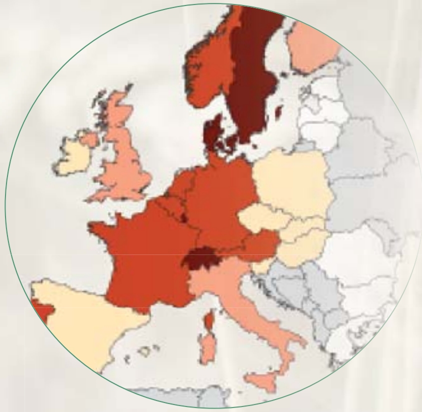
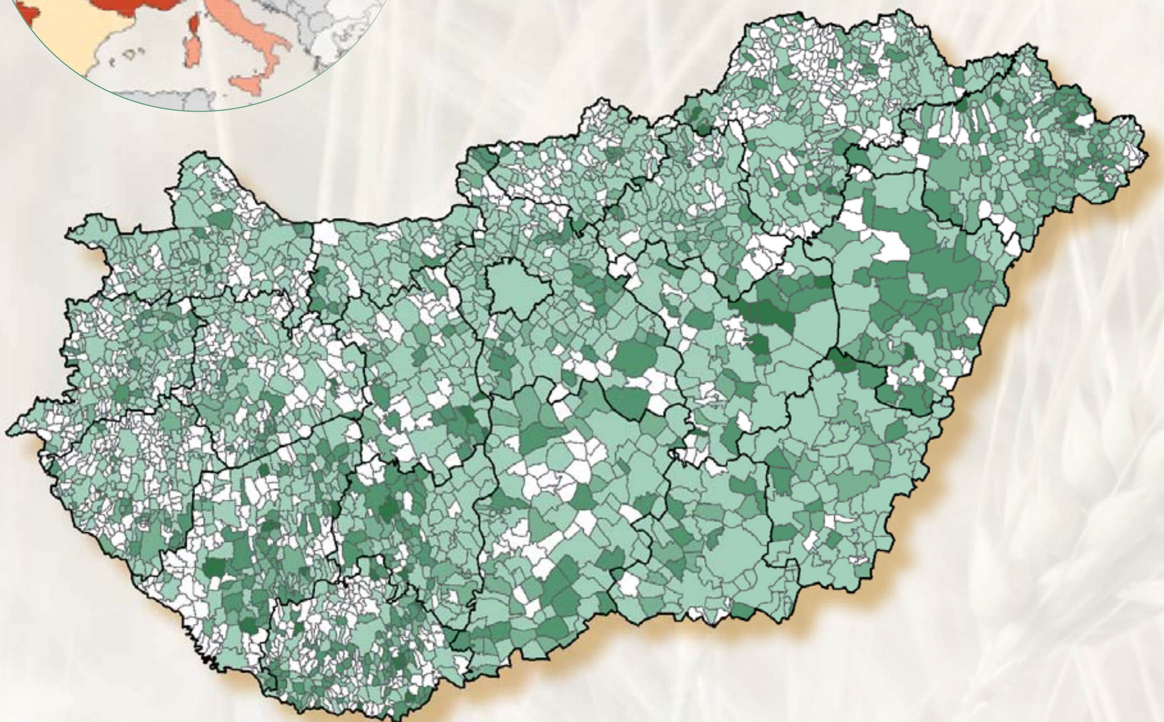
Environmental report, 2011





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Budapest, 2012

Studies describing the state, protection and renewal of and pressure on the environment and databases serving as the basis for the studies are nowadays in high demand. One of the most important elements of international methodological developments is the use of environmental indicators.
The current publication is based on the previous two Environmental reports of Hungary, published in 2006 and 2008. However, numerous changes in terms of data, look and content have been made. Besides presenting statistical data on natural resources, such as water, air, land and wildlife, the publication is also concerned with waste and energy issues of high importance as well as environmental protection expenditures and environment-related taxes.

The structure of the previous publications followed the PSR model developed by OECD. This model is based on the relationship between human activities and the environment, in which human activities generate pressure on the environment and alter both the quality and the quantity of natural resources. These changes and their harmful effects induce social responses. The following matrix displays the indicators in the publication both by topics and the PSR (pressures-state-responses) classification.
Data and information in the study are based either on data of the Hungarian Central Statistical Office (HCSO) or on data composed with the contribution of HCSO. Moreover, data of other governmental and non-governmental institutions are used too.

The aim of the publication was to exhibit the available information with the help of figures and maps but it does not contain detailed analyses of the topics. However, links provide access to background information and supplementary tables in the HCSO database.
We strived to be consistent with respect to the way of presenting the data. Each topic is set the way that latest data, long time series, regional and international data are all demonstrated, so long as they were available and relevant to that certain topic.
It is a novelty that to help you search between the different chapters, figures, as well as tables referred to, in the publication we ensured - indicated in green colour - direct access to them.

	Natural resources	Pressures	State	Responses
WATER	Water resources, water abstraction	Water pollution	Water quality	Sewage treatment
AIR	Carbon sequestration	Emission	Ambient air quality Weather	
LAND, SOIL	Land use Organic farming Mineral resources	Use of fertilizers Use of manure Use of pesticides	Nutrient balance Areas exposed to drought Areas exposed to floods and inland inundation	
FORESTS, WILDLIFE	Forest area Afforestation, timber assets Game management	Balance of wood harvesting	Population trends of farmland birds Health conditions of forests	Nature conservation
WASTE, MATERIAL FLOW	Material flow	Waste generation		Waste treatment
ENERGY	Energy production Balance of electricity Energy dependency	Energy consumption		Renewable resources Energy intensity
ENVIRONMENTAL EXPENDITURES				Environmental protection investments Environmental protection expenditures Environmental industry Environmental taxes

Water is one of the most important resources on Earth, and is vital for all known forms of life. Disposable drinking water accounts for only 0.5%–1% of the planet's water resources and according to estimations, more than one billion people will be facing water-based vulnerability.

The EU Water Framework Directive aims to improve the quality of surface and groundwater to meet the requirements of sustainability. It involves the chemical cleanliness of water and the conservation of water-related habitats, so that they remain as natural as possible.

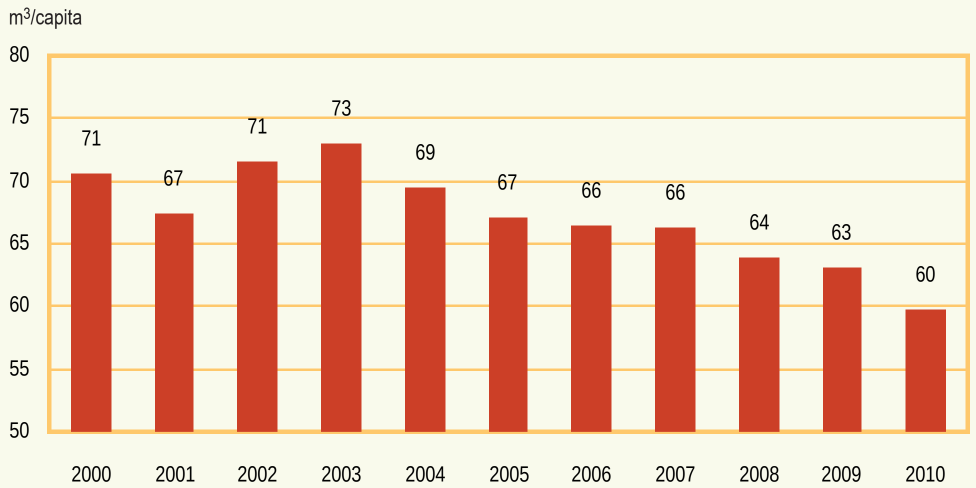
List of figures

1.1. Water resources, water abstraction

Water resources may differ even within the borders of one country, therefore their exploitation should be subject to statutory, supervisory and economic regulations. While the value of water is mainly determined by availability, the rank of priority is set up by quality and importance of consumption. Considering that a large proportion of surface waters in Hungary is taking its source abroad, water management desperately needs international co-operation. The quality and availability of water bodies considerably depend on population density, and on the intensity of industrial activities, of agricultural farming.

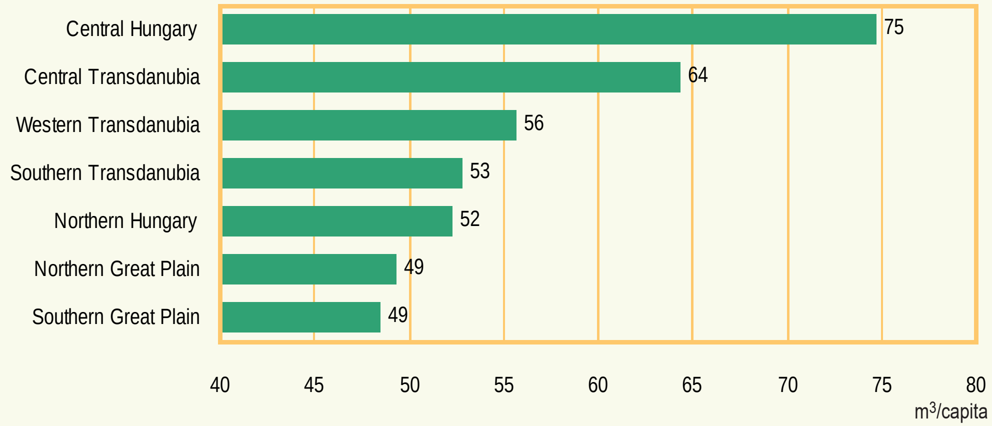
Directives presented by the Fifth and Sixth Environmental Action Programmes and the Water Framework Directive of the EU declare important objectives towards the protection of water quality and availability, paying attention to the aspects of water use reduction as well as pollution prevention. Regarding waste water management and remediation the most relevant task is the collection and treatment of waste water – released after consumption of drinking water – and the improvement of the process of discharge into surface water by following strict control procedures.

Figure 1.1.1 Water abstraction per capita by public water supply



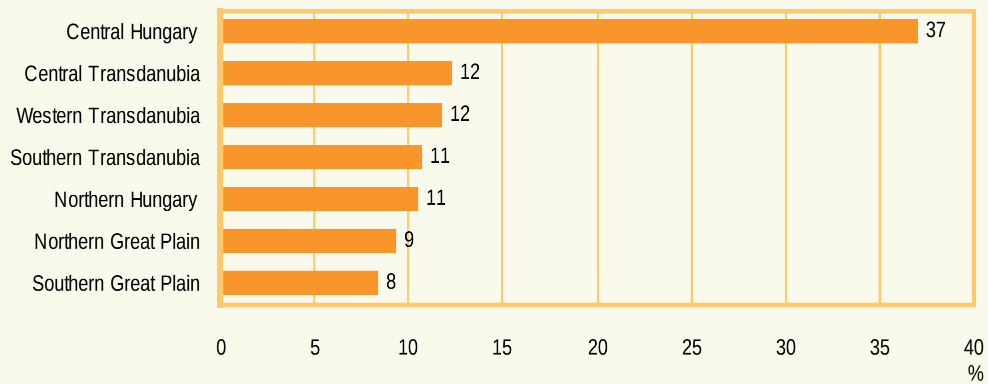
This indicator shows the annual gross water abstraction from fresh surface and ground water resources by public water supply, for different economic and human uses: mainly for public water supply, but for industrial, agricultural and energy purposes also.

Figure 1.1.2 Water abstraction per capita by regions of public water supply, 2010



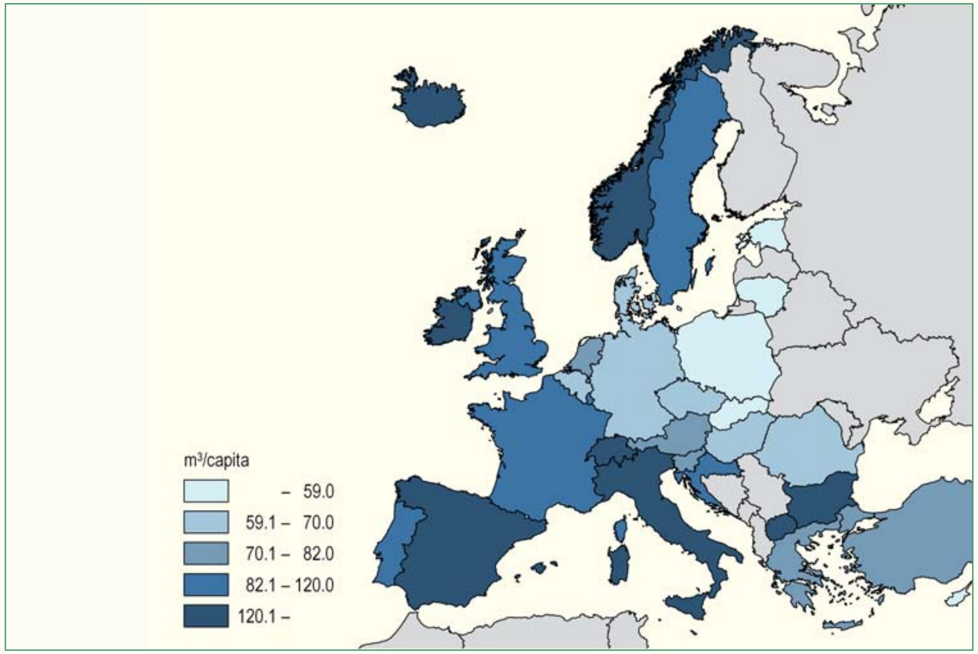
Regional data on water abstraction of public water supply suggest that the greatest value per capita was observed in Central Hungary. The lowest value was measured in Southern Great Plain, which was 65% of the value for Central Hungary. The main reasons for the different values were the different water abstraction technologies and the different facilities of dwellings.

Figure 1.1.3 Water abstraction by regions of public water supply, 2010



According to the further analysis of the regional data it can be stated that more than one third of abstracted water was produced in Central Hungary in 2010. The rest is more or less evenly shared between the other six regions, with water abstraction ranging from 8% to 12%.

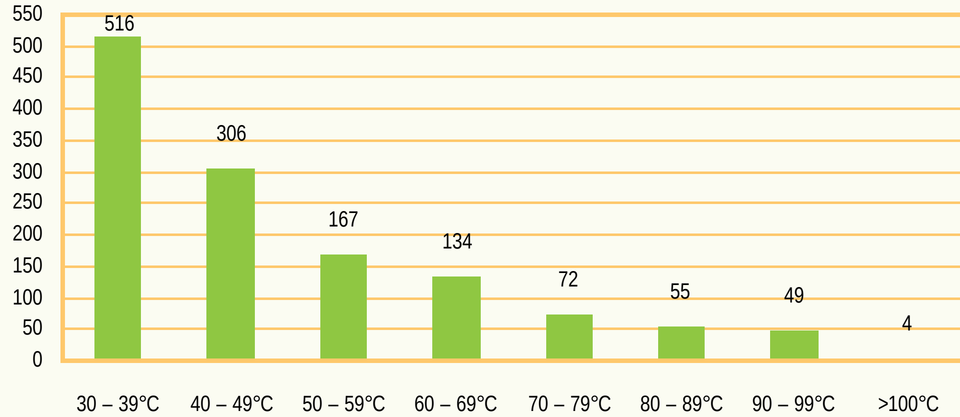
Figure **1.1.4 Water abstraction by public water supply in Europe, 2009**



Note: Data refer to the latest available year: Hungary (2010); Austria, United Kingdom, Netherlands, Italy, Portugal, Spain, Turkey (2008); France, Greece, Ireland, Germany, Norway, Sweden, Slovakia (2007); Switzerland (2006); Finland, Iceland (2005); excluding data on Albania, Belarus, Bosnia and Herzegovina, Finland, Latvia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat, HCSO.

Compared to EU member sates, data on water abstraction by public water supplies reveal that the value per capita in Hungary (2010) belongs to the second lowest quintile. Generally the values of water abstraction per capita are lower in new member states than in the old ones. The main reasons for the different values of water abstraction per capita by regions of public water supply could be the following: different water abstraction technologies, the different public water facilities of dwellings, different climatic circumstances and the different types of ownership of public water facilities (state/private) etc.

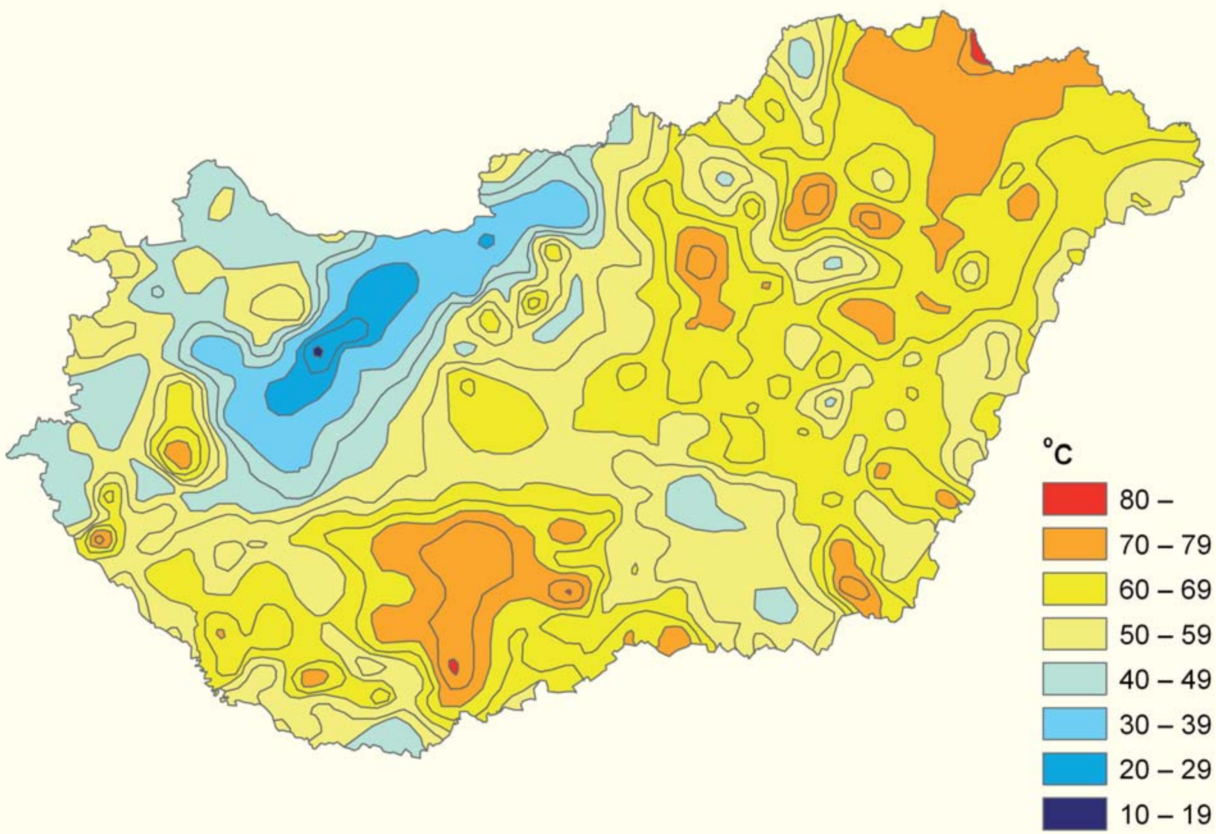
Figure 1.1.5 Number of thermal wells in Hungary by temperature at outflow



Source: Environmental Protection and Water Management Research Institute (VITUKI)

In Hungary thermal water, which has a temperature greater than 30°C at outflow, is used for bathing, energetic and drinking water purposes. The most important thermal water abstraction areas are situated in the Great Plain.

Figure 1.1.6 Temperature at a depth of 1000m in Hungary, °C, 2002



Source: Dövényi, P., Horváth, F. and D. Drahos, 2002: Hungary. In: Hurter, S. and R. Haenel (eds.) Atlas of Geothermal Resources in Europe. Publication No. 17811 of the European Commission, Office for Official Publications of the European Communities, L-2985 Luxembourg, pp. 36–38.

The value of the geothermal gradient in Hungary is 5°C/100m, which is 150% of the average global geothermal gradient. As a result, the temperature of our ground water can also be high.

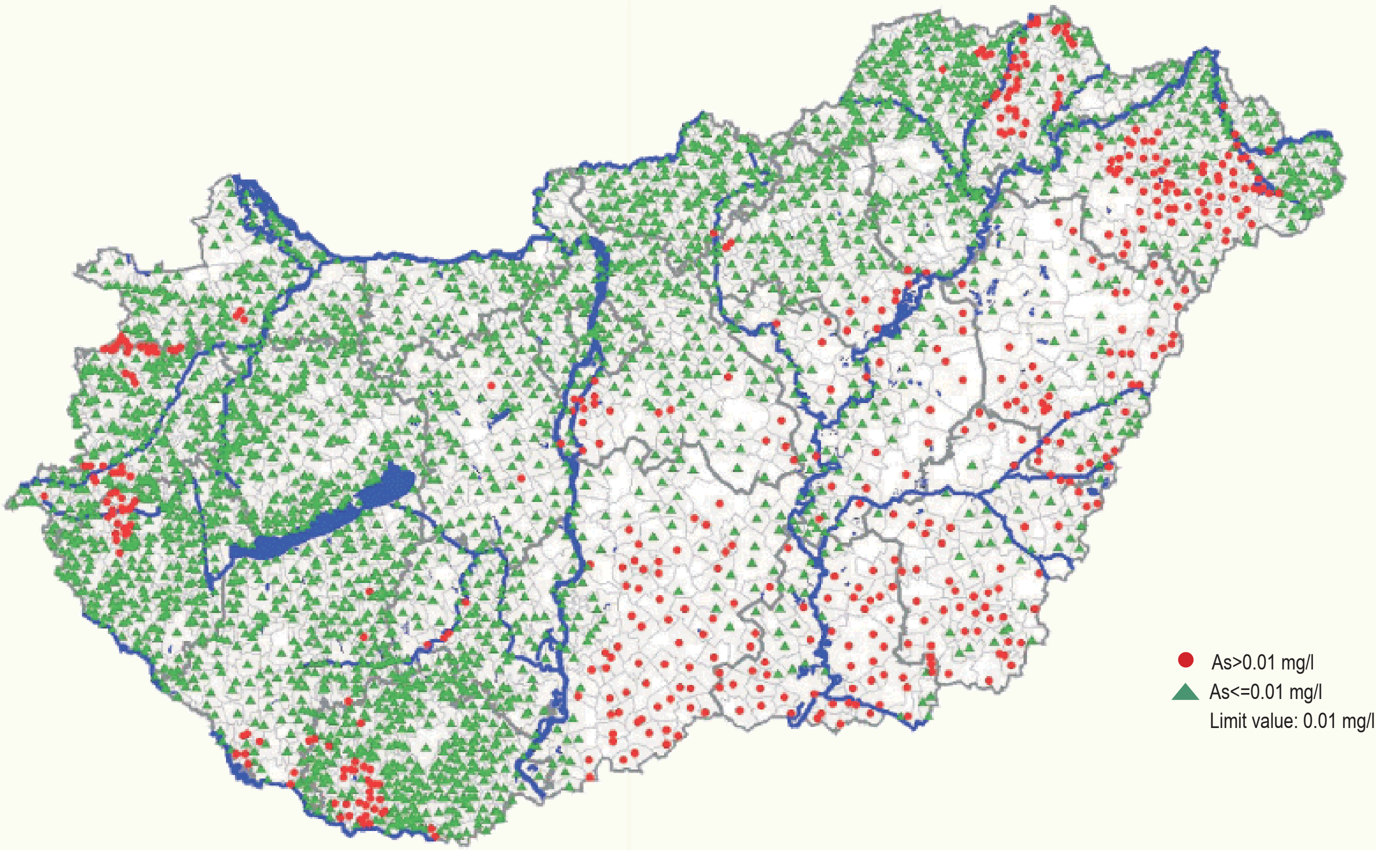
Tables (Stadat):

5.4.1. Subsurface water production by types of water

5.4.2. Public water abstraction and supply

1.2. WATER QUALITY

Figure 1.2.1 Arsenic content of drinking water from public drinking water supplies in Hungary, 2007

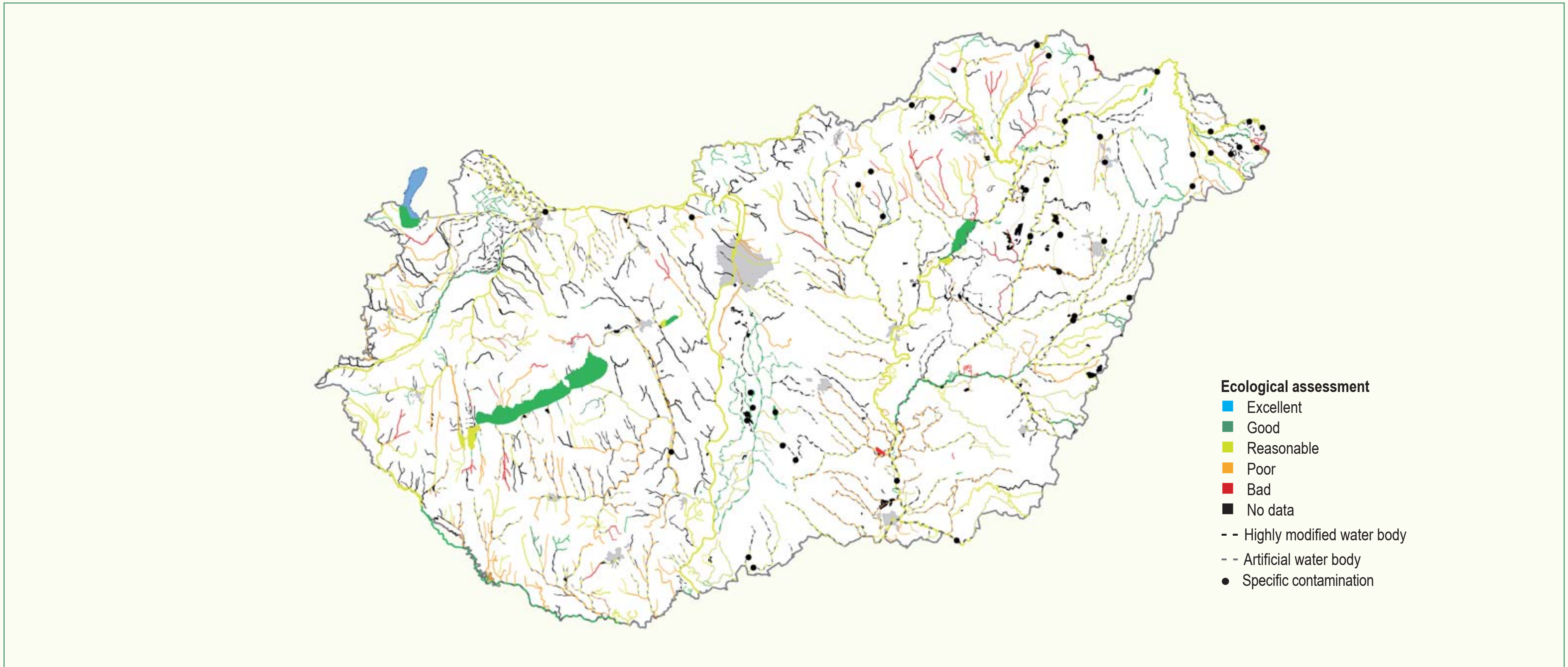


Source: National Institute of Environmental Health, 2007

Water quality is the typical physical, chemical and biological characteristics of water; accordingly, no indicator or methodology, which would be suitable to describe it, exists. For this reason, the determination of water quality can only serve certain well-defined goals such as drinking water consumption, and use in industry (cooling water), agriculture (irrigation), tourism (bathing) or ecology.

Inorganic arsenic is a potent human carcinogen and toxicant which people are exposed to mainly via drinking water and food. In Hungary, mainly in Southern Great Plain, drinking water (artesian wells) from several public drinking water supplies contains amounts of arsenic in excess of 10 microgrammes/litre. The arsenic content of waters is of natural origin, mobilized from deep aquifers. Although Hungary has already invested lot of money to reduce arsenic levels in the water, the strict European threshold value is still not reached in some places.

Figure 1.2.2 Ecological assessment of surface water bodies in Hungary, 2010



Source: National Environmental Institute, Hungarian River Basin Management Plan, 2010.

The Water Framework Directive of the EU requires the ecological assessment of all surface water bodies. One of the main aims of the directive is to reach the good ecological status of all surface waters. According to the updated ecological assessment of surface water bodies in Hungary in 2010:

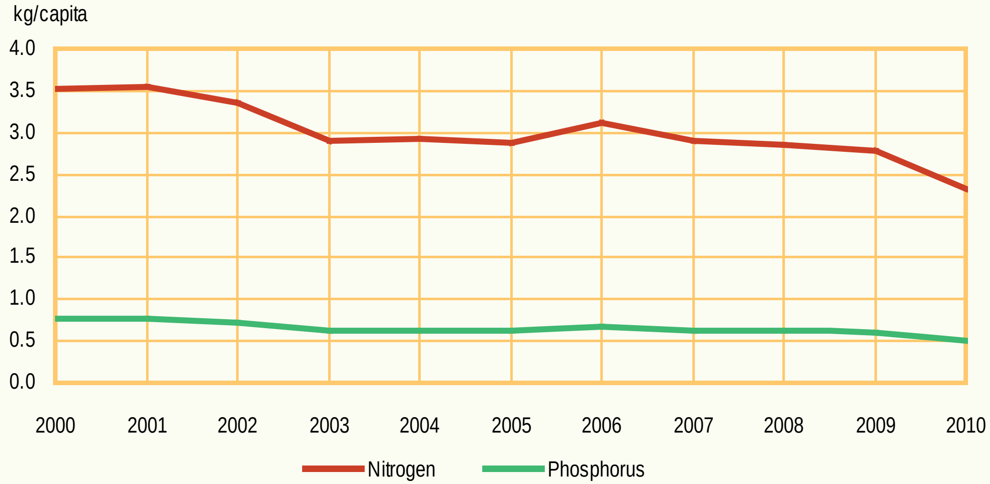
- 9% of the total length of all water-courses was in good or excellent status
- 65% of the surface of all lakes and reservoirs reached good or excellent status

Tables (Stadat):
5.4.4. Main surface water quality parameters of Hungarian rivers
5.4.5. Temporary water supply to settlements without healthy drinking water

1.3 WATER POLLUTION

Water pollution occurs when the quality of surface and ground water is changed. The physical, chemical and biological characteristics of contaminated waters alter the way that they become partially or fully unsuitable for drinking, agricultural, industrial and other use as well as for natural biomes. Water pollution is mainly caused by human activities.
At this stage, indicator calculation includes only the estimated annual nitrogen, phosphorus and biochemical oxygen demand (BOD_5) emissions from domestic waste water after treatment, because of the lack of data on emissions from agriculture and industry.

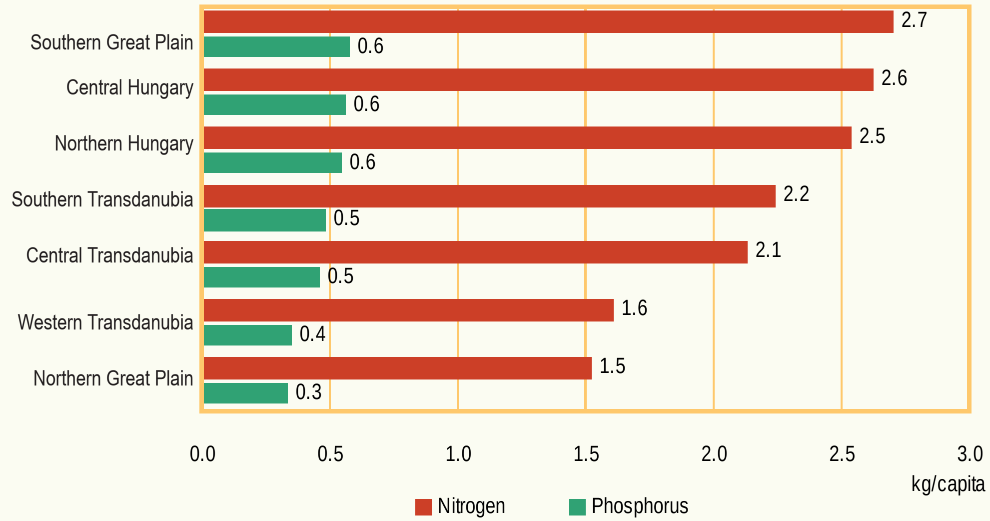
Figure 1.3.1 Estimated annual nitrogen and phosphorus emissions from households after waste water treatment



The indicator is defined as the annual average emissions of nitrogen and phosphorus from households discharged into aquatic ecosystems after treatment.

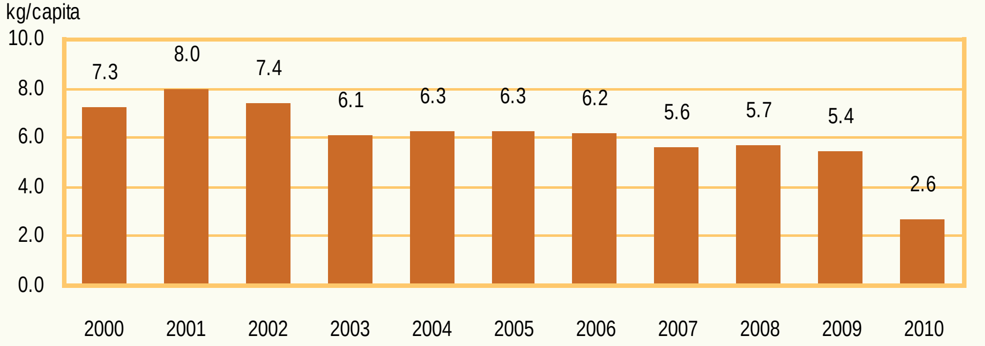
The emissions from households are estimated by means of data on population connected to treatment plants, the following emission factors:
– 4.4 kg N/inhabitant
– 1 kg P/inhabitant
and the theoretical efficiency of the treatment plants.

Figure 1.3.2 Estimated annual nitrogen and phosphorus emissions from households after waste water treatment, by regions, 2010



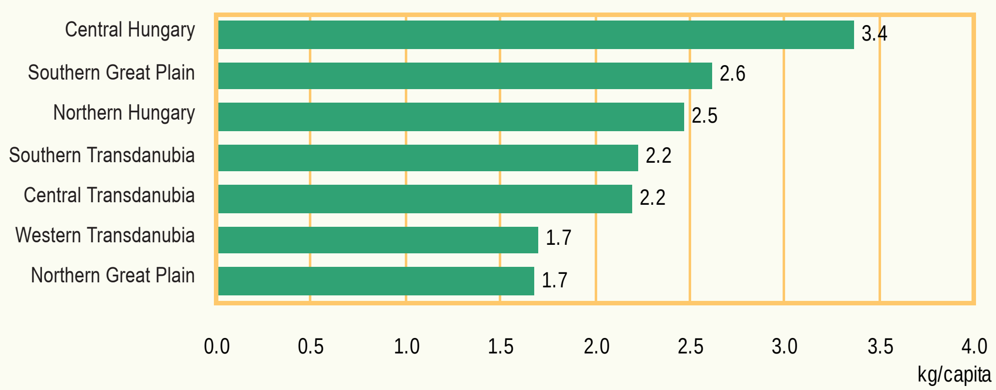
According to the assessment of the regional data of estimated per capita nitrogen and phosphorus emissions from households after waste water treatment it can be stated that the highest values are in Southern Great Plain and Central Hungary, while the lowest values are in Western Transdanubia and Northern Great Plain. The main reason for the differences is that the estimated proportion of households connected to waste water treatment plants with advanced (tertiary) treatment technology is significant in Western Transdanubia and Northern Great Plain (56% and 47% respectively).

Figure 1.3.3 Estimated annual BOD_5 emissions from households after waste water treatment



The indicator is defined as the quantity of organic matter discharged by human activities (domestic, industrial and agricultural) measured in terms of biochemical oxygen demand (BOD_5) after treatment. Due to the lack of statistical data on the efficiency of treatment plants, estimations have been made by applying average technical data. They reflect the potential efficiency of treating domestic waste water, and the actual efficiency does not necessarily equal the potential one. Therefore, the indicator can be interpreted as the potential BOD_5 emission from households. The average factor of the biochemical oxygen demand emissions used for estimations is 60g/capita/day. The efficiency value used in indicator estimation, expressed as a percentage of the pollution removed, is 30% for primary, 85% for secondary and 95% for tertiary treatment.

Figure 1.3.4 Estimated annual BOD_5 emissions from households after waste water treatment, by regions, 2010



According to the analyses of the regional data of estimated per capita BOD_5 emissions from households after waste water treatment it can be stated that the highest values are in Southern Great Plain and Central Hungary. The lowest values are in Western Transdanubia and Northern Great Plain. The main cause of the differences is that the estimated proportion of households connected to waste water treatment plants with at least biological (secondary) treatment is substantial in Western Transdanubia and Northern Great Plain (77% and 66% respectively). Furthermore, the advanced (tertiary) treatment technology is applied instead of mechanical (primary) in these two regions.

1.4 SEWAGE TREATMENT

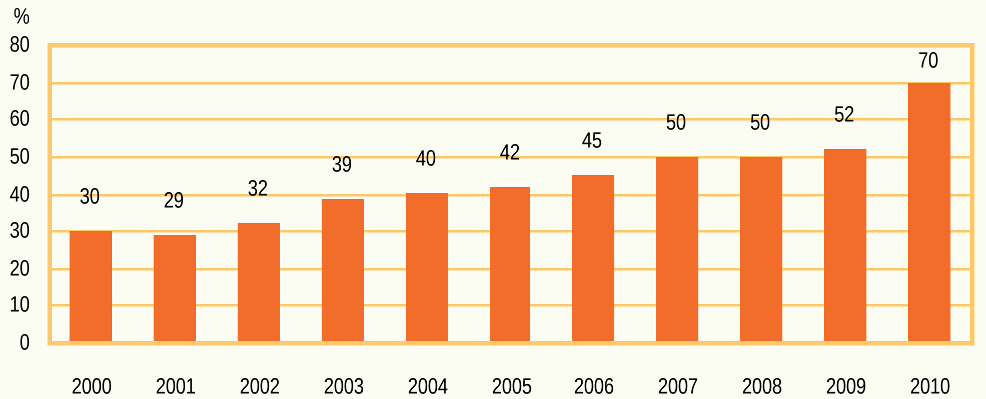
Sewage treatment aims at removing contaminants from waste water to such an extent that the residual can be degraded by the self-purification of water. This makes further utilization of water possible, and eases the burden on the environment as well.

The development of waste water treatment contributes to the improvement of the quality of water ecosystems in many respects and affects related economic activities such as fisheries. Developments also benefit public health.

The mode of sewage treatment is highly dependent on the characteristic and the origin of waste water. As a result, domestic, municipal, industrial, agricultural etc. sewage treatment can be distinguished.

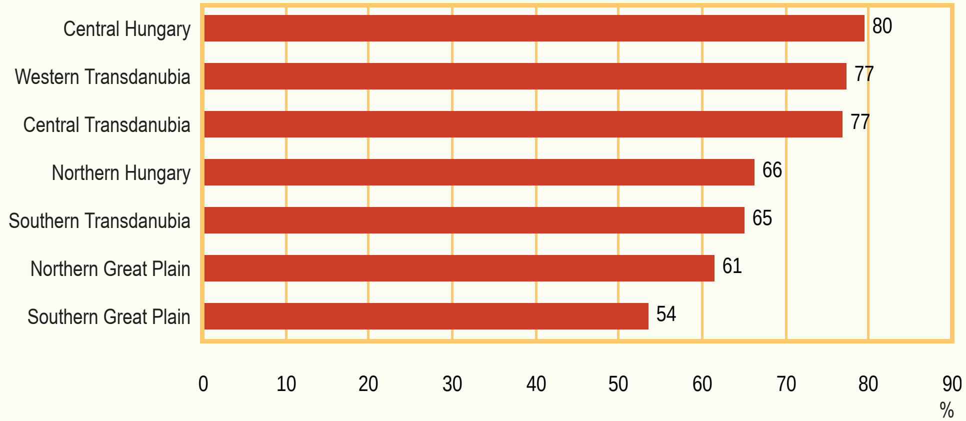
The proportion of the population connected to waste water treatment plants with at least secondary (biological) treatment technologies indicates the results in urban waste water treatment of the given region or country, in line with the implementation of Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment, as amended by Commission Directive 98/15/EC of 27 February 1998.

Figure 1.4.1 Estimated proportion of population connected to waste water treatment plants with at least secondary (biological) treatment technologies



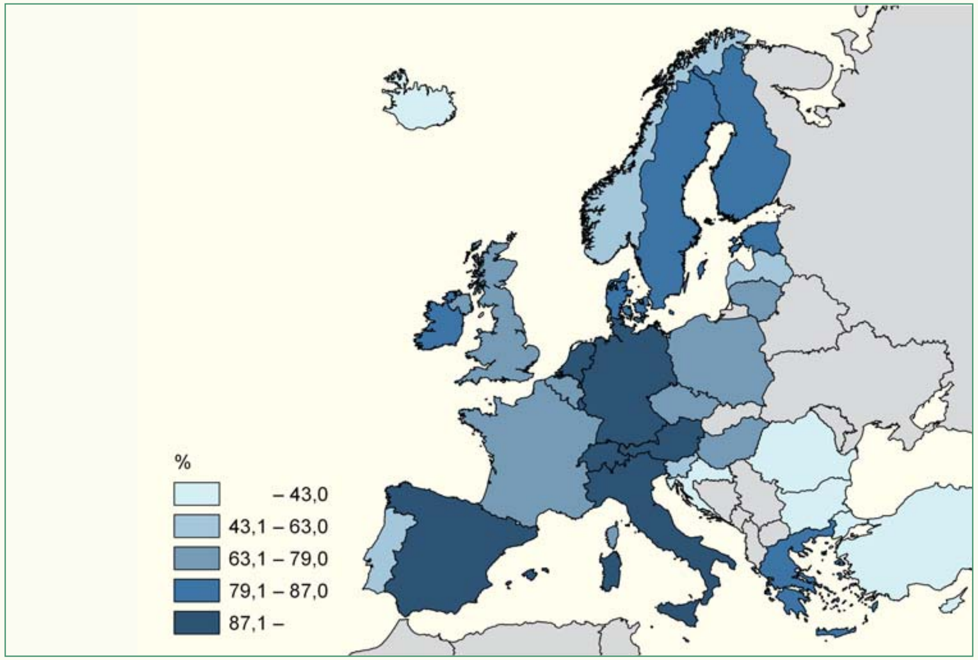
The implementation of the EU Urban Waste Water Treatment Directive has had a positive influence on urban waste water treatment in Hungary. In 2010 72% of the population was connected to some kind of public waste water treatment. It is important to mention that the proportion of population connected to advanced treatment technology also increased dynamically: it reached 33% in 2010. The proportion of population connected to waste water treatment plants with at least secondary (biological) treatment technologies was 70%, primarily due to the implementation of a new central waste water treatment plant in Budapest in 2010.

Figure 1.4.2 Estimated proportion of population connected to waste water treatment plants with at least secondary (biological) treatment technologies, by regions, 2010



According to the regional analysis of the estimated proportion of population connected to waste water treatment plants with at least secondary (biological) treatment technologies it can be concluded that the highest values are in Central Hungary (80%) and Western Transdanubia (77%), while the lowest in Southern Great Plain (54%). Regional disparities are caused by the regional distribution of waste water treatment plants with at least biological treatment technologies.

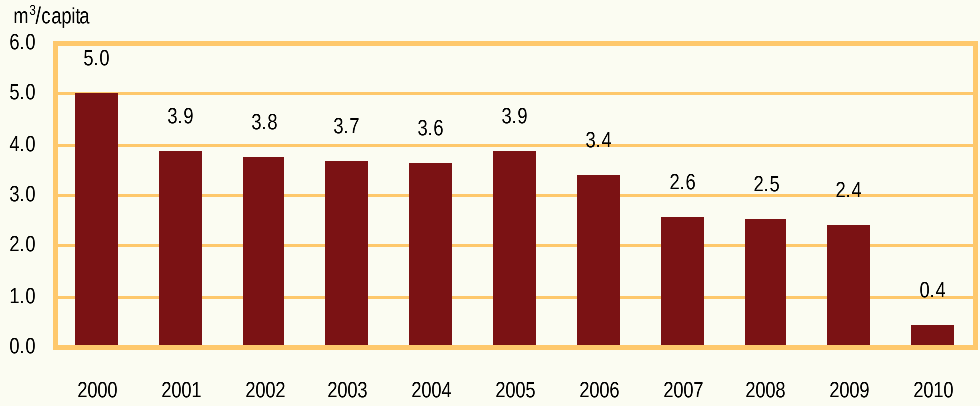
Figure 1.4.3 Estimated proportion of population connected to waste water treatment plants with at least secondary (biological) treatment technologies, in the European Union, 2009



Note: Data refer to the latest available year: Hungary (2010); Austria, Belgium, Czech Republic, Netherlands, Portugal, Spain, Turkey (2008); Croatia, Latvia, Germany (2007); Sweden (2006); Cyprus, Iceland, Ireland, Italy, Switzerland (2005); France (2004); Luxembourg (2003); Finland (2001); Denmark (1998); United Kingdom (1994), excluding data on Albania, Belarus, Bosnia and Herzegovina, Macedonia, Moldova, Montenegro, Russia, Serbia, Slovakia and Ukraine.
Source: Eurostat.

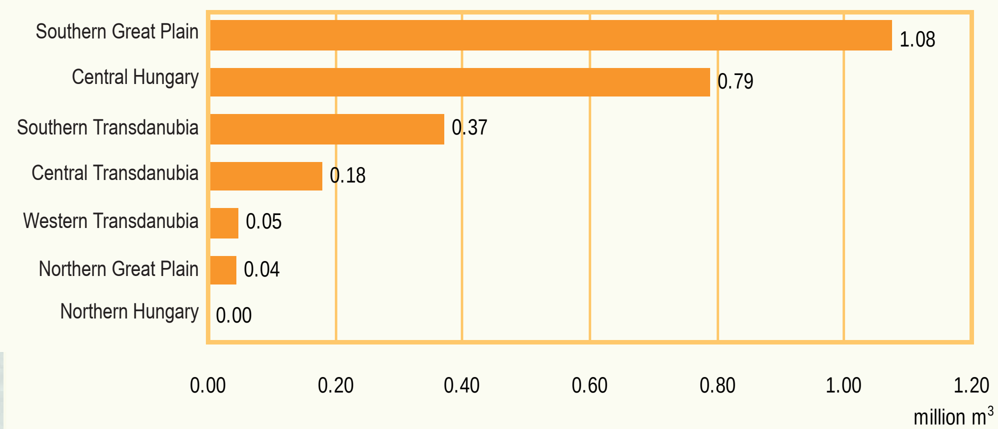
According to the assessment of the estimated proportion of population connected to waste water treatment plants with at least secondary (biological) treatment technologies at EU level it can be stated that the indicator of Hungary falls in the middle quintile in 2010. Generally this estimated proportion is lower in the new member states than in the old ones. The main reasons for the regional differences can be the following: differences in waste water collection and treatment technologies and population density, the different public waste water facilities of dwellings, different climatic circumstances and the different types of ownership of public water facilities (state/private) etc.

Figure 1.4.4 Volume of non-treated municipal waste water connected to public sewerage



The discharge of non-treated urban waste water is a major cause of pollution of surface water and eutrophication problems. The purpose of this indicator is to monitor trends in the pressure from urban waste water on surface water.

Figure 1.4.5 Volume of non-treated municipal waste water connected to public sewerage, by regions, 2010



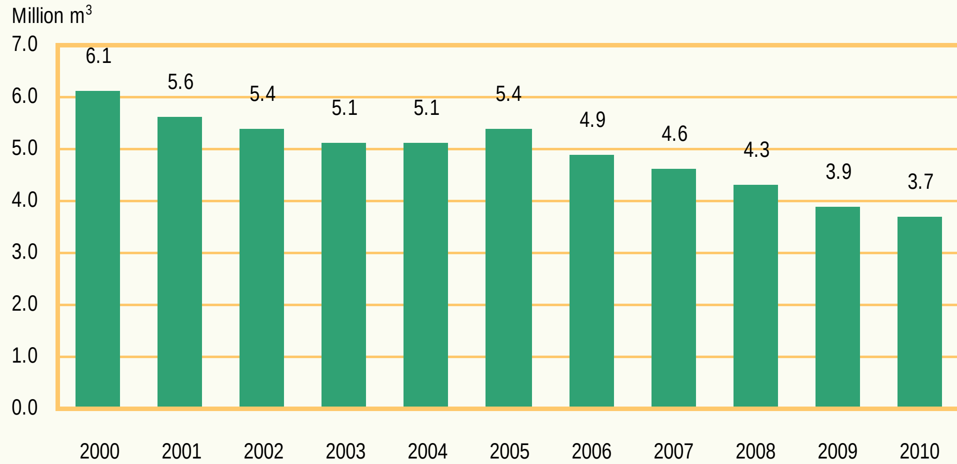
According to the analyses of the regional volume of non-treated municipal waste water connected to public sewerage it can be stated that the largest volumes are in Southern Great Plain and Central Hungary, while the lowest volumes are in Western Transdanubia, Northern Great Plain and Northern Hungary.

Municipal liquid waste

Municipal liquid waste is waste water that is not treated by sewerage network and/or sewerage treatment plants, and according to the relevant legislation comes from:

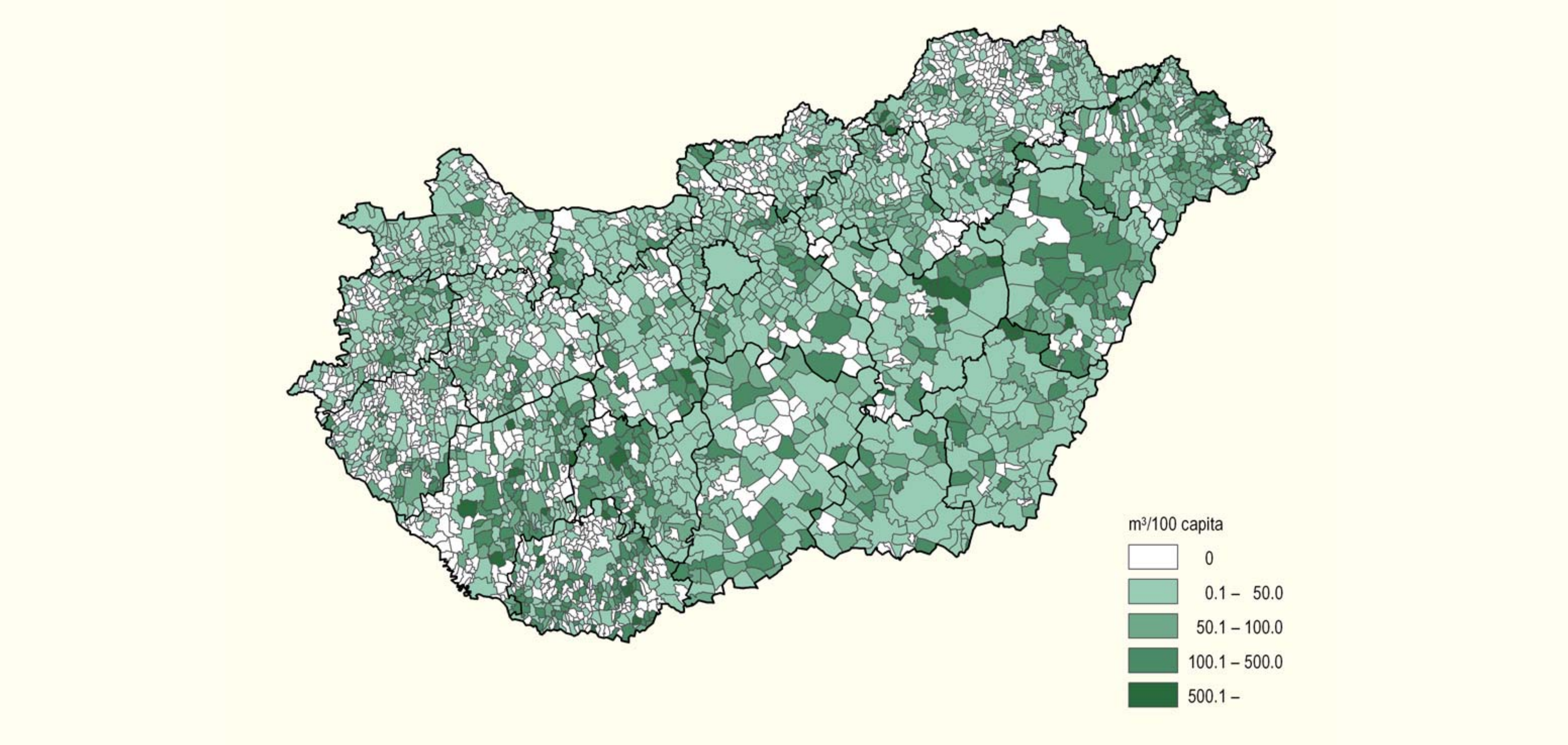
- emptying waste water storage facilities belonging to buildings suitable for human residence,
- drainage and sewerage networks beyond public service,
- technological activities excluding production processes.

Figure 1.4.6 Volume of municipal liquid waste



The volume of municipal liquid waste has continually decreased since 2005 along with the expansion of the sewerage network.

Figure 1.4.7 Volume of municipal liquid waste per hundred population, 2010

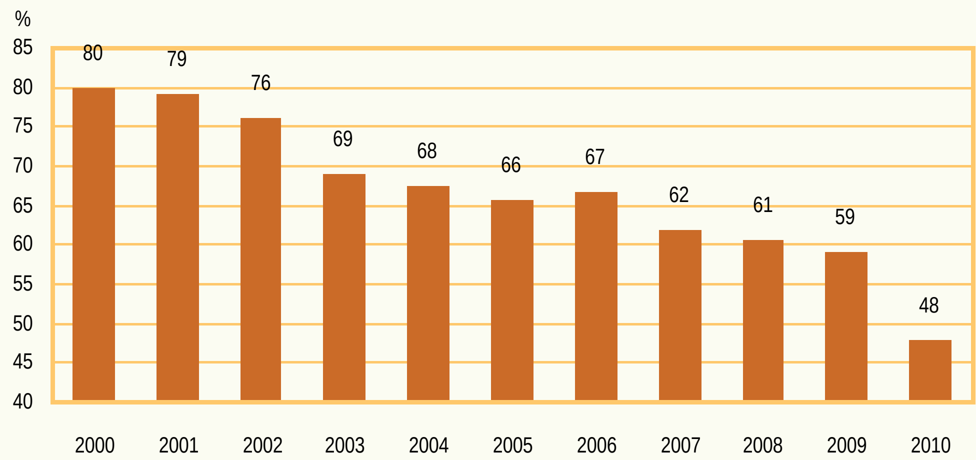


The volume of municipal liquid waste per 100 capita depicts the areas less equipped with sewerage system.

Municipal waste water treatment index

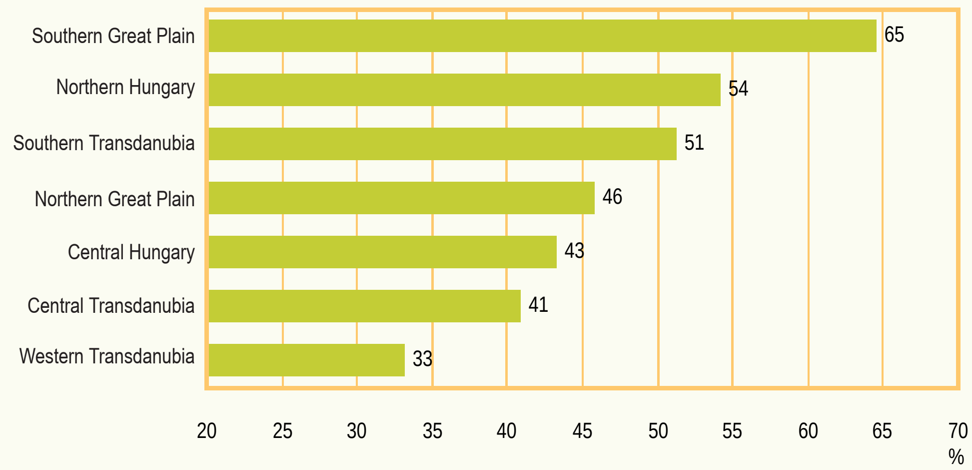
The municipal waste water treatment index expresses the development of sewage treatment based on treatment efficiency.

Figure 1.4.8 Index of municipal waste water treatment



The index of municipal waste water treatment allows for the measurement of the development of urban waste water treatment, based on the effectiveness of treatment. For the description of the effectiveness of waste water treatment plants the coefficients developed by Eurostat were applied: 1.00 for non-treated waste water, 0.86 for primary (mechanical) treatment only, 0.49 for additional secondary (biological) treatment, and 0.00 for additional tertiary (advanced) treatment. The index of municipal waste water treatment is 100% if there is no treatment, and 0% if all municipal waste water is treated by tertiary treatment. Owing to more effective waste water treatment plants, the value of the index fell by 32 percentage points in Hungary in the examined period.

Figure 1.4.9 Index of municipal waste water treatment, by regions, 2010



According to the analyses of the regional index of municipal waste water treatment it can be stated that the lowest indices are measured for Western Transdanubia and Central Transdanubia. Waste water treatment indices decreased significantly at national level (48%) and in Central Hungary (43%) as well, due to huge investments into waste water collection and treatment in Budapest. The values of this index are the highest in Northern Hungary and Southern Great Plain. The main reasons for the differences are that the estimated proportion of population connected to waste water treatment plants with at least biological (secondary) treatment technologies is significant in Western Transdanubia and Central Transdanubia (around 77% each), and the volume of waste water treated by advanced (tertiary) treatment technologies is relatively low in Southern Great Plain.

Tables (Stadat):
5.4.3. Municipal waste water discharge and treatment
6.5.1. Municipal waste water treatment

One of today's major environmental tasks is to curb the underlying cause and the adverse effects of climate change. Accordingly, it is crucial to detect the relationship between air pollution and the different economic sectors and to give a detailed insight into the current state of air quality and weather conditions in order to help the elaboration and the implementation of objectives and policies.
Greenhouse gases cause a global problem, therefore international co-operation is needed to control the quantity emitted to the air. The United Nations Framework Convention on Climate Change, an international environmental treaty, was produced in Rio de Janeiro in 1992. The objective of the treaty was to stabilize greenhouse gas concentration in the atmosphere and applied to the primary greenhouse gases, namely, to carbon dioxide, methane and nitrous oxide.
Acidification is mainly caused by atmospheric deposition (dry or wet), which has harmful effects on surface waters and forests. The process when aerosol particles or gases which are soluble in water secede from airspace and fall on the surface is called acid deposition.
In Hungary, big cities with downtown and agglomeration, where transportation is significant, have the highest ozone pollution. Although measures have been taken, there is still room for improvement with respect to the air quality of former heavy and energetic industry cities.
When it comes to global warming, it is important to take a look at the annual number of hot (mean temperature above 20°C) and cold (mean temperature below 0°C) days. Global temperature rise leads to changes in the environment, in the quantity and spatial distribution of precipitation, in weather patterns and also results in sea-level rise.

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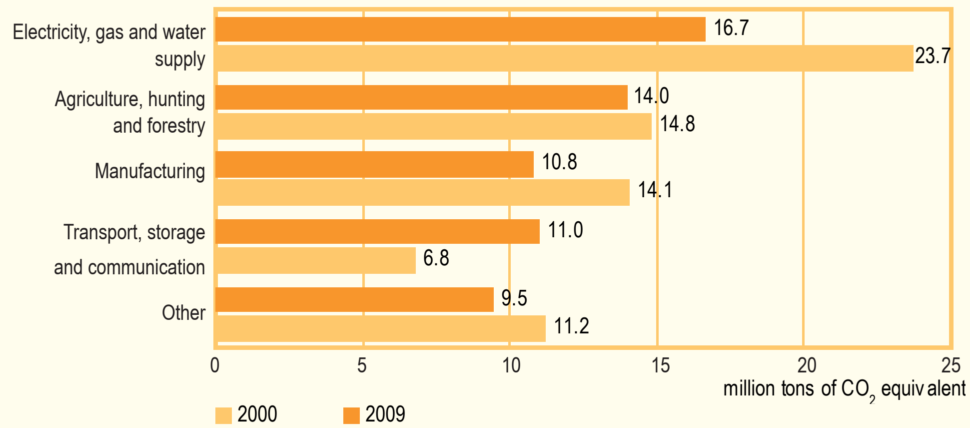
2.1 EMISSION

Data collected and calculated based on NAMEA (National Accounting Matrix including Environmental Accounts) suggest that harmful emission fell between 2000 and 2009. It is mainly ascribed to the introduction and broader use of new technologies. However, emission had been decreasing already in the 1990s as a result of shrinking industrial production and the structural change of the economy.

Air emissions accounts indicate the net flow of gaseous and particulate matter originating from the economic system emitted to the air. For compiling Air Emission Accounts the "energy-first-approach" is applied. It starts from energy statistics which are re-arranged to Energy accounts from which air emissions are calculated using certain emission factors.

Emission of greenhouse gases

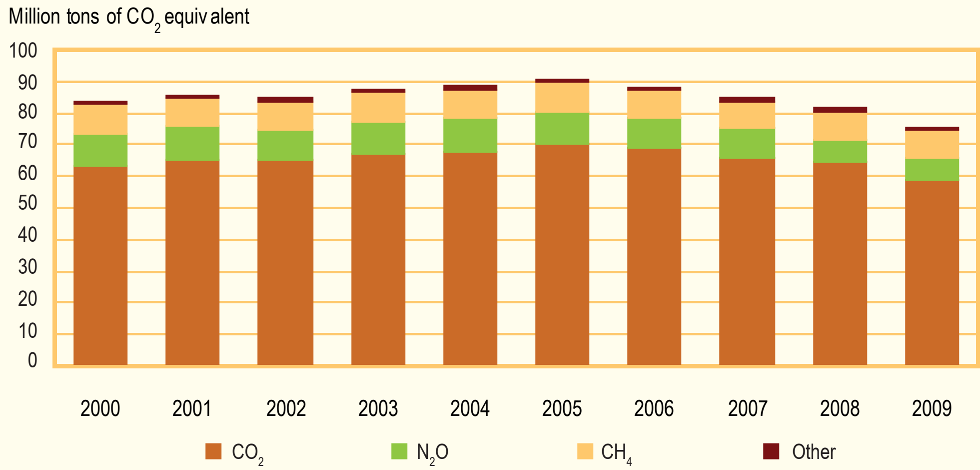
Figure 2.1.1 Structure and quantity of aggregated greenhouse gas emission of the Hungarian economy



The total greenhouse gas emission showed a downward trend with a value of 75.6 million tons of CO_2 equivalent. 13.6 million tons stemmed from household consumption, while 62 million tons from economic activity. The most polluting industry in Hungary in terms of greenhouse gases is electricity, gas and water supply, but its share is continually decreasing. Agriculture, hunting and forestry as a whole as well as manufacturing are responsible for one-fifth of total emission each. The most significant changes occurred in transport, storage and communication. Their share increased by nearly 10 percentage points between 2000 (9.6%) and 2009 (18%).

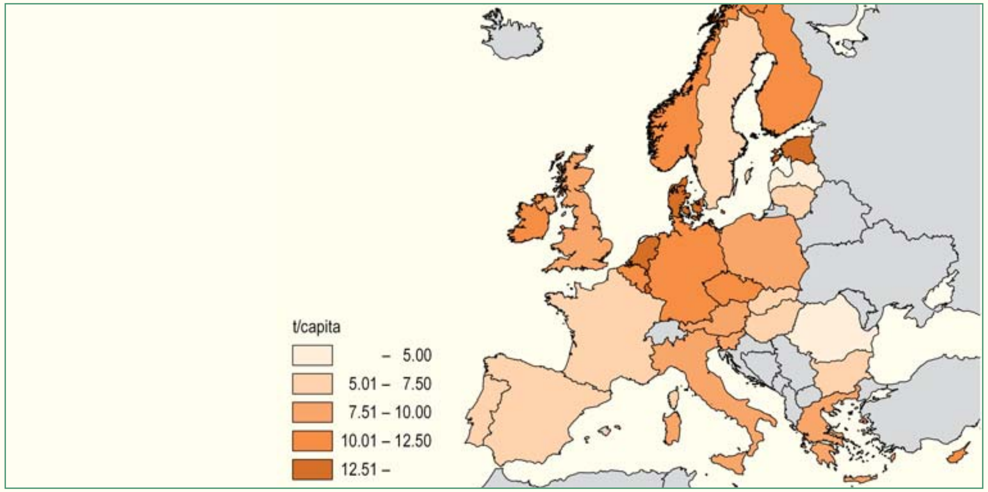
In Hungary, 80%–84% of greenhouse gas emissions stem directly from economic activity, the rest come from household consumption. While the emission of the economy is decreasing, that of households is increasing. The cause of growing household emission is the growing need for heating and car use.

Figure 2.1.2 Distribution of greenhouse gas emission of the Hungarian economy and households by gases



Carbon dioxide is the most important greenhouse gas in Hungary. Its share compared to nitrous oxide and methane decreased less dynamically. Between 2000 and 2005 carbon dioxide emission was increasing, but it has been significantly falling since the middle of the decade. Electricity, gas and water supply accounted for 34% of total carbon dioxide emission in 2009, transport, storage and communication for 23% and manufacturing for 21%. In case of nitrous oxide, 75% of the emission originates from agriculture (fertilizers). As for methane, agriculture is responsible for about 50% of the emission.

Figure 2.1.3 CO_2 emission per capita in Europe, 2009

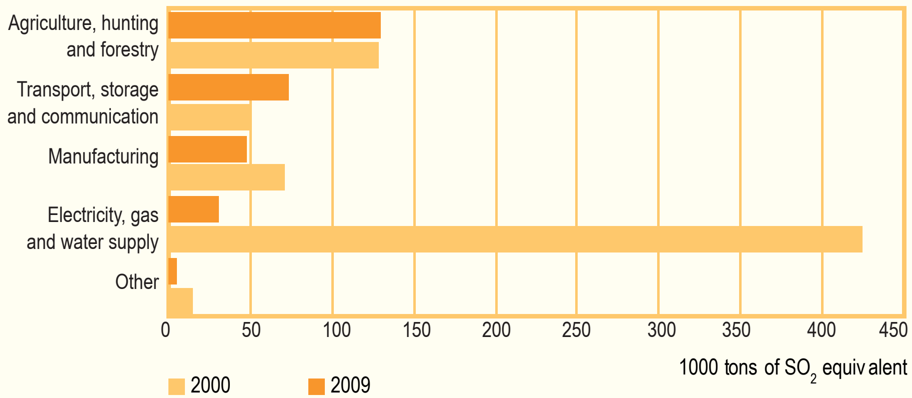


Note: excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Iceland, Macedonia, Moldova, Montenegro, Russia, Serbia, Switzerland, Turkey and Ukraine.
Source: Eurostat.

CO_2 emission per capita was the highest in Denmark, Estonia and the Netherlands, and it was the lowest in Latvia and Romania.

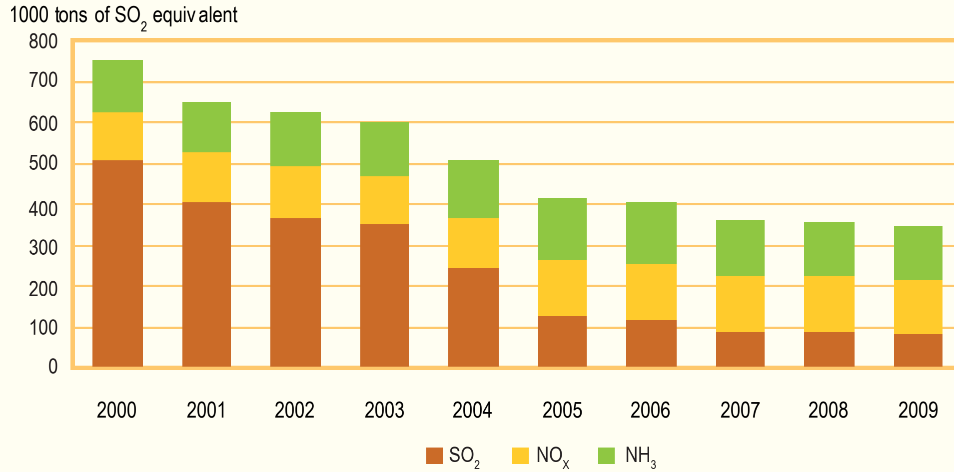
Emission of acidifying gases

Figure 2.1.4 Structure and quantity of aggregated acidifying gas emission of the Hungarian economy



Sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3) are examples of acidifying substances that are emitted into the air. In the Hungarian economy the aggregate quantity of acidifying substances sank drastically, from 688 thousand tons of SO_2 equivalent in 2000 to 287 thousand tons in 2009. The reason for this decline is the sweeping technological changes in electricity, gas and water supply, which led to a significant drop of 393 thousand tons of SO_2 equivalent in the branch between 2000 and 2009.

Figure 2.1.5 Distribution of acidifying gas emission of the Hungarian economy and households by gases

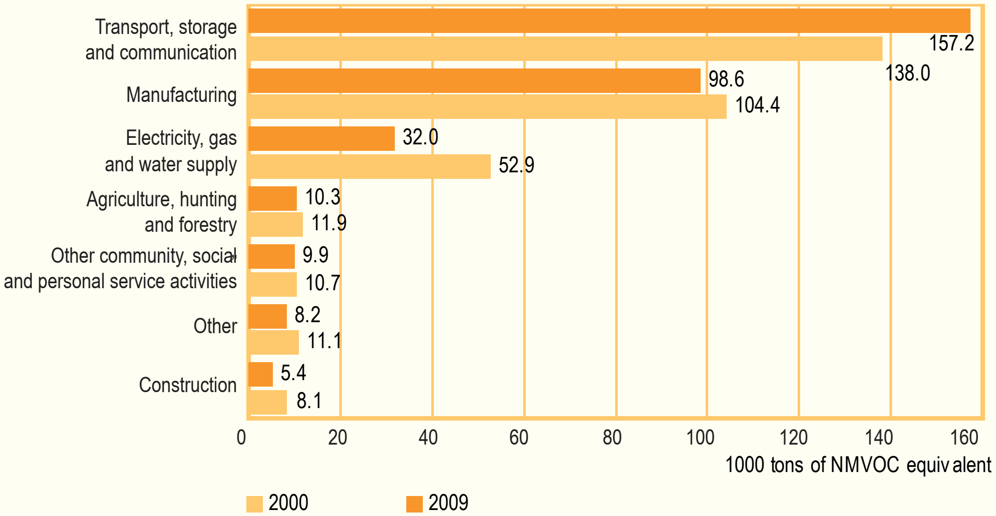


Besides the quantity, the proportions of acidifying gases also changed significantly. Sulphur dioxide emission was reduced by nearly 90%, so the direct emissions of ammonia and nitrogen oxides became dominant in the examined time period. The underlying reason for this improvement is the significant reduction of sulphur-dioxide emission in electricity, gas, steam and water supply. It fell from 396 thousand tons in 2000 to 13 thousand tons in 2009. The biggest emitter of ammonia is agriculture (especially livestock), which was responsible for 98% of total ammonia emission in the national economy in 2009, while the biggest emitter of nitrogen oxide is transport, storage and communication, accounting for 67% of the total.
An increasing proportion of total emissions of acidifying gases in Hungary is caused by households. Their share doubled from 2000 to 2009, and in the last examined year it made up 17% of total acidifying substances emission.

Emission of ozone precursors

Ground level ozone (nearby the Earth surface) might have an adverse effect on the environment. Ozone is a secondary pollutant that is not emitted directly to the air. It forms in the air when primary pollutants (ozone precursors) react or interact and it might get concentrated further away from where precursors were emitted.[1] Ozone concentration, consequently, depends on the quantity of ozone precursors, diffusion process and subsidence.

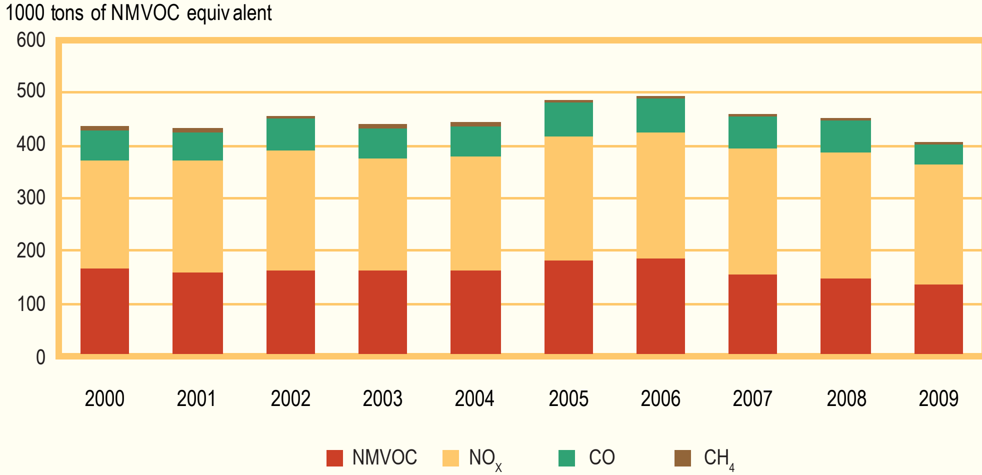
Figure 2.1.6 Structure and quantity of aggregated ozone precursor emission of the Hungarian economy



The emissions of ozone precursors grew steadily from 2000 (337 thousand tons of NMVOC equivalent) to 2009 (322 thousand tons of NMVOC equivalent). While the majority of industries reduced emission, the most polluting industry, namely transport, storage and communication, increased it by 14%.

[1] *Ozone precursors comprise non-methane volatile organic compounds (NMVOC), carbon monoxide, nitrogen oxides and methane.*

Figure 2.1.7 Distribution of ozone precursor emission of the Hungarian economy and households by precursors



Among ozone precursors, non-methane organic compounds and nitrogen oxides are dominant. In 2009 manufacturing was responsible for almost two-thirds of NMVOC emissions of the Hungarian economy.

The economy itself accounts for less than 80% of total ozone precursor emission, meaning that household emission is the highest in case of ozone precursors in comparison to other greenhouse gases.

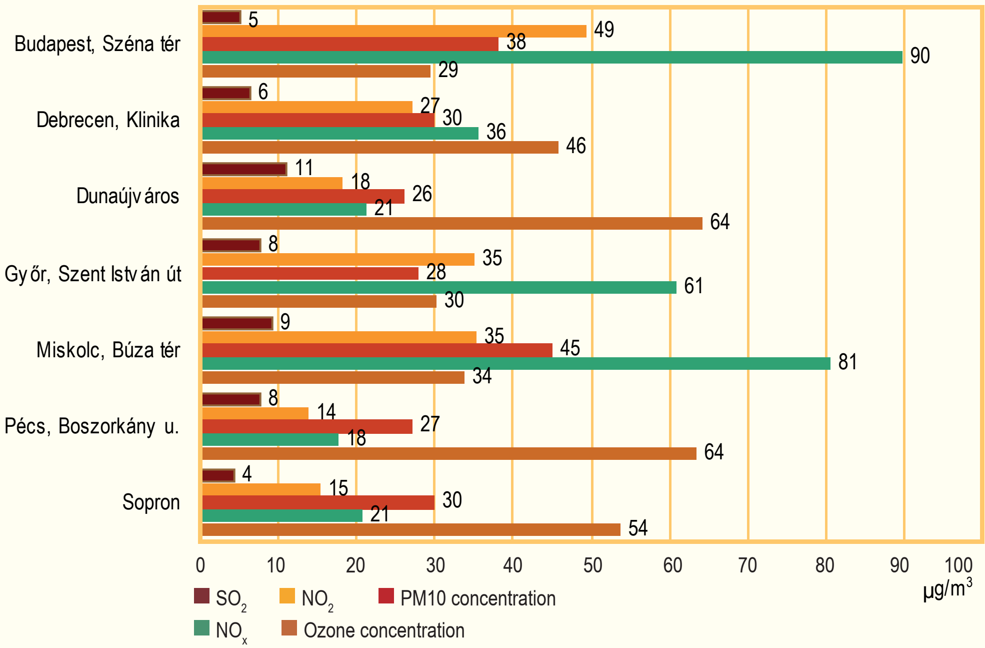
Tables (Stadat):

- 5.3.1. Emissions of air pollutants
- 5.3.2. Emission of greenhouse gases by industries
- 5.3.3. Emission of carbon dioxide by industries
- 5.3.4. Emission of dinitrogen oxide by industries
- 5.3.5. Emission of methane by industries
- 5.3.6. Emission of acidifiers by industries
- 5.3.7. Emission of sulphur dioxide by industries
- 5.3.8. Emission of nitrogenoxides by industries
- 5.3.9. Emission of ammonia by industries
- 5.3.10. Emission of ozone precursors by industries
- 5.3.11. Emission of non-methane volatile organic compounds by industries
- 5.3.12. Emission of carbon-monoxide by industries
- 5.3.13. Emission of particulate matter with a diameter of 10 micrometres or less by industries

2.2 AMBIENT AIR QUALITY

Air quality and air pollution in Hungary are assessed based on Hungarian Air Quality Network (HAQN) data. HAQN has manual as well as automatic monitoring networks. The automatic monitoring network is designed to measure the most important pollutants (SO_2, NO_2, NO_x, O_3, CO etc.) and the necessary meteorological parameters (wind velocity, wind direction, temperature, humidity). Here data of the automatic monitoring network are presented.

Figure 2.2.1 Average air pollution in certain settlements, 2010



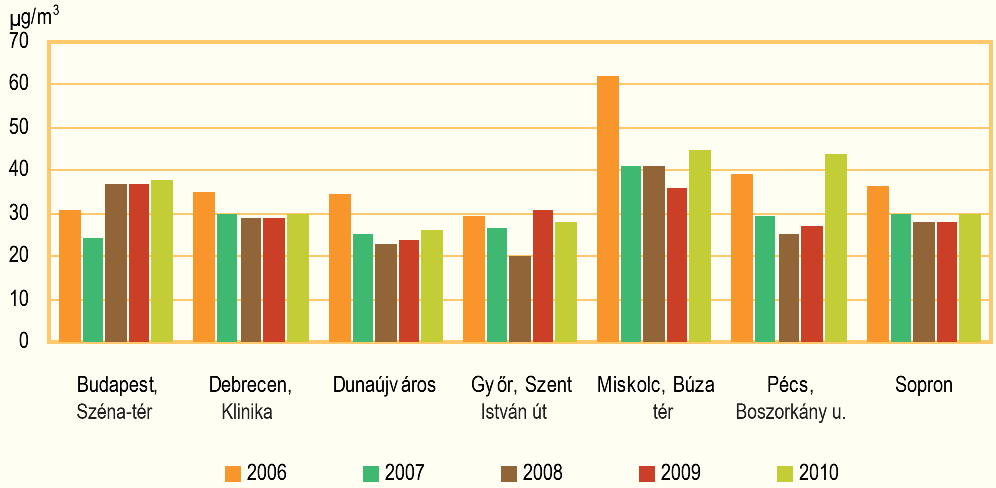
Source: National Directorate for Environment, Nature and Water.

With the exception of Dunaújváros, where SO_2 exceeded the 24-hour occupational exposure limit, air quality measured at the monitoring points met the requirements during the year. The highest concentrations were recorded in Pécs, Kazincbarcika and Várpalota.

The concentration of nitrogen dioxide and nitrogen oxides exceeded the limit values at most monitoring points, for nitrogen dioxide, in Budapest, Debrecen and Pécs, while for nitrogen oxides, in Budapest, Pécs, Miskolc and Győr. The concentration of the group slightly increased in comparison with the previous year.

As to ozone pollution, its concentration overstepped the occupational exposure limit nearly at every measuring point during summer, with significantly higher values measured in big cities. Particulate matter (PM) concentration was also above the limit.

Figure 2.2.2 Average PM10 concentration in certain settlements



Source: National Directorate for Environment, Nature and Water.

As the concentration of PM10 has increased over the past few years in Hungary, limit values were exceeded at most monitoring points. In Pécs, Várpalota, Budapest, Kazincbarcika and Miskolc more than one-fifth of the measurements revealed higher concentration.

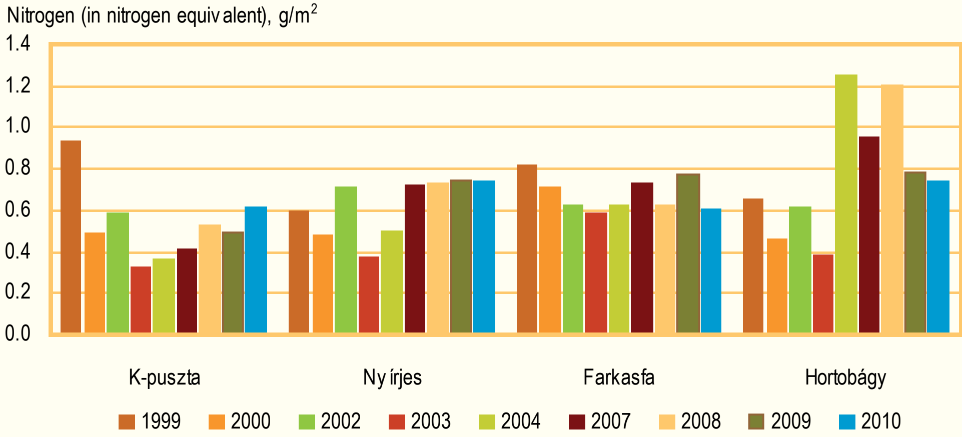
Tables (Stadat):

- 5.3.14. Concentrations of sulphur dioxide in county seats and in selected industrial towns according to data of the manual network
- 5.3.15. Concentrations of nitrogen dioxide in county seats and in selected industrial towns according to data of the manual network
- 5.3.16. Concentrations of settling dust in Budapest, in county seats and in selected industrial towns according to data of the manual network
- 5.3.17. Concentrations of sulphur dioxide according to data of the monitoring network
- 5.3.18. Concentrations of nitrogen dioxide according to data of the monitoring network
- 5.3.19. Concentrations of suspended particulates of below 10 µm according to data of the monitoring network
- 5.3.20. Concentrations of nitrogen oxides according to data of the monitoring network
- 5.3.21. Concentrations of ozone according to data of the monitoring network
- 5.3.22. Concentrations of carbon monoxide according to data of the monitoring network

Background concentration

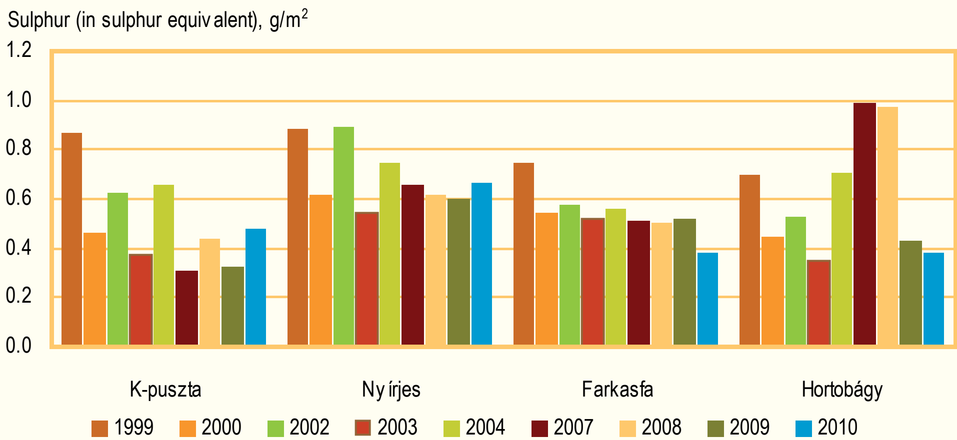
The monitoring network measuring background pollution is run by the National Meteorological Service. Measurements are carried out in K-Puszta, Nyírjes, Farkasfa, Hortobágy and Sarród.

Figure 2.2.3 Wet deposition of nitrogen



Source: Hungarian Meteorological Service.

Figure 2.2.4 Wet deposition of sulphur



Notes: in the period of 2005–2006 sampling was suspended at the monitoring point of Farkasfa.
Source: Hungarian Meteorological Service.

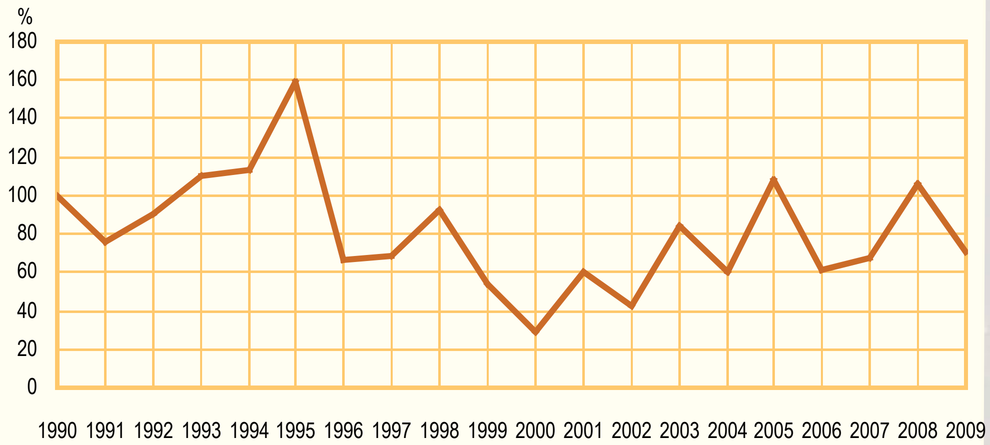
Atmospheric deposition is the transfer of substances from the air to the surface of the Earth, either in wet or in dry form. Wet deposition is the process that removes compounds from the atmosphere and delivers them to the Earth's surface. Wet deposition is highly dependent on the quantity of pollutants emitted to the air and precipitation conditions. Wet deposition of sulphur and nitrogen dropped in Hortobágy and K-Puszta in the examined period, while in Nyírjes and Farkasfa no significant changes were observed.

Tables (Stadat):
5.3.23. Trends of regional background concentrations of some air pollutants

2.3 CARBON SEQUESTRATION

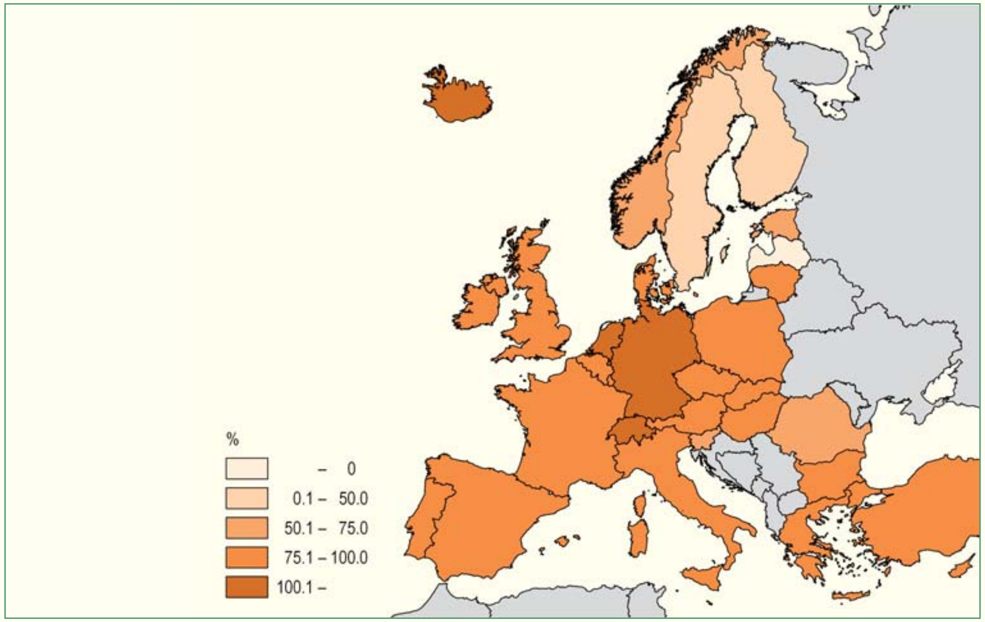
The indicator shows the quantity of anthropogenic carbon dioxide captured by land use. Its rate varies depending on land use change and forest cover.
The quantity of carbon dioxide captured makes up 5% of total carbon dioxide emission (4% of total GHG emission) in Hungary, with its value having fluctuated over the past 20 years, though having been stable since 2005.

Figure 2.3.1 Quantity of CO_2 captured



Source: Hungarian Meteorological Service.

Figure 2.3.2 Ratio of net to gross CO_2 emission in Europe, 2009



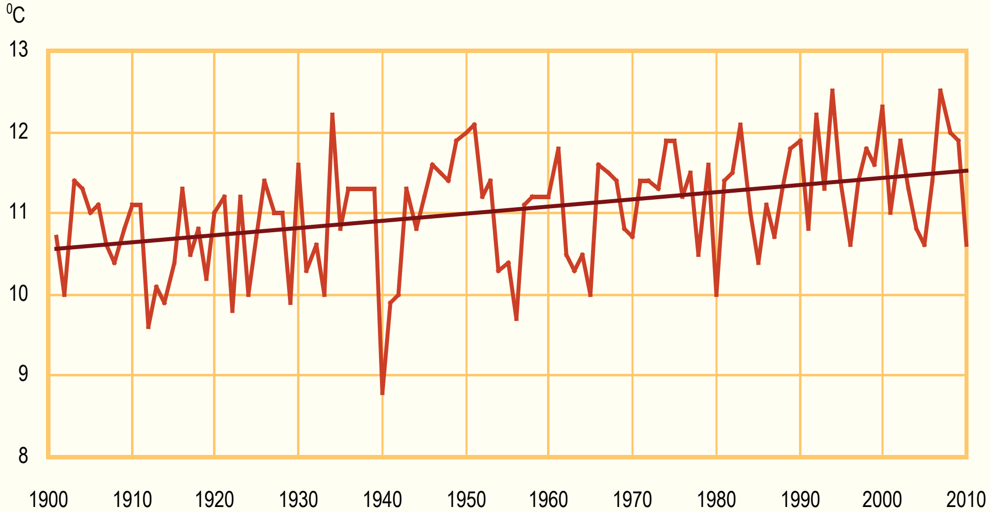
Note: excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: European Environment Agency.

Carbon sequestration is significant mainly in countries where there are larger contiguous forest areas, such as in France, Italy, Turkey, Finland and Sweden.

2.4 WEATHER

Hungary has a continental climate and owing to its geographical location it is rarely hit by extreme weather. As there are no big distances and differences with respect to latitude and altitude Hungary's climate is fairly steady. However, terrain conditions have an impact on microclimate.
Annual average surface temperature is calculated by taking the mean of monthly average surface temperatures of the year.
The quantity of falling precipitation is expressed in millimetres of height that rainwater or unfrozen snow would reach if there was no evaporation or infiltration.

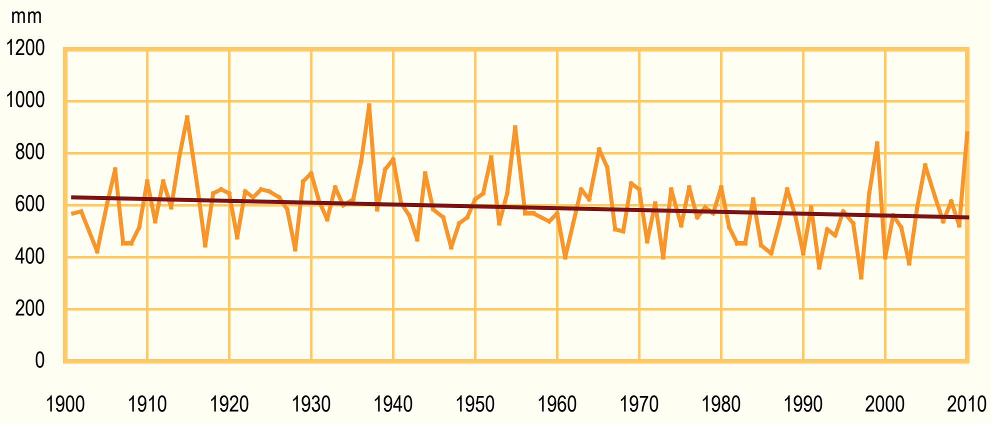
Figure 2.4.1 Annual average surface temperature in Budapest



Source: Hungarian Meteorological Service.

It is apparent, though characterized by volatility that the annual average surface temperature has trended upward. According to the trend line fitted to the series of average temperature values, warming reached 1°C in the examined period. A significant part of the temperature rise is explained by accelerating urbanization.

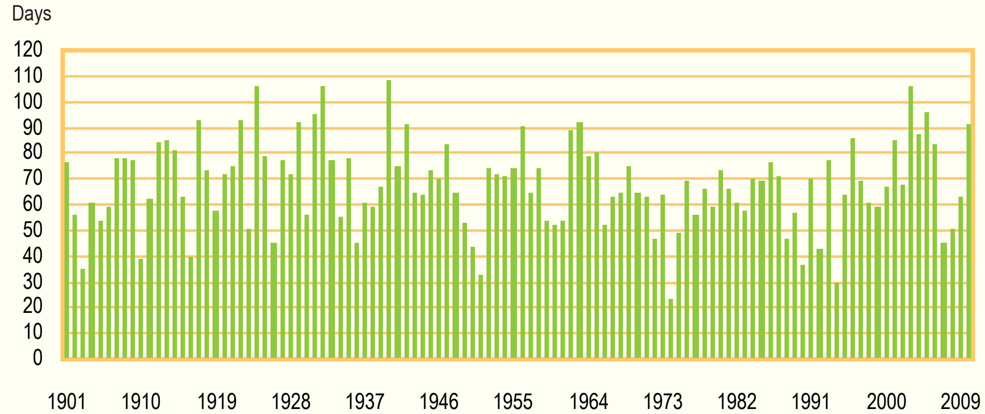
Figure 2.4.2 Average rainfall in Budapest



Source: Hungarian Meteorological Service.

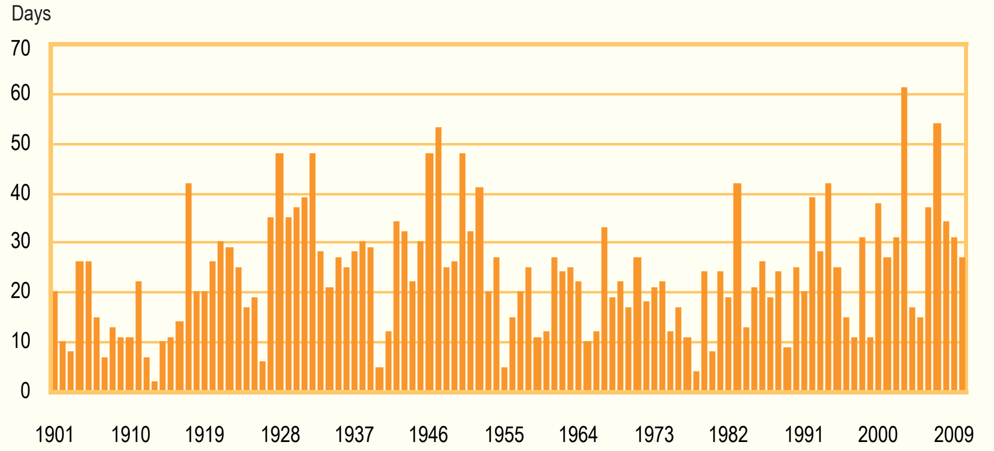
Average rainfall, though the quantity varies from year to year, is the highest in May and June, and the lowest in January and February. Dry years might see three times less rainfall than wet years. Although average annual precipitation has been volatile, it depicts a conspicuous downward trend between 1901 and 2010. There is 0.7 mm less precipitation each year in Budapest.

Figure 2.4.3 Number of cold days in Budapest



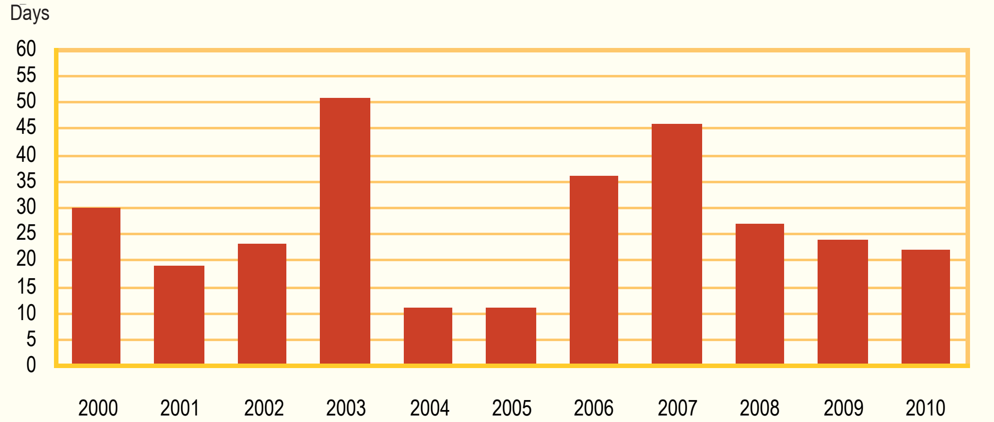
Note: cold days are described as days when the daily minimum temperature stays below 0°C.
Source: Hungarian Meteorological Service.

Figure 2.4.4 Number of hot days in Budapest



Note: hot days are described as days when the daily maximum temperature reaches 30°C. When this occurs in three consecutive days, this is called heat wave.
Source: Hungarian Meteorological Service.

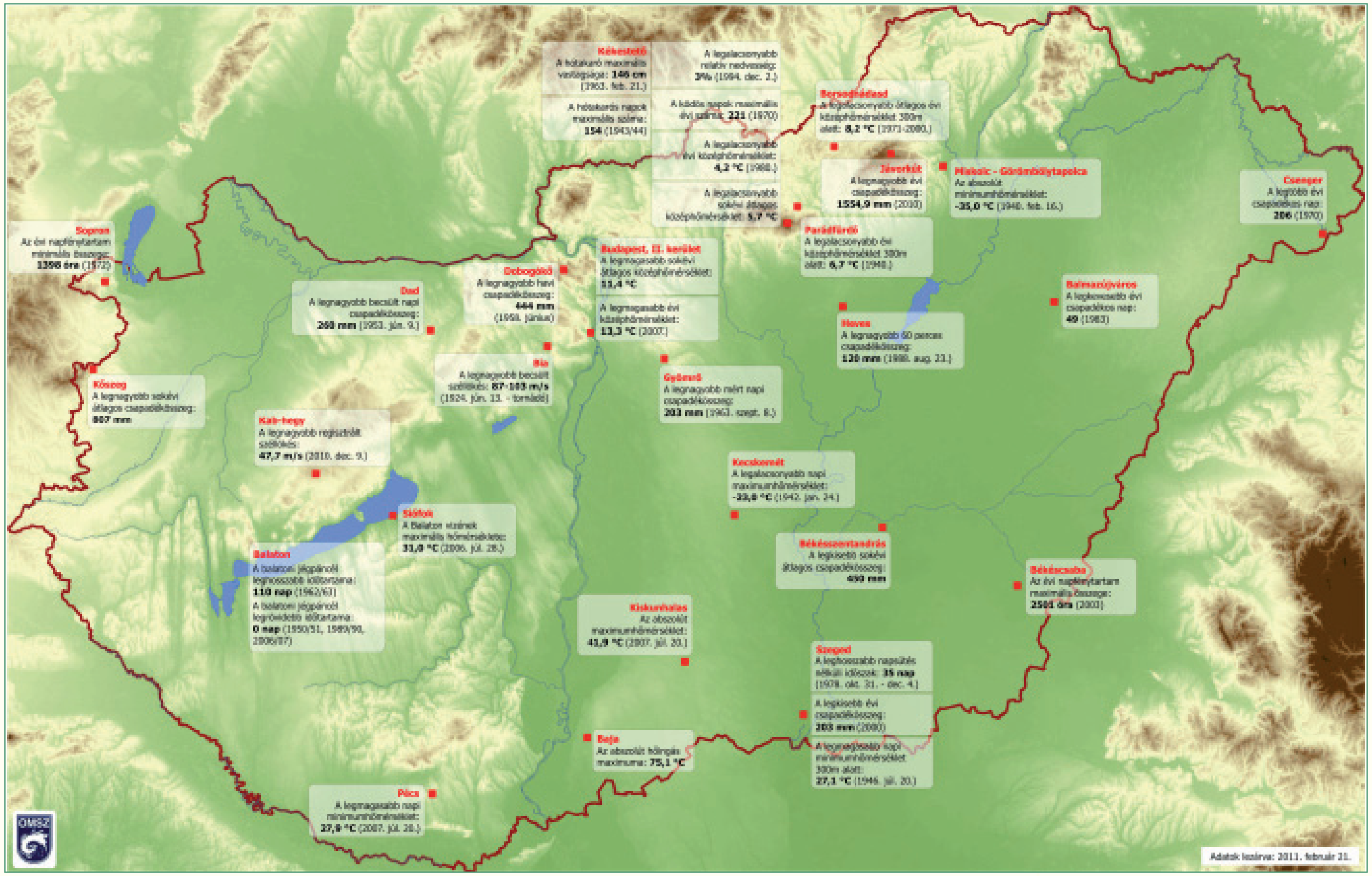
Figure 2.4.5 Sum of days from heat waves in Budapest



Source: Hungarian Meteorological Service.

Average surface temperature, temperature extremes (hot and cold days) and their time range together provide insight into a country's temperature conditions.

Figure 2.4.6 Extreme weather conditions, recorded before 21 February 2011



Source: Hungarian Meteorological Service.

The lowest temperature (-35°C) in Hungary between 1901 and 2010 was recorded in 1940, while the highest (41.9°C) in 2007. The lowest amount of annual precipitation (345 mm) was measured in 2000, while the highest (996 mm) in 2010. Year 2007 was hotter than the average, Pécs, Siófok, Szeged, Miskolc, Kecskemét and Budapest saw their highest temperature values this year. As for cold records, years of 1929 (Budapest, Siófok, Kecskemét, Szeged) and 1942 (Debrecen, Mosonmagyaróvár, Pécs, Siófok) still hold the lowest values in numerous settlements.

The above exhibit that, along with the average temperature rise of 0.9°C the number of cold days has decreased, while those of hot days and heat waves have increased during the 20th century. However, there are also years with significantly different values.

Tables (Stadat)
5.12. Extreme weather values
5.13. Main data of the meteorological observation stations

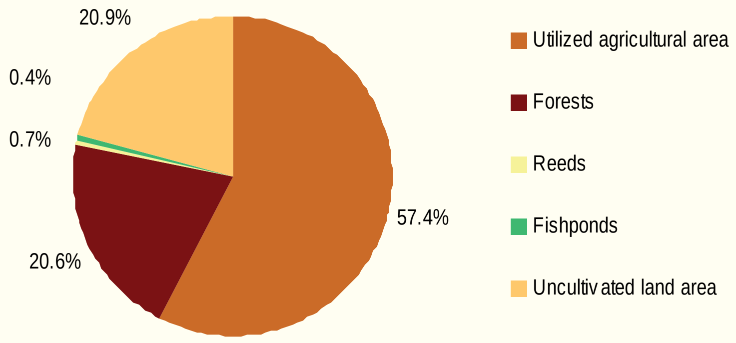
A significant part of Hungary (57%) is utilised by agriculture, therefore it is important to monitor the effects of agriculture on the environment. Agricultural practices may help nature protection by creating and maintaining several valuable semi-natural habitats. On the other hand, inadequate production methods can pollute soil, surface and ground water, the atmosphere, and can cause fragmentation of habitats. Toxic agents are threatening directly or indirectly the ecosystem of soil and of other natural resources, like water bodies under surface, and are spoiling biodiversity and the balance of distribution of species. The protection of soil has become a political issue, which means its ecological and human exploitation makes it one of the most important natural resources. This chapter is also devoted to Hungary's mineral resources as part of the country's natural resources and the national wealth.

List of figures

3.1 LAND USE

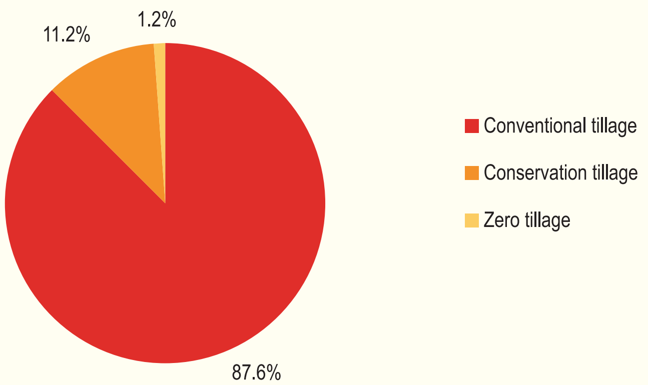
In Hungary the largest land area is utilized by agriculture. Changes of land use in recent years may have a significant effect on the environment and landscape, because these alterations (e.g. areas permanently withdrawn from agricultural production) frequently cause the irreversible change of land use and contribute to the expansion of built-in areas.

Figure 3.1.1 Distribution of land use categories, 2010



Agricultural areas occupy the largest part of Hungary, although they decrease continuously. In 2010 utilized agricultural areas were 5 343 thousand hectares, i.e. 57% of the country's area. Besides, the area of forests and uncultivated land areas was also significant (21% each).

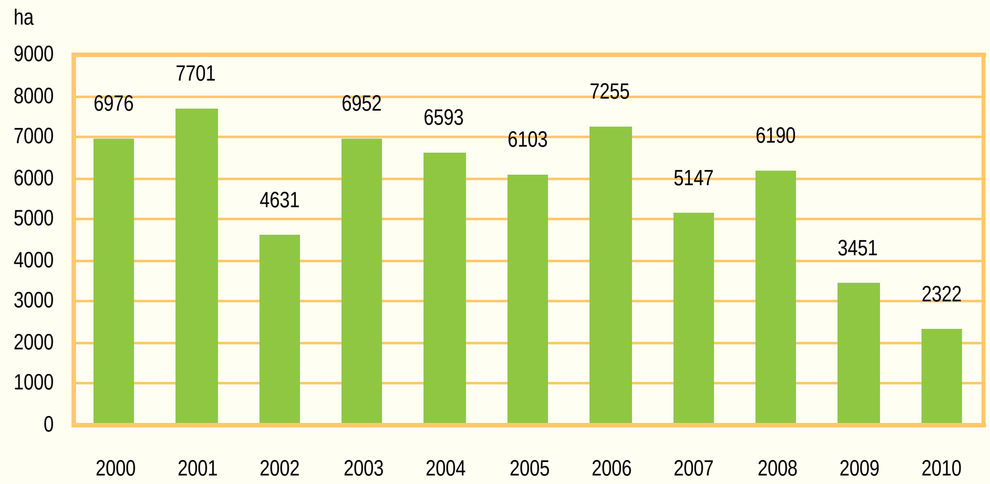
Figure 3.1.2 Distribution of different tillage methods, 2010



Tillage practices in line with soil characteristics promote high crop yields, protect soil structure and its biological activities, and enhance good water, nutrient and air management of the soil. Inadequate tillage practices are the main reason for soil erosion.

According to preliminary data of the Farm Structure Survey conducted in 2010 88% of arable land was managed by conventional tillage, 11% by conservation tillage and 1% by zero tillage.

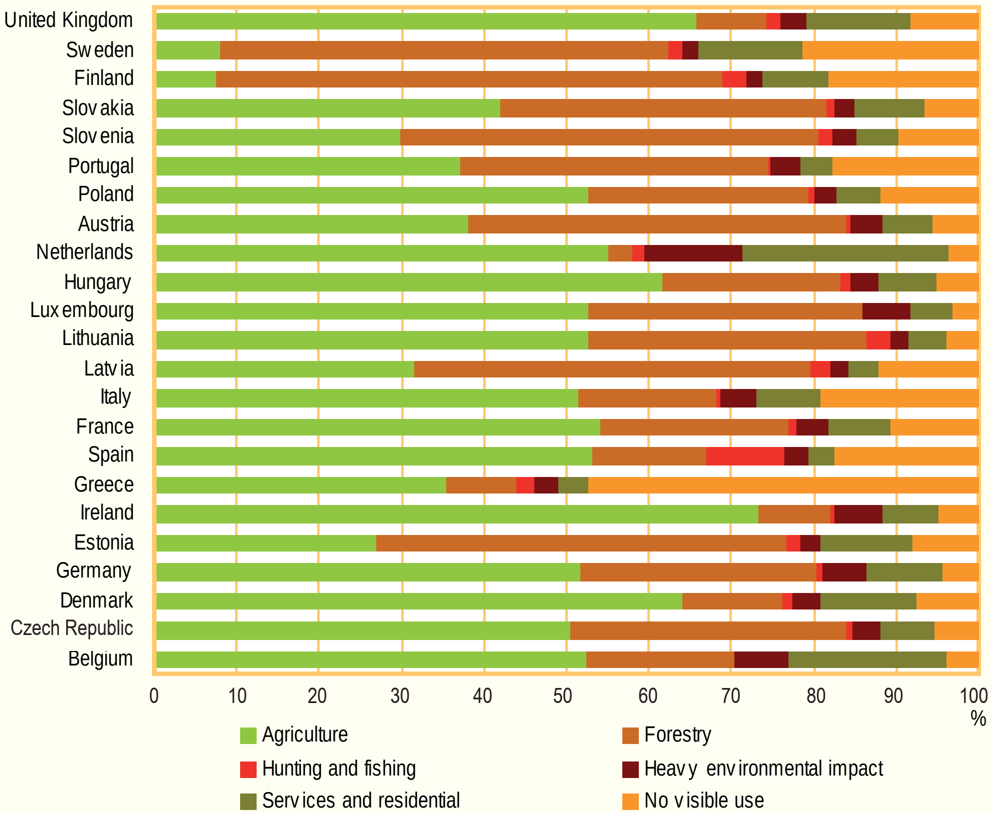
Figure 3.1.3 Areas permitted to be withdrawn permanently from agricultural production



Source: Ministry of Rural Development.

Between 2000 and 2008 relatively large areas were permitted to be withdrawn permanently from agricultural production, mainly for industrial/mining, urbanization and roads/railways construction purposes. From 2009 this trend slowed down considerably, 2 322 hectares were granted permission in 2010.

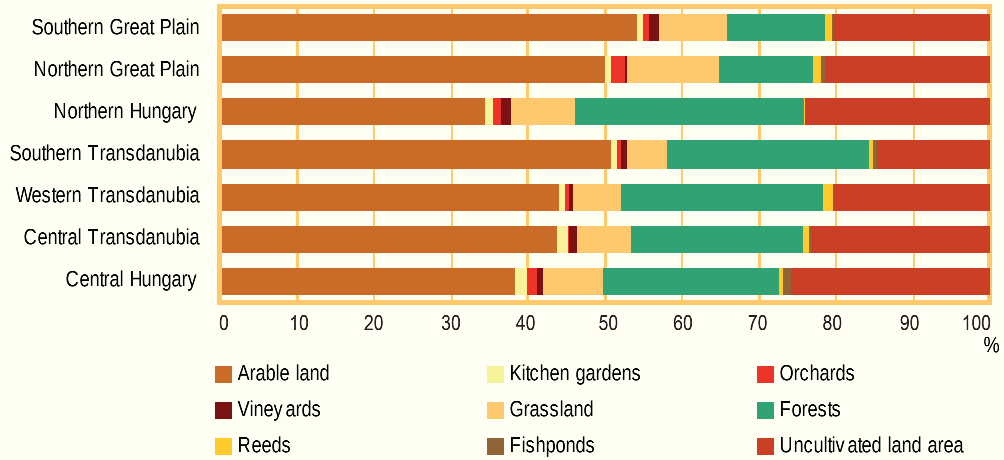
Figure 3.1.4 LUCAS land use data, 2009



Source: Eurostat

The LUCAS (Land Use/Cover Area frame Statistical) survey was carried out in 23 Member States in 2009. Cyprus and Malta were not surveyed because of their size, but Romania and Bulgaria participated. According to the results more than 40% of EU area is used for agricultural production, and almost 30% is used for forestry purposes. More than 10% of EU area is used for residential, commercial or industrial purposes.

Figure 3.1.5 Regional distribution of land use methods, 2010



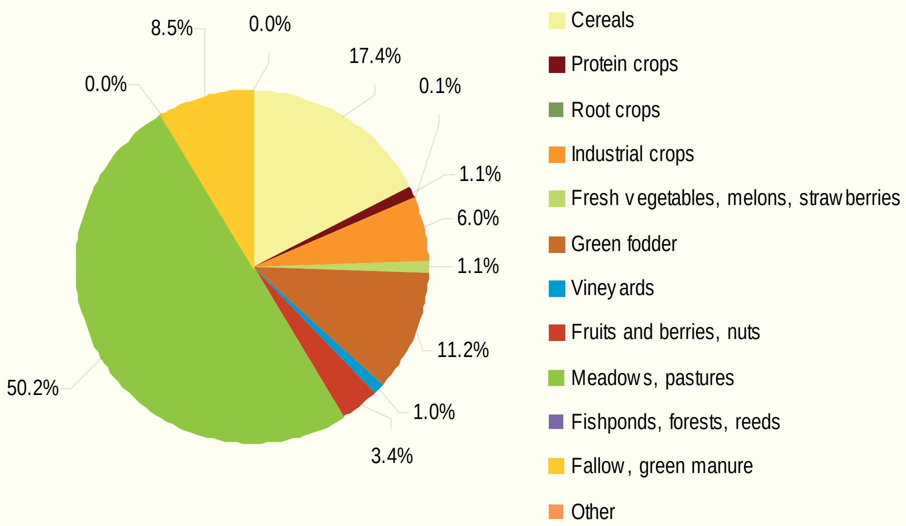
No less than 50% of total area is occupied by arable land in Southern Transdanubia, Northern Great Plain and Southern Great Plain. The proportion of forest area is above the national average in five regions: Central Hungary, Central Transdanubia, Western Transdanubia, Southern Transdanubia and Northern Hungary. The proportion of uncultivated land area is relatively high in Central Hungary, Central Transdanubia and Northern Hungary.

Tables (Stadat):
4.1.4. Use of land area by land use categories and by legal forms

3.2 ORGANIC FARMING

Organic production is controlled by EU regulation, and its main objectives are to protect the environment, surface and ground water reserves, promote biodiversity and food safety.

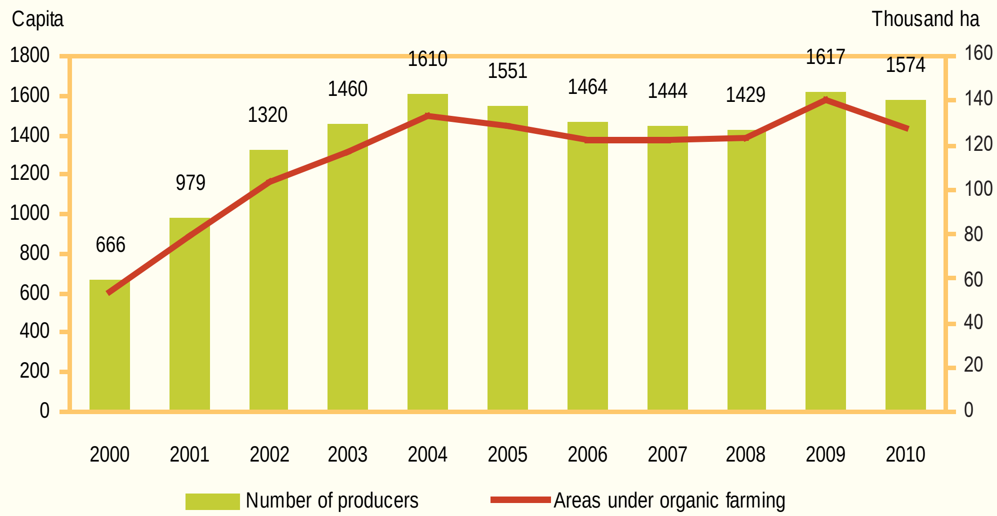
Figure 3.2.1 Distribution of areas under organic farming, 2010



Areas under organic farming in Hungary were almost 128 thousand hectares, half of which was meadows and pastures, and another 11% was occupied by green fodder. In addition, the area of cereals was 17%.

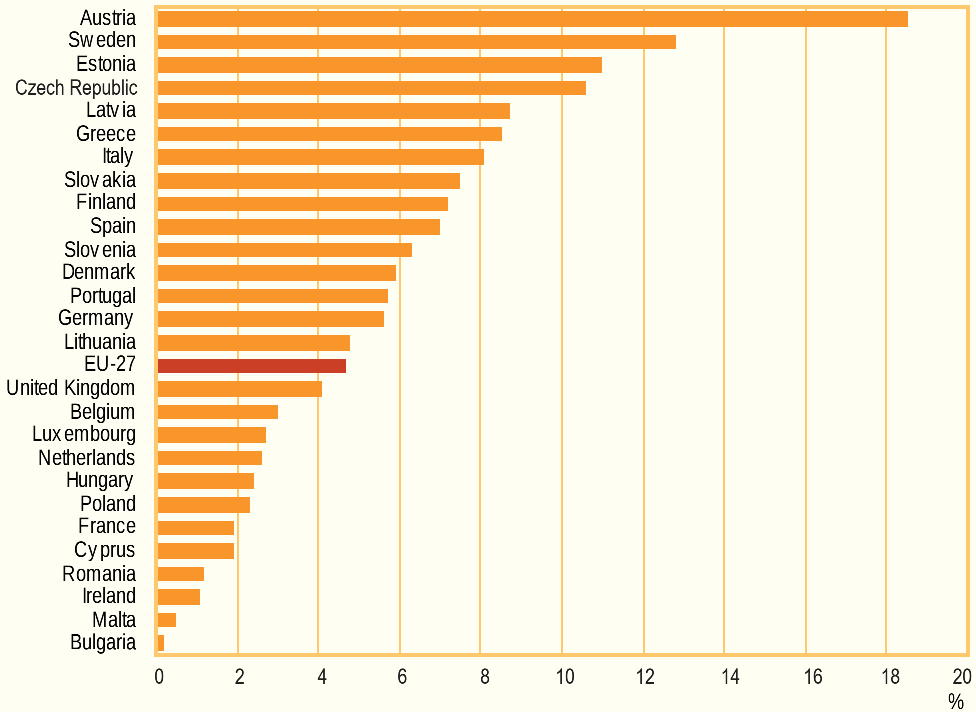
The proportion of areas under conversion may indicate the potential growth in the future, since organic products can only be grown in areas that went through a conversion period of 2–3 years. In 2010 24% of areas under organic farming were under conversion, and 76% were fully converted.

Figure 3.2.2 Areas under organic farming and number of producers engaged



Since 2000 areas under organic farming have grown by almost 140% in Hungary. The growth of areas under organic farming stopped in 2004, since the agri-environmental programme, started in 2004, did not support organic production. Since 2009 organic producers can apply again for support within the framework of the new agri-environmental programme. That may have helped areas under organic farming increase in 2009 and reach 140 thousand hectares. In 2010 agricultural areas under organic production declined again.

Figure 3.2.3 Share of areas under organic farming in agricultural area, 2010



Source: Eurostat.

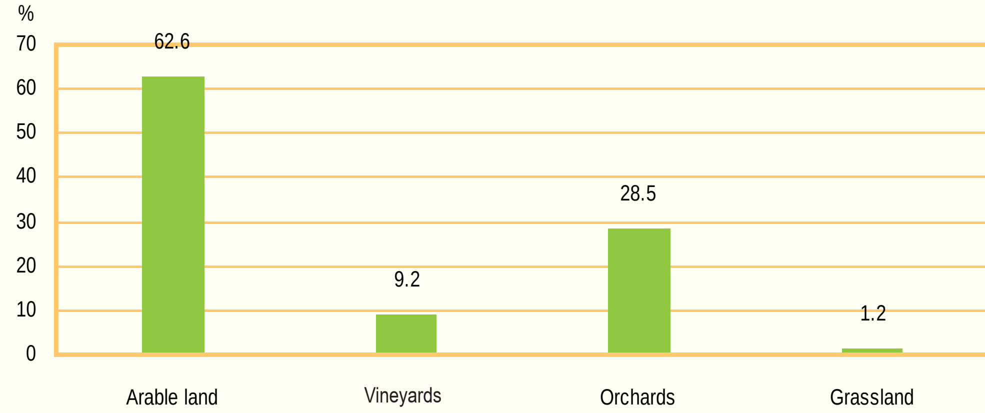
The share of areas under organic production in utilized agricultural area was 2.4% in Hungary in 2010, which is below the EU average of 4.7%. The proportion of areas under organic farming was the highest in Austria (19%), and it was also above 10% in Sweden, Estonia and the Czech Republic.

Tables (Stadat):
5.6.1. Organic farming

3.3 USE OF FERTILIZERS

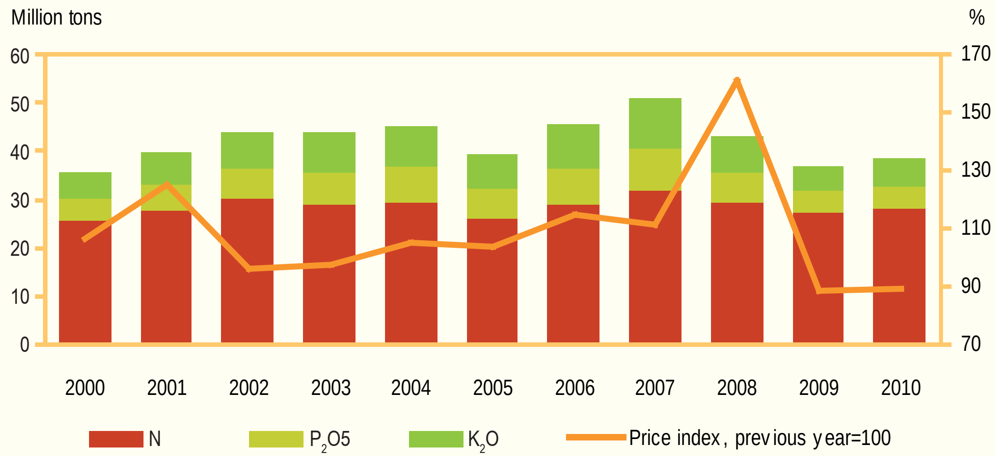
Nitrogen oxidized into nitrate in fertilizers causes acidification and leaches into deeper layers of the soil and the groundwater, leading to the eutrophication of surface waters. It may also cause poisoning in drinking water, and the production of nitrogen fertilizers entails significant emission of greenhouse gases too.

Figure 3.3.1 Proportion of fertilized areas, 2010



In Hungary fertilized areas covered 2.7 million hectares in 2010. The proportion of fertilized areas was the highest in case of arable land areas (63%). 28% of orchards were fertilized.

Figure 3.3.2 Active ingredients of sold fertilizers, quantity and price index

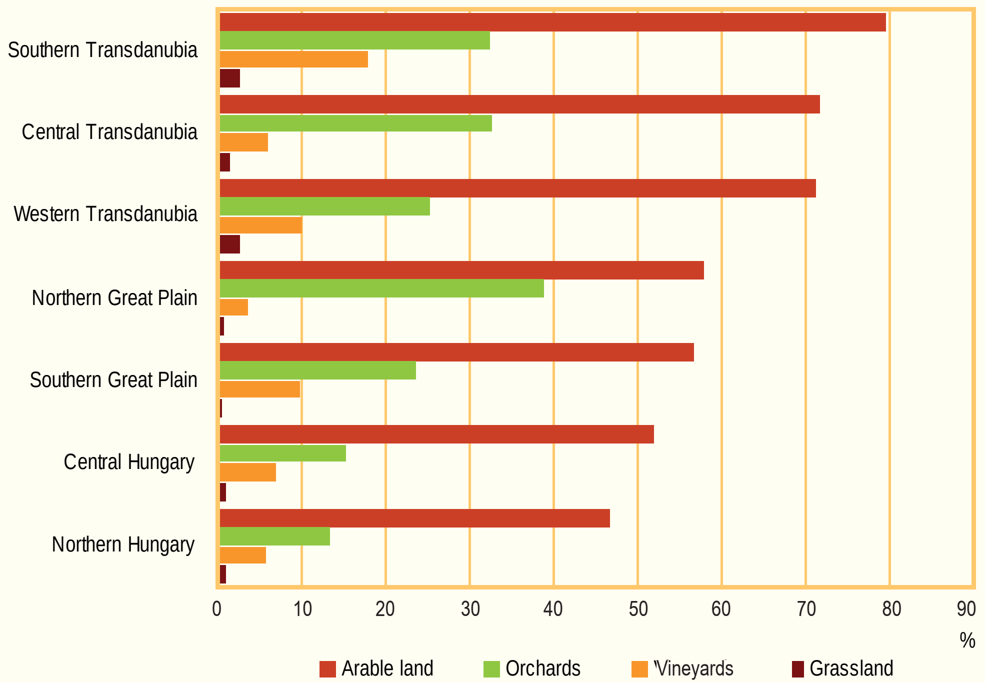


Source: Research Institute of Agricultural Economics, HCSO.

The quantity of fertilizers sold had grown almost continuously until 2007 in Hungary, since then it has dropped significantly. In Hungary nitrogen fertilization has the major importance, producers decrease phosphorus and potassium application in case of financial difficulties. The share of nitrogen in total nutrient quantity was 73% in 2010.

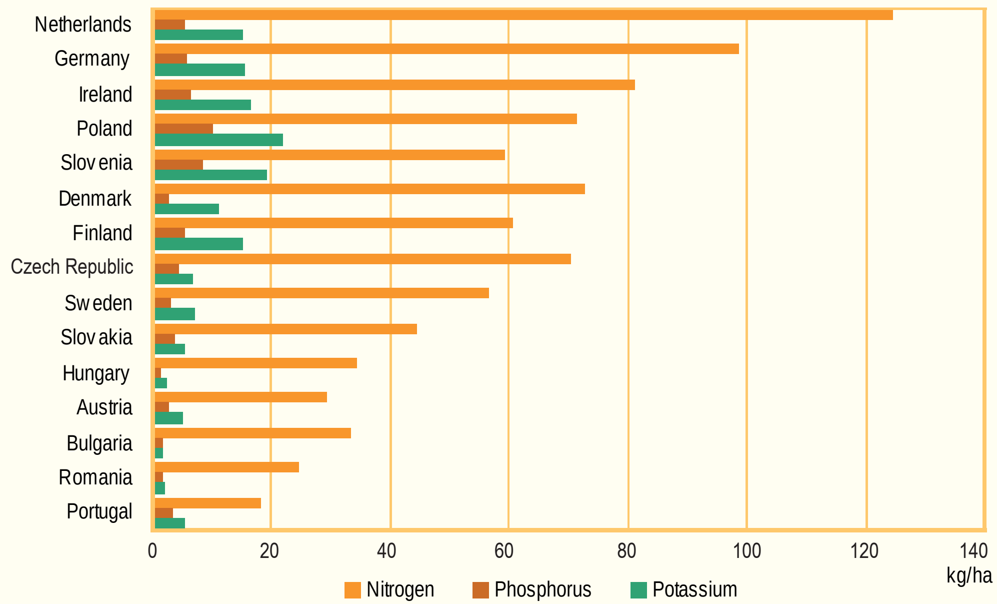
The purchase price index of fertilizers was fluctuating. In 2008 the index increased by 61% compared to the previous year, but declined in the subsequent years probably because of a substantial drop in the quantity sold.

Figure 3.3.3 Proportion of fertilized areas by regions, 2010



The proportion of fertilized areas was the highest in almost each land use category in the regions of Transdanubia. The proportion of fertilized orchards, however, was the highest in Northern Great Plain.

Figure 3.3.4 Active ingredients per hectare of agricultural area, 2009



Source: Fertilizer Europe, Eurostat.

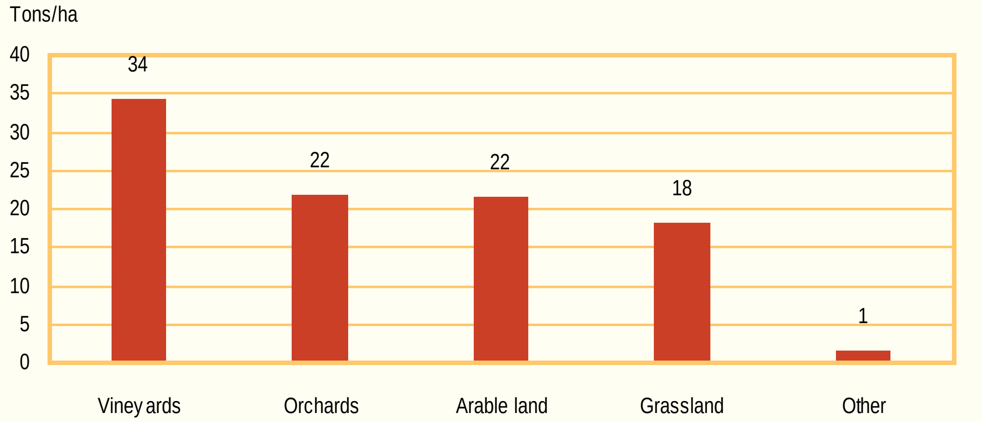
According to the estimation of Fertilizer Europe nutrient application per hectare of agricultural area was the highest in the Netherlands, 145 kg/ha. Among new Member States producers in Poland, Slovenia, the Czech Republic and Slovakia use more fertilizers than farmers in Hungary.

Tables (Stadat)
4.1.5. Quantity of sold fertilizers

3.4 USE OF MANURE

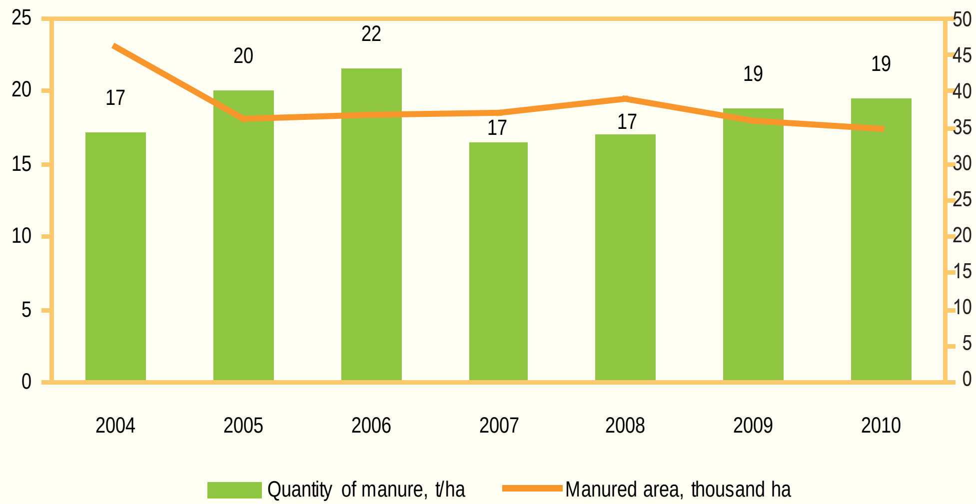
The quantity of manure comprises solid and liquid manure. Solid manure, unlike fertilizers, ameliorates not only the fertility of the soil but also its structure. If stored and incorporated into the soil appropriately, it reduces greenhouse gas emission too. However, it can harm water resources, therefore, nitrogen content inherent in manure is limited to an annual 170 kg per hectare on agricultural areas sensitive to nitrate.

Figure 3.4.1 Quantity of manure per hectare of manured area, 2010



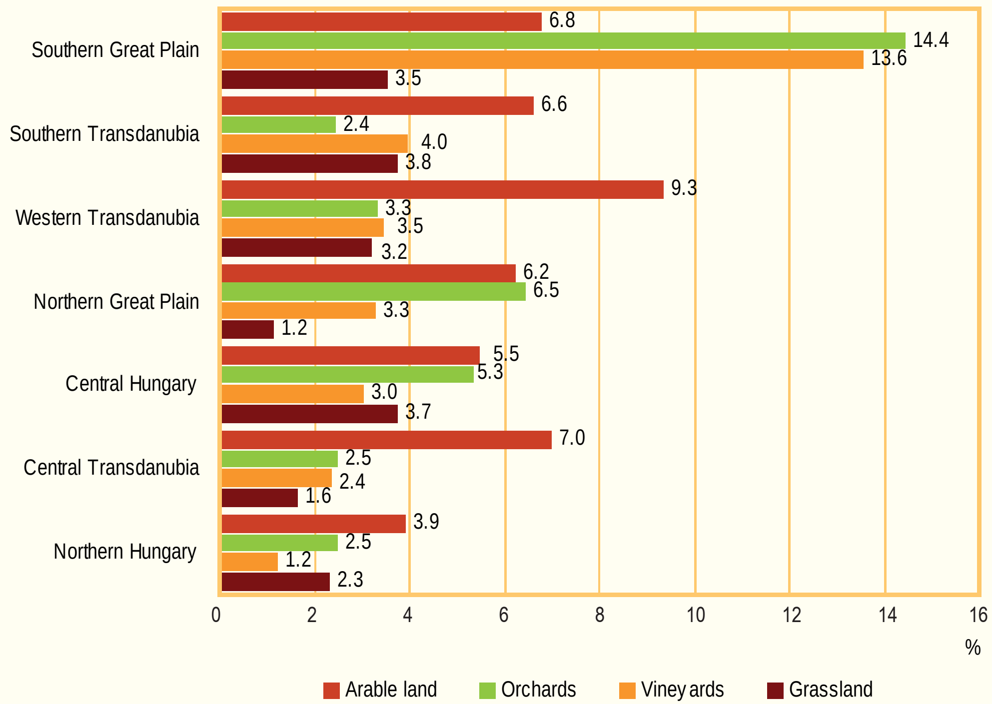
Manure application per hectare was the highest in the case of vineyards (34 t/ha), while 22 t/ha of manure was used in orchards and on arable land areas by agricultural producers in 2010.

Figure 3.4.2 Manured area, and quantity of manure on manured area



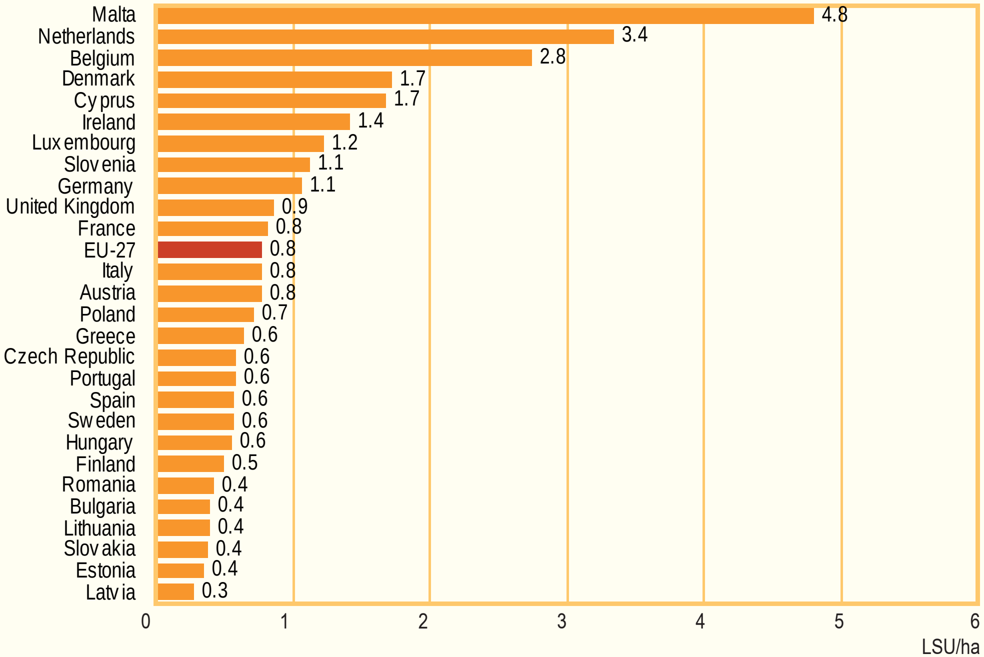
The areas where manure was applied have been decreasing almost continuously since 2004, in parallel with which the quantity applied per hectare has been growing since 2007. The quantity of manure applied decreased from almost 8 million tons in 2004 by 14% by 2010.

Figure 3.4.3 Regional proportion of manured areas by land use categories, 2010



The proportion of areas where manure was applied was the highest in Southern Great Plain, which may result from the high number of pigs in this region.

Figure 3.4.4 Livestock per hectare of agricultural area, 2007



Source: Eurostat.

Manure application is in line with the number of animals. Livestock units per hectare of agricultural area were the highest in Malta, the Netherlands and Belgium.

3.5 NUTRIENT BALANCE

The calculation of nutrient balances presents a picture of changes in the nutrient content of the soil as well as the circle of mineral substances which are important for crops. A permanently and significantly high nutrient balance results in higher risks of nutrient leaching and water contamination. A balance that is negative for a longer period of time indicates problems regarding the sustainability of the agricultural methods applied.
Nutrient intake should be in line with soil type and status, as too much nitrogen and phosphorus leaching into waters may cause eutrophication. The application of organic and inorganic fertilizers can also cause nitrogen dioxide and ammonia emission into the atmosphere.

Figure 3.5.1 Components of nitrogen balance, 2010

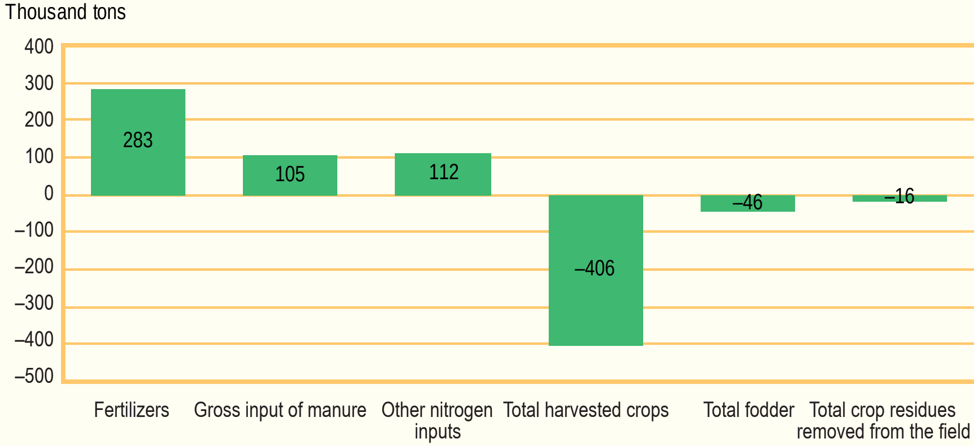
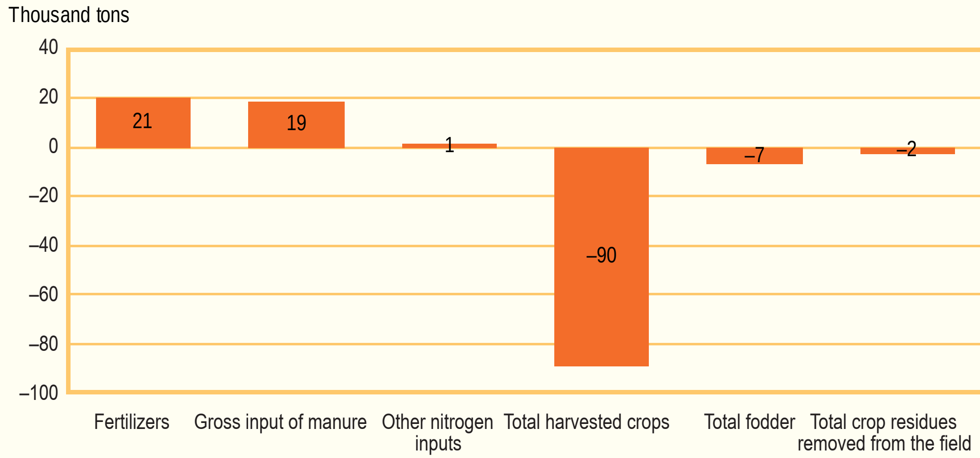
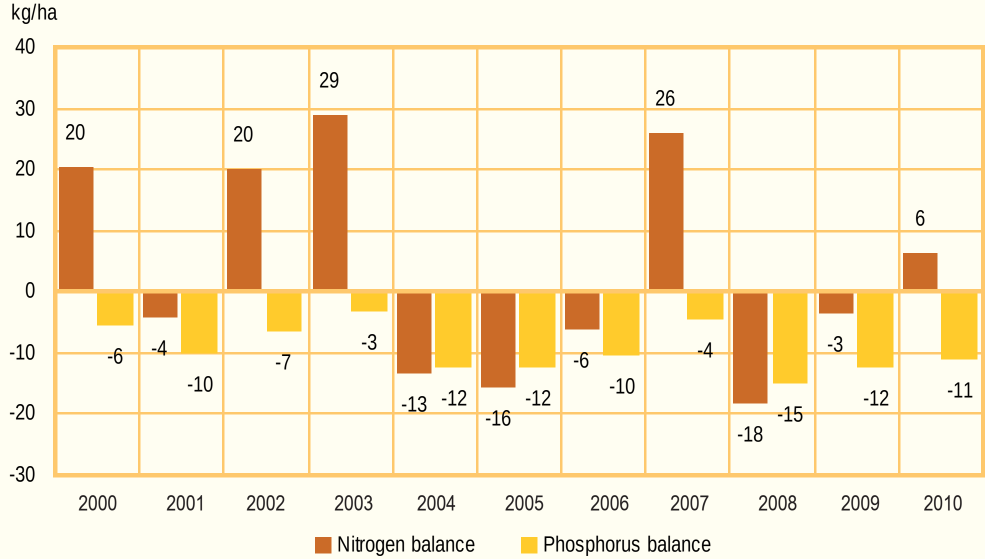


Figure 3.5.2 Components of phosphorus balance, 2010



Nutrient balances show the difference between the input by fertilization and other ways and the output of nutrients by crop yields. The input side of the balance is mainly determined by the nutrient intake through fertilization, while the major part of the output side is crop yield, which depends to a great extent on weather conditions.

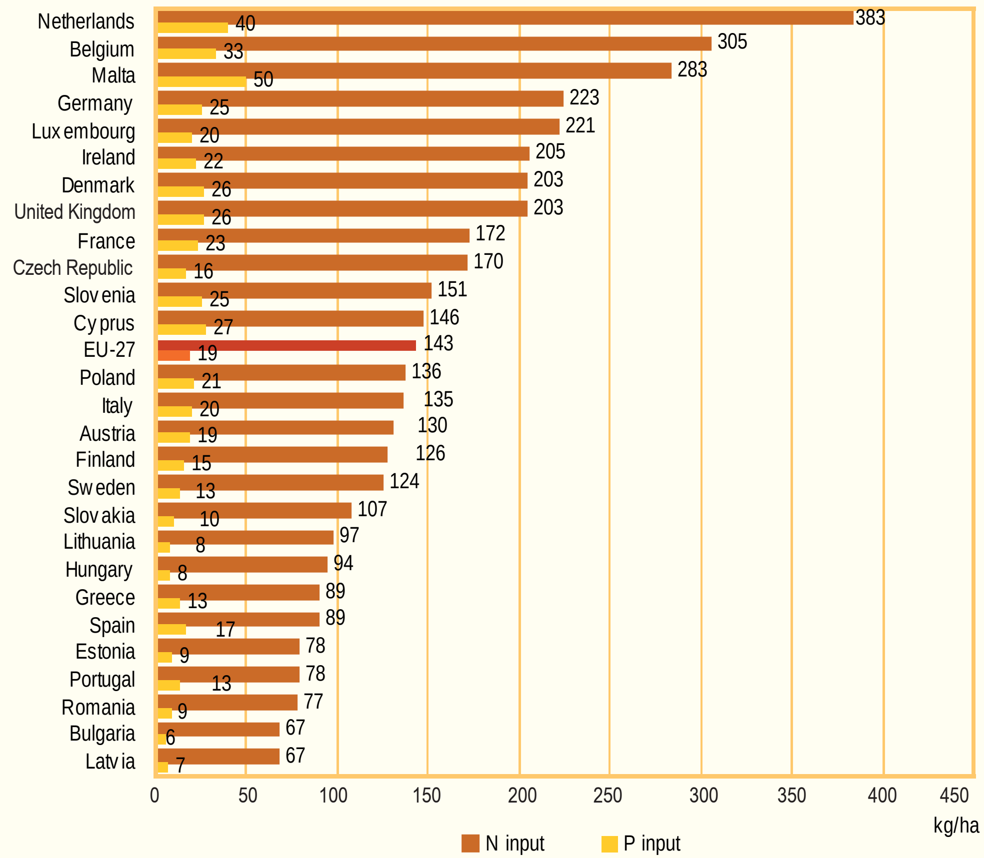
Figure 3.5.3 Nutrient balance per hectare of agricultural area



According to nutrient balances calculated in line with Eurostat/OECD methodology, the quantity of nutrient inputs between 2000 and 2010 was quite stable in Hungary, and nitrogen balances varied mainly depending on differing crop yields in different years.

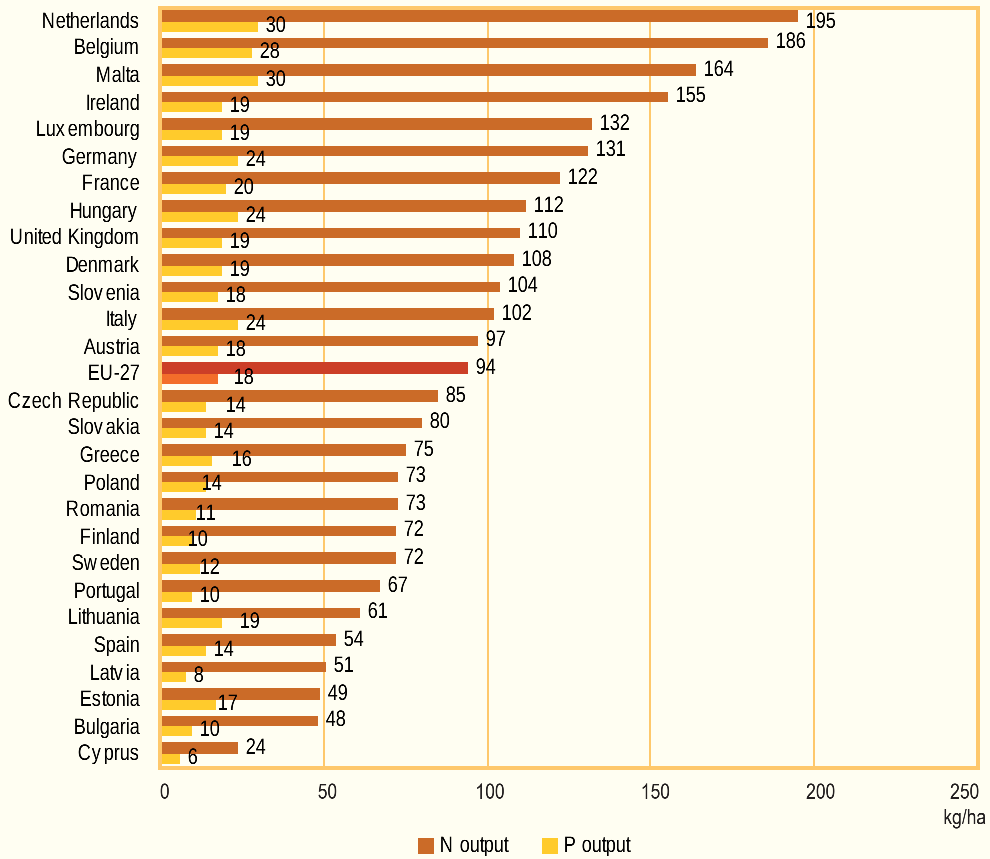
Phosphorus is less mobile than nitrogen, therefore excessive amounts remain in the soil and accumulate year by year, increasing the soluble and total amount of phosphorus in the soil. However, phosphorus balances were negative each year in Hungary between 2000 and 2010, which may even risk the sustainability of agricultural production.

Figure 3.5.4 Nutrient input per hectare of agricultural area, 2008



Source: Eurostat.

Figure 3.5.5 Nutrient output per hectare of agricultural area, 2008



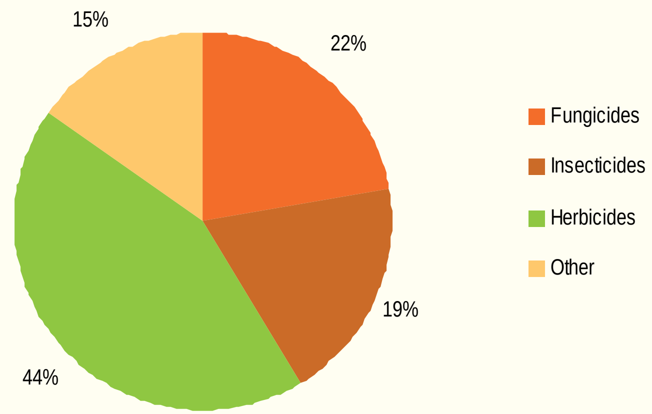
Source: Eurostat.

In Hungary nutrient inputs are lower than the EU average, while outputs exceed that. Therefore, nutrient balances in Hungary are much less favourable than they are in other Member States.

3.6 USE OF PESTICIDES

Minimizing the environmental and health risk of pesticide application and elaborating the Strategy for the Sustainable Use of Plant Protection Products are an important domain in the Sixth Environmental Action Programme of the EU. As information on only the sold quantity of pesticides is collected in Hungary from producers and retailers, it must be regarded as consumption.

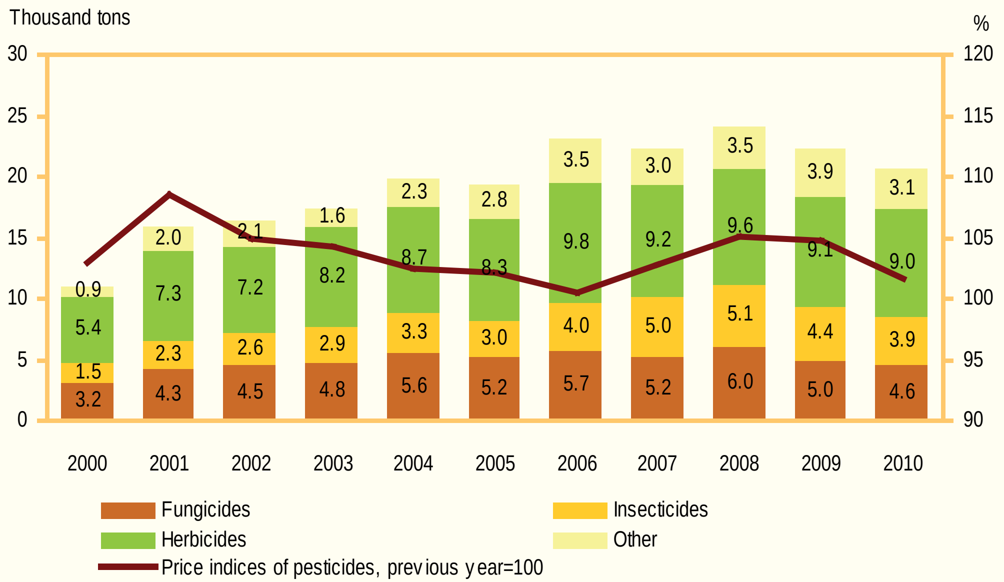
Figure 3.6.1 Distribution of the quantity of pesticides sold, 2010



Source: Research Institute of Agricultural Economics.

In 2010 herbicides accounted for 43% of the sold quantity of pesticides.

Figure 3.6.2 Pesticides, sold quantity and price index



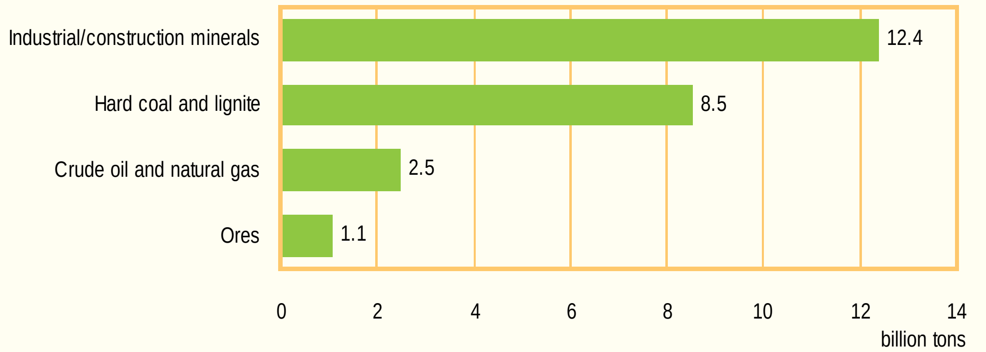
Source: Research Institute of Agricultural Economics, HCSO.

Until 2008 the quantity of pesticides sold had grown almost continuously, since then it has dropped by 15%. However, the sold quantity was still 88% higher in 2010 than it was in 2000. The price of pesticides was rising in every year between 2000 and 2010. The most significant increases in the price indices compared to the previous year were observed in 2001–2002 and 2008–2009.

3.7 MINERAL RESOURCES

The Hungarian Office for Mining and Geology updates the national register of mineral resources by location, commodity and main group of commodities as well as compiles regular regional balance-like registries and preliminary economic evaluations as of 1 January. Mineral resources of the country are owned by the state. Statistics on mineral reserves are based on compulsory data supply from mining enterprises and the decrees of mining authorities.

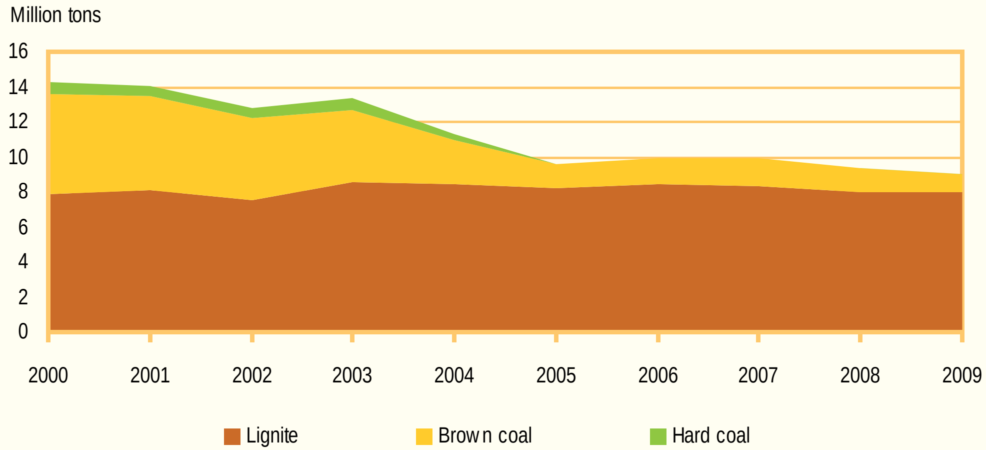
Figure 3.7.1 Mineral reserves, 1 January 2010



Source: Hungarian Office for Mining and Geology.

The National Mineral Inventory contains the data of more than 3 700 known deposits with 37.5 billion tons of geological and 24.4 billion tons of exploitable reserves as of 1 January 2010.

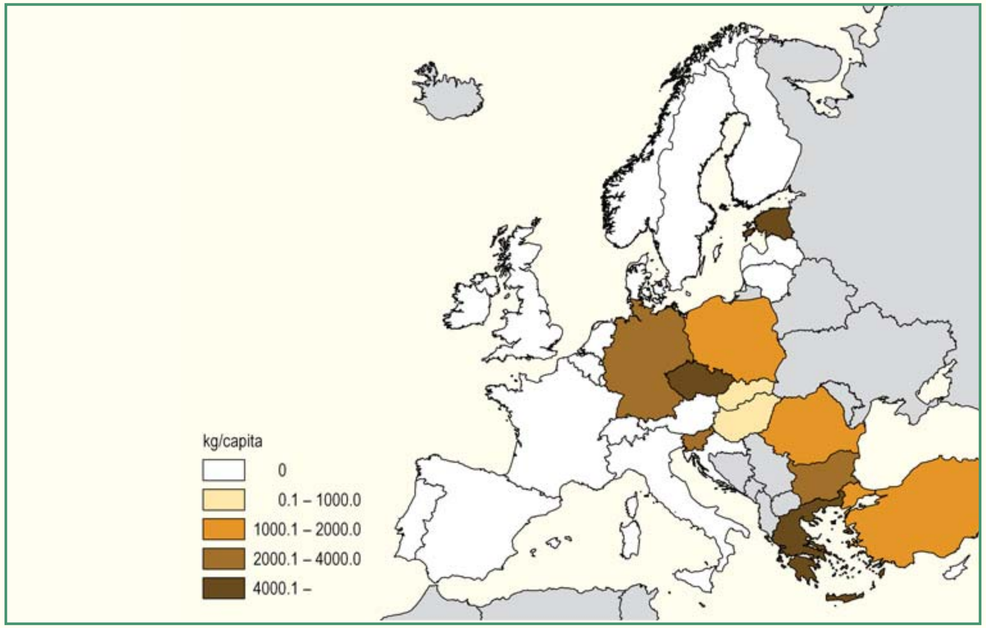
Figure 3.7.2 Coal extraction in Hungary



Source: Hungarian Office for Mining and Geology.

Coal mining played a dominant role in the energy supply of Hungary until the end of the 1960s. Annual coal extraction peaked in 1964 at 34.5 million tons. This was followed by a short stagnation and then a decrease. Hard coal mining ceased in 2005, and the combined brown coal and lignite extraction was less than 9 million tons in 2009.

Figure 3.7.3 Lignite extraction in Europe, 2009



Note: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Iceland, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

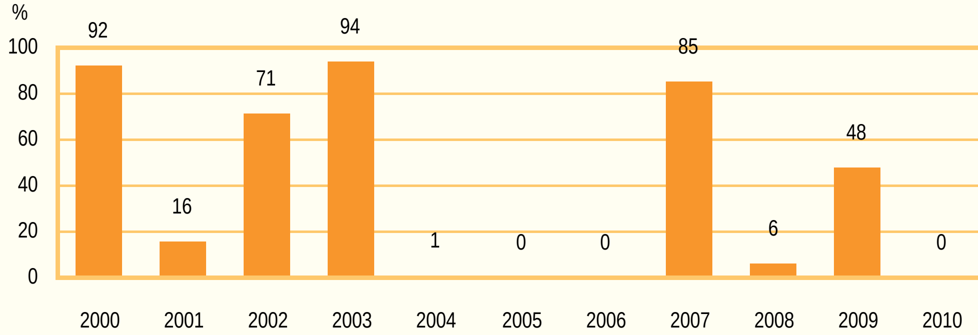
Per capita lignite extraction in Estonia was more than 11 thousand kg, which was the highest value in the EU.

Tables (Stadat):
5.10. Exploitable reserve, 1 January

3.8 AREAS EXPOSED TO DROUGHT

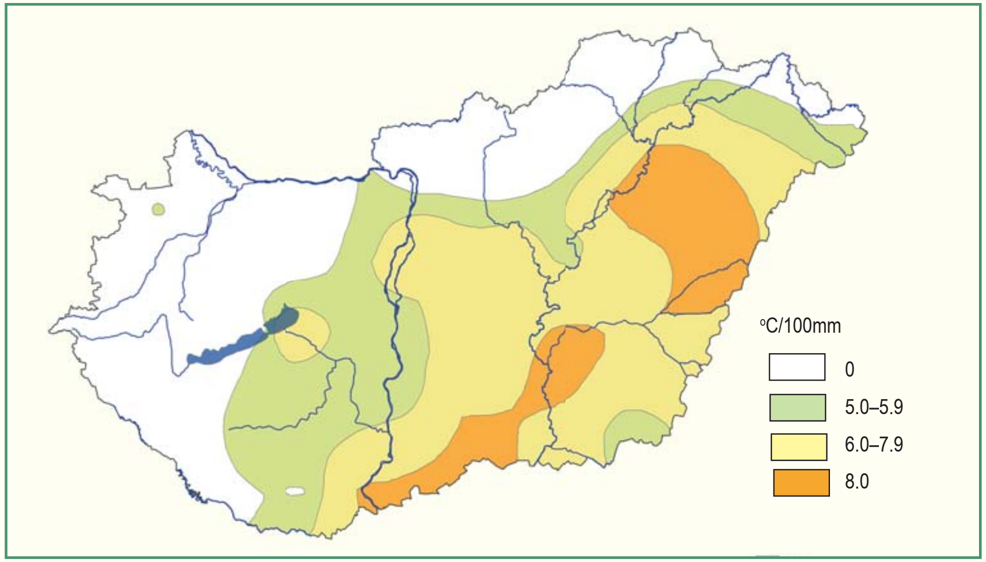
The size of areas exposed to drought is determined by the Pálfai drought index (PDI). The PDI is the quotient of mean temperatures in the period between April and August and the weighted precipitation amount of the period between October and August. The index takes into account the following: number of hot days; length of period with no precipitation; depth of ground water; and changing water demand of agricultural plants.

Figure 3.8.1 Proportion of areas exposed to drought in Hungary



Source: Vituki.

Figure 3.8.2 Territorial distribution of the drought index (PDI) in Hungary, 2009



Source: Vituki – edited by HCSO.

Drought-free areas: PDI< 6°C/100mm; extreme drought: PDI>12°C/100mm.

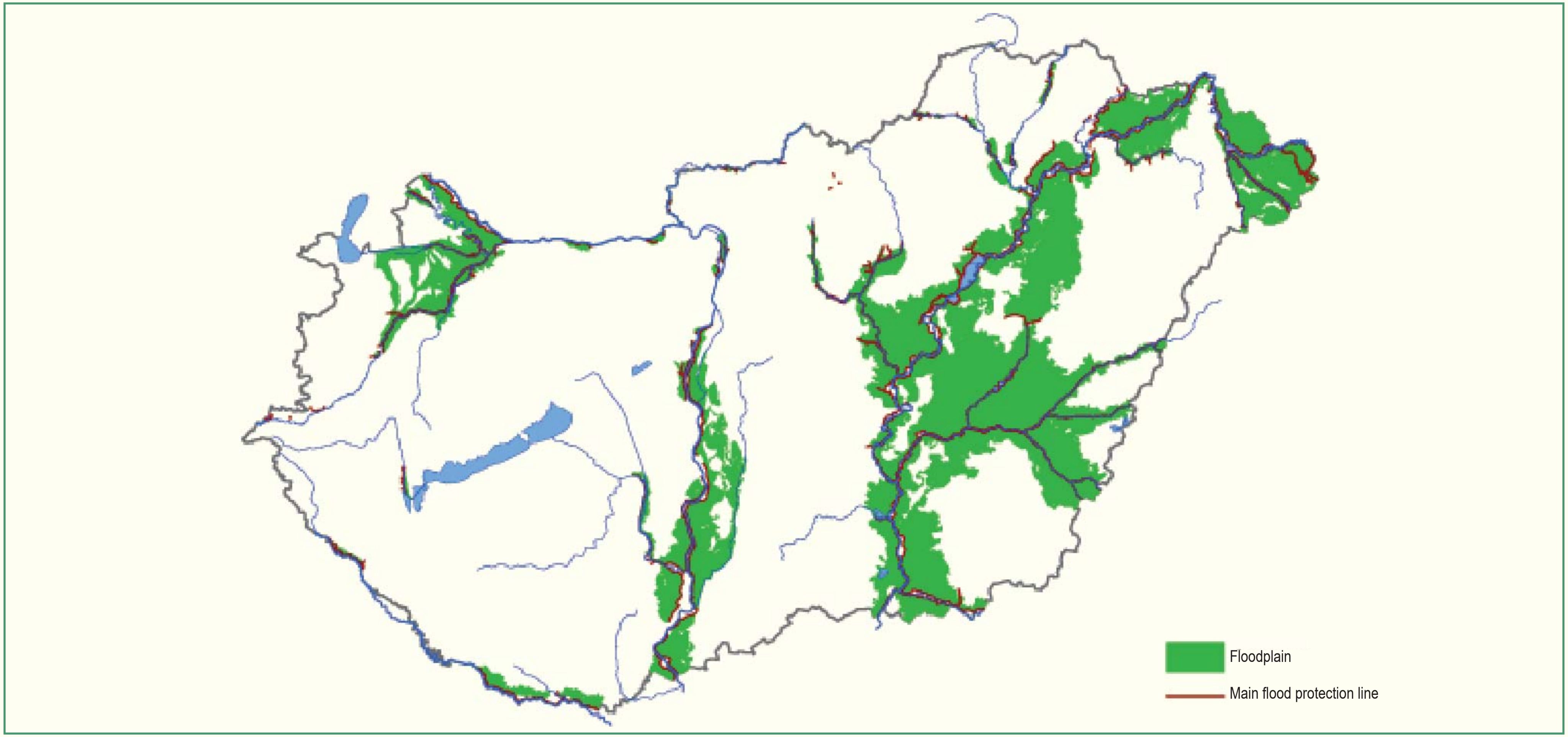
Tables (Stadat)
5.6.2. Areas exposed to drought

3.9 AREAS EXPOSED TO FLOODS AND INLAND INUNDATION

Due to its location, relief and climate conditions, the extent of drought, flood and inland inundation exposure is high in Hungary.

In Hungary the temporal and spatial distribution of water resources is very extreme. Generally there are two main flood periods. Floods in early spring are caused by runoff from snowmelt, while floods in early summer are the consequences of heavy rains.

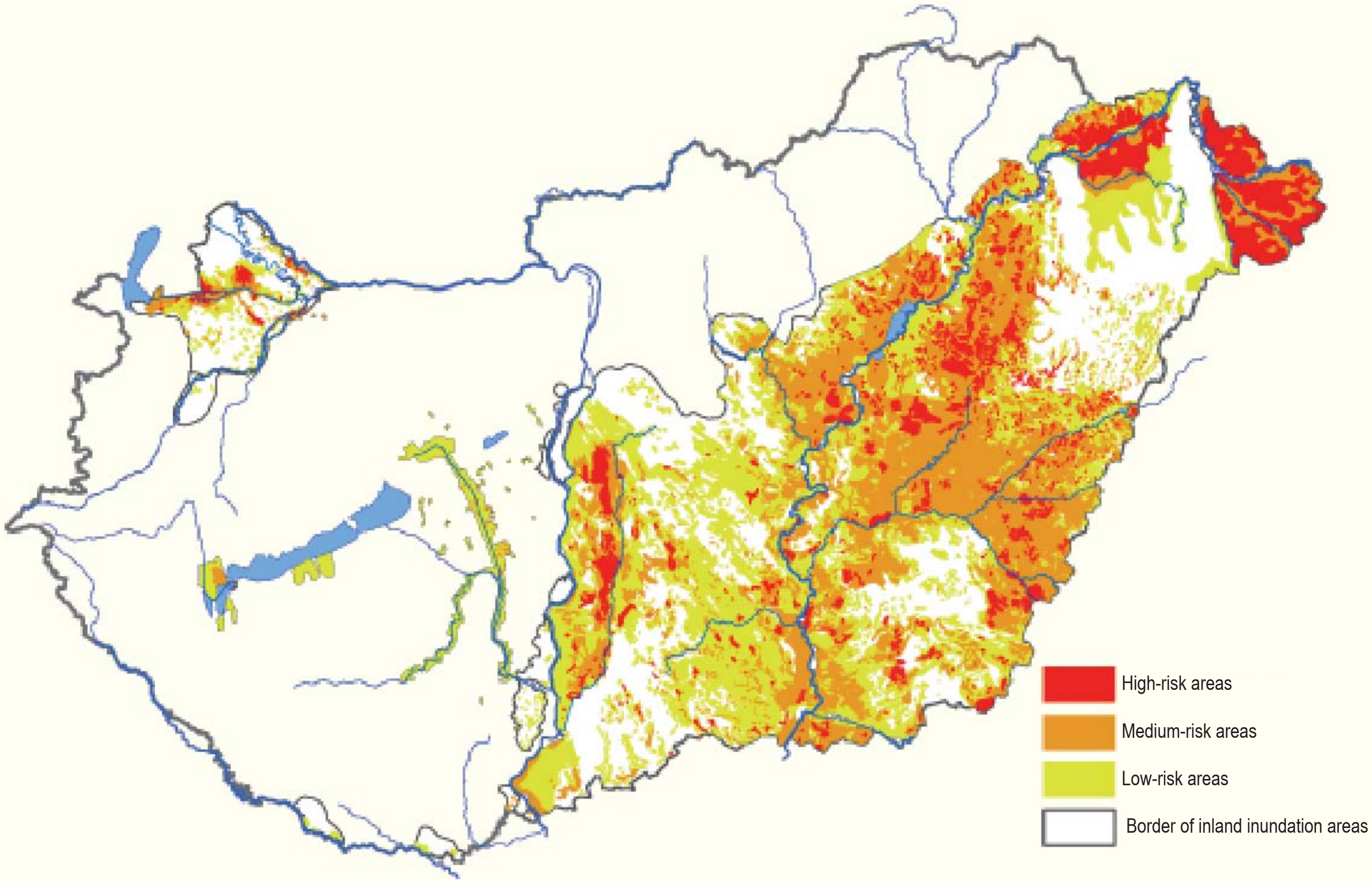
Figure 3.9.1 Areas exposed to floods in Hungary, 2010



Source: National Environmental Institute, Hungarian River Basin Management Plan, 2010 .

Nearly half of Hungary is plain area (44 500 km2) with endorheic lowlands having a significant share. More than 20 000 km2 is threatened by floods, of which 5 610 km2 belong to the river basin of Danube, and 15 641 km2 to the river basin of River Tisza.

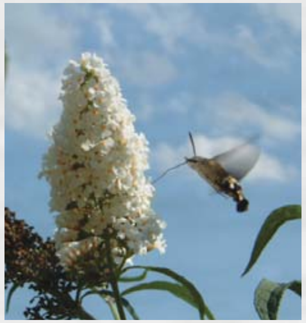
Figure 3.9.2 Areas exposed to inland inundation in Hungary, 2010



Source: National Environmental Institute, Hungarian River Basin Management Plan, 2010.

Around 60% of lowlands in Hungary are exposed periodically to inland inundation year by year.

The goal of nature conservation is to protect biodiversity. Protected species include all the animal, plant, mushroom and lichen species which fall under the protection of any of the legislations in force.
In national parks, nature conservation areas, landscape protection regions as well as in forest and biosphere reserves certain plant species enjoy protection of different degrees as part of the habitat.
One of the requirements of joining the EU was the designation of Natura 2000 territories. Natura 2000 is an ecological network designed to protect animal and plant species and habitats across Europe.
In Hungary, forest areas under the scope of the Act on Forests are registered in the National Forest Database. According to the database around one-fifth (22%, 2 046 ha) of Hungary was covered by forests in 2010. As a result of strict regulations, forest management in Hungary is no longer concerned only with logging but also with sustainable management involving social expectations regarding the conservation of biodiversity, tourism and leisure activities.
As a part of the European Forest Monitoring System, a network is operated within the complex programme of forest protection in Hungary. It consists of grids of 4x4 km, and checks the health condition of Hungarian forests, based especially on defoliation.
There are 6 species of big game and 26 species of small game that can be hunted in Hungary. However, only five of the big game species as well as hare, pheasant and partridge have value with respect to hunting. Game management is to sustain the balance between the increasing game population and the decreasing area of habitat.



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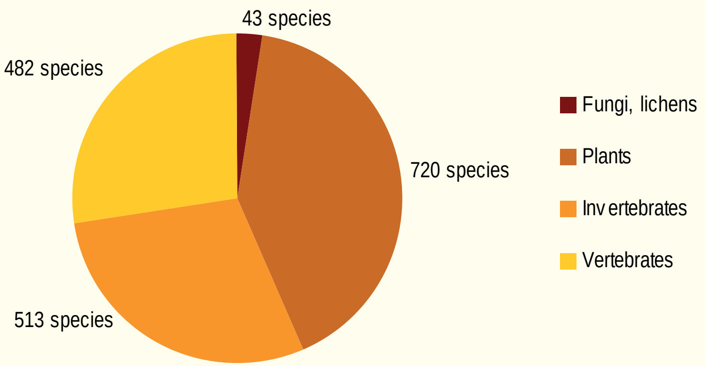
4.1. NATURE CONSERVATION

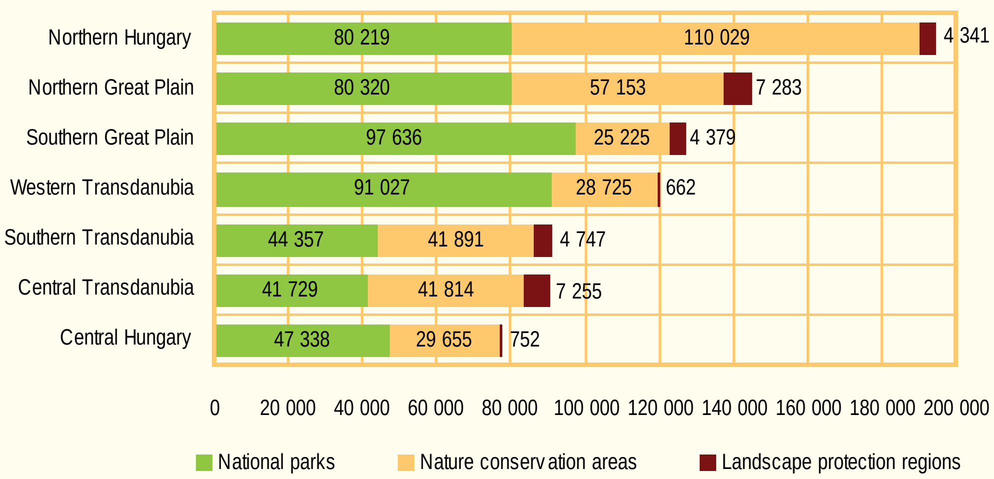
The legal protection of wildlife can be reached in two ways. First, certain species of animals and plants are under protection. Second, they fall under protection as part of protected natural areas, such as national parks, nature conservation areas and landscape protection regions.

Figure 4.1.1 Natural values protected without area, 2010



Source: Ministry of Rural Development.

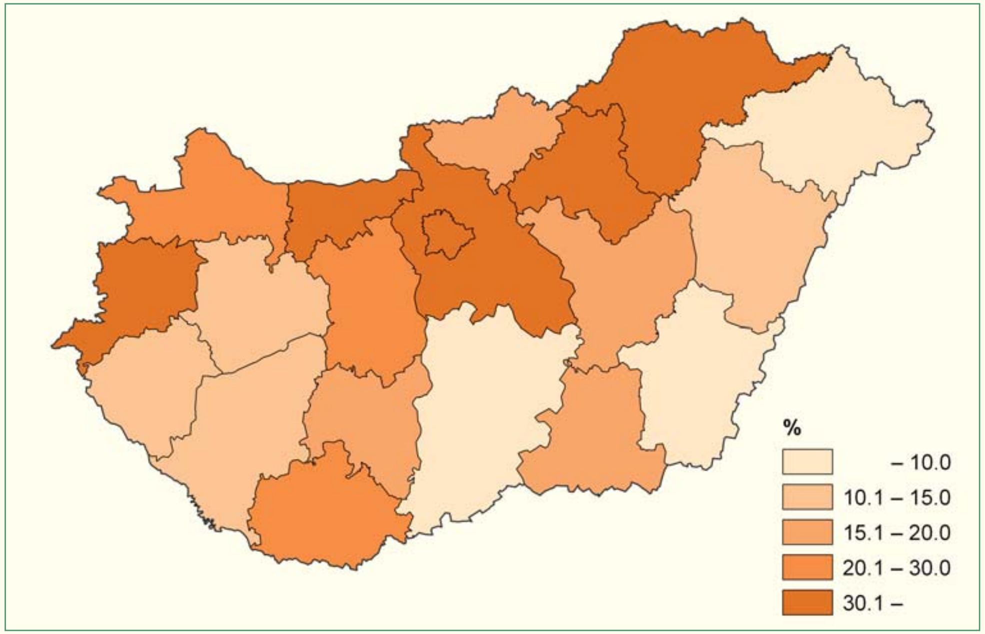
Figure 4.1.2 Protected areas of national significance by regions, 2010



Source: Ministry of Rural Development.

In Hungary there are around 419 927 hectares of protected forests, which make up more than 20% of the total forest area. The planning of the management of forests situated in protected natural areas aims to restore and maintain the natural state of protected forests.

Figure 4.1.3 Share of protected forest areas in total forest area, 2010

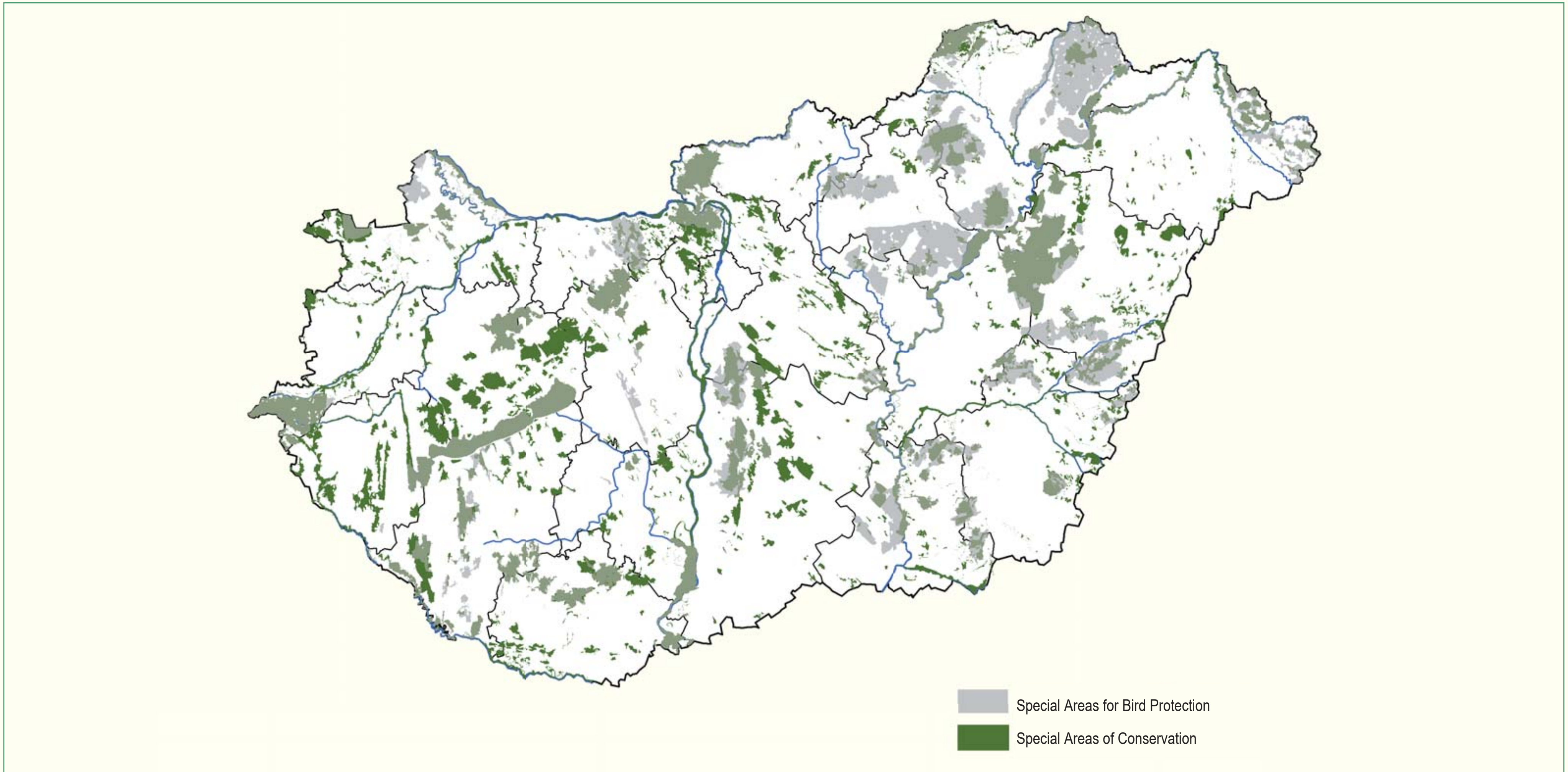


Source: Central Agricultural Office, Forestry Directorate.

The proportion of protected forest areas in the northern part of Hungary is higher than the average.

Natura 2000 areas were designated for the protection of biodiversity and the restoration or the maintenance of the natural state of the concerned areas. The network comprises Special Areas for Bird Protection (classified under the Birds Directive) and Special Areas of Conservation (classified under the Habitats Directive). 105 different species of animals, 36 different species of plants and 46 different types of habitats were identified in the designated Natura 2000 areas. 55 Special Areas for Bird Protection are to ensure the protection of bird species of European significance living in our country as well as that of migrating birds. The number of Special Areas of Conservation is 467. Natura 2000 areas total some 1 950 thousand hectares, 39% of which is already protected.

Figure 4.1.4 Natura 2000 protected areas



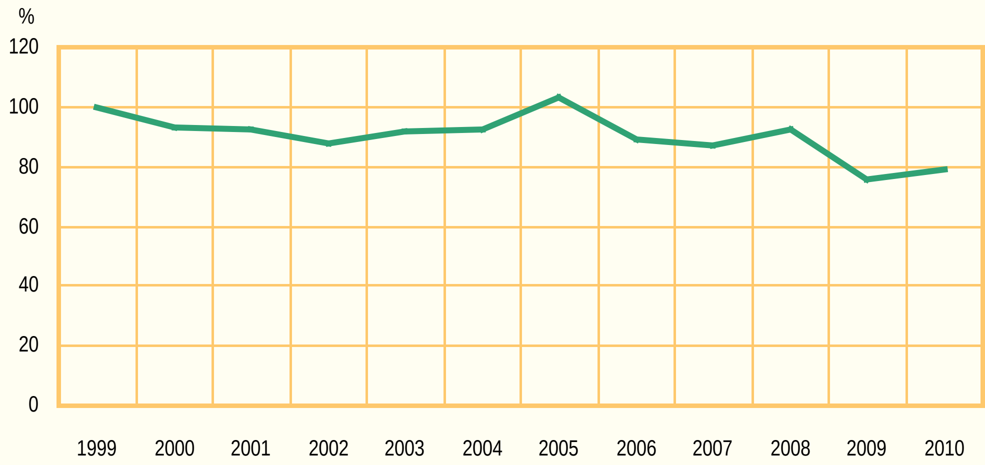
Source: Ministry of Rural Development.

Tables (Stadat):
5.2.2. Protected natural areas
5.2.3. Protected natural values

4.2 A POPULATION TRENDS OF FARMLAND BIRDS

In Hungary, the monitoring of farmland birds has been carried out by the Hungarian Ornithological and Nature Conservation Society (MME) since 1999 involving almost a thousand volunteer counters. The survey covers 2% of the country's area in every year. This indicator is an aggregated index based on the results of the monitoring programme on farmland species dependent on agricultural land for nesting or feeding. It reflects the state of habitats in agricultural areas and the sustainability of farming practices.

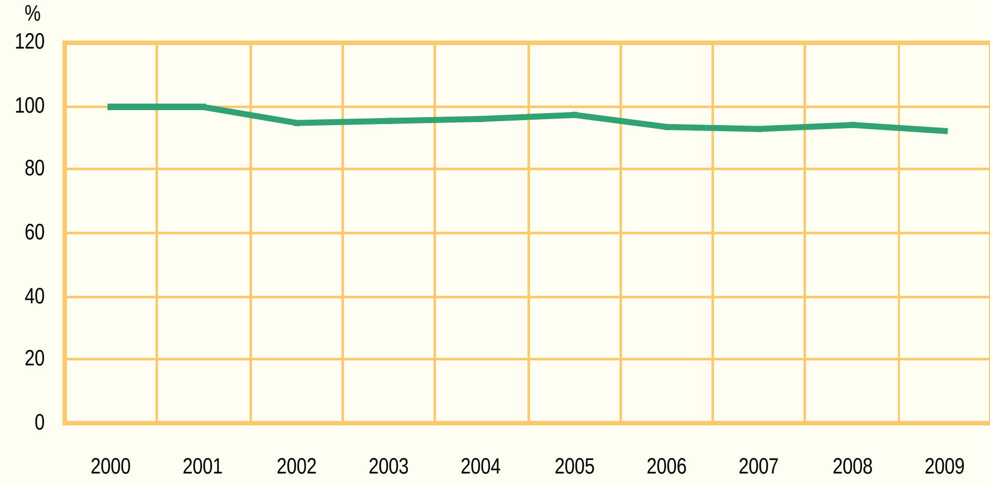
Figure 4.2.1 Change in the population of farmland birds (1999=100)



Source: BirdLife Hungary (MME).

This index shows the changes in the population of farmland birds compared to 1999. The index shows stagnation until 2005, but it has been decreasing since then, with lows in 2009 and in 2010.

Figure 4.2.2 Change in the population of farmland birds in the EU-27 (1999=100)



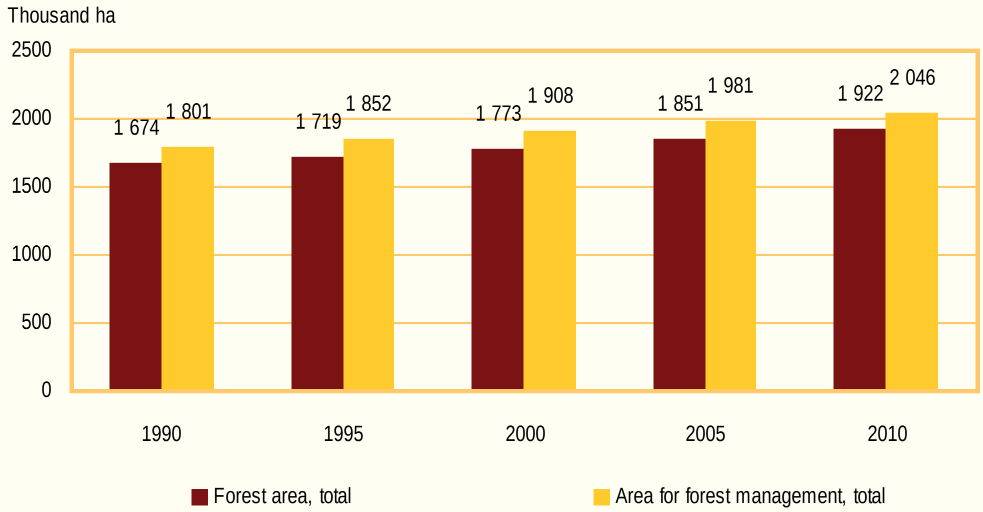
Source: Eurostat.

Similarly, the index for the EU-27 shows a decreasing tendency compared to 2000.

4.3 FOREST AREA

The National Forest Plan (2006) recommends a forest coverage of 27% in the long run (35–50 years). In 2010 forest management areas account for 22% of the area of Hungary, nearly 21% of which is forest area.

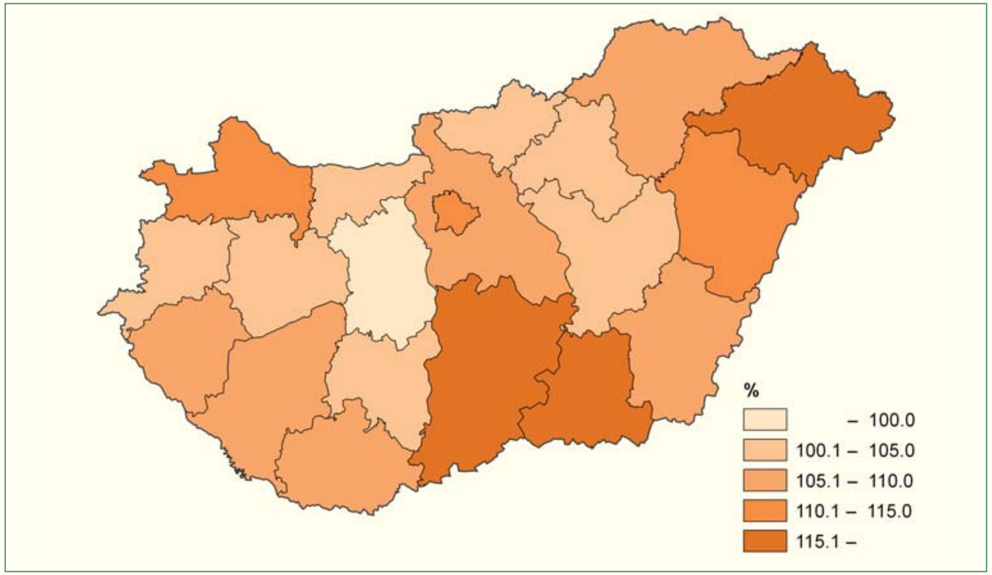
Figure 4.3.1 Total forest area



Source: Central Agricultural Office, Forestry Directorate.

Owing to more intense afforestation and tree planting, forest area grew by 14 thousand hectares each year over the last decade. As a result of this, the area under forest management is now above 2 million hectares.

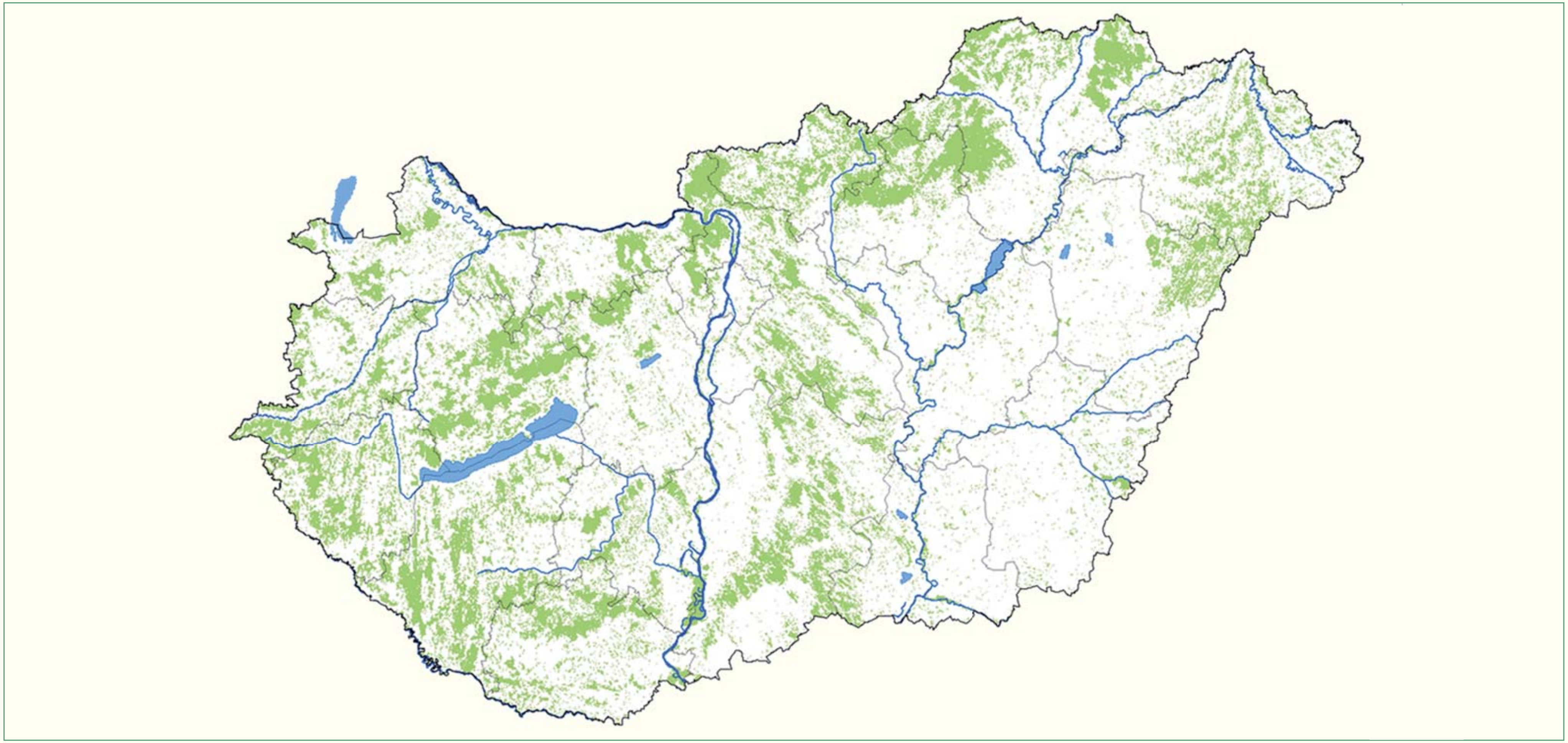
Figure 4.3.2 Change in forest area, 2010



Source: Central Agricultural Office, Forestry Directorate.

The last ten years saw the most significant plantings in the two regions of the Great Plain. However, forest coverage there is still below the average of all the regions.

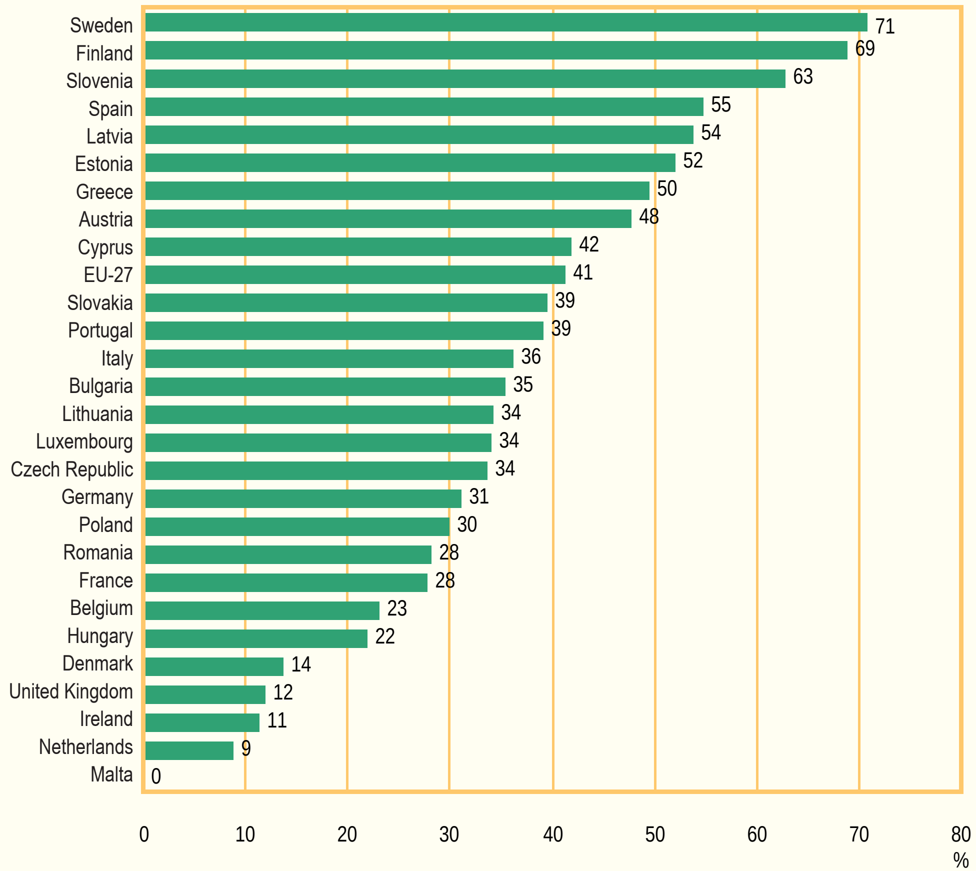
Figure 4.3.3 Forest areas in Hungary, 2010



Source: Central Agricultural Office, Forestry Directorate.

Due to the favourable geographical conditions (over 400 m of altitude above sea level, annual precipitation more than 600 mm), the forest cover of our medium-high mountains is well above the average (29%). Target values (25%) are reached everywhere, with the exception of regions of the Great Plain.

Figure 4.3.4 Forest cover in the EU, 2010



Source: Central Agricultural Office, Forestry Directorate.

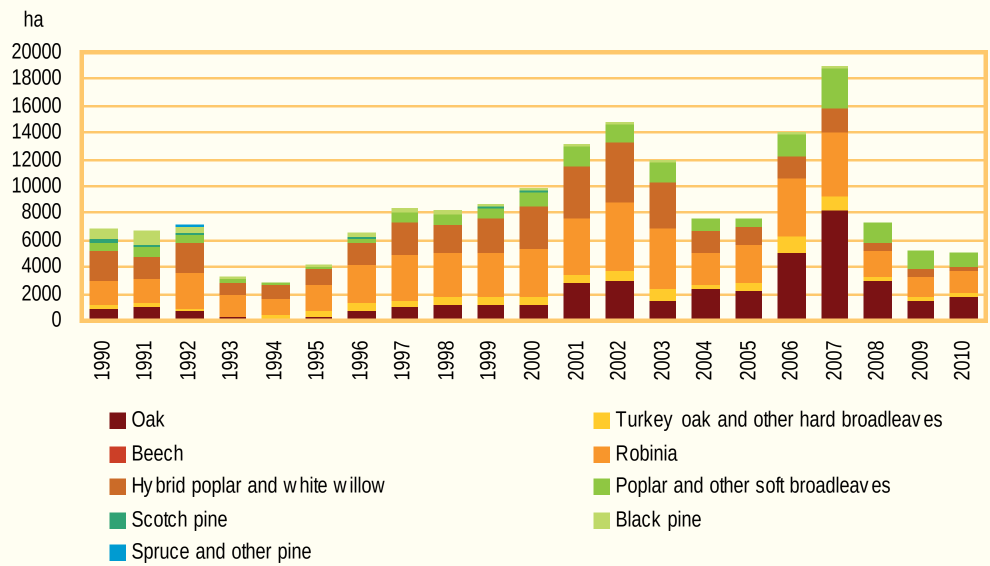
The area under forest management grew by 3.5 million hectares (a 2% increase) in the EU between 2000 and 2010. The average of Hungary was 9 percentage points higher than the EU average.

Tables (Stadat):
5.1.1. Distribution of forest area by primary goals, 1 January
5.1.2. Distribution of stocked forest area by tree species and age group, 1 January

4.4 AFFORESTATION, TIMBER ASSETS

Over the past ten years around 120 thousand hectares of tree planting has taken place, resulting in a 7% growth in forest cover. Although the proportion of forests in Hungary continues to increase, it is still low in an international comparison (35% in the EU). A target of over 25% forest cover by 2015 was set by the National Forest Plan.
Forests account for 45% of natural vegetation in Hungary, within which a relatively low forest cover and a relatively high proportion of forest plantations with non-native species can be observed. 57% of the total forest area is made up of indigenous and 43% of naturalized or cloned tree species.

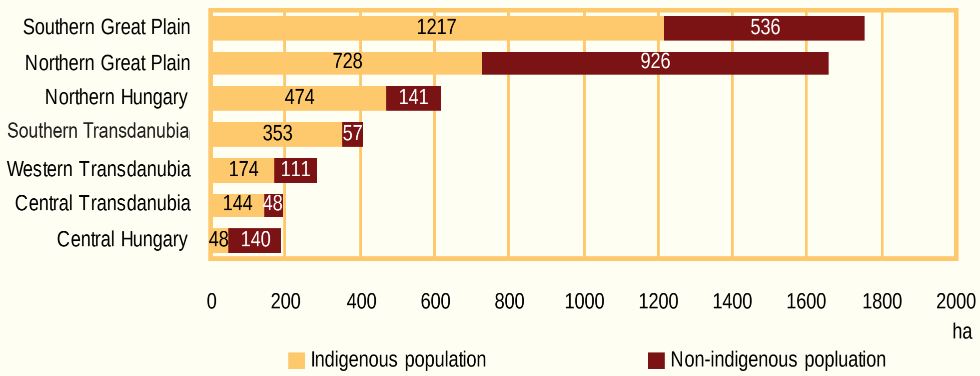
Figure 4.4.1First afforestation by groups of tree species



Source: Central Agricultural Office, Forestry Directorate.

Indigenous trees (beech, oak, lime, ash, elm) provide flora and fauna with better living conditions. For that reason, Act on Forests states that plant populations as natural as possible have to be created using indigenous trees.

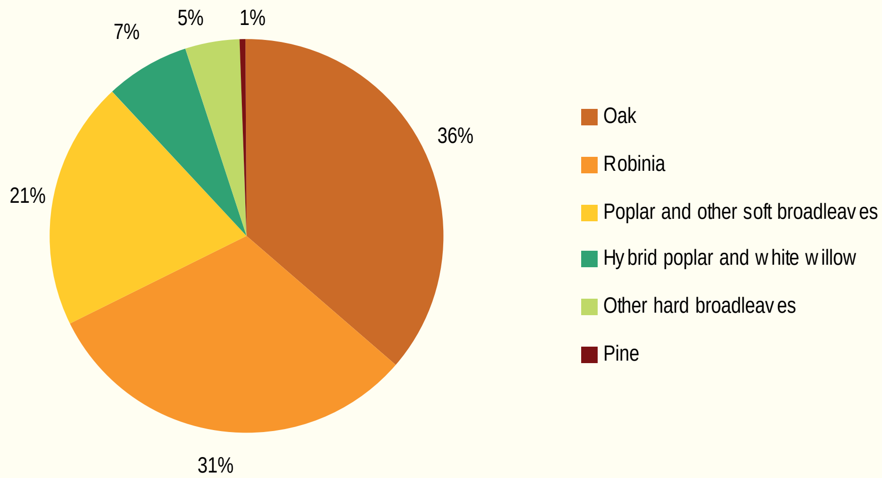
Figure 4.4.2 First afforestation by regions, 2010



Source: Central Agricultural Office, Forestry Directorate.

The most significant forest plantings were in the regions of Northern and Southern Great Plain in 2010. Indigenous species of trees were preferred during the planting.

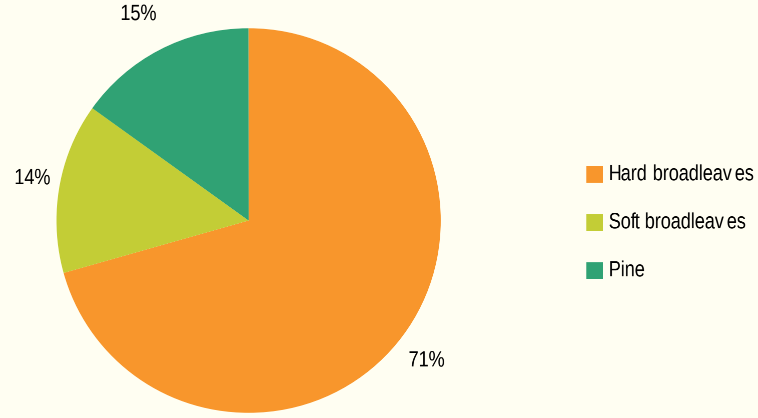
Figure 4.4.3 First afforestation by groups of tree species, 2010



Source: Central Agricultural Office, Forestry Directorate.

Though the planting of non-indigenous robinia trees is still widespread, the combined share of oak and other indigenous species is higher.

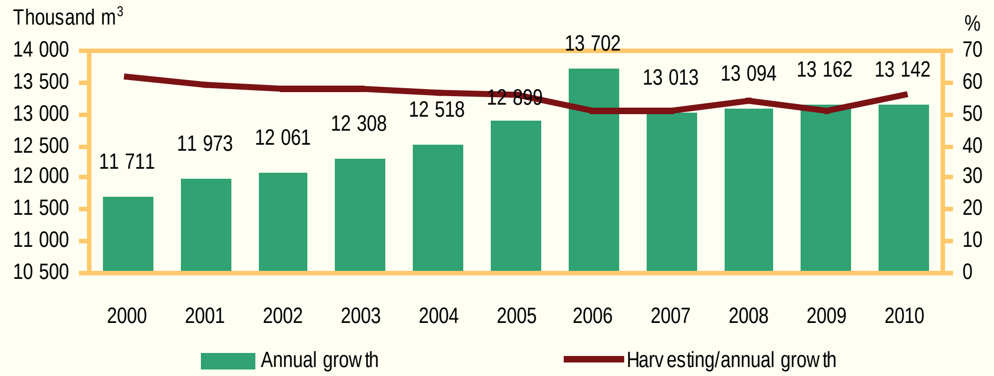
Figure 4.4.4 Timber assets, 2010



Source: Central Agricultural Office, Forestry Directorate.

The volume of standing timber was 359 million m^3 in 2010, of which hard broadleaved species accounted for two-thirds.

Figure 4.4.5 Net annual increment and rate of wood harvesting



Source: Central Agricultural Office, Forestry Directorate.

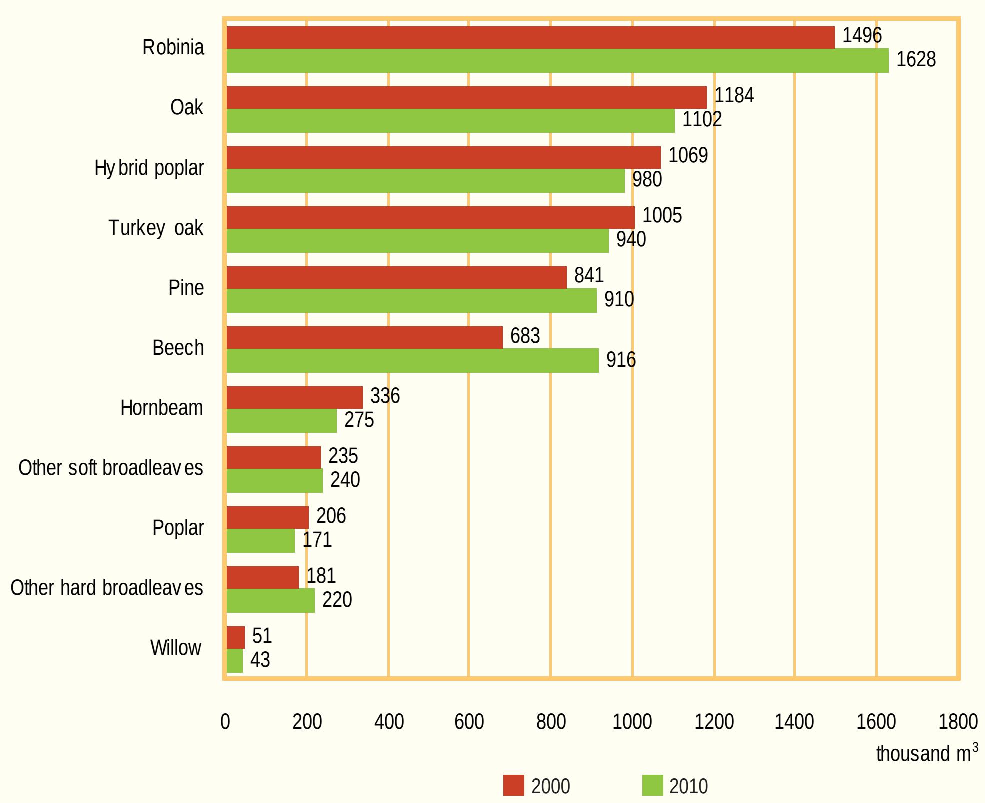
Increment was higher than timber extraction, resulting in an increase of 34 million m^3 of timber assets from 2000 to 2010. Timber assets increased by some 0.5%–1.5% a year.

Tables (Stadat):
5.1.4. Afforestations, plantations, regenerations

4.5 BALANCE OF WOOD HARVESTING

Sustainable forest management set out by Act on Forests covers also the sustainable use of forests and forested areas preserving biodiversity, productivity and replenishing capacity. Sustainable forest management is implemented based on proper forest management plans in which wood harvesting is regulated by forest plan rules.

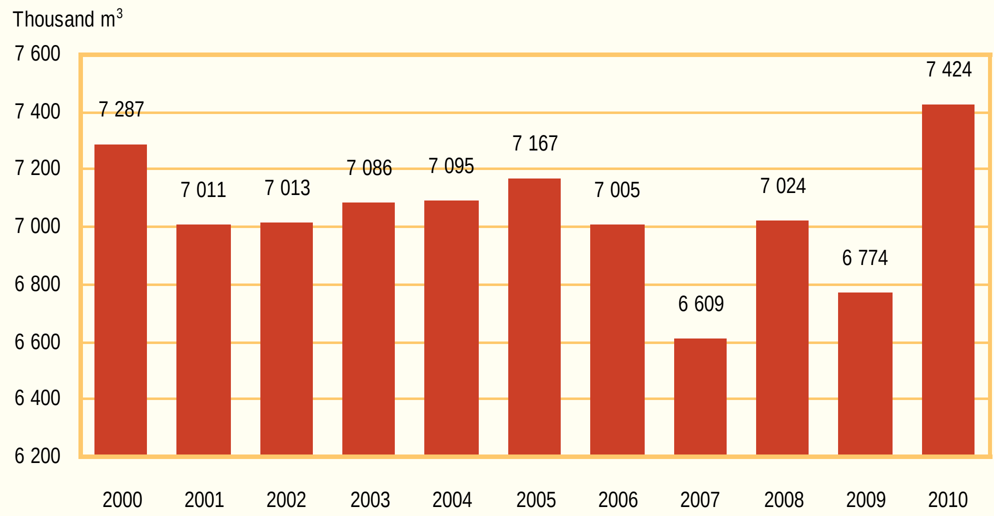
Figure 4.5.1 Changes in wood harvesting by groups of tree species



Source: Central Agricultural Office, Forestry Directorate.

Out of tree species robinia trees with the shortest felling age as well as not properly acclimatised pine trees were harvested at the highest rate.

Figure 4.5.2 Changes in wood harvesting



Source: Central Agricultural Office, Forestry Directorate.

The sustainable development of forestry depends on the balance of wood harvesting. The monitored period saw a sustained increase in increment and a varying wood production of between 6.6 million and 7.4 million m^3 from 2000.

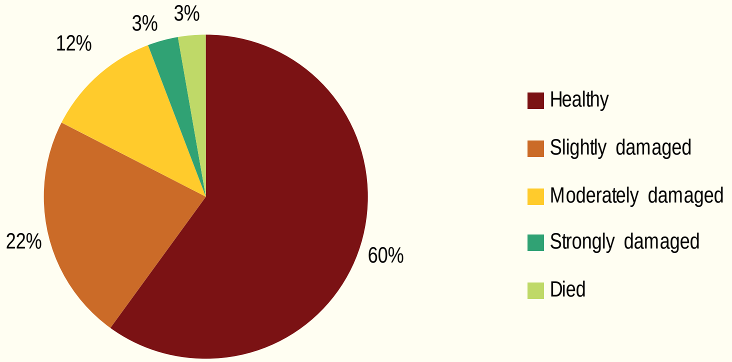
Tables (Stadat):
5.1.3. Logging by tree species

4.6 HEALTH CONDITIONS OF FORESTS

When elaborating its forest management strategy the EU, in addition to formulating guidelines for sustainable forest management and stimulating forest renewal, put a great emphasis on enhancing the efficiency of plant health monitoring and stimulating the research of forest protection methods.

Examining the last decade, it can be stated that forest health based on defoliation has not changed significantly. However, there have been small fluctuations. Monitoring data suggest that the state of our forests is similar to the EU average. This results from a forest management system based on prudent planning, careful monitoring and traditions.

Figure 4.6.1 Health conditions of forests based on defoliation, 2010



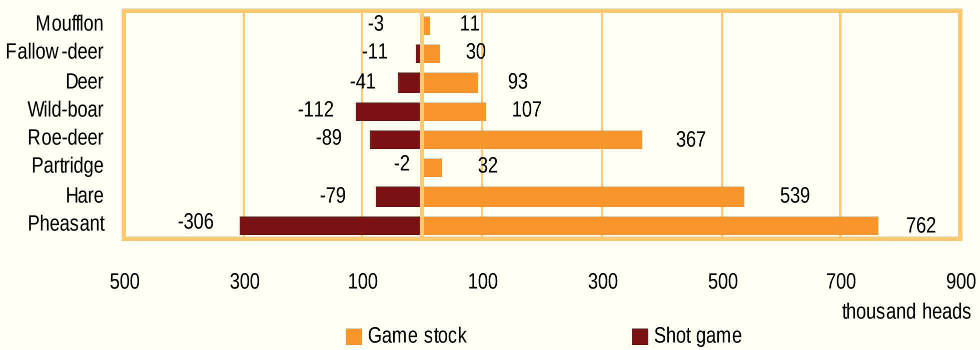
Source: Central Agricultural Office, Forestry Directorate.

Tables (Stadat):
5.1.5. Health conditions of the forests

4.7 GAME MANAGEMENT

In Hungary, the National Game Management Database is in charge for publishing statistics and making reports on game population and the general state of game management. The establishment and operation of the database were enacted. The main goal of game management is to maintain the balance between the growing game population and the shrinking habitat.

Figure 4.7.1 Game management, 2010



Source: Ministry of Rural Development.

Increasing game damage made it necessary to reduce deer population. Deer herds also appeared in the parts of the Great Plain where forests appropriate for them have been planted over the past decades.

The number of wild-boars has gone up because the forest cover has increased over the past ten years and wild-boars adapt well to land-use changes. Consequently, a reasonable reduction of the wild-boar population is needed to ensure the sustainability of agriculture and forest management.

The fallow-deer population is estimated at around 30 thousand heads. Its quality is excellent even in a European comparison.

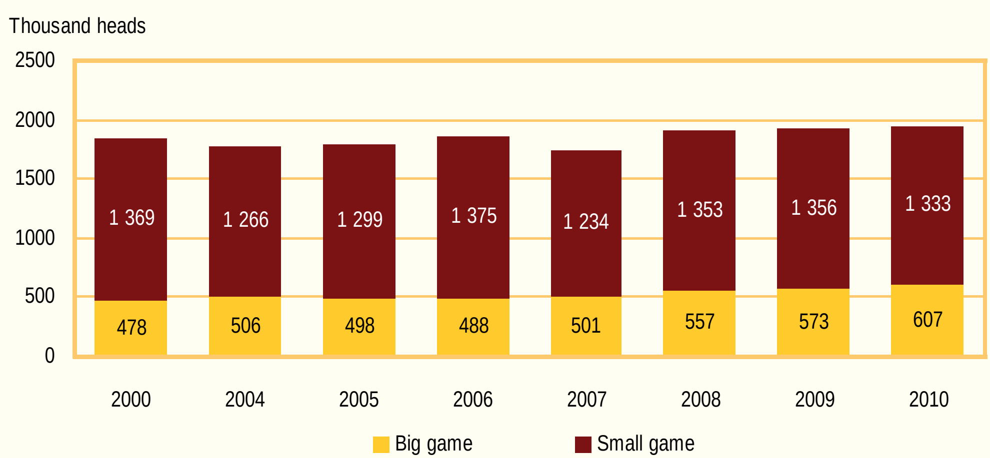
The protection of the roe-deer population of 367 thousand heads is a priority task taking into account the permanent disturbance resulting from the fragmentation of the post-privatisation forest areas.

There are measures to decrease the mouflon population intentionally introduced in the 1970s and 1980s: an increase was seen in the number of shoots, reducing the damage caused in protected areas. The mouflon population was estimated at nearly 11 thousand heads in 2009.

Out of the three most abundant small game species in Hungary, fluctuation was seen in the wildfowl population and an increase in the hare population.

The population of huntable indigenous species, i.e. deer (85 thousand heads), wild-boar (96 thousand heads) and roe-deer (340 thousand heads) also increased. A decrease was recorded in the area of forests of high carrying capacity and an increase in that of forests with less favourable endowments.

Figure 4.7.2 Game population



Source: Ministry of Rural Development.

Tables (Stadat):
5.2.1. Game farming

The control of waste management in Hungary is based on legal rules. Technical requirements for waste management, applicable economic incentives and sanctions, obligations for waste producers and waste handlers, and official licensing and control tasks are set out by rules and regulations. The European Union modified its waste management guidelines, entailing changes in the related Hungarian act. The new rules will come into force in 2012.

The Waste Information System (HIR), being a part of the National Environmental Information System, is a data inventory for waste management. The inventory of HIR, being in operation since 2004 and receiving around 25 000 data entries a year, is based on the European Waste Catalogue (EWC). Information on waste generation and treatment can be accessed by EWC codes. Both waste producers and treatment enterprises are obliged to supply data. Waste producers are subject to supply data on the amount of generated waste, missing volumes are estimated by sampling.

The chapter also contains information on material flows of the nation.

5.1 WASTE GENERATION

5.2 WASTE TREATMENT

5.3 MATERIAL FLOW

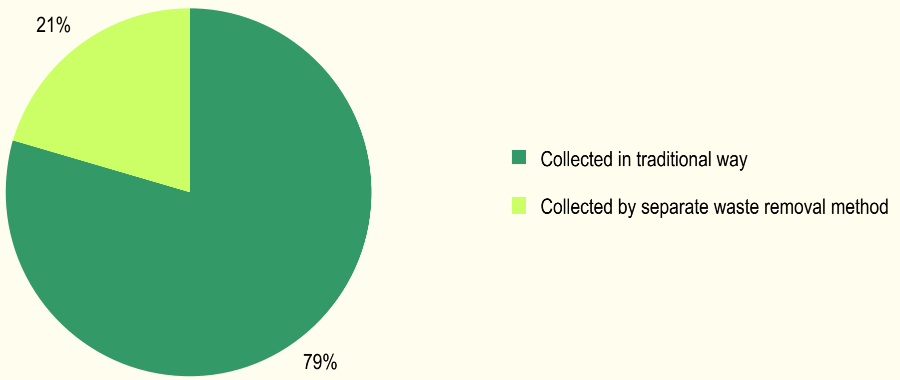
List of figures

5.1 WASTE GENERATION

The production and consumption of goods result in waste generation that either directly or indirectly threatens the environment. Based on the source of waste generation, waste can be classified as municipal waste originating from distribution and consumption activity or as production waste originating from production or service activity. In the latter group hazardous and non-hazardous wastes are distinguished by their impact on the environment.

Municipal solid waste

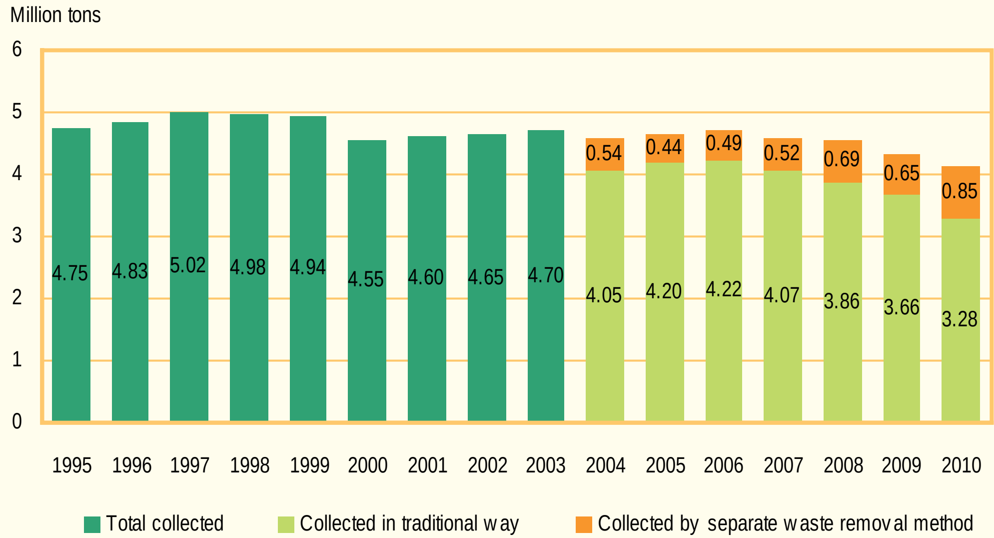
Figure 5.1.1 Municipal solid waste by mode of collection, 2010



Source: Ministry of Rural Development (MoRD), Waste Information System.

The development of selective waste collection is indispensable for recycling. A target proportion of 50% of recycling should be met in the case of household wastes and other similar glass, metal, plastic and paper wastes by 2020 in policy areas laid down in the EU regulation on waste management.

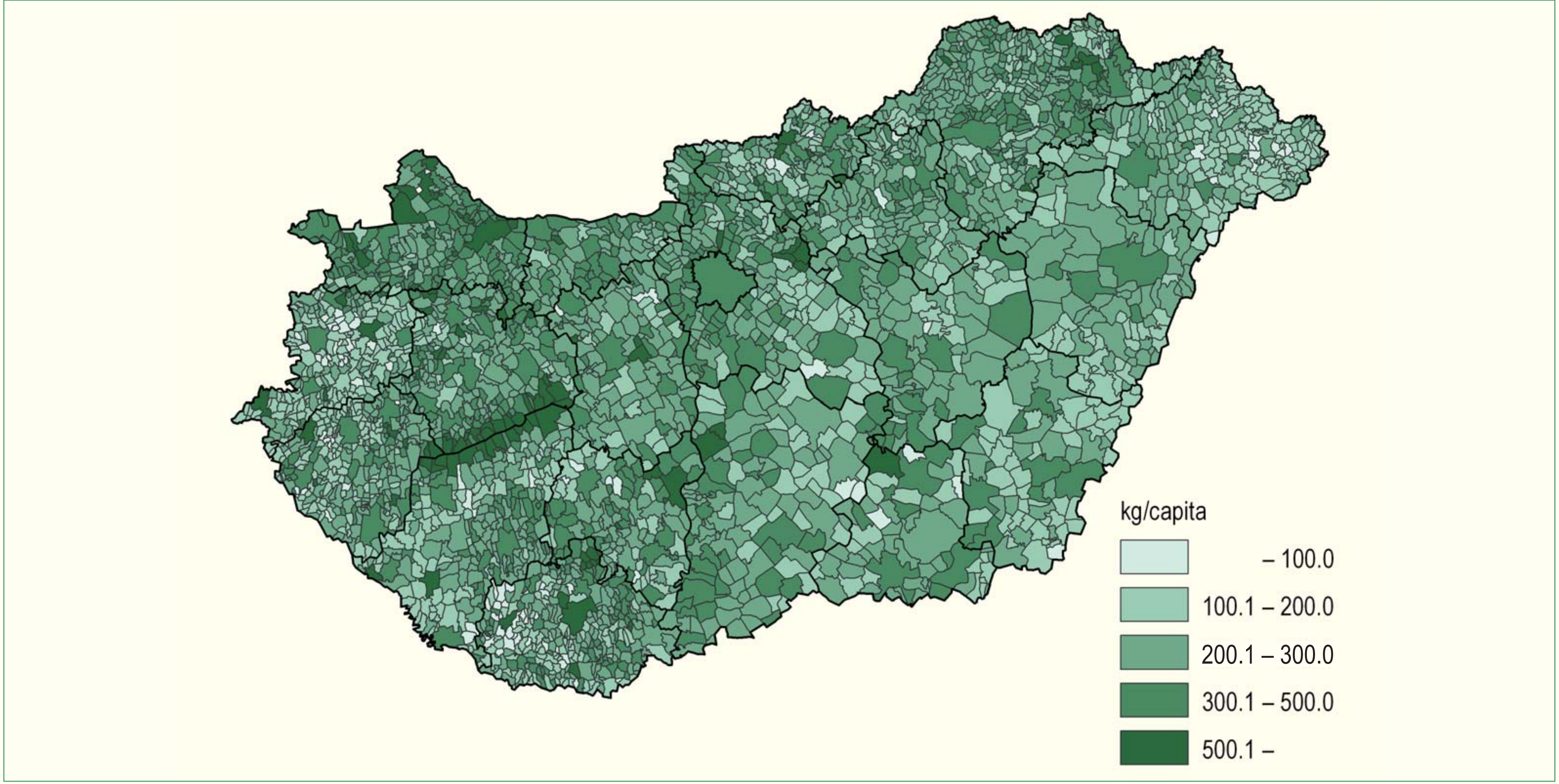
Figure 5.1.2 Volume of generated municipal solid waste



Source: HCSO, MoRD, Waste Information System.

The volume of generated municipal solid waste has decreased year by year since 2006, while the volume of waste collected separately has grown over the same period (except for 2009).

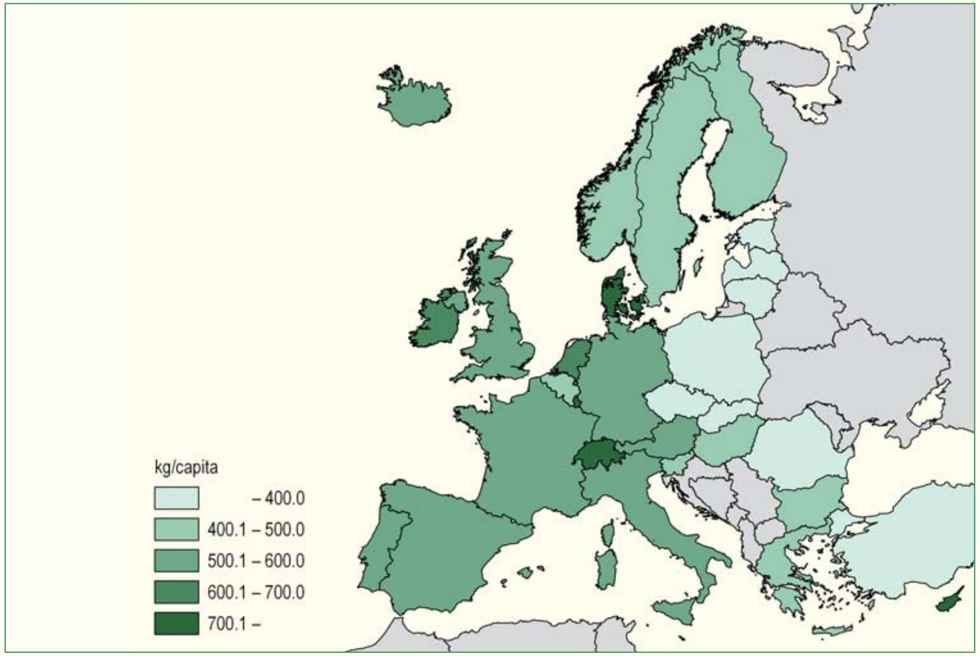
Figure 5.1.3 Volume of generated municipal solid waste removed by public services, 2010



Source: MoRD, Waste Information System.

In Hungary, settlements around Lake Balaton as well as some settlements with significant tourism were positive outliers based on the volume of municipal solid waste collected per capita.

Figure 5.1.4 Per capita volume of municipal solid waste generated in European countries, 2009



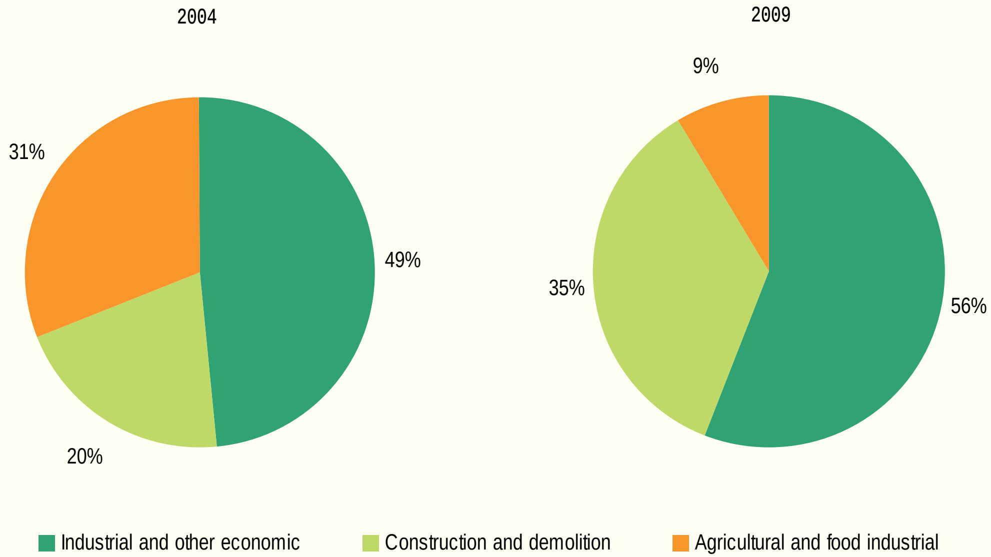
Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

One of the reasons for the regional differences of this indicator is that consumption patterns in the new member states – East-Central European countries – are different from those in Western Europe. Accordingly, there is a lower per capita volume of municipal waste in the former than in high-income Western European countries.

Tables (Stadat):
5.5.2. Amount of waste types according to waste generation

Other non-hazardous wastes

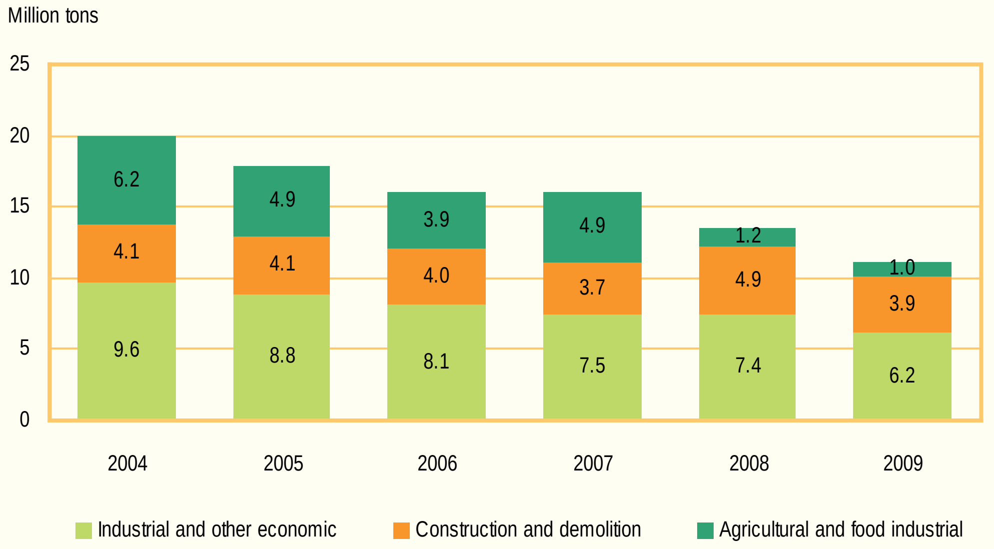
Figure 5.1.5 Distribution of other non-hazardous waste generated



Source: MoRD, Waste Information System.

A significant change can be seen in the composition of other non-hazardous wastes: agricultural and food industrial wastes accounted for a much lower proportion in 2009 than in the base year of this period.

Figure 5.1.6 Volume of other non-hazardous wastes



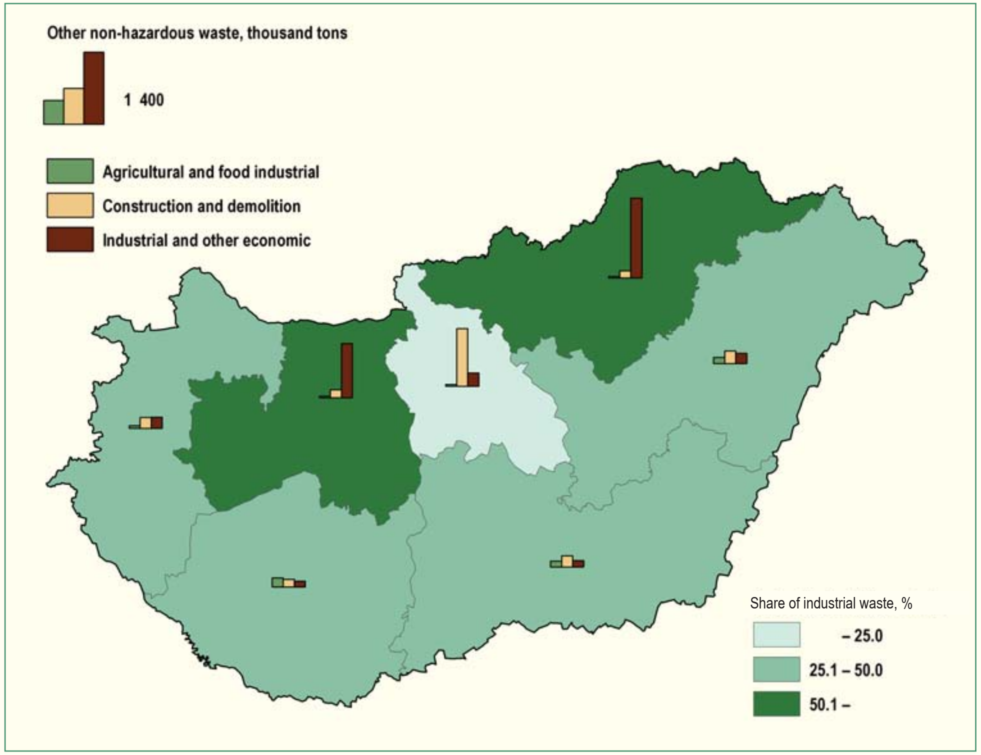
Source: MoRD, Waste Information System.

As a result of methodological changes in 2008, only the volume of manure as well as animal and vegetable wastes effectively qualified as wastes is classified into the group of agricultural and food industrial wastes. This resulted in a significant decrease in years after 2007.

The volume of industrial wastes continued to decrease during this period as a consequence of a decline of major waste producing sectors (e.g. mining, metallurgy), an increasing share of sectors with lower raw material needs in production and the modernization of production processes.

The volume of generated construction and demolition wastes was mainly influenced by changes in construction investments.

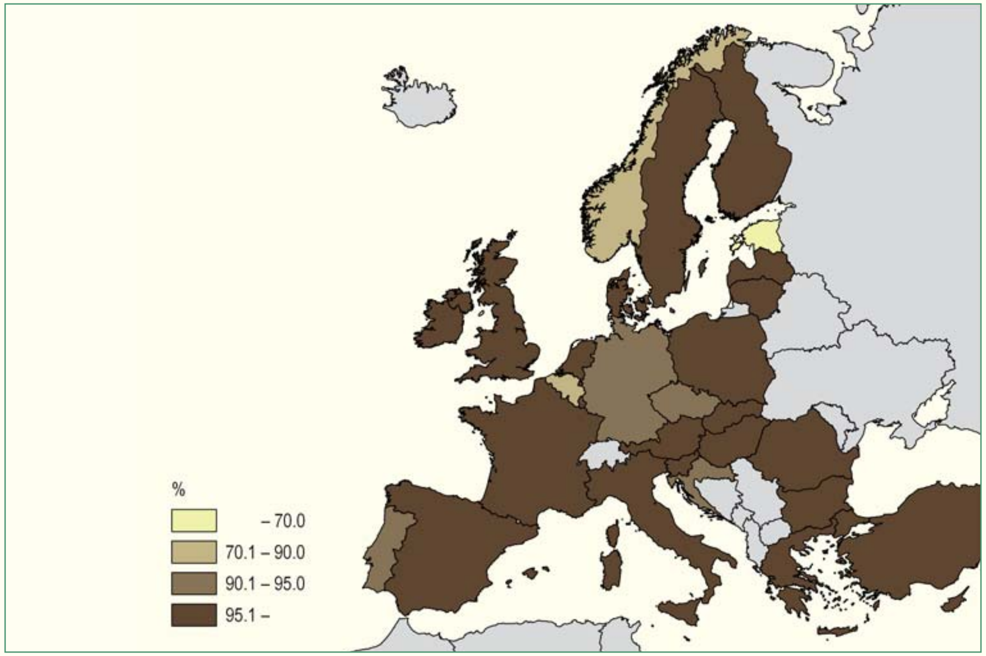
Figure 5.1.7 Regional distribution of other generated non-hazardous waste, 2009



Source: MoRD, Waste Information System.

Concerning demolition and construction wastes Central Hungary was a positive outlier because considerable volumes of – primarily – demolition wastes were generated during construction works in the capital (e.g. metro line 4).

Figure 5.1.8 Share of generated non-hazardous waste of total generated waste in European countries, 2008

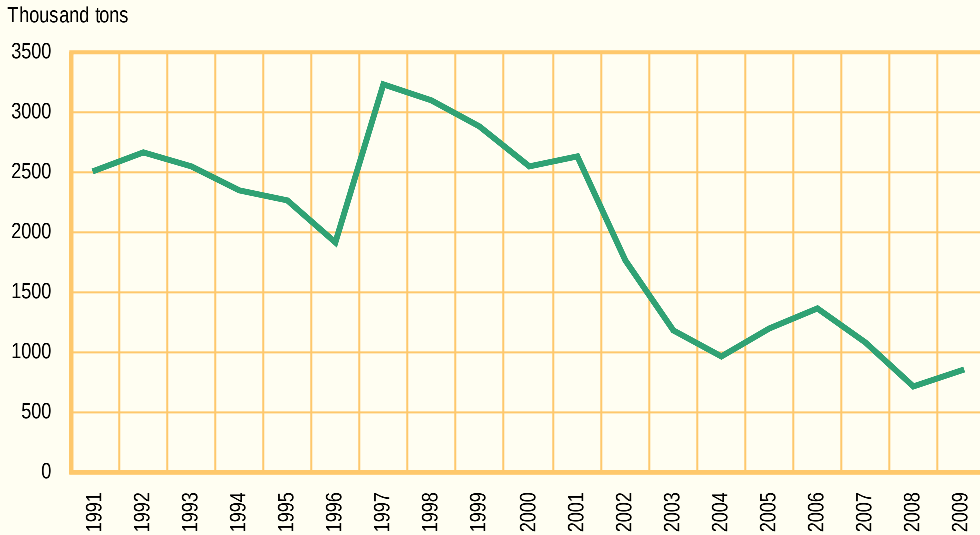


Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Iceland, Macedonia, Moldova, Montenegro, Russia, Serbia, Switzerland and Ukraine.
Source: Eurostat.

Non-hazardous wastes account for over 95% of the total of wastes in most EU countries.

Hazardous waste

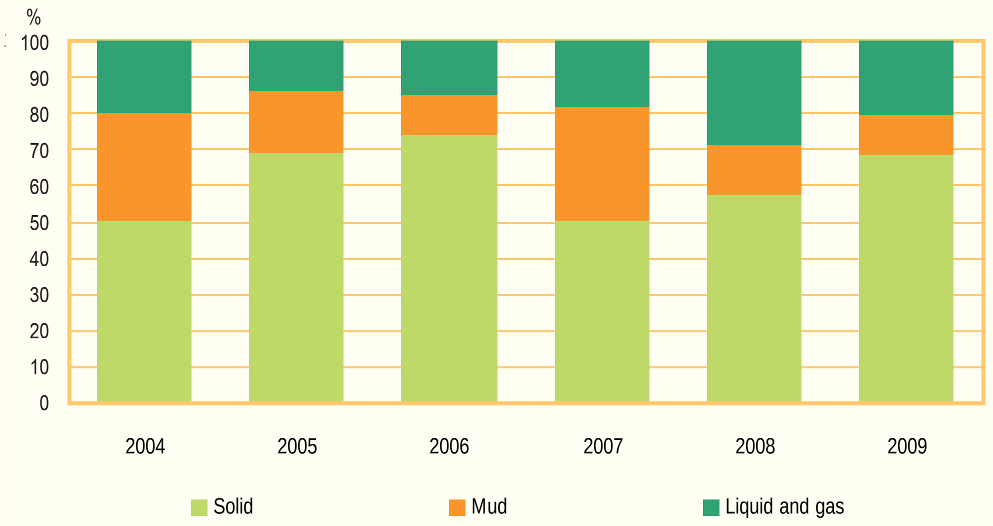
Figure 5.1.9 Generation of hazardous waste



Source: HCSO, MoRD, Waste Information System.

The slag of certain power plants was qualified as hazardous waste, resulting in a sharp increase in the volume of hazardous wastes in 1997. Although the decreasing tendency of the last decade resulted mainly from a fall in production, there were methodological changes as well. According to the European Waste Catalogue, applied in the records from 2002, several types of waste (e.g. those of animal origin, medical wastes) have not been qualified as hazardous waste. In certain years (2005, 2006), when hazardous waste included polluted soil originating from remediation activities, interruptions were observed in this decrease.

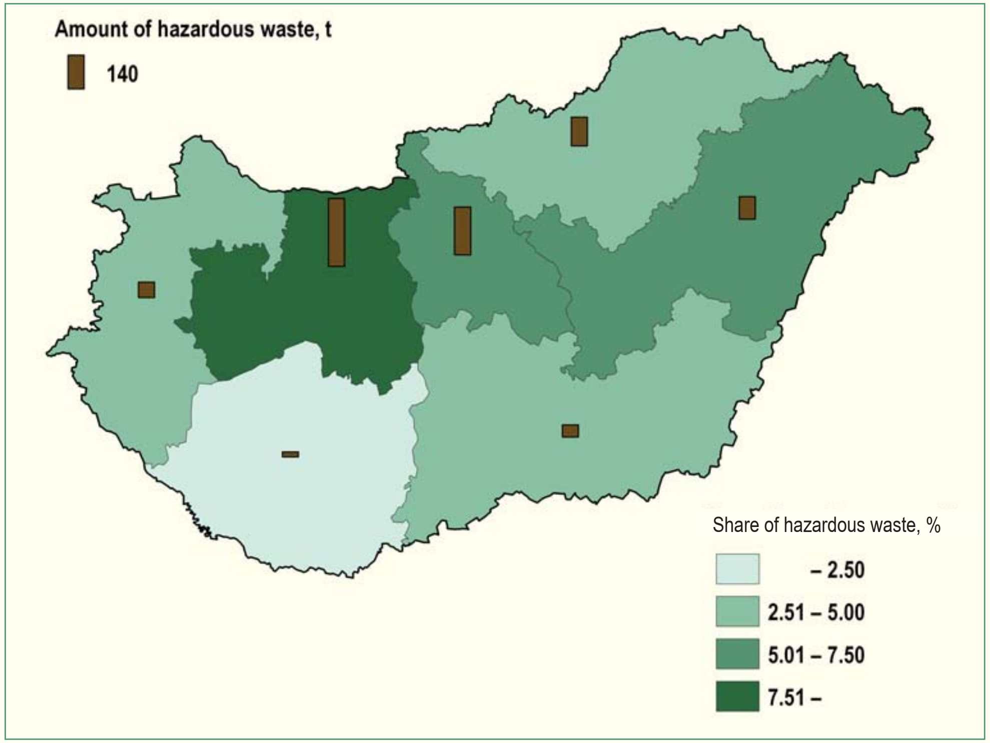
Figure 5.1.10 Volume of hazardous waste by solidity



Source: MoRD, Waste Information System.

The monitored period saw changes in the composition of hazardous wastes by solidity but solid hazardous wastes accounted for the highest proportion in each year.

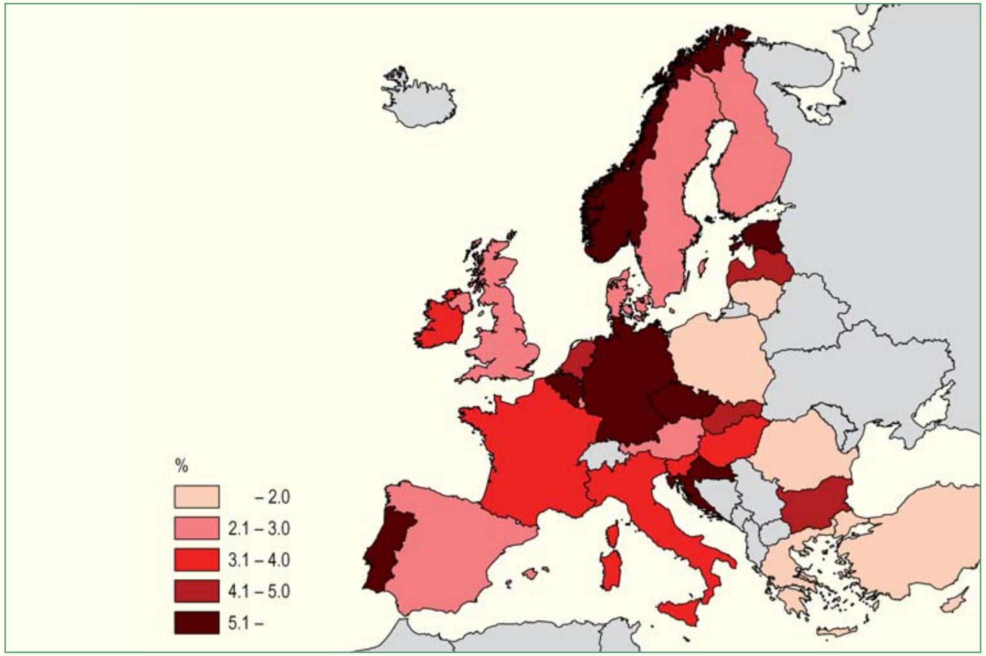
Figure 5.1.11 Volume of generated hazardous waste, share of total waste generation, 2009



Source: MoRD, Waste Information System.

Higher proportions of hazardous waste generation in some regions are due to mining and chemical industrial activities.

Figure 5.1.12 Share of hazardous waste of total waste generation in European countries, 2008



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Iceland, Macedonia, Moldova, Montenegro, Russia, Serbia, Switzerland and Ukraine.
Source: Eurostat.

In the total volume of waste generation the share of hazardous waste was the highest in Estonia, Norway and Belgium. Underlying driving forces are country-specific: in Estonia hazardous waste from electricity, gas, steam and air conditioning supply is dominant, in Norway the major part of hazardous waste originates from oil extraction and processing, while in case of Belgium a large volume of construction and demolition waste was generated.

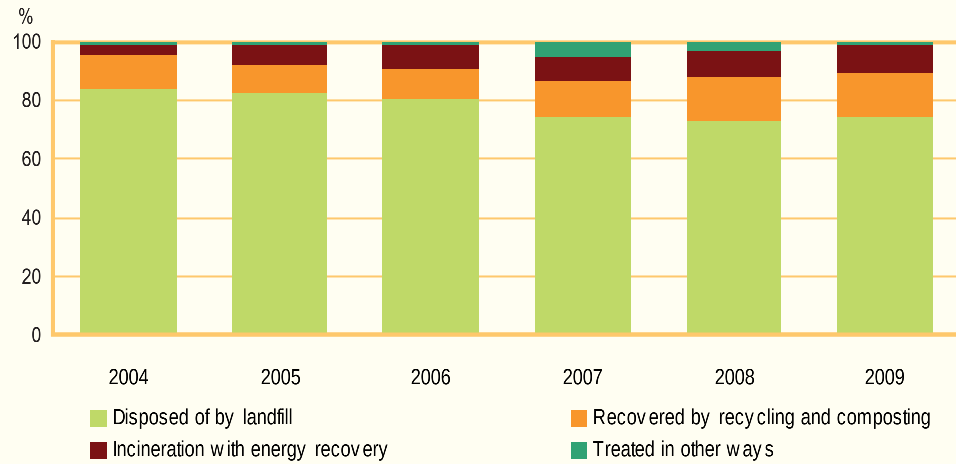
Tables (Stadat):
5.5.1. Amounts of hazardous waste by solidity

5.2 WASTE TREATMENT

Waste management is a complex environmental issue: the recycling of valuable waste materials as well as the environment-friendly disposal of wastes is a more and more expensive task.
If we want to rank waste management methods, then, from the point of view of environmental protection, recycling is the most important treatment mode, since recycling is concerned with the repeated use of waste materials in production and services. Incineration is waste treatment in an incineration or co-incineration plant. Waste disposal on land in accordance with legal and technical safety requirements is qualified as landfilling.

Municipal solid waste

Figure 5.2.1 Treatment of municipal solid waste



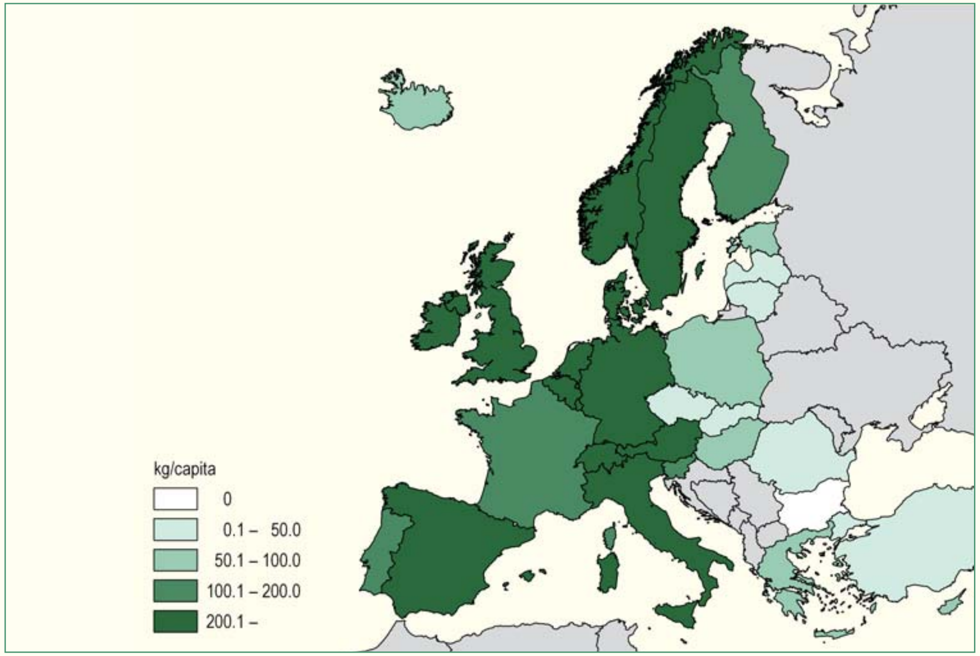
Source: MoRD, Waste Information System.

Landfill, the least environment-friendly treatment mode, is still the most common treatment and disposal method of municipal solid waste, mainly for being not as expensive as recycling or incineration. The disadvantages of landfill are the leaching of nutrients, heavy metals and other toxic compounds, the emissions of greenhouse gases, the loss of valuable land space, and increased road transport. Landfill is harmful to air, soil and water, and is detrimental for human beings, the flora and fauna.
The trends of the recycling of municipal solid waste are positive, since its proportion has increased since 2005. From the point of view of environmental protection recycling is the most important

treatment mode since it reduces environment pollution through the extraction of useful materials from waste.

The extent of incineration has remained almost unchanged since 2006. Incineration is a more environmentally friendly treatment method than landfill because it makes possible to recover energy and reduce waste volumes. On the other hand, it may lead to the emission of toxic gases such as dioxins, to the production of ashes, and to water pollution from gas cleaning.

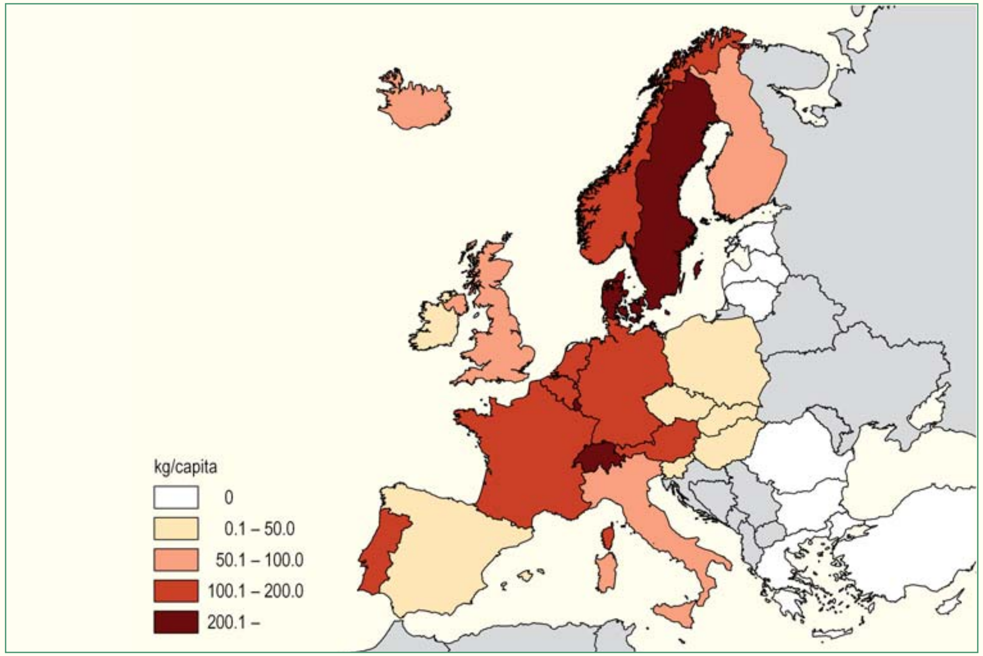
Figure 5.2.2 Recycled municipal solid waste, 2009



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

The volume of recycled municipal waste per capita is lower in East-Central-European countries. This mode of waste treatment is much more widespread in Western Europe.

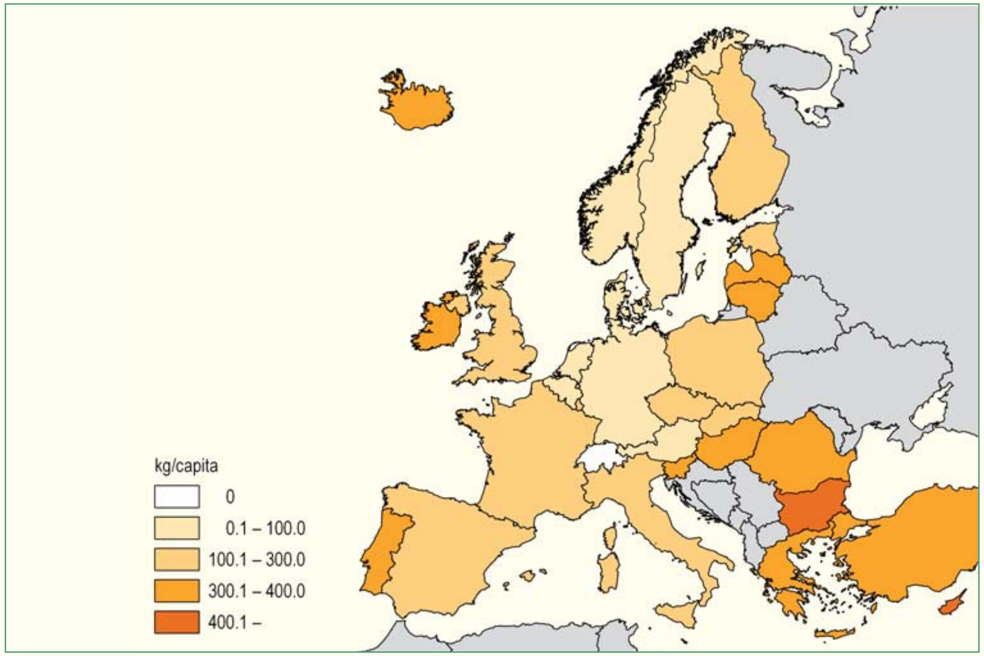
Figure 5.2.3 Incinerated municipal solid waste, 2009



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

There is no incineration in Cyprus, Malta, the Baltic States, Greece and Bulgaria. In contrast, it is quite popular in the more developed countries of Europe.

Figure 5.2.4 Municipal solid waste disposed of by landfill, 2009



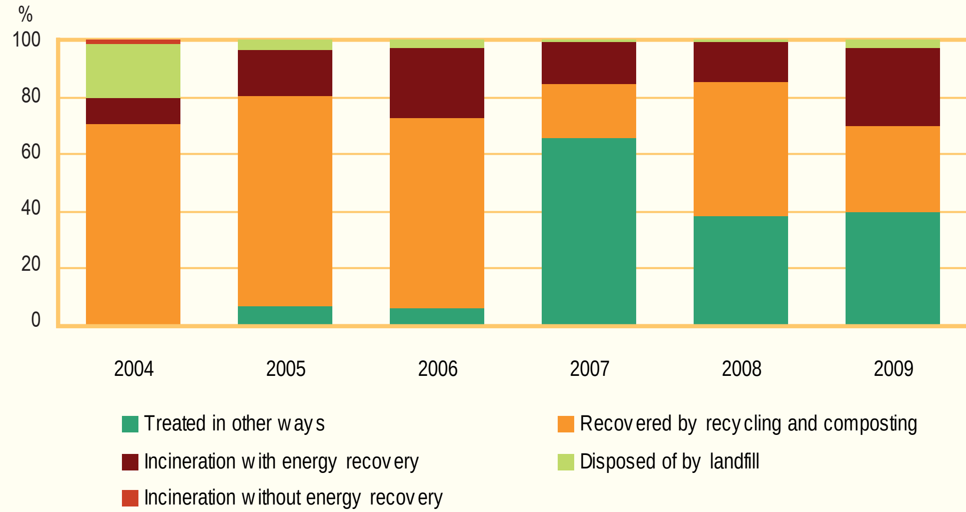
Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

Waste disposal by landfill is still significant in East-Central-European countries, while Western-European countries reduce landfill by switching to recycling or incineration.

Tables (Stadat):
5.5.2. Amount of waste types according to waste generation

Other non-hazardous waste

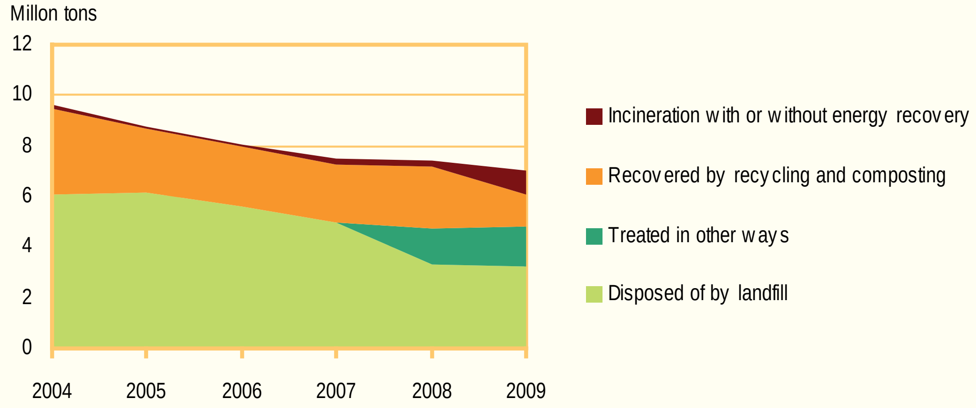
Figure 5.2.5 Treatment of agricultural and food industrial waste



Source: MoRD, Waste Information System.

The decrease in the proportion of the recycling of agricultural and food industrial waste is due to a methodological change, since only the volume of manure and animal or plant by-products, effectively qualified as waste, have been classified as waste since 2008. The rules of the treatment of animal by-products effectively qualified as waste became stricter, reducing the potential recycling of this type of waste.

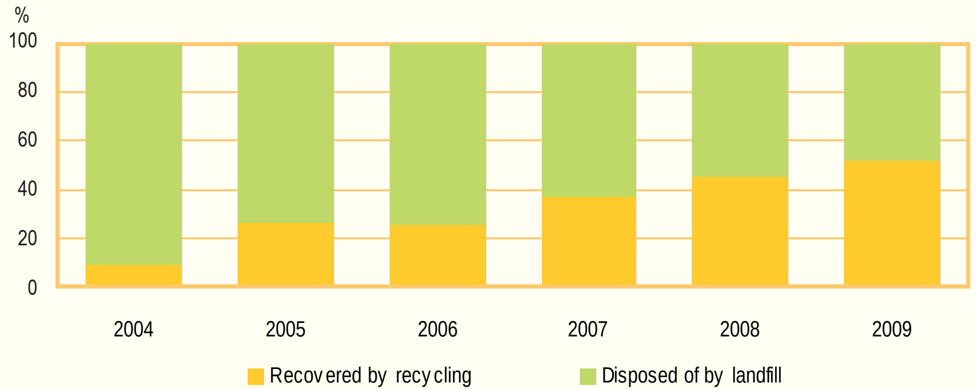
Figure 5.2.6 Treatment of industrial and other economic waste



Source: MoRD, Waste Information System.

Landfill accounts for the highest proportion of the treatment of industrial and other economic wastes, too. Along with the decrease of this waste type the amount of recycled waste also diminishes compared to previous years.

Figure 5.2.7 Treatment of construction and demolition waste

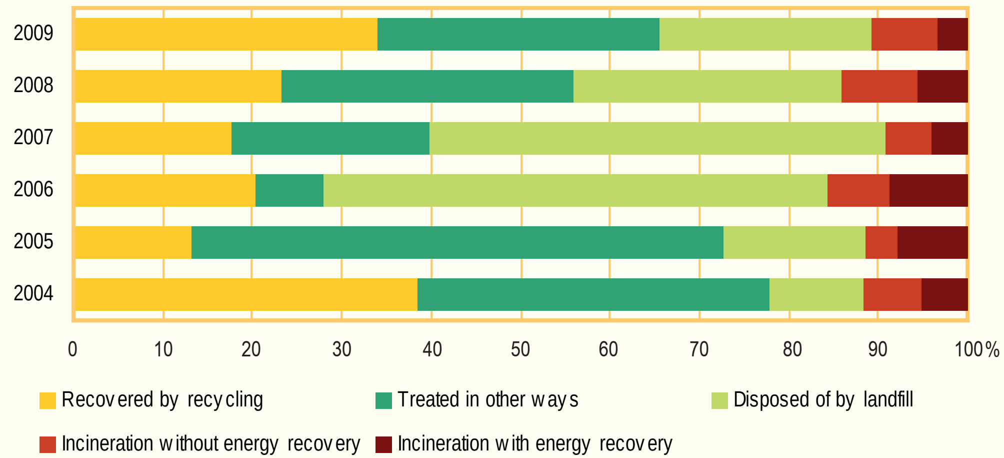


Source: MoRD, Waste Information System.

The proportion of construction and demolition waste disposed of by landfill keeps decreasing.

Hazardous waste

Figure 5.2.8 Treatment of hazardous waste



Source: MoRD, Waste Information System.

Other methods of hazardous waste treatment cover the pre-treatment of hazardous waste (which can result in non-hazardous waste, the final treatment of pre-treated waste can be recovery or disposal) and biological treatment.

5.3 MATERIAL FLOW

Material flow accounts (MFA), because of their scale-like structure, are applicable to describe the relationship between the economy and the environment. The input side of the MFA comprises those material flows that enter the economy from the side of environment in a given time period: natural resources used in the economy, such as domestically extracted fossil fuels and minerals, biomass and imported raw materials as well as products. The most important MFA input indicators (direct material input, domestic material consumption, physical trade balance) are available in Hungary for the period of 2000–2009.

The calculation methods of the indicators are as follows::

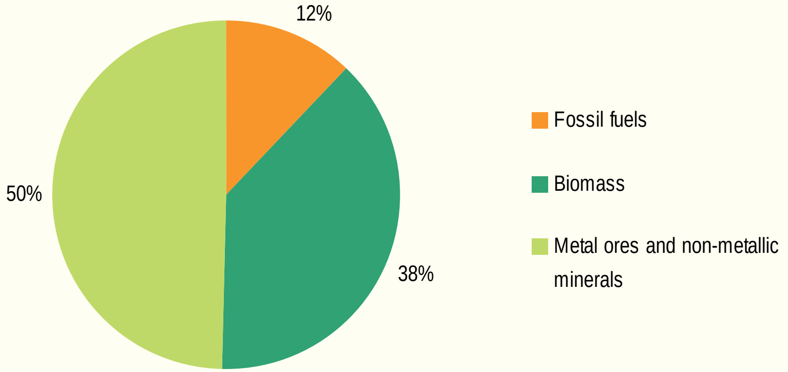
Domestic extraction = biomass + metal ores + minerals + fossil fuels

Direct material input = domestic extraction + imports

Domestic material consumption = domestic extraction + imports – exports

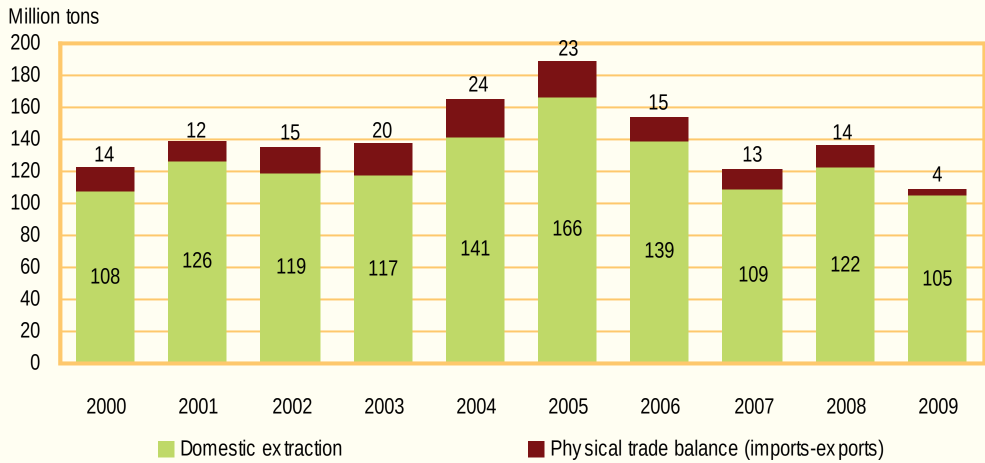
Physical trade balance = imports – exports

Figure 5.3.1 Components of domestic extraction, 2009



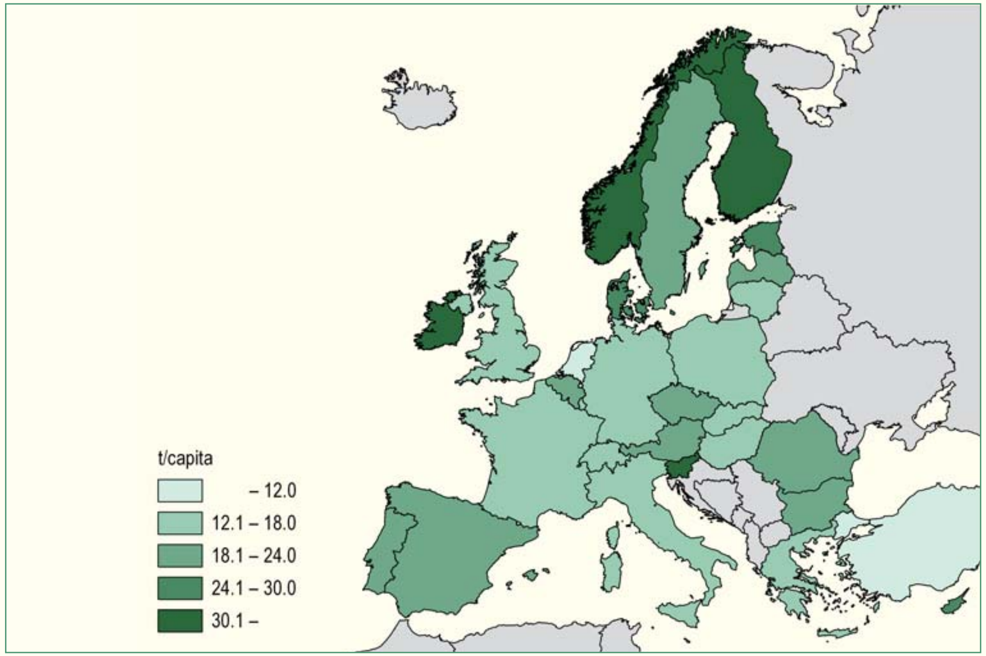
Sand and gravel accounted for 70% of the total volume of metal ores and non-metallic minerals extracted in 2009.

Figure 5.3.2 Components of domestic material consumption



Domestic extraction (DE) fluctuated between 105 and 166 million tons from 2000 to 2009. The large amount of extraction in 2005 was caused by the increased volumes of construction sand and gravel extraction, essential for motorway construction. For the same reason domestic material consumption also hit an all-time high in 2005. This latter indicator was only 109 million tons in 2009, when the volume of raw material and product imports, part of the physical trade balance, was the lowest.

Figure 5.3.3 Domestic material consumption in the EU and in selected European countries, 2007



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Croatia, Iceland, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

Considering EU and EFTA countries, material consumption per capita was the highest in Norway, Finland and Ireland. In the latter it amounted to 53 tons/capita in 2007.

Tables (Stadat):
5.11. Material flows

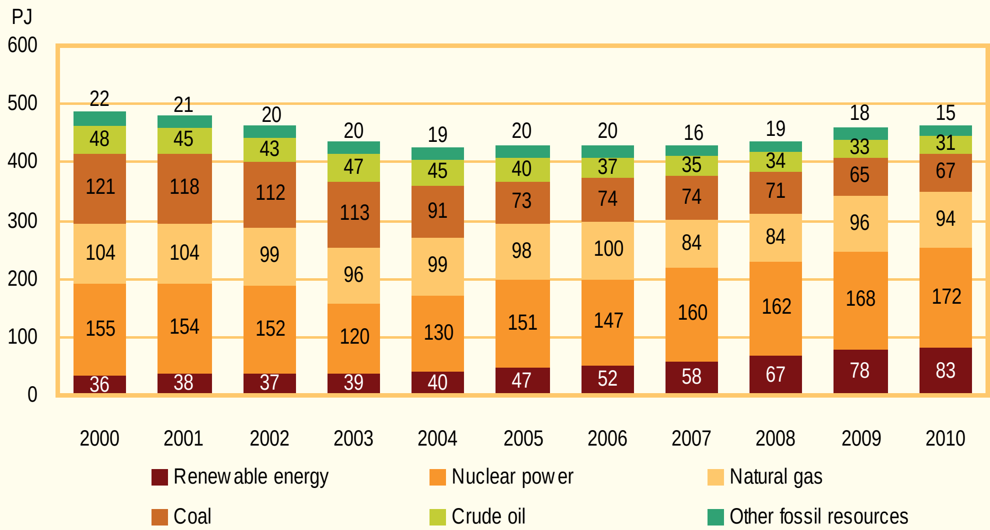
Both energy-producing industrial activities and energy consumption place a burden on the environment. The extraction and burning of fossil fuels, such as crude oil, natural gas and coal, increase the atmospheric concentration of greenhouse gases (CO_2, N_2O, CH_4) contributing to global warming. Gases released by burning (SO_2, NO_2, CO) contain substances harmful to human health. The technologies of energy production and transformation pollute water resources and the soil. The treatment of hazardous waste generated in nuclear power stations also imposes a burden on the environment.
One of the main goals of energy management is to ease the above-mentioned pressures on the environment. This, for instance, can be done by increasing the share of renewable energy, preferably from local sources. In the long-run they include the considerably reduced use of fossil fuels and the reduction of imported energy.

List of figures

6.1 ENERGY PRODUCTION

Hungary's traditional fuel stocks (carbon hydrogen and coal) have almost been completely depleted during the past decades. The domestic production of natural gas, crude oil and coal fell by 10%, 36% and nearly 50% respectively between 2000 and 2010. As black coal mining ceased in 2005, domestic coal production is confined only to brown coal and lignite. Natural gas makes up nearly 35% of our energy supply. Its production in 2009 was 3 billion m^3, which covered 26% of domestic consumption. The last time when domestic natural gas production could satisfy domestic consumption to a higher extent was at the beginning of the 1980s.
The falling production of fossil fuels is offset by the rising share of nuclear power and renewable energy in electricity production. Electricity generated at hydro and wind plants, firewood and other renewable energy sources account for 18% of domestic energy production, meaning a two-fold increase over the 10 years examined.

Figure 6.1.1 Primary energy production in calorific value



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Other fossil resources	22	21	20	20	19	20	20	16	19	18	15
Crude oil	48	45	43	47	45	40	37	35	34	33	31
Coal	121	118	112	113	91	73	74	74	71	65	67
Natural gas	104	104	99	96	99	98	100	84	84	96	94
Nuclear power	155	154	152	120	130	151	147	160	162	168	172
Renewable energy	36	38	37	39	40	47	52	58	67	78	83

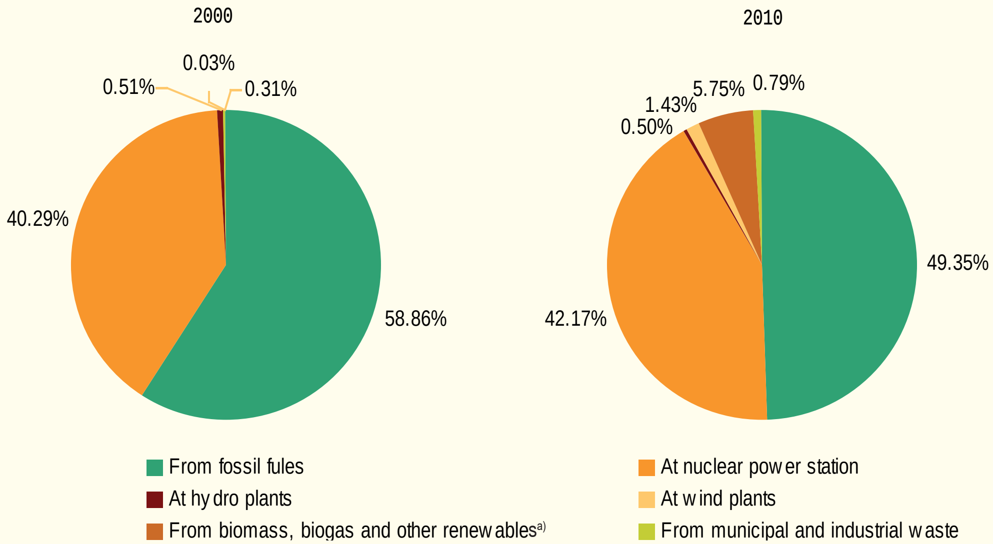
Source: Energy Centre Non-profit Ltd.

Tables (Stadat):
5.7.1. Final energy consumption

6.2 BALANCE OF ELECTRICITY

Detailed information on the actual state of domestic production of electricity is provided by the national balance of electricity. On the supply side the balance includes the annual amount of electricity production, its composition by sources, the capacities of power stations involved in energy production as well as the volume of imports. On the distribution side it takes into account domestic consumption, the self-consumption of plants, network losses and exports.

Figure 6.2.1 Distribution of electricity production by sources



[a)] Biomass includes wood, wood waste and other solid waste, while other renewables include solar panel.
Source: Energy Centre Non-profit Ltd.

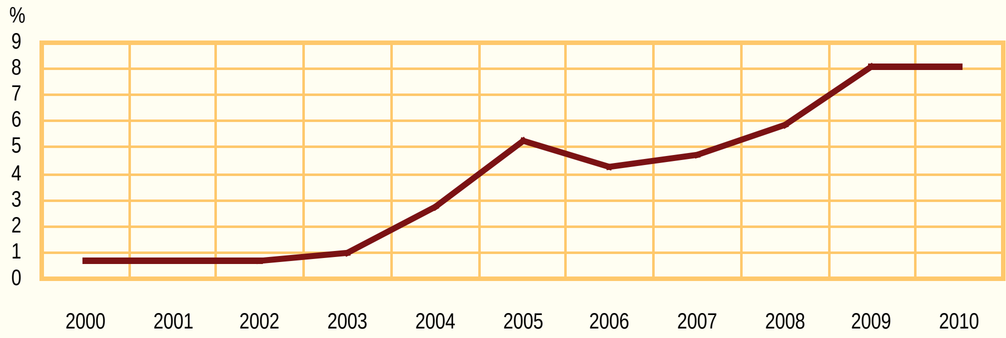
In the last decade, national electricity production increased by 6%, while domestic consumption grew by 16%. The share of renewable energy sources in electricity production reached 8.1% in 2010, equalling a ten-fold increase in the examined period. The contribution of the different renewable energy sources changed notably. Earlier on hydroelectricity generation and municipal waste had been dominant, but by the end of the period biomass became the most significant source. The share of electricity generated from fossil fuels saw a 12% decrease in the same period.

Tables (Stadat):
3.8.2. Electricity balance

6.3 RENEWABLE RESOURCES

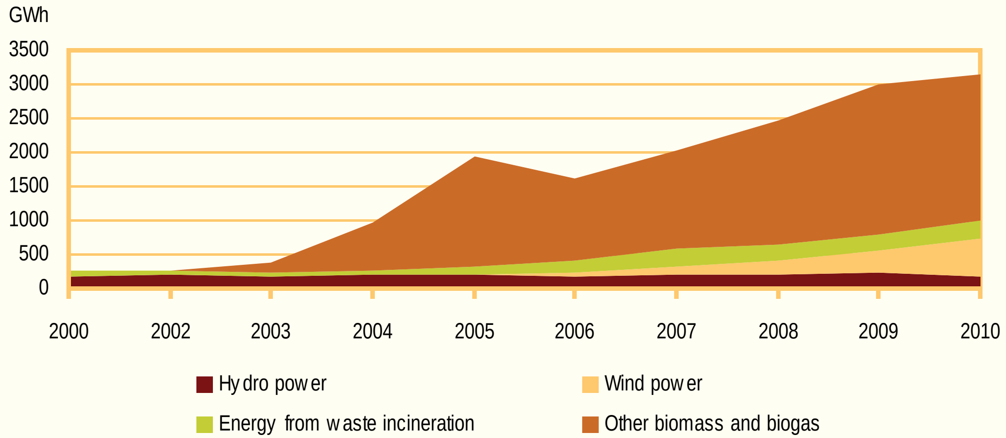
Renewable fuels are characterized by the fact that they replenish, accordingly, their use does not reduce their quantity. They have gained in popularity due to their sustainability, low contributions to the carbon cycle, and in some cases lower or no amounts of greenhouse gases. Examples of renewable fuels include biomass, biofuels, and fuels that are synthesized from renewable energy sources, such as wind, solar, water and geothermal energy.

Figure 6.3.1 Share of electricity generated by renewable resources



Source: Energy Centre Non-profit Ltd.

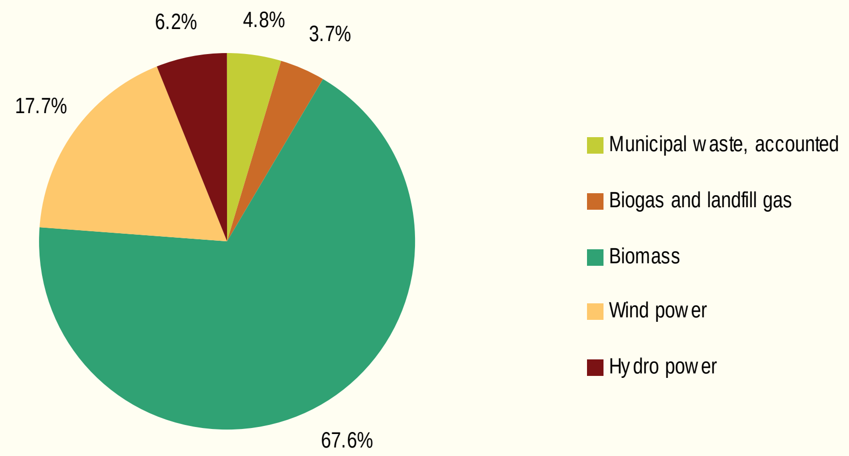
Figure 6.3.2 Volume of electricity generated from renewable and waste resources



Source: Energy Centre Non-profit Ltd.

Electricity production based on renewable resources has begun to increase from 2003 as a result of subsidies benefiting the sector. Due to high delivery prices and change in the general attitude towards sustainability, conventional power stations changed either entirely to biomass fuel (Pécs, Ajka, Kazincbarcika) or to combined heating (Tiszapalkonya, Mátra), thus increasing the share of green electricity to 5.3% in 2005 from only 1% in 2000. Consequently, Hungary not only fulfilled but also exceeded the proportion of 3.6% undertaken by the EU. Although there was a small drop brought about by regulations with respect to the quantity of green electricity, the share of renewable energy sources in electricity production exceeded 8% in 2010.

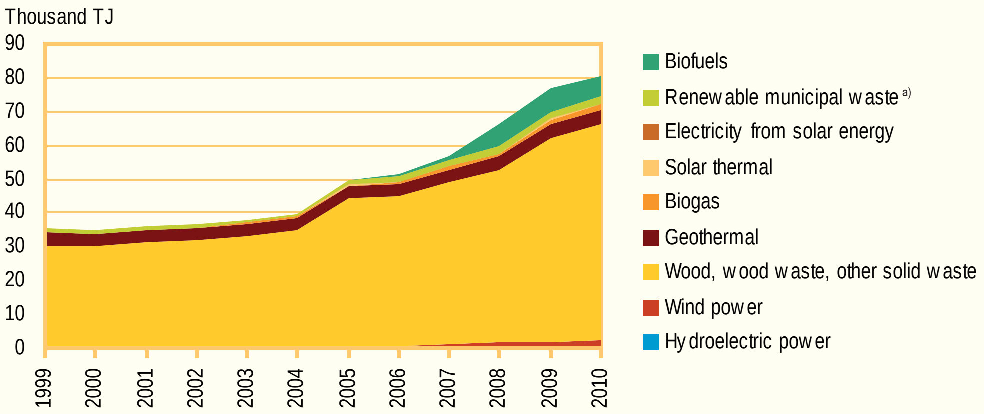
Figure 6.3.3 Composition of electricity generated from renewable resources, 2010



Source: Energy Centre Non-profit Ltd.

Within electricity supply generated from renewable resources, biomass has always been dominant. Its share of total electricity generated from renewable resources reached nearly 70% in 2010. In the last 7 years, the amount of electricity produced increased three-fold, to 2142 GWh. The share of wind energy has been growing considerably since 2007.
Biomass can come from by-products generated in agriculture and sylviculture, animal husbandry and food industry, as well as municipal and industrial waste. Biomass is mainly used for heat production, but electricity is also generated from it.

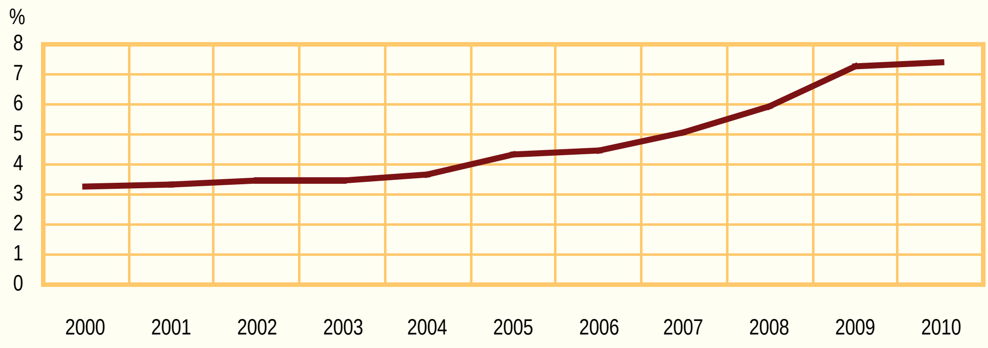
Figure 6.3.4 Energy generated from renewable resources in calorific value



[a] Half of municipal waste used for energy production.
Source: Energy Centre Non-profit Ltd.

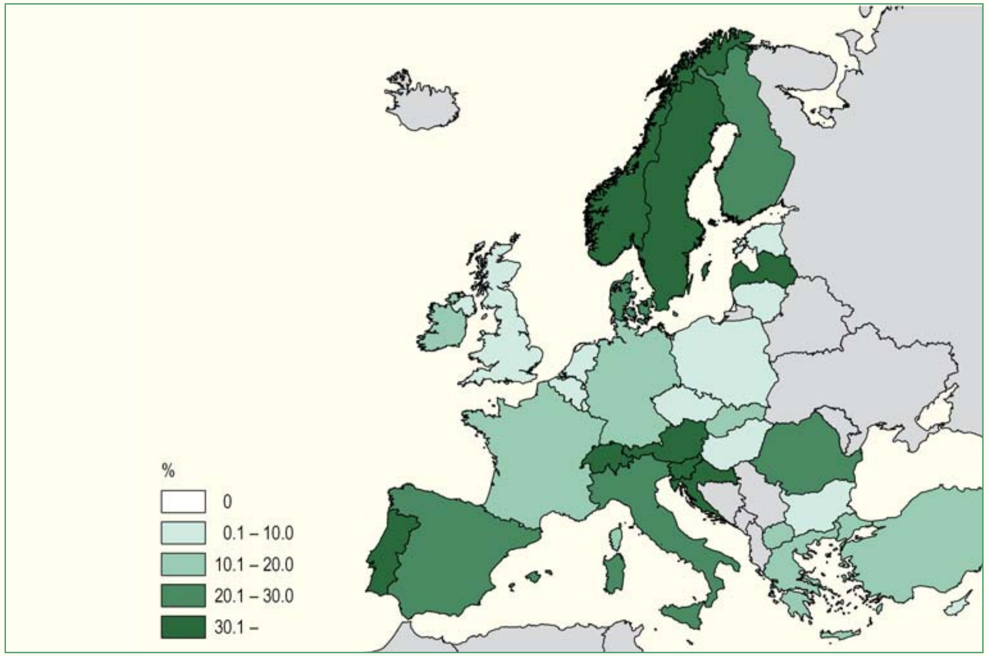
In 2009, the European Parliament and the Council aimed to increase the share of renewable resources in gross final energy consumption to 20% in the EU by 2020. Considering the conditions/potentialities, the target values referring to member states were set in a directive (13% for Hungary). However, the Renewable Energy Utilization Action Plan of Hungary set a target of 14.65%. In 2010, 7.4% of the total energy consumption of the national economy derived from renewable energy sources. The proportion of biomass is remarkable here, too: it represented nearly 80% of total renewable energy production. At the same time the volume of energy generated from biofuels rose from 1 200 PJ to 6 000 PJ in the last three years but their proportion is still low (7% in 2010).

Figure 6.3.5 Share of renewable resources in total energy consumption



Source: Energy Centre Non-profit Ltd.

Figure 6.3.6 Share of renewable resources of energy production in international comparison, 2009



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Iceland, Moldova, Montenegro, Russia and Ukraine.
Source: Eurostat.

In the EU-27 the share of renewable energy sources of energy production grew from 13% to 18% between 1999 and 2009. Austria is the first in the ranking with its 67%, followed by Sweden (56%).

Figure 6.3.7 Wind plants in Hungary, April 2011

Source: Hungarian Wind Energy Association.

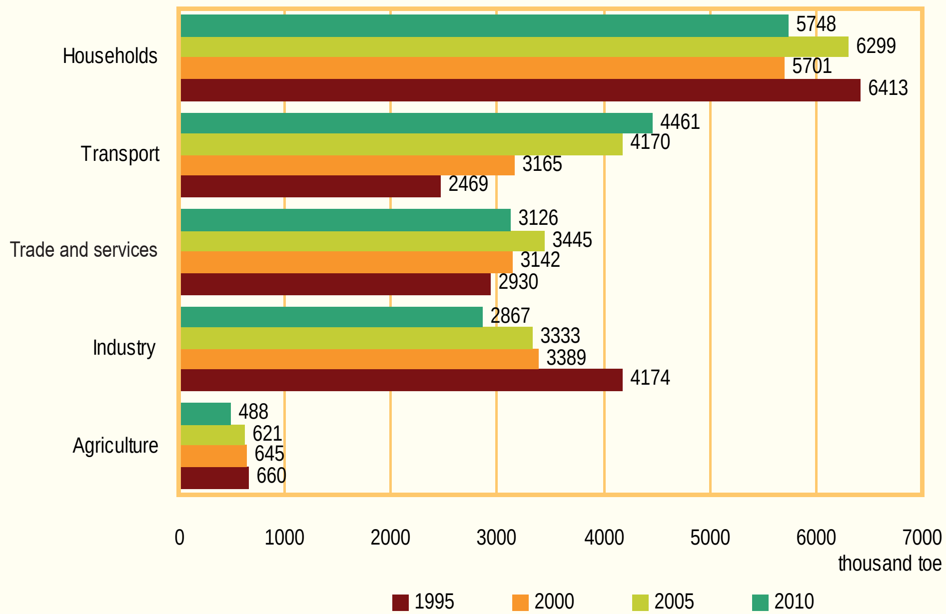
At present 172 wind power turbines work in Hungary with a total capacity of 329 MW. Most of them can be found in the north-western part of the country, in Komárom-Esztergom and Győr-Moson-Sopron counties. The first wind plant in Hungary integrated into the electricity supply network was set up in Kulcs village in 2001. In 2010 the contribution of wind plants to the electricity produced from renewable energy (green electricity production) was 17%. As the delivery price of renewable electricity is twice as high as the average price of electricity produced by conventional plants, the number of permissions to establish wind-power plants increased considerably.

Tables (Stadat):
5.7.3. Share of renewable resources from electricity production
5.7.4. Production of energy from renewable energy resources

6.4 ENERGY CONSUMPTION

Energy consumption is the sum of final energy consumption and energy transformation losses, decreased with the amount of utilized waste energy. Fuels are accounted for in calorific value, while heat and electricity by the caloric value of fuels necessary for their generation.
Direct energy consumption contains the sum of ultimate energetic, non-energetic and material-like consumption, excluding consumption aimed at energy transformation into other energy source.
According to the methodology of the Energy Centre the quantity of energy supplied to final customers is the sum of the energy consumption of industry, transport, households, trade, services, agriculture, etc. The consumption of industry covers all industrial sectors, with the exception of energy production. The quantity of fuels transformed in electricity-generating power plants and that of fuels transformed to blast furnace gas are excluded from industrial use, but the transformation sector includes them. The energy use of transportation includes the energy consumption of rail, road, air and inland water transport.

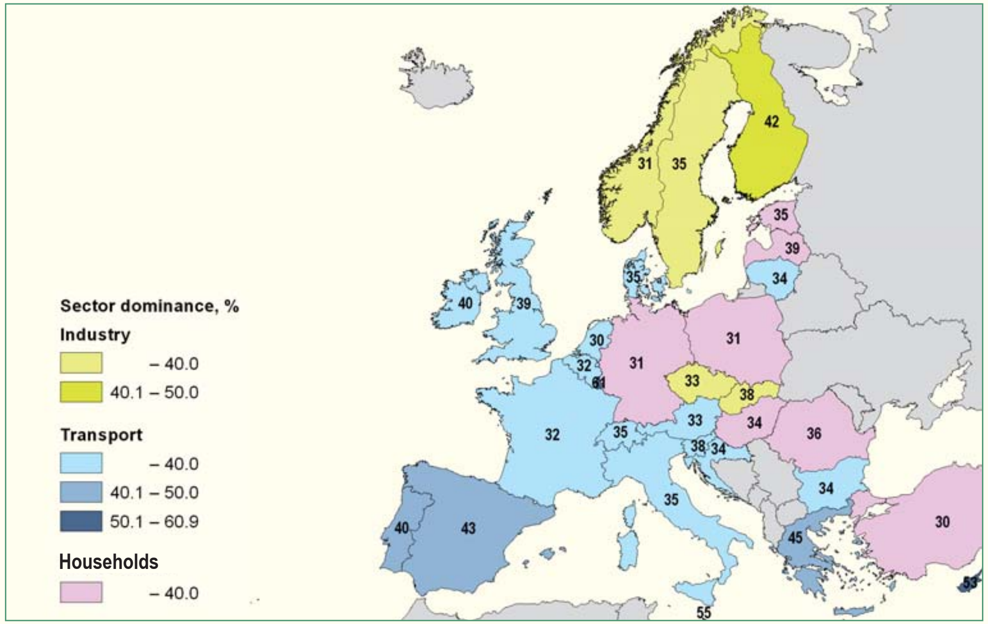
Figure 6.4.1 Final energy consumption by sectors



Source: Energy Centre Non-profit Ltd.

After the regime change, the final energy consumption of the country saw a slight decrease, followed by stagnation. In the recent years it has increased somewhat. Regarding final energy consumption, households (34%) and transport (nearly 30%) represent the highest proportions. Heating accounts for around 40%-45% of households' energy consumption. Within final energy consumption gaseous and liquid hydrocarbons have a dominant role.

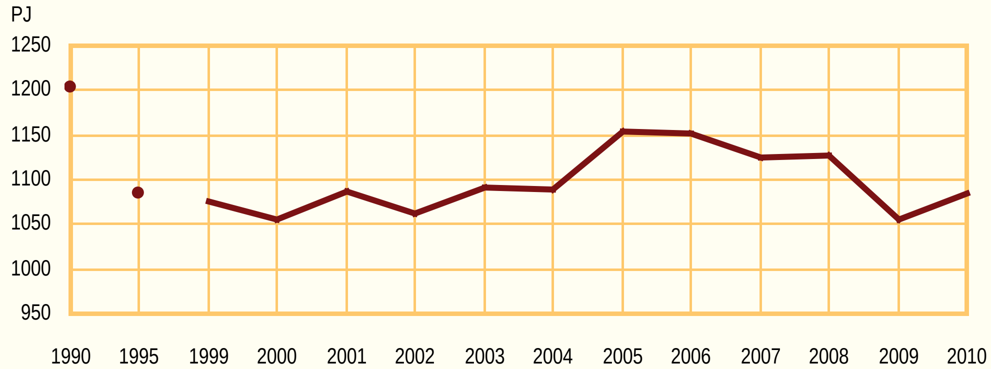
Figure 6.4.2 Share of dominant sectors in final energy consumption in European countries, 2009



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Iceland, Macedonia, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

The transport sector consumed a third of EU-27 final energy in 2009. Its share is particularly significant in Luxemburg (61%) and Cyprus (53%).
The energy consumption of the industrial sector decreased by 15%, meaning that its share fell from 29% to 24% over 10 years. The share of industrial energy consumption is dominant in Slovakia, the Czech Republic and Scandinavian countries, especially Finland (42.1%). In the examined year the proportion of energy consumption by households and services was 27% and 13% respectively in the EU-27. The Member States with the highest share of household consumption included Latvia, Romania and Estonia.

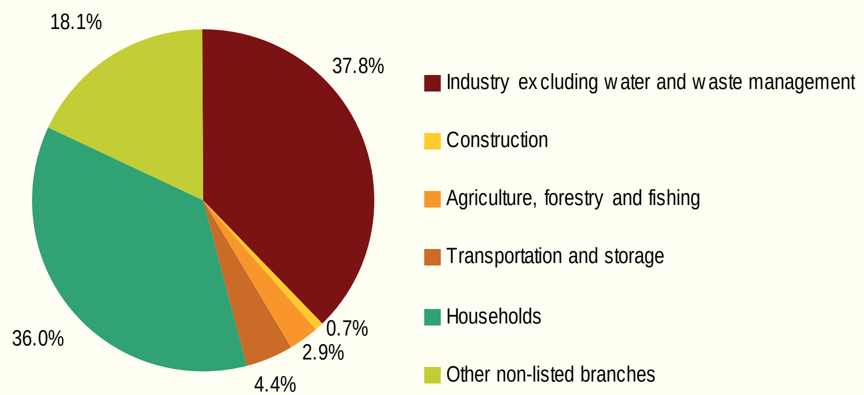
Figure 6.4.3 Total energy consumption of national economy



Source: Energy Centre Non-profit Ltd.

The energy consumption of the national economy fell drastically after the change of regime (by 10%) and following the financial crisis in 2008 (by 6.3%). In 2010 final energy consumption grew again, by 2.7% compared to the previous year.

Figure 6.4.4 Energy consumption by sectors, 2010



Source: Energy Centre Non-profit Ltd.

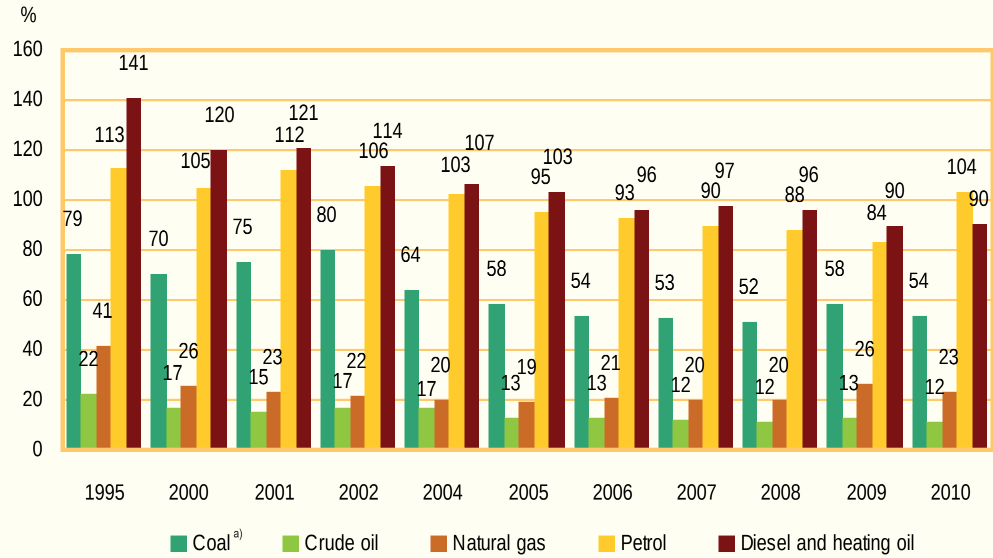
The share of sectors in total energy consumption has remained almost unchanged in the last decade. The energy consumption of agriculture and construction has fallen by 20% and 14% respectively, while that of industry has increased by 12%.

Tables (Stadat):
5.7.1. Final energy consumption

6.5 ENERGY DEPENDENCY

Energy dependency shows the extent to which an economy relies upon imports in order to meet its energy needs. The indicator is calculated as follows: net imports are divided by the amount of gross inland energy consumption.

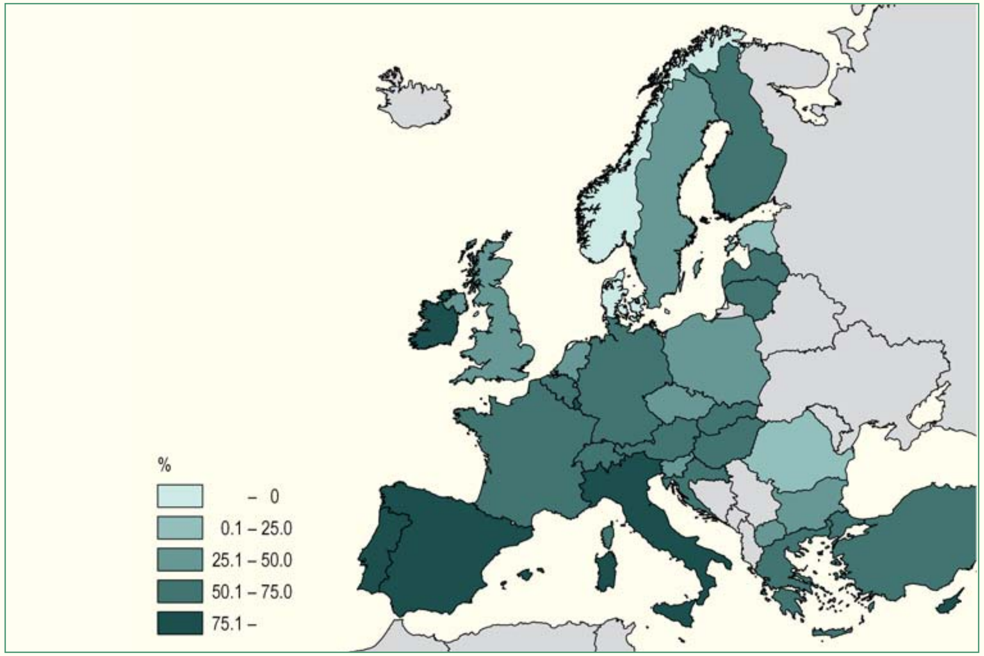
Figure 6.5.1 Ratio of domestic production to domestic use of major fuels



a) Coal includes the coking coal consumption of the manufacture of coke.
Source: Energy Centre Non-profit Ltd.

In Hungary energy production has been gradually decreasing since the 1990s, while the imports of energy resources show a continuous rise. The rate of energy import dependency per domestic consumption is steadily high (exceeds the EU average) because of the scarcity of own resources (in 2010 the shares of production and imports were 38% and 62% respectively). Within imports hydrocarbons represent the highest proportion. As for national energy supply the share of natural gas consumption is one of the highest in Europe (35% in 2010).

Figure 6.5.2 Energy import dependency in international comparison, 2009



Notes: Excluding data on Albania, Belarus, Bosnia and Herzegovina, Iceland, Moldova, Montenegro, Russia, Serbia and Ukraine.
Source: Eurostat.

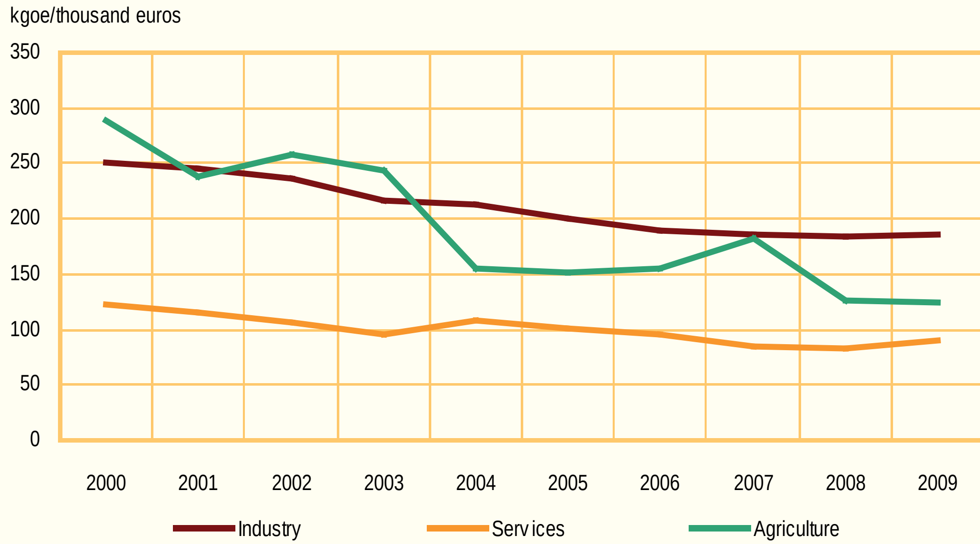
The EU-27's dependence on imports of primary energy stood at 54% in 2009, meaning a nearly 9% increase over the past ten years. The largest increase was seen in Poland, where dependency rate went up from 10% to 32%, while Estonia experienced the largest drop from 35% to 21%. Denmark is the only country in the Union with a negative dependency rate (-19%).

6.6 ENERGY INTENSITY

The indicator of energy intensity shows the energy efficiency of a nation's economy. It is measured by the quantity of energy required per unit output in a calendar year and expressed in kilogrammes of oil equivalent. The indicator for agriculture, industry or services is the quotient of final energy consumption and gross value added of the particular section.

The indicator shows the number of energy units needed to generate one unit of gross domestic product or gross value added, accordingly, the fall in energy intensity means an increase in energy efficiency.

Figure 6.6.1 Energy intensity of industry, agriculture and services



Source: Energy Centre Non-profit Ltd., ODYSSEE database.

As a result of a significant restructuring in the economy and an increase in the efficiency of energy production and consumption, the energy intensity of the total economy decreased by 17% between 2000 and 2009.

The energy intensity of industry fell by 26% in the examined period. It is ascribed to a significant drop in the share of energy-intensive sectors, which were replaced by modern, energy-efficient manufacturing units producing goods of higher gross value added. The installation of the new units led to increasing production indices, while energy consumption stagnated. Since 2000 the energy intensity of agriculture has decreased by around 57%, while that of services by 27%.

Environmental protection investments are all investment expenditures resulting from actions and activities which have as their prime objective the prevention, reduction and elimination of pollution and any other degradation of the environment. These investments are generated by an environmental protection task and can be linked directly to that.

Current internal environmental expenditures include current internal expenditures on operating equipment aiming at the reduction of emissions to the environment. They can be grouped – similarly to environmental protection investments – by environmental domains.

Environmental goods and services industry contains the production, service and construction activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damages to water, air, soil, as well as problems related to waste, noise and ecosystems.

According to the definition of OECD and Eurostat, environmental taxes are taxes whose tax base is a physical unit that has a proven, negative effect on the environment. In most European countries (as in Hungary) the grouping of different environmental taxes follows the terminology of OECD. According to this, the different taxes can be classified into four main categories:

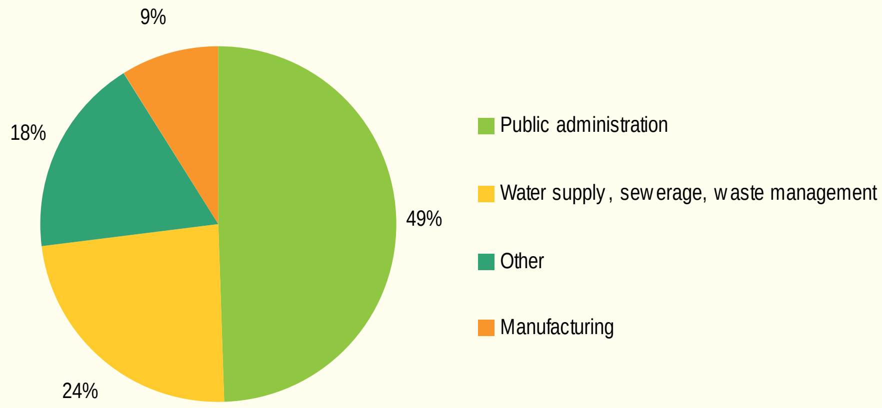
- energy taxes (including carbon-dioxide tax as well)
- transport taxes
- pollution taxes
- resource taxes

List of figures

7.1 ENVIRONMENTAL PROTECTION INVESTMENTS

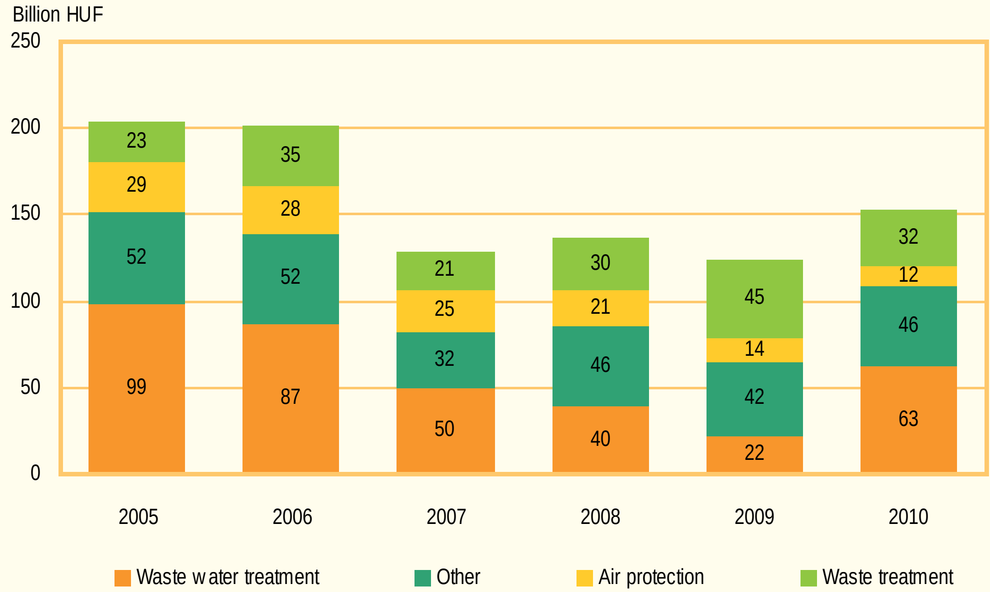
End-of-pipe investments are additional technical installations that do not affect the production process itself, they are operated independently or they are identifiable parts added to production facilities, and their basic task is to treat pollution that has been generated, prevent the emissions or spread of pollutants or measure the level of pollution (monitoring). Integrated investments are investments where a production process or installation is adapted or changed so that it generates less emissions or pollutants than it would in the absence of the technology. The aim of these investments is generally prevention.

Figure 7.1.1 End-of-pipe environmental protection investments by economic branches, 2010



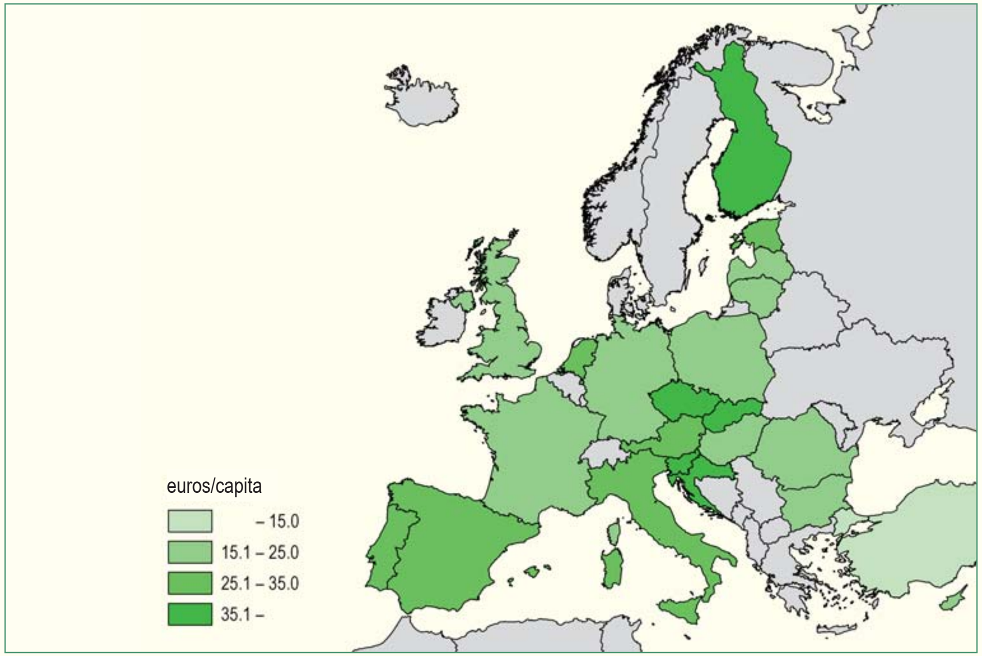
The value of end-of-pipe environmental protection investments was as high as HUF 135 billion in 2010, in which the share of public administration as an economic branch was HUF 67 billion. Two-thirds of total end-of-pipe environmental protection investments of public administration were in waste water treatment.

Figure 7.1.2 Environmental protection investments by environmental domains



Investments in the Budapest Central Waste Water Treatment Plant in 2010 caused a significant increase in the waste water-related environmental protection investments of the national economy.

Figure 7.1.3 Environmental protection investments per capita in industry, 2007

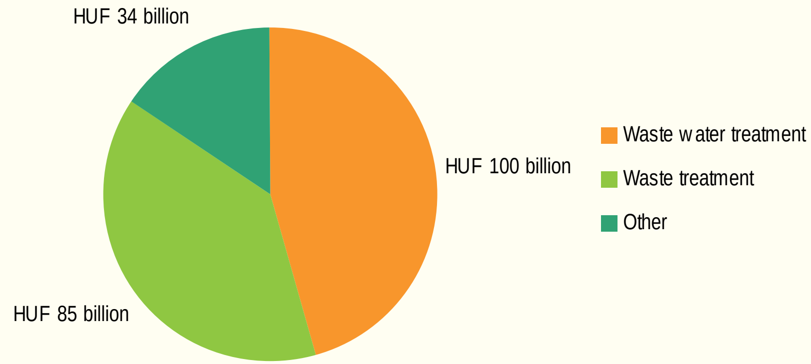


Notes: Excluding data on Albania, Belarus, Belgium, Bosnia and Herzegovina, Denmark, Greece, Iceland, Ireland, Macedonia, Moldova, Montenegro, Norway, Russia, Sweden and Ukraine.
Source: Eurostat.

Environmental protection investments per capita were the highest in Slovenia in 2007, amounting to 58 euros per capita.

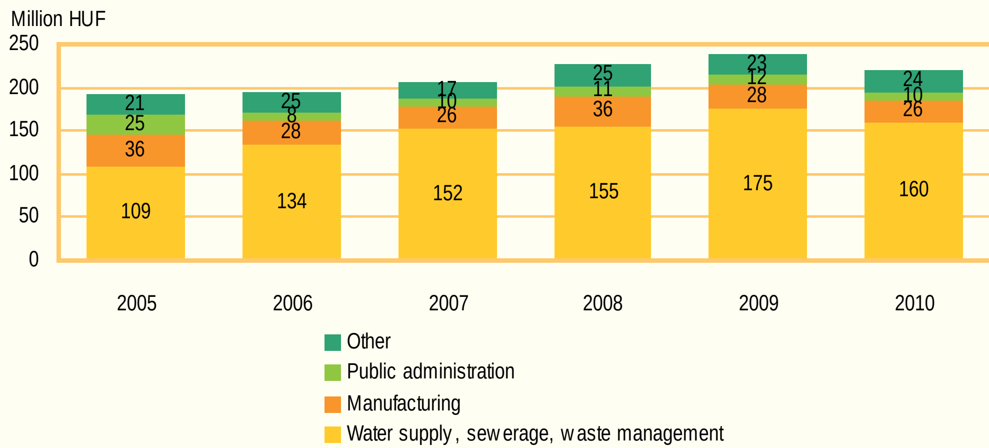
7.2 ENVIRONMENTAL PROTECTION EXPENDITURES

Figure 7.2.1 Current internal environmental protection expenditures by environmental domains, 2010



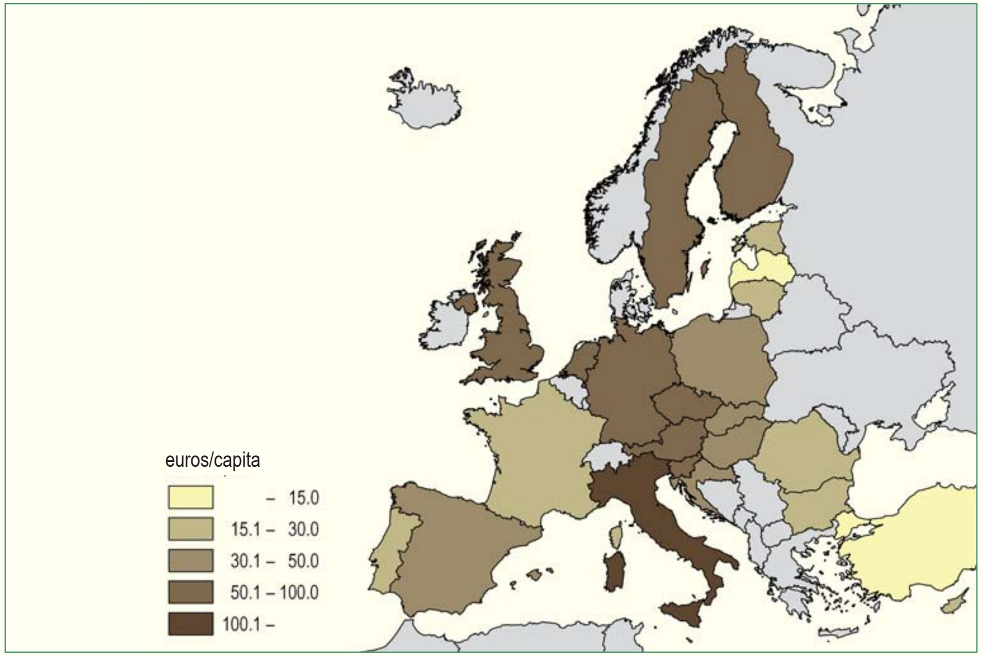
In 2010 the share of waste water treatment in total current internal environmental protection expenditures was 45%, while those of waste treatment and air protection were 39% and 3% respectively.

Figure 7.2.2 Current internal environmental protection expenditures by economic branches



The total value of current internal environmental protection expenditures was HUF 219 billion in 2010, 11% less at comparative prices than the year before.

Figure 7.2.3 Current internal environmental protection expenditures in industry, 2007



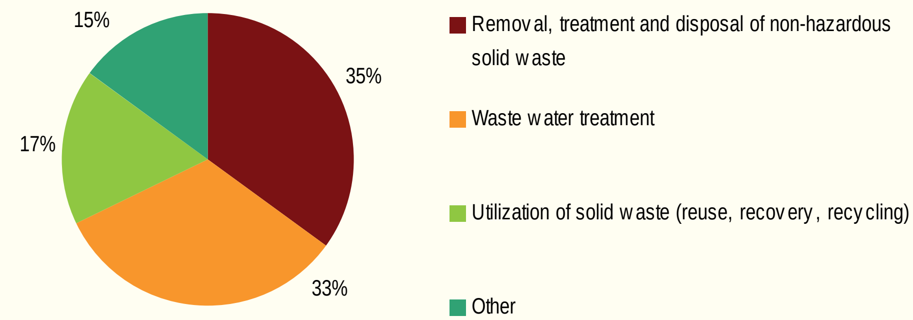
Notes: Excluding data on Albania, Belarus, Belgium, Bosnia and Herzegovina, Denmark, Greece, Iceland, Ireland, Macedonia, Moldova, Montenegro, Norway, Russia and Ukraine.
Source: Eurostat.

Current internal environmental protection expenditures in industry were the highest (185 euros per capita) in Italy in 2007.

Tables (Stadat):
5.9.1.2. Environmental protection investments by purpose – NACE Rev.2
5.9.2.2. Environmental protection investments by branch of industry – NACE Rev.2
5.9.3.2. Internal current environmental expenditures – NACE Rev.2

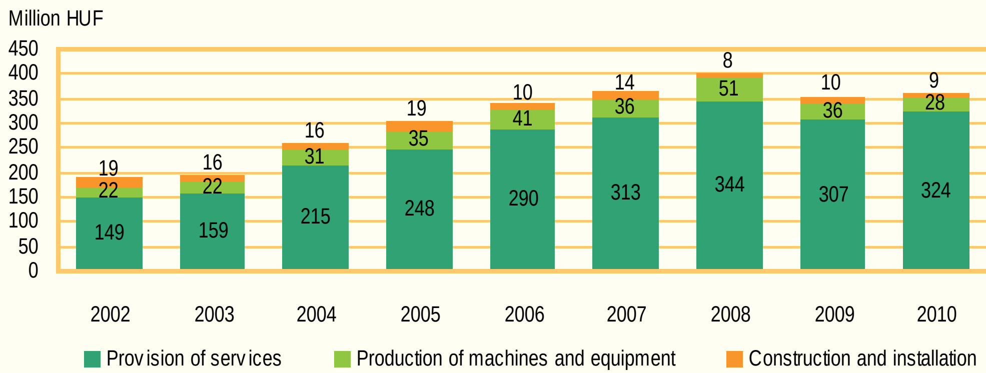
7.3 ENVIRONMENTAL INDUSTRY

Figure 7.3.1 Net environmental industrial sales for end-of-pipe pollution abatement purposes by environmental domains, 2010



In 2010 the share of removal, treatment and disposal of non-hazardous solid waste was 35% of total environmental industrial sales for end-of-pipe pollution abatement and control purposes, while that of waste water treatment was 33%.

Figure 7.3.2 Value of environmental industrial sales at current prices



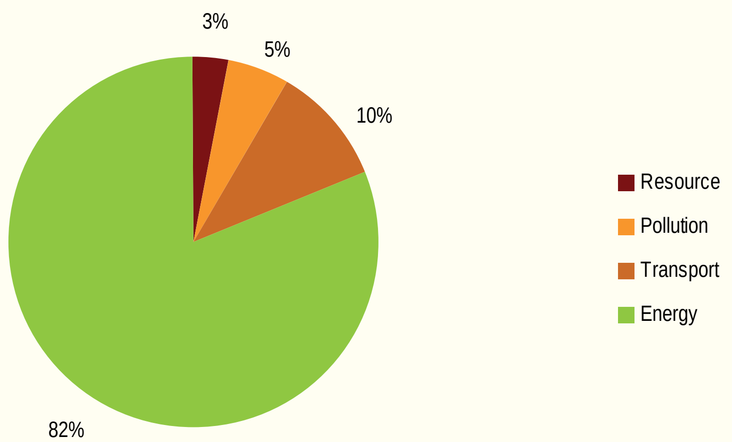
In 2010 the share of provision of end-of-pipe pollution abatement and control services was 89% of total environmental industrial sales, compared with only 78% in 2002.

Tables (Stadat):
5.8.1. Value of environment industrial sales

7.4 ENVIRONMENTAL TAXES

The bases of energy taxes are different energy products, for example fuels used in power plants and during road and air transport. That is the reason why gasoline tax is labelled as energy tax and not as transport tax. Among the different transport taxes motor vehicle tax is the most common in Hungary. The tax base of the third category, i.e. pollution taxes is air and water pollution, solid waste generation and noise emission. Resource taxes must be paid after the use of different natural resources. In Hungary the water resource fee can be classified as resource tax.

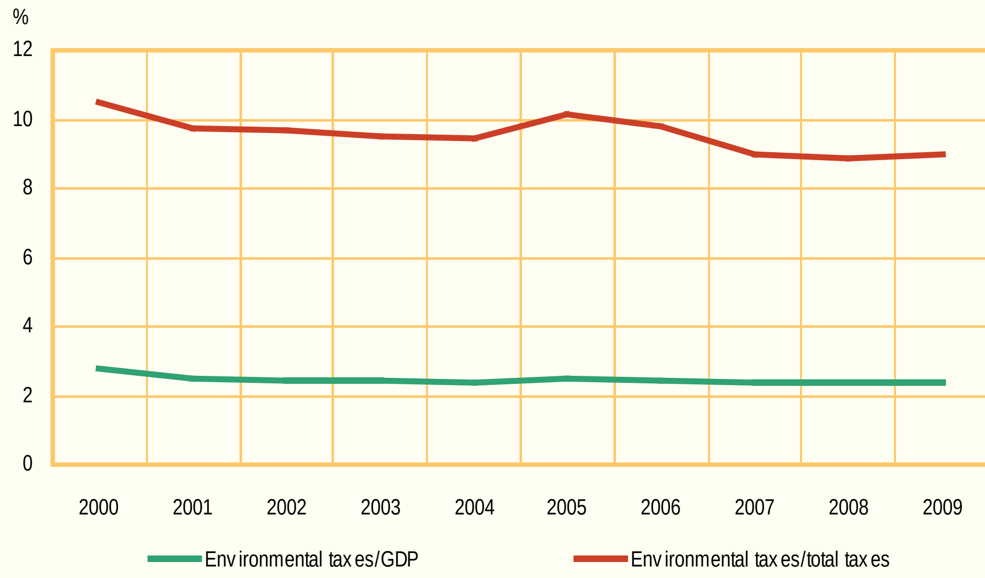
Figure 7.4.1 Environmental taxes, 2009



Source: Ministry for National Economy.

81% of environmental taxes were energy taxes in 2009 (compared with 89% in 2000), which was the highest proportion in Hungary, similarly to other Member States of the EU. Of energy taxes, excise taxes on gasoline and diesel have the largest share: the tax revenue from these products was HUF 482 billion in 2009, which accounted for 78% of total environmental tax revenues. In 2000 the corresponding proportion was 86%.

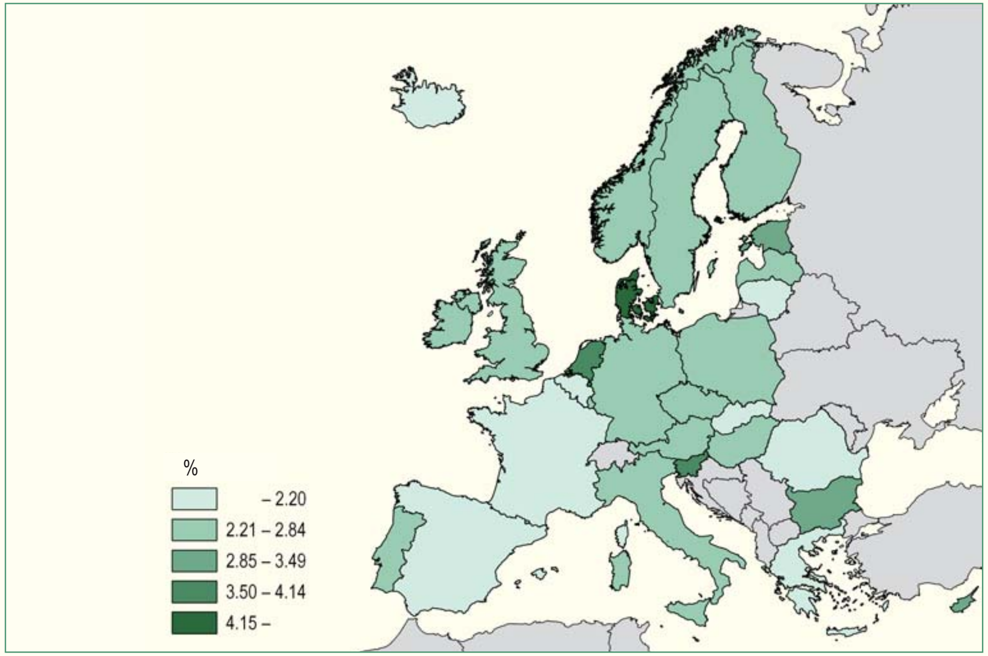
Figure 7.4.2 Environmental taxes in percentage of GDP and of total taxes



Source: Ministry for National Economy.

The environmental taxes/GDP rate was more or less constant from 2000 (around 2.4%), while the environmental taxes/total taxes rate decreased from the highest level of 12% in 1999 to around 9% in the last four years.

Figure 7.4.3 Environmental taxes in percentage of GDP in the EU and some other European countries, 2009



Notes: Excluding data on Albania, Belarus, Belgium, Bosnia and Herzegovina, Denmark, Greece, Macedonia, Moldova, Montenegro, Russia, Switzerland, Turkey and Ukraine.
Source: Eurostat.

The environmental taxes/GDP rate was nearly 5% in Denmark in 2009, the highest among EU Member States.

Tables (Stadat):
5.9.4. Environmental taxes

ACKNOWLEDGEMENT

We would like to thank our partners involved for their efforts, advice and inspiration:

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