HUNGARY

Sustainable Energy Watch
2002 Report

Energy and Sustainable Development in Hungary

a report by Gábor **Takács**
tgabor@energiaklub.hu

The Hungarian Parliament decided to ratify the Kyoto Protocol in July 2002. The elaboration of related legislation, policies and measures will be speeded up by the European Union's requirements and the pressure from business - interested in Joint Implementation projects and missions trading.

Table of contents

Executive Summary

In this first Sustainable Energy Watch (SEW) Report for Hungary, given the limited time and data available, we calculated seven indicators out of eight.

Generally speaking except the access to electricity indicator Hungary performs quite poorly based on the calculations. The main reasons can be summarised as follows:
After 1989, Hungary went through significant structural changes: from a centrally planned economy and a one party system it became a functioning market economy and a democratic country. But the heritage of the Soviet era, the rapid changes and privatisation of the energy sector let to survive outdated opinions and kept the energy sector's role players driven by old – unsustainable – practice. Foreign investors, owners of the privatised part of the Hungarian energy sector, don't operate necessarily according to the priorities of the weak energy policy.

Awareness about climate change negotiations and the Kyoto Protocol (KP) is very low in Hungary. Climate change being a complex problem is not on the political agenda at all. The Hungarian Parliament decided to ratify the KP in July 2002. The elaboration of related legislation, policies and measures will likely take place quite slowly. The European Union's requirements and the pressure from business – interested in Joint Implementation and Emission trading - can speed up the process a bit. The Hungarian Energy Office also plays an important role in shaping the legislation.

Legislation planned for the near future that might affect the SEW indicators:

- The market liberalisation by January 2003, from many points of view, but especially if it will result in price increases.
- Elimination of cross subsidies and the elaboration of compensation schemes for vulnerable consumers at least as far as gas is concerned.
- The future of the development plan (Széchényi Plan) that slowly increased the amount of fund available for renewable energy sources (RES) and energy efficiency.
- Legislation of the district heating sector. If it is in favour of energy efficiency in this sector, 25-30 % energy saving could be achieved relatively easily.
- Legislation in favour of RES, and the willingness of foreign RES companies to invest in Hungary.
- The MVM (Hungarian Electricity Works) could be privatised.
- The MOL (Hungarian Oil and Gas Co.) might sell its gas industry to the State.
- Exchange rate changes for EUR and USD as energy trade is counted in USD while GDP is in HUF (Hungarian Forints or EUR).

Introduction

This is the first Sustainable Energy Watch Report for Hungary compiled by Gábor Takács from Energy Club Hungary (www.energiaklub.hu). The report was produced in June and July of 2002.

As probably in most of the other countries working on SEW Reports, we faced difficulties to find or calculate relevant and reliable data. We did our best to improve the accuracy of data and to clarify misunderstandings. Therefore we hope that instead of providing a collection of figures we provided a writing that can be a basis for further discussion and debate on how to achieve sustainability in the Hungarian energy sector and of course on how to do the measurement. Everybody is welcome to comment on this report and contact the author.

Out of the eight indicators, seven were calculated and for five of them we have the 1990 reference data. Unfortunately within the limited time we could not collect data calculated on the same basis for the same year for the others and this results in the spreading of final year from 1998 to 2000.
Indicator 6 was not calculated, as we could not provide data that would at least roughly reflect the required parameter.
The biggest uncertainty is in the case of indicator 4: clean energy investments. We do not know data collected on private energy efficiency investments, and the investments generated by national and international funds are not clear.

Data on renewable energy was collected and calculated by Zoltan Vass (Energy Club), while Villő Lelkes (Energy Club) did the editing and language checks. For compiling this report the help and understanding of Peter Tulej from CTI and Helene Connor from SEW Secretariat were extremely helpful. The South African report done by Randall Spalding-Fecher helped a lot to understand the calculation and the way of discussing the indicators, providing a practical example in addition to the Manual compiled by the SEW Secretariat.
All misleading or unclear discussions and errors are the fault of the author. Comments, suggestions and clarifications are more than welcome.

Contact: Gábor Takács tgabor@energiaklub.hu tel: 36-30-438-13-81

General Discussion of the Country

Hungary is located in the eastern part of Central Europe. It has 10,2 million inhabitants living on 93 000 km^2. Its surface is rather flat as around half of the country's territory is a plain, while there are no mountains higher than 1000 m. From a natural resources point of view, Hungary is very poor. The only significant industrial mineral it has is bauxite. From an agricultural point of view, Hungary has excellent natural circumstances. From a regional development point of view, it is important to notice that ¼ of the population is living in the capital (Budapest), which in itself reaches the EU's average development level, while the rest of the country is far under it.

From the late 40s till 1988/89, Hungary was part of the Eastern, socialist block both from economic and political point of views and had a centrally planed economy with a one-party political system. Hungary was a member of the Warsaw Pact and of the Council for Mutual Economic Aid (COMECOM). After Hungary changed to a functioning market economy and a democratic political system, it became a member of NATO and of the OECD. Hungary applied for EU membership in 1994 and the long accession negotiations will shortly result in her full membership.

Due to the structural changes and rationalisation of the economy, the artificially significant heavy industry almost disappeared (causing long-lasting regional problems), the role of service sector rapidly increased. A significant proportion of the country's export is produced by some multinationals operating within the country.

▶Other Energy–Related Developments

Hungary has decreasing natural reserves from non-renewable energy sources. The import dependency for energy is 70%. Within the total energy consumption, solid fuels accounts for around 15 %, oil around 30%, nuclear power for 13% and the majority of the rest is satisfied by natural gas.

Hungary's total primary energy supply (TPES) fell back to 1042 PJ/year by 1994 from the 1357 PJ/year peak of 1987, and has been stable at around 1050 PJ/year since then. It is important to note that despite the sharp decrease of industrial energy consumption, the residential sector's total energy consumption has been increasing, just like the total electricity consumption since 1995 (34 000 GWH/year)[1].

After structural changes, the huge energy efficiency potential of the industry started to be utilised under market pressure (e.g. between 1992-2000 70% industrial growth was achieved with 10% additional energy consumption decrease![2])

Between 1992 and 1997 a great part of the Hungarian energy sector was privatised. Many studies[3] argue that the rapid privatisation was not managed and planned well. However there is an official energy policy, this is not updated and the legislation of energy sector is not necessarily in accordance with its principles, especially as far as

[1] Villamos Energia Statisztikai évkönyv 2000 (Yearbook of Electricity Statistics 2000), MEH, Budapest, 2001

[2] EU Enlargement Watch: The Role of Natural Gas in Europe, 2000, www. energiaklub.hu

[3] Járosi,M- Pecz,E: EU csatlakozás és privatizáció (EU accession and privatisation), Püski, Budapest 2000,

environmental protection, security of supply and priorities issues are concerned. Due to the level of privatisation and the preparation for market liberalisation, the Hungarian legislation on gas[4] [5], electricity[6] and district heating[7] were in place quite early (we do not analyse them here). Later these acts were changed[8][9]. To regulate the market, an independent regulatory authority, the Hungarian Energy Office (MEH)[10] was created. This is the most proactive and most developed regulatory authority in the region. The main problem with its operation is that the final pricing authority is the Ministry of Economic Affairs, which makes political decisions.
Quite controversial in the field of climate change, the MEH is the most proactive and we can say the most environmentally-friendly governmental body.

The main issue of energy sector regulation nowadays is the elaboration of operational rules for the electricity and natural gas sector in harmony with the EU and Hungarian market liberalisation plans. It is also crucial for RES promotion.

The EU accession process is quite controversial for the energy sector as well. It requires market opening, elimination of cross subsidies, free market on one hand, RES promotion[11] on the other hand. The 12% share of RES is not an easy task to achieve for Hungary. The mine – power plant integration (power plants have purchasing obligations for domestic solid fuel production), and the postponed shutdown of polluting solid fossil fuel combusting power plants hinder the changes in the energy sector towards a more secure and more sustainable one.

The Paks Nuclear Power Plant (the only one in Hungary producing 40% of the electricity) is heavily lobbying for its lifetime extension and capacity increase. It would of course decrease the level of energy security due to very limited diversification and would increase the risk level of nuclear catastrophe. Waste management costs and the cost of final shutdown would also increase, while hindering the sustainable energy system development.

The district heating sector, effecting ¼ of the population of Hungary, is the biggest problem that no government has touched effectively, yet. It also will happen sometimes before the predicted EU accession.

[4] 1994 XLI Törvény a gázszolgáltatásról (XLI Act on Gas Distribution of 1994)

[5] 1997 XX Törvény az 1994 XLI Törvény módosításáról (XX Act of 1997 on Changes of the XLI Act of 1994)

[6] 1994 XLVIII Törvény a villamosenergia termeléséről, szállításáról és szolgáltatásáról (XLVIII Act of 1994 on Electricity Production, Transportation and Distribution)

[7] 1990 évi LXXXVII törvény az árak megállapításáról (LXXXVII of 1990 Act on Pricing)

[8] 2001 évi CX törvény a villamosenergiáról (CX Act of 2001 on Electricity

[9] 1998 évi XVIII törvény a távhőszolgáltatásról (XVIII Act of 1998 on District Heating)

[10] The homepage of the Hungarian Energy Office www.eh.gov.hu

[11] 2001/77/EC directive of the European Council on Renewables

The Eight Indicators

Eight Indicators of Energy Sustainability for Hungary

	1990		2000		% change	
	Metric	*Vector*	*Metric*	*Vector*	*Metric*	*Vector*
1. Carbon emissions	1861 kgC/capita	1,347	1543,5 kgC/capita (1999)	1,066	-17,06%	26,40%
2. SO2 emission	43 kgSO2 /capita		45 kgSO2 /capita (1998)	1,039	0,47%	
3. Households electrification	99%	0,01	99%	0,01	0%	0%
4. Clean energy investment	1,4% (1992)		5,50%	0,956	392%	
5. Resilience: energy trade				0.66		
6. Government investment						
7. Energy productivity	26, 49 MJ/€ of GDP	2,655	20,47 MJ/€ of GDP	2,029	-22,70%	
8. Renewable energy			3,04%	1,064		

►Indicator 1: Per Capita Energy Sector Carbon Dioxide Emissions

Vector calculations and values of indicator 1

According to the data provided by Hungary to the UNFCCC in its first[12] and third[13] national communication, the carbon emissions of the Hungarian energy sector, due to fossil fuels combustion for 1999 totalled 15.48 million metric tons. For a population of 10,2 million people[14], this is 1514 kgC/capita. This compares to 1798 kgC/capita in 1990. Based on these data, the vector for Hungary values in both years is greater than one and shows an almost 20% decrease, as it is 1,292 for 1990 and 1,040 for 1999.

Metric (actual data)
for 1990: 1514 kgC/capita
for 1999: 1798 kgC/capita

Vector values:
for 1990: 1,292
for 1999: 1,040.

Discussion of indicator 1

Hungary has been taking part in the climate negotiations from the very beginning. She ratified the UN Framework Convention on Climate Change quite early in 1995[15].

[12] First national communication of Hungary for the UNFCCC www.unfccc.int/resource/docs/natc/hunnc1.pdf

[13] Third national communication of Hungary for the UNFCCC, www.unfccc.int/resource/docs/natc/hunnc3.pdf

[14] Website of the Central Statistical Office, www.ksh.hu/pls/ksh/docs/index_fontosabb_adatok.html

[15] 1995 évi LXXXII törvény az ENSZ Éghajlatváltozási Keretegyezményének kihirdetéséről (LXXXII Act of 1995 on the UNFCCC)

Hungary's activity in the field of climate protection at both international and national levels has been fluctuating ever since. She did not sign the Kyoto Protocol, being the only in Europe apart from Iceland in this respect, and decided ratifying it on 16 July 2002.
Climate change has just recently become a separate item in the official environmental policy in the National Environmental Programs, especially in the second one, currently under construction. The first step towards a complex climate change strategy was taken in 2000, when a Governmental decree on Hungary's climate change strategy was adopted[16], and the implementation plan is under elaboration.
Even though there were some energy efficiency -see below- and waste management programs initiated in the 90s, the fallback of the energy sector's carbon emissions is mainly due to the structural changes in the Hungarian economy after the years of transition, when the old, energy intensive, Soviet type industry collapsed.

Another important factor of the fallback of carbon emissions is the intensive spreading of natural gas both in residential and power sectors, replacing coal and lignite by the much cleaner natural gas. Almost 70 % of the households are connected to the gas network[17] , satisfying 40% of the residential sector's total energy demand. In the power sector, gas is used mainly in combined heat power plants, producing 20 % of the electricity. The role of coal stayed stable at 30% (115 PJ in 2000) in electricity production, due to the legislation that requires power plants to purchase domestic coal.

The promotion of RES seems to get a bigger emphasis: in the New Electricity Act (2001) the purchasing obligation of electricity produced by RES is well defined and in the operative legislation the purchasing price is quite high. It is very important because the role of RES in Hungary's energy supply is around 2,2 % including traditional firewood combustion.

It is important to note, that despite of the decreasing contribution of the energy sector to CO2 emissions, Hungary's total GHG emissions almost went back to the 1990 level in 2000 producing around 10% increase compared to the lowest emitting year (1994). This undesirable phenomenon is mainly due to other GHGs, the transport and the agricultural sectors.

[16] Kormányhatározat a klímavédelem magyarországi stratégiájáról 39. Határozatok Tára A Kormány 2206/2000/(IX.13) rendelete (Governmental decree No. 2206/2000 (IX.13) on the National Strategy of Climate Protection)

[17] Annual Report 2000, Association of Gas Distribution Companies

►Indicator 2: Most Significant Energy-Related Local Pollutant: SO_2

Vector value calculations and values of indicator 2

Within the country's SO_2 emissions – that fell back significantly from 101 kg SO_2 /capita in 1990 to 59 kg SO_2 /capita in 1998 – the energy sector's sulphur–dioxide emissions show some increase because the metric value increased from 43 kg SO_2 /capita in 1990 to 45 kg SO_2 /capita in 1998.

Metric (actual data)
for 1990: 43 kg SO_2 /capita
for 1999: 45 kg SO_2 /capita

Vector value
for 1998: 1.039

Discussion of energy related SO_2 emissions

It is important to note that the most hazardous, damaging, local pollutant is nuclear waste that Hungary's only nuclear power plant produces while satisfying 40% of the country's electricity demand. All types of radioactive wastes are stored at the power plant, as since 1993 Russia has rejected transporting it to its country and no deposit possibility has been built in Hungary.

From the many pollutants that the energy sector emits we chose sulphur-dioxide. The reason is its unique place in the legislation.
Hungary's total SO_2 emissions decreased in the 90's by almost 40%, due to the above mentioned collapse of the polluting heavy industry, to the improved quality of vehicles and to the fact that the households replaced other more polluting fuels with natural gas. Due to the slowly growing electricity demand, the mines-power plants integration (power plants must buy domestic coal and lignite) and the increased usage of oil (18,6 PJ in 1990, 43,1 PJ in 2000) the electricity sector's SO_2 emissions slowly increased. This process is slowed down by the intensive spreading of CHPs and the replacement of some oil power plants (PP) by gas turbines.

Since 1995, when a governmental decree on clear air was adopted[18], the sulphur emissions legislation became stricter. The results are the renovation of power plants to meet the requirements – it happened in most of the privatised (efficient, attractive for investors) PPs on one hand, and because of the growing amount of fines paid by the others on the other hand. The Matra PP which is the second biggest SO_2 emitter (99 thousand tons in 2000) has done recently the sulphur retrofit, and has been operating according to the legislation since then. The biggest polluter, Vértes PP (130 thousand tons of SO_2 in 2000), was to be shut down in 2004 as it cannot meet environmental requirements and produces at high cost. Both PPs are run by the state-owned Hungarian Electricity Works (MVM). The Vértes PP got 56 million EURs[19] state subsidy and will get around 1,8 EUR cents for every kWh totalling an additional 172 million EURs of subsidy during its extended lifetime (10 years). The decision was clearly political, based on

[18] Governmental decree No. 97/1995. (VIII.24.) of 1995

[19] For all exchange rate calculations we used the Hungarian National Banks yearly average exchange rates. www.mnb.hu

unpublicised calculations, and also against the will of the Hungarian Privatisation and State Holding Company (ÁPV Rt) which is a shareholder in the MVM[20]. The Ministry of Environment granted the power plant a promise for letting off its environmental punishments, this would clearly violate the polluter pay principle[21], and also violates economic sustainability and postpones the transition to a less polluting sustainable energy system.

Note for future Observer-Reporter:

Data: The latest version of Environmental Statistics contains data on 1990 and 1998 for the latest. This was the peak SO_2 emissions of the electricity sector. According to the Yearbook of Electricity Statistics in 2000 the emissions of PPs started to decrease. We could not use this data – and chose 1998 – because the methodological differences between the two sources were not clear. Transport sectors emissions are excluded.
Follow-up on the state subsidy, and let off of punishments for Vértes PP and the other high polluting power plants. Check and follow if the Hungarian practice on subsidies, liberalisation and competition are in accordance with the EU's legislation. Follow the MVM's attempts to extend its polluting power plants lifetime (nuclear PP, lignite and coal fired ones) even if it cause price increases, and of course hinders the spreading of RES.

[20] Az MVM leszavazta az ÁPV Rt-t (The MVM voted against the ÁPV Rt) , Népszabadság, 04 May 2002,

[21] Environmental Club of MVM, 20 June 2002, see www.vert.hu

►Indicator 3: Households with Access to Electricity

Vector value calculations and values

According to the Central Statistical Office in the last two years national census (in 1990 and 2001), the questioners did not deal with access to electricity as in both years they took it to be practically 100%. Based on this statement[22] we took the percentage of the households that have access to electricity in both years for 99%, which results in 0,0100 value for the vector.

Metric (actual data)
for 1990: 99%
for 2001: 99%

Vector value
for 1990: 0,0100
for 2001: 0,0100

Discussion of indicator 3

Back in the socialist era (before 1989), a ranch electrification program was initiated and resulted that even the remote and small (two- three houses) settlements got access to electricity. The price of electricity was the same for everybody, and there was no capacity charge (which could have been different based on pure cost reflecting pricing).
In Hungarian statistics there are no categories for households with electricity. There are data for dwellings (naturally not equal with the number of households), and data for the number of residential consumers of electricity. Both are slightly different from households with access to electricity category. This last data is much higher (4,7 million) than the number of households (4,05 million)[23]. The difference is the result of the fact that not only households fall under the residential electricity tariff category and one household can have several electricity meters (in one dwelling, for the garage, for holiday house, for night tariff). The reason for not taking access to electricity for 99% was data found in the Yearbook of Regional Statistics 2000[24], that 1,6 % of the dwellings owned by local governments does not have any kind of comfort level. This 1% "discount" is clearly an assumption which does not effect the final value of the vector significantly.

Note for future Observer-Reporter

However from a social point of view this level of electrification in Hungary seems very nice, it makes the diversification very hard, as well as the utilisation of local, renewable resources both from technical/financial and public acceptance point of view. In the future it would be very useful to carry out a public poll on RES awareness and acceptance of RES technologies. Another field of possible research is to study the Hungarian electricity system's tolerance to RES input (now the base power plant's proportion is quite high, so taking that RES – especially solar and wind – technologies may produce altering output), thus the system/system operator might have problems to keep the desired voltage level.

[22] Népszámlálás 1990, 2001, Adatfelvétel és feldolgozási összefoglaló ismertetése (Data Collection and Data Processing Summary of National Census), KSH Budapest, 2002

[23] Lakásstatisztika 2000, (Yearbook Statistics of Dwellings), kKSH Budapest 2001,

[24] Regionális Statisztikai Évkönyv 2000, (Yearbook of Regional Statistics 2000), KSH Budapest 2001,

Another issue to be studied can be the electricity export- import right which could decrease this tension.

►Indicator 4: Investment in Clean Energy (a proxy for employment)

Vector calculation of indicator 4

Energy efficiency and renewable energy investments were for 1992 (the first year available) 4,22 million 1992 ECU, and 34,5 million 2000 EUR for year 2000. These data are to be compared with the total energy sector investment for 1992, which was 320 million 1992 ECU and increased to 636,3 million 1999 EUR.

Metric (actual data)
for 1992: 1,4%
for 2000: 5,5%

Vector value
for 2000: 0,956

Discussion of indicator 4

The calculation of this vector is one of the most challenging which is due to the following facts. However, total energy sector investment data are available[25], but the state subsidies are not calculated into them. E.g. the above-mentioned 228 million EUR subsidy for 10 years for the Vértes PP, the instalments that the Paks Nuklear Power Plant pays to the Hungarian state on which there is no interest (!).
The percentage of clean energy investments is increasing. New programs were initiated to support these developments, but these are far less than what could utilise the huge energy efficiency potential of the Hungarian economy, and let's say there is almost nothing to promote the renewable potential.
It is important to note the difficulties of collecting data that reflects the reality, as past, present and future subsidies or the lack of subsidy in case of RES makes the comparisons difficult. As it was mentioned in the introduction, after privatisation and before the strict regulation was in place there had not been any significant investment (like power plant shutdown, lifetime expansion or building a new big one). It is to happen in the following years.

It is even more difficult to gather the energy efficiency and renewable investments data that are not directly subsidy related. We used state or internationally co-financed programs to estimate the total investment into clean energy. As the first data available were those of 1992 for total energy sector investments, we calculated the clean investments generated by subsidies for this year too, which were 4,22 million 1992 ECU. For clean energy investment calculations in year 1992 we have no data on RES investment, compared to 320 million 1992 ECU total energy sector investments. In this year the only fund for clean energy was the Energy Saving Credit Fund which became a revolving fund and was financed by the German Coal Aid.

In the year 2000, the main sources of clean energy investments were the following:
- the Energy Saving Credit Fund generating 6,577 million 2000 EUR;
- the Energy Saving Credit Program (1997); later the Energy Saving Program generating 9,135 million 2000 EUR;

[25] Based on the combined data of Statistical Yearbook of Hungary 2000, KSH 2001 Budapest; Vízgazdálkodási adatok (Water management data) 1992-95, KSH Budapest 1996; Vízgazdálkodási adatok (Water management data) 1997-2000, KSH 2001 Budapest

- and the Energy Efficiency Co-Financing Scheme generating 18,8 million 2000 EUR; totalling 34,512 million 2000 EUR investment into energy efficiency and renewables[26]. This is to be compared to the 636,28 million 2000 EUR [27].

Note to future Observer-reporter

The Hungarian development plan (Széchényi Plan) is to be monitored: the total credit to be granted and the direct financial support, the items that it can be allocated to. Investment data should be collected and calculated on the same basis, for the same year. For this state subsidy should be carefully measured.

[26] Calculation is based on data in Good Practices in Policies and Measures for Climate Change Mitigation (Draft), Regional Environmental Center, 2002,

[27] We used 1999 data as this was the latest available on the basis as it is for 1992, and based on the investment trends simply calculated as if investments in 2000 had been in real terms equal with 1999 investments.

►Indicator 5: Energy Resilience: Energy Trade

Value and calculation of the vector 5

Hungary is definitely an energy import-dependent country.
In 2000, the total energy import was 668 842 TJ while the country's total non-renewable energy consumption was 1 013 825 TJ. Whence: 668 842/1 013 825 = 0,660
For the calculation of the indicator we took 100% of the energy import to be non-renewable, as only less than 2% of the imported electricity is produced by hydro power plants purchased mainly from Slovak large hydro-power plants.

Vector: 0,660

Discussion of indicator 5

Security of energy supply should be one of the main issues of all countries' energy policy. In the official Hungarian energy policy[28] it is mentioned, but not really reflected concretely in practice as far as domestic renewable use, energy efficiency, demand side management are concerned.
In addition to that, the energy policy in practice is not really in favour of clean energy, Hungary does not take significant steps towards source and fuel diversification. Almost 70% of the total energy demand are covered by import. Domestic production of almost all kinds of fuels is decreasing, due to the scare sources. The most critical is the issue of natural gas as Hungary is historically dependent on Russian gas (80% of the import, more than 50% of gas consumption), while 40% of total energy demand is covered by natural gas. 70% of the country's natural gas consumption takes place in the heating season. As domestic sources are decreasing, demand – especially residential demand – is increasing, Hungary is very sensitive to price changes. This extreme situation is due to the residential sector's gasification and the intensive fuel switch in the power sector, by CHP promotion[29].
The main short-term challenge for the Hungarian energy sector is to meet the EU requirement of liberalising the market, eliminating cross subsidies, while elaborating a compensation scheme for the vulnerable consumers and meeting security of supply needs. Now there is a tension in the gas sector because the import price is changing, while the domestic prices are partly regulated. As the MOL (Hungarian Oil and Gas Co.) runs both the import and the domestic production, and it is the wholesaler, it is the state that suffers losses due to the regulation.

Note to the future Observer-Reporter

The MOL (Hungarian Oil and Gas Co) is the exclusive gas importer and the producer of (cheap) domestic gas. It would be very useful to study the production, import and storage costs, to have a picture on MOL's real and reclaimed losses that are due to imported gas price changes.

[28] 21/1993. (IV.9) OGY határozat a magyar energiapolitikáról (Parliamentary Resoulution on the Hungarian Energy Policy)

[29] A földgáz szerepe a magyar energiapolitikában (The Role of Natural Gas in the Hungarian Energy Policy), EU Enlargement Watch, Budapest, 2000

►Indicator 6: Burden of Energy Investments

Discussion of indicator 6

In Hungary, the state is involved into the development of the energy sector. Before the years of transition (1988/89) the whole energy sector was run by the state. The electricity sector was run by the Hungarian Electricity Works (MVM), while the oil and gas industry was run by the Hungarian Oil and Gas Trust (later the MOL Co.).
Mainly due to the huge amount of state debt, the government decided privatising the energy sector, which took place very fast mainly in 1996/96. By this time the gas and electricity distributors, plenty of power plants and a great proportion of MOL Co. (still exclusively produces oil and gas, importers, transports and it also stores stocks) were privatised.
What the state kept for itself are the MVM which runs among others and owns the Paks Nuclear Power Plant, Vértes Power Plant and some other smaller power plants, generating more than 50% of the electricity. The state also has 25% of MOL shares.
For a quantitative analysis, even for an estimation that could provide a basis for the calculation of this vector, more time and deeper research are needed. Below are some points.
To estimate the non–renewable energy investments and the burden on the budget is the biggest challenge in this review for the following reasons:

- As it was mentioned above, after privatisation, no significant investment did take place either by the private sector or by state run companies. In Hungary, the mainly hidden and direct subsidies from the state to different players puts the main burden on the budget. To estimate the state's role, these subsidies should be studied by future Observer – Reporters.

- For the companies run by MVM, the Hungarian State gave capital for capital increase.

- Uneconomical power plants (like Vértes) get a subsidy for every kWh electricity produced.

- The Paks Nuclear Power Plant (producing 40% of the electricity and satisfying 13% of total energy demand of Hungary) does not clearly provision the needed funds for its shutdown, retrofit, and the radioactive wastes deposit. These enormous costs will be a burden on the budget- and would have a high present value if they were calculated.

- It would be crucial to estimate the real costs reflecting market prices for both natural gas and electricity, which could be the first step to calculate the volume of state subsidies.

- State guaranties given to borrowing companies also should be counted as budget costs related to investments.

►Indicator 7: Energy Productivity (energy consumption/GDP)

Value and calculation of indicator 7

Hungary's GDP production was 8,7% (46 977 million 2000 EUR) lower in 1990 than in 2000 and used 1 244,2 PJ[1] energy for producing it. It is to be compared to the 50 568 million EUR GDP in 2000 and 1 036,1 PJ. The energy intensity of Hungary was 26,49 in 1990 and 20,47 MJ/ EUR of GDP[30] in 2000 more than double of the world average in 1990. Therefore to say the vector for 1990 is 2,655 and for 2000 is 2,029 which means that Hungary uses 92% more energy to produce one EUR of GDP than the rest of the world on average.
Note that energy intensity data are not calculated on purchasing power parity basis.

Metric

for 1990: 26, 49 MJ/EUR of GDP
for 2000: 20,47 MJ/EUR of GDP

Vector

for 1990: 2,655
for 2000: 2,029

Discussion of indicator 7

After the collapse of the energy-wasteful heavy industry in Hungary, western type investors bought them out and therefore invested into energy efficiency or financed firms. Also some foreign and governmental programmes provided some funding for energy efficiency investments. Generally under market pressure, inspired by some foreign and domestic support, and also due to structural changes in the economy, the energy intensity of Hungary slowly decreased after the collapse of GDP production and energy use. The GPD production exceeded the 1990 level just in 1999, while the energy consumption remained under the 1990 energy consumption level by almost 20%. But still the Hungarian economy uses almost double of the world average energy, and almost three times more than the EU.
Energy efficiency investment should work under market conditions and would favour energy saving companies. To favour such investments, one of the key issues is to develop a bank culture that can rely on future energy savings as a guarantee behind loans[31].
Despite gasification, the residential sector remained very inefficient. It is especially true for the district heating sector which covers 1/5 of the population, where up to 26% of energy saving could be achieved, without counting the impact of changed heating habits[32]. It is due to the following factors:

[30] Gross Domestic Product 2000, KSH Budapest 2002

[31] Pesentation of Landis and Staefa – Siemens ESCO at a workshop of Hungarian Energy Efficiency Workshop run by the International Finance Corporation on 4 July 2002

[32] Kovacsics István: Fogyasztó oldali energiahatékonyság a távhőszolgáltatásban (Consumers' Side Energy Efficiency in the District Heating Sector), presentation of earlier studies at a Hungarian Energy Efficiency Workshop run by the International Finance Corporation on 4 July 2002

- huge heat loss (lack of insulation);

- consumers behaviour (flat rates are paid in most cases, so more efficient heating and warm water use are not necessary decreasing district heating costs);

- pricing practice (40-60% of the district heating cost is a fixed charge for capacity which cannot be affected by any kind of energy saving, so the rate of return of energy efficiency investments is lower).

Note for future Observer – Reporter

An other important issue for energy saving companies (ESCOs) is that the Hungarian taxation system does not know about the ESCO category and therefore they have to pay 25% VAT, and not the 12% like energy trading companies.
The energy saving potential in the district heating sector is huge. In 2002-2003 the problems of this sector should be somehow solved: pricing, demand-side management, the district heating companies involvement into secondary side investments, etc. This process should be followed, and the energy savings should be measured.
The main role player is the Budapest District Heating Company (FŐTÁV) which has the worst system in the country, but has the biggest lobby power. The calculation of FŐTÁV's operational costs should be the key step to possible capacity charge backdrop, which is crucial for secondary side energy efficiency investments.

►Indicator 8: Renewable Energy Deployment

Value and calculation of vector 8

Hungary's primary energy consumption in 2000 was 1 036 096 TJ while using 31,5 PJ of renewables. Therefore the 3,04% of the energy consumed can be considered to be renewable, which result in a quite poor 1,064 for the indicator which is quite far away from the world average and the desired 8,64%.

Metric

for 2000: 3,04%

Vector

for 2000: 1,064

Discussion of vector 8

In a country where only 3 % of the energy demand is satisfied by renewable sources there are huge RES potentials. Many studies emphasise the possibilities[33] [34] [35] for technical utilisation of RES potentials calculating with 220-250 PJ technical potential. The basis of these calculations is doubtful, as there are no updated overviews on biomass, wind and geothermal potentials.

Traditional renewable energy consumption decreased to almost zero level due to gasification and electrification programs. These also hindered the creation of small, flexible energy systems on a local basis. There are some places where biomass and geothermal sources are used.

The main issue is not the potential itself, but the legislation, awareness raising and attractiveness for investments. The main step for RES promotion is being taken in 2002 when the price of renewable electricity with purchasing obligation is defined. The other big issue is bank loans, which can be more easily gotten in case the legislation and RES promotion are coordinated.

In Hungary, we do not know about studies on public acceptance of clean technologies that would facilitate the RES promotion. The slowly increasing amount in the development program (Széchenyi Plan) will hopefully increase the household sector's RES utilisation and acceptance.

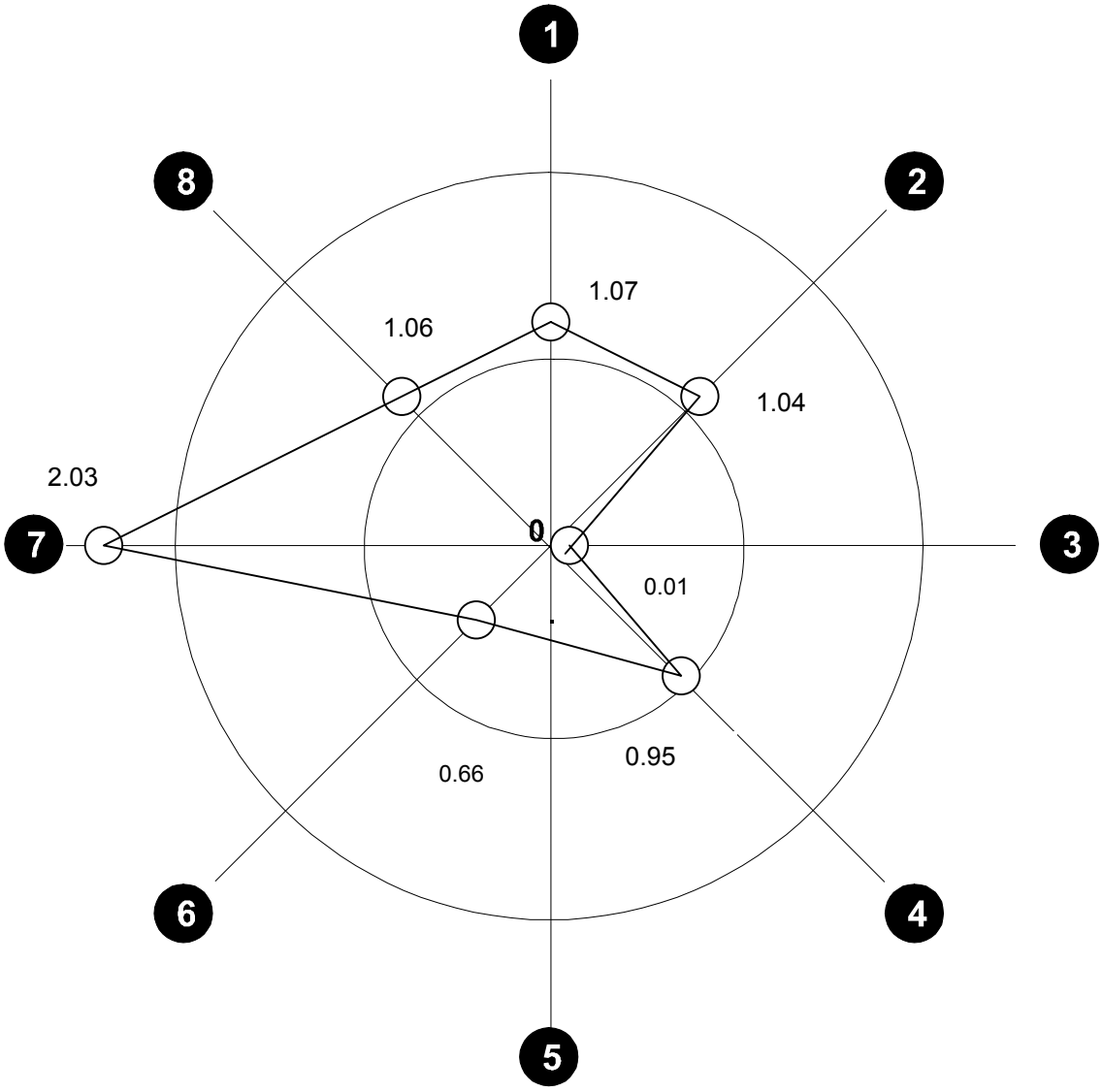
It is a fact that the lobby power of the Nuclear Power Plant and the other polluting power plants is huge, and they practice it against system reforms and changes.

[33] A közös megvalósításban való hazai részvétel stratégiája (National Strategy for Participation in Joint Implementation), MAKK és Env-Int-Cent, Budapest 2001, background study

[34] Kocsikk, K.. Intenational Collaboration for Decentralized Energy Supply of Rural Areas, International Agrophysics, 1998

[35] Állásfoglalás a biomassza energetikai felhasználásról, (Position paper on Utilisation of the Biomass for Energy), Centre for Environmental Studies, Budapest, 2000

Presentation of the Country's Star



Conclusions

Reporter's conclusions on all indicators

The sharp reduction of the energy sector's CO_2 emissions is triggering a nice decrease of the indicator on carbon dioxide emissions. This picture can be misleading as this took place unintentionally simply due to structural changes. As forecasted by estimations, the energy and electricity demand will increase, and CO_2 emissions may increase again.

The increasing SO2 emissions of the energy sector is mainly due to domestic – low quality - coal and lignite purchasing regulation. Even though a strict SO2 regulation is in place, for political reasons the predicted shutdown of polluting power plants is postponed.

With practically 100% access to affordable electricity, Hungary performs very well from the social sustainability point of view. Unfortunately this level of connection to the national grid makes the supply less secure as it promotes the big base-power plants, and hinders the spreading of small renewable-based small systems.

The indicator for investment into clean energy (0,956) shows a pretty nice improvement between 1992 and 2000 with almost 400% increase. But despite the improvement, the proportion of clean energy in the Hungarian energy sector remains around 5 % being far less then the desired 8,6 %.

The energy trade indicator (0.66) clearly shows that in addition to Hungary's energy import dependency, the country imports from non-renewable sources, using its old connections with the former socialist block.

We simply did not calculate the 6 indicator evaluating the non-renewable investments as budget burdens for two reasons. Energy Club's opinion – hard to prove, should be studied - is that in Hungary the biggest burdens on state budget are not direct investments into the energy sector – there are hardly any, and the ones that take place are not necessarily burdens -, but price subsidies, and present values of future expenses that should be covered by present savings.

For energy intensity vector (2,029 for 2000) we can say that despite a significant total energy efficiency improvement (20% less energy for one EUR of GDP), the Hungarian economy still uses double of the world average. In addition to energy efficiency programs – that have small amount of funds compared to the possible energy saving (= national interest), public awareness raising and third-party financing should be promoted to work in favour of energy efficiency.

As only 3,04 % of Hungary's energy demand is satisfied by renewables the vector for indicator 8 (1,064) clearly indicates how much Hungary neglects its domestic RES sources.

Note to SEW

For better sustainability, source diversification and reliance on smaller, more flexible, local sources would be crucial. These are the systems that RES technologies could operate. Maybe an indicator for domestic sources, and a number of systems (three power plants for a country of twelve) is worth to be considered. However it is clear, that the aim of SEW is not to produce as many indicators as it can, but rather to simplify.

For indicator 6. As most of the states give price support to some of its players (e.g. for mines for regional development and unemployment reasons, or for power plants to keep

the production of expensive electricity, etc. not only direct investments but long term price subsidies should be taken into account being a continuous burden on the budget, and they take away funds from cleaner energy.

Note to future Observer-Reporters

Included into discussion of indicators.