3. ENVIRONMENT

*The **environment** comprises everything that creates natural conditions for the existence of organisms, including human beings, and is a prerequisite for their further evolution. Its components are especially the air, water, rocks, soil, organisms, ecosystems, and energy.*

***Waste management** refers to activities focused on preventing waste generation, managing waste, and subsequent care for places where waste is deposited, as well as to checking these activities.*

***Water management** refers to all activities aimed at the use, development and protection of water sources and protection against harmful effects of water.*

***Environmental protection expenditure** includes expenditure on the acquisition of environmental fixed assets and non-investment environmental expenditure. The data are collected by means of an annual statistical questionnaire of the CZSO. The data on fixed assets are the sum expended by reporting units on acquiring fixed assets (by purchase or own activities) and the total value of fixed assets acquired free or by transfer according to relevant legislation or by a change from private use to business. The non-investment expenditure include wages and salaries, payments for rent, energy and other material, and payments for services whose principal purpose is to protect the environment.*

Notes on tables

*Table **3**-1. **Land use***

All agricultural and non-agricultural land is measured by summing up crop areas recorded in the real estate register kept by the Czech Office for Surveying, Mapping and Cadastre as at 31 December.

***Agricultural land** comprises arable land, hop-gardens, vineyards, gardens, orchards, and permanent grassland.*

***Non-agricultural land** includes forestland, ponds, lakes and other water surface areas, as well as built-up and other areas.*

All the data on land are measured as crop areas of agricultural holdings and non-agricultural establishments or of private owners, no distinction being made as to the land size and the type of holder.

*Tables **3**-2 to **3**-5. **Protected areas***

*The Act on Nature and Landscape Conservation distinguishes between 6 categories of **specially protected areas**:*

*– national parks and protected landscape areas – referred to as **large protected areas**, and*

*– national nature reserves, nature reserves, national nature monuments, and nature monuments referred to as **small protected areas**.*

The data in the tables were provided by the Agency for Nature Conservation and Landscape Protection, Prague.

*Tables **3**-6 to **3**-11. **Emissions from air polluters and specific emissions of main pollutants***

***Basic pollutants of primary concern**, which are generated by combusting solid and liquid fuels and discharged into the air, comprise solids (fly-ash and solid particulate matter), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and hydrocarbons (C_xH_y). In 2002 reporting hydrocarbons (C_xH_y) emissions was replaced by reporting volatile organic compounds (VOC) which also covers emissions from the use of solvents, paints and varnishes e.g. for outdoor maintenance and in households.*

In 2006 recalculations of emissions from heating households covering the 2000–2006 period were completed. The methodological adjustments resulted in decreased total heat consumption, fuel consumption, and emissions by approximately 15–20%; emissions from technical pollutants decreased by 40%. Also methodology for determination of automotive fuel consumption and emissions from mobile polluters underwent new redistribution of diesel oil consumption between means of transport and other mobile polluters. Data on automotive fuel consumption for the 2000–2006 period provided by the CZSO were used for updating the balance of emissions from transport, operation of agricultural and forestry machinery and other off-road vehicles (e.g. construction machinery).

Amounts of pollutants discharged into the air are listed in the Register of Emissions and Air Polluters (Registr emisí a zdrojů znečišťování ovzduší – REZZO). *The register keeps records of the following types of polluters broken down by their thermal outputs:*

– ***REZZO 1****: includes stationary fuel-burning systems more than 5 MW in thermal output, plus systems operated in especially important technological processes. The systems classified to this group are referred to as 'big polluters';*

– ***REZZO 2****: includes technological systems incorporating stationary fuel-burning equipment whose thermal output ranges from 0.2 to 5 MW, equipment of important technological processes, and coal mines and similar areas, where burning, evaporating or escaping of pollutants is possible. This group is referred to as 'medium-sized polluters';*

– ***REZZO 3****: includes local technological systems with stationary fuel-burning equipment whose thermal output is lower than 0.2 MW, production process equipment not falling into the category of big and medium-sized polluters, areas where work done can pollute the air, storage sites of fuel, raw materials, products, waste and captured emitted pollutants, and other facilities and activities polluting the air to a large extent. This group is referred to as 'small polluters';*

– ***REZZO 4****: mobile systems equipped with air-polluting combustion or other engines. This group includes especially road and rail motor vehicles, vessels and aircraft. It is referred to as 'mobile polluters'. Since 1995, the balance has been including emissions of solid and sulphur dioxide pollutants from transport.*

Specific emissions *are emissions of pollutants per unit of time per unit of area.*

*Tables **3**-12 and **3**-13.* ***Pollution at selected locations and background stations***

Background stations *are stations located in less populated places far from urban and industrial areas and unaffected by local pollution emissions; excluded are places where surface inversions occur and mountain tops.*

Pollution limit *is the maximum permissible concentration (by weight) of a pollutant contained in the air. Permissible 24-hour concentrations are set for sulphur dioxide and PM_{10} as 50 µg/m^3 and 40 µg/m^3, respectively.*

Methods of measurement*:*

– *sulphur dioxide (SO_2): colorimetry, coulometry and UV fluorescence;*

– *PM_{10} (respirable fraction of suspended particulate matter with an aerodynamic average of 50% of particulates below 10 µm): radiometry;*

– *nitrogen oxides (NO_x): colorimetry and chemical luminescence;*

– *precipitation acidity: pH-metry.*

Precipitation acidity *is read on the scale of 14 to 1, where pH values = 14, 7 and 1 indicate extremely alkaline, neutral and extremely acidic environments, respectively.*

*Table **3**-14.* ***Carbon dioxide and other greenhouse gases emissions***

At present the climate change is regarded as one of the most serious global problems. The climate system is influenced by many anthropogenic activities, and the prevailing role is assigned to the emissions of greenhouse gases (GHG), which cause the increase of the greenhouse effect. The main anthropogenic greenhouse gases are considered to be carbon dioxide (CO_2), methane (CH_4),

nitrous oxide (N_2O), partly (HFC) and completely (PFC) fluorinated hydrocarbons and sulphur hexafluoride (SF_6), (collectively known as fluorinated GHG, abbreviated as F-gases).

CO_2 emissions are caused mainly by fossil fuels combustion, carbonate decomposition in the production of cement, lime, glass, in desulphurization processes and also in metallurgy and chemical industries. CO_2 emissions and removals occur in the sector Land use, land-use change and forestry (LULUCF); in the total balance of the sector LULUCF removals have prevailed so far. Anthropogenic methane emissions in the Czech Republic have their origin mainly in mining, processing and distribution of fuels; this type of source is called a fugitive source. Other significant methane emission sources are as follows: animal breeding, anaerobic decomposition of biowaste during land filling and wastewater treatment. The largest amount of nitrous oxide emissions has its origin in agricultural activities, mainly in denitrification of nitrogen supplied to the soil in artificial fertilizers or manure and other organic material. The production of nitric acid is another major source. Fluorinated gases are not produced in the Czech Republic and all their emissions come from use of these substances mainly in the refrigeration and air conditioning equipments, to a lesser extent, used as blowing agents for the manufacture of foam insulation materials, propellants for some aerosol products, filling of extinguishers, insulating medium in electrical equipment and the thermal insulation of windows.

Emissions from international transport are not currently included in the commitments of the UN Framework Convention on Climate Change nor the Kyoto Protocol. They are therefore not included in the total national emissions and reported as a separate item.

Emissions in the table are expressed in CO_2 equivalents.

In 2008 there was a change in the methodology and the whole time series was recalculated. The changes were most influenced by recalculation of emissions and sinks in the sector Land use, land-use change and forestry (LULUCF).

*Table **3**-15. **Ground level ozone concentrations***

Maximum ground level ozone concentration refers to the maximum 8-hour average concentration measured between 09.00 and 17.00 hours.

The ground level ozone concentrations were measured by the UV absorbance method.

*Data in Tables **3**-6 to **3**-15 were provided by the Czech Hydrometeorological Institute.*

*Table **3**-16. **Total ozone amounts in the atmosphere***

Ozone is measured with Dobson spectrophotometer. The principle relies on the measurement of wavelength-selective absorption (proportional to the ozone amount) of solar radiation passing through the atmosphere. All the measurements are given in Dobson units (D.U.) B.P. Scale.

The data in the table were provided by the Solar and Ozone Observatory, Hradec Králové, *managed by the Czech Hydrometeorological Institute.*

*Tables **3**-17 to **3**-20. **Generation of waste***

***Waste** is any movable thing a person disposes of or intends/is under duty to dispose of, which is classified to any group of wastes listed in the Waste Act.*

***Hazardous waste** is waste included in the List of Hazardous Wastes and any other waste exhibiting one or more hazardous characteristics.*

***Waste management** refers to gathering, concentration, collection, purchase, sorting, transport, storage, recovery and disposal of waste. Ways of waste management are divided into the following groups:*

Recovery operations (R-codes)

R 1 – Use principally as a fuel or other means to generate energy
R 2 – Solvent reclamation/regeneration

R 3 – Recycling/reclamation of organic substances which are not used as solvents (including biological transformation processes except composting)
R 4 – Recycling/reclamation of metals and metal compounds
R 5 – Recycling/reclamation of other inorganic materials
R 6 – Regeneration of acids or bases
R 7 – Recovery of components used for pollution abatement
R 8 – Recovery of components from catalysts
R 9 – Oil re-refining or other reuses of oil
R 10 – Land treatment resulting in benefit to agriculture or ecological improvement
R 11 – Use of wastes obtained from any of the operations numbered R1 to R10
R 12 – Exchange of wastes for submission to any of the operations numbered R1 to R11
R 13 – Storage of wastes pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced)

Disposal operations (D-codes)

D1 – Deposit into or on to land (e.g. landfill, etc.)
D2 – Land treatment (e.g. biodegradation of liquid or sludgy discards in soils, etc.)
D3 – Deep injection (e.g. injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
D4 – Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)
D5 – Specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
D6 – Release into a water body except seas/oceans
D7 – Release into seas/oceans including sea-bed insertion
D8 – Biological treatment not specified elsewhere in this table which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12
D9 – Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D8 and D10 to D12 (e.g. evaporation, drying, calcination, etc.)
D10 – Incineration on land
D11 – Incineration at sea
D12 – Permanent storage (e.g. emplacement of containers in a mine, etc.)
D13 – Blending or mixing prior to submission to any of the operations numbered D1 to D12
D14 – Repackaging prior to submission to any of the operations numbered D1 to D13
D15 – Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)

Other treatment operations (N-codes)

N1 – Use of wastes for landscaping
N2 – Transfer of wastewater treatment sludge for use on agricultural land
N3 – Transfer of waste to other authorized person (except transporters)
N5 – Store balance, 31 December
N7 – Waste exports to EU member states
N8 – Transfer of parts and wastes for re-use
N9 – Processing of car wrecks
N10 – Sale of wastes as a raw material
N11 – Use of wastes for deposit reclamation
N12 – Deposit of wastes as technological material to make landfills safe
N13 – Composting
N14 – Biological decontamination
N15 – Treading of tyres
N17 – Waste export to non-EU states
N18 – Processing of electrical waste

***Municipal waste** refers to all waste generated within the municipality by the activity of natural persons, which is classified to Group 20 of the Waste List, except for waste produced by legal or natural persons holding a business licence. In this publication the municipal waste also includes **commercial waste** whose composition is similar to municipal waste and which is generated by non-production activities of legal or natural persons holding a business licence (e.g. small entrepreneurs, offices).*

Standard waste collection *refers to collection of mixed wastes from dustbins, containers or bags.*

Bulky waste collection *refers to collection of wastes overly large to be placed in dustbins, containers or bags.*

Table ***3****-21.* ***Pollutants discharged into watercourses and accidents on water sources***

The quantities of pollutants discharged into watercourses are given in metric tonnes per year, separately for individual pollutants defined as follows:

– ***undissolved substances****: substances determined by filtering water and drying up the residue to constant weight at 105° C;*

– ***dissolved inorganic salts****: substances which remain after the filtration of the water sample. They are determined by evaporating a filtered water sample and by drying up and annealing (at 600° C) the residue after evaporation. The residue is annealed to constant weight;*

– ***biological oxygen demand (BOD_5)****: the amount of oxygen consumed by the aerobic biochemical decomposition of organic matter contained in water, over 5 days under standard conditions;*

– ***chemical oxygen demand (COD_{Cr})****: the amount of consumed oxygen (O_2) determined by the dichromate method.*

The data on water source accidents were provided by the Czech Environmental Inspectorate.

Table ***3****-22.* ***Watercourses and surface water abstraction under watercourse management organizations***

The decisive part of watercourses is under the care of water management organizations – state-owned enterprises Povodí*.*

Length of watercourses *(km) includes regulated, partially regulated and non-regulated watercourses and excludes drainage, irrigation and feeding channels.*

Tables ***3****-23 to* ***3****-28.* ***Public water-supply and sewerage systems, public wastewater treatment plants (WWTPs), production of sewage sludge***

The field of water-supply and sewerage systems embraces activities related to the operation and management of these systems, i.e. production and distribution of good quality drinking water and disposal and treatment of sewage water.

Public water-supply and sewerage systems*: water-supply and sewerage systems established and run in the public interest.*

Production of water*: includes both invoiced and non-invoiced water. The sum of these two items may differ from the water production figures by water received from or supplied to other organizations.*

Wastewater treatment plants *(WWTPs) are facilities with mechanical, biological and/or other treatment that are used in the treatment and reclamation of sewage water. Coarse pre-treatment facilities (rakes, sand traps, oil traps, etc.), cesspools and simple mechanical facilities, which are not regularly observed and operated. are not considered to be wastewater treatment plants.*

The ***capacity of WWTPs*** *refers to design capacity (in m^3/day). Higher capacity than the design capacity is given where implemented intensification measures have been approved by the water authority.*

The data listed in Tables ***3****-22 to* ***3****-28 have been obtained from the processing of CZSO questionnaires filled in by watercourse management organizations and operators of water-supply and sewerage systems. Information on water-supply and sewerage systems has been collected from major operators. At present, a sample survey is also conducted to collect data from small operators and the data obtained are grossed up to regions and the country.*

*Tables **3**-29 to **3**-34.* ***Investment, non-investment expenditure and economic benefit from environmental protection activities***

Environmental protection is divided into 9 components:

Protection of ambient air and climate *includes innovations of technological processes designed to prevent pollution (protection of air, climate and ozone layer); removal of waste gas and vented air; removal of solid and gaseous emissions; air quality monitoring systems, etc.*

Wastewater management *includes innovations of technological processes designed to prevent pollution; construction of wastewater treatment plants; construction of sewerage systems connected to wastewater treatment plants; cooling water management; water quality monitoring systems, etc.*

Waste management *includes innovations of technological processes designed to prevent waste generation; facilities and equipment for waste collection, transport, separation and treatment; construction of incineration plants, recycling plants, controlled landfills, and composting plants; redevelopment (sanitation) of old landfills; waste monitoring systems, etc.*

Protection of biodiversity and landscapes *includes protection and rehabilitation of habitats and species; protection of natural and semi-natural types of landscape; protection and renewal of environmental stability elements; revitalization of hydrological network; costs of solutions to duties resulting from the Act on the Protection and Use of Mineral Resources (the Mining Act), etc.*

Protection and remediation of soil, groundwater and surface water *includes prevention of pollutants from deposition in soil and then from infiltration into water; prevention of soil contamination and degradation by chemical effects, followed by soil remediation; protection of soil against erosion, slope movements and other degradation caused by physical phenomena, including costs of solutions to landslide issues; costs of geological survey tasks aimed at protection of soil, groundwater and surface water, etc.*

Noise and vibration abatement *(excl. workplace protection) includes prevention of noise and vibration through technological innovations; construction and application of noise and vibration control systems in transport by road, rail and air and in industry; measuring equipment, etc.*

Protection against radiation *includes anti-radon measures; geological work connected with the issue of locating deep nuclear waste depositories; measuring equipment; transport and handling of highly radioactive waste, etc.*

Research and development *include R&D activities dealing with air pollution control and protection of climate and ozone layer; water pollution control; waste management; soil and groundwater protection; noise and vibration abatement; biodiversity and landscape conservation; radiological protection; other environmental research and development, etc.*

Other environmental protection activities *include acquisition of tangible fixed assets to prevent floods, environmental protection education and training, etc.*

The source of the data given in the tables is annual questionnaires of the CZSO.

*Table **3**-35.* ***Environmental expenditure from central resources***

Environmental expenditure from state funds comprises expenses of the State Environmental Fund (without administrative expenses for the office of the Fund) and of the State Agricultural Intervention Fund, from which activities for environmental protection are co-financed.

*Table **3**-36.* ***Income and expenditure of the State Environmental Fund (SEF)***

SEF's incomes consist of various payments and charges plus resources from the National Programme of Air Pollution Control (NPAPC), while SEF's expenditure includes grants and loans.

Since 2009 the Fund receives income from The Green Savings programme (GIS) – income from the sale of emission credits. These are earmarked funds for implementation of measures leading to energy savings and utilization of renewable energy in family houses and multi-dwelling buildings.

*Data in Tables **3**-35 and **3**-36 were provided by the State Environmental Fund, the National Property Fund and the Ministry of Finance of the CR.*

*Table **3**-37.* ***Selected material flow indicators***

Most environmental problems are directly or indirectly connected with the passage of materials through the economy. The compilation of macroeconomic material flow accounts is aimed at the quantification of total material intensity of the economic system. This intensity can be expressed as material inputs to the economic system, material consumption or total waste flows from the economic system back to the environment.

***Direct material input (DMI)** measures the input of materials used in the economy, i.e. all materials which are of economic value and are used in production and consumption activities. DMI equals domestic used extraction (extracted raw materials, grown biomass) plus imports.*

***Domestic material consumption (DMC)** measures the total amount of materials directly used in the economy, excluding hidden flows. DMC is calculated as DMI minus exports.*

*Further, economic performance indicators can be related to the input or output material flow indicators. For example, GDP per DMI or DMC unit refers to direct **material productivity** of the economy. Conversely, input indicators related to GDP give **material intensity** of the economy.*

The material input indicators of the Czech Republic are divided into the following categories:

– *biomass (raw materials, raw products and products from biomass);*

– *fossil fuels (raw materials, raw products and products from fossil fuels);*

– *metal ores (raw materials, raw products and products from metal ores);*

– *non-ferrous minerals (raw materials, raw products and products from industrial and construction minerals);*

– *others (other products not elsewhere classified and wastes).*

In 2008 there was a change in the methodology. Therefore the data in the table are not comparable with those published in the last Statistical Yearbook.

* * *

Further data can be found on the website of the Czech Statistical Office at:

– http://czso.cz/eng/redakce.nsf/i/environment_zem

or of other institutions at:

– http://www.cenia.cz/__C1257257003305C2.nsf/index.html – *Czech Environmental Information Agency*

– http://portal.chmi.cz/portal/dt?action=content&provider=JSPTabContainer – *Czech Hydrometeorological Institute*

– http://www.mzp.cz/en – *Ministry of the Environment of the CR*

– http://www.ochranaprirody.cz/index.php?lang=en – *Agency for Nature Conservation and Landscape Protection of the CR*