users by universal service providers in Hungary 2008-2013 Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

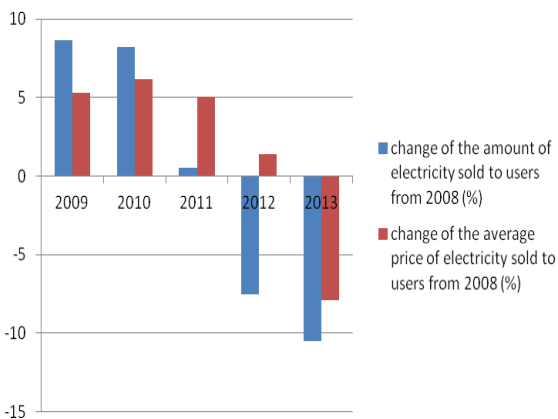


Fig. 11. Change in the amount and price of the electricity sold to users by universal service providers in Hungary 2008-2013 Source: Hungarian Energy and Public Utility and Regulatory Authority, 2014.

Considering the change of the amount and the price of electricity, a significant difference can be realized. Fig.11. shows the change in the amount and the price of electricity sold as a percent of the value in 2008. The big change in the amount from 2010 to 2011 was not followed by significant change in the price, moreover the

price in 2012 was larger by 1 percent than in 2008, while the amount of energy sold to users was smaller by 8 percent.

#### CONCLUSION

In this paper we examined the total amount of electricity produced and the sources of electricity supply in the energy market in Hungary between 2008 and 2013, furthermore analysed the average price of electricity sold and purchased as well.

We found that the use of the renewable energy for producing electricity significantly decreased in Hungary between 2008 and 2013, however, the electricity generated from waste increased slightly (by 0.39 percentage points).

The average selling price to all potential purchasers decreased except for the universal service providers. The average price of electricity sold by traders and coming from import decreased, while there was an increase in the price of electricity produced by Hungarian domestic plants. This means that the prices paid for electricity import was the lowest between 2010 and 2013. However, the average prices of the exported electricity were lower than the imported prices in 2009, 2010 and 2013. The change in the average price of electricity shows that the competition in the wholesale and retail electricity market is relatively strong.

#### ACKNOWLEDGMENT

The publication is supported by the TÁMOP-4.2.2.A-11/1/KONV-2012-0041 project. The project is co-financed by the European Union and the European Social Fund.

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