

POWER PLANTS IN HUNGARY

Main characteristics of the power plants, and
their consequences regarding energy policy formulation

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**ENERGIA
KLUB**

Hungary's power plant map, and what it shows

The scope of our analysis

The Energy Policy Division of Energia Klub created the power plant map of Hungary in the beginning of 2008, with the intention to make the publicly available data regarding the major power plants of Hungary easily accessible and understandable to anyone interested in environmental protection and energetics. The data can be found with the help of our interactive map. The power plant map indicates the most relevant economic, technical and environmental properties of the major power plants of Hungary.

Our study of the Hungarian power plant portfolio confines itself to the major power plants (that is installed capacity reaching at least 50 MW), and these are examined predominantly according to their electricity production. The relevance of the scope of the analysis is provided, since in 2006 the net electricity production of these capacities reached 93,17 per cent¹ of the domestic production, and 72,17 per cent² of the total electricity supply. The difference between the two data are due to our electricity import.

¹ Statistical Data of the Hungarian Power System, 2006
http://english.mvm.hu/engine.aspx?page=statistical_data

² Statistical Data of the Hungarian Power System, 2006
http://english.mvm.hu/engine.aspx?page=statistical_data

Energy sources

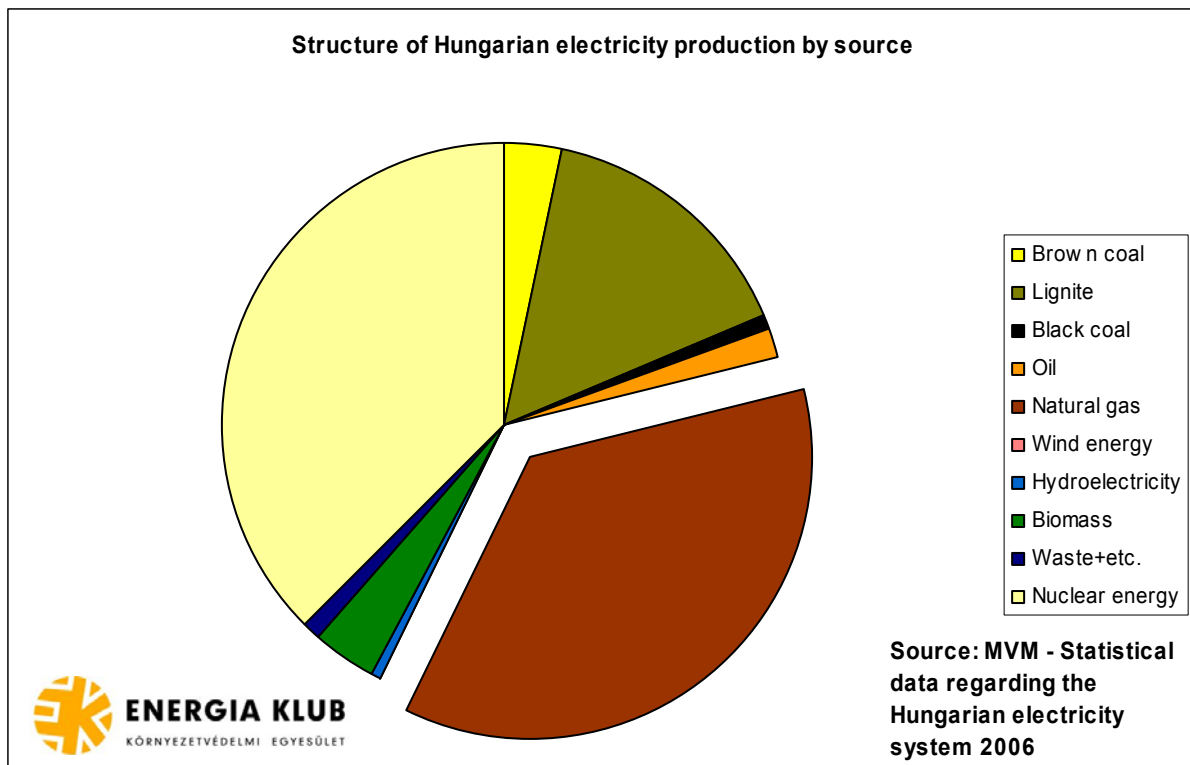
The well-known fact that Hungary's reserves of conventional energy sources (especially hydrocarbons and coal) have been largely depleted in the last decades, leaves its mark on the Hungarian electricity production. This is striking in regional comparison, as most of the neighbouring countries still possess significant amount of coal and hydroelectricity sources, and generates electricity from them. For instance, in Poland 92.5 per cent of electricity production comes from coal³, in Romania 37 per cent coal, 30 per cent hydroelectricity⁴, while in Serbia 66 per cent coal and 30 per cent hydroelectricity.⁵ In Hungary, the depletion of fossil resources has been spanned by the import of hydrocarbons from a single source (Soviet Union, later Russian Federation), leading to an ever increasing magnitude of dependency. So, as a consequence of our geographical capabilities and erroneous political decisions, the proportion of imported hydrocarbons (mainly natural gas) in our electricity generation is unprecedentedly high⁶. The events of January 2006 which lead to the Russia-Ukraine gas dispute clearly indicated the danger of such a one-sided dependency.

³ International Energy Agency http://www.iea.org/Textbase/stats/electricitydata.asp?COUNTRY_CODE=PL

⁴ International Energy Agency http://www.iea.org/Textbase/stats/electricitydata.asp?COUNTRY_CODE=RO

⁵ International Energy Agency http://www.iea.org/Textbase/stats/electricitydata.asp?COUNTRY_CODE=CS

⁶ In Europe, only the natural gas exporter Netherlands generates larger proportion of electricity from natural gas. International Energy Agency, <http://www.iea.org/textbase/nppdf/free/2004/netherlands.pdf>



Territorial concentration of the power plants

Electricity generation is fairly much concentrated in Hungary. The overwhelming majority of the production is in the central and northeast part of the country. The map clearly indicates that the western corridor and southeast part completely lacks any power plants exceeding 50 MW of installed capacity. We can consider the reason for this to be the geographic allocation of our energy sources and consequently the distribution infrastructure. Perhaps in the case of the western part of the country, the security policy rationale of the former political system could also provide an explanation. Furthermore, the bulk of our electricity import comes from Slovakia and Ukraine⁷, which enters the grid in the north-northeast part of the country, while our electricity export leaves the system to Croatia and Serbia in the south.⁸ This

⁷ International Energy Agency, <http://www.iea.org/textbase/nppdf/free/2006/hungary2006.pdf>

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distribution imposes further strain on the grid and contributes to the high percentage of grid loss⁹, and leads to higher infrastructural investment and maintenance costs.

Ownership structure

The composition of the owners of the power plant portfolio is also unique in the region. In most of the neighbouring countries, the majority of electricity generation remained in the ownership of the state monopolies. In cases where privatization has occurred, the subject of the privatization process was a vertically-integrated monopoly. Therefore, in most of these countries, a single actor supplies the overwhelming majority of the electricity. (For example, in the Czech Republic, CEZ's share is around 70 per cent, in Slovenia HSE is around 50 per cent, in Slovakia SE – controlled by ENEL – disposes 80 per cent of the market.¹⁰) In Hungary, production capacities have been mostly decoupled from the state monopoly, and have been privatized apiece, so the individual companies became affiliates to different corporations (among them RWE, AES, Électricité de France, Electrabel). Furthermore, MVM (former Hungarian state monopoly) retained considerable electricity generation capacities.

This setting can be viewed as a promising precondition for a real market competition, as the oligopolistic structure enables producers to compete with each other, which might lead to lower consumer prices. A real market competition stimulates producers to develop their power plants: for instance to invest in efficiency improvement, which leads to the reduction of costs and strain on the environment. However, the existence of long-term power purchasing agreements (PPA)¹¹, and the current insufficient amount of supply compared to demand¹² do not

⁹ Grid loss in Hungary was above 10 per cent in 2006. (Statistical Data of the Hungarian Power System http://english.mvm.hu/engine.aspx?page=statistical_data), while the OECD average is 6-7 per cent. (International Energy Agency, <http://www.iea.org/textbase/nppdf/free/2006/hungary2006.pdf>)

¹⁰ Data can be found on the websites of the individual companies. (www.cez.cz, www.hse.si, www.seas.sk)

¹¹ A long-term power purchasing agreement (PPA) in the present context is a bilateral contract between a power plant and an electricity buyer (wholesaler, retailer or consumer) about the long-term purchase of electricity. The time-span of such contracts can reach up to 15-20 years, which gives a renders calculability, but on the other hand, makes market competition inconceivable. At present, MVM via such agreements, controls approximately 70 per cent of the domestic production, granting a monopolistic position for the company.

¹² The present electricity supply as a combination of domestic production and import capacities scarcely meet consumer demands, which according to the market mechanism leads to the increase of electricity prices.

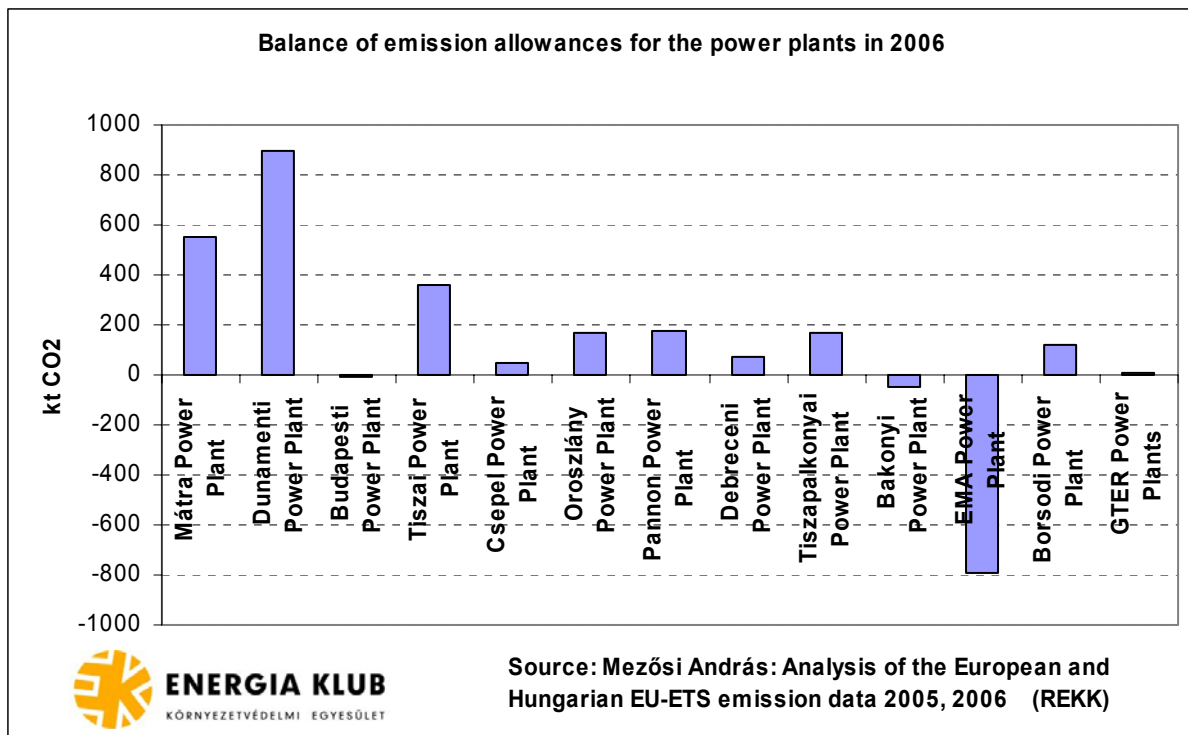
enable the development into a real market competition, and therefore improvement of services and reduction of electricity prices.

Emission of greenhouse gases

The current balance of emission allowances and occurred emission during the first National Allocation Plan¹³ (2005-2007) indicates, that the allowance allocation actually meant several billion forints of revenues for the power plants. This effectively – in the form of indirect state subsidies – further decreases the competitiveness of renewable sources compared to conventional power plants. By the recent allowance allocation, a rise in prices would only further increase the revenues of the power plants, since their excess quota would only earn them more. However, in case the allocation scheme would change according to the plans of the European Union, the current situation would alter fundamentally. The National Allocation Plan II (which is under administrative reconciliation), plans to cut the free allowances designated to power plants by almost 30 per cent. From then on, the missing emission allowances would need to be acquired on a market basis. In its recent status, by the prevailing prices of emission allowances, the operation of some power plants with high emissivity¹⁴ would become questionable.

¹³ The first National Allocation Plan (2005-2007) designed by the Ministry of Environment and Water allocated carbon emission allowances to Hungarian industry sites, among them power plants. In case the actual emission of a given power plant exceeded its allowance, the plant had to buy allowances to cover its emissions. The power plants which retained a surplus of allowances – among them the vast majority of the Hungarian power plants – were entitled to sell their allowances to other companies in the EU-ETS mechanism.

¹⁴ Emissivity: quotient of greenhouse gas emission to electricity production (e.g. g/kWh)



Flexibility of electricity production: how can it adjust to consumer demands?

The Hungarian electricity system is relatively inflexible¹⁵: the remarkable share of nuclear energy, among the highest in the region, due to technological characteristics makes the system rigid. The same problem occurs in a moderate way by coal and biomass fueled thermal power plants. The share of hydrocarbon based electricity generation was 37.7 per cent in 2006. The significance of natural gas-based power plants is likely to increase in the future, contributing to the flexibility of the electricity system.

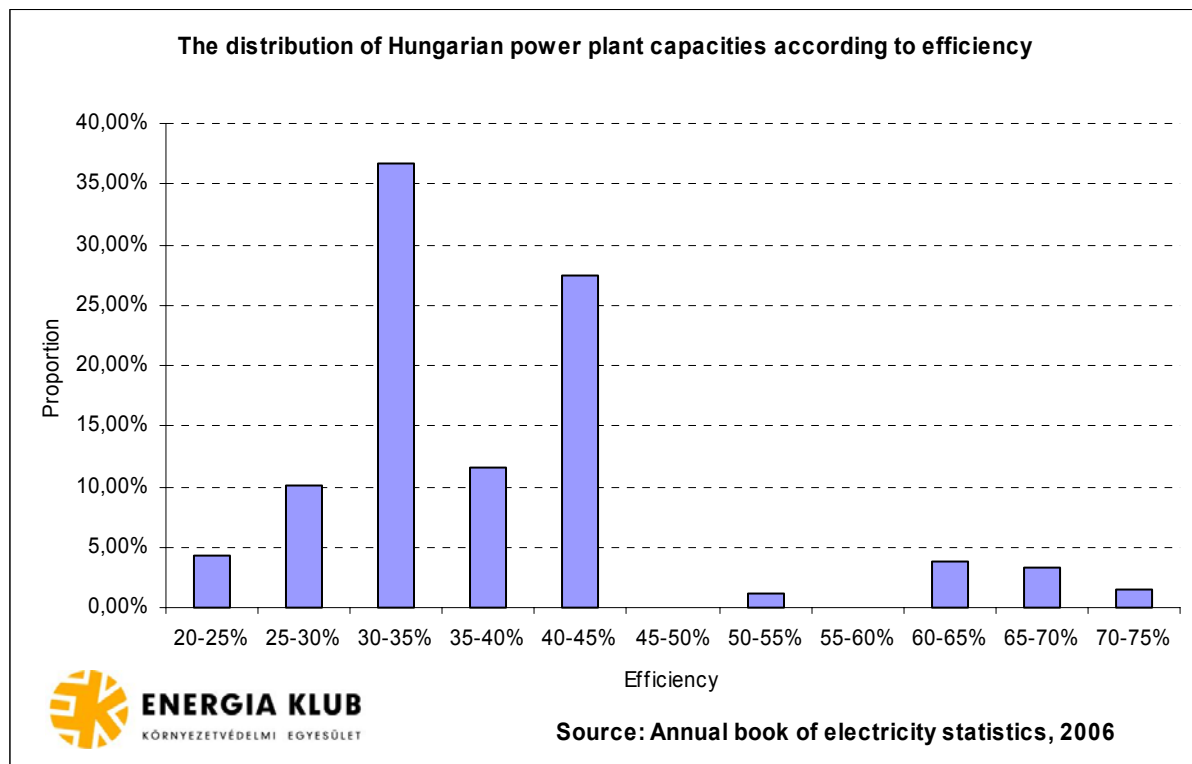
Applied technology

The Hungarian power plant portfolio is considerably outworn: coal-firing plants built in 1950s and 60s, hydrocarbon-based plants from 70s and Paks nuclear power

¹⁵ As a peculiarity of the electricity system, electricity could only be stored with the help of expensive facilities – and Hungary lacks such storage capacities – therefore production always has to be adjusted to current demand for electricity. Nuclear and coal plants due to technological distinctiveness cannot respond quickly to consumer demand, so their utilization makes the electricity system inflexible.

plant built in the 70s and 80s. The 700 MW installed capacity of coal power plants are seededly old, and their operation licence will end between 2011-2015.

In total, the average age of the domestic major power plants is above 20 years¹⁶. Their efficiency is accordingly meager, the mean average of the power plant portfolio is around 30-35 per cent, way below the desirable 50 per cent. Consequently, new, state-of-the-art capacities are to be built (in this regard, the increased utilization of renewable energy should be prudently evaluated) or the increase of electricity import becomes indispensable. Since, in the energy sector the feasibility of investments takes decades, and by the time that is probable, due to the anticipatory overdemand for hydrocarbons, the permeation of renewable sources of energy is justified not merely in terms of sustainability but also of supply security even in the middle-term.



¹⁶ Weighting according to installed capacity.