REPUBLIC OF HUNGARY
MINISTRY OF ECONOMY AND TRANSPORT

COUNTRY REPORT

on the status of electricity production based on renewable energy sources

(on the implementation of Directive 2001/77/EC)

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TARTALOM

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This Country Report serves for compliance with Article 3 (3) of Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market.

1. Strategic considerations for increasing the use of renewable energy sources

Energy conservation and increasing the use of renewable energy – in accordance with intensifying environmental protection – have a prominent position in the energy policy of the European Union (energy conservation is the first priority, and increasing the use of renewable energy is the third).

The current objective of the European Union is to increase the former 5.3% of renewable energy use to 12% and the percentage of electric energy use produced using renewable energy sources to 22.1% by 2010 (Directive 2001/77/EC of the European Parliament and of the Council of 21 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market). Following negotiations, a 3.6% percentage requirement for increasing the ratio of electric energy produced from renewable sources was formulated with respect to Hungary on behalf of the EU, which is also included in Item 12 of Annex II of Act XXX of 2004 on accession.

Directive 2003/30/EC of the European Parliament and of the Council on the promotion of the use of biofuels or other renewable fuels for transport requires Member States to increase the ratio of biofuels in transportation; that is, Member States are required to reach 5.75% by 2010. In this area, Hungary has set an objective of 2% by 2010 pursuant to Government Resolution 2233/2004 (IX 22.) on national objectives regarding the use of biofuel and other renewable fuels in transportation. Parliamentary Resolution 63/2005 (VI. 28) OGY has called on the Government to achieve 4% biofuel use by 2010.
Increasing the use of renewable energy sources is not only required according to Member State requirements, it has numerous advantages with regard to the national economy:

- the state of the environment can be improved,
- with respect to climate change, the environment is not burdened or this burden is significantly less than in the case of fossil energy sources, and this contributes to compliance with the obligations undertaken in Kyoto as well as to CO_2 savings that can be sold on the international market,
- they can replace fossil energy sources, and this can reduce the energy import dependence on traditional energy sources,
- import burdens can be reduced, thereby improving the balance of payments,
- new jobs can be created,
- added value, GDP and exports can be increased,

— modification of the agricultural structure is promoted, which has a beneficial effect on improving the quality of life in the countryside and keeping the population stationary,
— increasing the use of renewable energy sources facilitates the application of new, advanced technologies,
— environmental burden can be significantly reduced by converting those materials that would otherwise burden the environment (e.g. wastewater sludge) into energy.

2. Government measures in order to increase the use of renewable energy sources

2.1. Domestic legislative provisions regarding electricity production based on renewable energy sources

Act CX of 2001 on electricity

Act CX of 2001 has the following major provisions:

— When selling electricity produced from renewable energy sources, competitive disadvantage shall be reduced by integrating subsidy in the prices. Upon determining this subsidy, the natural characteristics of the country as well as the different payback periods of the technologies related to individual energy sources shall be taken in consideration.
— Within the scope of its tasks related to electric energy sources, the Hungarian Energy Office shall determine and certify the quantity of electricity produced from renewable energy sources or waste by producers or small power plant operators.

Act LXXIX of 2005 on the amendment of Act CX of 2001 on electricity

The amendment of 2005 has retained the provisions of Act CX of 2001 and specified some more accurate requirements:

— the effect of subsidized technology on the balanced operation of the electric energy system shall be taken in consideration when subsidizing green electricity;
— as regards mandatory acceptance, the former 0.1 MW power limit is repealed, and acceptance becomes mandatory irrespective of power limit;
— a price of 23 HUF/kWh is specified for the mandatory acceptance of electricity based on renewable energy sources, which shall be modified by a “k” factor to an extent corresponding to inflation.

Decree 78/2005 (X. 7.) GKM by the Minister of Economy and Transport on the rules for accepting electricity subject to the acceptance requirement as well as on the amendment of Decree 56/2002 (XII.29) GKM on the determination of rules and prices of electric energy subject to the acceptance requirement.

The Ministerial Decree contains a summary of the provisions of Act CX of 2001 as well as Act LXXIX of 2005 on system safety as well as subsidies. The Decree applies two price types for taking into account the system security effects and technological differences of electricity produced from renewable sources:

— in the case of technologies based on non-fossil energy sources depending on weather conditions – electricity production based on wind and solar energy – the mandatory acceptance price of 23 HUF/kWh is applied irrespective of the season,
— in order to assert system security consideration and in the case of technologies independent of the weather – electricity production based on biomass, hydraulic power and geothermal energy – seasonally dependent prices shall be determined in such a way that their average delivers a price of 23 HUF/kWh.

Government Decree on the implementation of Act LXXIX of 2005

The Government Decree has specified more precise requirements for mandatory acceptance pursuant to Act CX of 2001. According to the Decree, the Hungarian Energy Office shall determine the quantity of electricity obtained from renewable energy sources or waste subject to mandatory acceptance according to the consideration of the equal treatment principle in the construction and production license of the power plant or the cumulate license for the minor power plant. In this process, the Hungarian Energy Office shall take the following in consideration:

— a national commitment to achieve a 3.6% rate of green electricity by 2010 in the use of electric energy;
— making green electricity competitive;
— effect of the given technology on the balanced operation of the electric energy system;
— load capacity of electric energy consumers;
— extent of other subsidies for the given investment project;
— expected return on the investment;
— furthermore, the Decree provides that the acceptance price shall be determined and the subsidy system shall be applied in such a way that the subsidy used by the power plant or small power plant should not exceed the amount of depreciation write-off related to the efficiently operating power plant and major power plant investment project, as well as the profit required for operation.

Thus, the regulatory conditions – included in statutes and minor legislation – satisfy the following major requirements:

— the time limit that previously troubled potential investors because the effect of pricing was to last until 2010 has been eliminated;
— legislative rules provide a suitable level of security for investors;
— pricing has taken into account the considerations of system security and technological differences;
— finally, the subsidy has achieved the goal of creating competitive conditions for green electricity but simultaneously excludes the creation of unwarranted extra profits;
— finally, it has created full harmony with the basic EU principle regarding the application of subsidies.

2.2. Objectives of the Government Program

The objective of the Government Program is energy conservation, which applies the increase in renewable energy use as an instrument, which facilitates the replacement of fossil energy sources. Increasing the use of renewable energy sources can have a favorable effect on employment, on one hand by creating new jobs and, on the other hand, by the employment of agricultural producers creating base materials, since it provides a method for alternative land use. It also promotes the achievement of government objectives related to environmental protection.
In its “100 steps” program, the Government intends to support the increase in renewable energy use with the following measures:

- growing plants for energy purposes must be subsidized;
- the propagation of biofuels must be subsidized by excise regulation;
- biomass-based electric energy production must be encouraged by the long-term stabilization of acceptance prices.

Increasing the use of renewable energy is directly related to the following areas of the government program:

- sustainable development: renewable energy sources constitute an indispensable element of sustainable development, and they reinforce all three pillars of sustainable development (environmental, social, economic);
- economic competitiveness: steps aimed at the reduction of dependence on energy imports can increase the competitiveness of economy in the long run;
- creation of new workplaces: new markets and services that increase employment are being created.

3. Renewable energy use in Hungary

Table 3-1 presents the composition of renewable energy use in Hungary for the years 2001-2004.

Renewable energy sources accounted for 3.4% of total energy use in Hungary in 2003 (this ratio was 3.5% if waste incineration is taken into account, and it increased to 3.7% by 2004). The ratio of electric energy produced from renewable energy sources represented 2.2% in 2004 within the electricity use in Hungary; this figure increases to 2.3% if electricity produced from waste incineration is taken into account.

Table 3-1

	Electric energy production from renewable energy sources (GWh)				Utilization of thermal energy (TJ) (including renewable energy source quantities used for electric energy production)			
	2001	**2002**	**2003**	**2004**	**2001**	**2002**	**2003**	**2004.**
Geothermal energy	-	-	-	-	3,600	3,600	3,600	3,600
Solar collector	-	-	-	-	60	70	76	76
Firewood	7	6	109	678	13,539	14,592	14,850	14,659
Firewood forestry waste	-	-	-	-	4,600	4,550	3,326	2,805
Biomass from other sources	-	-	-	-	12,461	11,602	14,425	16,892
Biogas	7.6	11.2	18.37	22	126	133	191	274
Hydroelectric power	186	194	171	205.5	669.6	698.4	615.6	739.8
Wind power	0.9	1.2	3.6	5.6	3.24	4.32	12.96	20.16
Photoelectric	0.06	0.06	0.07	0.1	0.021	0.021	0.025	0.0
TOTAL	**201.5**	**212.4**	**301.97**	**911.2**	**35.1 PJ**	**35.2 PJ**	**37.1 PJ**	**39.1 PJ**
Waste incineration	112	59	67	54	2,597	1,995	1,507	1,373
Total including waste	**313.5**	**271.4**	**368.97**	**965.2**	**37.7 PJ**	**37.2 PJ**	**38.6 PJ**	**40.4 PJ**

3.1. Heat and electric energy production from biomass

The issue of renewable energy sources is a key question for agriculture since food production must be significantly reduced because of the changing intervention system and WTO negotiations. According to some estimates, this can affect 800-1000 thousand hectares of cultivation area. Considering the alternation of crops, this includes the income opportunities for 80-120 thousand producers, which, if family members are included, can affect 400-500 thousand people. Due to the significant societal effect, this issue affects not only agriculture, but the entire economy and all of society.

It must be realized that although it has a significant role, alternative employment (e.g., rural tourism, handicrafts, etc.) cannot absorb such an amount of workforce. Therefore, a solution must be found for ensuring income-producing opportunities for the given group of people and keeping them in place that

- ensures that they continue their agricultural production activity;

- agricultural produce created as a result of this activity should be sold under marketable circumstances without significant central state subsidy (intervention).

In practice, the above criteria are only satisfied by energy-focused plant production and the use of biomass as a renewable energy source. In the course of creating a strategy for increasing the use of renewable energies, these considerations must be applied to the greatest possible extent.

3.1.1. Solid-state biomass used as an energy source

By increasing the utilization of agricultural biomass – and specifically, the creation of energy plantations – the ratio of renewable energy sources within energy production can be significantly increased in the short run.

Apart from advantages pertaining to energy policy and environmental protection, this has the following agricultural and regional development advantages:

- diversification of the agricultural production structure, thereby decreasing excess cereals, and the pressure on the intervention system (which is expected to change significantly);
- new sales opportunities will be opened in the product paths currently under overproduction difficulties (e.g., cereal market);
- contribution to the volume of employment and thereby the retention of income-producing opportunities of agricultural producers;
- new permanent and temporary workplaces can be created in the countryside;
- opportunities for alternative land use can be created in areas of unfavorable cultivation characteristics or increased risk (e.g., flood and inland water hazard);
- it delivers a positive cumulative effect on the preservation and improvement of the quality of life, as well as the increase of population retention capability of the countryside.

There is approximately 12 million m^3 of tree growth per year in the Hungarian forests, of which a maximum of 9 million m^3 could be produced (due to reasons of sustainable forestry). For many years, only 7 million m^3 of wood material per year has been produced from this amount. From the 7 million m^3, 1.5 million m^3 remains in the forest as “cutting residue”; therefore, the amount of wood material utilized is 5.5 million m^3. From this 5.5 million m^3 of useful wood material, there is approximately 3.5 million m^3 of cordwood, which can be used for fiberwood, firewood or paperwood (2 million m^3 of higher value industrial wood).

In the past few years, the ca. 3.5 million m^3 of cordwood selection and the 400-500 thousand m^3 of lumber industry waste produced in various lumber production plants and wood-mills were partly used by the manufacturers in

the Hungarian wood board industry and partly used for providing firewood to the population (ca. 1.6 million m^3), and it was partly incinerated by the plants themselves or used for export purposes, energy use (in power and heating plants) was only at a lesser degree.

It is important to note that pursuant to legal regulation (Act LIV of 1996 on forests and their protection, as well as the decrees regulating its implementation), forestry is performed in each Hungarian forest according to 10-year forestry plans or annual forestry plans. Forestry legislation in Europe is among the strictest rules, and they provide for the prevention of forestry overuse in our country even along with the wood use for energy purposes which is exhibiting a dynamic growth at present.

The incineration product of solid biomass (ash) can be utilized for soil improvement after treatment (e.g., used as an additive to artificial fertilizers). As further soil improvement materials, treated sludge remaining after the energy use of wastewater sludge can be taken in consideration, the organic matter content of which facilitates more intensive plant growth (e.g., energy plants).

Owing to various subsidies and preferences, several minor electricity or heat energy production capacities were implemented during the past years and the minor energy investments fundamentally based on sawmill waste have created a competitive market for sawmill industry waste.

Significant investment projects implemented:

Investment project	**Average annual wood material requirement**
Distance heat production, Szigetvár (2 MW)	2,200 t/year
Distance heat production, Mátészalka (5 MW)	6,000 t/year
Distance heat production, Papkeszi (5 MW)	1,000 t/year
Distance heat production, Körmend (5 MW)	6,000 t/year
Distance heat production, Szombathely (7 MW)	8,000 t/year
Heat and electricity production, Balassagyarmat (2 MW)	12,000 t/year
Heat and electricity production, Szentendre	20,000 t/year

Investment projects representing significant wood material demand have been started or even completed by converting power plants previously operating with coal to biomass.
These are the following:

Pécs Power Plant (49 MW)	330,000 t/year
Kazincbarcika Power Plant (30 MW)	200,000 t/year
Ajka Power Plant (20 MW)	192,000 t/year

Apart from purely wood-firing blocks, the Power Plants at Tiszapalkonya and Mátra use wood material for mixed firing. New energy developments have

significantly increased wood use for energetic purposes in Hungary. This increased demand has significantly increased the price of wood, and tensions have been created between fiberboard manufacturing and power plant supply.

Tests have shown that forests in Hungary are still capable of satisfying current needs – even by strict adherence to the requirements of sustainable forestry – but sufficient base material for the creation of significant new capacities could only be provided by a significant infringement of the interests of other market participants (e.g., fiberboard manufacturers, firewood supply for the public, etc.). The pre-condition of creating new capacities would be the launching of an efficient energy plant production program, and the domestic adoption of energetic plant production (herb and wood cultures, as well).

3.1.2. Biomass used as a liquid-state energy source

Two major groups of so-called liquid biofuels are distinguished: ethanol originating from plants (bioethanol) and biodiesel produced from vegetable oil by esterification.

The launching of biodiesel and ethanol production would facilitate a significant production growth in several areas of agriculture. As the production of biofuel can facilitate future land use in Hungary in compliance with the agricultural policy of EU countries, the management of this issue – beyond considerations of energy policy – is primarily a task of agricultural policy.

In accordance with the requirement set forth in Parliamentary Resolution 63/2005 (VI. 28.) OGY, which has stipulated that the ratio of the use of biofuels should reach 4% by 2010, the introduction of new incentives has become warranted. Therefore, the Excise Act provides tax exemption up to 2007, and after this year it will apply a differentiated tax rate, thereby encouraging the compliance with goals stipulated in the above parliamentary resolution.

3.1.3. Biomass used as gaseous energy source

In current biogas-producing establishments, the base material of biogas production is usually liquid manure or liquid containing organic matter from the food industry in which the dry matter content is between 2-8% and the organic matter content is between 40-60%. The biogas plant in Nyírbátor, which is significant even by European standards and based on agricultural and animal husbandry waste, commenced operation in 2003. The plant, which has a 1.6 MW electricity production capacity, produced nearly 7 GWh of electric energy on a biogas basis with three gas engines operating on the plant site.

A characteristic location of biogas production is the municipal solid waste landfill where the so-called deposit gas is formed spontaneously. Energetic use of biogas produced in landfills (due to the mandatory reduction of organic matter content of the landfilled waste) is to be expected to a lesser degree in the future, but the trapping and energetic utilization of unused methane gas provides an important energetic and environmental opportunity for existing landfills.

According to the experiences of the Nyírbátor plant, the main opportunity in the future in this field is the utilization of energy production opportunities in animal husbandry and wastewaters, for which new plans have been prepared. According to the plans, in the Northern Pest Wastewater Treatment Plant, 7 GWh of electricity will be produced in a 1.75 MW gas turbine by a HUF 1.5 billion investment. Within the framework of the collective implementation mechanism of the Kyoto Protocol, the Biogas Demonstration Project designed with Austrian and Hungarian cooperation intends to use liquid manure to produce 13.4 GWh of electricity per year.

The increase of biogas production must be treated as a prominent program due to the following considerations, as well:

- it is related to the National Waste Management Plan,
- it is related to climate strategy
- it harmonizes with the EU subsidy policy.

In order to neutralize the by-products created in agricultural production (liquid dung, food industry waste, etc.), biogas production must be given preference, which will make it possible to produce energy while at the same time achieving environmental objectives.

3.1.4. Conversion of sludge from municipal wastewater treatment plants into electric and heat energy

There were 555 different municipal wastewater treatment plants operating in Hungary on 1 January 2003. Their sludge was treated at 458 different locations. The organic matter content of the sludge varies generally between 65% and 75%, which depends on the quality of treatment in the liquid phase.

The quality of biogas produced in the course of rotting is the function of decomposed organic matter quantity. Table 3.1.5-1 depicts the gas and electric power obtainable from the treatment plants, which may be taken in consideration according to the appropriate dimensions.

Table 3.1.5-1

Municipal wastewater treatment plants connected to the national electric energy network and theoretically produced energy quantities

Number	Name of treatment plant	Expected load up to 2010 (10^3 LEÉ)	Total biogas quantity produced (10^3 Nm^3/day)	Electric energy quantity that can be utilized in the network (MWh/day)
1	Budapest-Central	1,458	36.45	71.13
2	Budapest-Southern Pest	515	12.88	25.13
3	Budapest-Northern Pest	455	11.38	22.20
4	Budapest-Southern Buda	262	6.55	12.80
5	Debrecen	546	13.65	26.43
6	Miskolc	317	7.92	15.45
7	Pécs	346	8.65	16.86
8	Szeged	230	5.75	11.22
9	Kecskemét	280	7.00	13.64
10	Szombathely	262	6.55	12.80
11	Székesfehérvár	204	5.10	9.95
12	Békéscsaba	204	5.10	9.95
13	Zalaegerszeg	183	4.58	8.94
14	Győr	178	4.45	8.90
15	Pápa	159	3.98	7.75
16	Szolnok	150	3.75	9.44
17	Sopron	148	3.70	6.35
18	Kaposvár	141	3.52	6.00
19	Vác	133	3.32	5.70
20	Siófok	112	2.80	4.60
21	Hódmezővásárhely	105	2.62	4.50
22	Keszthely	104	2.60	4.50
23	Veszprém	89	2.60	4.50
24	Gyöngyös	86	2.15	3.60
25	Tatabánya	81	2.02	3.45
26	Nagykanizsa	80	2.00	3.45
27	Szarvas	79	1.98	3.44
28	Szekszárd	77	1.92	3.42
29	Dunakeszi	77	1.92	3.42
30	Cegléd	75	1.88	3.40
31	Gyula	75	1.88	3.40
32	Nagykőrös	70	1.75	3.38
33	Eger	69	1.72	2.98
34	Dunaújváros	67	1.68	2.90
35	Jászberény	66	1.65	2.86
36	Baja	65	1.62	2.86
37	Kiskunhalas	62	1.55	2.64
38	Ajka	59	1.48	2.60
39	Kapuvár	59	1.48	2.60
40	Szentendre	59	1.48	2.60
41	Kazincbarcika	58	1.45	2.50
42	Orosháza	56	1.40	2.45
43	Tiszafüred	55	1.38	2.35
44	Mosonmagyaróvár	51	1.28	2.35
	Total	**8,048**	**201.59**	**381.39**

The biogas energy that can be theoretically obtained from wastewater sludge at the 44 treatment plants investigated can provide excess electricity of 381.4 MWh/day or ~127.8 GWh/year when assuming 335 workdays. In relation to the operation of gas engines, a significant waste heat is produced, which can be utilized in the plants themselves. This facilitates the replacement or supplementation of the quantity of "fuel" required for municipal hot water supply and heating for the plants as well as the heat conservation of rotting facilities, etc.

As a further advantage, the treated sludge remaining after energy production is highly suitable for improving the soil of trees and plants cultivated for energy purposes. The organic matter content of wastewater sludge facilitates more intensive plant growth.

3.2. Electricity production from wind energy

According to wind conditions in Hungary, a wind potential of 70 W/m^2 per year can be expected on the Great Plain and 160-180 W/m^2 per year can be expected in Northwestern Hungary.

In European countries with significant wind energy use (the Netherlands, Denmark, Germany), the usable wind potential is significantly greater: 600-800 W/m^2 per year.

In Hungary, the wider application of small wind engines can be considered especially in areas without electric energy networks, which operate water pumps, electric energy generators, water ventilation equipment, designed for a wind velocity of 5 m/s, with wind turbines of 2-4 m diameter and on 7-10 m high supports.

As a result of the mandatory acceptance and favorable price of electricity produced with renewable energy sources as well as the investment subsidies, the construction of wind power plants has started in Hungary. In the fall of 2005, 10 wind power plants were operational: 600 kW in Kulcs, 200 kW in Inota, 2 x 600 kW in Mosonszolnok, 2 x 600 kW in Mosonmagyaróvár, 800 kW in Erk and 800 kW in Újrónafő, 250 kW in Bükkaranyos and 600 kW in Váp, and the construction of several others is in progress. The establishment of a wind power station is highly favorable economically when taking into account current regulation. This is the reason for the fact that potential investors had submitted to the Hungarian Energy Office construction license applications for nearly 900 MW of planned wind turbine capacity by the end of 2005. However, one fact represents a problem, namely that production occurs only at suitable wind levels, as a consequence of which electric energy production cannot be regulated in an absolute extent. According to system tests, in order to make wind power plants a fully utilized component of the electric energy system, nearly 90% of

the wind power plant capacity has to be available in the system as a backup capacity.

The Hungarian Energy Office – considering regulatory problems and the characteristics of the domestic electricity system – has specified the total achievable capacity of wind power plants to be 330 MW. A basic condition for the construction of wind power plants at higher capacities is the solution of regulatory problems of the system (e.g., the construction of a pump and reservoir based power station).

Apart from the solution of regulatory problems, the Hungarian propagation of wind power stations is helped by the fact that the Ministry for Environment and Water (KvVM) has summarized the environmental, landscape and nature protection considerations related to the establishment of wind power plants in a document titled “Information on the landscape and nature protection considerations of the location of wind power stations” and the annexed map. This Information outlines the areas for which grounds for exclusion exist for the placement of wind power stations from nature and landscape protection considerations, such as:

- areas of national ecologic network: protected environmental areas, their protective zones, natural areas and ecologic corridors,
- areas subject to international treaties (Ramsar areas, biosphere reservations, etc.)
- Natura 2000 areas,
- habitats for plant species subject to increased protection or for protected plant species in large numbers, living, nutrition and nesting areas of animal species, migration paths and their immediate environments.

In the future, the domestic construction of wind power plants will be helped by the fact that in 2005 the National Meteorological Service prepared a wind map of Hungary that serves as a good basis for selecting the location of the power stations.

3.3. Use of geothermal energy for the production of heat and electric energy

Since the geothermal gradient is nearly one and a half times greater than the world average, Hungary is an area of favorable geothermal characteristics. The measured thermal current values – i.e. the heat emitted from the depth of the Earth in a unit area – are large (90 mW/m^2 on average), whereas the average value on the European continent is 60 mW/m^2. According to the previously mentioned geothermal gradient, the temperature of rock formations and their water content is 60°C at a depth of 1 km and 110°C at a depth of 2 km. The geothermal gradient is larger in Southern Transdanubia and the Great Plain and smaller in the Small Plain and the mountainous area in comparison with the national average.

Considering the fact that thermal waters in Hungary constitute a part of Hungary's groundwater supply of strategic significance in a uniform hydraulic system with restricted replenishment, water extractions for the purpose of geothermal energy use can only be authorized if accompanied by water feedback. This latter procedure will solve the placement problems for the pollutants of extracted thermal waters contaminating surface, subsurface or groundwaters, but it poses an extraordinary difficulty on increasing geothermal energy use.

Taking into account environmental considerations, salinity and feedback requirements as well, a geothermal energy of 10-50 PJ could be theoretically used per year (depending on user requirements as well), from which the current actual use is only 3.6 PJ.

According to expert opinion, there are eight known dead wells in Hungary (drills where no hydrocarbons were found in the explorations), which could be theoretically suitable – along with finding suitable technical conditions – for the implementation of heat and electricity production in the event that water feedback could be solved, as well.

Table 3.3-1

	Potential heat production capacity (MW)	**Potential electric energy production capacity (MW)**
Fábiánsebestyén	120	64
Álmosd	20	4
Tótkomlós	15	1.5
Mélykút	35	5
Tura	15	1.5
Andráshida	10	0.6
Nagyrécse-Pet	20	2
Bajcsa	20	1
Total	**255**	**79.6**

Currently, there is no electric energy production in Hungary that is based on geothermal energy; hot water extracted to the surface is being used for heat technology purposes – heating, utility hot water production, heating of pools, and technological objectives. In the development and implementation of domestic geothermal power stations, MOL Rt. has a prominent position due to its experiences in geology and technology (drilling, water feedback) as well as its capability of financial risk-bearing. MOL Rt. is currently investigating the conditions for creating an experimental power station with a planned 2-5 MW capacity.

Apart from direct utilization, a special type of heat supply based on geothermal energy is the heat pump which delivers the heat absorbed in a lower-temperature medium to an area of higher temperature along with electric energy use. The propagation of heat pumps is in an initial state in Hungary.

3.4. Heat energy production from solar energy

The best and most prevalent area of direct heat utilization of solar energy is represented by greenhouses, agricultural drying plants and hot water production in all areas where hot water demand is even or coincides with sunny periods. This latter method of utilization – heat production with solar collectors – can be achieved by smaller, unique, community-based as well as by larger, central equipment. Reliable technologies with high efficiency, as well as domestic and import products and equipment units are all available.

According to experience, hot water production equipment utilizing solar energy can be used to supply 40% or even 60-70% of the hot water demand of a given household. The utilization of solar energy will be supposedly accelerated by Directive 2002/91/EC on the energy performance of buildings, which is currently under domestic adaptation. The Directive provides that in the case of new buildings exceeding 1000 m^2, the economic considerations of applying decentralized energy supply systems based on renewable energy sources must be investigated.

3.5. Electric energy produced from solar energy

The technical conditions for utilizing solar energy with solar cells by the photoelectric effect are available, along with a well-qualified group of experts, and there are successful enterprises in Hungary that intend to be engaged in solar cell production in the future. So far, the majority of domestic applications have been produced for an autonomous electricity supply that will provide consumers with continuous electricity by using a suitable storage facility.

In the case of autonomous electricity producing tasks, the application of solar cell electric sources is determined by the energy demand, the cost of building the electricity network, as well as the network electric energy costs. For low electricity consumption, the creation of an autonomous solar-cell electricity source can be cheaper than building a network connection if the electric network has to be built for a relatively great distance.

3.6. Electric energy production from hydroelectric power

The conditions for hydroelectric power use are not favorable in Hungary. The specific potential hydroelectric power is a good characterization of our capacity for hydroelectric power use, which is 110 thousand kWh/km^2 in Hungary. In comparison with European countries, Hungary has the penultimate position in this regard, only the Netherlands has worse conditions.

The total output of the currently existing 31 hydroelectric power plants is 55 MW and the electric energy production is 195 GWh/year, which represents nearly 0.5% in comparison with the total domestic electric energy system. Electricity is currently being produced at 23 of the 31 existing hydroelectric power stations; the small power plants of eight locations are currently inoperational. Nearly 90% of the electric energy from hydroelectric power stations is produced by four major locations (Kisköre, Tiszalök, Kesznyéten and Ikervár).

Based on the unfavorable conditions in Hungary for the construction of hydroelectric power stations, it is possible to establish that after the prevention of previous plans for the Bős-Nagymaros power stations, the utilization of renewable energy in Hungary cannot be significantly improved by the construction of hydroelectric power stations. A favorable opportunity for the construction of hydroelectric power plants is represented by the discharged cooling water of the Paks Nuclear Power Plant Rt. where a power station with a capacity of around 5 MW could be built according to preliminary estimates by a nearly HUF 2.7 billion investment. The power plant is currently examining the conditions of profitability for the evaluation of a possible investment project. Further potential hydroelectric power plant utilization locations are represented by storage plants built on the rivers and watercourses of Hungary without any hydroelectric power utilization.

4. Development of electric energy production in Hungary based on renewable energy sources up to 2005

Electric energy use in Hungary was 41 TWh in 2003, 369 GWh of which was, according to statistics, electricity produced from renewable sources. Thus, electricity produced from renewable sources was 0.9% of gross use in the year 2003. This number contains the 67 GWh of electricity produced by

waste incineration, which does not satisfy the renewable electricity category specified in the EU-supported regulations. According to Directive 2001/77/EC by the European Parliament and the Council, “waste utilization (incineration) may only be accounted for in the subsidy system of renewable energy sources if it satisfies the relevant Community legislation pertaining to waste management, i.e. the provisions of selective collection”. Without counting waste incineration, this ratio was only 0.7%.

By 2004, green electricity production increased to 965 GWh, which represented a ratio of 2.3%.

By 2005, the power stations that had switched to biomass had achieved normal operating conditions, and the three biomass-powered blocks with a total capacity of 100 MW – the Ajka, Pécs and Kazincbarcika power plants – were operating at full capacity. As the production of green electricity was further increased by the fact that two power stations – those at Tiszapalkonya and the Mátra – mixed coal and lignite fuel with renewable energy sources, it is expected that biomass-based electric energy production – according to preliminary data – will reach 1550 GWh by 2005, and owing to this fact, the total green electricity production for the year 2005 will be around 1880 GWh (representing a ratio around 4.5%).

According to the requirement imposed on Hungary by the EU – in accordance with Directive 2001/77/EC – which was also reinforced by Act XXX of 2004 on accession – the ratio of electric energy produced from renewable energy sources must reach 3.6% of the electric energy use by 2010. According to expected data for the year 2005, we reached or exceeded the requirement for the year 2010 in 2005. In order to increase the security of energy supply and achieve environmental and agricultural advantages, the determination of a higher national objective is warranted, and the production of green electricity as well as the increase of renewable energy source use for the purpose of heat energy must be treated and supported as a prominent program.

5. Connections of renewable energy use with climate policy

Hungary joined the Kyoto Protocol in 2002 and committed to a 6% decrease in greenhouse gases in comparison with the 1985-1987 baseline. The safe performance of this undertaking – from the aspect of energy use – can be achieved by two methods.

- One possible way is energy conservation since CO_2 emission relevant from the aspect of the greenhouse effect is reduced in proportion to the conserved energy.
- The other opportunity is to increase the use of renewable energy sources, since renewable energy sources either do not emit any

CO_2 or – and this refers to solid biomass – the maximum emitted amount is equal to that absorbed during their development.

As an addition, the Kyoto Protocol has introduced a flexibility mechanism in the implementation of the Convention. An Interministerial Committee has been created for elaborating, coordinating and managing the implementation of these mechanisms in Hungary. This Committee prepares proposals regarding the issuance of licenses for participation in Joint Implementation.
The license list reflecting the status in August 2004 is shown in Table 5-1. From the list, it is apparent that a significant part of the projects created for the purpose of CO_2 conversion were in reference to the increased use of renewable energy sources.

Table 5-1

Joint Implementation (JI) Projects in Hungary

	Project supplier	Project owner	Support statement	Approval statement	Project type and location of implementation
1	**AES BORSODI Power Plant**	ERUPT (the Netherlands)	issued	issued	conversion to biomass (Kazincbarcika)
2	**BAKONYI Power Plant Rt.**	ERUPT (the Netherlands)	issued	issued	conversion to biomass (Ajka)
3	**BÁTORTRADE Kft.**	CDC IXIS (French bank)	issued		methane gas utilization from agricultural waste (Nyírbátor)
4	**ENVIROINVEST Kft.**	Mitsubishi C. (Japan)	issued	issued	geothermal methane gas utilization project (34 locations)
5	**MÁV Rt.**	Mitsubishi C. (Japan)	issued	issued	energy efficiency (81 locations)
6	**GREEN PARTNERS, BGP Engineers BV**	ERUPT (the Netherlands)	issued	issued	methane gas utilization from landfills (Nagykanizsa, Orosháza, Baja)
7	**PANNONPOWER Rt.**	PCF (World Bank)	issued	issued	conversion to biomass (Pécs)
8	**Framex Bioenergia Kft.**	ERUPT (the Netherlands)	issued		methane gas utilization from organic waste (Sajóbábony)
9	**Független Energiatermelő Kht.**	General Electric	issued		combined electricity and heat production (Salgótarján)
10	**SZEGEDI Hőszolg. Kft –Démász/BKZ**	ERUPT (the Netherlands)	issued		combined electricity and heat production
11	**Szombathely Distance Heating. Kft.**	PCF (World Bank)			combined electricity and heat production and thermal water utilization
12	**Vértesi Power Plant Rt.**	ERUPT (the Netherlands)	issued	issued	conversion to biomass (Tatabánya)
13	**Euroinvest Rt. – Füzitő GM Kft.**	unknown	correction of missing items in progress		fuel change from oil to gas (Almásfüzitő Power Plant)
14	**EETEK Kft.**	ERUPT (the Netherlands)	issued		methane gas utilization from landfill (Gyöngyös, Göd,

	Project supplier	Project owner	Support statement	Approval statement	Project type and location of implementation
					Salgótarján)
15	**Exim-Invest Biogas Kft.**	Austrian government	issued	issued	methane gas utilization from landfill (Nyíregyháza-Oros)
		GE Jenbacher AG	issued		
16	**Albertirsai Wind Power Plant Kft.**	ERUPT (the Netherlands)	issued		wind energy (Albertirsa-Ceglédbercel)
17	**Pálhalmai Agrospeciál Kft.**	Austrian government	issued	issued	methane gas utilization from agricultural waste (Pálhalma)
18.	**Eurowind**	ERUPT (the Netherlands)	issued		wind energy (Pusztaszabolcs)
		Austrian government	issued		
19.	**Hungarowind**	ERUPT (the Netherlands)	issued		wind energy (Sopronkövesd, Nagylózs)
		Austrian government	issued		
20	**Füzfői Power Plant Kft.**	ERUPT (the Netherlands)	issued	issued	combined electricity and heat production from biomass fuel (Balatonfüzfő)
21	**Debreceni Waterworks Rt.**	ERUPT (the Netherlands)	existing project		Biogas utilization
22	**Callis CRt.**	Austrian government	issued		wind energy (Tét)
		ERUPT (the Netherlands)	issued		
23	**Callis CRt.**	Austrian government	issued		wind energy (Kimle)
		ERUPT (the Netherlands)	issued		
24	**Kaptár „B" Energetika Kft.**	Austrian government	issued		wind energy (Károlyháza)
25	**Kaptár „B" Energetika Kft.**	Austrian government	issued		wind energy (Kisigmánd
26	**E.On Hungária Rt.**	Austrian government	issued	issued	wind energy (Rácalmás)
27	**E.ON Hungária Rt.**	Austrian government	issued	issued	wind energy (Kimle)
28	**Pannónia Wind Kft.**	Austrian government	issued	in progress	wind energy (Ostffyasszonyfa)
29	**Liget Bioenergy Works Kft.**	Mitsubishi C. (Japan)	issued		electric energy and heat production from biomass fuel (Dél-Nyírség)
		ELSAM Kraft (Denmark)	issued		
30	**Callis Rt.**	Austrian government			wind energy (Ikervár)
31	**Nitrogen Works Rt.**	several project owners	issued	issued	reduction of N_2O emission from acid production plant
32	**EETEK**				wind energy (Hárskút)
33	**Geogas Energy Use and Supply Kft.**				utilization of supplementary gases in thermal waters (26 locations)
34	**Gas Feld Kft.**	InterPower Corporation (Canada)			reduction of methane emissions of dead hydrocarbon wells

	Project supplier	Project owner	Support statement	Approval statement	Project type and location of implementation
					(46 locations)

6. Subsidy opportunities for increasing the use of renewable energy sources

The German Coal Aid Credit (currently named Energy Conservation Credit Fund) was established in 1991 for the promotion of energy conservation and the use of renewable energy sources based on the coal aid received from Germany. This favorable credit scheme provides loans with interests decreased by 50% with respect to the prevailing prime interest rate of the Central Bank for investment projects related to energy conservation. As the Fund is not related to the state budget, no direct state subsidy is connected to this credit scheme.

Direct state intervention started in 1996 when the Government in its Resolution No. 1113/1996 (XI. 29.) provided for the establishment of the Energy Conservation Credit Program with its specific objectives and instruments to be determined on an annual basis. This scheme provided loans in the total amount of HUF 2.8 billion in the years 1997, 1998 and 1999 for the energy rationalization investment of public institutions owned by local municipalities, with a 50% interest preference, the source of which was the Economic Development Allowance managed by the Ministry of Economy (the legal predecessor of the GKM).

For the purpose of approaching the European level of energy efficiency, the Ministry of Economy created a new energy conservation strategy in 1999, along with a related action program. In its Resolution No. 1107/1999 (X. 8.), the government accepted the energy conservation and efficiency strategy up to 2010, as well as the complex Action Program assisting its implementation.

The major objectives of the Program by 2010 are as follows

- Along with an assumed average GDP growth rate of nearly 5%, energy use should not exceed the average growth of 1.5% annually. In order to achieve this, energy demand has to be reduced by 3.5% on an annual basis.
- The conservation of energy sources with a 75 PJ/year caloric value or their replacement with domestic renewable energy sources is required through energy conservation activities that are partly state subsidized by 2010.

When summarizing allocations and accepted applications, the development of the subsidy system from domestic sources has been as follows in the past years.

Years	Accepted applications	Annual allocation for energy conservation and increasing the use of renewable energy sources (billion HUF)
2001	1,079	3.0
2002	8,996	4.5
2003	5,428	3.4
2004	4,780	1.641

The budget in the year 2005 approved HUF 524.1 million as an allowance for the Energy Use Efficiency Improvement Allocation supporting energy conservation and the increase in the use of renewable energy sources, which amount was covered fully by commitments beyond the 2004 subsidy system year. Consequently, there was an opportunity in 2005 to issue calls for energy conservation subsidy applications, and this caused the interruption in the long-term energy efficiency program that has been successful since 2000. In 2006, the program will be continued by providing a HUF 1.2 billion allowance.

In addition to from the domestically subsidized grant system, a program titled “Environmentally friendly development of energy management” under EU co-financing will be launched in 2004 within the framework of the Environmental Infrastructure and Operative Program. In this subsidy scheme, an amount of HUF 5,200 million is available for the years 2004, 2005 and 2006; 75% of this is from an EU subsidy. Within the framework of the program, subsidy applications related to the improvement of energy efficiency and increasing the use of renewable energy sources can be submitted. The KIOP program facilitates the acceptance of programs exceeding HUF 125 million and, in comparison with domestic subsidies, higher-level subsidies can be received in this system. Both local municipalities and business enterprises are eligible to apply, and subsidy ratios are differentiated according to the applicant and the application objective.

In the KIOP subsidy system, 28 applications have been awarded subsidies so far (in January 2006, the allowance was loaded to 71%). 14 of the winning applications were used for increasing energy efficiency, 6 of them for institutional energy conservation, 4 for the modernization of distance heating system, 2 for installation of gas engines, and one each for the modernization of public lighting and the tramway network.

Of the 14 applications aimed at increasing the use of renewable energy sources, nine were received for installing wind energy power stations, three

were submitted for the use of geothermal energy, one for processing marc and one for alternative fuel production.

The Ministry for Agriculture and Regional Development provides subsidies pursuant to Decrees 18/2005 (III. 18.) FVM and 28/2005 (IV. 1.) FVM as well as 74/2005 (VIII. 22.) FVM for the production of oil plants, as well as energy producing trees and plants and initiated the amendment of the Forest Act in such a way that forest cultivation rules should not be applicable to energy producing trees.

7. Further growth opportunities for electricity production from renewable energy sources

Apart from the favorable changes in green electricity production in the period between 2003 and 2005, further increase will be necessary in order to achieve further advantages for the national economy. In comparison with the situation in 2005 – with regard to the characteristic features of Hungary – the following opportunities for increasing green current production can be realistically evaluated in Hungary by the year 2010:

- As regards hydroelectric energy, the establishment of nearly 5 MW of new capacity can be considered realistic on the basis of various initiatives, which can be used to increase current electric energy production to an extent of 27.5 GWh/year.
- As regards wind energy, several projects are currently in the process of being licensed. Some of these projects have been licensed within the joint implementation mechanism of the Kyoto Protocol. By 2010, the creation of new capacity exceeding 200 MW is probable.
- Increasing electric energy production with solar energy can only be expected at a very limited level due to the high level of production costs.
- In the case of electricity production with solid biomass (wood, wood waste, energy plants), a minimum capacity increase of 30 MW beyond the existing power plant developments can be safely taken into account by 2010. The 30 MW increase assumed according to current condition can only increase energy production to the extent of 180 GWh/year. It is important to note that in the case of the proper functioning of the agricultural energy plant production program under preparation by the FVM, the increase in available biomass quantity may even make a 100-150 MW capacity investment possible.
- According to EU requirements and provisions, the treatment of municipal and animal husbandry wastewater is promoted and wastewater treatment plants are continuously being constructed. Methane-containing biogas is suitable for energetic use and

electricity production. In 2004, 20 GWh were produced and utilized on a biogas basis. For wastewater treatment systems to be constructed by 2010, further biogas production and utilization equipment can be installed and this will facilitate the production of nearly 55 GWh of electricity.

— As for geothermal energy – along with appropriate subsidy and technology development by 2010 – the establishment of a 5 MW capacity is to be expected.

— As for waste incineration, a production of 165 GWh accepted according to EU terminology can be considered realistic in 2010, taking into account the difficulties of selective waste collection, as well.

By these developments, renewable energy based electricity production can be increased by 750 GWh by 2010. The investment requirement of the developments is HUF 91 billion and according to approximate calculations – 30% subsidy intensity – nearly HUF 27 billion in state subsidies is required for program implementation. Along with the implementation of the program, the domestic ratio of green electricity can reach 5.8% in 2010.

Table 7-1

Further realistic growth opportunities for electricity production by renewable energy sources by 2010

	2003		2005		2010			
					New capacity 2005-2010	Produced by new capacity	Total production	
	GWh/ year	TJ/year*	GWh/ year	TJ/year	MW	GWh/ year	GWh/ year	TJ/year**
Water energy	171	615	195	702	5	27.5	222.5	801
Wind energy	3.6	13	5.5	20	200	400	405.5	1,45
Photoelectric	0.06	0.2	0.06	0.2	0.16	0.16	0.4	1.4
Firewood, wood waste, energy plant	109	1,090	1,550	18,600	30	180	1,730	20,76
Landfill biogas	2	20	2	24	-	-	2	24
Municipal wastewater sludge biogas	16.37	163.7	20	240	10	55	75	900
Geothermal energy	-	-	-	-	5	32.5	32.5	390
Waste incineration	67.0	670	110	1320		55	165	1,98
TOTAL	**368.97**	**2,571**	**1,882**	**20,906**	**250.16**	**750**	**2,632**	**26,31**

* Data calculated with actual renewable energy source input

** In the case of hydroelectric power, wind power and photoelectric energy, conversion to TJ/year is performed by 3,600 KJ/kWh heat equivalent. For other renewable energy sources where the production of electric energy is performed by heat drop, conversion has been performed by a specific factor of 12,000 KJ/kWh (30%).

7.1. The effect of increasing electric energy production with renewable energy sources on the cumulative share of renewable energy sources in energy use

In 2003, the total cumulative domestic renewable energy use – including waste incineration – was 38.6 PJ, which was 3.5% of the annual nationwide energy use. By 2005, the significant increase in green electricity production resulted in the fact that the cumulative renewable energy use, including waste incineration, is expected to grow to 56.9 PJ and the ratio within total energy use is expected to increase to 5.2%. Further opportunities that have been studied for increasing electric energy production with renewable energy sources can increase the total domestic annual renewable energy source utilization by another 5.4 PJ by 2010.

8. Further increase in the use of total renewable energy sources by 2010

Directive 2001/77/EC of the European Parliament and the Council providing for a mandatory increase of renewable energy source utilization by Member States also contains a recommendation regarding the increasing use of all other renewable energy sources. According to the recommendation, the cumulative ratio of renewable energy sources must be increased to 12% at an EU-wide level. For Hungary, there is no mandatory requirement yet regarding the increase of the total amount of energy sources and the achievement of an expected ratio. Member States must also take into consideration the EU recommendation, and, furthermore, according to previous experience, increasing the use of renewable energy sources has numerous domestic advantages along with the fact that the process clearly necessitates further state subsidies.

The following section discusses the amount of state subsidies – above the growth facilitated by electric energy production – that will promote a further increase in the 3.5% ratio of 2003 and the expected 5.2% ratio of 2005.

8.1. Increase in the use of biofuel

For the development of nationwide renewable energy use – along with increasing electric energy production with renewable energy sources – the next strongest effect is exercised by Directive 2003/30/EC on biofuels. According to Parliamentary Resolution 63/2005 (VI. 28), domestic biofuel use must reach 4% of the domestic fuel use level for transportation purposes.

Utilizing the data in the EK Kht and MOL Rt prognoses, the use of renewable energy sources in the area of transportation is expected to reach 7 PJ along

with 4% of renewable energy source use. The preferential treatment provided by the Excise Tax Act until 2010 – excise tax exemption until 2007, and tax differentiation until 2010 – is causing a significant income reduction for the budget but is ensuring the achievement of the targeted ratio.

8.2. Solar collector program

Item 14 of Govt. Decree 1107/1999 (X. 8.), which initiated the long-term energy conservation program currently under progress, planned the implementation of 20,000 roofs equipped with solar collectors. Despite the fact that the program has been supporting this area since 2000, this process is still in its initial state (solar collector-based heat supply has been implemented for 450 detached houses with this subsidy).

The investment in a program of this size is roughly HUF 10 billion, and the subsidy requirement for this – along with 50% – will be a total of HUF 5 billion by 2010. A total energy conservation of nearly 0.18 PJ/year can be achieved through this program by generating solar energy.

8.3. Increasing the use of renewable energy sources for other heat utilization purposes

Further heat energy production developments will be possible in the future in addition to the studied developments. The following areas will provide the greatest results:

- according to the tests, heat production from solid biomass can be increased by at least 4.5 PJ with new heating plants. The investment costs of this project – based on research materials – is around HUF 9 billion with a HUF 2.7 billion subsidy requirement;[*]
- in the event that the environmental regulation of geothermal use shows a favorable change (relaxation of feedback requirement, significant reduction of wastewater fine for geothermal energy and reduction of the payable water resource allowance), energy use can be increased even higher than 10 PJ/year by 2010. A HUF 34 billion investment, which includes an approximately HUF 10 billion state subsidy portion, will be required to achieve this;
- treating the biogas program as a special priority (and providing a suitable subsidy) in the 2007-2013 period of the National Development Plan, the yearly biogas use in animal husbandry and wastewater treatment plants can be increased by nearly 6 PJ/year until 2010. The total investment cost of smaller, decentralized projects is around HUF 25 billion, in which the required subsidy can be estimated at HUF 7.5 billion at 30% intensity.

[*] The condition for further increasing solid biomass use is the successful energy plant producing program, but the achievable increments are only expected to deliver a sudden increase in the use of this renewable energy source after 2010.

— in the area of waste incineration a further increase of heat energy production around 0.5 PJ is probable.

As a result of opportunities investigated, renewable energy use for heat energy purposes can be increased by 28 PJ between 2005 and 2010. The total investment costs of such an increase in use for heat energy purposes is nearly HUF 78 billion, and the required subsidy is HUF 25 billion (but these do not include required investments in the area of agriculture, the investments of increased waste incineration and uncertain amounts of investments in the area of biofuel).

9. Nationwide summary of renewable energy use achievable in 2010

With regard to domestic conditions, the realistic opportunities for increasing renewable energy use are summarized in Table 9-1:

Table 9-1

Nationwide renewable energy source use achievable by 2010 according to Hungarian conditions

	Electricity production					Heat energy production*			Renewable energy source use
	2003	2005	Increase between 2005-2010	2010		2003	Increase between 2003-2010	2010	2010
	GWh	GWh	GWh	GWh	PJ	PJ	PJ	PJ	PJ
Total electric energy production	369	1,882	750	2,632	26.31				26.31
Use of biofuel						-	7	7	7
Solar collector program						0.08	0.18	0.26	0.26
Heat production from biomass						31.51	4.5	36.01	36.01
Geothermal energy, heat pumps						3.6	10.0	13.6	13.6
Biogas						0.007	6.0	6.007	6.007
Waste incineration						0.83	0.5	1.33	1.33
TOTAL	**369**	**1,882**	**750**	**2,632**	**26.31**	**36.03**	**28.18**	**64.207**	**90.517**

* Not including the quantities of renewable energy sources used for producing electricity

Summarizing the previous information, in addition to increasing renewable energy-based electricity production by 750 GWh by 2010, the total use of renewable energy sources can be increased to over 90 PJ by implementing the outlined program. The depicted target values can result in the fact that the ratio of green electricity will be able to reach 5.8% and the ratio of total renewable energy sources will be able to reach 7.9% in 2010.

In order to increase the use of renewable energy sources in the manner presented, a total of nearly HUF 169 billion in state-subsidized investment projects (taking into account investments in electric energy production, as well) must be implemented in the Hungarian economy. The required total investment subsidy – according to estimates – is nearly HUF 52 billion, which does not include the subsidies for increased biofuel production. The implementation of such a large-scale program is only realistic if subsidies, primarily from EU sources, will be made available in the 2007-2013 period of the National Development Plan.