Hungarian Energy Market REPORT

1st Issue 2010
The aim of the Regional Centre for Energy Policy Research (REKK) is to provide professional analysis and advice on networked energy markets that are both commercially and environmentally sustainable. We have performed comprehensive research, consulting and teaching activities on the fields of electricity, gas and carbon-dioxide markets since 2004. Our analyses range from the impact assessments of regulatory measures to the preparation of individual companies' investment decisions.

**Key activities of REKK:**

- **Research**
  - Geographically, our key research area is the Central Eastern European and South East European region:
    - regional electricity and gas price modelling
    - CO₂ allowance allocation and trade
    - supports for and markets of renewable energy sources
    - security of supply
    - market entry and trade barriers
    - supplier switching

- **Consultancy services**
  - price forecasts and country studies for the preparation of investment decisions
  - consultancy service for large customers on shaping their energy strategy on the liberalised market
  - consultancy service for regulatory authorities and energy supply companies on price regulation
  - consultancy service for system operators on how to manage the new challenges

- **Trainings**
  - Our training programmes:
    - summer schools
    - courses for regulators
    - trainings and e-learning courses in the following topics:
      - price regulation
      - electricity markets
      - market monitoring
      - gas markets
    - occasional trainings for companies based on individual claims

Nowadays, due to market opening, energy markets cannot be analysed without taking into account regional environment. We monitor the market situation and developments of the countries of the Central Eastern and South East European region. We have built a regional electricity market model including 15 countries to forecast regional electricity prices.

The experts of REKK with their energy regulatory experience and academic background can supply scientific solutions taking also into account the specialities of the given markets.

**Our reference partners:**

- **Regulatory authorities and ministries**
  - MEH (Hungarian Energy Office), GVH (Hungarian Competition Authority), KVVM (Ministry of Environment and Water), GKM (Ministry of Economy and Transport), FVM (Ministry of Agriculture and Rural Development)

- **Energy companies and large customers**
  - Mavir, E.ON, MOL, MVM, ELMÜ, Főgáz, Alcoa, DRV

- **International organisations**
  - DG TREN, USAID, ERRA, CEER, NARUC

1093 Budapest, Közraktár u. 4–6., Hungary  T. (+36 1) 482 7070  F. (+36 1) 482 7037  E. rekk@uni-corvinus.hu  www.rekk.eu
Dear Reader,

We are very pleased that our publication Hungarian Energy Market Report is in its second year. We sincerely hope that our readers have been satisfied with the issues of the first volume and continue to be our subscribers.

In the current issue as well as discussing the market developments of the last quarter, we are publishing four brief analyses.

In the first two analyses we focus on two important features of the institutional environment of the electricity market: the settlement of balancing energy and the allocation of cross-border transmission capacities. The relevance of examining balancing energy prices is underscored by the dramatic increase of these prices last year.

Regulation of the access to cross-border transmission capacities considerably impacts on the conditions of electricity export and import, and through this, on the price of domestic electricity.

In the related analysis we highlight those problems associated with the allocation method, the elimination of which could substantially improve the conditions of use of the international transport infrastructure.

The third article examines the structural characteristics of and underlying reasons for the decline of domestic natural gas consumption last year. In the fourth article, published under the Working Papers column, we describe the main conclusions of the long term REKK forecast for the energy use of Hungary.

We are hopeful that we can provide lots of useful information to our valued readers also in the current issue. It is our continuing goal to keep raising the professional standard of our publication. If you decide to subscribe to our publication, or renew your subscription, please fill in the attached subscription form (also downloadable from www.rekk.eu).

Péter Kaderják, Director

---

TABLE OF CONTENTS:

INTRODUCTION 1

ELECTRICITY MARKET DEVELOPMENTS
International price trends 2
Overview of the electricity market in Hungary 3
Next year’s electricity prices in Hungary and in the Central European region 5

ENERGY MARKET ANALYSES
Is the current high level of domestic balancing energy prices fundamentally justifiable? 7
Reflections on the allocation method of the Hungarian cross-border transport capacities 9
Recent developments of natural gas consumption in Hungary 11

WORKING PAPERS
Forecast of energy consumption in Hungary up to the year 2020 14
ELECTRICITY MARKET DEVELOPMENTS

During the last quarter of 2009 no major changes were seen in the international energy markets. The price of crude oil exhibited moderate fluctuations, the price of coal, on the other hand, showed almost no change. Only minor changes were witnessed in the price of carbon credits and electricity futures. Within the domestic electricity market demand continued to fade in this quarter, too, although to a lesser degree than in previous quarters. In fact, in December electricity consumption started to increase compared with figures of a year ago. Importantly, during the last quarter of the year domestic electricity prices – in both the spot and futures markets – sank to the level of German wholesale prices. Nevertheless, the price of electricity in Hungary is still a few Euros above the Czech and Slovak futures prices.

International Price Trends

Commodity prices did not change significantly at the end of 2009. During the last quarter the price of crude oil stayed within the 70-80 USD/barrel range. In mid-October 2009 a robust price increase took place, resulting in 80 USD/barrel trades. The price of crude oil stayed at around this level until early December when it suddenly fell to 70 dollars, only to climb back to 80 dollars again by the end of the year. During the last quarter of 2009 no substantial change took place in the coal market, coal futures prices stayed within an especially narrow range – 81-86 USD/ton – the whole time.

The price of EEX traded baseload and peak electricity started to decline gently at the end of the third quarter. The erosion of the price stopped in early October, and reversed into an increasing trend, culminating in late October at 49 EUR/MWh for baseload and 69 EUR/MWh for peak energy. Subsequently, the prices of both products started to decline, finishing the year at 45 EUR/MWh and 60 EUR/MWh, respectively.

In the fourth quarter of 2009 the price of the European Union Emission Allowance (EUA) stayed within the range of 13-16 EUR/ton, which has been typical of the carbon-dioxide market since the middle of April 2009. October 2009 was marked by somewhat

---

**Figure 1** Prices of ARA coal futures 2010 traded on the EEX, and spot prices of WTI crude oil between October 2008 and the end of 2009

**Figure 2** Futures prices of 2010 baseload and peak products on EEX
increasing prices, followed by a moderate decline. The largest impact on the price of the allowance was made by the Copenhagen Climate Conference which ended on 18 December. The meeting was unsuccessful in the sense that individual countries have not committed themselves to binding emission reduction targets, only an agreement of principles was reached. As a result, the price of EUAs started to decline, falling to 12.5 EUR/ton at the end of the year. Trading volume on the ECX in the last quarter of 2009 can be viewed as average, except for late December, when the average daily volume stayed notably below the annual average.

**Overview of the electricity market in Hungary**

In the fourth quarter of 2009, the monthly temperature adjusted power consumption, excluding seasonal impacts, was 2.3% lower on average than in the same period of the previous year. This is below the 6.5% year-on-year decline of the previous quarter. Monthly data makes the progression even more noticeable. While consumption in October and November was 4.4% and 3.1% below the figures of a year ago, December registered a 0.57% increase in domestic electricity consumption.

In the third quarter the share of import in total domestic electricity consumption was at a record setting level of almost 25%. In the last quarter of 2009 this ratio decreased to 8%. This matches the trend that has been observed for the last few years, namely that import, as a proportion of domestic electricity consumption, is at its lowest in the fourth quarter.

A look at the results of the monthly cross-border capacity auctions held by MAVIR Zrt. in the fourth quarter of 2009 reveals that the price of cross-border capacity has declined dramatically from the high level of early 2009. In this period transporting a kWh across the border cost 0.1 HUF on average. We can find higher prices only at the Austrian border section, where the auctions results are interesting from another point of view, too. While the price of import capacity in October substantially exceeded the price of export capacity, this situation had turned around by December, when exporting a kilowatt-hour of electric power cost 0.71 HUF.

In addition to cross-border capacity auctions, day-ahead prices of the neighbouring countries’ power exchanges as well as the Hungarian Electricity Price Index (HEPI) disclosed by the Association of Hungarian Electricity Traders (Magyar Villamosenergia-kereskedők Egyesülete, MVKE) provide important short-term price information. (HEPI is based on the self-reported data of day-ahead transactions provided by MVKE members.) Next, we compare OPCOM, EEX, OTE (operated by the Czech TSO) day-ahead electricity prices and that of the Hungarian price index, allowing us to analyse primarily the short-term tendencies. In the fourth quarter of 2009, the average day-ahead baseload prices varied greatly. Within that period the price of electricity was the highest in October, while November and December were characterised by substantial price declines. The decline was particularly strong in the Romanian market as the average October price of 45 EUR/MWh fell to 27 EUR/MWh in November, rising again to 37 EUR/MWh in December.

October and the last two months of the year are distinct also when it comes to regional comparisons. While the highest October prices were registered in Hungary, November and December prices in Hungary were roughly equal to the price levels of the Czech and German markets.

The wholesale price of electricity is influenced by the costs of settlement of deviations from the schedule – in other words by the balancing energy prices – as well. The system operator sets
the settlement prices of positive and negative balancing energy based on the procurement prices of the upward and downward regulation services. The financial costs of balancing for the balance circles are determined by the spreads between the balancing energy prices and the spot price of electricity in the settlement period. The higher the price of positive balancing energy is compared with the spot price, the more costly it is to purchase the shortage from the balancing energy market, and the lower the price of negative balancing energy compared with the spot price, the higher the loss incurred from selling the surplus to the system operator (instead of selling to the market) is.

In the fourth quarter of 2009, the average hourly electricity price (HEPI) was 8 HUF/kWh, and the average settlement prices of positive and negative balancing energy were 29 and 0.15 HUF/kWh, respectively. The costs of balancing on the Hungarian market are very high due to the wide spreads

---

**Figure 6** Results of monthly cross-border capacity auctions in Hungary, Q4 2009

In the figure capacities mean the capacities offered for auction. Capacities were not sold fully in the period under review only if they were oversubscribed at a specific price since then the system operator regarded the next highest price as the auction price.
between balancing energy prices and the market price. A negative balancing energy price close to 0 HUF/kWh means that the loss from balancing a long position of 1 kWh is equal to the market price. However, the loss from a short position is even higher since the deficit must be covered at a price which is more than triple of the market price, i.e., at a price premium of over 200%.

**Next year’s electricity prices in Hungary and in the Central European region**

The Prague Power Exchange (its new name is Power Exchange Central Europe) opened its Hungarian section in March 2009, where monthly, quarterly and yearly futures can be traded. In 2009 a total of 3.47 TWh of electricity was traded in the Hungarian section with a value of EUR 182 million. Another important development is that starting in January 2010 this platform will also enable spot trading with delivery in Hungary.

Next we analyse the development of Hungarian wholesale electricity prices based on the 2010 PXE prices for Czech, Slovakian and Hungarian baseload futures and the EEX prices for the same products.

The declining price trend in baseload futures prices in the region, prevalent since August 2009, continued in the last quarter of 2009 as well. A rather important recent development in the Hungarian market is that since November 2009 domestic futures electricity prices started to align with the German market.
again. As is well known, after domestic prices were cut loose from German prices in the summer of 2007, the Hungarian wholesale market was characterised by a substantial price premium for about two years. The price premium of next-year baseload delivery was 12 EUR/MWh in the autumn of 2007 and 13 EUR/MWh in the autumn of 2008 compared with the German market. Due primarily to the large scale decline in demand, but also because of the favourable changes experienced at virtual capacity auctions (expanding and more predictable supply) in the first half of 2009 the price premium significantly eroded, and in November it completely disappeared. The evaporation of the premium is also indicated by the results of the last MVM capacity auction held on 4 November 2009. The 2010 baseload product of MVM was purchased at a price of 13.56 HUF/kWh, which is – exchanged to Euros at the effective futures exchange rate of 280 HUF/EUR – equivalent to the November price of the German baseload product listed at the exchange (48.4 EUR/MWh).

The results of the annual cross-border auctions also provide important information for the 2010 wholesale prices, as summarised in Figure 10. Looking at the total sales volume we can discover a slight decline for the more important border sections. Volumes decreased in both directions at the Austrian-Hungarian border, and volume of the Slovakian import capacity fell by 100 MW. The room for Romanian and Croatian import, however, increased, and so did the capacity to export to Slovakia. Cross-border capacity prices have considerably declined on all border sections and stay below 1 HUF/kWh in all locations. In comparison with the auction prices from previous years, the price for Austrian import declined from 3-3.5 HUF/kWh to 0.27 HUF/kWh. A similar trend took place for the Slovakian and Romanian import, with the price of capacity entitlements falling to around 0.5 HUF/kWh. In accord with our earlier conclusions this indicates that domestic wholesale prices dropped to the level of the German–Austrian markets, and are 1-2 EUR/MWh above the prices of the neighbouring Slovak and Romanian electricity markets.

Figure 10 Results of the 2010 annual cross-border capacity auctions in Hungary

The capacities displayed in the figure are the sum of the quantities auctioned by the two system operators. In case neighbouring system operators hold their own auctions, the displayed prices are equal to the prices reached at the MAVIR auctions.
ENERGY MARKET ANALYSES

Is the current high level of domestic balancing energy prices fundamentally justifiable?

While last year the domestic and neighbouring electricity markets were characterised by a substantial decline in prices, the settlement price for positive balancing energy in Hungary grew by more than 50%. In our article we ponder if the current high level of Hungarian balancing energy prices is justifiable. In our analysis we put the development of domestic balancing energy prices into perspective by comparing them to Hungarian spot prices, the fuel cost of regulating power plants and balancing energy prices of other European countries.

The settlement of balancing energy is an essential component of the wholesale electricity market. Due to the uncertainty surrounding electricity consumption and production, electricity traders can keep their balance circles in equilibrium only with a specific margin of error. In order to balance the real time shortfall and surplus, traders buy balancing energy, provided by the system operator through scaling in and out of reserved capacities. A vital goal of operating the balancing power market and the related system of settlements is to enable market participants to settle differences originating from planning imprecision at transparent and foreseeable settlement prices.

The costs of system level balancing are passed on to electricity consumers through two channels. The fixed costs of purchasing balancing energy – made up of the capacity fees of power plant capacities reserved for balancing energy purposes and the capacity fees of reserves on the consumer side – are included in the network use tariffs as a system level services fee. The settlement price of balancing energy is determined by the variable cost of purchasing balancing power, i.e. the average energy fee of balancing power plants and consumers in the period in question. The balancing energy costs of balance circles are then passed on to the price of retail electricity.

Figure 11 describes the monthly average values of the positive balancing energy prices and the hourly electricity prices between January 2008 and December 2009. (The positive balancing energy is used to supplement shortfalls, while the negative balancing energy helps to offset surpluses). Since most of the power plants providing balancing services in the domestic electricity market are gas fired, we also included the regulated retail prices for natural gas in the figure.

Comparing balancing energy prices with spot electricity prices is warranted by the fact that in a properly functioning electricity market the price of balancing energy closely follows the hourly price of electricity. The difference between these two reflects the surplus price for which operating power plants are willing to increase their production. Under average demand conditions – that is, when power plants operate below maximum capacity-, this cannot be too high, as increased load will not lift the costs of generation substantially. Therefore, under normal market conditions the price of positive balancing energy cannot really escape from the spot market price of electricity - and this statement is also supported by international experience (see later). This surplus price must
especially be curtailed these days, when electricity markets are characterised by abundant capacity due to a large fall in demand.

Apparently, the price of domestic balancing energy and the price of hourly electricity started to diverge in 2009: while spot prices fell considerably, the price of balancing energy notably appreciated. In 2008 and 2009 the average settlement price for positive balancing energy was 21 and 32 HUF/kWh, respectively, while the average hourly spot price was 15 and 8 HUF/kWh. In other words, while the price of electricity halved, the price of balancing energy increased more than fifty percent. The degree to which balancing energy prices broke away from spot market prices unambiguously points to the impaired operation of the domestic balancing energy market.

The radical increase of balancing energy prices cannot be explained by cost factors, either. In the first half of 2009 the official retail price of natural gas increased by 22% compared with the same period of the previous year, while balancing energy prices rose by 76% in the same period. That is, the energy fees demanded by power plants for upward balancing – and as a result, the price of positive balancing energy – grew at a much higher rate than the fuel costs of power plants.

Finally, we compared domestic balancing energy prices with the same prices of two other countries, neighbouring Austria, and Belgium, which has a power plant portfolio that is quite similar to that of Hungary. It is easy to see how in Austria and Belgium balancing energy prices are determined by the general energy market trends. During the first three quarters of 2008 Austrian and Belgian balancing energy prices increased in line with the price of electricity. Then, in the last quarter of 2008 and in the first quarter of 2009 they tempered significantly, as the outbreak of the global financial crisis drove electricity demand and fuel prices down. We can also witness how the two year average balancing energy prices in Belgium and Austria are not really different from each other.

Hungarian balancing energy prices in 2008 already exceeded those of Austria and Belgium, but the difference became drastic in 2009. While in the Belgian and Austrian markets the cost of balancing in 2009 was 50 EUR/MWh on average, more than twice this amount, 114 EUR/MWh on average had to be paid for positive balancing energy in Hungary.

Based on the above we can safely say that Hungarian balancing energy prices exhibit a strong departure from both domestic electricity prices and from the balancing energy prices of other European countries, and are at a level not justified by fundamentals. We do not dispute that balancing energy prices have to contain some premium in order to encourage adherence to the schedule. An exceedingly high premium, however, will result in multiple unfavourable consequences. Firstly, costs associated with balancing will boost the final consumer price, high balancing energy prices, therefore, inflate prices. According to our estimates balancing costs make up almost 1 HUF/kWh in the electricity price of domestic consumers, while they account for only about 0.2–0.3 HUF/kWh in Belgian electricity prices. Secondly, the level of balancing costs influences consumer prices indirectly as well, through its impact on retail competition. High balancing energy costs impose a relatively higher burden on smaller electricity traders which have a smaller clientèle and therefore a more difficult to plan consumption portfolio. Therefore overly punitive balancing energy prices breed competitive disadvantage to new entrants to the retail market, and thus lead to weaker competition and higher prices.
Reflections on the allocation method of the Hungarian cross-border transport capacities

Below we examine if the allocation system of cross-border transport capacities on the Hungarian side facilitates the maximum possible utilisation of the available physical infrastructure. We analyse the attributes of the annual and monthly cross-border capacity auctions, present the trends of auction revenues at MAVIR, and finally articulate specific recommendations to alter the allocation method with which the conditions of use of the international transport infrastructure could be substantially improved.

Regulating access to the cross-border transmission lines with finite capacity makes a profound impact on the operation of the Hungarian electricity market. On the one hand, Hungary is traditionally a net electricity importer and the price of electricity import is partly determined by the price of the physical infrastructure necessary for import transmissions. On the other hand, the import of electricity contributes to the expansion of domestic supply and consequently to limiting the market power of the dominant domestic wholesaler. Therefore the supply of cross-border transmission capacities also indirectly – through strengthening the domestic wholesale competition – plays a vital role in influencing domestic electricity prices. Finally, regulating foreign trade affects the market opportunities of domestic power plants to a large extent and therefore has a significant impact on the returns of power plant construction projects.

The way cross-border capacities are allocated, therefore, notably impacts on the long term development of the electricity market.

Physical capacities at the borders are sold by the system operators as annual, monthly and daily transmission rights. First, we take a look at the change in the quantity and relative proportion of annual and monthly transmission rights at the Slovakian–Hungarian border, which can be viewed as the most important border section based on import volumes. The orange rectangles represent annual capacity rights, while the grey rectangles stand for monthly capacity rights. We depicted Hungarian import in the positive area, and Hungarian export in the negative range.

As shown in Figure 13, annually 850 and 900 MW of import capacity rights were on offer between 2005 and 2007. We should remark, however, that only a portion of this quantity was allocated in a transparent fashion. Since 2008 there is a tendency to offer increased volumes of monthly capacity rights at the expense of annual capacity rights. The volume of annual capacity rights decreased to 700 MW in 2008, to 400 MW in 2009 and to 300 MW in 2010. At the same time, the quantity of allocated monthly capacity rights grew constantly: it exceeded 235 MW in each month of 2008, and surpassed 255 MW in each month of 2009. The offered monthly quantities, nevertheless, notably vary from month to month, and supply shows neither a trend, nor seasonality.

A similar tendency can be recognised at the Austrian–Hungarian border, another important section from a foreign trade perspective. While in 2008 the volume of annual import capacity rights was 300 MW, this figure fell to 180 MW in 2009 and to 120 MW in 2010.

The change in the structure of the offered capacity rights is without a doubt unfavourable for market participants involved in foreign trade. Primarily due to the uncertainty surrounding the quantity of monthly capacity rights, their value is far below that of annual capacity rights. The quantity of cross border capacity rights offered at the monthly auctions substantially changes...
from month to month, and the system operator informs the market players about the volume available for a given month only during the month before. Sometimes the system operator makes a lot of transmission rights available on a given border section for several months in a row, only to offer no rights at all for some of the months for the same location. Finally, the value of monthly capacity rights is also eroded due to the order in which capacity is restricted. If, because of a technical reason, the system operators have to reduce the flow on a specific cross-border line, then they first limit the use of the daily, then the monthly, and finally the annual capacity rights.

The lower market value of monthly capacity rights is also confirmed by the results of the cross-border capacity auctions. We placed in Table 1 the auction fee of the annual baseload transport rights for both import and export at each border section. In Table 2 we computed the price for annual baseload transmissions by summing the fees of all the monthly capacity rights. (Obviously we were in a position to compute the annual transport price from the monthly capacity fees only when at a given border section capacity rights were offered in every month of the year in question). Within the tables yellow colour indicates the more expensive of the options: buying the cross-border transmission capacity at the annual capacity auction or purchasing a unit of capacity right at each of the monthly auctions. The comparison unambiguously reveals that annual capacity

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT - HU</td>
<td>16.04</td>
<td>(0.86)</td>
<td>(0.29)</td>
<td>(6.69)</td>
<td>(27.19)</td>
<td>29.50</td>
</tr>
<tr>
<td>HU - AT</td>
<td>-</td>
<td>(4.83)</td>
<td>(18.22)</td>
<td>(1.11)</td>
<td>(1.14)</td>
<td>1.30</td>
</tr>
<tr>
<td>HR - HU</td>
<td>0.91</td>
<td>0.28</td>
<td>(0.34)</td>
<td>(1.03)</td>
<td>(3.97)</td>
<td>2.96</td>
</tr>
<tr>
<td>HU - HR</td>
<td>4.68</td>
<td>(1.37)</td>
<td>(0.96)</td>
<td>(2.23)</td>
<td>26.73</td>
<td>(1.35)</td>
</tr>
<tr>
<td>SK - HU</td>
<td>18.61</td>
<td>(13.21)</td>
<td>(11.99)</td>
<td>(17.71)</td>
<td>-</td>
<td>16.05</td>
</tr>
<tr>
<td>HU - SK</td>
<td>1.04</td>
<td>(0.11)</td>
<td>(0.20)</td>
<td>(0.23)</td>
<td>1.28</td>
<td>(0.11)</td>
</tr>
<tr>
<td>RS - HU</td>
<td>-</td>
<td>1.63</td>
<td>(2.37)</td>
<td>(0.59)</td>
<td>(1.16)</td>
<td>3.83</td>
</tr>
<tr>
<td>HU - RS</td>
<td>-</td>
<td>0.57</td>
<td>2.33</td>
<td>9.80</td>
<td>20.18</td>
<td>4.37</td>
</tr>
<tr>
<td>RO - HU</td>
<td>-</td>
<td>2.83</td>
<td>22.95</td>
<td>(17.24)</td>
<td>(37.83)</td>
<td>(33.59)</td>
</tr>
<tr>
<td>HU - RO</td>
<td>-</td>
<td>(0.46)</td>
<td>(0.51)</td>
<td>0.60</td>
<td>1.22</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Table 1 Price for the annual cross-border transmission capacities, million HUF/MW

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT - HU</td>
<td>2.20</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.04</td>
</tr>
<tr>
<td>HU - AT</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.14</td>
</tr>
<tr>
<td>HR - HU</td>
<td>0.06</td>
<td>0.24</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.96</td>
</tr>
<tr>
<td>HU - HR</td>
<td>0.42</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.67</td>
<td>-</td>
</tr>
<tr>
<td>SK - HU</td>
<td>9.99</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.07</td>
</tr>
<tr>
<td>HU - SK</td>
<td>0.04</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.07</td>
<td>-</td>
</tr>
<tr>
<td>RS - HU</td>
<td>-</td>
<td>1.58</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.82</td>
</tr>
<tr>
<td>HU - RS</td>
<td>-</td>
<td>0.50</td>
<td>0.59</td>
<td>14.27</td>
<td>3.51</td>
<td>1.77</td>
</tr>
<tr>
<td>RO - HU</td>
<td>-</td>
<td>8.15</td>
<td>15.91</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HU - RO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.66</td>
<td>0.32</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Table 2 Price for the annual baseload transmission capacity, summed from the monthly transmission capacity fees, million HUF/MW
rights carry much more market value than monthly capacity rights. We are aware of only four situations in which the price for the annual transmission capacity, as summed from the monthly values, exceeds the auction fee of the annual capacity right.

An interesting exercise is to look at the revenues of MAVIR from cross-border capacity auctions for the last few years.

There is considerable fluctuation in revenue. In 2004 total revenues exceeded HUF 10 billion, and fell to HUF 4.6 billion in 2005. Afterwards an uninterrupted rise took place until 2008 when revenues surpassed HUF 16 billion. Revenues depend primarily on import from Slovakia and Austria and export to Croatia.

Based on the above we can phrase the following statements and recommendations:

- Rights sold at the annual capacity auction represent a higher value than the ones sold at the monthly auctions. MAVIR and the neighbouring system operators should, therefore, strive to sell all of the capacity that is available throughout the year at annual auctions, and only the surplus capacity fragments should be allocated through monthly auctions. Using the Slovakian-Hungarian border section as an example, in both 2008 and 2009 at least an additional 200 MW should have been allocated at the annual capacity auction, since monthly auctioned quantities always exceeded this value.

- Before the start of each year MAVIR ought to calculate the expected monthly ATC values and release this information to traders. A good example for this is the practice followed by the Slovenian system operator (ELES). Every month ELES announces a one year forecast of the anticipated monthly ATC data for all Slovenian cross border capacities. Prior publication of the planned level of monthly transmission rights by MAVIR could substantially reduce the uncertainty surrounding the available capacity of international transmission lines.

- Secondary trading of cross border rights should be facilitated since the current inflexible exchange of capacity rights considerably reduces the value of the rights. For each border section the so called profile transfer should be made possible (even an hour long right could be sold). Furthermore, the time interval between the actual time of transport and the reporting time of capacity transfer has to be reduced, so that transport rights could be exchanged in a flexible manner and as close to the time of actual transport as possible.

### Recent developments of natural gas consumption in Hungary

In this article we describe the developments of natural gas consumption in Hungary between January 2008 and October 2009. Our analysis is mostly descriptive in its nature. We used publicly available data from Eurostat, the Hungarian Energy Office (MEH) and MAVIR in our calculations. Our goal was to better
understand the structural characteristics of the decline in natural gas use last year.

Figure 14 depicts total natural gas consumption in a monthly breakdown. During the first ten months of the year we experienced a 20 percent decline in natural gas use on average, but for some of the months – like April and September – the fall was twice as large.

Figure 15 depicts natural gas use outside the power sector, comparing the corresponding monthly data of the two years. On the right hand scale we display the additional heating requirement in the form of monthly heating degree-day deviations from the long term average (positive values indicate above average, negative values below average heating requirement).

In the bottom half of the figure we can see that in the natural gas use of consumers outside the power sector – with the exception of April and September – there is only a slight difference between the corresponding months of the two successive years. The heating degree-days in the upper pane of the figure, however, show that April 2009 was unusually hot and the difference in heating requirements between the September months of the examined two years was likewise large.

Summing through the first ten months of the two years, we can note that in 2009 the number of heating degree-days was 1.3% higher than in 2008 (despite the high temperatures in April, the first months of last year were colder than usual). Based on this we could anticipate the aggregate natural gas consumption outside the power sector to be somewhat higher in 2009 than in the year before. In contrast, natural gas consumption in 2009 was 9.5% lower than in 2008. Therefore, based on this short analysis we can state that natural gas usage outside the power sector declined by around 10% during the economic downturn.

The natural gas use of the power sector is displayed in Figure 16, separately for generation units with a capacity below and above 50 MW. The natural gas consumption of large power plants stayed substantially below the previous year’s values in each month between January and October, while small power plants experienced a similar decline between May and September (outside of the heating season).

The 10-month average value for the decline in fuel use was 44% and 26% for generation units with capacity above and below 50 MW, respectively. Since gas-fired power plants usually have the highest marginal cost of electricity generation, the phenomenon is in accordance with the normal operation of markets: as demand weakens, it is the more expensive plants that will cut production first.

Inspecting the developments on the electricity market, we can realise that domestic electricity...
consumption (including network losses) during the first 10 months of 2009 was 6.6% lower than in the same period of 2008, tracked by a “double” decline of 12.4% in domestic electricity generation. The difference can, of course, be captured in the import balance, which increased by 38.5%.

Production at domestic gas-fired power plants was therefore scaled back not only by falling demand, but also through the increased import of relatively cheap foreign electricity (see Figure 5).

In addition to the economic downturn, the price of crude oil also fell, impacting on the price of natural gas and therefore the competitiveness of gas-fired power plants. Nevertheless, due to the temporal delay built into the import gas price formula, the price of natural gas started to decrease perceptibly only in July 2009. Moreover, even this decline was mostly neutralized by the import tariff correction item imposed by the Ministry for Transport, Telecommunications and Energy (KHEM) during the months preceding the heating season (Figure 17). As a result even the slow intra-year rise of foreign and domestic electricity prices - which started in June 2009 –, could do little to support the increase of natural gas consumption within the domestic power sector.

Figure 16 Natural gas use of small and large power plants in Hungary

Figure 17 Wholesale electricity and natural gas prices in Hungary
Forecast of energy consumption in Hungary up to the year 2020

Below we review the main results of our long term forecast for national energy use.1 Future energy consumption is an essential issue from the perspective of energy producing companies, but also with regard to the fulfilment of the EU commitments of Hungary. By 2020 Hungary has to supply 13% of its gross energy use from renewable sources, while also achieving a 20% reduction in energy use. These percentage targets imply that the measures necessary to attain these goals have to be tailored to the anticipated level of energy use of the country.

We first consider energy efficiency in an international context. Figure 18 shows the relation between economic development and energy use. It is easy to spot the negative relationship between development and relative energy use: the more developed a country is, the less energy it uses to produce a unit of gross domestic product. The relationship between the two variables is formalised by a regression equation, of the power function type. The energy efficiency in Hungary is much lower than what the trend-line would suggest, since its energy consumption is 20% above the value associated with its level of development. This is seemingly in contradiction with the fact that for the last couple of years energy use grew at a considerably lower rate than gross domestic product.

During the decline of economic activity following the systemic change our energy consumption has indeed decreased for a while, after which it grew at a lower rate than the generated GDP. Between 1995 and 2008 GDP and energy use grew at an annualised rate of 3.5% and 0.4%, respectively. But this trend was (also) supported by a radical restructuring of manufacturing. Compared to 1995, the share of energy intensive 1This projection is an improved and expanded version of the forecast made for the Hungarian Energy Office. The forecast is based on publicly available data (Energy Center, MVM, MAVIR). The statements of the document reflect exclusively the viewpoints of the experts of REKK. We should note that some of the critics of the analysis believe that the forecast level of energy consumption is overestimated.
sectors had shrunk significantly by 2008. The share of sectors with above average energy intensity (mining, metallurgy, chemical industry, metal processing, power sector and gas supply) within GDP fell below 10% by 2008, while the ratio of sectors with low energy consumption increased. In 2008 the share of non-material services (which is called, rather imprecisely and ambiguously, “communal use” in the energy statistics) within GDP already exceeded 50%. In this period the moderate change in energy use was driven mainly by the so called composition effect, implying that if energy use had not changed in any of the sectors, a change in the structure of GDP – a shift toward sectors with a lower appetite for energy – in itself would have reduced overall energy use. We believe that this process has already finished, additional structural changes will take place within the service sector, increasing the growth rate of energy consumption.

We explained the volume of national energy use with a regression technique, using GDP and population as explanatory variables. The regression analysis was based on data from the last 20 years. Overall, the two variables explained 85% of the volume of energy use. Projecting the explanatory variables until 2020, it was possible to estimate energy use. The population will almost certainly shrink, while we assumed a 4% annual average growth rate of GDP, once the crisis is over.

In Figure 20, in addition to the energy consumption data of 1990 to 2008, we also included estimates from the regression model for the period of 1990 to 2020. Based on the proximity of historical and estimated data points for the last 20 years we can assert that the regression model has good explanatory power. Based on our assumptions about population and GDP, the energy consumption of the country is forecast to increase from the current 1000 PJ to 1300 PJ by 2020. Therefore, according to our calculations, national energy use in the next 10 years will grow at a much higher rate than in the last 15 years. The primary explanation for this is that the restructuring of the Hungarian economy toward less energy intensive sectors has slowed down.

We would like to stress that the just elaborated prognosis does not consider the impacts of the energy efficiency programmes. In accordance with EU expectations in 2008 Hungary adopted a National Action Plan to improve energy efficiency. The document, approved through a Government Decree, contains detailed energy saving targets for households, the tertiary sector, industry and transport. If the targets are indeed attained, then a total of 85 PJ/year of energy can be saved by the 2020s. This is much below the required 260 PJ of energy savings which ensues from the 1300 PJ of total energy use – not accounting for the energy saving programmes – and the 20% energy saving ratio promised to the EU. All this draws our attention to the need to further develop the energy efficiency programmes, since our lag in this field is substantial.
### Abbreviations in the report:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APCS</td>
<td>Austrian Power Clearing &amp; Settlement</td>
</tr>
<tr>
<td>ARA</td>
<td>Amsterdam–Rotterdam–Antwerpen</td>
</tr>
<tr>
<td>ATC</td>
<td>Available Transfer Capacity</td>
</tr>
<tr>
<td>ECX</td>
<td>European Carbon Exchange</td>
</tr>
<tr>
<td>EEX</td>
<td>European Energy Exchange</td>
</tr>
<tr>
<td>EIA</td>
<td>Energy Information Administration</td>
</tr>
<tr>
<td>ELIA</td>
<td>Belgium’s transmission system operator</td>
</tr>
<tr>
<td>EUA</td>
<td>European Union Allowance</td>
</tr>
<tr>
<td>HEPI</td>
<td>Hungarian Electricity Price Index</td>
</tr>
<tr>
<td>MAVIR</td>
<td>Hungarian Transmission System Operator Company (Magyar Villamosenergia-ipari Rendszerirányító)</td>
</tr>
<tr>
<td>MEH</td>
<td>Hungarian Energy Office (Magyar Energia Hivatal)</td>
</tr>
<tr>
<td>MVKE</td>
<td>Association of Hungarian Electricity Traders (Magyar Villamosenergia-kereskedők Egyesülete)</td>
</tr>
<tr>
<td>NCV</td>
<td>Net Calorific Value</td>
</tr>
<tr>
<td>OPCOM</td>
<td>Romanian Power Market Operator</td>
</tr>
<tr>
<td>PXE</td>
<td>Power Exchange Central Europe</td>
</tr>
<tr>
<td>TSO</td>
<td>Transmission System Operator</td>
</tr>
<tr>
<td>WTI</td>
<td>West Texas Intermediate</td>
</tr>
</tbody>
</table>
REKK kindly invites all subscribers of its Hungarian Energy Market Report publication to attend the 2nd workshop of its Regional Security of Supply Project.

The planned date for the workshop is 15 April 2010. The presentations and the summaries of the panel discussions of the first workshop of the project are available at http://www.rekk.eu/sos. Information about the spring workshop will be shortly available at the same site.

The Energy Regulators Regional Association (ERRA), in cooperation with the experts of REKK, will hold its 8th summer university titled ‘Introduction to Energy Regulation’ in Budapest between 12 and 16 July, 2010. More information about last year’s and this year’s summer university is available at http://www.erranet.org/Events.