

THE REPUBLIC OF LITHUANIA

**LITHUANIA'S
REPORT ON
DEMONSTRABLE
PROGRESS**

**IN LINE WITH
DECISIONS 22/CP.7
AND 25/CP.8
OF THE UNFCCC**

VILNIUS, 2006

**MINISTRY OF ENVIRONMENT
OF THE REPUBLIC OF LITHUANIA**

**INSTITUTE OF ECOLOGY
OF VILNIUS UNIVERSITY**

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CHAPTER 1

Introduction

CHAPTER 1. Introduction

The report presents Lithuania's demonstrable progress made by the country towards fulfilment of commitments under Article 3 of the Kyoto Protocol from 1990 up to 2005. During the above-mentioned period Lithuania prepared four UNFCCC National Communications, two UNFCCC implementation National Strategies and Action Programs and submitted National GHG Inventory Reports.

Lithuania is a state in Central Europe with an area of 65,302 km² near the Baltic Sea. Its population is 3,425.3 thou people. On 11 March 1990, Lithuania restored its independence after 50 years of the Soviet Union annexation. On 1 May 2004, Lithuania became a member of the European Union (EU) and in the same year, took part in the elections to the European Parliament for the first time. Lithuania's Seimas (Parliament) ratified the UNFCCC (Rio de Janeiro, 1992) on 23 February 1995. Lithuania ratified the Kyoto Protocol (Kyoto, 1997) on 19 November 2002. Consequently several legal acts and measures on national level were taken to achieve country's obligations on Convention. A great stimulus for the process was Lithuania's accession to the European Union in 2004. This placed protection of the climate amongst the priority environmental issues in Lithuania. The last decade of economic reforms in Lithuania was the most productive in respect to macroeconomics. Market economy and stable macroeconomic environment took hold. Since 2000, GDP has been constantly increasing. In 2004, it reached 61.9 billion LTL, and its growth – 6.7%, compared to 2003.

Aggregated emissions of direct GHG expressed in CO₂ equivalent without CO₂ removals, and emissions from Land-Use Change and Forestry sector (LUCF) decreased by 66% during the period 1990-2003. Net CO₂ emissions/removals decreased by 84%, and emissions of CH₄ and N₂O decreased by 55% and 68%, respectively. Between 1990 and 1998, GHG emissions decreased significantly as a consequence of the reconstruction of the economy: the decline in industrial production engendered a sharp decrease in fuel consumption and, as a result, in GHG emissions.

Energy sector is one of the most important economic sectors in Lithuania. It includes sub-sectors of electricity, central heating, oil, natural gas, coal and local fuel, and renewable energy resources. In 2004, the energy consumed amounted to 4,342.3 thou t of oil equivalent. Transport, household and industry are the main energy consumers. Oil products, thermal energy, electrical energy and wood are the commonest sources of energy. The Lithuanian National Energy Strategy (2002) designates basic strategic goals, which are directly connected with energy saving, its more effective use, and expansion and promotion of alternative energy consumption (in 2003, the consumption of renewable energy resources in Lithuania amounted to 8.22 TWh).

In relation to it, the EU and Lithuania have undertaken to reduce greenhouse gas emissions in the period 2008-2012 to, on average, 8% below the level of the base year, which is 1990 for carbon dioxide, methane and nitrous oxide and 1990 or 1995 for industrial greenhouse gases.

The data on greenhouse gas emissions show that Lithuania, as a new member of the EU, shall make appropriate efforts to reduce emissions and achieve the Kyoto Protocol emission reduction targets.

The Third and Fourth National Communication on Climate Change under the United Nations Framework Convention on Climate Change was prepared at the Institute of Ecology of Vilnius University with participation of specialists from the Ministry of Environment, Institute of Ecology of Vilnius University, Vilnius University, Lithuanian Hydro meteorological Service, Lithuanian Energy Institute, and Centre for Environmental Policy. The National Communication was submitted to and adopted by the National Climate Change Committee and at the seminars of Lithuanian NGO's.

The Progress report is prepared under the UNFCCC CoP Decision 22/CP.7 and requirements indicated in document FCCC/CP/2001/13/Add.3 and under Decision 25/CP.8 in document FCCC/CP/2002/7/Add.3.

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CHAPTER 2

Escription of National Climate Policy, Strategies, Programmes and Instruments

CHAPTER 2. Description of National Climate Policy, Strategies, Programmes and Instruments

2.1. Policy Making in Lithuania

Being a Member State, Lithuania is bound by the EU legislation including environmental issues on climate change therefore Lithuania's climate policy is developed in interaction with the EU law.

According to the Constitution, Lithuania is a sovereign democratic republic with the separate powers of the Seimas, the President of the Republic and the Government, and the Supreme Court.

The Seimas is the supreme legislative power considering and adopting constitutional amendments, passing laws, accepting resolutions concerning referendums, ratifying and denouncing international treaties, etc.

In the legislative power, environmental issues are being coordinated by the Committee on Environment Protection of the Seimas, within the capacity of which are the following environmental spheres:

1. Ambient air (impact of transport on air quality (fuel, catalysts, communication systems); stationary sources of air pollution; heat and energy saving; utilization of local and renewable energy resources; pollution reducing measures).
2. Water (rational utilization; protection of open water bodies and underground water against pollution; treatment of household and industrial wastewater; protection of marine environment against contamination).
3. Environmental protection in the economic activity (pesticides, fertilizers; polluted territories and their treatment; expedient utilization of natural resources; monitoring).
4. Issues of sustainable development, construction, projection, protection of land and immovable cultural values.
5. Waste (management of waste and secondary raw materials; waste disposal; industrial and hazardous waste; medical waste; nuclear energy and radioactive waste).
6. Optimization of land use and forest structure (prudent use and protection; forestry; afforestation of non-agricultural lands).
7. Landscape conservation, protected territories (protection of ecologically sensitive and most natural (picturesque) territories).
8. Fishing and hunting, animal protection.
9. Environment protection against physical pollution.

10. Economic issues of environmental protection.
11. Cooperation with the association of municipalities and counties in the field of environmental protection, relations with foreign countries, EU funds and other programmes.

12. Relations with the society, and raising environmental awareness.

The Government of the Republic of Lithuania provides the executive power.

At present, there are 13 ministries in Lithuania, which manage state affairs, implement laws and resolutions of the Seimas, as well as decrees of the President, etc.

The Ministry of Environment is the main managing authority of the Government of the Republic of Lithuania which forms the country's state policy of environmental protection, forestry, utilization of natural resources, geology and hydrometeorology, territorial planning, construction, provision of residents with housing, utilities and housing, as well as coordinates its implementation.

Having assessed the data of environmental observations, taken into consideration the conclusions of scientific institutions and the public opinion, and following the existing strategic documents and preparing the legal bases, the goals of the Ministry of Environment and its subordinate institutions are as follows:

- to implement the principle of sustainable development;
- to set preconditions for rational utilization, protection and restoration of natural resources;
- to ensure provision of information about the state of environment and its forecasts to the public;
- to create conditions for the development of construction business and the provision of residents with housing;
- to maintain proper environmental quality, taking into account the norms and standards of the EU.

Implementation of the Kyoto Protocol of the UNFCCC

- UNFCCC Kyoto Protocol's implementation is being pursued and maintained by the Ministry of Environment of the Republic of Lithuania.
- In 2004, the National Climate Change Committee

was formed by the Order of the Minister of Environment in place of the former Committee established in 2001. The main objective of the Committee is to ensure attaining the goals related to the restriction of GHG emissions as set in the National Sustainable Development Strategy, and implementing the measures for reaching these goals. The Committee also has to organize the implementation of the provisions of the UNFCCC and coordinate compliance with the requirements of the Kyoto Protocol and EU legal acts related to the UNFCCC, evaluate the efficiency of the creation of the national legal basis in this area and measures to be implemented.

- To ensure coordination of sustainable development on the highest level, the National Sustainable Development Commission headed by the Prime Minister was established in 2000 (in 2003 the commission was reorganized). The commission joins representatives of ministries, President's Office of the Republic of Lithuania, other institutions and public organizations. The Department of Statistics under the Government has to announce annually under the established procedure the main sustainable development indices in the main annual yearbooks of statistics of Lithuania, with specific indices to be issued in other publications.

- State institutions (the Ministries of Agriculture, Economy, Finance, Interior, Education and Science, and Transport, State Prices and Energy Control Commission, State Enterprise "Energy Agency") contribute to the development of environmental protection.

- Municipalities of different regions tackle environmental problems, and evaluate the possibilities of using local and alternative fuel. They also initiate projects of local and renewable energy resources' utilization. Moreover, they provide local conditions for private investments, and take part in international projects.

- Educational institutions (Vilnius University, Kaunas University of Technology, Vilnius Gediminas Technical University, Lithuanian University of Agriculture), scientific research institutions (Institute of Ecology of Vilnius University, Lithuanian Energy Institute, Institute of Agriculture Engineering of Lithuanian University of Agriculture, Lithuanian Forest Research Institute, etc.), non-governmental organizations (AER Use Commission of the Presidium of the Lithuanian Academy of Sciences, Lithuanian Green Movement, Institute of Scientists Association, Center for Environmental Policy, etc.) also contribute to the development of environmental protection.

- For the implementation of projections on renewable energy, not only know-how or experience, but also financial and/or political support are indispensable. Consequently, the market participants in Lithuania have established associations for uniting their efforts and gaining stronger political financial power (Lithuanian Wind Energy Association, Lithuanian Association of Agricultural Engineers, the Chamber of Agriculture, etc.).

2.2. Development of Climate Policy

Many international initiatives have been developed to mitigate emissions of GHG, and Lithuania has committed itself to the most significant ones. Lithuania's Seimas ratified the UNFCCC (Rio de Janeiro, 1992) on 23 February 1995 and the Kyoto Protocol (Kyoto, 1997) on 19 November 2002. In this connection, the EU and Lithuania have undertaken to mitigate GHG emissions in the period 2008-2012 to, on average, 8% below the level in the so-called base year, which is 1990 for CO₂, methane and nitrous oxide, and 1990 or 1995 for industrial GHG.

The most important environment protection measures are related to the construction of wastewater treatment facilities, introduction of modern waste management systems, and mitigation of air pollution. The focus is laid on the control of some products, stricter requirements for waste management, and integrated control of pollution from the industry sector.

In Lithuania, strategies have already been prepared for separate environment protection sectors, and numerous laws have been adopted for the application of economic environmental measures (Facts 1).

Facts 1. Climate policy and measures since 1992

The fundamental law of Lithuania – **Law on Environmental Protection** – defining responsibility of various institutions in the sphere of environmental protection, the main environmental issues, and ways of their solution was adopted.

National Report for the United Nations Conference on Environment and Development held in Rio de Janeiro presenting analysis of the situation in Lithuania, and foreseeing measures and goals in the sphere of climate change was introduced.

1994:

The first **National Energy Strategy** was approved. It

stipulated the basic regulations for the reform and development of the energy sector for comparatively long period until 2015. In 1999 and 2002, the strategy was updated with regard to the changes in the state's economy and energy sector, referring to the EU experience and available information.

1996:

The adopted **National Environmental Strategy** provides the main regulations that have to be implemented for the sustainable development of different sectors, determination of emission rates which should not be exceeded in 2010.

Approved **National Strategy for Implementation of the UNFCCC**. The updated strategy will be approved in 2006. The Strategy defines the priorities and principles of the UNFCCC and the Kyoto Protocol; provides the strategic analysis of the country's economic, social and regional development, and information about climate fluctuations in Lithuania, as well as their projections in the context of the global climate change. Sectoral and strategic analysis of GHG emissions has been carried out in the context of the EU directives; strengths and weaknesses, opportunities and threats in different sectors related to climate change problems have been evaluated; aims and tasks of the fulfilment of the UNFCCC and the Kyoto Protocol requirements in different sectors have been elaborated; strategy implementation action plan for sectors, environmental protection, science and education spheres has been prepared; strategy implementation and control mechanisms, and result estimation criteria have been designated.

1999:

Law on Ambient Air Protection – the main legal act harmonising the general requirements of Lithuania in the area of air protection with those of the EU establishing the fundamental requirements for ambient air quality assessment and management, and setting out the principles regulating ambient air pollution from mobile sources.

Law on Environmental Pollution Tax establishes tax paying procedure and control. Its basic goals are: to employ economic measures for encouraging polluters to mitigate pollution of the environment, to pursue waste prevention and management, not to exceed the limits imposed on waste discharged into the atmosphere, and to accumulate income for the implementation of environment protection measures. Tax-exemption cases are foreseen for the pollution from stationary

sources if only biofuel is used, as well as for natural and legal persons using motor vehicles with the installed exhaust gas neutralization systems; there are also other cases when pollution tax rate could be reduced.

2000:

Lithuanian Law on Biofuel (amended in 2004) provided legal conditions for biofuel production and utilization.

2002:

The updated and harmonized with the EU legal acts **National Energy Strategy** (1999) was adopted foreseeing fundamental targets for the Lithuanian energy sector, one of which is directly related to environmental requirements. At present, a new version of this strategy is being prepared, and is due to be approved in 2006.

Long-term Economic Development Strategy of Lithuania until 2015 envisages numerous economic measures for mitigation of pollutant emissions and environmental contamination; foresees environmental measures for different sectors, rules for “green purchases” according to which enterprises participating in proclaimed state institutions' competitions of public purchases should possess a certificate of implemented environmental management system (ISO 14000); investigates relevant opportunities and approaches for their practical application in exchange of some tax reduction for the increase of pollution tax rate (formation of “green budget”).

In the **Long-term National Development Strategy**, environmental protection stands out as one of the basic targets ensuring secure growth of the Lithuanian society. These targets include the spheres of water, air, soil, physical pollution, waste and others.

2003:

The Government approved the **National Sustainable Development Strategy**, which is one of the main documents integrating the principles of sustainable economic development, environmental protection and social policy. The main objective of the sustainable development of Lithuania by the year 2002 is to reach the EU average according to the indices of efficiency of economic and social development and the use of resources, not to exceed permissive EU rates according to the indices of environmental pollution, and observe requirements of international conventions restricting environmental pollution and impacts on global climate.

2004:

One of the objectives of the **Law on Biogases, Biofuels and Biooils of the Republic of Lithuania (2004)** is to mitigate emissions of GHG and pollution. Manufacturers and users of biogases, biofuels and biooils are subject to statutory exemptions.

Strategic Trends of the General UNFCCC and Kyoto Protocol Implementation Mechanism were set up with the basic aim – via common projects, corresponding to all requirements of Article 6 of the Kyoto Protocol, carried out by Lithuania and other UNFCCC Annex 1 parties – to reduce GHG emissions, and to increase their removal from the atmosphere.

Rules of Integrated Pollution Prevention, and of Issuing, Amending and Cancelling Control Permits were prepared and updated.

Pursuant to the EU directive 2003/87/EB, specifying the trading scheme of GHG emission permits, and seeking its implementation, **Description of the Procedure for the Issuance and Trading in GHG Emission Permits** was approved.

To meet the requirements of the Kyoto Protocol and those imposed by the EU for the reduction of GHG emissions, in 2004 **Lithuania's National Allocation Plan for Greenhouse Gas Emission Allowances for the period from 2005 to 2007** was prepared and harmonized with the European Commission. The Order of the Minister of Environment "On Approval of the Description of the Procedure for the Issuance and Trading in Greenhouse Gas Emission Permits" approved the procedure and legitimated the system of trading.

2005:

GHG trading registry system was introduced, and regulations for the maintenance of the registry of GHG emission permits were approved. Payment rates for opening and managing accounts in the GHG emission permits registry were defined (orders of the Minister of Environment: **On the Approval of Payment Rates for Opening and Managing Accounts in the GHG Emission Permits Registry; On the Establishment of the GHG Emission Permits Registry; On the Approval of Regulations for the GHG Emission Permits Registry**). The GHG emission permits trading scheme was introduced for the promotion of the economically effective reduction of GHG emissions in energy production and transfor-

mation, production and processing of black metals, processing of mineral substances, and in pulp and paper production.

Rules for the Management of General Implementation Projects provide the procedure of project management in compliance with the requirements of the UNFCCC Kyoto Protocol Article 6 for Lithuania as a recipient country.

Striving to promote clean development, and to keep to the commitments to restrict and reduce pollution levels as stipulated in the UNFCCC Article 3, Lithuania is obliged:

- to implement and further improve energy saving policy;

- to stimulate protection and expansion of different GHG absorbents not controlled by the Montreal Protocol, and afforestation, as well as reforestation;

- to promote sustainable agriculture, and research, development and wider use of new and renewable energy forms, carbon dioxide absorption technologies, and new and most advanced ecologically friendly technologies;

- to gradually reduce and completely eliminate market disproportions in all sectors with GHG emissions, as well as fiscal incentives, taxes and duties, concessions and subsidies which contradict the aims of the Convention, and are related to the market mechanisms;

- to promote reforms in certain sectors for enhancement of policies and measures restricting and reducing greenhouse gases not controlled by the Montreal Protocol;

- to restrict and reduce methane emissions by processing and utilizing it in waste management, as well as in generation, transmission and distribution of energy;

- to cooperate with other countries to enhance the efficiency of their national and common policies and measures foreseen in the Convention, to exchange experience and information about those policies and measures seeking the ways for their collation to make them clearer and more effective.

Facts 2. Basic climate policy instruments

- **Tax on emission of air pollutants:** the Law on the Environmental Pollution Tax was adopted in 2002 (in place of the former one approved in 1992, and amended in 1999), and it designates tax rates imposed on emissions of air and water pollutants, and the payment procedure, as well as production taxes.

The aim of the law is to promote (by sue of economic measures) pollutants to mitigate environmental pollution, carry out waste prevention and management, not to exceed set emission rates, as well as to use proceeds from the pollution tax for the implementation of environmental measures.

- **“Polluter pays” principle:** waste management expenses should be paid by waste keeper and (or) waste producer (Lithuanian Law on waste management, 1998).

- **Limitation of emissions of volatile organic compounds:** legal act of the ministers of environment, social security and labour, and transport and communications was approved in 2000 and revised in 2001 determining limitations for emissions of volatile organic compounds from modern equipment of petrol storage, distribution and transportation.

- **Pollution standards for fuel combusting equipment:** in 2001, the Minister of Environment approved pollution standards for large fuel combusting equipment. This legal act defines not only environment pollution standards but also evaluation rates for air quality parameters.

- **Tax on production waste pollution:** according to the Lithuanian Law on Packagings and Packaging Waste Management (2001), producers and importers not following the instructions of packaging and packaging waste collection, processing and other utilization have to pay the tax on production waste pollution.

- **To promote the use of renewable energy resources,** reduce environmental pollution and fulfil commitments under the Kyoto Protocol to reduce GHG emissions, the Draft Law on Amending the Law on Pollution Tax of the Republic of Lithuania established tax allowances for pollution caused by use of biofuel or for the implementation of environmental measures reducing emissions of a certain pollutant by no less than 5%.

- **Application of excise concessions:** the Lithuanian Law on Excises adopted in 2001 and updated in 2004 stipulates excise exemption for electrical energy generated using renewable energy resources. Excise concessions are granted to the part of biofuel corresponding to the part of biological admixtures (%) per ton of a product.

- To reduce the unfavourable effect of heat energy on the environment, **combined heat and power generation, and heat generation from biofuel and re-**

newable energy resources is being promoted (the Lithuanian Law on Heat Economy, 2003).

- **Raising public awareness about the interrelation between health and environment:** in 2003, the Lithuanian Government adopted a Regulation for the Approval of the National Programme Action Plan for the Environmental Health Improvement during 2003-2006, which enforces interaction between public health care and environmental institutions, and their cooperation to mitigate the unfavourable effect on the population. The goal is set to inform the public about environmental and health relationship as much as possible, as public awareness and people’s efforts to mitigate environmental pollution are of utmost importance.

- According to the Law (updated in 2005) of the Republic of Lithuania on the Evaluation of the Impact of Planned Economic Activity on the Environment, **the impact assessment** is carried out to determine, specify and evaluate possible direct and indirect impact of planned economic activity on human health, fauna and flora, soil, land surface and its depths, air, water, climate, landscape and biodiversity, material values and immovable cultural values, as well as on the interaction of all these environmental components.

- **Economic factors for environmental protection:** the Strategy of Economic Factors of Environmental Protection is part of the Long-term Economic Development Strategy of Lithuania until 2015, and includes the reform of pollution charges with a view to strengthening their incentive character, introduction of a possibility of emissions trading via the transferability of pollution permits, implementation of an efficient waste management system accompanied and promoted by a wider application of product charges and deposit-refund systems, initiation of the “green budget” reform and establishment of the “green purchases” rule for public procurements, promotion of the subsidiary principle by extending municipal rights and responsibilities in the area of local environmental control.

- **Ambient air quality observations:** also, Ambient Air Quality Assessment Programme was worked out and approved, ambient air quality assessment equipment updated and data quality assurance work completed, which facilitated cooperation between institutions responsible for ambient air quality assessment, strengthening of municipal powers in taking adequate decisions on air quality management, raising public awareness, and informing relevant national

and international organizations about the quality of Lithuanian ambient air.

- **Financing of investment projects:** the environment part setting up trends for the use of the EU structural funds for environmental protection within the General Programming Document of Lithuania for 2004-2006 was elaborated. About 35 million LTL will be allocated annually from the European Regional Development Fund for the action "Improvement of Environmental Quality and Prevention of Damage to Environment". The strategy of the Cohesion Fund for environmental protection setting up trends for the use of funds of the Cohesion Fund in the sector of environment for 2004-2006 was worked out. The strategy is the basis for running investment projects intended for the creation of potable water supply and wastewater treatment and regional waste management systems, as well as ambient air protection with a view to ensuring the supply of proper quality potable water to citizens and reducing environmental pollution caused by household waste and pollution emitted into the atmosphere. About 1,088 million LTL intend to be allocated for the implementation of the projects from the EU Cohesion Fund.

2.3. Cross-sectoral Policies and Measures in National Sustainable Development Strategy

Priorities of sustainable development in Lithuania: mitigation of the impact of transport, industry, energy, agriculture, housing and tourism sectors on the environment; more effective utilization of natural resources and waste management; abatement of the threat to human health; mitigation of global climate change and its consequences are ensured in the Lithuanian National Sustainable Development Strategy. Sustainable development is legitimated as a fundamental long-term public development system that is based on three equal components – environmental protection, economic and social development. Sustainable development in this strategy is interpreted as a compromise among environmental, economic and social goals of the society, providing opportunities for common welfare of present and future generations not exceeding permissible limits for the impact on the environment. As cross-sectoral barriers exhibit themselves as one of the main obstacles to sustainable development, this Strategy closely relates objectives and tasks of different sectors. Furthermore, it is envisaged to involve the society into these processes as widely as possible. Lithuanian strategic priorities and principles of sustain-

able development are presented taking into account Lithuanian national interests and identity, and some principal issues tackled in the EU sustainable development strategy, as well as the priorities in their solution – mitigation of the impact of key economic branches (transport, industry, energy, agriculture, housing and tourism) on the environment:

- more effective utilization of natural resources and waste management;
- abatement of the threat to human health;
- mitigation of global climate change and its consequences;
- more intense preservation of biodiversity;
- better preservation of landscape and reasonable management;
- reinforcement of the role of science and education.

This Strategy could be successfully implemented only due to participation and cooperation of various social groups of the society, international, national, municipal, non-governmental institutions and individuals as equal partners. Objectives and tasks (environmental, economic and social) of sustainable development in the strategies, programmes and plans of each economic sector or region have to be presented as a whole, as positive results could be achieved exclusively with the common efforts of all sectors to reach their common environmental targets:

- Maintenance of targeted sustainable development, reasonable coordination of departmental, regional, institutional and group interests, and limitation of them for the benefit of common public interests is possible only in case of strong guidance at the national, regional and municipal level, and clear division of inter-institutional functions.
- Expenses needed for the implementation of environmental measures must not be considered as inevitable additional expenses on the account of economic development. Economic and organizational mechanisms should be determined for the augmentation of economic efficiency of environmental measures and assurance of their payback.
- The burden of expenses connected with environmental protection and management measures (waste management, wastewater treatment, etc.) should not be born only by tax payers. These measures have to be easily accessible to all inhabitants, thus, they have to be well-grounded by the most advanced, economically and ecologically effective technologies.
- Economic activity should be planned carefully so as to be less detrimental to the environment and human health. The impact of planned economic

activity, implementation of economic development programmes and territorial planning should be defined, as well as prevention of extreme situations and measures for mitigation and liquidation of consequences.

- Production and services should grow much faster than utilization of natural resources, i.e. for the manufacture of the same amount of products and provision of the same amount of services, less energy and other natural resources should be utilized. Thus, the set target claims to gain more with less input. Wider utilization of secondary raw materials is one of the main measures for dematerialization of production.
- Substances hazardous to the environment and human health should be substituted by non-hazardous ones, as well as non-renewable resources by renewable ones.
- Development of different sectors and their separate sections should be based on modern scientific achievements, knowledge, and the most advanced environmentally friendly technologies.

2.4. Policies and Measures in Sectors

2.4.1. Energy Sector

Basic measures for tackling the problems of climate change

energy production using local, renewable and waste energy resources

establishment of systems and equipment for various energy calculations, and for the control of heat volume

differentiated excise system

environmental indices of fuel

promotion of energy saving measures, and implementation of projects for using local, renewable and waste energy resources

Law on Electrical Energy of the Republic of Lithuania updated in 2004 designates certain priorities of electrical energy generated using local, renewable and waste energy resources.

Law on Excises amended in 2004 stipulates excise concessions for energy products got from substances of biological origin or with their additives; excise exemption for electrical energy generated using renewable energy resources; reduced excise rate applied to coke and lignite used for business needs.

In 2001, the Order of the Minister of Economy of

the Republic of Lithuania approved the revised and updated National Energy Efficiency Programme for 2001-2005, which is reviewed and updated every four years.

Energy saving measures, as well as implementation of projects for the use of local, renewable and waste energy resources will be supported by the Special Programme for the Implementation of Energy Saving Measures.

For mitigation of environmental pollution caused by combustion of heavy fuel oil and gasoline used for energy production, as well as by using petrol and diesel fuel in internal combustion engines, Environmental Indices of Fuel Quality were approved (2001). Those indices define pollution control conditions for heavy fuel oil and gasoline, and also measures for market control of petrol and diesel fuel. Since 1 January 2004, on the territory of Lithuania, the use of heavy fuel oil with sulphur content being more than 1% by mass has been prohibited. The ban on the use of gasoline, including marine gasoline, with sulphur content being, respectively, more than 0.1% and 0.2% by mass will be imposed from 1 January 2008.

2.4.2. Industry

Basic measures for tackling the problems of climate change

- reorganization and modernization of the industry of building materials production

- cleaner production methods

- renovation of technologies and implementation of new ones

- reduction of volatile organic compounds

For achieving environmental targets, the industry sector should be reorganized: the amount of its waste should be reduced, production should be more ecological and environmentally friendly, natural and energy resources should be saved, secondary raw materials should be processed, multi-use packagings and materials should be produced and utilized, waste (especially hazardous) should be securely managed, and equipment needed for environmental protection should be manufactured. In the programme of the actions undertaken for the reduction of NO_x, SO₂, CO₂, LOJ emissions from stationary sources stipulated in Environment Protection Strategy, it is indicated that enterprises should constantly implement the most advanced technologies, not demanding too heavy expenses, and also design, produce and implement technologies for decontamination of volatile organic compounds, and

cleaning equipment, and control their utilization.

The preventive environmental protection measures and cleaner production methods are also widely introduced. During the last decade, a number of bilateral technical assistance projects on training and implementation of cleaner production, and on waste minimization and environmental management were carried out. Introduction of the best available technologies as part of the requirements for the Integrated Pollution Prevention and Control (IPPC) will, to a certain extent, reduce GHG emissions from IPPC installations.

Since 1 January 2004, "The Procedure for the Limitation of Emissions of Volatile Organic Compounds Due to the Use of Solvents in the Installations of Certain Activities" has come into force. The document is intended to mitigate direct and indirect impact of VOC (separated from dye, solvents, glue and other preparations) on environment, most frequently on ambient air, and possible hazard to human health, as well as prescribes measures and procedures to be implemented in respect of types of activity specified in the document in case any such activity is pursued exceeding the threshold amounts for the use of solvents specified in the document. Annex 3 of the document approves the Pollution Mitigation Plan affording a performer of activities a possibility to reduce, by using other measures, the amount of VOC emitted into the atmosphere to the same degree it would decrease if marginal values of VOC emitted into the atmosphere were applied.

2.4.3. Transport

Basic measures for tackling the problems of climate change

- utilization of ecological fuel
- renovation of bus parks
- improvement of road infrastructure and road cover
- expansion and improvement of the market of public transport services
- reformation of the railway
- application of tax reduction
- promotion of biofuel and pilot projects
- support of biofuel producers, and maintenance of its utilization

The transport sector is one of the main environment polluters, therefore, much attention is drawn to the implementation of measures indispensable for mitigation of pollution from mobile sources.

Long-term (until 2025) Strategy on Development

of Lithuanian Transport System (2005) focuses on transport expansion and environmental protection. While developing economically effective transport system, expansion of all transport types should be coordinated, giving preference to more environmentally friendly transport; energy efficiency of the transport sector should be augmented, more alternative fuel causing the least pollution should be used for mitigation of environmental contamination. The state should control and regulate the impact of transport on the environment, urge economic entities and state institutions to work towards the prevention of harmful impact on human health and environment. Economic and legal conditions should be provided for the development of safer and causing less pollution transport, more environmentally friendly (liquid and natural gas, low sulphur heavy fuel oil) and alternative (biodiesel, bioethanol) fuels should be used. Improvement of road infrastructure and road cover is of the utmost importance as well.

Programme (2004) of the Promotion of Biofuel Production and Utilization in 2004-2010 ensures increase in the production of biofuel from raw materials of Lithuanian origin, and in its utilization, implementing organizational, economic and legal measures of that programme. Production of biofuel is ascribed to new, environmentally friendly technologies. Such type of activity could be rendered the status of a pilot project by the resolution of the Lithuanian Government. Tax concessions could be provided for biofuel and pilot projects, intended for the environmentally friendly technological development, or related to the biofuel generated from renewable energy resources. The cost price of biofuel production and wholesale price exceed the price of mineral fuels, which means that without support producers are unable to expand biofuel utilization. The Law encourages production of biofuel from raw materials of the Lithuanian origin in compliance with the programmes approved by the Lithuanian Government and financed from the state budget. Direct state support could be rendered for the implementation of pilot projects. They could be also financed by the EU.

Technical Regulations for Lignin Biofuel (2004) enable Lithuanian producers and users, respectively, to produce and sell biofuel of this type ensuring high quality and its control, and secure utilization. Therewith, indices of lignin biofuel quality have been ascertained.

2.4.4. Housing Sector

Basic measures for tackling the problems of climate change

- rational utilization of energy resources; reconstruction of houses to reduce their heat conduction as much as possible
- promotion of renovation and modernization of residential houses increasing energy efficiency; improvement of financing mechanism

In 2004, the Lithuanian Housing Strategy was approved setting up long-term housing policy aims and priorities which would serve as the basis for the perfection of legislation in the sphere of housing, governing system and the system of informing the public, for the preparation and implementation of programmes and measures for the development, renovation and modernization of housing, for financial and social support to the population, paying due regard to the current housing situation in Lithuania and the EU housing policy principles, as well as the State Long-term Development Strategy (2002). One of the objectives of the Lithuanian Housing Strategy is to ensure effective use, maintenance, renovation and modernization of buildings, including rational use of energy resources. The following is to be done to attain this objective by the year 2020:

- renovation and (or) modernization of the heating systems of most condominiums, renovation and heat insulation of roof constructions, change or renovation of windows and doors;

- elimination of defects in wall joints of precast concrete residential houses and reduction of heat conduction of walls of such houses;

- reduction by no less than 30% of relative costs of heat energy and fuel, as calculated per unit of usable area;

- increase in household expenses (investments) for housing needs to constitute from 20 to 30% of all expenses.

these measures will make it possible to achieve an up to 30% reduction in relative heat and fuel costs calculated per one unit of area by 2020. This also reduces sulphur dioxide emissions generated due to household activities.

Fulfilling the objective of the Lithuanian Housing Strategy for 2004-2006 to renovate and modernize residential houses, and to maintain rational utilization of energy resources, the adopted measures (2004) stipulate the effective financing and crediting mechanism for renovation and modernization of apartment houses. Until it starts operating, population itself will

continue financing the renovation of residential houses and public buildings and modernization of their energy sector in the country, by using preferential loans administered by the public institution Housing and Urban Development Facility and applying other possible sources of financing. The Housing and Urban Development Facility is formed from the funds allocated from the State Treasury, as well as loans of the World Bank and foreign countries (National Energy Strategy).

2.4.5. Agriculture and forestry

Basic measures for tackling the problems of climate change

- promotion of ecological farming
- reduction of nitrate pollution
- afforestation of unusable, uncultivated and poor-quality lands
- cultivation of energy plants
- development of farmers' capability to accomplish environmental requirements

The most important goals pointed out in the Agricultural and Rural Development Strategy (2000) are environmental protection and ecological farming nurturing biodiversity and landscape. Non-food agricultural production, ecological farming, liquidation of the foci of pollution, partial financing of the construction of manure yards, conversion of unusable land into pastures or its afforestation, and reduction of nitrate pollution are strongly emphasized. Furthermore, cultivation of energy plants should be promoted, as well as reconstruction of boiler-houses for utilization of fuel from unsorted wood and other organic waste.

Code of Good Agricultural Practice (CGAP) had to be worked out. CGAP is a compendium of compulsory and recommended measures for the management of agricultural production. In the nitrate vulnerable zones CGAP is compulsory, whereas in other areas it is optional. CGAP sets requirements for farm management that have an impact on emissions of N₂O and CH₄ from fertilizer application and manure management. Capacity building and raising awareness of farmers about environmental requirements in farming (following CGAP) is one of the indirect measures to mitigate emissions of GHG in the agricultural sector.

Having stated the nationally accepted principles related to the development of natural resources – both in terms of increase and consumption – it is expected that the measure “Afforestation of Agricultural Land” within the Rural Development Plan together with the

investment instruments related to forestry, processing and use of wood within the EAGGF Guidance Section will contribute to the implementation of the Lithuanian Forest Increase Programme for 2003-2020 and further to the obligations related to the reduction/absorption of carbon dioxide emissions.

The Lithuanian Forestry Institute is responsible for forest monitoring activities. The Lithuanian Forest Fund provides financial support for the development of forestry, national and regional parks.

Adopted Programme of Ecological Agriculture (2002) provides favourable conditions for ecological agricultural production, and for the development of its processing, realization and certification system. One of this programme's preconditions – strengthening motivation of environmental protection, and one of the main causes – to sustain and increase soil productivity, reduce water pollution and emissions into the atmosphere, and to preserve the stability of the ecosystem.

Increase of forest coverage is conditioned by the complex of legal, organizational, social-economic and ecological-environmental factors.

Lithuanian Forestry Policy and its Implementation Strategy (2002) and the Lithuanian Programme on Increase of Forest Coverage (2002) were prepared and approved to maintain environmental quality, and to achieve greater absorption of carbon dioxide and air purification. Lithuania has formulated a long-term forest policy and its trends, and the strategic forest development objectives until 2015. Ecological trend is one of the forest policy trends ensuring stability of forest ecosystems, preservation of biodiversity and improvement of forest healthiness.

Implementation of this programme lies with the Ministries of Environment and Agriculture, General Forest Enterprise under the Ministry of Environment, National Land Service under the Ministry of Agriculture, administrations of county governors, municipalities, public institutions – Forest Seeds Control Station, and Lithuanian Forest Selection and Seed Growing Centre, forest enterprisers, private land owners.

2.4.6. Waste

Basic measures for tackling the problems of climate change

- sorting of waste
- processing of waste
- implementing the “polluter pays” principle
- applying tax reduction
- using methane gas for energy generation
- improving waste collection in all residential areas

General requirements for waste management have been transposed into national law with the adoption of the Law on Waste Management (1998), the Order of the Minister of Environment on the Approval of the Rules for Waste Management (1999), the Government Resolution on the Outline of the National Waste Management Strategy and Action Programme (1999), the Government Resolution on the National Programme for Hazardous Waste Management and Measures for the Implementation Thereof (1999), and the Order of the Minister of Environment on the Approval of Procedure for the Granting of Permits to the Utilization of Resources and for Determining Limitations on the Utilization of Natural Resources and Permitted Levels of Environmental Pollution.

Pursuant to the EU law, the following documents were approved: “Rules for the Construction, Operation, Closure and After-Care of Landfills” (2000), Lithuanian environmental normative document (LAND 19-99) “Fundamental Requirements for the Incineration of Waste” (1999), the order “On the Approval of Standards for the Use of Sewage Sludge” (1996), and “Provisional Rules for the Installation and Use of Grounds Designed for the Disassembly of Road Vehicles” (1998).

The State Strategic Waste Management Plan was approved in 2002. It was drawn up with regard to the legal acts regulating the EU waste management.

The main objectives of the plan are as follows:

- to protect nature and human health from the impact of pollution caused by waste through maximal though rational use of material and energy resources;
- to create the rational waste management system meeting public needs, ensuring sound quality of the environment and complying with the principles of market economy;

to set waste management targets, measures and actions ensuring implementation of the EU directives on waste management in the near decade.

Water Economy Management (water supply and wastewater disposal) Strategy (2005) designates the following goals:

to reduce discrepancies in the price of centralized potable water supply and wastewater treatment services, and in the state of water supply and wastewater treatment between cities and villages, and throughout the whole territory of the country (in different municipalities, regions, etc.);

to ensure the compliance of centralized potable water supply and wastewater treatment services with the requirements for health and nature protection, and to maintain sustained functioning of centralized potable water supply and wastewater treatment systems;

to increase accessibility of centralized drinking water supply and wastewater treatment services, and to ensure effective use of centralized water supply and wastewater treatment infrastructure.

This sector is generally regulated by the economic measures of environmental protection which were dealt with in Facts 2.

THE REPUBLIC OF LITHUANIA

Lithuania's Report on Demonstrable Progress

IN LINE WITH DECISIONS 22/CP.7 AND
25/CP.8 OF THE UNFCCC

VILNIUS, 2006

MINISTRY OF ENVIRONMENT
OF THE REPUBLIC OF LITHUANIA

INSTITUTE OF ECOLOGY OF VILNIUS UNIVERSITY

CHAPTER 3

Trends and Projections of the Emissions and Removals of Greenhouse Gases

CHAPTER 3. Trends and Projections of the Emissions and Removals of Greenhouse Gases

The GHG inventory covers the years 1990 (base year), 1998, 2001, 2002 and 2003 (NIR submitted to the UNFCCC Secretariat). The GHG inventory contains information on anthropogenic emissions by sources and removals by sinks for the following direct (CO₂, CH₄, N₂O) and indirect (CO, NO_x, NMVOCs, SO₂) greenhouse gases. The data on F-gases (PFCs and SF₆) are absent, only potential emissions of HFCs being presented.

A number of factors induced a degree of uncertainty in Lithuania's GHG emissions inventory: non-existence of data collection system for this purpose (data from Statistical Yearbooks are mainly used); lack of permanent group of experts for inventory and monitoring; 2003 is only the third year for which an inventory has been established in the CRF format, making full use of the IPCC guidelines wherever possible; National emission factors have been established only for fuel combustion; Quality Control/Quality Assurance system still has to be put into practice.

The Third and Fourth National Communication of Climate Change contains more detailed information on GHG inventory methodology and projections.

3.1. GHG Emissions and Removals

In Table 3-1 GHG emissions by sectors expressed in CO₂ equivalent, and based on the data for the years 1990, 1998, 2001, 2002 and 2003 are presented. Such trends as can be established from a relatively sparse time series can be deduced from these figures.

The Lithuanian emissions profile shows the clear dominance of the energy sector with CO₂ as the main GHG. Aggregated emissions of direct GHG expressed in CO₂ equivalent without CO₂ removals and emissions from the Land-Use Change and Forestry sector decreased by 66% during the period 1990-2003. The net

CO₂ emissions/removals decreased by 84%, and emissions of CH₄ and N₂O decreased by 50% and 68%, respectively (Figure 3-1).

Between 1990 and 1998, GHG emissions decreased significantly as a consequence of the decline in industrial production engendered a sharp decrease in fuel consumption and, as a result, in GHG emissions. The average annual reduction in GHG emissions from 1990 to 1998 was 3,574 Gg CO₂ equivalent per year. Towards the mid-1990s, Lithuania's GDP began to rise. However, the annual increase of GHG emissions between 2002 and 2003 reached only 8 Gg CO₂ equivalent per year. Once rehabilitation of the economy started, reductions were also achieved through energy efficiency and measures taken to reduce emissions.

The main sectors of the economy and their percentage share in the GDP structure according to the data of 2002 are as follows: services (57.6%), industry and construction (35.4%), and agriculture, forestry and fishery (7%).

Decline in the emissions of the direct GHG between 1990 and 2003 with LUCF sector is presented in Figure 3-1. CO₂ and CH₄ emissions slightly increased in 2002 and 2003. This rise mainly follows the growth in industrial output as reflected by the growth of GDP (HFCs emissions have slightly decreased but they make only a minor input to total amount of GHG).

As shown in Figure 3-1, the net CO₂ emissions/removals decreased by 84% between 1990 and 2003 due to the decline of emissions in all energy subsectors, especially in energy industries and in manufacturing industries and construction. Emissions from energy accounted for the largest share of CO₂ emissions, followed by industrial processes.

Consumption of biomass as fuel was facilitated by the government via promotion of the use of renewable ener-

Table 3-1. Trends of GHG emissions by sectors, CO₂ equivalent, Gg

GHG sources and categories	1990	1998	2001	2002	2003	2003/1990	2003/2002
1. Energy	37,633.53	14,885.29	12,624.50	11,556.24	12,036.60	-68%	+4
2. Industrial Processes	2,671.50	2,710.36	2,122.07	1,976.57	1,610.17	-40%	-18%
3. Solvent and Other Product Use	NE	NE	NE	NE	-	-	-
4. Agriculture	7,143.87	2,540.35	2,972.27	2,169.66	2,113.10	-70%	-3%
5. Land-Use Change and Forestry	-5,482.36	-7,557.51	-7,335.19	-6,720.60	-6,989.43	(27%)	(4%)
6. Waste	3,479.70	1,682.18	1,562.82	1,512.63	1,463.24	-58%	-3%
Total with LUCF	45,446.24	14,260.67	11,946.47	10,494.50	10,233.68	-77%	-2%
Total without LUCF	50,928.60	21,818.18	19,281.66	17,215.10	17,223.11	-66%	+0.0%

LUCF – Land-Use Change and Forestry

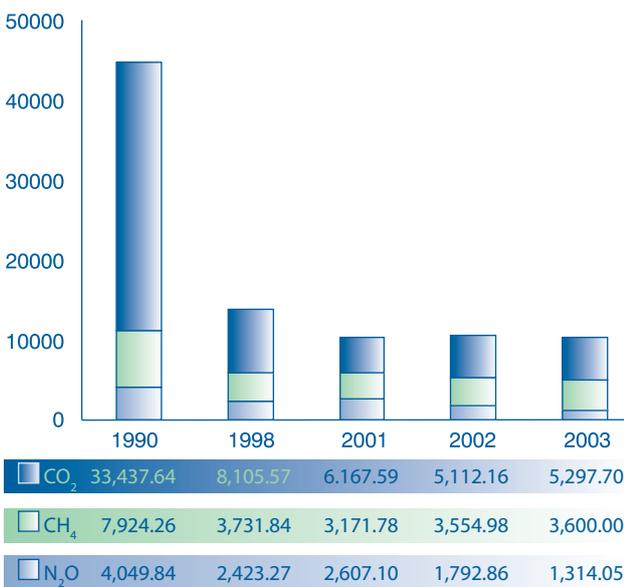


Figure 3-1. Trends of GHG emissions by gas in CO₂ equivalent, Gg (based on CRF summary; with LUCF sector)

gy sources. It was also regarded as a cleaner and cheaper fuel source. In addition, a number of boiler houses have switched from heavy fuel oil to biomass as a result of a programme of Activities Implemented Jointly mainly with Scandinavian countries. CO₂ emissions from biomass have increased more than four times since 1990 (Table 3-2).

Table 3-2. CO₂ emissions from biomass in 1990-2003 (Gg)

Year	1990	1998	2001	2002	2003
CO ₂ emissions	616	2,419	2,790	2,814	3,052

As shown in Figure 3-1, methane emissions have been decreasing until 2001, and then increased slightly in 2002 and 2003 due to the recent increase in coal burning and the more intensive agriculture. Emissions of CH₄ decreased by 55% between 1990 and 2003. The main decrease was in sources of waste management and agriculture.

Emissions from agriculture accounted for the largest share of N₂O emissions, followed by industrial processes (nitric acid production) and energy. Emissions of N₂O decreased by 68% between 1990 and 2003. As shown in Figure 3-1, total N₂O emissions increased by 17% between 1998 and 2001. This increase is attributed mostly to a steep growth in emissions from agricultural soils, partly because of increased fertilizer application on agricultural soils. The increase of N₂O emissions from nitric acid production can be explained by increased production rates following a higher demand from export markets.

Within the fuel combustion sector, N₂O emissions

originate almost equally from energy industries, transport and other sectors. The manufacturing industries and construction sector make less – about 12% of N₂O emissions from fuel combustion. As regards N₂O emissions from transport, the most important source is road vehicles.

HFCs, PFCs and SF₆ are used as alternatives to chlorofluorocarbons (CFCs). Unfortunately, the estimation of quantities, and therefore emissions becomes difficult to pursue due to lack of data.

The analysis of trends of GHG emissions by sectors (Table 3-1) showed that the major source of GHG emissions in 1990 was the energy sector responsible for 76% of all GHG emissions (in CO₂ equivalent), not taking into account removals/emissions from LUCF sector, followed by agriculture (14%), waste (5%) and industrial processes (5%) (Figure 3-2). At the end of the period 1990-2003 the energy sector accounted for 71% of emissions, followed by agriculture (12%), industrial processes (9%) and waste (8%).

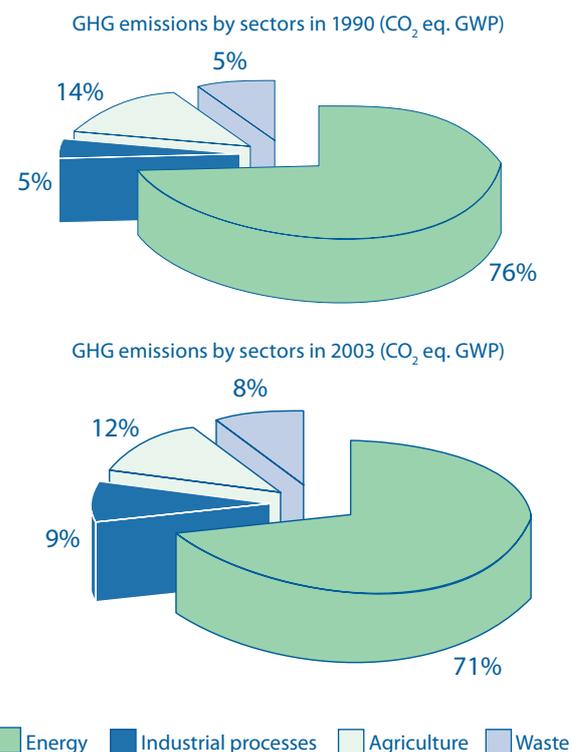


Figure 3-2. Share of GHG emissions by sectors in 1990 and 2003 in CO₂ equivalent

Fuel combustion activities in energy sector are responsible for 5 key source categories of GHG emissions (CO₂), whereas fugitive emissions from oil and gas operations (CH₄) – for 1 key source. The share of CO₂ from stationary combustion (gas) contains 28.7% of total GHG emissions, from mobile combustion (road vehicles) – 19.2%, from stationary combustion (oil) – 10.2%,

from stationary combustion (coal) – 5.6%, from mobile combustion (railways) – 1.3%. The share of CH₄ from oil and gas operations contains 2.7% of total GHG emissions.

Four sources of GHG are identified in the industry sector, 2 of which fall within the key source categories: CO₂ from ammonia production (share of total GHG emissions – 4%) and N₂O from nitric acid production (2.9%).

Agriculture is the second largest source of GHG, accounting for 40% of all methane and 51% of nitrogen oxide emissions. 3 sources of GHG from agriculture are among the key sources of emissions: CH₄ from enteric fermentation in domestic livestock (share of total GHG emissions – 7.3%), N₂O from agricultural soils (2.2%) and N₂O from manure management (1.3%).

The inventory of CO₂ from the land use, land-use change and forestry is given in Table 3-3.

Net emissions/removals made 6,989.43 Gg CO₂ in 2003 and comparing to 1990 they increased to 1,507.07 Gg CO₂. This is a result of the expansion of forest area by 46,700 ha during 1998-2003, which made an increase in sink strength.

Emissions of GHG from the waste sector in Lithuania originate from two major source categories: solid waste disposal on sites (share of total GHG emissions – 5.8%) and wastewater handling (for industrial, domestic and commercial wastewater) (share of total GHG emissions – 2.7%).

3.2. Projections of GHG Emissions

Projections of GHG emissions and removals in fuel combustion sector are presented according to the National Energy Strategy (2002) and should be assumed as GHG emission projections „with measures“. Total GHG emissions projections according to scenarios “without measures” are presented only for energy sector. Lithuania still lacks projections for GHG emissions regarding three scenarios: „without measures“, „with measures“ and „with additional measures“.

Primary energy demand is influenced by both internal factors (rate of economic development, increase of

energy consumption efficiency, fuel and energy losses, importance of energy sector, fuel consumption in production of fertilizers and other non-energy production), and external, such as the volume of power surplus export. General growth of economy and income has a significant impact on the introduction of new technologies and on a possibility to reduce energy consumption. Thus, three scenarios of economic growth were selected: 1) fast economic growth (annual growth rate of 7% up to 2010, and 3% from 2010 to 2020), 2) baseline scenario (4.7% up to 2010, and 3% from 2010 to 2020), and 3) slow economic growth (2% up to 2010, and 3% from 2010 to 2020) (Figure 3-3).

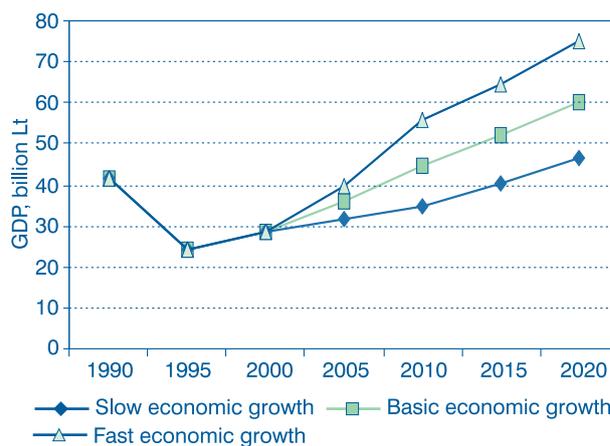


Figure 3-3. Scenarios of economic growth in 2005-2020

Final energy consumption has been presented by: 1) economic sectors (industry and its sectors, agriculture, transport, services and household sector), 2) industrial processes, 3) branches of transportation, and 4) social needs of the population. 2000 was taken as the base year. Projections of final energy demand have been presented in detail according to the sectors of economy and energy sources.

Thorough analysis shows that in all cases the final energy demand in 2020 would not exceed the demand in 1990. At the end of the forecasted period, the consumption of fuel and energy in the basic scenario would be 6.2 million t of oil equivalent, or 71% of the amount in 1990. In this case, the energy intensity index in 2020 would constitute only 49% as against 1990, while energy effi-

Table 3-3. Net CO₂ emissions/removals from LULUCF in 1990, 1998, 2001, 2002 and 2003, Gg

Greenhouse Gas Source and Sink Categories	Net CO ₂ Emissions/Removals				
	1990	1998	2001	2002	2003
Total LUCF	-5,482.36	-7,557.51	-7,335.19	-6,720.60	-6,989.43
Changes in Forest and Other Woody Biomass Stocks Temperate Forests	-7,264.76	-6,248.73	-5,996.65	-5,302.00	-7,150.00
Abandonment of Managed Lands Temperate Forests	-930.40	-1,549.16	-1,549.16	-1,608.75	-
CO ₂ Emissions and Removals from Soil Cultivation of Organic Soils	2,712.80	240.38	210.62	190.15	160.57

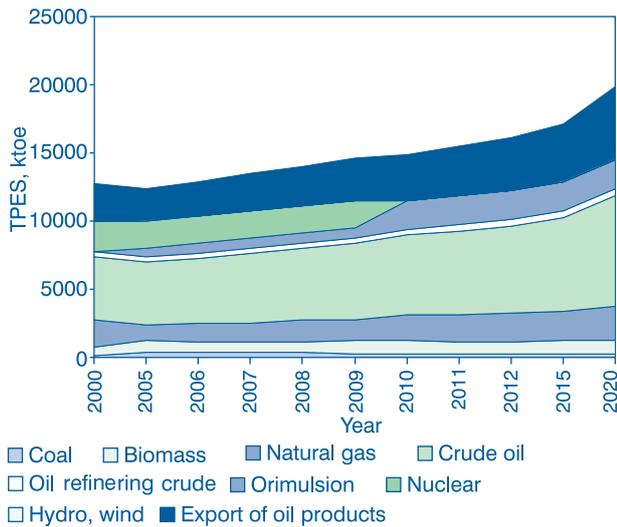


Figure 3-4. Total primary energy supply (TPES) forecast

ciency according to this indicator would be close to the current average level of the EU. Over the period up to 2020, final energy intensity by GDP in Lithuania could be expected to converge to the EU level.

Total primary energy supply forecast is presented in Figure 3-4, and primary energy consumption in energy production sector – in Figure 3-5.

Projections of CO₂ emissions generated from fuel combustion are presented in Table 3-4.

Forecasted N₂O emissions from fuel combustion in different sectors of economy are presented in Table 3-5.

Forecasted CH₄ emissions from fuel combustion in different sectors of economy are presented in Table 3-6.

Forecasted total GHG emissions in CO₂ potential

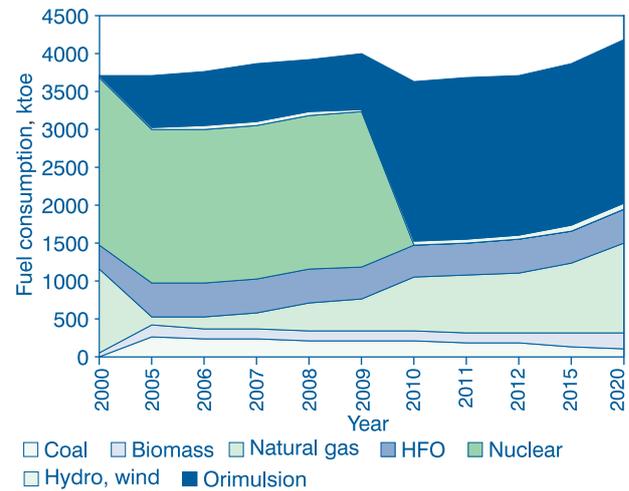


Figure 3-5. Primary energy consumption forecast in energy production sector according to fuel structure

from fuel combustion are presented in Table 3-7. For evaluation of CO₂ potential the following GWP factors were used: CO₂ – 1; CH₄ – 21; N₂O – 310.

Forecast of final energy demand in industry and residential and service sector shows that in 2005 it will make 12 TWh, and emissions of CO₂ will amount to 1,16 Mt.

The National Energy Efficiency program states that energy efficiency potential in transport sector is averagely 1.7 TWh or 0.15 Mtoe per year. Perspective energy balances show that average GHG emissions in transport sector in the period from 2005 to 2007 will amount to 3.9 Mt CO₂ potential per year. According to perspective energy balances, final energy demand in transport will

Table 3-4. Forecasted CO₂ emissions from fuel combustion in sectors of economy 2005-2015 and inventory data for 2001-2002, Mt

Sectors	Year											
	2001	2002	2005	2006	2007	2008	2009	2010	2011	2012	2015	2020
Oil refinery	1.5	1.4	1.00	1.00	1.05	1.16	1.19	1.22	1.28	1.35	1.43	1.68
Electricity and heat	4.4	3.9	5.10	5.29	5.42	5.52	5.67	11.00	11.10	11.17	11.35	11.7
Industry	1.7	1.09	3.3	3.44	3.54	3.59	3.59	3.65	3.68	3.71	3.80	3.95
Service	0.4	0.31	0.41	0.43	0.44	0.45	0.45	0.46	0.46	0.47	0.48	0,5
Transport	3.48	3.6	3.6	3.65	3.77	3.87	3.99	4.11	4.20	4.29	4.56	5.06
Agriculture	0.18	0.2	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.31
Household	0.56	0.598	0.60	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.62	0.63
Total	12.2	11.1	14.20	14.66	15.02	15.36	15.76	21.31	21.61	21.87	22.53	23.8

Table 3-5. Forecasted N₂O emissions from fuel combustion in sectors of economy for 2005-2020 and inventory data for 2001-2002, Gg

Sectors	Year											
	2001	2002	2005	2006	2007	2008	2009	2010	2011	2012	2015	2020
Oil refinery	0.04	0.03	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.09
Electricity and heat	0.10	0.09	0.45	0.5	0.55	0.46	0.47	0.79	0.78	0.78	0.77	0.75
Industry	0.15	0.04	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.17
Service	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
Transport	0.14	0.15	0.26	0.27	0.27	0.28	0.29	0.29	0.3	0.3	0.32	0.35
Agriculture	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Household	0.09	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.055
Total	0.54	0.42	1.02	1.09	1.1	1.07	1.15	1.42	1.43	1.43	1.45	1.49

Table 3-6. Forecasted CH₄ emissions from fuel combustion in sectors of economy for 2005-2020 and inventory data for 2001-2002, Gg

Sectors	Year											
	2001	2002	2005	2006	2007	2008	2009	2010	2011	2012	2015	2020
Oil refinery	0.33	0.07	0.29	0.3	0.32	0.33	0.35	0.37	0.38	0.4	0.43	0.49
Electricity and heat	0.50	0.24	1.58	1.65	1.72	1.69	1.72	3.58	3.61	3.63	3.68	3.78
Industry	0.3	0.26	0.233	0.237	0.242	0.246	0.25	0.254	0.256	0.259	0.268	0.283
Service	0.6	0.42	0.57	0.58	0.6	0.61	0.63	0.64	0.65	0.67	0.71	0.788
Transport	1.49	1.44	3.6	3.64	3.71	3.74	3.8	3.86	3.9	3.94	4.06	4.24
Agriculture	0.11	0.14	0.36	0.37	0.38	0.4	0.41	0.41	0.43	0.44	0.47	0.539
Household	8.59	8.2	8.79	9.05	9.30	9.55	9.8	10.4	10.5	10.57	11.04	11.72
Total	11.93	10.77	15.42	15.87	16.27	16.56	16.96	19.51	19.73	19.9	20.66	21.84

Table 3-7. Projections of total GHG emissions from fuel combustion in CO₂ equivalent, Gg CO₂

Sectors	Year											
	2001	2002	2005	2006	2007	2008	2009	2010	2011	2012	2015	2020
Oil refinery	1,507.3	1,410.8	1,021.6	1,026.3	1,080.1	1,185.5	1,215.9	1,249.5	1,309.7	1,380.1	1,463.8	1,718.2
Energy production	4,449.9	3,932.9	5,270.6	5,463.2	5,664.4	5,838.8	5,839.4	11,320	11,417.6	11,488	11,665.9	12,011.9
Industry	1,752.8	1,026.9	3,351.4	3,535.6	3,588.6	3,641.7	3,644.9	3,704.9	3,734.9	3,765	3,855.2	4,008.6
Service	412.7	311.92	454.4	460.9	467.5	473.3	478.7	488.9	489.2	499.6	510.4	535.2
Transport	3,554.7	3,676.7	3,693.7	3,812.6	3,927.0	4,155.3	4,159.7	4,280.9	4,374.9	4,465.7	4,744.5	5,257.5
Agriculture	185.4	206.04	2,393	250.8	259.1	274.5	275.8	284.8	285.2	294.4	306.1	327.5
Household	768.2	780.1	804.2	811.1	818.14	826.1	832.3	845.9	846	847.4	867.3	893.2
Total	12,631	11,345	14,835.2	15,357	15,806	16,395.3	16,468	22,175.1	22,455.5	22,737.2	23,413.3	24,752.1

Table 3-8. GHG emission projections “with measures” and “without measures” in energy sector, Gg

	1990	1998	2001	2002	2005	2010	2015	2020
CO ₂	37,332	16,103	12,207	11,100	14,239	21,314	22,533	23,820
CH ₄	5.25	7.9	11.93	10.77	15.42	19.51	20.66	21.84
N ₂ O	0.95	0.19	0.54	0.42	1.02	1.43	1.45	1.49
Total GHG emissions in CO ₂ potential	37,737	16,328	12,631	11,345	14,835	22,175	23,413	24,741
Impact of GHG reduction measures	-	-	-	-	-4,456	-5,143	-5,562	-6,074
GHG emissions without measures	37,737	16,328	12,631	11,345	19,291	27,318	28,975	30,815

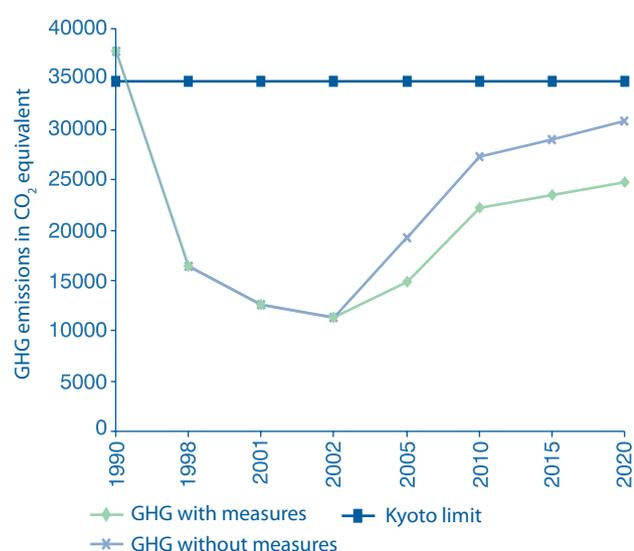


Figure 3-6. GHG emissions projections according to “with measures” and “without measures” scenarios in energy sector

make 18.68 TWh in 2015 and 20.8 TWh in 2020, and CO₂ emissions from transport sector during the same years will make 4.56 Mt and 5.06 Mt, respectively.

GHG emission projections “with measures” and „without measures“ are available only for energy sector and according to GHG gases are given in Table 3-8 and Figure 3-6.

Projections of GHG emissions from non-energy sector were conducted for industry, agriculture, land-use change and forestry and waste.

According to the projections in agriculture up to 2020 a slight decrease in CH₄ and N₂O emissions is expected, as it is indicated in the Table 3-9.

The projections from the industrial processes sector were carried out only for CO₂ emissions from cement and lime production (Table 3-10).

Table 3-9. Projections of CH₄ and N₂O emissions in agriculture, Gg

	2005	2005	2010	2010	2015	2015	2020	2020
	CH ₄	N ₂ O						
Total agriculture	82.33	0.83	71.76	0.74	70.54	0.73	69.73	0.73
A. Enteric fermentation	72.31		62.14		60.97		60.18	
B. Manure management	10.01	0.78	9.62	0.69	9.58	0.68	9.55	0.68
D. Agricultural soils		0.05		0.05		0.05		0.05

Table 3-10. Projected CO₂ emissions from cement and lime production, Gg

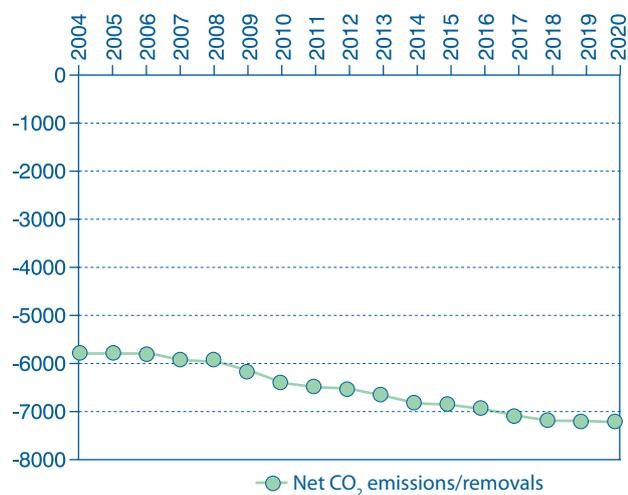
Activity and emissions	2005	2010	2015	2020	2025	2030
Cement production, kt	630	690	790	860	910	980
Lime production, kt	80	90	110	120	120	130
CO ₂ , Gg from cement production	315	345	395	430	455	490
CO ₂ , Gg from lime production	63.2	71.1	86.9	94.8	94.8	102.7

3.3. Projections of GHG Emissions and Removals from LULUCF Sector

The calculation based on forecasted forestry data is submitted in Table 3-11, Figure 3-7.

Table 3-11. Calculated projections of CO₂ emissions and removals, Gg

	2005	2010	2015	2020
CO ₂ emissions	5,448	5,178	5,058	5,120
Removals	-11,269	-11,595	-11,933	-12,270
Net CO ₂ emissions/removals	-5,821	-6,417	-6,875	-7,150

Figure 3-7. Forecasted net CO₂ emissions/removals in 2004-2020, Gg

During 1998-2002, forest area expanded by 66,900 ha from 30.3% to 31.3% and the trend of recent years is expected to continue. The Lithuanian Afforestation program has been developed for the period of 2004-2020 (afforestation of 5,000 ha per year – 4,000 ha of agricultural land, and 1,000 ha of new forests in 2004-2006; and afforestation of 7,000 ha per year in 2007-2020).

It is assumed that the average annual increase in CO₂ sinks will be approximately 1%. The assessment of GHG emissions from the waste sector, based on possible trends in production and management of municipal waste up to 2020.

It is anticipated that the amount of biodegradable waste deposited in landfills will decrease by about 65% by the year 2020, compared to 2000. This will correspond to a decrease in CH₄ emissions to 19.1 Gg (Table 3-12).

Table 3-12. Projected CH₄ emissions (Gg/year) generated in landfills

	2001	2010	2013	2020
Landfilled biologically degradable waste	1,046	784.5	523	366.1
CH ₄ emissions from landfills	52.3	40.95	27.3	19.1

CHAPTER 3. Trends and Projections of the Emissions and Removals of Greenhouse Gases

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CHAPTER 4

Evaluation of Impacts and Effects of National Instruments on Emissions and Projections of Greenhouse Gases

CHAPTER 4. Evaluation of Impacts and Effects of National Instruments on Emissions and Projections of Greenhouse Gases

Having committed to mitigate greenhouse gas emissions up to 8% until the year 2012 compared with the base year, Lithuania has been following a separate climate change policy and measures for its implementation since the year 1990. For more details about climate change policies and measures see part 3 hereof. In the energy sector, Lithuania is seeking to reduce CO₂, CH₄, N₂O emissions by applying the following measures:

- application of fixed feed-in tariffs for hydro, wind and biomass energy, which would enable Lithuania to increase the portion of renewable energy sources in the general primary energy budget by 12% by the year 2010;
- combined heat and electricity production is planned to make up 35% of the total of electricity produced by the year 2020;
- putting every effort to use energy in transport and building sectors as efficiently as possible;
- exemption of biofuel users from the value added tax;
- manufacturing cleaner products and reduction of energy use in the sector of industry;
- reduction of solid pollutants, storage of manure and slurry and use of mineral fertilisers in accordance with environmental requirements, increasing afforestation by 3% by the year 2021, and carrying out projects for the implementation of general actions.

As per calculations made within the National Programme on Increasing Energy Consumption Efficiency, about 25% of the total of energy resources consumed could be saved upon introduction of measures saving primary energy sources and energy. Energy saving potential makes up 2.3 TWh in industry. Each TWh of energy consumed generates 0.223 Mt of greenhouse gas. It had been forecasted that energy saving would allow reducing CO₂ emissions by 0.51 Mt in the year 2005.

4.1. Nuclear Power

Based on the commitments of Lithuania towards the EU, the Nuclear Power Plant of Lithuania should be decommissioned in December of 2009 therefore with a view to ensuring lower costs of the development and functioning of electricity and centralized heat sup-

ply systems and higher reliability of electricity supply, it is projected:

- to modernize Lietuvos Elektrinė (the Lithuanian Power Plant) as the main source of electricity as well as Vilnius and Kaunas thermal power plants: install new burners, modern control and management equipment and combustion products' treatment facilities;
- to renovate the Kaunas Hydro Power Plant by the year 2007;
- to construct thermal power plants in Klaipėda, Šiauliai and Panevėžys, a combined cycle gas turbine condensation-type power plant and additional thermal power plants in other cities in case it turns out that new capacities are needed and it is economically feasible;
- to rehabilitate the existing boiling houses: install gas turbines and generators or small thermal power plants using local fuel provided that their installation is economically feasible with regard to local conditions and they could compete with rehabilitated large power plants.

As per fresh study of the International Atomic Energy Agency, upon decommissioning of unit 2 of the Ignalina NPP, CO₂ emissions will increase by 4.0 Mt if replacement capacity comes from a new combined cycle gas turbine or by 5.5 Mt if it comes from the modernisation of the Lithuanian thermal power plants (basic economic growth scenario).

4.2. Impact of Measures in the Energy Sector

The promotion of production of electricity from renewable and waste energy sources and of the purchase of such electricity allows projecting a possibility of reducing GHG emissions due to the wider use of renewable energy sources in compliance with the requirements of Directive 2001/77/EB (reduction of the use of heavy fuel oil). The following significant reduction of GHG emissions will be reached:

- 235 thousand tonnes by the year 2005;
- 302 thousand tonnes by the year 2010;
- 379 thousand tonnes by the year 2015;
- 451 thousand tonnes by the year 2020.

According to the National Energy Strategy, renewable energy sources will have to make up 12% of the total primary energy in the year 2010. Forecasts about

primary energy and a portion of renewable energy sources in the total primary energy supply (TPES) allow projecting a possibility of reducing GHG emissions due to a wider use of renewable energy sources (by reducing the use of heavy fuel oil because the main direction in the use of renewable energy sources is the shifting from heavy fuel oil (HFO) in boilers to biomass). The following significant reduction of GHG emissions will be reached:

- 2.89 Mt by the year 2005;
- 3.2 Mt by the year 2010;
- 3.5 Mt by the year 2015;
- 3.8 Mt by the year 2020.

The implementation of the National Energy Strategy requires that 35% of electricity should be produced in the process of the general combined cycle heat and electricity production by the year 2020. Electricity production forecasts given within the economic analysis of the electricity sector and the difference between GHG emission from natural gas and heavy fuel oil allow projecting a possibility of reducing GHG emissions due to the development of cogeneration as provided for in the National Energy Strategy. The reduction of GHG emissions by shifting from heavy fuel oil to natural gas would constitute 21.3 kg/GJ. Thus the reduction of CO₂ emissions due to the increased impact of the combined cycle heat and electricity production will cause the following marked reduction in GHG emissions:

- 304 thousand tones by the year 2005;
- 345 thousand tones by the year 2010;
- 404 thousand tones by the year 2015;
- 483 thousand tones by the year 2020.

4.3. Impact of Policies and Measures in Industry and Residential and Service Sectors

As per calculations within the National Energy Efficiency Programme, energy saving potential in residential houses and buildings of the commercial and service sector constitutes 0.52 TWh, or 45% of the total consumption of energy in respective sectors. Such data gives grounds for the reduction of GHG emissions by 0.456 Mt CO₂ potential per year upon implementation of measures increasing energy efficiency in the household and service sector.

Upon implementation of such measures, relative heat and fuel cost per area unit would be possibly reduced by 30% by the year 2020. This will also reduce emissions of sulphur dioxide from household activities.

Each TWh of energy used in production generates

0.223 Mt CO₂. Energy saving will facilitate reduction of CO₂ emissions by 0.51 Mt in the year 2005, 0.21 Mt/TWh in 2010, 0.19 Mt/TWh in 2015 and 0.18 Mt/TWh in 2020.

The consumption of one TWh of energy in the residential and commercial sector will generate 0.097 Mt CO₂ emissions. Energy saving will allow reducing GHG emissions by 0.12 Mt in the year 2005. Similar GHG emissions are forecasted in the household and service sector in 2005-2020.

4.4. Impact of Policies and Measures in the Transport Sector

Pursuant to the National Energy Efficiency Programme (2001), the energy efficiency potential in the transport sector averages 1.7 TWh, or 0.15 Mt per year. Upon introduction of energy efficiency measures in the transport sector, GHG emissions will be 0.442 Mt per year.

As the Law on Biofuel is prepared according to EU Directive 2003/30/EB, the Government or institutions authorized thereby work out measures ensuring that biofuel would make no less than 2% of the total amount of petrol and diesel fuel intended for transport by 31 December 2005, and 5.75% by 31 December 2010. Consequently CO₂ emissions will decrease and make 0.078 Mt in the year 2005. By 2010, when energy consumption increases up to 17 TWh, CO₂ emissions could drop by 0.255 Mt per year.

Energy balance projections show that from 2005 to 2007 average GHG emissions will reach 3.9 Mt CO₂ potential per year in the transport sector. Based on forecasts, the final energy consumption in the transport sector will average 15 TWh per year during 2005-2007, i.e. one TWh will generate 0.26 Mt CO₂ emissions. By applying energy efficiency measures, GHG emissions will decrease in the transport sector by 0.44 Mt per year.

According to energy balance projections, a demand for final energy in the transport sector will be 18.68 TWh in 2015 and 20.8 TWh in 2020, and CO₂ emissions will be 4.56 Mt and 5.06 Mt in respective years. Thus the saving of one TWh in 2015 and 2020 would reduce GHG emissions by 0.24 Mt in respective years. The saving of 1.7 TWh would correspond to the reduction of emissions by 0.41 Mt. The use of renewable energy sources will increase by 7% in 2015 and by 8% in 2020 in the transport sector, which will reduce GHG emissions by 0.313 Mt in 2015 and by 0.39 Mt in 2020.

4.5. Impact of Policies and Measures in Agricultural and Forestry Sectors

The use of synthetic fertilisers and manure in agriculture is the main sources of greenhouse gas in the agricultural sector. Therefore the same factors are important when devising measures to achieve mitigation of N₂O and CH₄ emissions in the sector, i.e. development of plant-growing agriculture, intensive, protective and organic agriculture, plants with long and medium vegetation; mechanical soil cultivation; using appropriate types of organic fertilisers and their characteristics, nutrient substances in the nature, application of organic fertilisers and maximal recommended density of animals, etc.

Taking into consideration the Lithuanian Forest Increase Programme, it was planned that the average annual CO₂ absorption would increase by 1% on average and would be higher due to potentially greater funds intended for afforestation and introduction of the forest management policy.

4.6. Impact of Policies and Measures in the Waste Sector

As per experts' calculations made based on the Environmental Impact Assessment Report for the Kaunas Regional Landfill (EPPC, 2003), the improved collection, incineration and use of landfill gas will result in the reduction of methane emissions in Lithuania to 153 million m³ of landfill gases by 2012. It will make 0,475 Mt CO₂ potential by the year 2012, or 0.1 Mt yearly reduction (Chapter 3; Table 3-12).

A reduction of biodegradable waste and CH₄ emissions is only possible through reduction, distribution and processing of waste as well as improvement of waste collection and management.

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CHAPTER 5

Activities Related to the Implementation of Commitments under Articles 10 and 11 of the Kyoto Protocol

CHAPTER 5. Activities Related to the Implementation of Commitments under Articles 10 and 11 of the Kyoto Protocol

5.1. The National System and Improvements to Inventory of the Emission and Removal of Greenhouse Gases

Recently in Lithuania, the establishment of National Inventory System (NIS) is approaching its completion with finances of LEIF and setting up of NIR preparation group (Inventory Group) which will consist of experts from various branches of economy as well as institutions of science and studies. The Group's work will be co-ordinated by the Head of the Air Division of the Department of Environmental Quality of the Ministry of Environment who at the same time is the country's UNFCCC focal point.

In place of the National Committee for Implementation of EU Requirements in Climate Change Area, the Interministerial Committee on Climate Change being responsible for the overall coordination of the National Climate Change Strategy and Action Plan was established in February 2004. It comprises representatives from the Ministries of Environment, Economy, Transport, Agriculture, Health, the Lithuanian Academy of Sciences, Institute of Ecology of Vilnius University, the Lithuanian Green Movement, the Lithuanian Confederation of Industrialists and Vilnius Municipality. At several meetings of the National Committee it was decided upon more active integration of climate policy into different fields of research, economy, enhancing capacity building, strengthening institutional arrangements, raising public awareness. Preparation of the Lithuania's Third and Fourth National Communication on Climate Change and of the new National Climate Change Strategy and Action Plan is the outcome of the National Committee's activity.

From 3 to 7 October 2005 the in-depth review of the 2005 GHG inventory submission of Lithuania by the expert review team co-ordinated by the UNFCCC secretariat was performed. The report prepared under this review comprises many valuable comments, which are taken into account while compiling next GHG inventory submissions. Completion of time series and recalculations is planned for the 2006 GHG inventory submission.

After the submission of the Second UNFCCC Na-

tional Communication including preliminary GHG emissions inventory data lacking consistency and completeness, the Ministry of Environment submitted the relevant reports (CRF and NIR) to the UNFCCC Secretariat. These reports were prepared in accordance with the UNFCCC requirements related to national inventory submission with assistance of EU PHARE project EUROPEAID/112892/D/SV/LT/4 "Strengthening of institutional capacity to implement EU requirements on chemicals, GMO, IPPC and GHG". This project was implemented by national and foreign experts. The NIR contained the data on emission trends for 1990, 1998, 2001 and 2002. In 2005, this report was renewed by the data on emission trends for 2003 by experts from the Air Division of the Department of the Environmental Quality of the Ministry of Environment.

Currently Lithuania elaborated two projects which will help to fill in GHG inventories (preparation of NIR) of the missing years and will assist in furnishing a report for the year 2005. Moreover, QA/QC system will be elaborated. Close co-operation of NIR preparation group (Inventory Group) with the staff of the Air Division of the Department of Environmental Quality of the Ministry of Environment, institutions of branches of economy, Department of Statistics is anticipated. For GHG emissions and removal in the LULUCF sector extensive use will be made of annual statistics, participation and expert appraisal of agricultural specialists and foresters, results of CORINE land-cover project, experience and knowledge of the Institute of Ecology of Vilnius University, Laboratory of Avian Ecology, Group of Geoinformation Systems with the aim to obtain the most exact and newest data available in Lithuania.

The work of NIR preparation group (Inventory Group) is defined by the Air Division of the Department of Environmental Quality of the Ministry of Environment and National Climate Change Committee. A work performance scheme and plan have been set with Group's participants and relevant institutions as well as with required experts. A work scheme and regulations of NIR preparation group (Inventory Group) are to be approved in the second quarter of 2006. NIR submitted by the Group will be discussed and approved at the sittings of National Climate Change Committee.

5.2. National Programmes to Reduce Emissions and Increase Removals of GHG

For the purpose of reduction of GHG emissions, the Government of Lithuania set a number of measures complying with the UNFCCC requirements such as energy saving, rational and efficient energy use, cutting of losses, development of alternative energy (solar, wind, water), wider use of biotransport, etc. Furthermore, the Government is making steps towards amendment of the legal basis and initiation of joint Transboundary projects. Measures for the implementation of the UNFCCC are included into a number of strategies, namely, National Strategy for Implementation of the UNFCCC, State Long-term Development Strategy, National Sustainable Development Strategy, Long-term Economic Development Strategy of Lithuania until 2015, National Communications on Implementation of the UNFCCC and draft amendments to the National Strategy approved by the Government of the Republic of Lithuania in 1996.

The Lithuania's climate policy and strategy on the reduction of emissions and increase of removals of GHG is described in chapters 2 and 4 of this Progress Report and in more detail in the Lithuania's Third and Fourth National Communication on Climate Change (chapter 4: Policies and Measures). The updated Lithuania's Second Climate Strategy (2006) focuses on prevention of reduction of GHG, usage of adaptation and mitigation measures according to UNFCCC requirements.

Promotion of environmental protection and ecological farming fostering biological diversity and landscape in agriculture is one of three key strategic goals of the Ministry of Agriculture for 2005-2007. One of special programmes of the ministry is the Programme for Promotion of Development of Biofuel Production.

The Ministry of Agriculture pointed out to the following activities related to the UNFCCC: afforestation of uncultivated lands; use of agricultural waste for the production of energy, cultivation of new energetic plants for alternative energy.

The Ministry of Agriculture is seeking to develop technologies enabling better and more efficient use of renewable local energy sources and mitigation of hazardous emissions. Therefore, it is important to implement the principles of sustainable farming in the country as soon as possible. Mitigation of pollution caused

by nitrates from agricultural sources is an important part of such farming. The Ministry has prepared the State Programme for Mitigation of Pollution Caused by Nitrates from Agricultural Sources. The purpose of the programme is to ensure sustainable development of agriculture in harmony with environment. The objective of the programme is – through application of scientific research – to select and recommend the most efficient measures for mitigation of pollution by nitrates from agricultural sources, standardize the use of nitrogen fertilizers, including manure and other organic fertilizers balanced according to the needs of plants, to involve research and education institutions and consultancy services in the monitoring of pollution from agricultural sources.

To enhance the country's adaptation to climate change, CO₂ removal is being increased by planting new forest areas and by carrying out afforestation in barren and unused agricultural land. Changes in forest and other woody biomass stocks in Lithuania reduced total CO₂ emissions by 40.6% in 2003 (by 10.8% in 1990). Forestry is subsidized by the EU funds provided according to the General Programming Document and Rural Development Plan. In 2004-2006, 113 million LTL is intended for planting new forests and for the development of forestry. The total amount of support during 2004-2006 would allow planting 12 thousand ha forest, or 4 thousand ha forest per year. Agricultural land is also used for afforestation.

By conducting planned scientific research, researchers and laboratories of the Lithuanian Energy Institute, the Institute of Agriculture Engineering of the Lithuanian University of Agriculture are solving the issues of the use and development of alternative energy sources in the country. The Lithuanian Energy Institute is engaged in creating GHG emission reduction technologies. Research on the increase of efficiency of the use of solar energy and making equipment cheaper in Lithuania is conducted at the Semiconductor Physics Institute, Institute of Physics, Kaunas University of Technology and Vilnius University. Researchers of the Institute of Agriculture Engineering of the Lithuanian University of Agriculture, Lithuanian Institute of Agriculture are creating soil tilling and cropping technologies saving energy and resources, technologies to improve production quality under climate change conditions.

5.3. Most Relevant Impacts and National and Regional Programmes to Reduce Vulnerability and to Increase Adaptation Capacities to Climate Change

Considerable measures are taken to carry out research into climate change impact upon different spheres, create scenarios of possible impacts and define ways of mitigation of impacts. For more details, see special Chapters 4, 5, 6, and 7 of the Lithuania's Third and Fourth National Communication on Climate Change. These Chapters describe adaptation and impact mitigation measures applicable to certain branches of economy (energy, agriculture, forestry, and health protection) and environmental protection.

Due to climatic and geographic features, Lithuania falls into a group of countries vulnerable to climate change. The highest rate of temperature rise was registered in winter, whereas summer changes were insignificant. During the 19th-20th centuries the average annual air temperature in Lithuania increased by 0.6°C, the average temperature in the cold season by even 1.0°C. In the 20th century a tendency for precipitation in cold seasons to increase and in summer to decrease was registered. Besides, climate in Lithuania is increasingly losing its territorial specificity and can further be described as reflecting the global climate phenomena observed in large areas and regions.

According to the results of calculations based on five climate change models designed and used worldwide (HadCM2, UK; ECHAM4, Germany; CGCM1, Canada; GFDL-R15, USA, CSIRO-Mk2, Australia; and CCSR/NIES, Japan), air temperature should further increase in Lithuania in the 21st century. The highest temperature change rates will occur in the second half of this century. Air temperature in cold seasons (December-March) will increase in particular. In warm seasons of the year, air temperature will not go up so quickly. Lithuanian climate will further become more marine-type. Precipitation amounts are forecasted to be greater by the end of the 21st century. Mean wind velocity changes will be minor. The average number of days with snow cover should decrease by 15-25 days in Lithuania in the 21st century. The greatest changes are expected in the eastern part of Lithuania. The period of snow cover at the seaside is predicted to hardly reach 50 days. Character of annual hydrography of rivers influenced by snow nutrition will be noticeably changed.

Temperature and precipitation amounts as well as their regimes have special impacts upon agricultural crops. Countrywide investigations show close subjec-

tion of phytomass resources, CO₂ removal, productivity of agricultural cultures, abundance of pests and spread of diseases to climate change. Impacts on agricultural technologies are not sufficiently investigated therefore special research is necessary.

Trees serve as sensitive bioindicators of environmental changes caused both by anthropogenic activity and global warming. In the course of the last two decades, Lithuanian forests have been suffering global warming impact namely mass drying out and degradation of spruce forests, defoliation of trees, change in forest productivity, etc.

Changes in temperature and precipitation regimes will further affect productivity of agricultural cultures and production quality, and will require increasing financial investments in agriculture and its separate fields. A need to combine varieties, change and adapt cultures or their arrangement in the territory of the country to the ever-changing climate conditions will further remain. Impacts upon productivity of forests, especially those in protected territories and forest habitats, productivity and quality of minor forest goods will become stronger. Spread of new diseases and pests will increase investment costs.

Climate change affects various ecosystems and their components – habitats, species, communities and populations. Climate change impacts manifest through increase of eutrophication of water basins, marshes and wetlands; changes in the timing of spring arrival of birds; periods, dynamics, distances, directions and flyways of bird migrations; breeding timing of birds; shifting of bird breeding distribution areas and ranges; changes in bird wintering areas and in wintering populations; restructuring of species composition of birds breeding in Lithuania; changes in Important Bird Areas and Habitats; changes in insect development cycles, flying timing, population abundance and dynamics. Global warming impacts are more dramatic on water and wetland birds than on terrestrial avifauna.

Forecasts about climate change impact on biological diversity, ecosystems and their components become more complicated due to the anthropogenic pressure. So far there is no clear understanding of the balance between the climate impact and anthropogenic effect and changes of such balance in time and space and how it acts upon the status of ecosystems, habitats or species. Global warming impacts are likely to be greater recently than effects of decreasing man-induced activities in Lithuania.

In biological diversity, further degradation of ecosystems and habitats, extinction of species due to their shifts northward, arrival of new species, loss of part

of values of protected areas due to changes in species distribution areas and northward and northeastward shifts will occur. Many customary species protection and management measures applicable in environmental protection will lose their efficiency, which will necessitate new concepts, ways and measures for their conservation for future generations, cooperation between countries in creating new common systems or networks of protected territories. This is highly urgent for a network of European protected areas NATURA 2000, which is rather conservative, its creation is not harmonized with climate change processes.

Climate greatly affects long-term variations in the dates of ice cover formation on rivers making the process later in time and shorter in duration.

It is forecasted that the water level in the Baltic Sea may rise by 0.3-0.6 m throughout the 21st century. If such water rise rate holds on, sea water level by Klaipėda seaport at the end of the 21st century would be by 0.65 m higher than the level to date. Investigations show that upon rise of water level by 9 cm, the transverse profile of our coasts will gradually start changing, and when water level jumps up to 0.3 m, essential transformation of coast will begin. With water level rise by 0.6 m and more, the coastline will start changing drastically and part of the territory will be flooded. The rise of the Baltic Sea water level would mostly affect Lithuanian coastal areas.

The greatest changes in river runoff are forecasted for the hydrological area of Žemaičių highlands. Hydrological changes in hydrological areas of middle and southeast Lithuania are not so expressed. It is forecasted that cases with intensive precipitation will be gradually more frequent in Lithuania with the increasing risk of floods. Besides, higher temperatures in winter will make precipitation fall in the form of rain. Such rapid rise in water-flow will further increase a risk of floods. In particular, sudden, severe and localized floods in unexpected places will become more frequent, which can increase numbers of injured.

Global warming is forecasted to cause further spread of ticks transmitting tick-borne encephalitis and Lyme disease all over Lithuania as well as spread of bloodsucking insects in South Lithuania (Druskininkai resort) in particular. Pollen spread timing and change cause new problems for prophylaxis and therapy of allergic diseases.

Changes in climate, ecosystems, and their components and in biological resources due to global warming bring new urgent practical ecological problems related to different economic and environmental sectors, human health and well-being of the society.

Step by step recently the UNFCCC implementation covers a wider array of problems and spheres, all branches of economy and all environmental areas where climate change impacts are felt or probable, though not ascertained. Special attention is paid to agriculture and forestry, health protection and environmental protection, in particular – principles of designing the system of protected areas, management of such areas under variable climate conditions, impacts upon red-listed species and communities, NATURA 2000 territories and habitats. Of great importance is the conservation of the band of sea coast dunes in the Baltic Sea part belonging to Lithuania, protection of beaches from degradation, which is currently very intensive due to increasing sea water level, more frequent storms, improper use of marine landscape and protection infringements.

Irrespective of an array of works commenced in Lithuania, the country still has a lot to accomplish in this field. Primarily, it is necessary to formulate, implement, publish and regularly update national or regional programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change. Presently the Ministry of Environment is preparing National Strategy and Action Programme on Mitigation of Climate Change Impact on Lithuania and Adaptation of the Country to Climate Change. This Strategy and Action Programme will embrace separate sectors of economy: energy, transport, industry, land and forest industry, waste management, environmental protection and public health. This Strategy and Action Programme are to be prepared in 2006.

5.4. Co-operation in Research and Technologies

Research in the field of climate change and climate systems represents only a minor share in R&D, which is a consequence of a small number of organisations working in this field and existing national priorities in this field of R&D.

Upon signing by Lithuania of the UNFCCC in 1992 and upon ratification thereof in 1995, the National Strategy for the Implementation of the UNFCCC and the action programme providing for a number of research works was developed. The requirements of the UNFCCC for special research investigations are also reflected in other environmental strategies created by the Ministry of Environment, namely, the Biological Diversity Conservation Strategy, Strategy on Raising Environmental Awareness of the Society (Training, Educating, and Informing). The state complex research programme ECOSLIT and the State Ecological

Monitoring launched in 1992 (since 2005 it is performed according to the programme meeting the EU requirements) partially played a role in implementing the requirements under the UNFCCC. The latter programme was created with participation of experts from different research institutions representing various branches of research.

Under the financial support of the U.S. Department of State, the researchers of the Institute of Ecology of Vilnius University carried out two research projects related to the creation of a long-term ecological research network in 2004-2005. With participation of other research institutions (Vilnius University, Institute of Botany, Institute of Geology and Geography, Klaipėda University, etc.) the Long-term Ecological Research Network (LTER) was designed on the base of the Institute of Ecology of Vilnius University and crowned by a conference on research conducted under the network. In November 2005 during the international conference of parties in Mexico Conference the Long-term Ecological Research Network of Lithuania was incorporated into the International Long-term Ecological Research Network (ILTER). The following areas have been chosen as thematic priorities of the network: climate change and its impact on the nature and society of the country, conservation of biological diversity, environmental quality assessment and enhancement. The following territories that in the best way meet the requirements of the network have been chosen as LTER polygons: the Baltic Sea coastal area, Lake Drūkšiai area, Čepkeliai and Kamanos Strict Nature Reserves. In co-operation with researchers of other neighbouring countries (Latvia, Russia, Belarus, Ukraine, and Poland) and researchers working in the ILTER network, it is intended to initiate a number of research projects and obtain new results in the areas of the impact of climate change on ecosystems, society and certain branches of economy and environmental protection, to determine susceptibility, possible vulnerability and adaptation of separate ecosystems in the country.

Having taken into consideration thematic priorities under the EU Framework Programme for Research, in 2002 the Government approved the underlying national research priorities, including financial support in 2003-2006 in the area "Changes in Ecosystems and Climate", which complies with the thematic priority "Global Change and Ecosystems" under the EU 6th Framework Programme and remains urgent in the scheduled projects under the EU 7th Framework Programme for Research.

The main research related to the fulfilment of commitments under the UNFCCC is carried out in Vilnius

University, Institute of Ecology of Vilnius University, Lithuanian Energy Institute and, partially, in state research institutes (Institute of Geology and Geography, Lithuanian Institute of Agriculture, Institute of Agriculture Engineering of Lithuanian University of Agriculture, and Institute of Botany).

The Department of Hydrology and Climatology in the Faculty of Natural Sciences of Vilnius University performs analyses and forecasts of Lithuanian climate, prepares climate change future scenarios. The Department cooperates with the Lithuanian Hydro meteorological Service under the Ministry of Environment. In 2000-2003, Vilnius University participated in the project "European Flood Forecasting System" (EEFS) under the 5FP of the European Commission. Currently, Vilnius University is running the project "Origin of Organic Substances in Aerosol and Interaction with Climate Parameters" with the Institute of Physics and National University of Ireland, the project "Impact of Climatic Fluctuations on Geographical Processes in Lithuania" with the Institute of Physics and the Institute of Geology and Geography, the international project "European Climate Assessment & Dataset" coordinated by the Netherlands Royal Meteorological Institute and executed in Lithuania by Vilnius University, Institute of Geology and Geography, Lithuanian Hydro meteorological Service. Vilnius University is running projects "Climate Change and Quantitative and Qualitative Fluctuations of Lithuanian Water Resources", "Responses of the Hydrosphere to Climate Fluctuations at Different Time-Scales", etc.

Vilnius University in co-operation with other institutions arranged a number of different-level conferences and seminars directly related to the implementation of the UNFCCC, namely the seminar "European Flood Forecasting System and its Applicability in Lithuania"; international video conference "Climate Change and Public Spirit" organized by the British Council; international conference "Solar Energy: Possibilities and Perspectives for Northern Countries"; international conference "Problems on Coastal Management of the Baltic Sea"; conference "Meteorology and Hydrology in Lithuania: Development and Prospects".

With respect to the commitments of Lithuania under the UNFCCC, in 2003 the Institute of Ecology of Vilnius University changed its research trends harmonizing with EU FP. Three new research priorities have been approved by the Government and are financed by the state. Each year, the Institute carries on research to obtain new results on the impact of global warming upon ecosystems, habitats, animal communities, species and populations, as well as on their abundance,

change in distribution areas, as well as the state and change trends of populations. Furthermore, within a period from the submission of the UNFCCC NC2 to the Secretariat of the UNFCCC, researchers of the Institute implemented a number of projects directly and indirectly related to the fulfillment of the UNFCCC commitments.

Researchers of the Institute of Geology and Geography carry on research on the dynamics of Baltic coasts with a view to determining possible impact of global warming and other related phenomena – hurricanes, sea level change – on the state of coasts, recreation, tourism and the only seaport of the country.

NGOs play an important role in the process of implementation of the UNFCCC in Lithuania. They seek to use all available national scientific potential and lobby state officials for attaining common purposes. One of such organisations is the Regional Environmental Center (REC) for Central and Eastern Europe in Lithuania. The organisation was running the project of the UNDP and the Ministry of Environment “National Capacity Self-Assessment for Global Environmental Management”. The project covered climate change impacts upon ecosystems, registration of GHG, introduction of gas reduction technologies and different tools, including international instruments. The project concluded that the interaction between R&D and state institutions in implementing the convention is inefficient, officials responsible for the strategic planning do not take part in designing state orders in the area of developing research and technologies, applied research does not enjoy adequate financial support – the greatest part of research related to the implementation of conventions in Lithuania was carried out according to international projects, which proves that the concern of the state for the performance of international commitments is far from being sufficient.

5.5. Systematic Observations

The main tasks of the Lithuanian Hydro meteorological Service under the Ministry of Environment are meteorological, hydrological and agro meteorological observations and forecasts. A meteorological observation network covers all the territory of the country and includes 18 meteorological stations, 3 aviation meteorological stations, including 9 climatological stations. A water-gauging network consists of 59 stations. The oldest one was established in 1811.

Lithuania is a member of the World Meteorological Organisation since 1992. The Lithuanian Hydro meteorological Service takes part in the BALTEX joint

project of the Baltic States. The CLICOM programme has been implemented in co-operation with the meteorology service of the UK, the BALTMET system is in operation.

A strong scientific centre – a Department of Hydrology and Meteorology is at the Faculty of Natural Sciences of Vilnius University, being the main climatological scientific centre in the country. The main research trends of the department are related to the preparation of climate reviews, future climate forecasts and creation of future climate scenarios and modelling. Scientists of the department have prepared several books, monographs and papers on climate status and trends in Lithuania and in the Baltic region. Close co-operation with different international research centres on the UNFCCC research trends is maintained.

The Environmental Protection Agency being a subsidiary institution of the Ministry of Environment is responsible *inter alia* for environmental quality monitoring, gathering and storing environmental data and information as well as for the assessment and prognosis of environmental quality. One of the main tasks of the Environmental Protection Agency is managing, processing and reporting of information related to the UNFCCC issues.

The following types of climate monitoring are carried out in Lithuania: atmospheric, water, soil, wildlife, ecosystem and landscape. All existing types of observing the climate system are essentially satisfying our basic demands for climate variability analysis. The new State Environmental Monitoring Programme covers impacts upon ecosystems, wildlife and protected areas however it does not include the climate change impact – the programme only partially reflects the UNFCCC requirements and country's obligations.

Marine observations are concentrated in the Baltic Sea and Curonian Lagoon. The main research centres are the Marine Research Centre under the Ministry of Environment, the Institute of Ecology of Vilnius University, Institute of Geology and Geography, Klaipėda and Vilnius Universities. Research related to the UNFCCC implementation issues is concentrated on the circulation and transformation of water masses, water pollution, impacts on coastal ecosystem, dynamics of coasts, biological diversity, wise use of biological resources and their protection strategies and measures. Investigations are carried out according to both national and international (HELCOM) monitoring programmes. A special USA-Lithuanian symposium was organized in the country embracing climate change issues in 2004, the next is announced to be held in 2006.

5.6. Education and Public Awareness Raising

Lithuania has appropriate legislation for the development of modern educational system and social partnership. The sector of global climate change is integrated into long-term goals in the sphere of education and science, which are set out in the National Strategy for Sustainable Development. They are to build a society of educated, self-dependent, active and responsible members, to develop its intellectual potential and thus ensure the coherent and harmonious implementation of economic, social and environmental aims.

Climate change and related topics (vulnerability and sensitivity of ecosystems, global climate change impacts on economy, ecosystems and society, adaptation, mitigation measures) are covered in study programmes offered by the following higher educational institutions of Lithuania: Vilnius University, Vilnius Pedagogical University, Klaipėda University, Šiauliai University, Vilnius Gediminas Technical University, Vytautas Magnus University, Kaunas University of Technology, and Lithuanian University of Agriculture.

Problems of climate change trends and impacts were raised at several different-level conferences (international, regional and national), organized by the Ministry of Environment, the Institute of Ecology of Vilnius University, Vilnius University, Lithuanian Academy of Sciences, Klaipėda University, Vilnius Gediminas Technical University, etc.

At present Lithuania enjoys an appropriate legal basis which guarantees its citizens the right of free access to environmental information and participation in decision-making. These rights are also ensured by the UN European Economic Commission Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) which was ratified by Lithuania, EU Directives (the European Council Directive 90/313/EEC on Free Access to Environment-Related Information, EU Directive on Environmental Impact Assessment) and laws of the Republic of Lithuania: Environmental Protection of the Republic of Lithuania, Environmental Impact Assessment, Provision of Information to the Public (2000), Right to Receive Information from State and Municipal Institutions (2000), Territory Planning, Environment Monitoring, etc., resolutions of the Government and ministries, orders, ordinances. One of the main documents that regulates accessibility of environmental information is the Government Resolution "On the Procedure for the Provision of Information on the Environment to the Public".

Issues of public environmental education and information about climate change-related problems and ways to address them are included into the National Strategy and Action Programme for Environmental Education, Information and Public Awareness of Society, drawn up by the Ministry of Environment in 1998.

One of the main institutions responsible for the accessibility of environment-related information, implementation of EU and Lithuanian laws as well as other documents is the Ministry of Environment. The Ministry has the Public Information Division (in Public Information and Public Relations Department) the functions of which are to frame and pursue the policy of public education and information on issues within the ambit of the ministry; ensure provision of environmental information and its dissemination to the public; promote activities of state institutions and NGOs as well as enhance their cooperation in public environmental education, draw up and co-ordinate projects on environmental education.

The website of the Ministry of Environment has special web pages designed for UNFCCC issues. They contain currently adopted and valid convention-related legal acts, information on fulfilled and underway projects, project reports, draft laws and draft Government resolutions.

Public attention to climate change in Lithuania has considerably increased in recent years due to special publications in press (daily and weekly newspapers, popular magazines), TV and radio reports and interviews or nationally popular special TV broadcasts on climate change issues made by Lithuanian climatologists and specialists in environment protection.

A series of climate change-related events organized in 2005 by the Embassy of the United Kingdom in Lithuania and the British Council received a strong response in press and generated great interest of the public. The photo exhibition „NorthSouthEastWest“ presenting a special photo album and featuring photos of all climate change aspects recorded in all the continents of the world deserves a special mention. The exhibition was opened by the Ambassador of the UK to Lithuania and the Minister of Environment of the Republic of Lithuania. The follow-up round-table discussion "Climate change: promotion of closer co-operation" and international videoconference „Climate Change and Citizenship“ focused on the enhancement of co-operation among the Government, scientists, businessmen, NGOs and mass media in the areas of public informing and search for effective solutions to climate change-related problems. The discussion was

attended by the Ambassador of the UK in Lithuania. Participants of the discussion concluded that to highlight climate change-related problems, educate the society and develop publishing activities, it is necessary to team up all the interested organizations of the country.

NGOs aiming at environmental education of the society perform a significant role in the implementation of Convention commitments. At present there are over 80 environmental NGOs in Lithuania, a Coalition of Environmental NGOs being established in 2005.

