Hungary's Report on Demonstrable Progress

under Article 3.2 of the Kyoto Protocol, in line with Decisions 22/CP.7 and 25/CP.8 of the UNFCCC

Republic of Hungary
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1. INTRODUCTION

This report has been prepared in response to Article 3, paragraph 2, of the Kyoto Protocol, and in line with Decisions 22/CP.7 and 25/CP.8 of the UN Framework Convention on Climate Change. As required by these decisions, the report provides the Conference of the Parties with the basis for reviewing progress in four domains, namely:

- policies and measures, including arrangements for domestic compliance and enforcement;
- trends in, and projections of, national greenhouse gas emissions;
- the impact of domestic policies and measures on emission trends and projections;
- activities undertaken in fulfilment of the commitments under Articles 10 and 11 of the Kyoto Protocol.

The document gives a summary of Hungary's domestic measures, legal and institutional steps that were implemented in order to mitigate greenhouse gas emissions; discusses the trends in, and projections of, the country's greenhouse gas emissions; an evaluation of how the described domestic measures contribute to Hungary's meeting its commitments under the Protocol; and description of the activities, actions and programmes undertaken by Hungary in fulfilment of its commitments under Articles 10 and 11 of the Protocol.

2. DOMESTIC POLICIES AND MEASURES

Hungary acceded to the Kyoto Protocol on 21 August 2002 and the basic strategic elements to meet its commitments under the Protocol are incorporated into the second National Environmental Programme as stipulated already in 2001 (Government Resolution 1117/2001 (X.19.) Korm. on the concept for the second planning period (2003-2008) of the National Environmental Programme. The specific tasks together formed the "Thematic action programme (TAP) on climate change" under the NEP-II. The basic priorities were as follows: the reduction of GHG emission through mitigation measures in the energy sector, industry, transport and agriculture, enhancing sink capacities, strengthening the institutional basis to meet the monitoring and reporting requirements, raising public awareness among others. These tasks were formulated as part of an overall environmental strategy and also within the framework of the preparation for Hungary's accession to the European Union.

The national climate change strategy set the overall objective for the domestic mitigation measures i.e., the net Hungarian global warming potential (for the gases covered by the Kyoto Protocol) has to remain below 94% of the average emission level in the base period of 1985-87. Hungary joined the European Union in 2004 and since then on the one hand it takes part in formulation of Community climate change related policies and legal instruments, on the other hand, it fulfils the relevant Community programmes and regulations.

2.1 Institutional measures

2.1.1 The Inter-Ministerial Committee for meeting the Kyoto commitments

In order to ensure a coordinated approach to meet Hungary's commitments under the Kyoto Protocol, the Government Resolution 2045/2003. (III. 27.) Korm. made provisions to set up an Inter-ministerial Committee.

The task of the Committee is to identify and co-ordinate the various tasks related flexible mechanisms under the Kyoto Protocol; to supervise the approval of Joint Implementation (JI) project proposals; to be instrumental in creating the country's standpoint on the trading of GHG emission rights and allowances.

2.1.2 Institutional framework of national GHG inventory

The basis for all monitoring and tracking efforts of GHG emissions and the mitigation policies was a sound and reliable GHG inventory.

Already, the preparation of the climate change strategy, which involved several ministries, government agencies and authorities, indirectly provided a good basis to the formulation of the institutional background of climate change.

Until 1997 the calculation and formulation of the inventory was outsourced, but from 1998 the background institution of the Ministry of Environment and Water, the Institute for Environmental Management (IEM) is in charge of this task. As from 2006, following an institutional reorganisation, the preparation of the inventory will be directly coordinated by experts of the Ministry. For practical reasons some specific tasks are allocated to other agencies or still outsourced.

2.1.3 The Energy Centre

By the Government Resolution 1031/2000. (IV. 7.) Korm. the Hungarian Government created the Energy Efficiency, Environment and Energy Information Agency (Energy Centre for short) with the primary aim of creating the institutional framework for the implementation of the Energy Saving and Energy Efficiency Action Programme (ESEEAP) that is the key instrument in meeting the Kyoto targets within the energy sector, primarily in demand side energy use. The founders and owners of the Energy Centre are the Ministry of Economic Affairs and Transport (60%),

the Ministry of Environment (25%) and the Hungarian Energy Office (15%). The basic tasks of the Energy Centre are:

- to manage the annual energy saving programmes (named as SZT-EN or NEP in the different years);
- to manage other energy efficiency funds (such as EHA, EHP, UNDP-GEF);
- to operate the national level energy statistics system;
- to co-operate in the development of national energy policy;
- to be instrumental in information exchange on energy-related matters between Hungary and the international community, primarily the European Union;
- non-profit based information dissemination on energy and energy efficiency;
- to manage international energy efficiency and environmental programmes.

The Energy Centre was also assigned in the past some JI project management tasks.

2.1.4 The Inter-Ministerial Committee for Energy Efficiency

The Government Resolution 1031/2000. (IV. 7.) Korm. also made provisions for setting up the Inter-Ministerial Committee for Energy Efficiency, whose task is to make decisions on financial supports for energy efficiency projects within the framework of the different supports schemes managed by the Energy Centre. The Ministries responsible for economic affairs, environmental protection, finance, internal affairs, agriculture and rural development, transport, water management and the Hungarian Energy Office form the Committee. This way it is ensured that the supports would serve best the national strategies, the interest of all parties affected would be represented and overlapping supports could be avoided. As an observer an NGO is also invited to the Committee.

2.2 Legal basis

Hungary's greenhouse gas mitigation policies are all based on a set of basic pieces of legislation or general programmes which create the legal and/or partly financial framework for the more concrete, targeted operative programmes and policy tools. Although these have no direct, quantifiable emission reduction effects, they are of key importance as they provided the basis for the further legal instruments that were aimed at helping Hungary's efforts under the UNFCCC and the Kyoto Protocol.

Most of them cover much wider areas than climate change prevention or GHG mitigation: here only those aspects are discussed that are relevant to these topics.

2.2.1 Act on general rules of the protection of the Environment

Act LIII of 1995 codifies the general principles of environmental protection and creates the legal basis for all the subsequent regulations that are related to the environment. The major objectives and priorities of the Act are the following:

- to reduce the load and pollution of the environment, to prevent the environment from deterioration and damages, to restore any damaged environmental components;
- to protect human health and improve the environmental conditions of the quality of life;
- to protect and conserve natural resources and to promote sustainable resource management
- to co-ordinate other tasks and duties of the state with the requirements of environmental protection;
- to ensure and promote international co-operation in environmental protection;
- to foster public initiatives aimed at environmental protection and nature conservation;
- to harmonize the economic and social development with the interests of the environment and
- to create the institutional framework of environmental protection and to promote changes in public administration that serve the interests of the environment.

Climate protection is defined in the Act as a part of the protection of air.

2.2.2 Act on Electricity

Act CX of 2001 on Electric Energy declared among its general provisions, that production distribution, commerce and utilisation of electric power must be conducted by taking into account the aspects of, among others, environmental protection, nature conservation, energy saving and protection of human health. Through these provisions the Act founded several further pieces of legislation and measures that aided in GHG mitigation. The Act also defined what is considered renewable energy, introduced the concept of IPPs.

Besides the general provisions, the Electricity Act also laid down of the principles of support for renewables and cogeneration and tasked the Minister of Economy do develop the details of the support mechanism.

2.2.3 National Development Plan and National Rural Development Plan

In preparing for the utilisation of the EU Structural Funds, Hungary has prepared it's National Development Plan (NDP). On the basis of a thorough analysis of economic and social conditions, NDP identified the priorities that are to be supported by using finance from the Structural Funds.

Better quality of the environment is among the three major objectives of the Plan. Low level of renewable energy utilisation is identified as a major problem, and increasing the share of renewables within overall energy use is considered as key element of achieving the long-term goals of the NDP.

The specific goals of the Plan are to be achieved through five operative programmes, three of which has relevance from the aspect of GHG mitigation (Environment and Infrastructure Operative Programme – KIOP; Agriculture and Rural Development Operative Programme – AVOP; Regional Development Operative Programme – RFOP) and will be referred to in the current document.

The National Rural Development Plan (NRDP) was developed in order to identify priorities for the utilisation of support provided by the European Agricultural Guidance and Guarantee Fund. The general objectives of NRDP are

- to improve income and safeguard employment in rural areas;
- to ensure environment-friendly development of agriculture, rationalisation of land-use and
- to encourage landscape management.

The specific objectives include the improvement of the quality of the environment and increasing forest cover and thereby improve the ecological conditions.

2.2.4 Second National Environmental Protection Programme

As the sequel of the First National Environmental Programme (NEP-I) between 1997-2002, on 8 December, 2003, the Hungarian Parliament approved its Resolution 132/2003. (XII.11.) OGY, on the Second National Environmental Programme (NEP-II.) for 2003-2008.

NEP-II relies on the most important Hungarian and international environmental policy principles, which can be classified into three main categories:

- Traditional environmental protection principles, for example, principles of precaution, prevention, reconstruction, liability, co-operation, information, publicity and the 'polluter pays'.
- Additional principles exemplary for Hungary on the basis of the environmental government activities of developed countries (shared responsibility, transparency in planning, decision-making, financing, implementation and control, predictability in regulation and financing, accountability, clear objectives, measurable performance, partnership, subsidiarity, additionality, measures with multiple benefits).
- Taking into account the principles of sustainable development[1]; NEP-II must promote the establishment of social, economic and environmental conditions required for the transition towards sustainable development.

The primary objectives of the NEP-II are the following:

- The protection of the ecosystem.
- Provision of a harmonic relationship between society and environment.
- Enforcement of environmental criteria in economic development.
- Strengthening of knowledge on, and awareness of environmental processes, impacts, environment and nature conservation and co-operation.

It is recognised in the Programme that in the implementation period of NEP-II, a more than ten-year adjustment and catch-up period is completed with Hungary's accession to the European Union. During this period the Hungarian environmental and nature conservation policy, as well as legislation have been harmonised with the EU Community policy and *acquis communautaire*. However, EU membership means further tasks and opportunities for Hungary, including the following:

- Involvement and participation in the development of the environmental policy of the EU (for example, EU sustainable development strategy, integration of policies in the framework of the Cardiff process, measurement of environmental performance progress through indicators, development of the system of environmental reports and fulfilment of Hungarian obligations, active participation in the programmes of the European Environmental Agency (EEA), dissemination of the EU environmental policy in Hungary, development of Natura 2000 network, participation in the environmental co-operation of European regions, as well as activities of ENCORE conferences held biannually).

1 Sustainable development is understood according to the definition of Herman Daly, i.e. as "progressive social betterment without growing beyond ecological carrying capacity".

- Development of co-operation with the EU Member States and accession countries reflecting both Hungarian and EU environmental interests.
- Implementation of the 6th Environmental Action Programme of the EU in Hungary, in which the most important integrated problems are the following:
  - climate change;
  - nature and biodiversity;
  - environment and health;
  - sustainable use of resources and waste management.

The thematic structure of NEP-II is in line with the structure of the 6th Environmental Action Programme of the European Union.

2.2.5 Act LIV of 1996 on the forests and their protection

Hungary has a very elaborate legislative framework for the protection of the forests that ensures that forestry would be sustainable. The legislative framework is based upon the Act LIV of 1996 and the Decree 29/1997. (IV.30) FM on its implementation.

The Act LIV of 1996 codifies that besides preserving biodiversity, forests as a renewable resource provide raw material, energy and food while improving the status of the environment. Therefore maintaining and protection of forests is in the interest of the entire society, therefore management of forests must be in harmony with the public interest.

In order to ensure sustainable forest management the Act and the subsequent related legislation regulates in detail the system of forestry planning, recording and management. Forestry activities are conducted in accordance with a regularly updated 10-year plan that is broken down into individual one-year operative plans. Both types of planning are approved by independent bodies.

It is also important that afforestation of land formerly used for other purposes is stated as an activity that serves the improvement of environmental conditions, preservation of environmental values and the enlargement of natural resources.

2.2.6 Act XLIII of 2000 on waste management and the National Waste Management Plan

The basis of Hungary's waste management policy is expressed by the Act XLIII of 2000 on waste management and the National Waste Management Plan (NWMP) that was codified by the Resolution No. 110/2002. (XII. 12.) OGY of the Hungarian Parliament.

The basic purpose of the Act XLIII of 2000 was to create a framework for waste management that serve sustainable development and providing adequate conditions for the future generations; reduction of energy and raw materials consumption by improving efficiency and reducing the volume of waste and reduction of loads caused by waste on human health and the natural environment.

The Act put on emphasis on preventing the production of wastes, on recycling and the environmentally friendly treatment of wastes, and adopts the "polluter pays" principle. It codifies the rights and duties of manufacturers (producers), traders and consumers, identifies who is responsible for the treatment, collection, transport, recycling and treatment of wastes and the basic principles of all these activities. Among other provisions it stipulates that a national waste management plan then specific regional waste management plans have to be prepared. The different authorities of the local and regional governments and the Environmental Inspectorates are also identified. Two more provisions of the Act need also be mentioned: it creates the legal background for waste management fines and prescribes that a Waste Management Information System would be established.

The NWMP identifies concrete tasks in the following fields:

- Regulation and standards.
- Development of institutional background.
- Information dissemination, awareness raising.
- Training, education.
- Research and Development.
- Prevention and treatment.

The major quantitative targets of the NWMP are:

- Through prevention measures it should be achieved that by 2008 the quantity of waste produced would not exceed the level in 2000.
- The share of organic matters within the landfilled waste shall be reduced to 50% of the 1995 level by 2007.
- By 2008 some 50% of the non-biomass type wastes shall be re-used either as raw material or in energy generation.
- Landfilling of any biomass type organic waste shall be stopped, they shall be utilised for biogas production.
- The utilisation of sewage sludge shall be increased to 55% from the current 40% by 2008.

2.2.7 Research and Development

The National Research and Development Plan was accepted by the Government in 2000. The document identified the environment-oriented innovation as an important supplemental measure to the implementation of the environmental policy of the country. It is therefore

of priority to develop knowledge-base, to enhance domestic scientific and technological experience, to spread up-to-date technologies, to increase field research, to strengthen innovative and technological relations.

The R&D priorities of Hungary were later codified in a higher level legislation: Act CXXXIV of 2004 on research development and technology innovation. The Act also maintains the high priority of sustainable development of the country.

2.3 Operative programmes

2.3.1 Energy Saving and Energy Efficiency Action Programme

Based on the principles of Business Model of the Energy Sector and related policy decisions, the government adopted the new Energy Saving and Energy Efficiency Action Programme (ESEEAP) (Resolution of the Government 1107/1999.(X.8.) Korm.) that began in 2000 and is to run until 2010. The overall goals of the Action Programme are: 3,5% /year reduction of energy intensity; the saving of 75 PJ/year of primary energy use; reduction of 50 kt/year of SO_2 and 5 Mt/year of CO_2 emissions, increase of renewable energy production. The Action Programme lists 15 specific policy measures, the most relevant of which are described below.

Improving energy awareness

The purpose of this measure is to assist reaching the overall objectives of the ESEEAP by providing state-of-the-art information and training via the educational system and the organisation and operation of advisory networks and consumer offices, as well as via advertisements, the media etc. Another specific point of action is the promotion of energy efficiency labels. The resolution set an overall 10 PJ energy saving until 2010 via energy awareness raising tools.

R&D for energy efficiency and renewables

This action of the ESEEAP aims at encouraging the participation of Hungarian experts in foreign research, as well as the incorporation of energy saving and environmentally friendly technologies is the Hungarian R & D, including demonstration projects. According to the ESEEAP, the priority of energy efficiency within R & D has to be ensured with legal instruments and with preferential credits.

Energy audits in industry

It is widely recognised that demand side energy efficiency actions can only be effective if they are preceded by energy audits that can identify the most efficient course of action. Therefore energy audits have been supported through various tools, one of them being that energy audits in industry were one important item of the Energy Saving and Energy Efficiency Action Programme (ESEEAP). The program allocated financial support to such audits in the form of a soft loan. In practice, during the implementation phase of the Programme the audits were supported mainly through grants.

Improvement of municipality energy management.

Municipalities and their institutions represent serious share in the total energy consumption. It is recognized that the Hungarian municipalities often lack expertise to properly address energy related projects, therefore support was to be provided in form of soft loans for the elaboration of energy supply concepts, energy audits.

Least-cost planning, demand side management programmes

The aim of this action was to make the operators of large energy supply systems interested in reducing energy demands by recognised the related costs as justified costs and reflect them in the energy prices. The quantitative target was around 5 PJ saving of primary energy by 2010.

Energy conservative organisation of transport and transportation

Incentives were provided for organisational measures that would moderate the increase of road transportation and shift it to railways, waterways and combined way, as well as to moderate the use of passenger cars and switch traffic to public transport.

Reduction of industrial energy use

The objectives of the action were

- modernisation of energy processes of industrial production,
- improving thermal insulation,
- improving the efficiency of energy consuming equipment and
- improving the efficiency of energy generating equipment.

The objectives were to be achieved through providing preferential loans, but no concrete amount was allocated. The expected target reduction of industrial energy use was 8.5 PJ until 2010.

Modernisation of the transport

The action was aimed at the promotion of energy saving and environmentally friendly transport alternatives (railway, water) and public transport, as well as improving the technical level and replacement of existing vehicle stock. 4,5 PJ primary energy saving was foreseen till 2010.

Modernisation of technology in agriculture

Preferential loan was to be provided for implementing energy conserving equipment and technology in agriculture in order to achieve 0,5 PJ saving by 2010.

Residential and communal energy saving projects

Besides the reducing industrial energy consumption the ESEEAP also put emphasis on the support of residential and communal energy efficiency projects. This action of the ESEEAP focused on the improvement of thermal insulation and upgrading of building envelopes (facades, roofs, cellars, doors and windows) and the improvement the secondary heating systems of district-heated homes (primarily control and metering).

The foreseen tool of support was direct subsidies (grants) and the saving target was 10 PJ/year until 2010.

Increasing the share of alternative space heating modes

In order to reduce natural gas consumption and the related GHG emissions biomass-based heat supply modes were to be promoted through preferential loans (communal end-users) or grants (residential end-users).

Support for local renewable power generation and end-user renewable energy use

The purpose of the action is to increase the use of biomass, geothermal energy, organic waste, especially electricity generation from these renewable sources. Its bother sub-programme, the "Programme for 20000 solar roofs, 2000" is directed at the promotion of solar heat generation and photovoltaic projects.

The general objective of the ESEEAP was to achieve 50 PJ/year renewable energy utilisation by 2010. The other quantitative target within this objective was to have solar collectors on 20 000 homes or public buildings by 2010. The foreseen form of support was direct subsidies (grants).

Modernising district heating systems

District heating plays an important role in space heating and hot water supply in Hungary, especially in the residential sector. There are some 100 district heating schemes in the country, supplying heat to more than 640 000 homes. Efficiency of the systems and high space heating costs of the district heated buildings are not only a technical problem but also an evergreen political issue. Therefore the modernisation of the district heating systems was included among the priorities of the ESEEAP. The quantitative target was to achieve 10 PJ/year saving till 2010 by providing support for:

- increasing the share of cogeneration within the heat generation capacities of the district heating systems;
- primary side reconstructions including the installation of meters in the substations;
- secondary side modernisation, primarily for better controls and cost allocation.

2.3.2 Action Programmes of the SecondNational Environmental Protection Programme

The primary aims of NEP-II are broken down to individual concrete objectives, which are planned to be achieved through nine specific Thematic Action Programmes of:

1. Raising Environmental Awareness
2. Climate Change
3. Environmental Health and Food Safety
4. Urban Environmental Quality
5. Biodiversity Conservation and Landscape Protection
6. Rural Environmental Quality, Land-area and Land Use
7. Protection and Sustainable Use of Water
8. Waste Management
9. Environmental Security.

It is noted that tasks within the Thematic Action Programmes of NEP-II are divided into two groups. NEP-II partly includes interventions which are currently working (existing tasks), they are present separately or in other programmes and in this framework their necessary resources are also targeted. Incorporating these tasks into NEP-II is justified because environmental problems are dealt in a complex way. At the same time there are new elements among the goals and tasks, which have not belonged to the tasks of any programme but are indispensable for the solution of a given environmental problem.

The Climate Change Action Programme of the NEP-II

The wording of the Climate Change Action Programme of the NEP II concretely introduces the fact of climate change due to human activity into the Hungarian legislation. It is recognised that the dangerous consequences

of climate change can only be avoided thorough international co-operation. The primary objective of this action programme is the regulation and reduction of emissions from domestic economic activities. The action programme is aimed at the reduction of greenhouse gas emission, its contribution to anthropogenic climate change and at the same time at improvement of local and regional air quality. In addition, it contributes to the dissemination of environmentally sound consumption habits and improvement of the quality of settlement environment.

Implementation of the comprehensive goal of the action programme is realized through specific objectives. It is recognized in the text of the legislation that main sources of the emission of the affected gases are power generation, transport, certain industrial activities and intensive agriculture. Accordingly, contribution to the reduction of the risk of climate change can be ensured primarily by GHG emission-reducing development of the energy- transport infrastructure and of the production-agricultural systems permeating the national economy.

The specific and operative objectives of the Action Programme are:

- Promoting the reduction of atmospheric emissions from energy management activities
  a) Modernization of energy production, conversion and transportation
  b) Improvement of the energy conservation and energy efficiency of the consumers
- Development and dissemination of technologies related to the utilization of renewable energy sources (to subsidize investments):
  a) Application of alternative fuels
  b) Utilization of landfill gas
  c) Other biomass utilization, replacement of gas fuel used currently for local goals with local biomass, and development of simultaneous heating systems
  d) Application of solar, wind energies and geothermal energy
  e) Price preference for electric energy generated from renewable energy sources
- Reduction of pollution emission from transport:
  a) Accelerating the modernization rate of the vehicle stock
  b) Reduction of the environmental impact of freight transportation: supporting the propagation of environmentally friendly transportation ways, shifting freight transportation from trucks to railway
  c) Support for environmentally sound means of transport
- Reduction of emissions of greenhouse gases from agriculture and waste by strengthening carbon dioxide sink capacities:
  a) Reduction of methane emission form animal breeding and cultivation
  b) Support for cultivation of crops aimed at power generation and increasing the binding potential
- Stratospheric ozone depletion and prevention of atmospheric acidification:
  a) Reduction of gas emissions depleting the stratospheric ozone layer, compliance with relevant international conventions
  b) Prevention of atmospheric acid deposition
  c) Launching a halon treatment programme
- Research-development, horizontal measures:
  a) Research-development relating to climate change (researches on direct and indirect impacts of air pollution, climate change, on their abatement, causes and reduction)
  b) Attitude forming, information (tasks in relation to technological switchover, consumption habits) educational and raising awareness tasks aimed at the development of information systems

2.3.3 National Agri-environment Programme (NAEP)

The NAEP, a sub-programme of the National Environmental Programme, approved by the Government Resolution 2253/1999 (X.7.) Korm, includes several horizontal and zonal targets. One of them is to increase the territorial proportion of semi-natural forest management. NAEP also looks at afforestation as a tool of implementing some of its measures, such a forest plantation on flood areas in order to protect wetland habitat.

The NAEP objectives were integrated into the agri-environmental measures of the National Rural Development Plan (NRDP) in 2004.

Environmentally beneficial extensification, especially the reduced, optimised use of fertilisers and pesticides, the considered (limited) application of dangerous substances and other accompanying benefits for the environment are among the main priorities for agricultural practice. Integrated farming is based on the internationally approved principles and practices of integrated pest management (IPM, IOBC guidelines). This production system should be targeted as a future standard for market oriented agricultural production due to the economical and efficient production that it facilitates, its environmental merits and its food safety aspects. The Integrated Crop Management System (ICMS) was introduced in Hungary in 2002, also under the National Agri-environment Programme.

2.3.4 National Afforestation Programme

Based on the considerations of agricultural land utilisation concepts, the national long-term afforestation concept was completed in 1996. According to the concept, 778 thousand hectares is a realistic estimate of the quantity of agricultural land suitable for afforestation, and the afforestation of that area would raise the forest rate of Hungary to the optimum level of 27%. optimal. This concept provided the basis for the National Afforestation Programme drafted in 1997.

2.3.5 The SAPARD Plan of Hungary (2000 – 2006)

Decree No. 53/2001. (VIII. 17.) FVM identified Hungary's priorities in agriculture and rural development in order to prepare for the optimum use of the EU's SAPARD funds. This decree (SAPARD Plan for short) was based on, among others the NAEP. Reducing the negative impacts of agriculture on the environment is listed among the SAPARD Plan's specific objectives and the emphasis on environmental considerations is an integral part of the proposed strategy. The latter is planned to be put into practice by promoting natural farming methods.

Of the measures prescribed in the SAPARD Plan, the activities involved in the measures entitled "Protection of agri-environment" and „Technical Assistance" provided the basis for some corresponding measures with GHG mitigation aims or effects.

2.3.6 Nitrate Action Programme

Government Decree 49/2001. (IV. 3.) Korm on protection against the nitrate contamination of waters from agricultural sources (Nitrate Decree for short) contains provisions in line with Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources. In a manner similar to the directive, the Nitrate Decree, which came into effect in 2001, contains the list of settlements in nitrate sensitive areas, the rules of "Good Farming Practice in manuring" that farmers are obliged to keep and the time-schedule of implementation in the form of an action plan. The Action Programme was launched on 1 January 2002 and extends till 31 December 2013. Along with nitrate sensitivity, its priorities include the requirements applicable to the manure storage systems of animal keeping sites that use semi-liquid manure technology.

2.3.7 The specific programmes of the NWMP

The quantitative targets of the NWMP are to be achieved by a set of specific programmes:

- Program for the non-hazardous wastes of the industry, commerce and services:
  - Prevention and recycling programme of industrial wastes
  - Industrial waste treatment programme
  - Program for improving the waste management performance of SMEs
- Program for wastes from agriculture, food processing and biomass
- Program for municipal wastes:
  - Program for the management of municipal solid waste:
    - Establishing complex regional collection and treatment systems
    - Selective waste collection
    - Recultivation of old landfills.
    - Reconstruction of the Budapest Waste Incinerator Plant
  - Program for municipal liquid wastes
    - Program for achieving that all effluents are collected and treated
    - Pre-treatment and utilisation of sewage sludge.
- Program for hazardous wastes
- Program for special waste types (packing materials, batteries, tires, medical wastes, vehicles, asbestos etc.)

2.4 Tools of implementation

2.4.1 Regulatory tools and economic incentives

Regulation and support of CHP and renewable power

The objective of this policy item is to promote combined heat and power (CHP) production and renewable energy based power generation as a highly efficient tool of GHG emission reduction.

The primary objective of supporting renewable-based power generation and the relevant legislation (Act LXXIX of 2005 on the amendment of Act CX of 2001 on electricity; Decree 56/2002. (XII.29) GKM.) is to ensure that Hungary can comply with its international commitments to increase the share of renewable energy

in power generation to 3.6%, and the share of overall renewable energy to 5% by 2010, as a part of the general GHG mitigation policy of the European Union.

The relevant legislation (Decree of the Minister of Economic Affairs and Transport 56/2002(XII.29) GKM.) adopts two ways of support:

- Stipulates the mandatory purchase of co-generated electric power
- Provides financial support for the operators of CHP plants in the form of regulated and subsidised feed-in tariff.

Finance for the subsidies is provided by a small earmarked fraction of the regulated end-user electricity prices.

With these deadlines approaching some further incentives were incorporated in Hungary's renewable support policy such as technology-specific increased feed-in tariffs.

Results of CHP support

The mandatory purchase of co-generated power created a safe market for primarily small-scale CHP plants and the subsidised feed-in tariff ensured attractive economic performance. As a consequence rapid growth of small-scale CHP capacity has been experienced. By the end of 2005, it is estimated that the installed capacity of small-scale CHP, (practically all of them use the natural gas fuelled gas engine technology or gas turbines, smaller than 50 MW) exceeded 500 MW. It is to be noted that in relation to the installation of CHP plants in district heating systems, considerable modernisation has taken place in the primary systems, and the heat sources.

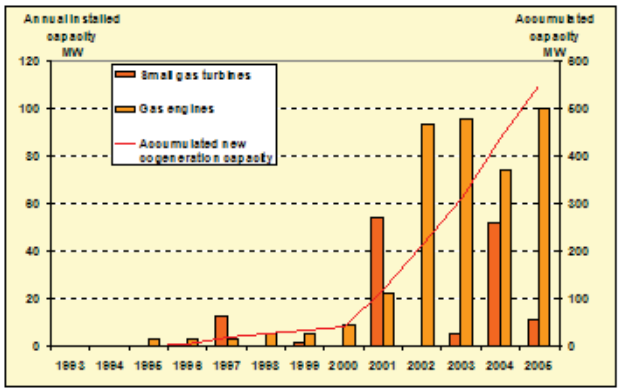


Figure 1.: Growth of small-scale CHP in Hungary

However, the rapid growth of small scale CHP capacities created some problems in the control of the national power system, therefore some limitations were included in the legislation that are expected to considerably slow down further growth:

- Yearly and monthly overall efficiency criteria are set as a condition of subsidy
- Bigger than 6 MW_e capacity plants can only receive subsidy if their heat is used in district heating
- The latest feed-in tariffs provide lower economic attractiveness.

The GHG-emission reduction benefits of the policy are the following:

- The new natural gas fired CHP units replace some of the fossil (coal and oil) power generation capacity of the Hungarian power system, as well as some of the heat-only thermal plants.
- The overall efficiency of the CHP plants is higher than the combined efficiency of conventional power generation and heat only plant, resulting in net fuel saving and hence emission reduction.

Achievements and expectations in renewable power generation

Regarding wind power Hungary has limited endowments in terms of wind power: the typical potential ranges between 70-200 W/m^2, the highest values reaching 260 W/m^2 in the north-western part of Hungary. In the long term, the total installed wind power capacity is also limited by load control considerations of the national power system: roughly 50% of the total electricity demand covered by the Paks nuclear plant, the fossil fuel plants need to provide hot stand-by capacities for wind power.

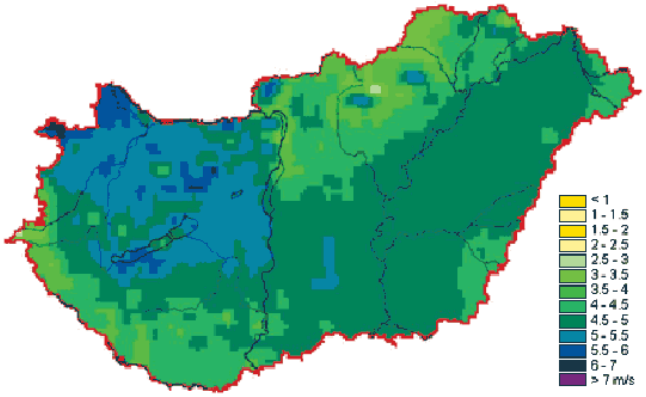


Figure 2.:Average wind in Hungary velocities at 50 m height

Due to the limited subsidies and insufficient wind potential, so far only a few wind power plants with relatively small unit sizes have been commissioned (Kulcs: 600 kW, Inota: 200 kW, Mosonszolnok: 2 x 600 kW, Mosonmagyaróvár 2 x 600 kW.) The most recent changes in the renewable policy however gave a boost to wind power project ideas: there are investor initiatives for some 200 projects with the installed capacity exceeding 1000 MW. Such a rapid increase, compared to the actual peak demand of Hungary (forecast to increase from 6270 MW in 2005 to some 7500 MW by 2015), with the specialities of the Hungarian power system (high share of nuclear energy and fossil fired plant to provide system control) in mind, is clearly unrealistic.

In terms of renewable potential, Hungary is best endowed with biomass, owing to the importance of agriculture and forestry within the economy, the high

(and increasing) level of forestation and the farming traditions in some large regions. The share of biomass is estimated to be more than 70% within the technical potential[2]. For power generation purposes hard-wood provides the best opportunities in the short term due to its favourable combustion characteristics. In the long term herbaceous plants, such as energy grass, can have high importance, when some current technical problems with their combustion at high temperatures necessary for efficient power generation, are resolved.

Both due to the supports and the very strict environmental regulations of power plant emissions some fuel switch projects have already taken place, where coal fired power plants switched to biomass fuel. Besides these projects new biomass (woodchip-fired) capacities will have to be created before 2010 if Hungary is to meet its international commitments. These can either be co-firing biomass with coal in the existing plants (e.g. Mátra, Tiszapalkonya) or preferably some green-field projects. This, however, can be limited by the quantity of the available fuel from the existing forests, thus simultaneous development of energy forests is of high importance.

In pursuing the renewable targets biomass is not only preferred due to its high potential and availability but also for the spin-off effects of such projects, such as infrastructure development, job creation or the general regional development.

Hungary is richly endowed with geothermal energy, in the estimation of renewable energy potential geothermal is considered to be the second most important after biomass. This, however is not true is power generation potential is considered. Due to the relatively low geothermal well temperatures (typically 40-95°C) the cycle efficiency of the possible ORC[3] plants is low, and the net power output is small. With respect to the high investment costs this feature, together with the problems created by the salt content of the waters geothermal based power generation is considered to have small significance in the time span investigated.

Geothermal energy may have higher significance in space heating and hot water supply. At present however in lack of supports (only renewable power generation is supported) such installations are rarely feasible because – among others – today's more stringent environmental regulations require the reinjection of used water.

Hungary being mainly flat, hydropower has limited potential within the overall electricity balance. The currently installed total capacity is 55 MW, the annual power generation is around 195 GWh, depending on the weather. Although the theoretical hydropower potential is 7500 GWh, whose 72% is provided by the Danube mainly due to historical and political reasons a large scale hydropower project is not planned in the medium term. The theoretical potential of the small rivers and streams is 338 GWh/year, which indicates that considerable increase is unlikely. Plans however exist, including, among others, those for a 5MW small hydro plant for the utilization of the head of the cooling water from the Paks nuclear plant.

Although Hungary has relatively high sun-hour values, there is an agreement between the experts that the major field of solar energy utilization is and will be primarily hot water generation in the medium term. Solar electric power generation, due to the high expenses of the technology and the low output of the currently available solar cells is unlikely to play a decisive role in the time-span investigated. Still, there are pilot projects, but the capacity of even the largest solar energy plant, just recently commissioned in the Gödöllő University, is only 10 kW. At any rate, with the improvement of the technology some modest increase of installed solar power capacity is forecast, in particular for those special applications where autonomous power supply is pursued.

Biogas is used typically either in cogeneration projects or heat-only applications. So far due to the larger investment costs biogas CHP projects have not been preferred, investors concentrated on natural gas based installations. This is likely to change, because the regulations that limit the further growth of CHP application do not all apply to biogas projects. Therefore it is foreseen that the number of these applications will grow. The heat-only biogas projects, although require lower investment are less attractive because subsidy on heat is not yet available.

Energy tax and environmental levy

A high level regulation (Act LXXXVIII of 2003) introduced the energy tax on the sales and imports of electric power and natural gas. Sales to residential consumer are exempt for the duty of paying the tax. The amount of the tax currently is HUF 186/MWh of electricity, and HUF 56/GJ of natural gas.

The primary objective of the tax is to incorporate some of the external costs of energy use in the price of energy, and to create incentive for energy saving and improving energy efficiency, in order to meet the general objectives of environmental protection and energy conservation.

Act. LXXXIX of 2003 introduced the environmental levies, in order to reduce the burden of the environment, protect nature, promote environmental awareness, and – not in the least - to provide funds for nature conservation. The objectives also include the use of best available technologies.

The levy is to be paid by the users of the environment in proportion to the quantity of pollutants emitted to the atmosphere, surface waters and soil. The amount of the levy is pollutant-specific. Residential heating facilities are exempt from the air pollution levy. The following pollutants are levied:

Air: SO_2; NO_x ; solid, non-toxic particles

2 Please refer to: 3rd National Communication for the UNFCCC
3 Organic Rankine Cycle

Water: COI, phosphor, inorganic nitrogen, mercury, cadmium, chrome, nickel, lead and copper.

Soil-related levy is not pollutant-specific, its amount based on the quantity of waste waters.

The two measures are discussed together because their working principle is very similar. The effect of both measures on GHG mitigation is indirect, and they work through fiscal incentives.

The direct effects i.e. the amount of tax and levy collected or the amount accumulated for the financing of environmental projects may easily be quantified. This volume is well demonstrated by the relevant lines of the state budget:

Act	Line code	Item	Million HUF
	2004		
CXVIII of 2005 Annex 1. XXII.	19.7.1	Energy tax	10921,8
	19.7.2	Environmental levy	6482,2
	2005		
CXXXV of 2004 Annex 1. XLII	1.7.1	Energy tax	10700,0
	1.7.2	Environmental levy	9000,0

Table 1: Volume of energy tax and levy

The effects of these policy items on GHG emission reduction, however, are rather indirect (GHGs are not levied), as they act through the following mechanisms:

Energy tax

- Increasing energy awareness
- Improving the feasibility of energy efficiency projects
- Creating incentive for energy efficiency measures or for the substitution of gas/electricity with other types of energy

Environmental levy

- Creating incentive for reducing energy use or for modernizing equipment
- Creating incentive for reducing polluting activity

Comparing the amount of energy tax to energy prices may give an indication as to show how strong the incentive for improving energy efficiency:

as of end of 2005	Typical communal	Small enterprise	Industry
Electricity			
Price, HUF/kWh	20.7	12.9	11.29
Energy tax	0.90%	1.44%	1.65%
Gas			
Price, HUF/MJ	1.069	1.610	1.643
Energy tax	5.24%	3.48%	3.41%

Table 2: Comparison of energy tax and prices

2.4.2 Energy efficiency and R&D support schemes

Direct supports or preferential loans are the major tools for implementing the specific actions of the Energy Saving and Energy Efficiency Action Programme, but the same is true for the research and development targets. In the past years the following support schemes were and some of them still are available. (The order of reviews does not reflect either priority or timeframe.)

UNDP energy efficiency programme for Municipal Energy Conservation

The aim of the assistance programme is to reveal the possibilities of rational use of energy; to reduce CO2 emission by financing energy audits and the compilation of feasibility studies at the municipal institutions. The programme is open for municipalities, county governments, district notaries and organisations in total or partial municipal ownership as well as for legal entities or business organisations dealing with issues of municipal energy use (such as the auditors themselves.) The form of support is direct subsidy (grant). In 2005 the following conditions of subsidy apply:

- 40% of the total costs of the audit or the feasibility study can be covered directly from the support;
- A further 40% can be granted (altogether maximum 80 per cent), if an investment into energy efficiency is initiated by 31 October 2006. (i.e. some or all of the recommendations of the audits are actually implemented.)

The total size of the funds available for the purposes of the programme is USD 1.535 million. The programme is planned to remain operative until the end of 2005.

EHA - Energy Saving Loan Fund (German Coal Aid)

The Government of Federal Republic of Germany offered Hungary DEM 50 million specially for the acquisition of coal in 1991. Sixty per cents of the HUF equivalent of the original aid, working as a revolving fund, are still used for the financial support of energy efficiency projects and the reduction of energy demand. The support can be obtained in the form of discounted repayment loan through an open application procedure.

The Fund finances the implementation of developments for achieving energy saving which contribute to the reduction of the energy demand and the energy costs of the national economy efficiently, reduction of pollution of the environment as well as dependence upon energy import. The aims are to substitute the traditional sources of energy with renewable energy sources and energy from waste, to establish the conditions of efficient

management of energy sources and the reduction and termination of energy losses at the least possible cost. Supported measures include:

- Reduction of energy losses of energy generation, distribution and use
- Procurement and use of modern, lower energy consumption process equipment
- Heat recovery and the utilisation of renewable energies
- Cogeneration
- Thermal insulation projects
- Better space heating control, especially in district heating

Phare Co-Financed Energy Efficiency Loan Construction

A 10-year energy efficiency loan construction established within the frame of European Union's Phare programme and supported by Phare Revolving Fund is operated via the Commercial and Credit Bank plc. and Raiffeisen Unicbank plc. The aim of the loan construction is to provide the financial incentive for developments focusing on the improvement of energy efficiency. The soft loan is open for private enterprises, municipalities or municipal institutions and independent public institutions such as Foundations , private schools. A precondition of the loan is that the energy efficiency project should be based on an energy audit or feasibility study. The amount of the loan is based on the actual project cost that may include feasibility planning, engineering, commissioning, training of operators, hardware.

Annual energy saving programmes (EHP, SZT-EN, NEP)

The energy efficiency support scheme was introduced in 1996 by the Government Resolution 1113/1996. (XI. 29.) Korm. Launched in 1997, named at that time as EHP (Energy Efficiency Loan Programme) the scheme provided loans with preferential interest rates for energy efficiency projects. EHP was replaced by the Széchenyi Plan[4] that - incorporating many of the actions of the ESEEAP and the National R&D plan provided other tools of support, including direct subsidies (grants). Every year the preferred and supported project types were advertised together with the conditions of support. Support was allocated via a meticulous application procedure and final decisions on the support were made by the Inter-Ministerial Committee for Energy Efficiency.

The current National Energy Efficiency Programme is the sequel of the Energy Chapter of the Széchenyi Plan. The conditions of support are reviewed annually according to changing emphases in the energy policy, but the major strategic goals are still based on the priorities of the Energy Saving and Energy Efficiency Action Programme. The key objectives of the NEP in 2004 were the following:

- Support of domestic energy saving for private individuals.
- Reduction of energy utilisation and energy cost of municipal, governmental and other institutions.
- Support of the modernisation of street lighting (of small settlements).
- Modernisation of the district heating on the customer side.
- Extension of the utilisation of renewable energy sources for municipalities and private individuals.
- Extension of the utilisation of renewable energy sources for business organisations.
- Support of R+D type of energy efficiency developments of small and medium size business organisations with low capital and the reduction of energy utilisation of production sector to reduce energy expenditures.
- Support of energy saving investments for enterprises with the involvement of third party financing.

In 2005 the due to the disproportion between the demand for support and the size of available funds the NEP was temporarily suspended but is planned to be continued in 2006.

KIOP-2004-1.7.0.f (Operative Programme for the Environment and Infrastructure Environmental friendly development of energy management for 2004-2006)

KIOP is one of the five operative programmes of the National Development Plan. One of the actions set forth within KIOP was the Environmental friendly development of energy management. The key objectives of the action are

- increased utilisation of renewable energies
- improved energy efficiency.

The tool of meeting the objectives is direct subsidies covering 25-75% of the justified costs of renewable projects and 30-75% of energy efficiency projects. The support cannot exceed HUF 300 million per project. The funds for the support are provided from the European Regional Development Fund (75%) and from national resources (state and municipal budgets) (25%).

This tool is designed for large projects: the minimum projects size is HUF 125 million. The support is available for governmental and municipal institutions, municipality-owned enterprises, non-profit NGOs, churches and SMEs[5].

4 The Széchenyi-Plan was a broad effort to fund modernisation of the Hungarian economy, launched in 2000.

5 Small and Medium Size Enterprises

Support for the energy efficient reconstruction or modernisation of pre-fab technology buildings ("Panel Programme" Code: LKFT-2005-LA-2)

Due to their large number, age and the technology used in their construction, the buildings constructed from pre-fabricated concrete elements between the end of the 1960s and 1990s ("panel" buildings) represent large potential in residential energy saving. The same applies to the "mass-produced" housing constructed with some other

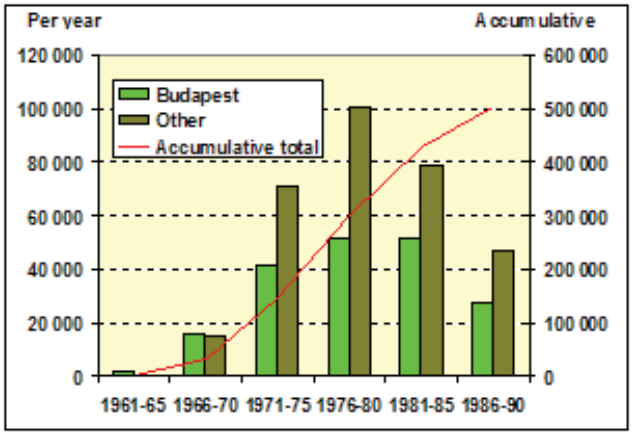


Figure 3: Number of "panel" buildings constructed

technologies. In order to realise some of this saving potential support is provided for the energy efficient reconstruction or modernisation of such buildings. The supported measures are primarily:

- thermal insulation of building envelope;
- replacement of windows and doors
- modernisation of heating, water supply, sewage and ventilation systems.

Maximum 33% of the total project cost or HUF 400.000/ home, whichever is the lower, can be provided in the form of grant. The support system is managed by the National Office for Housing and Construction (OLÉH).

Hungarian Energy Efficiency Co-Financing Programme (HEECP)

The purpose of the Programme is to provide assistance in the financing of energy efficiency within the financial sector. Three forms of assistance is offered:

- Guarantee Fund: By providing guarantees HEECP is instrumental in promoting the energy efficiency services of financing institutions, in the financial and technical preparation of projects.
- Technical assistance: HEECP is ready to cover the 50% of the personnel costs of one person who is working on preparation or monitoring of energy efficiency related projects, or on energy efficiency marketing. HEECP can also provide up-front financing for project preparation.
- Operation: Financing is available for information exchange, conferences, workshops, or work of experts.

Support for R&D activities

The support of energy efficiency and renewable energy related R&D was administered through the National Research and Development Programmes (NKFP), The Central Technical Development Base Program (KMÜFA) and the GVOP sub-program of the National Development Plan. NKFP supports large, long term complex programmes, the other sources aid smaller (less than HUF 100 million budget) projects. The form of support is mainly grants, or – to a lesser extent – preferential (zero interest) loans. Each of the three sources identified energy efficiency and renewable energy utilisation as top priorities within their energy chapters.

Quantitative results

Quantitative results are available for the years 2000-2004 and for the major support schemes. These, however are rather demonstrative as far as the country's efforts are concerned. In the following table the most important figures of the SZT-EN, NEP, Phare, EHA funds, related to the objectives of the ESEEAP are shown[1] in Table 3.

ESEEAP target	Number of projects	Expense HUF Mill.
Communal energy saving projects	16415	7297
Energy audits in industry	33	123
Energy conservative organisation of transport and transportation	4	11
Improvement of municipality energy management	175	154
Improving energy awareness	178	269
Local renewable power	156	348
Local renewable power generation	17	239
Local renewable power use (heat)	56	372
Modernisation of municipal public lighting systems	355	1915
Modernisation of technology in agriculture	1	26
Modernising district heating systems	112	3833
R&D for energy efficiency and renewables	3	1994
Reduction of industrial energy use	121	2448
Residential energy saving projects	16154	5068
Solar roofs	449	204
TOTAL	34229	24302

Table 3: Funds related to the objectives of ESEEAP

The contributions of the different funds to the total ESEEAP-related supports are shown in Figure 4[6]:

It must be noted, that the individual funds must not be evaluated on the basis of the above figure, as the chart shows strictly the ESEEAP related expenditures only. Many of the funds have other priorities, therefore thy may appear to be much less significant than they actually are.

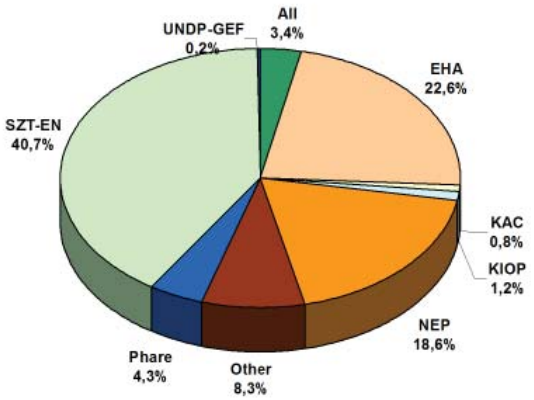


Figure 4.: Contributions to ESEEAP

It is difficult to identify the energy saving achieved by these measures and projects, as many of the project types do not allow such estimation, their effect being rather indirect (e.g. awareness raising, energy audits). Still, it can be stated that the total saving of those projects, where such data were available, was 7900 TJ.

2.4.3 Land-based support for energy crops and energy forests

In line with the priorities of National Rural Development Plan, Decree 28/2005. (IV. 1.) FVM provides for financial support for various agricultural activities that are entitled for support from the European Agricultural Guidance and Guarantee Fund. For these purposes additional national support may be obtained. The decree allocates EUR 946 000 for the production of energy crops (both wood and herbaceous plants). The detailed regulation of the support is codified by Decree 74/2005. (VIII. 22.) FVM. The latter decree defines which plant classifies as energy crop, maximises the area that can obtain financial support and the obtainable finance.

Type of crop	Maximum area, ha	Max. support EUR/ha
wheat, corn, rape and sunflower	16000	27.0
energy grass	10000	32.0
energy forest	2500	194.13

Table 4.:Support of energy crops

The primary objectives of the measure are to improve the competitiveness of agricultural production and food processing; to promote environment-friendly development of agriculture; rationalisation of land use and to assist to the realignment of rural areas.

Although the energy crops act as short-term carbon sinks, due to the short rotation it is not considered among the measure's GHG mitigation effects. The major impact of the measure is that all plants grown on the supported lands will be used either directly as fuel (energy grass, wood) or indirectly as raw material for automotive fuel or biogas[7].

Besides the direct impact, this tool is also of utmost importance because it enables the implementation of further bioenergy projects, by providing excess fuel at lower prices.

2.4.4 National targets and support for renewable automotive fuels

The Directive 2003/30/EC of the European Parliament and of the Council requires that the member states would increase the share of automotive biofuels to 2% until 2005 an then establish a growth rate of 0,75%/year in order to reach 5,75% share by 2010.

In order to address these targets, Government Decree 18/2003. (II. 19.) Korm. introduced a subsidy system for biodiesel and also provided a safe market for such products. This attempt proved to unsuccessful , therefore the system was abandoned.

As in several EU member states, the use of bioethanol (ethanol) and ETBE produced from bioethanol, as well as the use of biodiesel produced from vegetable oils is considered feasible in Hungary. Due to professional and financial considerations, direct blending of bioethanol in engine fuel is not preferred, however, technically, there is no restriction on the blending in of ETBE produced by the addition of isobutylene, a by-product of oil-refineries.

Thus in order to meet Hungary's international commitments, however, the Government in the Government Resolution No. 2233/2004. (IX. 22.) Korm. agreed that the share of renewable fuels (biodiesel and ETBE produced from bioethanol) within the total automotive fuel consumption shall reach 2% by 2010 . The decree also provided a tool for achieving the target by installing an excise-duty refund system until 2010.

Some further details of the use and commerce of biofuels are regulated by Government Decree 42/2005. (III. 10.) Korm., primarily by providing adequate definitions for the various types of biofuels.

One of the obstacles before the faster biofuel production is the lack of ETBE production capacities. At the time when the current targets were set, production capacity for bioethanol required for 40 thousand tons of ETBE was

6 "All" represents those expenditures where no data was available as to how the total was split among the individual sources.

7 Existing contracts with the to-be buyer of the crops, indicating the purpose of utilisation are the precondition of the financial support.

available. Subsequent to the new decree in late 2004, MOL Hungarian Oil and Gas Company plans to make investments in their Tiszai refinery, so that the total ETBE production capacity is expected to be over 100 000 tons from 2007. The bioethanol necessary for ETBE production is to be procured through tender procedures that trigger competition for the construction of ethanol production capacities. The first tender was launched in the summer of 2005.

It is difficult to make statements as to the quantitative impacts of the policy as yet, because the first results are about to show in 2006. According to the background studies of the Government's renewable strategy the 2% share target is realistic if the excise-duty refund (or zero excise duty) system is in place. With this value the absolute value of renewable energy consumption in transport through the use biofuels is thus expected to be 3 PJ in 2010. After 2010 the 2-2.5% share is thought to be maintained.

Estimating the corresponding GHG emission reduction effect is much more difficult, as there is no commonly agreed estimation regarding the impact of biofuels on overall GHG balance. In the light of recent studies, however, it can be stated that the biofuel related emission reduction is not likely to have a serious impact on the overall GHG emissions.

2.4.5 Support schemes for GHG emission reduction in agriculture

In order to implement the goals of the Climate Change Action Programme of the NEP-II., several support schemes are provided. The most important ones, that affect GHG mitigation are the following:

Entry Level Scheme (ELSs)

Entry level schemes promote environmentally friendly farm management in each land use type to provide broad scale opportunity to farmers to enter commitments to reach environmental achievements in their farming practice. Elements of the ELS have already been introduced in Hungary in 2002-2003 under Government Resolution 2253/1999 (X. 7.) on the introduction of the National Agri-environment Programme. ELSs are designed to encourage farmers to use farming methods adapted to the local environmental and agricultural conditions, to target production systems suitable to soil and climate conditions and natural environment, with special attention to relevant environmental protection aspects.

Organic Farming Scheme

The OFS is designed to encourage farmers using conventional farming methods to convert their production systems to organic production as prescribed by Regulation 2092/91 (as amended). Conversion to organic farming systems provides gains in terms of soil health and fertility, benefits for bio-diversity and wider landscape benefits through the use of organic soil cultivation, crop rotation and the absence of synthetic pesticides, herbicides and fertilisers. Besides organic farming contributes to GHG emissions through the use of manure as fertiliser and the limited energy use.

All farmland in the land use concerned must be entered into the scheme, parallel farming (both organic and conventional) is not allowed. Any farmer who is controlled by any organic production certification organisation approved under Article 9 of Regulation 2092/91 is eligible for aid under the OFS regardless that he/she is in conversion or already converted. For areas in conversion period the higher payment rates apply, this is 2 years for annual crops and 3 years for permanent crops.

Integrated Crop Management Scheme

The ICMS is designed to encourage farmers to use integrated farming methods of production in compliance with higher environmental standards, to optimise the use of fertilisers and pesticides and to apply all available means (equipment and know-how) of sound farming. The application of integrated farming systems provides benefits in terms of soil conservation, water protection and biodiversity through the use of environmentally friendly crop patterns, cultivation techniques, nutrient management, crop rotations, as well as the optimised, limited use of synthetic pesticides and fertilisers.

Environmentally beneficial extensification, especially the reduced, optimised use of fertilisers and pesticides, the considered (limited) application of dangerous substances and other accompanying benefits for the environment are among the main priorities for agricultural practice. Integrated farming is based on the internationally approved principles and practices.

This production system should be targeted as a future standard for market oriented agricultural production due to the economical and efficient production that it facilitates, its environmental merits and its food safety aspects. The ICMS was introduced in 2002 under Government Resolution 2253/1999 on the introduction of the National Agri-environment Programme.

Support for meeting standards

The general purpose of the support is to ensure that the requirements of the valid standards animal husbandry are met. Within the support a separate "sub-measure" covers the area of environmental protection. The aim of this type of support is to ensure the adequate on-site placement and management of the organic manure and the storage in line with the environmental requirements. The form of support is providing subsidy for the investment costs. In the framework of this support mechanism assistance is

also provided for compliance with provisions concerning keeping and foddering technology, although reduction of enteric fermentation is not identified as a target.

2.4.6 Waste management support schemes

The programs of the NWMP are partly implemented by regulatory instruments, a large set of lower-level legislation that codify the details for example of the utilisation of sewage sludge in agriculture (Government Decree 50/2001. (IV. 3.) Korm.), or of technical requirements of municipal solid waste landfills (Decree 5/2002. (X. 29.) KvVM), technical requirements of composting and treatment of biological wastes (Decree 23/2003. (XII. 29.) KvVM), etc.

The implementation of the policy is also aided by allocating finance from various sources:

- in the framework of targeted support HUF 5812 million was provided from the state budget to finance some 45% of the total investment cost of 48 landfills;
- considerable part (typically 20-25%) of the Environmental Fund was used for waste management related projects (this amounted to HUF 2,5 billion between 1996-2001);
- in the budget of the Ministry of the Interior HUF 4 billion was allocated for waste management projects.

Similarly to these past examples, the NWMP foresees that some 50-60% of the programs will be financed from

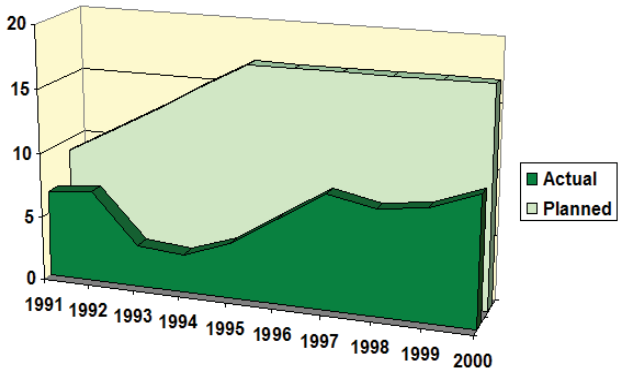


Fig. 4. Planned and actual afforestation in Hungary

central (state budget) resources and regional support systems, another 20-30% is planned to be covered from international funds and the remaining 10-20% will have to be paid for by the municipalities. Central support for the operation of the waste treatment systems, however, is not possible as it would contradict the relevant Community acts (2001/C37/03). Thus the operation will need to be financed primarily from the fees the polluters pay for waste collection and treatment.The results of the NWMP and the lower level legislation stemming from it have started to show. Several municipal landfill projects have been completed, just as the reconstruction of the Budapest Waste incinerator. The Information System on Wastes (HIR) is operative and several information dissemination efforts have been completed (school textbook on wastes for children, training package on wastes for pupils and teachers, specialised web-site, information booklets for households etc.)

2.4.7 Support for afforestation

The quantitative targets of afforestation were originally based on the draft of the National Afforestation Programme. Due to limited resources available, changes of land ownership and lack of information for the new land owners, however, the set targets were not met, and in the first year not even the trends followed the targets.

Thus, learning from the experience of the past years, the current targets are somewhat reduced and instead the constant high target figures an escalating schedule is foreseen. In practice, according to financing targets of the National Rural Development Plan, the following afforestation schedule is set: in 2005: 10 000 ha, in 2006: 11 000 ha, and then this value is predicted to rise to 15000 hectare/year between 2007-2013. These forests are predicted to be planted on low and medium quality arable lands, as most of the grasses are under protection. EU subsidies for afforestation are competitive with ploughing subsidies, so there is no danger of any barriers before turning arable land into forests. The annual wood felling is expected to stagnate around app. 8 million cubic meters of harvested wood.

The above described policy is implemented through a set of support schemes:

- Plantation: direct support for the afforestation of agricultural land, and, in justified cases, supplementary aid for certified additional activities performed in conjunction with the plantation. The amount of subsidy depends on the type (topography) of land and the type of trees planted. The additional activities also supported are the following:
  - o Protection of the soil of afforested areas
  - o Protection of the afforestation against grazing animals, game and trampling damage
  - o Protection of afforested areas against inundation/ flood damage
  - o Protection of afforested areas against fire
- Maintenance: protection and fill-in planting of newly planted forests, disbursed for a maximum period of 5 years. This support aims at the maintenance of forests established in agricultural areas, including measures required or protection against harmful biotic effects, for five years following the establishment. This includes the annual maintenance (machine weeding, hoeing,

sickle cutting, removal of young shoots, etc.) of forests along with their pest protection and the ploughing and cleaning of fire protection strips. The cost of additional maintenance and protection after establishment is determined for each target type as a lump sum, which applicants will receive in the third and fifth years after plantation.

- Premium for loss of income for the afforested area, disbursed for a maximum period of 20 years. The aim of this support is to provide compensatory payment to farmers for the loss of revenue or income caused by the afforestation of their agricultural land. Pursuant to paragraph 1of Article 31 of Council Regulation (EC) No.1257/1999 , support will be granted annually to cover loss of income due to the afforestation of agricultural land for a maximum period of 20 years.

2.4.8 Legislative measures

Limitation of emissions from stationary sources

The general and primary objective of the relevant legislation was to significantly reduce air pollution from stationary sources, especially that caused by SO_2. The Decree 22/1998 (VI.26) KTM and a sequel Decree of the Minister for Environment and Water 10/2003. (VII.11.) KvVM replacing it have set more strict emission limits than those in force earlier and offered two alternatives for the operators of the emission sources: either provisions are made to reduce emissions below the limit (e.g. FGD[8] units are installed) or the operation has to be stopped. The deadline for the measures for large power stations is January 1st 2005, for other plants (mainly industrial) 31st December, 2008.

The new regulation had the largest impact on the energy industry, and within the energy industry it affected primarily those power stations that used low quality, mainly domestic coals with high sulphur content.

The secondary objective of the policy is to reduce GHG emissions by the fuel switch and technology improvement projects stemming form the policy.

As the direct result of the policy several mitigation measures were put in place, including the installation of FGDs and a series of fuel switch projects[9]:

FGD unit installation:

- Mátra Power Plant (836 MW capacity): Installation of a wet SO_2 scrubber in 2000. Experiments have also started with adding woodchips to the fuel mix. It is planned that the share of renewables will exceed 10% in the fuel use by 2006.
- Vértes Power Plant (240 MW): The installation of an FGD has been completed.

Fuel switch projects:

- Borsod Power Plant (137 MW): has decided to switch two of its boilers to biomass fuel with a planned 260GWh electricity production and the combustion of 316 kt of biomass. This replaces the 700 kt sub-bituminous coal from the Lyukóbánya Mine, which was closed. The rest of the boilers have been switched to natural gas.
- Tiszapalkonya Power Plant (200 MW): it has switched to co-firing of wood-chips and sub-bituminous coal.
- Pécs Power Plant: The plant accomplished a major reconstruction project by converting all but one of its units to natural gas in place of coal. The remaining 50 MW unit was converted to wood-chip firing.
- Ajka Power Plant (102 MW): In order to meet the emission limits the plant was modified so that adding woodchips to the coal fired would be possible.
- Tatabánya Plant: Switched to natural gas and installed gas engines to improve efficiency.

Stop operation:

- Inota Power Plant: Its owners have temporarily suspended the operation of the plant. Plans exist to install a natural gas fired CCGT[10] unit, but no concrete steps have been made as yet.
- Bánhida power plant: Stopped operation from the beginning of 2005. Various plans exist for the utilisation, but no concrete projects have been so far initiated.

It must be noted, that as result of the implementation of the policy its secondary aims, i.e. the indirect reduction of GHGs is also fulfilled through the following benefits:

- Through the fuel switch projects coal was substituted by natural gas (with more than 40% less specific CO_2 emissions) and biomass (zero net CO_2 emission).
- Due to the falling demand for domestic coal the mining-related direct (energy use) and fugitive emissions are reduced.
- Stop of operation of the Inota and Bánhida plants may also reduce overall GHG emissions, although this effect is questionable, as the power production of the plant is obviously substituted by other sources such as increased output form other plants and/or imports.

8 Flue Gas Desulphurisation

9 It is noted that the application of the FGD technology increases CO_2 emission, but the other strategies (fuel switch, suspending operation) result in a net emission reduction.

10 Combined Cycle Gas Turbine

- It is important to emphasize, that as a special benefit this policy combined with the subsidies for renewable based power generation (discussed separately) resulted the first biomass-power projects in Hungary (Pécs, Borsod, Tiszapalkonya, Ajka). This, besides the direct CO_2 emission reduction significantly contributed to
  - o increasing awareness through the wide media coverage
  - o creating markets for wood fuel and eventually energy crops.

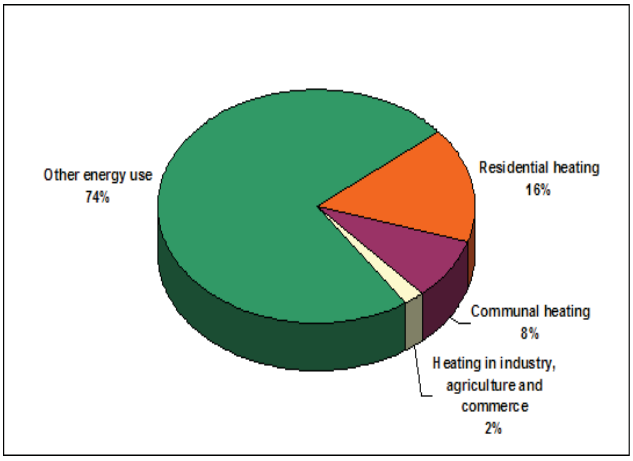


Figure 5.: Importance of space heating in total energy end-use

New legislation for the energy efficiency of buildings

The importance of heating in buildings is high: according the background study of OLÉH for their "Long-term Sustainable Building Energy Concept" it represents more than 26% of the total energy end-use and the related primary energy demand is 314 PJ per year. Having in mind the fuel mix of space heating the associated CO_2 emissions almost reach 19 000 kts.

In line with the principles of the Directive 93/76/EEC of European Commission that is aimed reducing the GHG emission through energy efficiency measures and the related Directive 2002/91/EC on the energy efficiency of buildings, the Hungarian Government acknowledges the potential of improving energy efficiency of buildings in GHG emission mitigation and puts emphasis on taking appropriate actions in this field. As regards setting out appropriate provisions on the minimum energy performance requirements, especially regarding new buildings, the relevant Hungarian legislation is under preparation and the newly adopted regulations are planned to be effective from the beginning of 2006. The regulation will introduce new standards for the energy performance of buildings. Both the methodology of evaluation (thermal calculations) and some key parameters (e.g. U-values and normalised heat loss) are prescribed. Meeting with these prescribed values will be the precondition for the issuance of licences for construction or major refurbishment of buildings. The objective is considerable savings through the more strict performance requirements.

As for the use of energy efficiency certificates, and regular inspection of boilers and HVAC systems as major energy consumer equipments within the buildings, unfortunately due to the lack of qualified and accredited experts, the application of these instruments suffers delays. Due to these problems, the Hungarian Government intends to avail itself of the possibility of having some additional period for the implementation of these provisions, while making every effort to make such a system is operational as early as possible.

Emission Trading System

In compliance with the relevant Community acts (2003/87/EC; 2004/156/EC) the Hungarian Parliament approved the Act XV of 2005 on the trading system of greenhouse gas emission units. This created the official framework for the allocation, trade, utilisation of GHG emission units and also codified those activities that are subject to emission licences.

The creation of the Act was preceded by some two years of intensive preparatory work, which resulted not only in the Act, but also in the preparation of all the necessary documents and procedures that were necessary to launch the trading system in Hungary. This included the detailed rules of the emission rights allocation and trading which were set forth in detail in the implementation decree of the Act, Government Decree 143/2005. (VII. 27.) Korm., and also the National Allocation Plan and the detailed Allocation List. The preparation work included a wide range public discussion about these documents.

The ultimate objective of the entire trading system is to reduce the risk of climate change. This is to be achieved by creating incentives for GHG emission-conscious behaviour an emission reduction measures, implemented by the biggest polluters.

The system is ready and operative for the first trading period (2005-2007) and preparation for the second period (2008-12) has started. The draft of the allocation principles for the second period has been written and disseminated and a series of public consultations have been announced.

The indirect impacts of the ETS on GHG emission reduction are not yet possible to measure or forecast. It is commonly agreed, however, that the first and most important impact of the ETS is that it considerably increases the awareness of the large companies – this has been strongly confirmed by their feedback during and since the preparation of the legislation. The companies rather soon realised the fact that they can generate extra revenues by reducing their GHG emissions. At the same time the limited availability of "free" emission rights puts a constraint of energy use reduction on new developments.

2.4.9 Special measures

Life extension of the Paks nuclear plant

In the Resolution 85/2005 (XI.23) OGy. of the Parliament, the life extension and capacity increase of the Paks nuclear power plant was approved. The rationale of the project identifies the environmental commitments related to the Kyoto protocol and its foreseen sequel among the most important objectives.

The four units of the Paks plant were commissioned between 1982-87. Currently the total capacity of the four units is 1866 MW – already bigger than the design capacity of 4x440=1760 MW. The Paks plant is the base power station of the Hungarian power system supplying about 40% of the total power production at low costs with no associated GHG emissions. The planned technical lifetime of the units ends between 2012-17, but all investigations show that the operation can safely be extended by at least 20 years. In the framework of the retrofits needed for the life-extension, the capacity of the plant will be increased by same 150 MW, chiefly through the improvement of control systems and use of upgraded fuel cells.

Thus the objective of the project is to ensure the availability of some 2040 MW nuclear capacity until at least 2032-2037, thus improving the safety of supply and save considerable GHG emissions.[2]

Although the project, as it will require neither finance nor guarantees from the government, first appears as a general development project by an enterprise, it may still classify as part of the national policy, partly because the Paks plant is state owned, partly due to its sheer size that has long-time impact on the national energy strategy, thus requiring governmental approval.

The measure has no impact on the projected CO_2 emission before the end of the originally planned lifetime of the individual units, since it may be well assumed that they would remain in operation until then, as they are at present. However, from then on, all the generated power of the individual units will substitute power that should be generated in other (fossil) power plants or imported, if the life extension did not take place.

It is very difficult to establish a baseline for calculation the actual emission reduction as there is practically no alternative to the life extension:

- natural gas based capacity developments are limited by the capacity of the gas supply system (almost utilised up to 100% even now);
- imports are also limited by the capacity of the transmission system;
- substituting 1860 MW by renewable is rather unrealistic.

Facilitating Joint Implementation programmes

Hungary, one of the Annex I. Parties of the Convention, can make use of the Joint Implementation flexible mechanism offered by the Kyoto Protocol. Joint implementation under Article 6 of the Kyoto Protocol provides for Annex I Parties to implement projects that reduce emissions, or remove carbon from the atmosphere, in other Annex I Parties, in return for emission reduction units (ERUs). The ERUs generated by JI projects can be used by Annex I Parties towards meeting their emissions targets under the Protocol. Since Hungary meets the eligibility requirements, the so-called “track one” procedure is pursued, i.e. Hungary as the host Party of JI projectst wishes to apply its own national rules and procedures to the selection of JI projects and the estimation of emission reductions from them.

In order to facilitate the implementation of JI projects, the Ministry of Environment and Water has accomplished the following tasks:

Developed the procedure for evaluating and approving JI projects. As a part of the procedure developed standard formats for various project documents such as the „Project Description” (PD - necessary for the issuance of the Letter of Endorsement) and the „Project Design Document” (PDD - necessary for the Letter of Approval). The standard formats and clear criteria help much the potential projects that seek recognition as JI projects.

It created and maintains a web site with the relevant, updated information on the application procedure and general information on JI projects. This includes the publication of PDDs submitted for approval, that provides opportunity for the public the have a say on the projects themselves and also serves as examples for potential applicants in making their own documents.

It developed a Manual for the calculation of reference CO2 emission factors used for baseline calculations of JI projects affecting the generation or use of electric power [3]. This was particularly useful for any applicant who wished to submit a project that involved electric power related emission savings. This method was necessary because as the baseline of JI projects that affect the generation or use of electric power is both specific to the given country and is variable in time, there is no generally accepted overall methodology available for its calculation. The methods used for this purpose in Hungary earlier, either gave less realistic values (the own calculations of project developers) or were somewhat inaccurate due to their general nature (such as the so-called “Dutch method”). The method developed reflects the specific features of the Hungarian power system and is based on extensive data from the power system operator.

It developed a manual that defines the additionality criteria for Hungarian JI projects and it regularly publishes the list of already submitted project initiatives and their status.

So far 36 project applications have been considered, 27 of which have received the Letter of Endorsement. 14 projects have been approved. The total CO_2 emission reduction potential of the 14 approved projects is 8 697 000 tons during the 2008-12 period.

The potential of JI projects might be limited with the restrictions of Directive 2004/101/EC, which practically eliminates further supply-side energy efficiency projects and significantly hinders the approval of demand side energy efficiency as well as renewable energy related JI projects in case they supply electricity to the grid.

3. TRENDS AND PROJECTIONS OF GREENHOUSE GAS EMISSIONS

Hungary is committed to reduce its greenhouse gas emissions by 6% compared to the average GHG emission level of the base period (1985-87). Due to the basic restructuring of the economy forced by the political changes in 1989-90 and the subsequent decline in production, considerable reduction in GHG emissions was experienced. These low levels, however, were maintained to these days, despite increasing production and GDP. Future trends are also promising (i.e. the emissions will not reach the allowed level in the time-span of the projections) even if a slow-rate increase of emissions seems realistic until 2020.

GREENHOUSE GAS EMISSIONS	Base years	1988	1989	1990	1991	1992	1993	1994	1995
	CO_2 equivalent (Gg)								
CO_2 (without LUCF)	84776	80326	78102	72278	68440	61974	62733	61595	60870
CH_4	13290	13707	13571	11870	11423	10780	10057	9903	10051
N_2O	23816	23127	22380	18895	15243	12294	12001	13214	12.397
HFCs	NO	NO	NO	NO	NO	0.1	0.1	1	2
PFCs	268	264	285	271	234	135	146	159	167
SF_6	81	84	25	40	53	49	52	68	70
Total (with net CO_2 emissions/removals)	120884	117115	114111	100983	93856	82941	81669	79522	78235
Total (without CO_2 from LUCF)	122232	117508	114363	103353	95392	85231	84989	84940	83557

GREENHOUSE GAS EMISSIONS	1996	1997	1998	1999	2000	2001	2002	2003
	CO_2 equivalent (Gg)							
CO_2 (without LUCF)	62220	60478	60139	60015	57803	59360	57703	60461
CH_4	10168	10074	10388	10024	10086	10356	9765	9523
N_2O	13330	13205	13203	13066	12583	13500	12621	12434
HFCs	2	45	125	347	206	281	393	478
PFCs	159	161	172	189	211	199	203	190
SF_6	69	68	68	127	140	107	120	162
Total (with net CO_2 emissions/removals)	81212	79060	79105	79334	77056	79261	78440	79283
Total (without CO_2 from LUCF)	85947	84031	84095	83768	81046	83803	80805	83248

Table 5.: Greenhouse gas emissions in Hungary since 1985-87

3.1 Past trends

The tables below show the emission trends as a whole show a significant decrease in comparison to the base year emissions. At the beginning of the period, corresponding to national economic performance and restructuring of the economy a significant emission decrease took place. Since the mid 1990's emission levels has been fluctuating around 83000 Gg per annum (without LUCF).

The overall trends and achievements in GHG reduction are more visible in the time series of the GHG emissions by gas type (CO_2 includes LUCF), as in Figure 6. The red straight line marks Hungary's Kyoto targets.

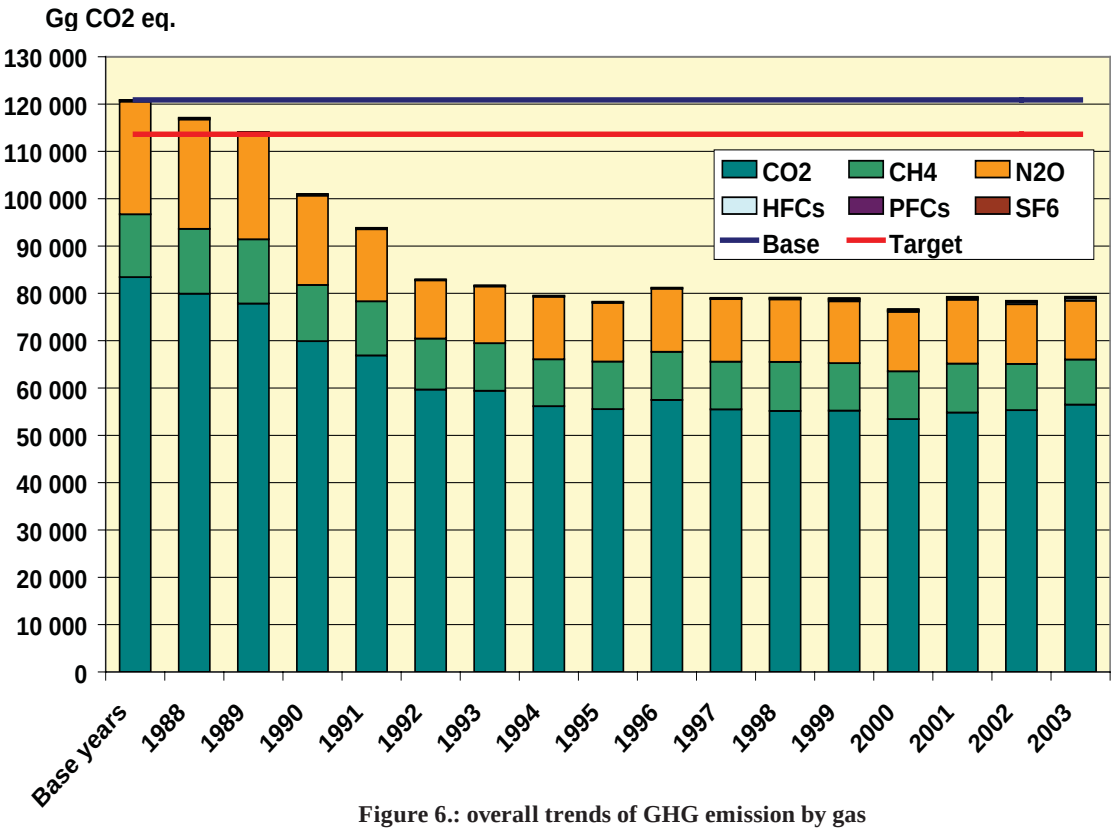


Figure 6.: overall trends of GHG emission by gas

The following conclusions may be drawn from the tables and the chart, that the overall GHG emissions are determined by CO_2, CH4 and N2O emissions. Despite their much larger GWP, the role of the other gases is not significant. After 1988-89 the emissions significantly dropped. This was primarily due to the consequences of the political and economic changes: the majority of the Hungarian industry was not able to cope with the challenges of a competitive market opening up, much of the energy intensive heavy industries stopped operation, and the economy shifted more towards services. This is illustrated in figure 7. At the same time the overall production levels and GDP also dropped, roughly until the mid-'90s. From then on, the GDP started to grow and the economic activity gained momentum. Still, as shown in the next chart, overall emission levels were kept at an almost even level. Even though by 1999 GDP reached pre- 1990 levels, emission values remained significantly below both the base and the target value.

Finer trends, however, are more sensible, if the three dominant GHGs are examined separately, and only the recent years, say since 1995 are taken into consideration. It is apparent from that the emissions of the three dominant GHGs stagnate in rather narrow range. Still, slightly increasing trends seem to appear in CO_2 emissions from 2000, but the timeframe is too short to draw serious conclusions. If compared to the trends of total energy use and the growth of GDP, however, it shows strong correlation with the former, but stays behind the growth

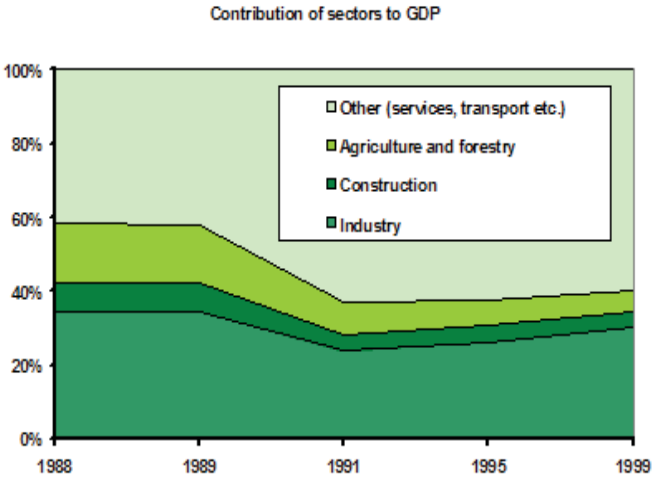


Figure 7.: changes in the contributions of sectors to GDP

rate of GDP, which indicates that both the efficiency of energy use and consequently the specific emission figures improved.

Methane emissions are affected by two contradicting factors: decreasing livestock population causes decline,

Changes of total emissions and GDP
1995=100%

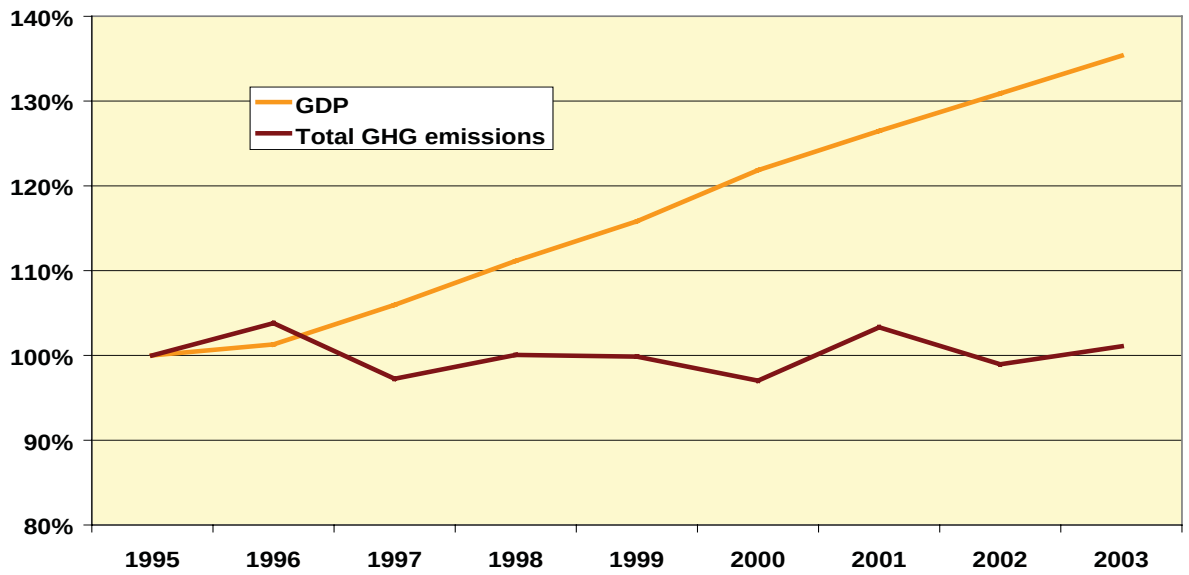


Fig. 8.: changes in total emissions and GDP

while fugitive emissions increase due the increasing use of pipeline gas. These two effects result in a relatively constant but slowly declining trend.

It is also worthwhile to look at the sectoral breakdown of GHG emissions in the same timeframe as previously.

GHG emission trends by sector
1995=100%

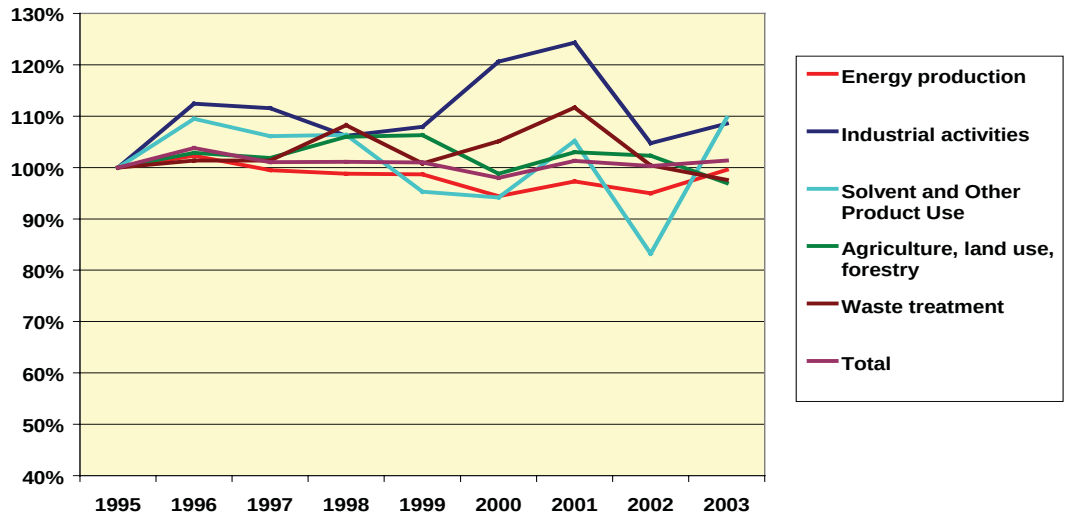


Figure 9.: GHG emission trends by sector

In order to better emphasize the trends, the emissions of the individual sectors of the national economy are shown in figure 9. in relation to those in 1995.

The previous statement about the stagnation of emission is reconfirmed: it is apparent that the change of total emissions is typically within 1% (the only exception is 1996 where the difference is 4%). Some slight trends of the individual sectoral emissions can still be identified:

- Emissions from the energy sector are show some gradual decrease with the use of less energy and of fuels of a better composition. (Natural gas and, to a small extent, renewables gained more importance.)
- Emissions from the industry sector also seem to show slow increase.
- The slightly falling emissions from the agriculture sector are associated with the decline

in livestock population and crop cultivation. It is noted at the same time that if agriculture is considered together with LUCF, then a marked increasing trend is shown, that indicates that LUCF is the sector where an obvious negative trend could be experienced.

- The slight increase of emissions from the Waste sector is a result of growing volume of waste generation and disposal.

3.2 Projections

The following projections are based on an extensive research project to forecast the national greenhouse gas emissions by a large community of researchers in 2004. This research was updated in 2005, and the effects of policies and measures and other assumed mitigating factors are presented in two scenarios.

A detailed account is given about the background and methodology of the forecasts in Hungary's 4th National Communication for the UNFCCC, here only some key points are mentioned that are necessary to follow the trends of the forecast.

The sector-specific forecasts are based on individual studies, which rely almost exclusively on official statistical data collected and published by government offices, national authorities and designated agencies.

The projection includes the following three sets of data:

- The baseline is the "without measures" forecast, without the effect of any planned policies or measures. However, it is not a classical business-as-usual scenario, because it already assumes that some steps are taken towards energy efficiency, fuel-switch, renewables use, to an extent that this is enforced by the forthcoming and existing regulation which is EU conform.
- The "with measures" includes the effect of the currently implemented and adopted policies and measures as well as those whose implementation is very likely. It is also noted, that some of the implemented but currently suspended policies whose future in the light of past experience seems uncertain (e.g. support of residential energy efficiency projects) are not included here, since their forecast savings are based on somewhat arbitrary assumptions. These are included in among the additional measures. The forecast savings of the individual measures were converted to a common reference year and baseline scenario.
- The scenario "with additional measures" assumes a higher rate of governmental interest and support in aiding the Kyoto emission reduction targets with the means of energy efficiency, renewables use, and transportation and traffic redesign, This scenario was approved and amended by the experts in the governmental agencies. The scenario with additional measures is different from the „with measures" scenario in the followings,
  - the government develops and implements from 2015 a radically new traffic and transportation scheme, resulting in a decreasing trend from 2015;
  - the strongest afforestation scenario is supported and implemented from 2010;
  - significant measures are taken in the agricultural sector;
  - the support on energy efficiency and renewables in real value grows to 400% of its present value beginning with 2010.

It is also noted that these are not unrealistic and impossible assumptions even if we consider the present budgetary conditions. There is a high chance that the European Commission takes a more stringent approach from 2010 and guides the government to increased support in reaching its commitments under Kyoto. Moreover, after the end of the first commitment period, it is expected that there would be further commitments agreed by the international community which, regarding the growing trends in Hungary's emissions can not be reached unless decisive governmental action is taken.

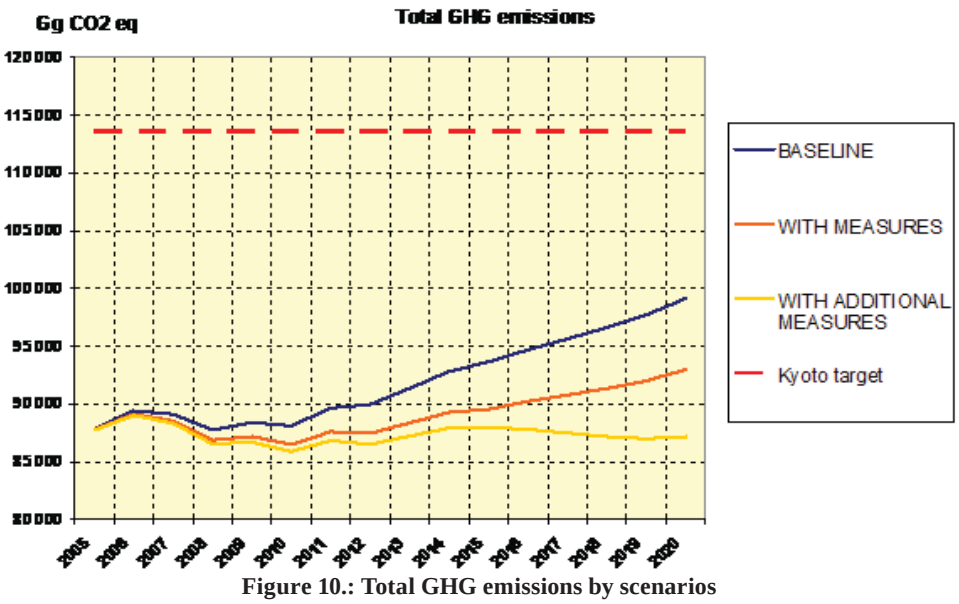
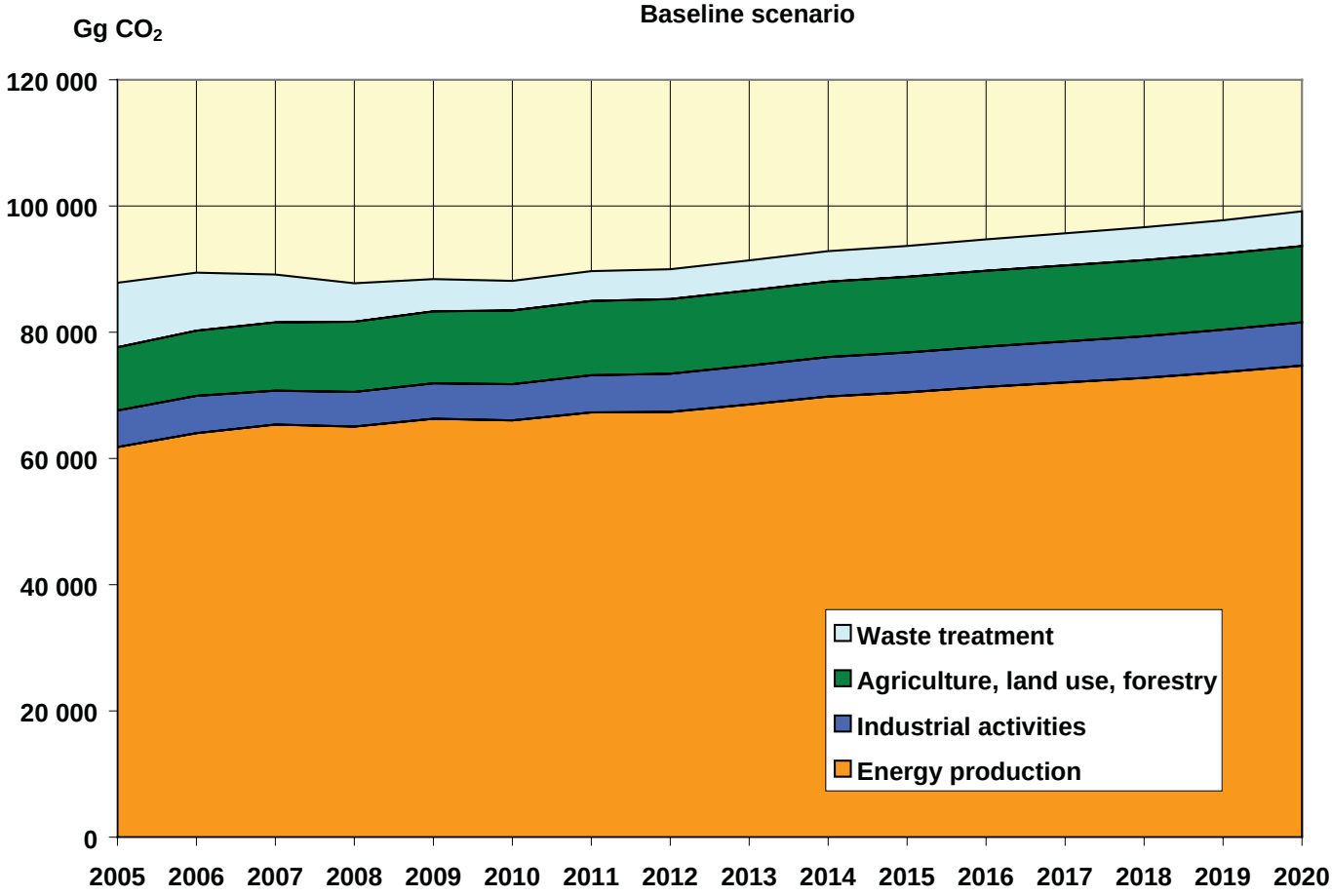
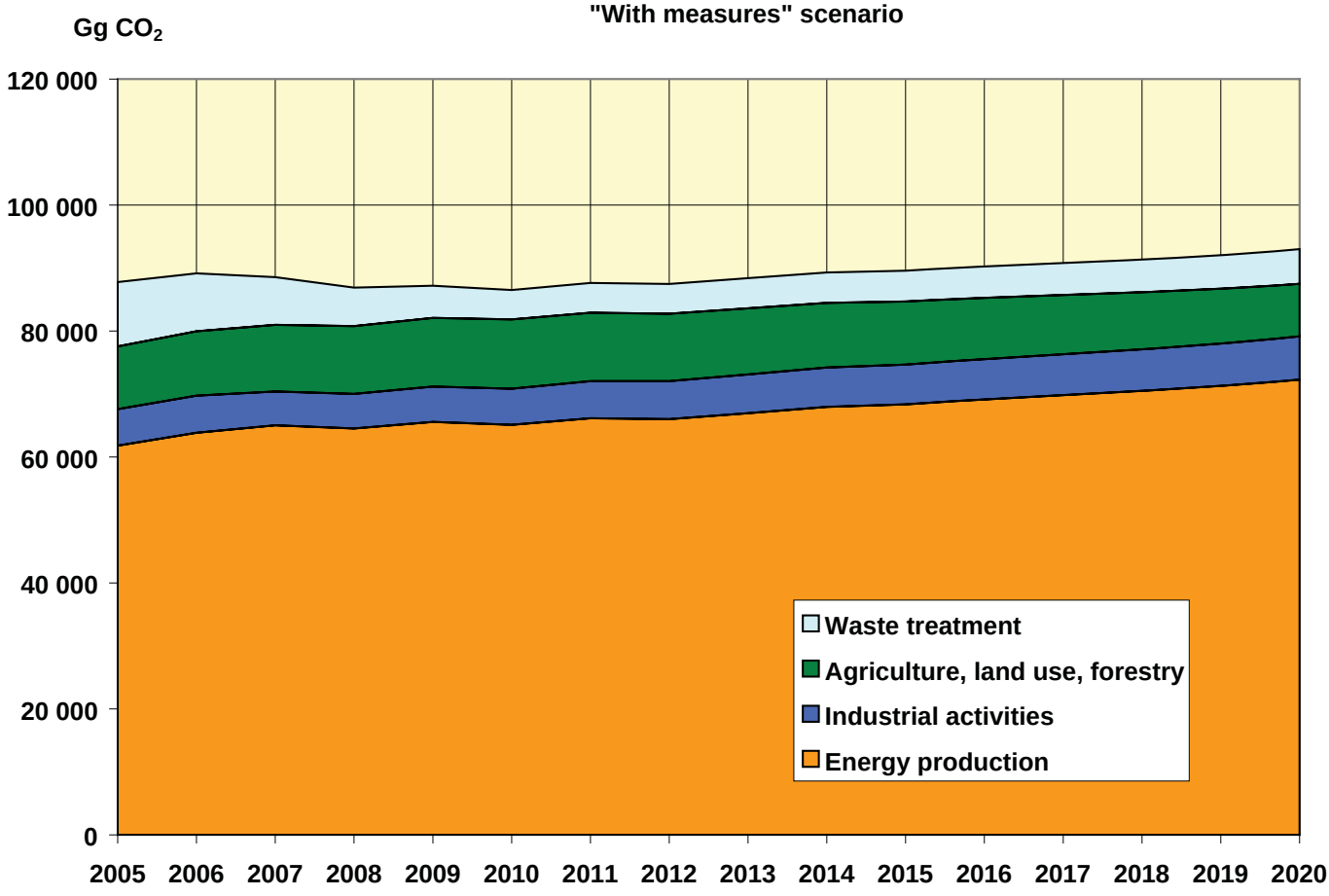


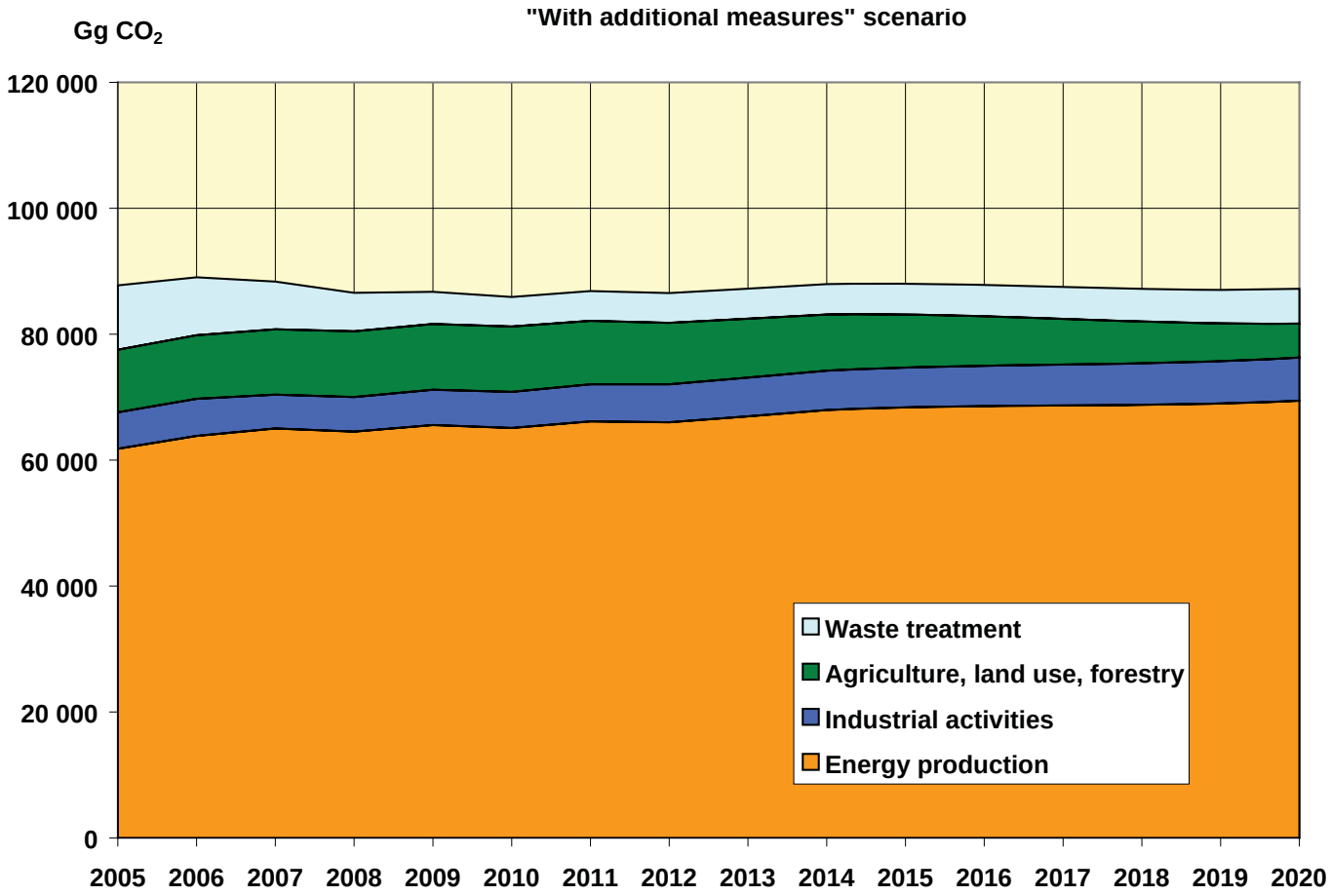
Figure 10.: Total GHG emissions by scenarios

Baseline scenario



"With measures" scenario





As it can be seen in the figures, even in the case of radical actions taken, significant reduction of the current emissions cannot be achieved, only a stabilisation with a slight drop in the emissions seems possible. It must be emphasized at the same time that – having in mind that Hungary's current emissions are well below the Kyoto target - this would be by far sufficient from the aspect of Hungary's contribution to the efforts of the EU to meet its Kyoto targets.

It is apparent from figure 10, that according to the projections even in case of the baseline scenario, Hungary will be able to meet its targets.

If the sectoral breakdown of the projections is investigated in some more detail (the trends are presented in the following charts) it clearly shows that significant GHG emission reduction potential is in the energy sector, but more importantly in agriculture and in land-use change and forestry.

This perception is well supported by the conclusions of the analysis of past trends that have shown that LUCF featured declining capability of carbon sequestration, hence the highest potential for improvement.

The energy sector is rather inflexible due to the constrained of the demands and capital intensive nature of the development projects or the limited import capacities. Besides, with the life extension of the Paks nuclear plant adopted, no technical possibility of similar significance is available. Further fuel switch projects to natural gas are hindered by the capacity of transmission pipelines and are also not preferred due to the increasing dependence on a single-source import. Thus the energy sector offers limited potential for additional measures.

On the other hand, LUCF sector really provides good opportunities for improvement, as the expertise, labour and lands are available. In several regions of Hungary, typically low quality arable lands had to be withdrawn from cultivation. In these regions the rate of unemployment is usually high, there is no other professional tradition than farming. Therefore afforestation programmes would not only significantly contribute to GHG mitigation but would also have favourable social and economic impacts.

4. EVALUATION OF DOMESTIC MEASURES

It has been shown in the previous chapters that Hungary created a strong legal background for measures aimed at meeting the Kyoto targets. The concepts of climate change, sustainability, GHG emission mitigation have all became the integral part of the Hungarian legal system.

The legislation is supported by an adequate institutional background, involving all the interested parties.

The operative programmes stemming from the legal basis cover all the areas that have decisive impact on GHG emissions: energy efficiency, agriculture, forestry and climate change in particular. The structure of implementing the programmes was also set up, however not always sufficient resources were available or allocated to the individual tasks.

The analysis of past trends and future projections show that the policies and measures have produced concrete emission reductions, which is best demonstrated by the stagnating GHG emission volumes against increasing GDP production. As shown in the figure 11., while earlier the trends of the GDP and GHG emissions earlier were similar, from roughly 1996, presumably as the consequence of the implementation of policies and measures the situation changed: the characteristics of the GHG emissions did not follow the upward trend of GDP.

It is also shown by the projections that owing to the mitigation efforts, Hungary can surely meet its Kyoto targets and the emissions will not exceed the Kyoto limits even until 2020.

The projections, however, suggest that there is quite some potential for further abatement measures, especially in the LUCF sector.

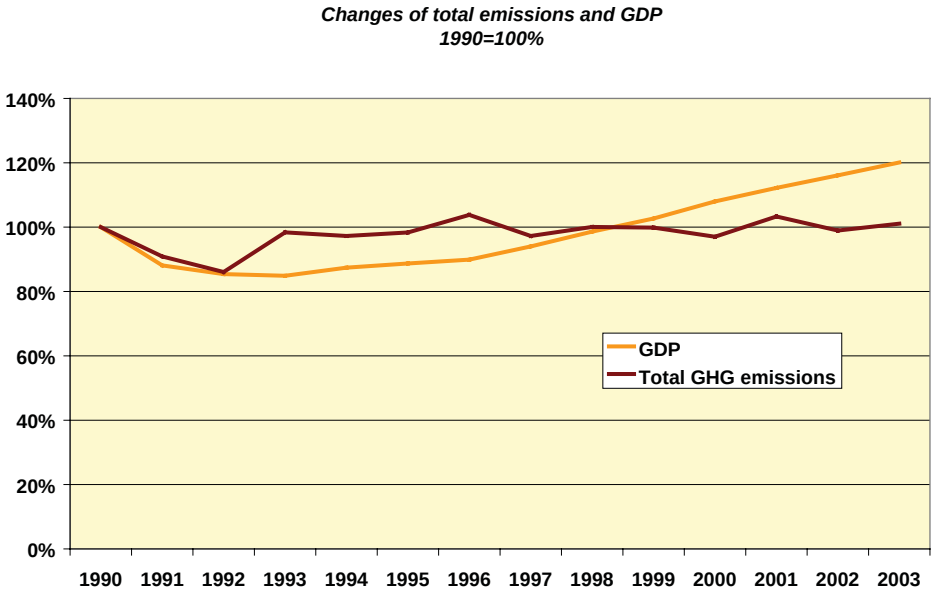


Figure 11.: Changes in total emissions and GDP

5. Activities related to Article 10 and 11 of the Kyoto Protocol

5.1 Improvements of national GHG inventories

Hungary prepares its greenhouse gas emissions inventory each year with the application of the IPCC methodology, as stipulated by the UNFCCC. During the preparation of the inventory Hungary switched over to the method suggested by the IPCC 1996 Revised Guidelines as from 1998, and from that year the inventory was prepared in Common Reporting Format (CRF). As from 1998 we have supplemented the inventory with fluoride, precursor and SO_2 gases.

In evaluating emissions it had to be realised that data before and after 1998 were not consistent due to the change in methodology. Previous data needed to be recalculated and the inventories of the years before 1998 to be processed according to CRF but due to lack of capacity it was not done until 2003 when the necessary resources were allocated. As the first step, the data of the base years (average of 1985-1987) and the year of 1990 were processed the CRF tables of the GHG inventory were prepared. Simultaneously the emission factors for Hungary for several technologies were determined, thus enhancing the accuracy of the inventory. In 2004, this work was continued and by early 2005 the complete and consistent time series of the years 1985 to 2003 (altogether 19 years) were finalized.

An Expert Review Team (ERT) organised by the UNFCCC Secretariat carried out an in-country review of Hungary's report of year 2000 which was submitted in 2002. Following the comments of the ERT some further refinement and corrections of inventories were made.

5.2 Adaptation programme

In order to tackle the increasing risk stemming from global climate change, and to support the founding of the domestic climate policy the Ministry of Environment and the Hungarian Academy of Sciences launched a common research programme named VAHAVA, "The domestic effects of global climate change, and the answers to be given to the challenge" in 2003. Primary aim of the three year project was the preparation to the potential negative and positive effects of climate change, harm reduction, prevention and advancement of restoration. Methodological characteristics of the project was the complex system synthesis, interdisciplinary and multi-sectoral approach, and wide range partnership.

The synthesis takes into consideration results from the relevant international research, the National Research Programmes, the National Environmental Programme, the National Environmental-Health Action Programme, and some published results in the domestic literature.

The expected final report from the project will be published in the spring of 2006.

It will summarise the

- unfavourable effects of varying frequency and intensity meteorological events from global climate change;
- the main elements of the national strategy on adaptation to climate change and atmospheric protection (preparation, mitigation, harm reduction, restoration);
- Suggested measures for the future to mitigate and adapt to harmful events.

The final report is primarily meant to raise awareness and attention of the governmental decision makers on the urgent tasks of adaptation and preparation for climate change.

The most important suggestion of VAHAVA project is that the Parliament accepts a decree on long range emission control and adaptation in the frame of a National Climate Change Strategy, including the National Drought Strategy (NDS).

This strategy is harmonised with international commitments, integrates into existing development plans and concepts, and forms priorities, defines the role and responsibility of the Government in execution, evaluation and monitoring of progress.

5.3 National GHG emission abatement programmes

A detailed account is given on these programmes in Chapter 2.3.

6. GLOSSARY

AVOP	Agriculture and Rural Development Operative Programme
BAU	Business As Usual
CRF	Common Reporting Format
EHA	Energy Saving Loan Fund
EHP	Energy Efficiency Load Programme
EHP	Energy Efficiency Loan Programme
Energy Centre	Energy Efficiency, Environment and Energy Information Agency
ERT	Expert Review Team
ERU	Emission Reduction Unit
ESEEAP	Energy Saving and Energy Efficiency Action Programme
EU	European Union
GHG	Greenhouse Gas
HUF	Hungarian Forint
ICMS	Integrated Crop Management Scheme
IPM	Integrated Pest Management
IPP	Independent Power Producer
KGI	Institute for Environmental Management
KIOP	Environment and Infrastructure Operative Programme

KMÜFA	Central Technical Development Base Program
LUCF	Land-use change and forestry
NAEP	National Agri-environment Programme
NAP	National Afforestation Programme
NDP	National Development Plan
NDS	National Drought Strategy
NEP	National Energy Efficiency Programme
NEP-II.	2nd National Environmental Programme
NGO	Non-Governmental Organization
NKFP	National Research and Development Programmes
NRDP	National Rural Development Plan
OLÉH	National Office for Housing and Construction
R&D	Research and Development
RFOP	Regional Development Operative Programme
SME	Small and Medium size Enterprise
SZT-EN	The energy efficiency chapter of the Széchenyi Plan
UNDP	United Nations Development Programme
UNFCCC	UN Framework Convention on Climate Change

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