Fourth National Communication of the Republic of Latvia under United Nations Framework Convention on Climate Change

MINISTRY OF THE ENVIRONMENT

MINISTRY OF ENVIRONMENT OF THE REPUBLIC OF LATVIA

FOURTH
NATIONAL COMMUNICATION
of the Republic of Latvia
to the United Nations Framework Convention
on Climate Change

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ABBREVIATIONS AND TRANSLATIONS

BAT	Best Available Techniques
CDM	Clean Development Mechanism
CM	Cabinet of Ministers
ERDF	European Regional Development Fund
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HPP	hydropower plant
IET	International Emissions Trading
IPCC	Intergovernmental panel on climate change
ISO	International Organization for Standardization
ISPA	Instrument for Structural Policies for Pre-accession
JI	Joint Implementation
LEGMA	Latvian Environment, Geology and Meteorology Agency
LULUCF	Land-use, Land-use Change and Forestry
NA	Not applicable
NE	Not estimated
NO	Not observed
SAPARD	Special Assistance Programme for Agriculture and Rural Development
SCORE	Supporting the Cooperative Organization of Rational Energy Use
PHARE	Poland and Hungary Action for the Restructuring of the Economy
UN	United Nations
UNFCCC	United Nations Framework Convention on climate change

CHEMICAL FORMULAS

CH_4	methane
CO_2	carbon dioxide
HFC	hydrofluorocarbons
NMVOC	non-methane volatile organic compounds
N_2O	nitrous oxide
NO_x	nitric oxide
PFC	perfluorocarbons
SF_6	sulphur hexafluoride
SO_2	sulphur dioxide

UNITS OF MEASUREMENT

kg	kilogram (10^3 grams)
t	ton (10^6 grams)
Gg	gigagram (10^9 grams)
mm	milimeter (10^{-6} meters)
km	kilometer (10^3 meters)
ha	hectare (10^4 m^2)
MW	megawatt
GWh	gigawatthour (10^9 watthours)
TJ	terajoule (10^{12} joules)
PJ	petajoule (10^{15} joules)
EUR	Euro
LVL	Lat

INTRODUCTION

Latvia participates in the global climate change mitigation process and together with many other countries of the world signed the United Nations Framework Convention on Climate Change (hereinafter, the Convention) in Rio de Janeiro UN Conference on Environment and Development in June 1992. It entered into force on 21 March 1994. The Parliament of the Republic of Latvia (Saeima) ratified the Convention on 23 February 1995.

The ultimate objective of the Convention is to achieve stabilisation of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. GHG are those natural and anthropogenic (created by human activity) gaseous constituents of the atmosphere that absorb and re-emit infrared radiation. They are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and also carbon monoxide (CO), nitric oxides (NO_x) and non-methane volatile organic compounds (NMVOC). In 1997, the Kyoto Protocol was added to the Convention. Latvia ratified it on 30 May 2002. In accordance with the Kyoto Protocol Latvia individually or in collaboration with other countries has to reduce the total anthropogenic emissions of CO_2, CH_4, N_2O, HFC, PFC and SF_6 by 8% in the period 2008 – 2012 compared to the emissions level in the year 1990, thus the average annual GHG emission amount must not exceed 23,323 Gg CO_2 equivalent in this period.

Parties to the Convention, including Latvia, have to submit annual reports on GHG emissions and removals to the Conference of the Parties. Once in every three years, Latvia has to prepare a national report that contains information not only about GHG emissions, but also about implemented and planned policies and measures for implementation of the Convention commitments.

Since 1750, CO_2 concentration in the atmosphere has increased by 31%, CH_4 concentration – by 151%, N_2O concentration – by 17% and these concentrations still continue to rise. Over the past 20 years about three quarters of the anthropogenic CO_2 emissions in the atmosphere have originated due to the burning of fossil fuel. Currently, ocean and land together remove about a half of the anthropogenic CO_2 emissions. In comparison with the 1980-ties, the annual CH_4 concentration increase has reduced in the 1990-ties. More than a half of the current CH_4 emissions are of anthropogenic origin (their sources are, for example, fuel burning, domestic animals, municipal waste landfills). Besides, with increase of the amount of CH_4 emissions, CO concentration in the atmosphere increases as well. About one third of current N_2O emissions is of anthropogenic origin (N_2O emission sources are, for example, agricultural soils, organic fertiliser, chemical industry).

Pursuant to the Second Assessment Report made by the Intergovernmental Panel on Climate Change, the European Council in 1996 announced that "the average temperature rise of the planet must not exceed 2ºC compared to the level before the industrial age". Also in Latvia the average temperature in the 20th century has increased by around 1◦C. Analysis of perennial precipitation data series shows that during the past 50 years the amount of total atmosphere precipitation has a tendency to increase. Phenological observations show – the vegetation period in Latvia has increased by 8 days on average.

Since 1990, with the restructuring of Latvia's economy and improvements in energy-efficiency, and implementation of EU environmental requirements, the main commitments under the Convention have been fulfilled. It is foreseen that Latvia will also fulfil the requirements of the Kyoto Protocol – in 2003, the so-called distance-to-target for Latvia was minus 53.3% to fulfil emission reduction commitments stated in the Kyoto Protocol.

The First National Communication under the Convention was elaborated and submitted to the Convention Secretariat in 1995 with a complete review of GHG emissions only for the base year – 1990. Since then, reports are made annually and have become more accurate. In the first report it was forecasted that, due to economic recession, emissions in 2000 would not exceed the level of 1990 even if special emission reduction measures were not taken.

It was already forecasted in the Second National Communication, prepared in 1998, that the rapid economic development would create a gradual increase of emissions. It was forecasted in the base scenario that emissions level in 2010 would be 15–25% below the level of 1990 and in the scenario "with measures" the amount of GHG emissions in the period 2008 – 2012 would be 35–40% below the level of 1990.

In the Third National Communication, information on GHG emissions and removals was given for the period 1995 – 2000 and, for comparison, data for 1990 as well, considering it as a point of reference. It should be noted that for the period 1990 – 1997 GHG emissions had not been recalculated according to the new IPCC Common reporting format which made full analysis and comparison of data difficult. Projections demonstrated that GHG emissions in 2010 when implementing the base scenario would be 45% below the level of 1990 and in the case of implementing the scenario "with measures", the amount of GHG emissions would be 51% below the level of 1990.

Information on GHG emissions and removals in the period 1990 – 2003 is given in the Fourth National Communication. Latest projections demonstrate that GHG emissions under the scenario "with measures" will decrease by 46% in 2010 compared to the level of 1990 and under the scenario "with additional measures" the amount of GHG emissions will decrease by 49%; in 2020 these figures will be 35% and 45% respectively.

The Fourth National Communication comprises information on national political structure and fluctuations of Latvia's climate, as well as the economic profile of the country and the development trends of the different economic sectors. General insight into the annual GHG emissions in the period 1990 – 2003 is also given in the report. Chapter 4 includes a summary of the latest policies and measures to reduce GHG emissions and increase CO_2 removals in Latvia, giving insight into international financial support programs and events implemented and initiated in the past three years and planned in the nearest future in each GHG-emitting sector individual projections were prepared for each sector to assess the future GHG emissions and removals trends, considering the current economic and social development level and taking into account the implemented and approved policies and measures (see Chapter 5). The next chapter includes information on the impact of climate change on the environment, sensitivity evaluation and adaptation measures, and Chapter 7 provides a brief description of recent research and observations in climate change assessment and mitigation. The effectiveness of solutions to environmental problems depends to a large extent on the level of public awareness and knowledge regarding the responsibility and opportunities to contribute to the global climate change mitigation efforts, therefore information on educational institutions, organisations and programmes in Latvia informing the community about climate change related issues is concentrated in Chapter 8.

1. SUMMARY

1.1 General information about the Republic of Latvia

Latvia comprises an area of 64,589 km^2. Forest land takes up 45% of the national territory of Latvia. Latvia lies in a temperate climate zone where active cyclone determines rapid changes in weather conditions (190–200 days per year). Annual mean precipitation is 600–700 mm. Main minerals in Latvia are clay, dolomite, sand, gravel, limestone and gypsum.

Latvia is an independent democratic parliamentary republic. The State President, elected by the Parliament (Saeima), nominates the Prime Minister who forms a Cabinet of Ministers that has to be approved by the Parliament. 15 ministries assist the Cabinet of Ministers to achieve the targets it has set.

There are 530 national level municipalities in Latvia, including 444 counties, 26 districts, 53 cities and 7 major cities that also perform functions of districts. In cities, districts and counties there are elected local municipalities, whereas regional municipalities consist of representatives delegated by the local municipalities.

At the beginning of 2004, the population of Latvia was 2,319.2 thousand, and 31.7% of the population lived in the capital Riga. The average population density was 35.9 persons per 1 km^2. The Gross Domestic Product (GDP) per capita, calculated in purchasing power parity units, in Latvia was 43.7% of the average level of the European Union (EU-25) in 2004.

State reforms and integration into the EU have positively affected economic development. One of the highest growth rates in the EU is observed in Latvia. Over the period 2001 – 2003, the average annual GDP growth rate was 7.3%.

Since the restoration of independence (1991) foreign trade volumes with EU member states has increased constantly and at present already approximately 70% of Latvia's export and import is related to theses countries.

The potential of economic development is best characterised by the increase in investment levels. Over the period 2000 – 2004, development of total stock capital has increased 1.6 times. At the end of 2004, direct foreign investment accumulated in Latvia was approximately 31.5% of the annual GDP value.

During the past six years, small changes in the sectoral structure of Latvia's national economy have been observed. Three sectors – trade, manufacturing industry and construction – have had the most stable growth.

Gradual growth rates are apparent in all economic sectors, particularly in construction, and the transport and communications sector, due to the increase in freight traffic, passenger transport services and the development of the communications sector. Manufacturing industry has shown slower growth than in 2003, partly due to adaptation to new conditions after accession to the EU.

Both local energy sources (wood, peat, hydro resources, wind) and imported energy resources (oil products, natural gas, coal, electricity) are used in the power supply sector of Latvia. In 2003, the share of renewable energy sources in Latvia's primary energy balance was 34.2%.

Convenient geographical situation, location on the Baltic Sea, ice-free seaports (Ventspils, Liepaja), railroad and road networks, gas and oil product pipelines provide good opportunities for the development of a multimodal transport system in Latvia. Transit and international transport constitute the major part of cargo transport with road transport as the most significant mode of transport. The number of vehicles is increasing rapidly in Latvia – during the past ten years, the number of registered vehicles has increased on average by 4–6% annually.

Industry takes the leading position in growth of the state economy. Over the period 2001 – 2003, output volumes in manufacturing industry on average increased by 9.4% annually,

considerably exceeding the average growth rate of the national economy. During these years timber industry, engineering industry and hardware production made the greatest contribution to industry growth. In 2004, output volume of manufacturing industry increased slightly slower – by 7.9%, more rapid growth occurred in chemical industry and building material industry.

Construction is one of the most dynamic economic sectors in Latvia. Fast increase in investment levels favourably influences the development of this sector. In 2004, it increased by 13% in comparison with 2003, volumes of new construction increased by 20.3%, volumes of renovation and reconstruction work – by 8.0%.

In Latvia, more than 70% of the total generated thermal energy is spent in residential and public buildings. In 2003, there were 330.6 thousand residential buildings with 967 thousand housing units in Latvia that comprised apartments, private houses, premises in hotels for business trips, social care centres, and others.

Agriculture is prevailing in key sectors. Although the GDP share of the sector is small (in 2002 – 2.6%, 2003 – 2.4%), the significance of agriculture in the national economy is high. In 2003, 104 thousand people or 10.3% of the total number of people employed in the country were employed in this sector, although the number of employed is gradually decreasing.

Latvia's forests and its wood resources are the main national wealth. The total growing stock of wood in Latvia is 578 mln m^3. Annual stock volume for the period 1991 – 2003 has increased from 4.4 mln m^3 to 11.7 mln m^3.

In Latvia, 57% of municipal waste (in total 1.056 mln tons or 453.1 kg/per capita in 2003) is biologically degradable. Most of municipal waste and other collected waste is deposited in dumpsites without pre-treatment (approximately 40% of collected waste is deposited in Getlini landfill, Riga district).

1.2 Report on anthropogenic greenhouse gas emissions and removals

This report summarises the estimated net emissions in the time period 1990 – 2003 of the direct GHG (CO_2, CH_4, N_2O, HFC, SF_6), indirect GHG (NO_x, CO, NMVOC) and SO_2 and aggregate CO_2, CH_4, N_2O and HFC, PFC, SF_6 emissions in CO_2 – equivalent according to their global warming potential values over a 100-year time horizon (see Table 1.1).

Emissions in 1990 – 2003, Gg

GHG	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CO_2	18654.30	17171.46	13304.91	11894.35	11450.16	8962.94	9155.64	8742.32	8129.69	7412.62	6854.65	7412.86	7336.64	7427.44
CH_4	176.42	169.46	148.87	111.47	104.35	113.61	111.41	110.48	110.84	107.74	104.31	104.06	103.11	90.69
N_2O	9.85	9.37	7.01	4.90	4.09	3.56	3.60	3.58	3.45	3.11	3.22	3.62	3.56	3.80
NO_X	70.37	57.96	47.47	47.50	43.74	41.93	43.86	42.78	40.39	37.92	34.77	37.68	36.81	37.27
CO	528.14	624.26	612.60	330.62	326.81	404.01	409.03	385.80	383.50	374.25	332.93	310.03	289.67	295.41
NMVOC	120.84	95.06	76.38	60.58	65.60	70.74	74.04	78.92	79.43	78.61	70.07	73.39	77.32	79.46
SO_2	99.14	81.09	67.25	66.92	76.90	47.76	54.38	39.97	35.84	29.49	14.70	10.63	9.10	7.58
HFC	NE/NO	NE/NO	NE/NO	NE/NO	NE/NO	0.29	1.33	2.48	4.62	6.79	8.60	9.82	11.84	12.83
SF_6	NE/NO	NE/NO	NE/NO	NE/NO	NE/NO	0.25	0.29	0.51	0.71	0.98	1.28	1.98	3.38	4.41

Table 1.1

In 2003, the main CO_2 emission source was fossil fuel combustion – 95%, including 33% in the power sector; manufacturing industry and construction – 12%; transport – 35%, other sectors (households, trade sector and agriculture, forestry and others) – 15%. Other CO_2 anthropogenic emission sources are industrial processes (3.2%), solvent and other product use (1.5%) and waste (0.4%). CO_2 removals take place by plants absorbing CO_2 in the process of

atmospheric photosynthesis. Net CO_2 removals from the land-use, land-use change and forestry sector (LULUCF) were 8186.76 Gg CO_2 in 2003.

Emissions of the second most significant GHG, CH_4, in 2003 have decreased by 49% compared to 1990 level. The main sources of CH_4 emissions in Latvia are municipal waste dumpsites and enteric fermentation of livestock. Other significant CH_4 emission sources are leakage from natural gas pipelines and burning biomass in the household sector.

Total N_2O emissions have decreased by 61%, compared to 1990 level. The main N_2O emission source is agricultural land, contributing 71% of N_2O emissions in 2003. Other N_2O emission sources are transport, combustion of biomass in the household, trade and other sectors, as well as waste and wastewater handling.

Energy sector was the key source of indirect GHG and SO_2 emissions in 2003. Transport created 57.7% of all NO_x and 26.5% of CO emissions. The industrial sector emitted 9.24 Gg NMVOC (11.6% of total emissions) in 2003, of this – 53.6% in the food industry, 46.2% from road asphalt–paving and 0.2% from steel production.

Aggregated GHG emissions, expressed in CO_2 equivalent units, have a declining trend as of 1990, and this trend continues also after 2001. It is mainly related to the reduction of CO_2 and CH_4 emissions (by 35%), whereas N_2O, HFC and SF_6 emissions have increased by 5%, 25% and 55% respectively.

1.3 Policies and measures to restrict and reduce greenhouse gas emissions and to increase CO_2 removals

The climate change mitigation policy in Latvia is gaining higher priority in line with the common policy and concerns about climate change in the world and the European Union. The latest policy document on climate change mitigation is the "Climate Change Mitigation Programme for 2005 – 2010". The primary goal of this programme – to ensure that, starting with 2008, the total amount of GHG emissions does not exceed 92% of 1990 level – is to be achieved by implementing activities in the following climate change mitigation policy areas:

1) increase the share of renewable energy sources in the energy balance;
2) increase efficient and rational use of energy resources;
3) develop an environmentally friendly transport system;
4) promote the implementation of the best available techniques, environmentally friendly technologies and cleaner production;
5) promote the implementation of environmentally sound agricultural methods that reduce direct GHG emissions;
6) increase CO_2 removals in forestry;
7) establish an up-to-date municipal waste management system, ensuring collection of biogas in municipal waste landfills.

In the implementation of the climate change mitigation policy, the following activities are analysed in detail:

- promotion of biomass use;
- promotion of biogas use;
- support for energy generation in small hydropower plants;
- support for wind power production;
- promotion of solar energy use;
- support for biofuel production and promotion of biofuel use;

- support for the construction of combined heat and power generation plants and energy efficiency projects;
- support for energy efficiency projects in thermal energy generation and transmission;
- support for projects improving energy performance of buildings;
- optimisation of the traffic flow in cities;
- promotion of the use of public transport services in Riga;
- development of bicycle transport infrastructure;
- improving and construction of manure storage facilities;
- sustainable use of agricultural resources;
- development of environmentally friendly agriculture and promotion of Good agricultural practice;
- increase of forest stand productivity;
- afforestation of unmanaged agricultural land;
- processing of biologically degradable waste;
- collection of biogas from municipal waste landfills;
- restoration of small municipal dumpsites not meeting environmental requirements.

In Latvia, also cross-sectoral climate change mitigation policy and measures are implemented, affecting several sectors of the national economy simultaneously. The cross-sectoral policy comprises the implementation of the EU greenhouse gas emission allowance trading scheme, participation in the Kyoto Protocol flexibility mechanisms (in particular, active participation in Joint Implementation projects), promotion of the implementation of environmental and energy management systems, promotion of the inclusion of environmental considerations in consumer decisions.

In order to effectively implement climate change mitigation policy and reach GHG emissions reduction targets, a wide range of policy instruments is used in Latvia: command-and-control measures (environmental impact assessment procedures, permitting regulations, standards, restrictions and prohibitions), economic instruments (natural resources tax, excise tax for energy resources, user's charges (tariffs)), as well as voluntary agreements and public awareness raising measures.

1.4 Projections of greenhouse gas emissions and CO_2 removals, and results of the implementation of measures

The future trends in GHG emissions and removals have been assessed, considering the current economic and social development level. In the assessment of the impact of measures on the level of GHG emissions, only the impact on the emissions of direct GHG – CO_2, CH_4, N_2O, HFC and SF_6 was estimated.

According to the provisions stated in Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, the projections of GHG emissions and CO_2 removals have been assessed according to two scenarios – the scenario "with measures", resulting from the implementation of approved policy documents and legislation, and the scenario "with additional measures", resulting from the implementation of planned policy documents and legislation as well.

Both of these scenarios are based on a long-term macroeconomic projection for the time period 2000 – 2020. The projection calculations are carried out in accordance with the

IPCC Common reporting format and the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Correspondingly, basic data have been forecasted in every sector, considering the measures described in Chapter 4. Optimisation model MARKAL was used to prepare energy sector projections, COPERT III model (Version 2.2) was used in the transport sector but in other sectors the projections were mainly based on experts' judgement and sector development plans.

GHG emissions in 2003 – 2020, Gg CO_2 eq.

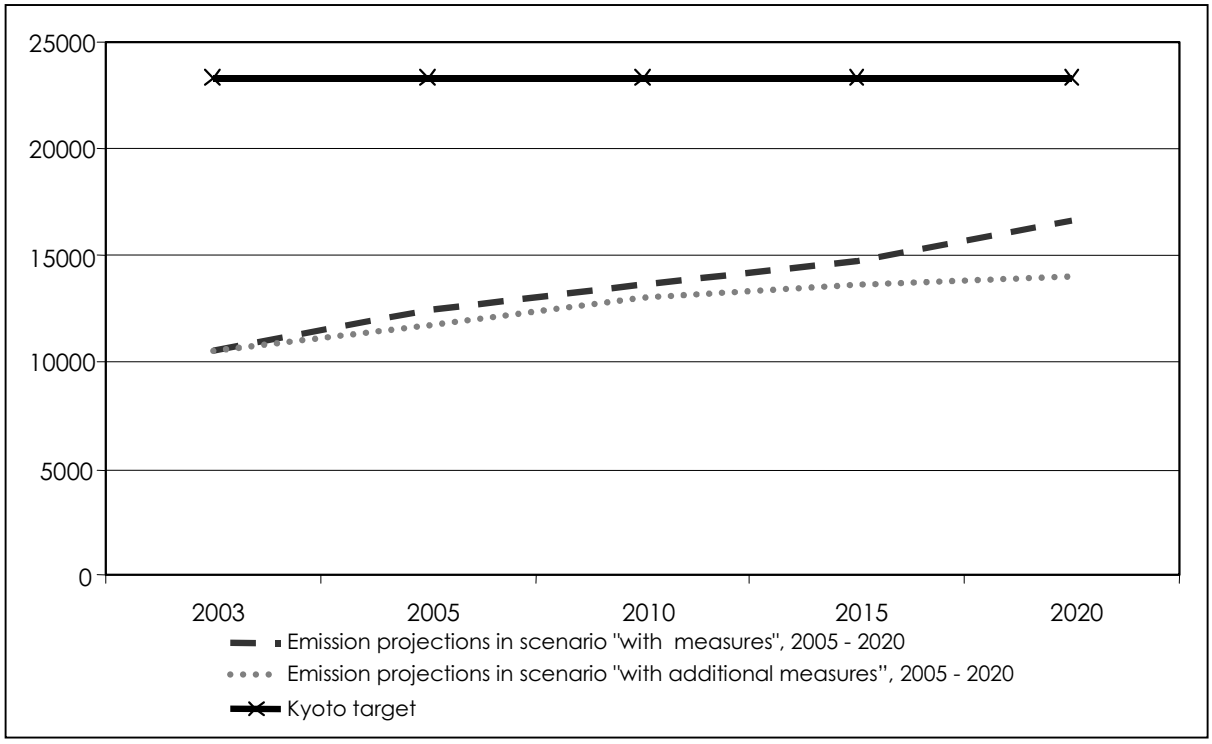

Figure 1.1
Source: Latvian Environment, geology and meteorology agency

As demonstrated by GHG emissions projections (see Figure 1.1), Latvia will be able to fulfil its international GHG emissions reduction commitments, imposed by the Kyoto Protocol, provided that the national economy develops at the forecasted pace and the climate change mitigation policies described in Chapter 4 are implemented.

1.5 Climate change impact, vulnerability assessment and adaptation measures

In Latvia, as in many other places, an increase in air temperatures and precipitation has been observed. The average annual temperature in Riga has increased by about 1°C over the past 100 years. This rapid temperature increase is partly related to the city environment effect. Specialists hold a view that in the future, due to the greenhouse impact, the snow cover period will be shorter, the plant vegetation period will extend, the river flow characteristics and precipitation distribution will change.

One of climate change features is the increasing frequency and intensity of extreme natural phenomena. It is demonstrated, among others, by the increasing trend of the extreme values for the sea level. In the latest water level rise, observed in January 2005 during a storm, the sea level rapidly increased due to wind onrush in all weather observation stations and in observation stations of the western coast of Riga Gulf the maximum water level exceeded the highest values observed up to now – during tides in 1969 and 1967.

The vegetation period in Latvia has increased by 8 days on average. Over the time period 1965 – 2000, the average vegetation period of the silver birch (*Betula pendula)* was 144 days, in the past decade – 152 days.

1.6 Research and systematic observations

Research activities and programmes in Latvia covering climate and climate change issues, climate change mitigation options and climate change impacts on ecological, social and economic systems, are carried out at universities, research institutes, ministries and agencies, state environmental institutions, research and consultative firms and nongovernmental organisations.

Financing for research is very limited and it is mainly provided from the government budget resources, National Investment Programme, Latvian Environmental Protection Fund as well as international programmes and projects.

1.7 Education, training and development of environmental awareness of the society

The results of climate change impact mitigation depend to a great extent on both the education of specialists and the forms and character of the development of community awareness.

Environmental education in Latvia has been developing at all levels, building on internationally recognised priorities and taking into consideration the traditions and experience in education. Environmental education guidelines approved by the Ministry of Education and Science define environmental education as an inter–disciplinary subject, integrated within other subjects to the extent possible. Some universities in Latvia – University of Latvia, Riga Technical University, Rezekne Higher Education Institution, Daugavpils University, Liepaja Academy of Pedagogy and Latvia University of Agriculture cover in their programmes subjects that identify and analyse processes related to climate change.

Access to environmental information and information on global climate change in Latvia is granted through mass media, internet, nongovernmental organisations and international organisations and special programmes dedicated to environmental issues.

Public awarness and information measures are implemented with the help of both state institutions and nongovernmental environmental organisations.

2. GENERAL INFORMATION ABOUT THE REPUBLIC OF LATVIA

2.1 Geographical profile and climate

Latvia is situated on the border of the Eastern European Plain near the Baltic Sea between 55°40' and 58°05' Northern latitude and between 20°58' and 28°14' Eastern longitude. The total length of the border of Latvia amounts to 1,368 km on land and 496.5 km along the coast. Latvia borders with Estonia in the North, with Lithuania and Belarus – in the South, with Russia – in the East.

The territory of Latvia covers an area of 64,589 km^2 in total. Its length in the North – South direction is 210 km, and the width in the West – East direction – 450 km. The average height above sea level is 87 m and the highest peak is Gaizinkalns (311.6 m above sea level)[1].

Two zones of woodland are found on the territory of Latvia. Deciduous forests in the South, elements of boreal forests – unmixed forests of pines and fir-trees in the North. This explains the variety of tree species and the large share of mixed forests and biological variety in general. Forest ecosystem is the most significant part of Latvia s environment. There is a wide variety in the types of conditions for forest growth in Latvia: forests on dry mineral soils represent 57% of forest land, on wet mineral soils – 11%, on wet peaty soil – 11%, on dried mineral soils – 11%, on dried peaty soil – 10%. The main tree species are pine, fir-tree and birch.

In Latvia, the forest land comprises 2,923 thousand ha or 45% of the national territory (see Figure 2.1).

Land-use categories in 2004

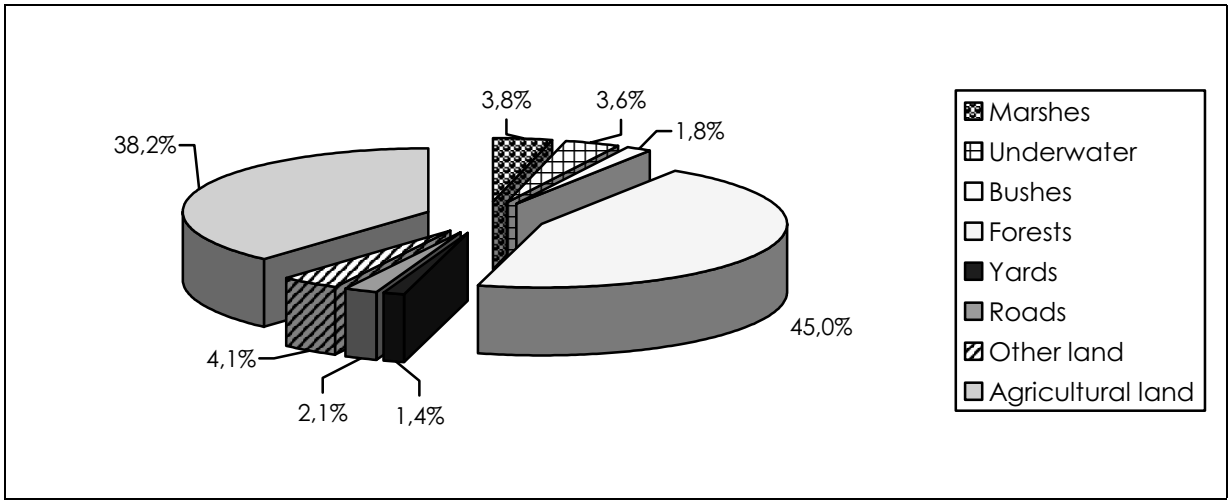

Figure 2.1
Source: State Land Service

Since the beginning of the last century, the area of forest land in Latvia has almost doubled. Historically, increase of forest land area is related both to natural overgrowing of land no longer used in agriculture, and purposeful afforestation of such land. It is anticipated that forests will cover 50–55% of the territory of Latvia in near future, provided by afforestation of land no longer used in agriculture and for other purposes.

Latvia is rich in mineral deposits that can be used in the production of building materials. Various mineral resources are found in Latvia that can be used as raw materials in construction, production of building materials, road construction, agriculture and metallurgy: clay, dolomite, sand, gravel, limestone and gypsum. The mining volumes of mineral recourses have changed over the years following the development of various construction sectors[2].

[1] Central Statistical Bureau of Latvia, 2004, "Statistical Yearbook of Latvia, 2004"
[2] Latvian Environment Agency, 2004, "Evaluation of resource consumption"

Seismic research work carried out in the Baltic Sea in the 1980s testifies that oil accumulation is possible in some underground structures. Part of these structures is in the shelf part of the territory of Latvia.

Latvia is commonly divided in its continental eastern part and the coastal zone. Proximity of the Baltic Sea and the Atlantic Ocean defines the activities of active cyclones and typical change of weather conditions 190–200 days a year. The climate profile of Latvia is presented in Table 2.1.

Climate profile of Latvia[3]

	Liepaja	Riga	Daugavpils	Aluksne
Mean temperature (°C)				
• January	-0.5	-1.9	-3.7	-4.5
• July	17.6	18.5	17.9	17.3
Mean daily temperature amplitude (°C)				
• January	4.5	4.2	5.1	4.6
• July	7.6	9.5	11.5	9.6
Mean relative humidity (%)				
• January	89	87	86	90
• July	78	73	73	75
Mean precipitation (mm)				
• Annual	672	685	632	748
• Dryest month	33	34	36	40
• Wettest month	84	85	81	101
Mean annual wind speed at the height of 10 m (m/s)	3.6	3.6	2.7	2.6
Mean annual duration of sunshine (hr)	1,996	1,794	1,784	1,713

Table 2.1

2.2 National political system

2.2.1 Political system

Latvia is an independent democratic parliamentary republic. The Parliament (Saeima) holds the sovereign political power of the Republic of Latvia. Its members are elected in general elections with participation of all citizens above the age of 18 years and are based on proportional representation principle, voting for parties' ballot list. The number of elected members of the Parliament (Saeima) is 100. The President is elected by the Parliament (Saeima) for a term of four years. Since 1999, Vaira Vike-Freiberga has been elected as the President of Latvia.

The State President, elected by the Parliament (Saeima), nominates the Prime Minister who forms a Cabinet of Ministers which has to be approved by the Parliament. A party has to obtain more than 5% of the votes in order to have representation in the Parliament (Saeima). The governments established since 1991 have been multiparty coalition governments. Ministries assist the Cabinet of Ministers to achieve the targets it has set. Their task is to define the development strategy for their respective sectors and to elaborate policy to implement the strategy. In 2005, there were 15 ministries:

- Ministry of Defence,
- Ministry of Foreign Affairs,

[3] Observation period: 1991–2004. Liepaja – coastal observation station on the Baltic Sea; Riga – state capital on the coast of the Gulf of Riga; Daugavpils – continental observation station in the South-East of Latvia; Aluksne – continental observation station in highlands in the East of Latvia. Source: Latvian Environment, Geology and Meteorology Agency

- Ministry for Children and Family Affairs,
- Ministry of Economics,
- Ministry of Finance,
- Ministry of Internal Affairs,
- Ministry of Education and Science,
- Ministry of Culture,
- Ministry of Welfare,
- Ministry of Regional Development and Local Government,
- Ministry of Transport,
- Ministry of Justice,
- Ministry of Health,
- Ministry of Environment,
- Ministry of Agriculture.

Two special assignments ministers are also part of the Cabinet of Ministers – one working on social integration issues and one for electronic management.

2.2.2 Administrative-territorial division

Latvia's Constitution (*Satversme*) states that the regions Vidzeme, Latgale, Kurzeme and Zemgale form the territory of Latvia within boundaries defined by international treaties. However, they have no administrative-territorial significance. In the present local government structure, two types of municipalities exist in Latvia:

- local municipalities (cities, districts and counties);
- regional municipalities.

There are 530 local municipalities in Latvia, including 444 counties, 26 districts, 53 cities and 7 major cities that also perform functions of districts. The local municipalitiesare arranged into 26 districts. In cities, districts and counties there are elected local governments whereas regional municipalities consist of representatives delegated by the local municipalities. Both levels of municipalities act independently according to their competence areas as stated in the law. The Law "On Municipalities" regulates the municipal activities in Latvia, including general rules and the economic basis, as well as the competence of municipalities, rights and responsibilities of the executive power.

2.3 Social development

At the beginning of 2004, the population of Latvia was 2,319.2 thousand, 31.7% of the population living in its capital Riga, but in all cities together – 67.8% (see Table 2.2). The average population density in Latvia was 35.9 persons per 1 km².

Population of Latvia in 1990 – 2004, in thousand, at the beginning of year

	1990	1999	2000	2001	2002	2003	2004
Number of population: in total, including	2668.1	2399.2	2377.3	2364.2	2345.7	2331.4	2319.2
- cities	1847.6	1638.9	1618.1	1606.5	1591.9	1580.4	1573.4
- country	820.5	760.3	759.2	57.6	753.7	751.0	745.7

Table 2.2
Source: Central Statistical Bureau of Latvia

Although the economic growth of the country has positively influenced changes in residents' income, overall the increase in the community welfare level is slow. Income inequalities and the process of social segregation have become more apparent in recent years. Demographic indicators in the country are among the least favourable in Europe. The number of population in the country continues to decline and, according to data from the Central Statistical Bureau (CSB), at the beginning of 2005 it was 2 million 306 thousand or 12.8 thousand less than the year before. In 2004, the number of population decreased more than in 2003 – by 0.55% compared to 0.53% one year earlier.

In Latvia, Gross Domestic Product (GDP) per capita, estimated in purchasing power parity units, was 43.7% of the average level of the European Union (ES-25) in 2004. Compared to 2000, GDP per capita has increased 1.4 times. Latvia's GDP increase per capita was mostly attributable to the increase in productivity and to a lesser degree – the increase in employment and demographic changes (see Figure 2.2).

GDP per capita of real growth component in 1999 – 2003, (changes, %)

** for persons aged 15–64 years*
*** age dependency – indicator characterising changes of proportion of non-workable population (under 14 years, 65 and more years) in the total population*

Figure 2.2
Source: Central Statistical Bureau of Latvia, Ministry of Economics

In 2003, the average expected lifespan of newborn was 65.9 years for males and 76.9 for females – that is one of the lowest indicators among the member states of the European Union. However, this index is higher than in 1990 and has significantly increased since 1995 when it was only 60.8 years for males and 73.1 years for females.

Regarding employment level, Latvia was the 16th among the member states of the European Union in 2004, however unemployment level indicators in Latvia were one of the worst. Still, the progress in recent years is indisputable – according to data of Central statistical Bureau on labour force, the unemployment level has decreased by 14.4% in 2000 and 10.4% in 2004[4]. Economic development in recent years has positively influenced the labour market in Latvia. During the past five years (2000 – 2004) the employment level has increased by 3.5%. The employment level in Latvia, compared to EU-25, was by 5% lower in 2000 and by 1% in 2004. The number of employed has increased by 7% since 2000. However, the rate of increase in employment level is essentially lower than the growth rate of gross domestic product.

[4] Source: Ministry of Economics, June 2005, "Report of economic development of Latvia"

2.4 Economic development

2.4.1 General information

National reforms and integration into the EU have positively affected economic development. One of the highest growth rates in the EU has been observed in Latvia. Over the time period 2001 – 2003, the average GDP growth rate per annum was 7.3%. In 2004, GDP growth was even more rapid – 8.5%. High growth rates are provided by the dynamics of stable domestic demand and the capacity of Latvian companies to expand in export markets. Growth is observed in all leading eceonomic sectors. Lately, almost three quarters of the growth was due to the development of service sectors where the growth of trade and communication sectors made the greatest contribution.

Although the average growth rates of the EU member states' economies have recently been weak, the growth rates of new member states' economies are high and stable, particularly in Latvia.

GDP dynamics in Latvia, Lithuania, Estonia and EU-25 by quarters, in 2002 – 2004 % change relative to the respective quarter of the previous year

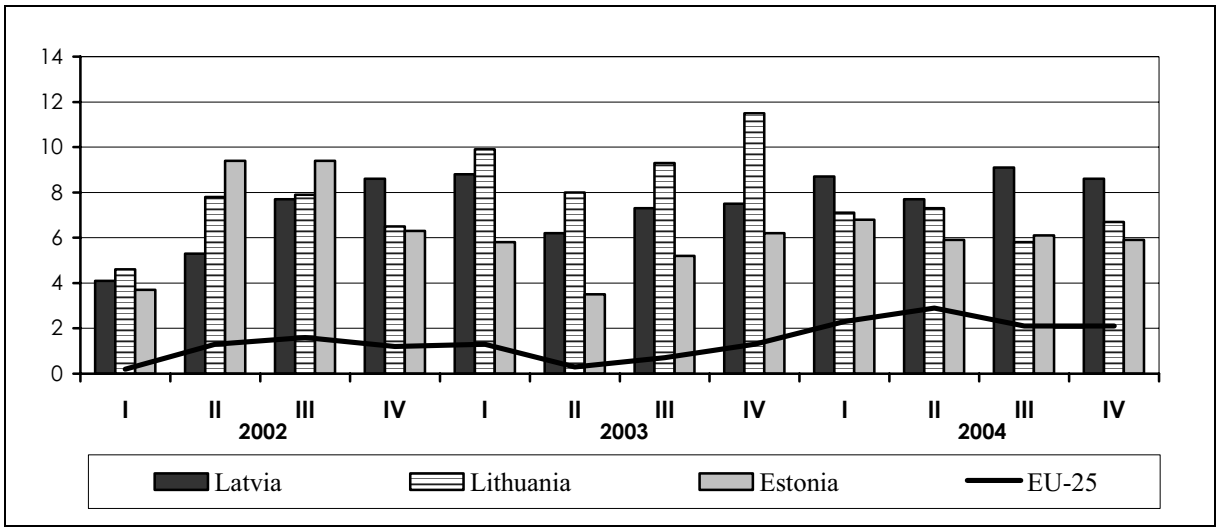

Figure 2.3
Source: Eurostat

Foreign trade

Latvia is implementing a rather liberal trade policy. Latvia's trade relationship with other countries are based on multilateral agreements within the World Trade Organisation, free trade agreements and other agreements that define the most-favoured-nation treatment. Simultaneously with Latvia's accession to the EU, the common international trade policy of the EU becomes binding for Latvia. This puts new emphasis on Latvia's economic and trade co-operation with its neighbouring countries and other non-member countries.

The EU is the main trade partner of Latvia. Since the restoration of independence, the amount of foreign trade with the EU member states has been growing steadily and at present already approximately 70% of Latvia's export and import is related to these countries. In 2004, Germany has the greatest share in Latvia's international trade turnover – 14% of the total volume, Lithuania – 11%, Sweden – 8%, Russia – 8% and Estonia – 8%.

Investment

The potential of economic development is best characterised by the increase in investment levels. Over the time period 2000 – 2004, the formation of total equity capital has increased

1.6 times. Investment growth rate and share in the GDP in Latvia is one of the highest in the EU. Several factors affect investment volumes: stable macroeconomic environment, flow of foreign investment, decreasing credit interest rates and the strengthening of the banking sector, overall increase of economic activities, and other. At the end of 2004, direct foreign investment, accrued in Latvia, was approximately 31.5% of the annual GDP value. In the following years, high investment levels continue to be expected.

In comparison with the previous year, EU investors have shown greater interest in Latvia. 85% of incoming foreign direct investment in 2004 was related to investors from EU member states. The most significant volumes of foreign direct investment in this period were attracted from Germany, Russia and the Netherlands[5].

Since 1995, national investment in Latvia has been implemented within the State Investment Programme (SIP). SIP comprises infrastructure investment projects that are financed from the financial sources available to the country – state budget, guaranteed credits, grants, project developers' own resources. Currently, the priority sectors in the SIP are base infrastructure objects in traffic, energy and environment protection areas.

2.4.2 Structure and dynamics of national economy sectors

In the national economy of Latvia, service sectors (trade, transport and communications) and industry (see Table 2.3) have the greatest share.

GDP of Latvia by sectors in 1990 – 2003, %

	1990	1995	2000	2001	2002	2003
Gross Domestic Product	100.0	100.0	100.0	100.0	100.0	100.0
Goods production sector	68.1	44.0	29.8	29.7	27.2	27.1
- agriculture[1)]	21.9	10.8	4.5	4.9	4.6	4.4
- industry[2)]	36.5	28.1	18.5	18.7	17.0	17.1
- construction	9.7	5.1	6.8	6.1	5.6	5.6
Services	31.9	56.0	70.2	70.3	72.8	72.9
- trade[3)]	6.8	12.4	19.3	19.8	18.7	19.4
- transport and communications	10.9	16.0	16.2	15.5	15.2	15.5
- financial services	1.7	5.6	4.9	4.8	5.0	5.4
- other services	12.5	22.0	29.8	30.0	33.9	32.7

[1)] including forestry, hunting and fishing
[2)] including supply of electricity, gas and water
[3)] including hotels and restaurants

Table 2.3
Source: Report of economic development of Latvia, 2004 and 2003

During the past six years, small changes in the sectoral structure of Latvia's national economy structure have been observed. Three sectors – trade, manufacturing industry and construction have had the most stable growth.

Over the time period 2001 – 2004, development maintained high growth rates and the rapid growth of service sectors provided the greatest contribution. Gradual growth rates are apparent in all economic sectors, particularly in construction and transport and communications, ensured by increase in cargo transport and passenger transport services and development of communications sector as well. Manufacturing industry has shown slower growth than in the previous year, partially due to adaptation to new conditions after accession to the EU.

[5] Source: Ministry of Economics, June 2005, "Report of economic development of Latvia"

The share of service sectors from the aspect of value added, has increased – from 71.4% in 1999 to 73.1% in 2004 because the trade sector has witnessed the most rapid development of all sectors of the national economy.

Both the increase of internal demand and extension of export opportunities have ensured the rapid economic growth in recent years. The increase of internal demand has direct impact on increase in the service sectors, and the industry growth was based mainly on the increase in export volumes.

2.4.2.1 Energy Sector

The main policy areas for Latvia's energy sector are the promotion of competition, increase in the security of power supply, promotion of the use of renewable and local energy resources and protection of the environment.

In Latvia, both local energy resources (wood, peat, hydro resources, wind) and imported energy resources (oil products, natural gas, coal, imported electricity) are used in the energy sector. The structure of primary energy resources in Latvia in 1995 – 2003 is presented in Figure 2.4.

Structure of primary energy resources in 1995 – 2003, PJ

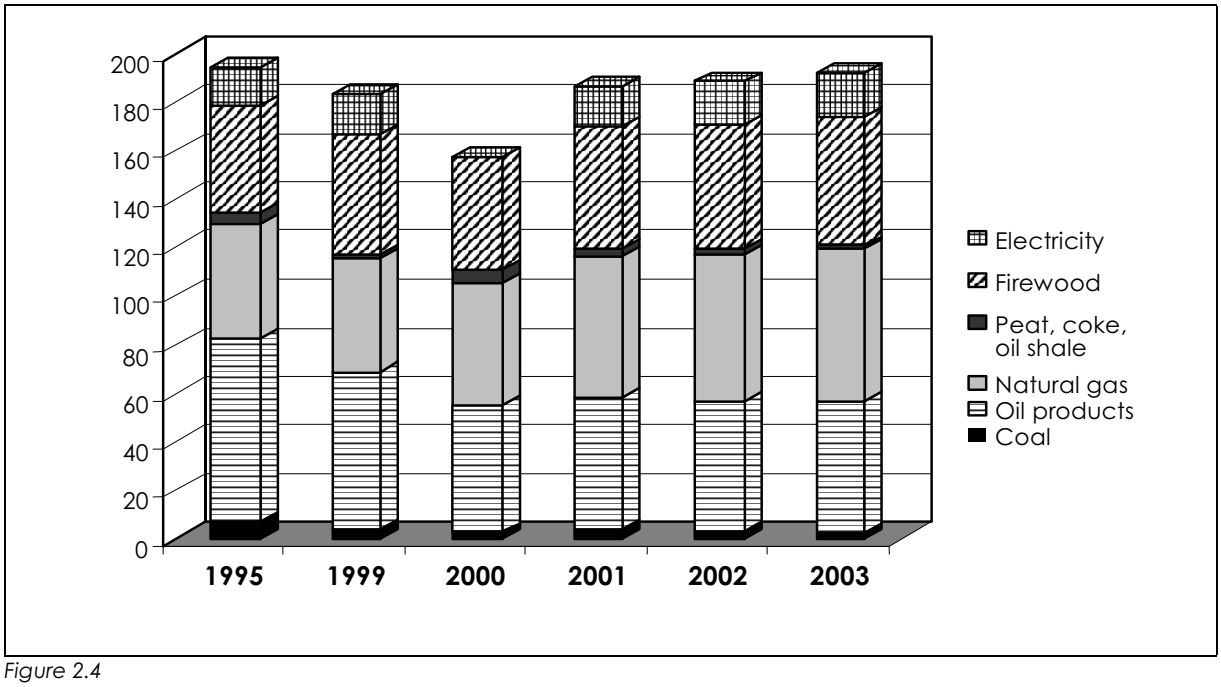

Figure 2.4
Source: Energy balance in 2003, Central Statistical Bureau, 2004

Currently, three types of primary energy resources are dominant in Latvia with approximately equal shares – oil products, natural gas and wood. Latvia, as many other European Union member states, is dependent on the import of primary energy resources. However, the dependence of Latvia has been reduced from 86% (1990) to 69% (2004) within the past 14 years, mainly due to more extensive use of wood resources.

Renewable resources that are available in Latvia include water, wind and solar energy, as well as different types of biomass – fuelwood, straw, rape (see Figure 2.5). Biogas from decomposition processes of organic substances in waste management has been used as well. In 2003, the share of renewable energy sources in the primary energy balance of Latvia

was 34.2%[6]. Since 1990, the consumption of local renewable energy resources in Latvia has increased from 44 PJ (in 1990) to 69 PJ (in 2004) with wood contributing most.

Structure of renewable energy sources in Latvia, 2004

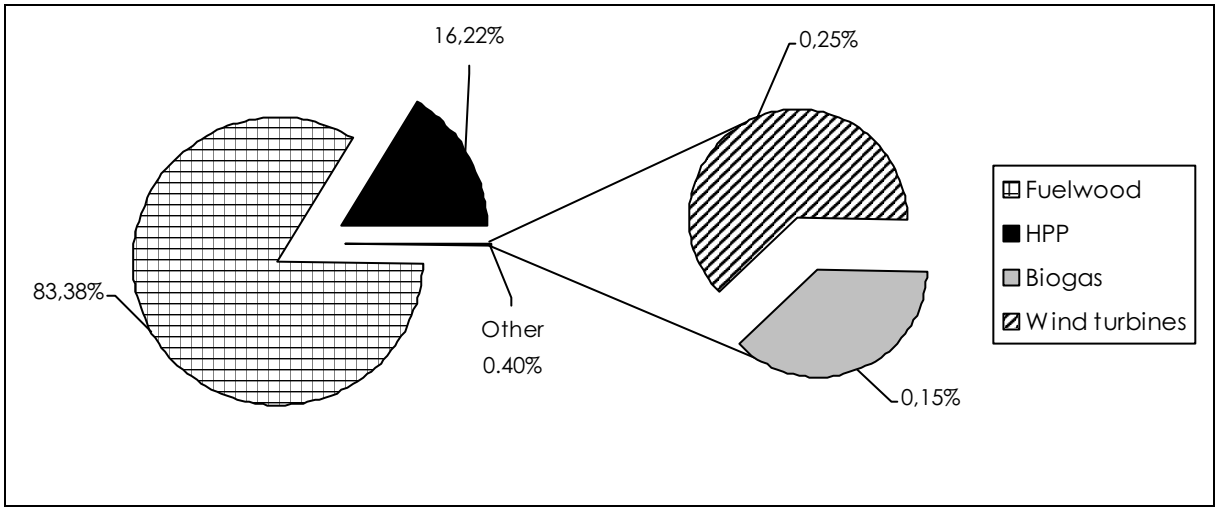

Figure 2.5
Source: Central Statistical Bureau of Latvia

Wood is the most significant local fuel in Latvia. In 2004, its share in Latvia's primary energy balance was 24.7%[7] of the total consumption of energy resources. Fuelwood is used mainly in the form of logs, woodchips and wood processing waste. The biggest consumers are households (39%), heat generating companies (25%), industry (mainly wood processing companies) and other consumers. Currently, the consumption of wood resources in Latvia has almost exhausted the potential of wood resources for utilisation (74.2 PJ/per annum) and it is higher than recommended (37.9 PJ/per annum). Sawn timber production in Latvia continues to grow steadily and the production volumes in 2002 have increased more than 10 times, in comparison with 1993.

The current structure of Latvia's energy supply, including the structure of primary energy resources, the fuel mix and power supply provisions has been developing in the ten year period mainly under the influence of market factors and local conditions. JSC "Latvenergo" is a dominant power supplying company, providing more than 90% of electricity produced in Latvia, its import, transmission, distribution and supply to consumers. The electricity output volumes depend on the flow of the river Daugava. The Daugava HPP cascade on average generates 2.8 TWh power annually and has a maximum output capacity of 1,540 MW. Water resources are difficult to forecast – the annual power production statistics fluctuate in the range of 1.8 to 4.8 TWh. A significant role in the power supply is played by electricity import from Russia, Estonia and Lithuania. Of the total national electricity consumption in 2004, the power plants of JSC "Latvenergo" cover 63.8%, small HPP – 1.24% and wind power plants – 0.84%. Remaining share of electricity was imported. The biggest electricity consumers in 2003 were industry (~29.3%) and households (~27.3%)[8].

[6] Source: Central Statistical Bureau of Latvia
[7] Source: Central Statistical Bureau of Latvia
[8] Source: Central Statistical Bureau of Latvia, "Energy balance, 2003"

Sectoral structure of energy consumption in 1990 – 2004, %

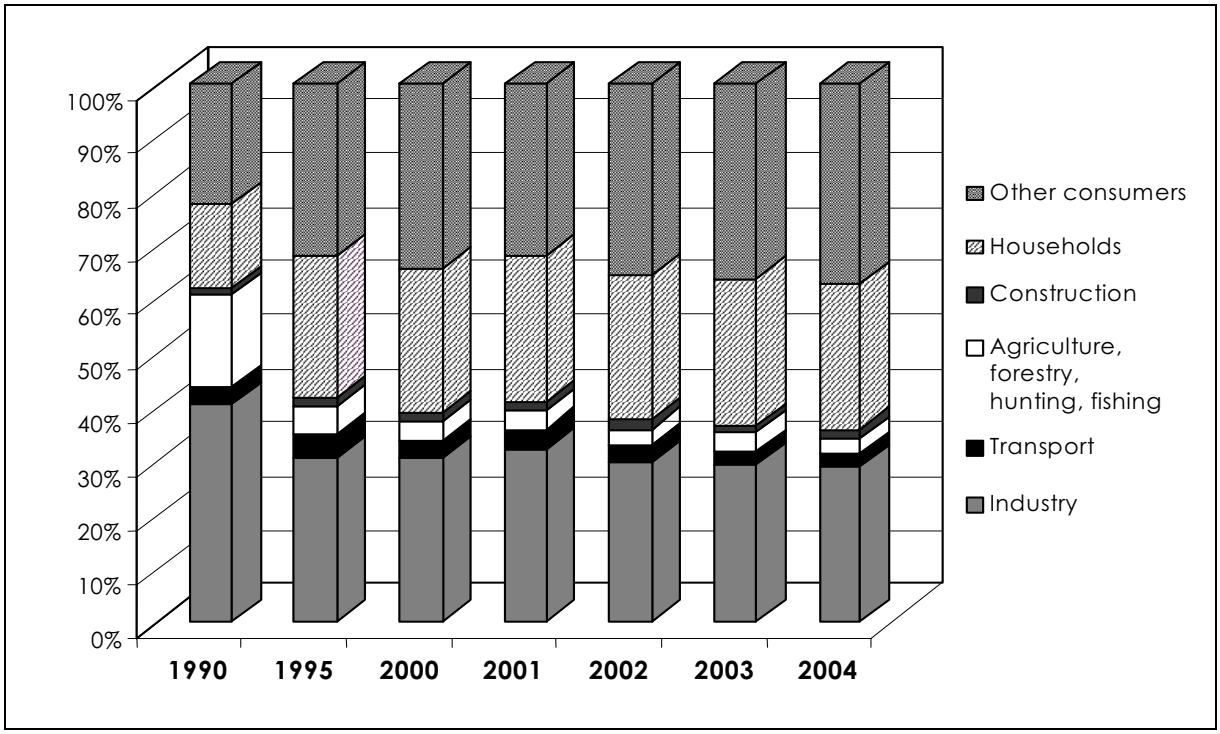

Figure 2.6
Source: Central Statistical Bureau of Latvia

Since the beginning of 1990s, active renovation of regionally significant small HPP (up to 2 MW) and manufacturing of equipment for the needs of small HPP has begun in Latvia. In 2003, the total installed capacity of 150 small HPP was 26.2 MW. Currently, the potential of small HPP is assessed as 0.18 PJ per annum. In May 2004, 148 small HPP were operational in Latvia, and these generated 1.24% of the total electricity output in Latvia[9]. The utilisation of small HPP is regulated, taking into consideration the national safety and environment protection concerns. Practically the potential has been fully utilised and further benefits can be reached only through increasing the efficiency of existing plants. The technically feasible potential is limited, considering the requirements to preserve environmental diversity[10].

Latvia has also gained positive experience in using wind for power generation – the largest wind farm in Central and Eastern Europe is operating in Latvia. However, the contribution of wind energy in the primary energy supply is insignificant. The share of wind energy in Latvia's electricity balance has increased from 0.06% in 2001 to 0.84% in 2003 (48 GWh, installed capacity 27 MW).

It is possible to use biogas in electricity production – power generation by the utilizing gas discharged in wastewater treatment facilities, waste disposal sites and also from agricultural production cycle and livestock breeding, is a process sufficiently investigated and these technologies are available. Since the utilization of biogas in power generation is related to considerable investment and innovation, it has only been successful in some places in Latvia – in Daugavgrivas wastewater treatment plant, Getlini landfill and Liepaja regional waste management site "Skede". Other cities and villages, and agricultural complexes have the potential for biogas utilization. In addition to the energy generation aspect, the collection of methane also has an environment protection effect and both of these aspects have to be considered comprehensively.

[9] Source: Latvian Environment Agency, Riga, 2004, "Evaluation of resource consumption"
[10] Source: Latvian Investment and Developemnt Agency, 2005, "Impact of the energy sector on economic development and life quality"

In Latvia, thermal energy is supplied from district, regional or individual heating systems. Increase in natural gas and fuelwood utilization is characteristic in district heating. The main fuel used in regional heating is wood (firewood, woodchips). Lately, the consumption structure in district heating has not changed, with central heating constituting 65–70% and hot water supply – 30–35%. Of the total thermal energy consumption, 2.2% is consumed in industry, 74% – in households and 23.8% supplied to other consumers.

The total amount of energy consumed in Latvia in the period 2000 – 2003 is presented in Figure 2.7.

Final energy consumption by sector in 2000 – 2003, PJ

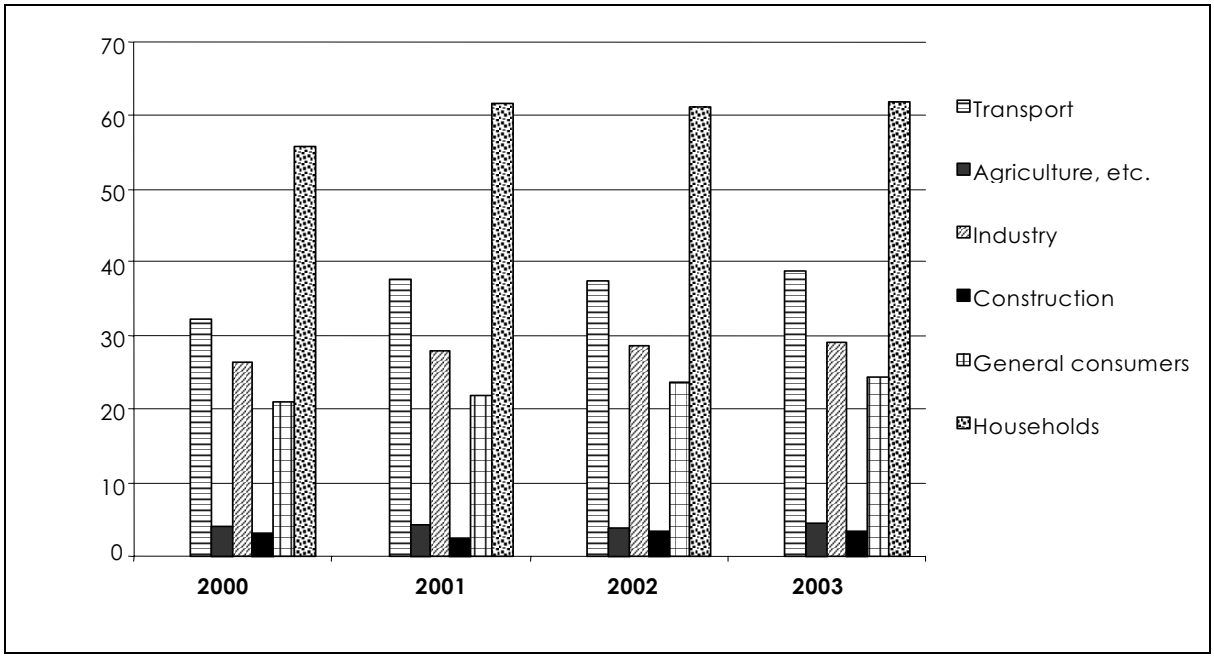

Figure 2.7
Source: Central Statistical Bureau of Latvia

Trends, observed in the analysis of changes in primary energy consumption during the past ten years, are summarised in Table 2.4.

Changes in primary energy consumption over the past ten years (1994 – 2004)

Categories of primary energy resources	Consumption changes, PJ	Changes in the share of consumption structure, %
Natural gas	*Increased* from 34 to 56	*Increased* from 17.5 to 31
Heavy fuel oil	*Decreased* from 48 to 4	*Decreased* from 25 to 2.2
Fuelwood	*Increased* from 37 to 50	*Increased* from 18.9 to 24.4
Coal	*Decreased* from 11 to 3	*Decreased* from 5.8 to 1.7
Peat	*Decreased* from 3 to 0	*Decreased* from 1.7 to 0
Diesel	*Increased* from 18 to 27	*Increased* from 9 to 15
Petrol	*Decreased* from 20 to 15	Small changes, 9
Hydropower and wind power	Small changes, 11.5	Small changes, 6

Table 2.4
Source: Energy sector impact on economic development and life quality, Investment and Development Agency of Latvia, 2005

Energy prices are determined by the free market, and no major changes have been observed over the time period 2001 – 2004 (see Table 2.5).

Average prices for purchased energy resources (without VAT) in sectors of manufacturing industry in 2001 – 2004

Type of energy resources	Unit	2001	2002	2003	2004
Natural gas	LVL/1000 m^3	66	67	72	81
Heavy fuel oil	LVL/t	79	82	90	102
Coal	LVL/t	33	33	33	38
Diesel	LVL/t	290	272	305	373
Imported electricity	LVL/MWh	32	32	32	35

Table 2.5
Source: Central Statistical Bureau of Latvia

2.4.2.2 Transport

Convenient geographical situation of Latvia, location on the Baltic Sea, ice-free seaports (Ventspils, Liepaja), railroad and road networks, gas and oil product pipelines provide good opportunities for the development of a multimodal transport system in Latvia. Transit and internationaltransport constitute the major part of cargo transport with the road transport as the most significant mode of transport. The main modes of the freight transport are summarised in Table 2.6.

Main modes of freight transport in 1995 – 2003, thousand t

Mode of transport	1995	2000	2001	2002	2003
Railroad	28,840	36,413	37884	40,100	49,401
Water[1)]	10,587	-	-	-	-
Road	25,026	32,911	32,299	36,906	41,816
Aviation	5	4	5	5	7

[1)] Starting with1998 cargo ships of Latvia have been registered under false colours and their freight traffic has not been listed in Latvia.

Table 2.6
Source: Transport and communications, Central Statistical Bureau of Latvia, 2003

The number of vehicles has been increasing rapidly in Latvia – during the past ten years the number of registered vehicles has increased on average by 4–6% annually. The number of vehicles in Latvia is given in Table 2.7.

The number of vehicles in 1995 – 2003, at the end of year

Type of vehicle	1995	2000	2001	2002	2003
Ships[1)]	317	271	251	242	234
Trucks, in thousand	68.7	97.1	99.7	102.7	104.6
Buses, in thousand[2)]	16.5	11.5	11.3	11.2	11.0
Passenger cars, in thousand	331.8	556.8	586.2	619.1	648.9
Trolley-buses	348	306	311	311	311
Tramcars	358	336	335	333	332
State Railway mobile equipment:					
Locomotives	349	248	232	229	229
Railcars	246	181	167	159	159
Aircrafts (engine propelled)	74	72	77	81	85

[1)] Ships registered in Latvia's Shipping Register of tonnage of 100 gross register tons and more
[2)] Up to 1997 – including all minibuses, from 1998 – including only those minibuses that are registered as buses for passenger transport

Table 2.7
Source: Statistical Yearbook of Latvia, Central Statistical Bureau of Latvia, 2004

The natural gas supply system in Latvia consists of 1,244 km of main line and 31,193 km of distribution line. Natural gas is imported from Russia and pumped into Incukalns underground storage system, the total capacity of which is 4.44 billion m^3 (active volume – 2.3 billion m^3). The operation characteristics of pipeline transportation systems in Latvia (including transit) is given in Table 2.8.

Pipe-line transport operations in 1995 – 2003

	1995	2000	2001	2002	2003
Oil transported along pipeline main, mln tons	15.2	21.0	26.6	19.3	16.0
Oil products transported along pipeline main, mln tons	2.9	3.5	4.0	4.1	4.6
Gas transported along gasmains, billion m^3	3.1	3.9	4.2	4.3	4.7

Table 2.8
Source: Statistical Yearbook of Latvia, Central Statistical Bureau of Latvia, 2004

2.4.2.3 Industry

Industry takes the leading position in the growth of the state economy. Over the time period 2001 – 2003, output volumes in manufacturing industry annually increased by 9.4% on average considerably exceeding the average growth rates of the national economy. In these years, wood processing, machinery and hardware manufacturing made the largest contribution to industry growth.

In 2004, output volumes of manufacturing industry increased slightly slower – by 7.9%, more rapid growth was observed in chemical industry and building material industry. The development in other sectors was more moderate than in the previous years, partly due to the adaptation to new conditions upon accession to the EU. Most of manufactured output is exported, therefore the development sector of the largely depends on the expansion of export opportunities.

A selection of indicators characterising Latvia's industry sectors is presented in Table 2.9 according to the assessment of the Ministry of Economics.

Added value structure of Latvia's industry in 1996 – 2003, %

	Added value structure of industry				
	1996	2000	2001	2002	2003
Total	100	100	100	100	100
Food industry	40.3	27.5	31.6	28.3	24.9
Light industry	11.5	14.2	12.3	10.5	9.6
Wood-processing	9.1	19.7	17.3	17.0	20.4
Paper industry and publishing	6.4	7.9	6.4	7.5	7.6
Chemical industry	6.8	3.0	5.2	5.1	4.4
Other non-metallic minerals industry	2.5	4.3	3,4	3,5	2.8
Metals industry	4.5	10.7	8.9	10.7	9.7
Car and equipment industry	15.0	8.5	10.5	12.0	14.6
Other industry	3.6	4.1	4.4	5.4	6.1

Table 2.9
Source: Report of economic development of Latvia, Ministry of Economics, 2001, 2002, 2003, 2004

Food industry is the largest sub-sector of Latvia's industry. The food production output constitutes more than 1/4 of industrial value added. There are about 400 food producing companies that have a considerable impact on the development of the agriculture sector and its overall support. Approximately 80% of food industry output is consumed in the local market and the rest is exported, mainly to Russia, Lithuania and Estonia. The second largest sub-sector is wood processing (approximately one fifth of industrial value added). It is a sector

with the most rapid growth during independence period. Wood processing output has increased approximately threefold during this period. The production export share is high in this sector – almost 70% of the output is exported. In Latvia, the leading wood processing sectors are timber sawing and production of plywood, particle chip-boards and furniture. In 2002, the output of machinery and equipment accounted for 12%, metal and hardware industry – 10,7% of industrial value added. 70–80% of the gross output in these sectors is exported, including 65% – to EU member states. Lately, a growing trend in the local market share has been observed. With the construction development, the demand for fabricated metal products has been increasing. In the past few years, companies are investing heavily in new technologies and equipment with foreign investment becoming active as well. In 2002, the sector output increased by 20%, compared to 2001 level.

Simultaneously, with the growth of the construction volumes, the output volumes for cement, lime, varnish and paint materials have also been increasing. In 2002, compared to 2001, the production volume of building materials increased by 15.3% but in 2003 the growth rate was 5.4%. Cement and lime industry is considered to be the most significant CO_2 emission source of industrial processes (excluding emissions from fuel combustion in industry).

The share of sectors with high value added, such as electronic industry, sub-sectors of information technologies, and others, is still too little in the industrial structure. Sectors using cheap labour force and natural resources, are dominant in Latvia's industry. Consequently, the industrial value added on the whole is comparatively low. In general, industrial output has low competitiveness. The situation is slightly better in the light industry and wood processing industry where higher quality sawn timber is competive in the international market. Timber products are dominant in the export to EU member states but the competitiveness of chemical industry goods in the EU member states is considerably lower – almost half of the exported output of Latvia's chemical industry goes to Latvia's neighbouring countries Lithuania and Estonia. Low labour force costs are one of the main competitiveness elements of Latvia's industry.

2.4.2.4 Construction

Construction is one of the most dynamic sectors of Latvia's national economy. Rapid investment growth has had a favourable impact on the construction development. In 2004, the sector output increased by 13%. Construction volumes of industrial and residential buildings, hotels, streets and roads, and other facilities rapidly increase. High construction rates are expected in the future as well, due to the development of mortgage crediting, growth of economic activities and investment, as well as the implementation of projects financed from EU funds.

In 2004, compared to 2003, volumes of new construction have increased by 20.3%, volumes of renovation and reconstruction work – by 8.0%. Nevertheless, the majority of construction work by the location of works has been concentrated in Riga – 49.0%, Riga region – 8.2%, Ventspils – 5.8%, and Liepaja – 4.7%.

2.4.2.5 Households

In Latvia, more than 70% of the total generated thermal energy is spent in residential and public buildings. In 2003, the number of residential buildings totalled 330.6 thousand with 967 thousand housing units comprising apartments, private houses, premises in hotels for business trips, social care centres, and others (see Table 2.10). Currently, apartment buildings constitute approximately two thirds of the whole building stock. Most of these have been in use for 30 years and more. Residences are worn out: the heating systems operate with big heat losses that is uneconomical from both, consumption of resources (fuel and electricity) and consumers' – tenants' viewpoint due to the high heating charge[11].

[11] Source: State Agency "Housing Agency", "Housing in Latvia", 2004

Building stock of Latvia in 1990 – 2003, billion m2 of total area (on 1 January of respective year)

	1990	2000	2001	2002	2003
Building stock in total	52.9	53.4	53.5	54.9	55.4
On average per capita	19.8	22.6	22.8	23.6	23.9
Building stock of cities	33.8	34.7	34.8	35.7	36.8
On average per one city dweller	17.9	21.5	21.8	22.6	23.0
Building stock of countryside	19.1	18.7	18.7	19.2	19.2
On average per one country dweller	24.5	25.0	24.8	25.6	25.8

Table 2.10
Source: "Building stock of Latvia, 2003", Central Statistical Bureau of Latvia, 2004

2.4.2.6 Agriculture

Agriculture is a dominant sector in primary sectors. Although the GDP share of the agriculture sector is not big (in 2002 – 2.6%, 2003 – 2.4%), its significance in the national economy is high. In 2003, 104 thousand people or 10.3% of the total number of employed in the country were employed in this sector, although the number is gradually decreasing.

According to the Land Balance of the Republic of Latvia on 1 January 2005, agricultural land was 38.5% of the total area of the regions or 2,464,057.5 ha, including arable land 1,807,051.1 ha, perennial plantations 28,785.5 ha, meadows 228,201.4 ha and pastures 400,019.5 ha (see Figure. 2.8). Compared to 2003, areas of agricultural land, marshes and other land have decreased (by 0.1%, 0.1% and 0.2% respectively of the total area). The unused land is gradually turning into wetlands and overgrowing with bushes of low value. This land has in fact dropped out of industrial and economic circulation, it is degrading rural landscape and the environment, polluting neighbouring fields with weeds and damaging melioration systems.

Distribution of agricultural land according to land-use types on 1 January, 2005

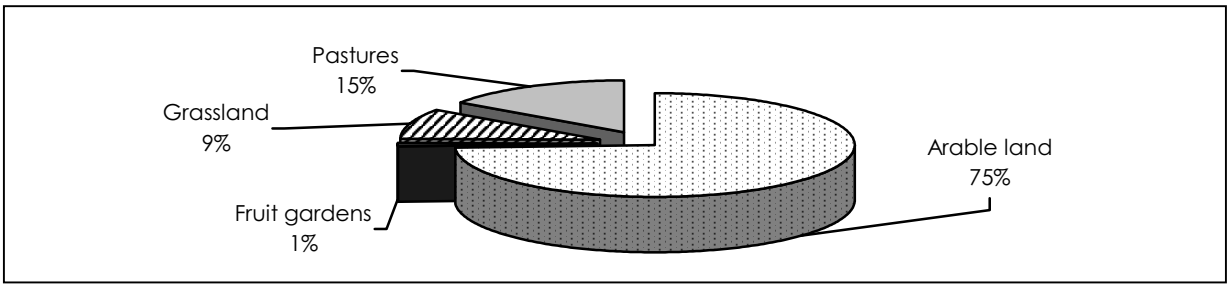

Figure 2.8
Source: State Land Service

With the development of biofuel production, rape sowing amounts were increasing – the trend of rapid growth in rape sowing continued also in 2004. Compared to the previous year, it increased by 28.5 thousand ha or 2.1 times, with harvest rising almost 3 times or by 66.2 thousand t. The share of rape in the farm sowing structure increases every year and in 2004 it reached 7.3% (in 2003 – 3.9%). In 2004, the sowing area of summer rape increased 1.7 times and of winter rape – 4.8 times[12].

There are large areas of actually unused agricultural land in Latvia, their share particularly high in the group of natural economy farms where 240.9 thousand ha or 37.5% of the available land resources are not managed, thus endangering the future potential use of this land.

[12] Source: Ministry of Agriculture, "Agriculture and countryside of Latvia", 2005

Starting with 2000, the situation in agriculture has stabilised. However, 2003 was not successful for this sector, partly due to unfavourable weather conditions. Thus, the value added (in comparable prices) in this sector has declined by 2.3% but in actual prices it has slightly increased – 0.8%. Low productivity of employed and external competition are the main barriers to the development of this sector.

Traditionally, the leading agricultural industries are livestock breeding and crop farming. In 2003, the final agricultural produce in the livestock breeding accounted for 46% (including milk – 21%, pork – 12%, egg – 6%), crop farming – 48% (including grain – 19%, potatoes – 10%, vegetables – 7%), and other agricultural produce – 6% of the total output.

Recently, the number of reproductive livestock and hens and poultry in Latvia has decreased considerably, the keeping and feeding conditions have changed and on the whole do not guarantee the amount and quality of the main food products neither for the local market, nor for export. As Latvia has set a goal to raise the productivity of cows by increasing milk yield, the number of livestock will proportionally decrease. Due to Latvia's accession to the EU, the increase in agricultural production will depend on agricultural produce allowances, allocated by the EU.

Low agricultural productivity of Latvia is the reason for still critically low incomes of those employed in agriculture; in 2002 their income was approximately 16 times lower than the average in the EU. Small incomes from agricultural activities do not attract young people; the sector employs predominantly people that are older than 45.

Biological agriculture is a nature-conserving type of agricultural practice. Since 1998, the number of farms practicing biological agriculture have increased more than five times, reaching 352 farms in 2002.

2.4.2.7 Forestry

Latvia is one of the most densely forested countries in Europe – the woodland occupies 45% of the national territory and on average the woodland per capita indicator is 4.5 times higher than in Europe. Forests are of great significance in the national economy of Latvia, providing also air purification from carbon dioxide and recreational value.

As a result of natural overgrowing of not-forest land and purposeful afforestation, Latvia's total wooded land increases every year. However, in Latvia more anthropogenic GHG emissions are still emitted than removed (in 2003 77.8% of GHG emissions were removed or 8.187 $GgCO_2$ equivalent less than was emitted). The GHG emission amount not related to changes in aggregate stocks of forest stands is insignificant – 1.1%.

The forests and the wood resources they contain constitute the main national wealth. In Latvia, the total growing stock is 578 mln m^3. Compared to the beginning of the past century, it has increased 3.3 times (see Figure 2.9), during the past twenty years it has increased by 194 mln m^3 or almost by 10 mln m^3 a year. Such an increase of growing stock is related to both increase of forest land area and purposeful forestry management activities[13].

[13] Source: Latvian Environment Agency, "Evaluation of resource consumption", 2004

Dynamics of total growing stock in 1935 – 2003, mln m³

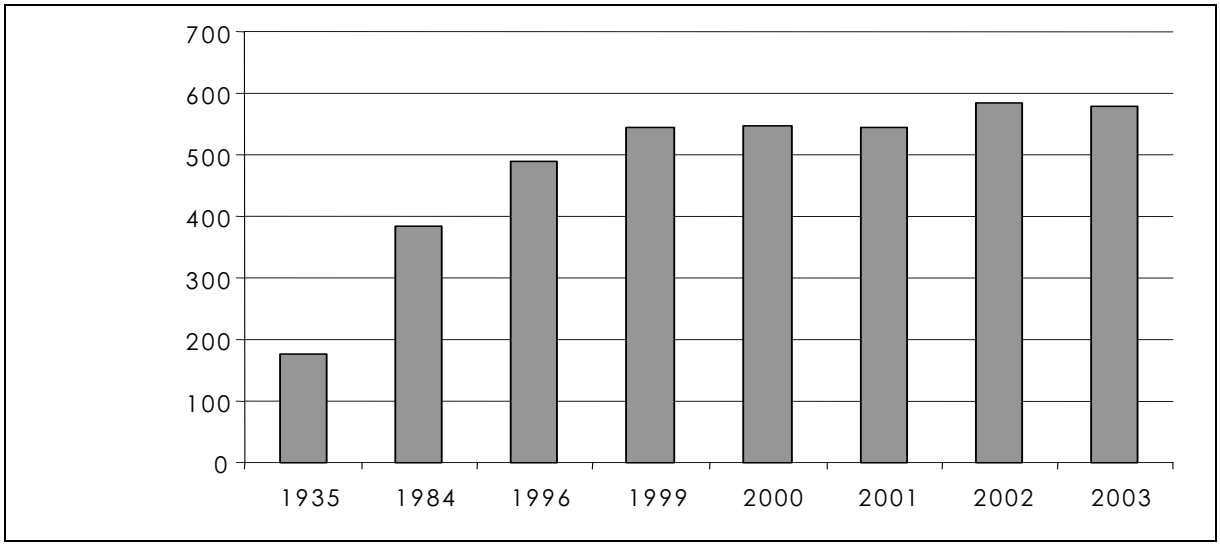

Figure 2.9
Source: State Forest Service

As a result of the Land Reform, the forest ownership structure has changed – the state owns 50.7%, owners of private forests or legal possessors are in charge of 45% and municipalities manage 3.7% of woodland.

In Latvia, coniferous forests dominate, however there are differences in the mix of species in the state forests and other forests. Forest stands of coniferous trees – pine and fir constitute most of the state owned forests. Coniferous forest stands constitute 69% of all forest stand areas in the state forests. In other forests, the areas of coniferous forest stands make 43% but a greater share of deciduous forest stands is observed, with the most represented species – birch (36% of total areas of forest stands), grey alder (13%) and aspen (4%). Such a structure of species in other forests could be explained by the tendency that these forests originate from agricultural lands, overgrowing with deciduous trees [14].

In total, the age structure of forest stands in Latvia is very irregular. Considering that pine, fir and birch stands constitute 87% of all woodland area, the overall age structure of forest stands is closely related to the age structure of these three species. A large share of forest stands is at the age of 40 to 80 years, which could be explained with the increase of forest stand areas as a result of overgrowing of agricultural land after WWII. The majority of forest stands is at the age of 51 to 60 years, that is unambiguously influenced by the large proportion of birch stands of this age. Pine stands are mostly at the age of 51 to 90 years but half of fir stands are young forest stands[15].

Annual harvest volumes for the period of 1991 – 2003 have increased from 4.4 mln m³ to 11.7 mln m³. The rapid growth rate could be explained with the inclusion of private forests in economic circulation and the development of wood processing, particularly timber sawing output. Currently, on average 65% of the total logging volumes occur in the private forests of Latvia. The amount of timber harvested in the state forests remains stable with only small changes since the regaining of independence. Irrespective of the significant increase in logging volumes, the felling did not exceed 75% of growth and 2% of total growing stock during the period of Latvia's regained independence. In the recent years, the felling volumes have stabilised and no longer demonstrates high growth rates, including in private forests. The main reason for this is the maximum allowed felling volume in the felling, which is directly regulated by law. Both in private and state forests the felling volumes are also regulated indirectly by restricting the felling age for forest stands; also, the main felling is prohibited

[14] Source: State Forest Service
[15] Source: Latvian Environment Agency, "Evaluation of resource consumption", 2004

unless the forest stands are restored according to the requirements stated in the legislative acts.

In 2004, altogether 37,571 ha of forests were restored, which is 8,160 ha or 28% more than in 2003. 32% of the forest is restored artificially (by planting or seeding) and 68% (25,598 ha) are restored naturally. The forest is mainly restored with a firtree, pine and birch.

In 2004, the gross exported forestry output accounted for 35.2% of total export of Latvia. In 2003, sawing materials contributed the largest share of the value – 42.2%, round timber (mainly pulp-wood) – 10.6%, furniture – 10.6%.

2.4.2.8 Waste

Although the waste management system in Latvia has improved and awareness of the community as to the necessity of waste reduction is increasing, still the amount of generated waste continues to grow year by year. In everyday life, the amount of packaging waste, particularly of small packaging, related to the increasing consumption of goods and services, is growing.

Data about the amount of municipal waste, (Table 2.11 and Figure 2.10), obtained from database "3 – Waste" of the Latvian Environment, geology and meteorology agency, show that the volume of municipal waste is increasing. Municipal waste data have been gathered only since 2001. The amount of waste produced by agricultural companies has an increasing trend as well.

Amount of produced municipal waste in 2001– 2003

Indicators	2001	2002	2003
Amount of produced municipal waste, in tons	1,103,460	987,160	1,056470
Amount of produced municipal waste per capita per year (kg/per capita)	466.7	420.8	453.1

Table 2.11
Source: Latvian Environment, geology and meteorology agency, 2005

In Latvia, 57% of municipal waste (in total 0.602 mln tons in 2003) is biologically degradable. In Latvia most of the municipal waste and other collected waste is deposited in dumpsites without processing (approximately 40% of collected waste is deposited in Getlini landfill, Riga district).

In Latvia, 57% of municipal waste (in total 1.056 mln tons or 453.1 kg per capita in 2003) is biodegradable. To comply with the commitments of EU environmental legislation[16], the share of biodegradable waste deposited in landfills must not exceed 75% in 2010, 50% in 2013 and 35% in 2020 of the amount of biodegradable waste produced in 1995. Binding targets are set also for cardboard and paper packaging regeneration – 56% in 2005 (53% processing, 3% energy recovery), 67% in 2007 (59% processing, 8% energy recovery).

The majority of collected municipal and other waste is still deposited in landfills and dumpsites without pre-treatment (approximately 40% of collected waste is deposited in the Getlini landfill of Riga district). Municipalities are responsible for the organization of waste management within their administrative territory. Collection and disposal of municipal waste in Latvia is mainly covered by commercial enterprises, of which 95% are owned by municipalities. Private commercial companies provide services to 50% of the population (in Riga, Liepaja, Jelgava and other cities).

[16] Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste and European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste

Amount of municipal waste produced through economic activities, by sectors in 2001 – 2003, 100 thousand

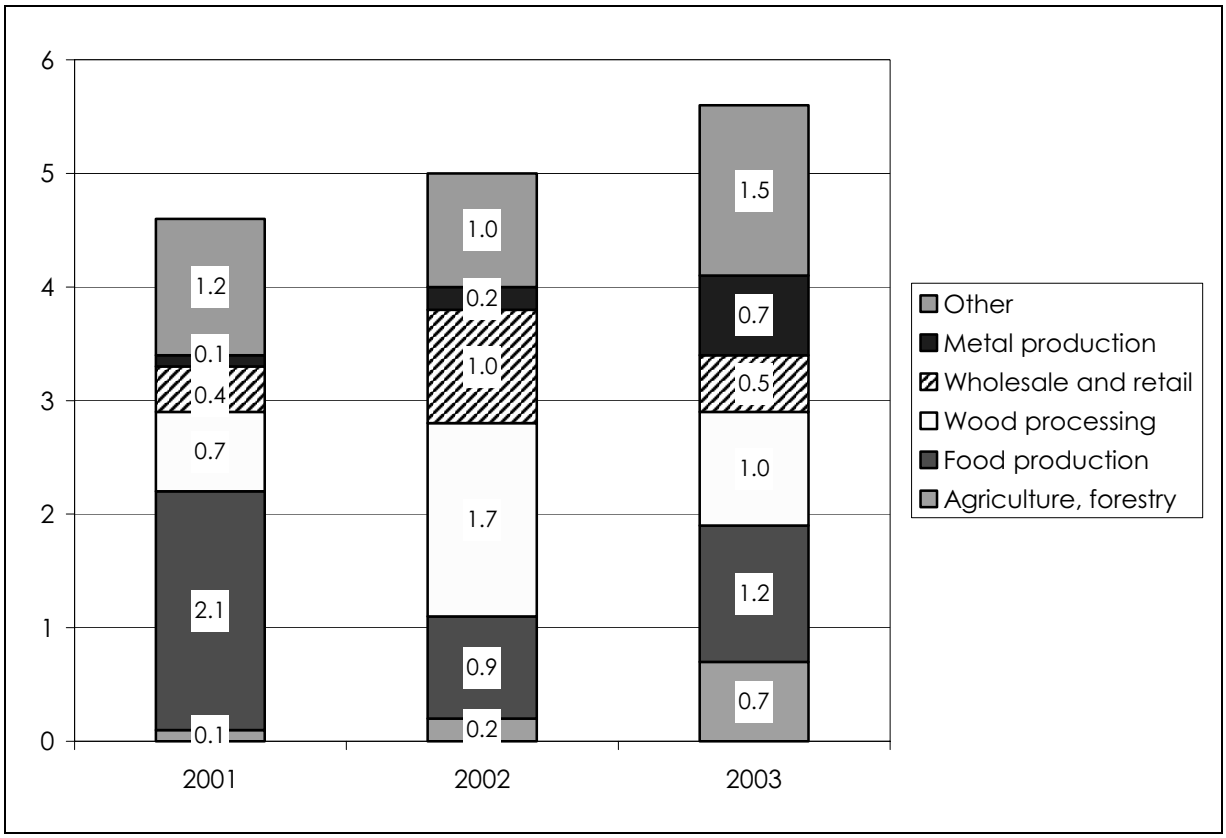

Figure 2.10
Source: Latvian Environment, geology and meteorology agency, 2005

In Latvia, four municipal waste landfills have been constructed by 2005 in the waste management regions of Riga, North Vidzeme, Ventspils and Liepaja. It means that ~ 57% of Latvian residents have all preconditions to dispose of produced waste in the landfills that are in compliance with environment protection requirements. In two municipal waste regions ("Getlini" un "Skede"), collection and utilization of biogas from the landfill has been started for the production of electricity.

One of the most significant problems in municipal waste management is the large number of small municipal waste dumpsites and their negative impact on the environment. Of more than 500 dumpsites identified during the elaboration of the State Investment Programme "Strategy for Municipal Waste Management in Latvia, 500-", 176 dumpsites with the total area of 261 ha were restored in the period 1998 – 2004, that is, 33% of the total number of dumpsites. Nevertheless, in the territory of Latvia 28% of the dumpsites that were initially identified as not conforming with environmental requirements, are still operating.

In Latvia, biodegradable waste composting is very typical, usually done by the inhabitants of private houses. The compost prepared this way is mainly used as a soil fertilizer. Waste produced in food preparing process is used to feed livestock but this kind of practice is more common in households with a small number of livestock.

In the process of wastewater treatment, sediments or wastewater sludge is formed; it is considered as treatment process waste, or more precisely – wet, solid remainder (particles). One of the most effective processing types of sludge treatment is biogas generation. The only place in Latvia, where sludge is anaerobically treated, is the biological treatment station "Daugavgriva" where three methane tanks are in operation with the total volume of 12,000 m3. The biogas obtained in methane tanks is used for heat supply and electricity production in a cogeneration plant.

3. REPORT ON ANTHROPOGENIC GREENHOUSE GAS EMISSIONS AND REMOVALS

This chapter summarises information on GHG emissions and removals in Latvia for the time period 1990 – 2003.

Annual inventory on anthropogenic greenhouse gas emissions and removals is prepared by the Latvian Environment, geology and meteorology agency (hereinafter – LEGMA) under surveillance of the Ministry of Environment. LEGMA, according to its competence areas, implements the national policy in the sectors of geology, meteorology, climatology, hydrology, air quality and transboundary air pollution. LEGMA is responsible for establishing and maintaining a system for the management of environmental data in Latvia, creating databases on water use and pollution, water treatment plants, air pollution, hazardous waste and waste landfills, protected flora and fauna, special protected nature territories.

This report summarises the estimated net emissions in the time period 1990 – 2003 of the direct GHG (CO_2, CH_4, N_2O, HFC, SF_6), indirect GHG (NO_x, CO, NMVOC) and SO_2 and aggregate CO_2, CH_4, N_2O and HFC, PFC, SF_6 emissions in CO_2 – equivalent, according to their global warming potential values over a 100-year time horizon.

Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (2000) (hereinafter – IPCC Good practice guidance) were used in the GHG emissions calculations. The summary report of the GHG inventory is prepared using the Common reporting format developed by the Intergovernmental Panel on Climate Change and adopted by the Conference of the Parties to the Convention in its 5th session, 1999 (hereinafter – IPCC Common reporting format), and is regularly revised.

In the course of preparation of the GHG inventory, key emission sources are identified and given priority because of the significant impact that their assessment can have on the total national emissions. Calculations are performed in accordance with the IPCC Good practice guidance, applying the assessment of "Level" and "Trend" (Table 3.1).

Key emission sources

Sector	Key emission sources	Direct GHG	Base year (1990), Gg CO_2 eq.	Year 2003, Gg CO_2 eq.	Level assessment, %	Trend assessment, %
Energy	CO_2 emissions of stationary incineration plants– oil products	CO_2	7,293.64	1,021.84	0.11	0.48
Energy	Mobile incineration sources: transport	CO_2	1,909.19	2,333.25	0.24	0.43
Energy	CO_2 emissions of stationary incineration plants – natural gas	CO_2	5,433.81	3,105.89	0.32	0.27
Energy	CO_2 emissions of stationary incineration plants – coal	CO_2	2,849.31	316.21	0.03	0.21
Waste	Emissions from municipal waste landfills	CH_4	418.62	664.31	0.07	0.13
Agriculture	Emissions from agricultural soil	Direct-N_2O	1,289.06	31.08	0.00	0.12

Sector	Key emission sources	Direct GHG	Base year (1990), Gg CO_2 eq.	Year 2003, Gg CO_2 eq.	Level assessment, %	Trend assessment, %
Agriculture	Emissions from applying nitrogenous mineral fertilizers in agriculture	Indirect-N_2O	998.69	20.58	0.00	0.10
Agriculture	Emissions from livestock enteric fermentation processes	CH_4	2,057.23	571.14	0.06	0.06
Energy	Emissions from burning biomass in stationary plants	CH_4	161.93	228.48	0.02	0.04
Solvent and other product use	Emissions from solvent and other product use	CO_2	105.71	108.89	0.01	0.02
Waste	Emissions from industrial and household wastewater	CH_4	347.00	193.70	0.02	0.02
Energy	Emissions from burning biomass in stationary plants	N_2O	34.10	65.52	0.01	0.01

Table 3.1
Source: Latvian Environment, geology and meteorology agency

GHG inventory is prepared in co-operation with the Central Statistical Bureau of Latvia, Ministry of Transport, Ministry of Agriculture, State Land Service, private institutions and sector experts. Prior to the establishment in 2005 of the national system for assessment of GHG emissions and CO_2 removals, the information necessary for inventory was requested on an annual basis.

In 2005, a project for the development of the national system was implemented. As stated in the provisions of the "Climate Change Mitigation Programme for 2005-2010", institutions responsible for submitting the required information for the preparation of the inventory and the national inventory report, ensuring and improving data quality and data quality control procedures were appointed and the deadlines for the sumbissions were defined. An evaluation was carried out to assess the level of capacity necessary to ensure sustainable performance of the national system, including data collection for the calculations of GHG emissions and CO_2 removals as well as increasing the competence and knowledge of the specialists involved in the inventory process. The implementation of the project establishing the national system for the assessment of GHG emissions and CO_2 removals will bring additional benefits, such as improved quality of emissions data in reports to the Secretariat of the Convention on Long-Range Transboundary Air Pollution and better quality information for the state institutions to protect state interests in climate change policy negotiations at international (UN and EU) level .

Schematic overview of Latvian national system is given in Figure 3.1

National system for the preparation of annual inventory of GHG emissions and CO_2 removals

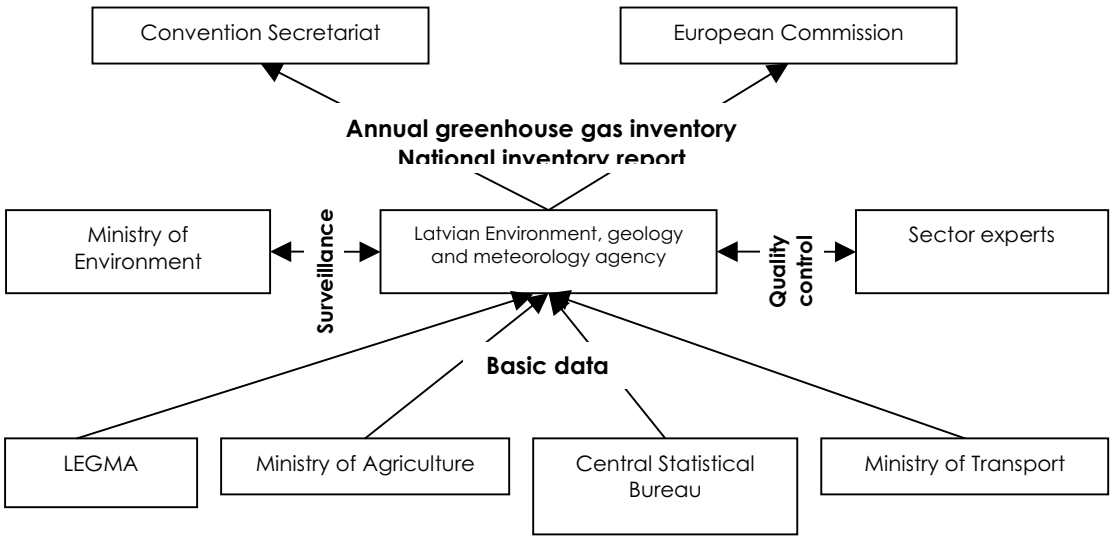

Figure 3.1

GHG emissions and CO_2 removals have been recalculated for the period 1990 – 2003 and submitted to the Secretariat of UN Framework Convention on Climate Change in May 2005. Recalculations of past years are carried out if corrections have been made to active data, the calculation method for emissions and removals is changed, emission factors or assumptions are changed, and considering the proposals of international experts.

Since the classification of soil currently used in Latvia does not conform with the requirements specified in the methodological recommendations of Intergovernmental Panel on Climate Change, CO_2 emissions and removals in soils are not included in the GHG emissions calculations.

In accordance with the requirements of methodological recommendations, the annual report summary tables for 1990 – 2003 are attached in Appendix 4.

3.1 CO_2 emissions and removals

In 2003, the major CO_2 emission source was the combustion of fossil fuels – 95%, including the energy sector – 33%; manufacturing industry and construction – 12%; transport – 35%, other sectors (in household, trade sector and agriculture and forestry as well, etc.) – 15%.

Other sources of anthropogenic CO_2 emissions are industrial processes (3.1%), solvent and other product use (1.5%), and waste (0.4%).

CO_2 removals occur by green plants absorbing CO_2 in the process of atmospheric photosynthesis. Net CO_2 removals from the land-use, land-use change and forestry sector in 2003 was – 8,186.76 Gg CO_2.

CO_2 emissions and removals for the period 1990 – 2003 are presented in Figure 3.2.

CO_2 emissions and removals in 1990 – 2003, Gg

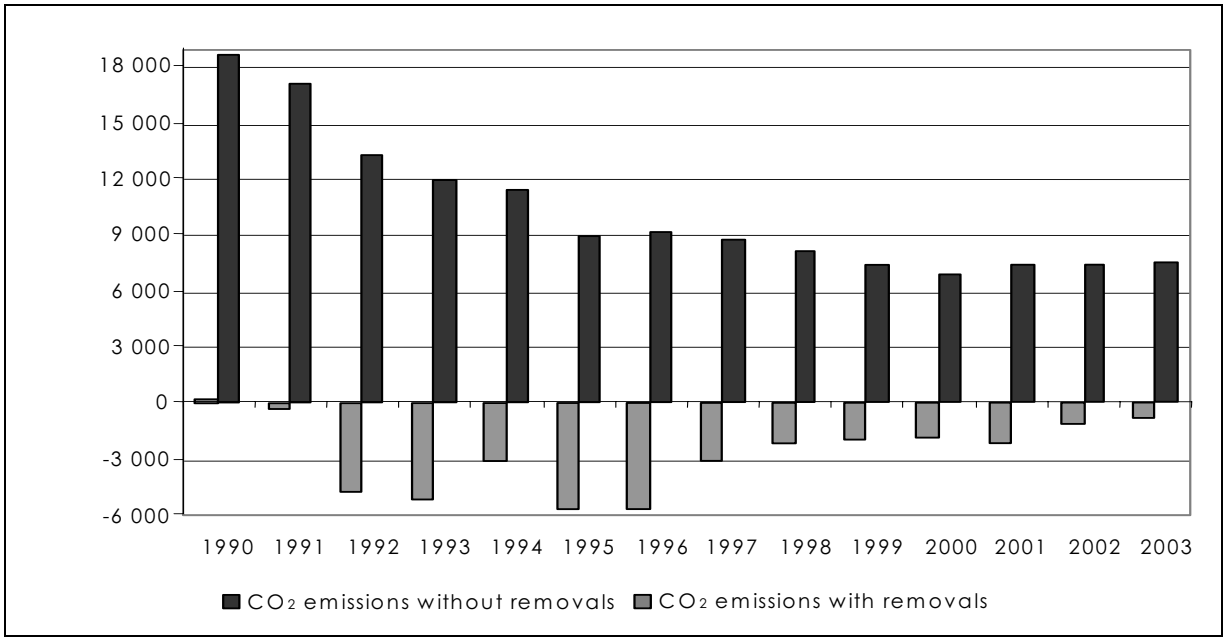

Figure 3.2
Source: Latvian Environment, geology and meteorology agency

A more detailed division of CO_2 emissions and removals is given in Table 3.1.

Total CO_2 emissions and removals in 1990 – 2003, Gg

GHG source and sink categories	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1. Energy	18044.84	16729.83	13090.52	11791.08	11188.21	8734.24	8910.24	8460.06	7835.71	7075.80	6576.86	7098.70	6973.99	7058.19
A. Fuel combustion	18044.84	16729.83	13090.52	11791.08	11188.21	8734.24	8910.24	8460.06	7835.71	7075.80	6576.86	7098.70	6973.99	7058.19
1. Energy industries	9863.48	9085.95	6844.01	6024.91	4781.72	4106.09	4412.39	3843.41	3525.00	3134.14	2708.21	2600.17	2459.98	2416.41
2. Manufacturing industries and construction	2538.15	1527.16	1293.35	930.19	1708.99	1309.83	1219.25	1487.46	1327.03	1056.50	932.20	896.35	950.12	948.83
3. Transport	2 445.12	1 696.54	1587.53	1982.40	1736.54	1851.24	2022.05	2021.00	1982.86	1948.81	2 119.84	2 561.52	2 559.75	2 589.51
4. Other sectors*	3 198.10	4 420.19	3365.64	2853.59	2960.96	1467.08	1256.55	1108.19	1000.82	936.35	816.61	1 040.66	1 004.14	1 103.44
2. Industrial processes	503.75	351.59	161.17	59.18	199.98	169.37	180.91	202.05	207.97	242.06	189.10	208.74	222.70	231.08
A. Mineral products	459.55	340.60	155.61	39.20	167.33	142.27	155.28	157.67	160.66	196.28	143.61	164.25	178.18	186.92
C. Metal production	44.19	10.99	5.56	19.98	32.65	27.11	25.64	44.38	47.31	45.78	45.49	44.49	44.52	44.16
3. Solvent and other product use	105.71	90.04	53.21	44.09	61.97	59.33	64.48	80.22	86.01	91.22	82.73	92.30	102.43	108.89
5. Land-use, land-use change and forestry	-18453.38	-17480.33	-18065.91	-17000.15	-14481.86	-14630.26	-14841.23	-11793.88	-10273.84	-9349.54	-8640.01	-9594.20	-8424.90	-8186.76
A. Changes in forest and other woody biomass stocks	-18587.80	-17614.38	-18150.47	-17092.41	-14595.38	-14696.48	-14870.33	-11851.30	-10281.77	-9339.96	-8611.50	-9521.91	-8341.47	-8111.06
D. CO_2 emissions and removals from soil	134.42	134.05	84.55	92.25	113.52	116.45	102.44	112.79	92.27	93.09	94.69	91.24	106.88	114.61
6. Waste	NO	NO	NO	NO	NO	NO/NE	NO/NE	NO/NE	NO/NE	3.53	5.94	13.11	37.52	29.28
C. Waste incineration	NO	NO	NO	NO	NO	NE	NE	NE	NE	3.53	5.94	13.11	37.52	29.28
Total CO_2 emissions without LULUCF	18654.30	17171.46	13304.91	11894.35	11450.16	8962.94	9155.64	8742.32	8129.69	7412.62	6854.65	7412.86	7336.64	7427.44
Total CO_2 emissions with LULUCF	200.92	-308.87	-4761.01	-5105.80	-3031.70	-5667.32	-5685.59	-3051.55	-2144.15	-1936.92	-1 785.37	-2181.34	-1088.26	-759.31

** agriculture, forestry, fishing, households, trade/service*

Table 3.1
Source: Latvian Environment, geology and meteorology agency

3.1.1 Energy, including transport (1A,B)

The energy sector is the largest source of CO_2 emissions, including emissions from energy generation and transmission, manufacturing industry and construction, transport, trade, services, household, agriculture, forestry and fishing. In 2003, the most significant CO_2 emission amount in energy sector was from the combustion of natural gas in the energy generation sector and fuel combustion in the transformation sectors. Consumption of natural gas and consequently CO_2 emissions from the combustion of natural gas has been increasing since 1999 due to the rising number of companies switching from the use of liquid fuel to gas or biomass fuel.

According to the annual reported data, CO_2 emissions from the energy sector are decreasing. This is due to the fall of winter mean temperature, changes in the fuel structure (fuel switching) and implementation of energy efficiency measures. In 2003, the transport sector was the main source of CO_2 emissions, generating 35% of the total CO_2 emissions. Considerable amount of emissions comes from the road transport that annually increases by 3% due to the increasing number of vehicles.

3.1.2 Industrial processes (2A)

In 2003, the largest amount of CO_2 emissions that are not related to energy consumption in Latvia's industry originated from mineral products (production of cement and clinker, lime, bricks and ceramic tiles), constituting 81% of the total CO_2 emissions from industrial processes. 19% of the total CO_2 emissions from industrial processes originate in metal and steel production from the use of dolomite, limestone and coke as raw material.

As of 2000, an increase in CO_2 emissions has been observed, which is explained by the development of the national economy and increasing production volumes.

3.1.3 Land-use, land-use change and forestry (5A,D)

In 2003 the calculated CO_2 removals, compared to the situation of the 1990s, have decreased. Although the area covered by forest in Latvia is increasing, at the same time felling volumes are also increasing. In 2003, the felling volumes were approximately 2.5 times higher than in 1992. This rapid increase is explained by the inclusion of private forests in economic turnover and changes in legislative acts regulating forest management. However, in recent years the volumes have stabilised[1]. At present, the total CO_2 emissions are lower than CO_2 removals.

CO_2 emissions are estimated also from agricultural land that is intensely managed – drained, cultivated, fertilized and limed. Considering that the amount of lime applied in the period 1995 – 2003 varies, CO_2 emissions also change year by year, affecting the volume of CO_2 removals as well.

As seen in Table 3.1, CO_2 emissions from soil in 1998, compared to previous years have decreased, but as from 1999, CO_2 emissions have a trend to increase.

3.2 CH_4 emissions

The emissions of the second most important GHG – methane (CH_4) have decreased by 49% in 2003, in comparison with 1990 (Figure 3.3). The main sources of CH_4 emissions in Latvia are municipal waste landfills and enteric fermentation processes of livestock. Other significant CH_4 emission sources are leakage from natural gas pipeline systems and biomass combustion in the household sector. Total CH_4 emissions by sectors for the period 1990 – 2003 are presented in Figure 3.3 and Table 3.2.

[1] Source: "Forestry sector in Latvia", 2004

CH_4 emissions in 1990 – 2003, Gg

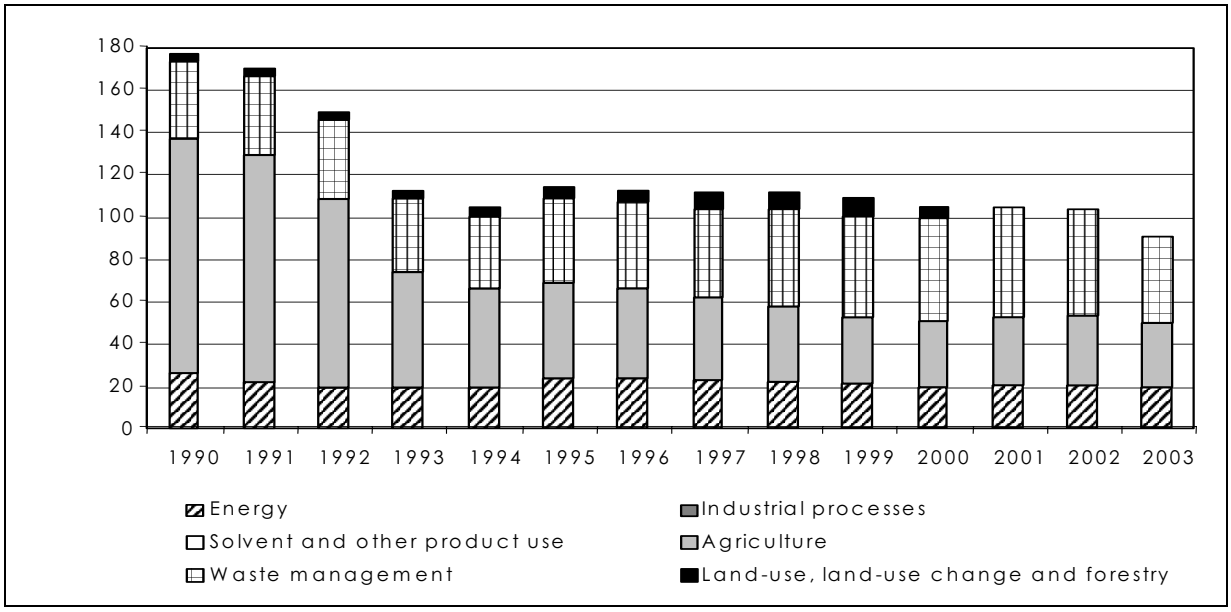

Figure 3.3
Source: Latvian Environment, geology and meteorology agency

Total CH_4 emissions in 1990 – 2003, Gg

GHG source and sink categories	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1. Energy	25.94	21.63	19.21	19.33	19.56	23.56	23.51	22.25	21.87	21.28	19.80	20.64	20.69	18.63
A. Fuel combustion	12.89	9.06	7.75	8.37	8.85	13.13	13.46	12.87	12.87	12.70	11.86	12.94	12.66	12.35
1. Energy industries	0.48	0.41	0.38	0.35	0.42	0.43	0.48	0.51	0.45	0.40	0.38	0.37	0.41	0.45
2. Manufacturing industries and construction	0.19	0.16	0.13	0.08	0.14	0.15	0.19	0.20	0.23	0.21	0.19	0.22	0.23	0.24
3. Transport	0.68	0.40	0.39	0.61	0.59	0.56	0.58	0.57	0.54	0.53	0.51	0.58	0.58	0.58
4. Other sectors*	11.53	8.08	6.85	7.33	7.69	11.99	12.20	11.59	11.66	11.56	10.78	11.76	11.44	11.08
B. Fugitive emissions from fuels	13.05	12.57	11.46	10.96	10.71	10.43	10.05	9.38	9.00	8.58	7.94	7.70	8.03	6.28
2. Oil and natural gas	13.05	12.57	11.46	10.96	10.,71	10.43	10.05	9.38	9.00	8.58	7.94	7.70	8.03	6.28
4. Agriculture	111.27	107.10	88.77	54.60	45.78	44.64	41.86	39.19	35.86	31.35	30.60	32.07	32.31	31.20
A. Enteric fermentation	97.96	94.63	79.27	48.88	40.60	39.32	37.09	34.72	31.67	27.52	26.88	28.08	28.20	27.20
B. Manure management	13.31	12.47	9.50	5.72	5.17	5.32	4.77	4.47	4.19	3.83	3.73	3.99	4.11	4.01
5. Land-use, land-use change and forestry	2.75	3.27	2.98	3.54	4.26	5.12	5.03	6.64	7.46	7.96	4.91	NA/NO	NA/NO	NA/NO
6. Waste	36.46	37.46	37.91	34.00	34.75	40.29	41.01	42.40	45.65	47.15	49.00	51.36	50.11	40.86
A. Solid waste disposal on land	19.93	21.18	22.49	23.73	24.88	30.66	31.50	32.94	36.17	37.82	39.58	41.76	40.92	31.63
B. Wastewater handling	16.52	16.28	15.42	10.28	9.88	9.63	9.51	9.46	9.47	9.33	9.42	9.60	9.19	9.22
CH_4 emissions, total	176.42	169.46	148.87	111.47	104.35	113.61	111.41	110.48	110.84	107.74	104.31	104.06	103.11	90.69

** agriculture, forestry, fishing, households, trade/service*

Table 3.2
Source: Latvian Environment, geology and meteorology agency

3.2.1 Energy (1A,B)

The main source of CH_4 emissions in the energy sector is the combustion of fuelwood in the household sector, constituting 74% of the total emissions from fuel combustion. CH_4 forms as a result of incomplete combustion of hydrocarbons contained in the fuel. Such conditions mostly arise in small ovens used by residents, central heating furnaces and also from burning fuel outdoors.

Since 2001, data on methane leakage has been obtained from JSC "Latvijas Gaze"; calculations are made by the company on the basis of methodology, developed for the whole natural gas supply system, containing Incukalns underground gas depository, transport and distribution network and also the consumer-side internal systems. The methodology has been developed by the company and is based on international methodologies. JSC "Latvijas Gaze" has also reported an estimation of methane emissions into the environment in the period 1990 – 2000, based on current assessment considering that emissions data for this period are not available.

3.2.2 Agriculture (4A,B)

CH_4 is produced in herbivores as a by-product of normal enteric fermentation and constitutes 87% of the total emissions from agriculture sector and is also formed in decomposition of livestock manure in anaerobic conditions. Figures in Table 3.2 demonstrate a decrease in methane emissions from the agriculture sector, the main reason for the reduction being a decrease in the number of livestock and poultry.

3.2.3 Land-use, land-use change and forestry (5B)

CH_4 emissions in this sector originate from the on-site burning of wood residues from wood felling. As of 1995, emissions are increasing corresponding to an increase in felling volumes. For more detailed information, see Chapter 3.4.4.

3.2.4 Waste (6A)

CH_4 is produced in municipal waste landfills from the decomposition in anaerobic conditions of the biodegradable fraction of waste. GHG emissions in the waste sector have increased by 37% in 2002, compared to 1990, due to the increase in municipal waste amount. The waste sector accounted for 9% of the total GHG emissions in 2003. Ccompared to 2002, CH_4 emissions have decreased by 18% in 2003. This can be explained with the increase of waste sorting and processing amounts.

Since 2002, data on municipal and hazardous waste are obtained from annual statistical reports "No. 3-Waste".

It should be noted that in Latvia wastewater from the industrial and household sector is not accounted for separately. The amount of household wastewater is calculated using data on the size of population. In order to calculate methane emissions from industrial wastewater, only methane emissions from local industrial wastewater treatment facilities is considered; this amount is estimated from the amount of industrial production output.

3.3 N_2O emissions

The total N_2O emissions have decreased by 61%, compared to 1990 (Figure 3.4 and Table 3.3). The key source of N_2O emissions is agricultural land, accounting for 71% of N_2O emissions in 2003. Other N_2O emission sources are transport, incineration of biomass in the sectors of household, trade and other, as well as waste and wastewater handling.

N_2O emissions in 1990 – 2003, Gg

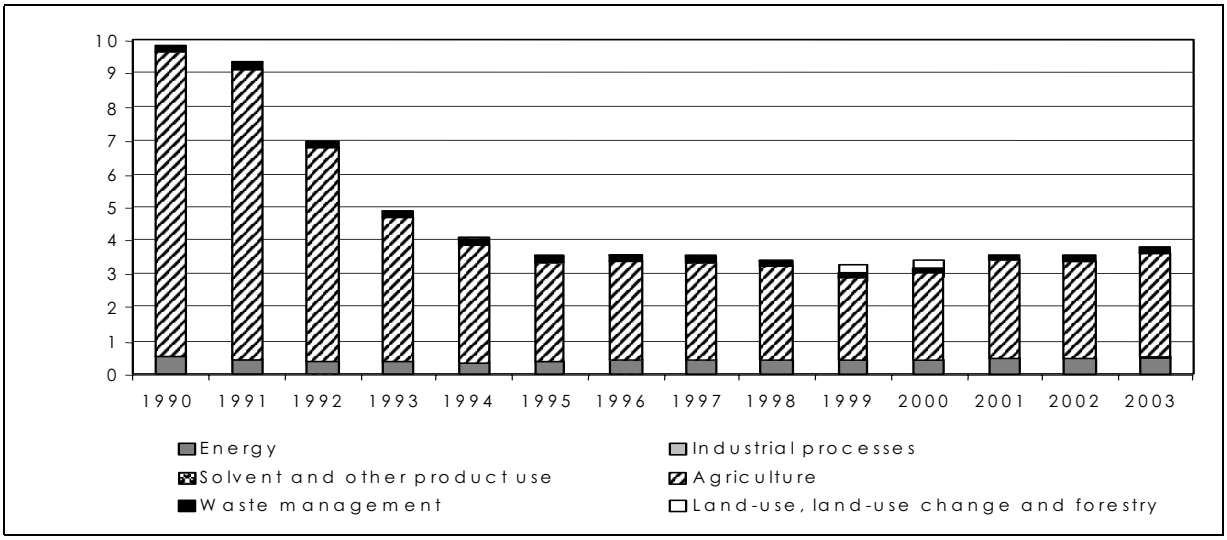

Figure 3.4
Source: Latvian Environment, geology and meteorology agency

Total N_2O emissions in 1990 – 2003, Gg

GHG source and sink categories	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1. Energy	0.54	0.47	0.38	0.36	0.31	0.38	0.42	0.44	0.44	0.42	0.41	0.47	0.49	0.51
A. Fuel combustion	0.54	0.47	0.38	0.36	0.31	0.38	0.42	0.44	0.44	0.42	0.41	0.47	0.49	0.51
1. Energy industries	0.08	0.07	0.07	0.06	0.07	0.06	0.07	0.07	0.06	0.06	0.05	0.05	0.06	0.06
2. Manufacturing industries and construction	0.06	0.05	0.02	0.02	0.03	0.02	0.03	0.04	0.04	0.04	0.02	0.03	0.04	0.04
3. Transport	0.26	0.24	0.20	0.19	0.13	0.15	0.17	0.18	0.19	0.18	0.19	0.24	0.25	0.26
4. Other sectors*	0.14	0.10	0.10	0.09	0.09	0.15	0.15	0.15	0.15	0.15	0.14	0.15	0.15	0.15
3. Solvent and other product use	NO/ NE	NO/ NE	NO/ NE	NO/ NE	NO/ NE	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.02	0.02
D. Other**	NO/ NE	NO/ NE	NO/ NE	NO/ NE	NO/ NE	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.02	0.02
4. Agriculture	9.11	8.69	6.43	4.35	3.58	2.96	2.96	2.91	2.78	2.46	2.61	2.96	2.89	3.12
B. Organic manure use	0.97	0.96	0.90	0.67	0.58	0.58	0.54	0.51	0.46	0.41	0.40	0.42	0.43	0.42
D. Agricultural land	8.14	7.73	5.52	3.67	2.99	2.38	2.41	2.40	2.31	2.05	2.21	2.53	2.46	2.70
5. Land-use, land-use change and forestry	0.02	0.02	0.02	0.02	0.03	0.04	0.03	0.05	0.05	0.05	0.03	NA/NO	NA/NO	NA/NO
B. Forest and grassland conversion	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.03	NA/NO	NA/NO	NA/NO
6. Waste	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16
B. Wastewater handling	0.18	0.18	0.18	0.18	0.18	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16
N_2O emissions, total	9.85	9.37	7.01	4.90	4.09	3.56	3.60	3.58	3.45	3.11	3.22	3.62	3.56	3.80

** agriculture, forestry, fishing, households, trade/service*
*** use of N_2O in anaesthesia*

Table 3.3
Source: Latvian Environment, geology and meteorology agency

3.3.1 Energy (1A, B)

In the energy sector, the key N_2O emission sources are transport and the incineration of biomass fuel in the energy transformation, industrial and other sectors (trade, household, agriculture and forestry) (Table 3.3).

3.3.2 Solvent and other product use (3)

The only source of GHG emissions in this sector is N_2O, also known as laughing gas, used in anaesthesia. Emissions from this sector are covered as of 1995 (Table 3.3).

3.3.3 Agriculture (4B, D)

In Latvia, N_2O emissions in the agriculture sector are estimated from agricultural land, contributing the majority (87%) of emissions in this sector, and from organic fertiliser use. A comparison of N_2O emissions in the agriculture sector in 2000 and 2003 demonstrates an increase (Table 3.3), mainly because of an increased use of mineral fertilizers.

Expert assessments of the distribution of the types of manure storage systems used and the amount of cultivated organic soils, as well as the amount of nitrogen produced by one domestic animal per year (kg) have been used in emissions calculations.

3.3.4 Land-use, land-use change and forestry (5B)

CH_4 emissions in this sector originate from the on-site burning of wood residues from wood felling. As of 1995, emissions are increasing corresponding to an increase in felling volumes. For more detailed information, see Chapter 3.4.4.

On-site burning of wood felling residues creates N_2O emissions as well (for more detail, see Chapter 3.4.4). As of 1995, N_2O emissions have increased (Table 3.3); an explaination for this is the growth of felling volumes, as a result of which the amount of wood residues for burning have increased as well. After 2000, emissions from burning of wood felling residues were not estimated, based on information provided by experts that they were used for further processing or left on-site.

3.3.5 Waste (6B)

A small amount of N_2O emissions is produced when sewage wastewater enters water bodies. For the calculation, the annual protein consumption 0.11 kg per capita per day or 40.15 kg per capita per annum is used, which is derived from the results of a survey carried out in 1991. Estimated emissions are summarised in Table 3.3.

3.4 Indirect GHG and SO_2 emissions

As mentioned above, the indirect GHG emissions of nitrous oxides (NO_x), carbon monoxide (CO) and non-methane volatile organic compounds (NMVOC) are estimated as well. Sulphur dioxide (SO_2) is not a GHG, however, as it contributes to the formation of sulphate aerosols in the atmosphere, it has the potential to affect the climate. In Figure 3.5, the amount of indirect GHG and SO_2 emissions is presented for the period 1990 – 2003.

Indirect GHG and SO_2 emissions in 1990 – 2003, Gg

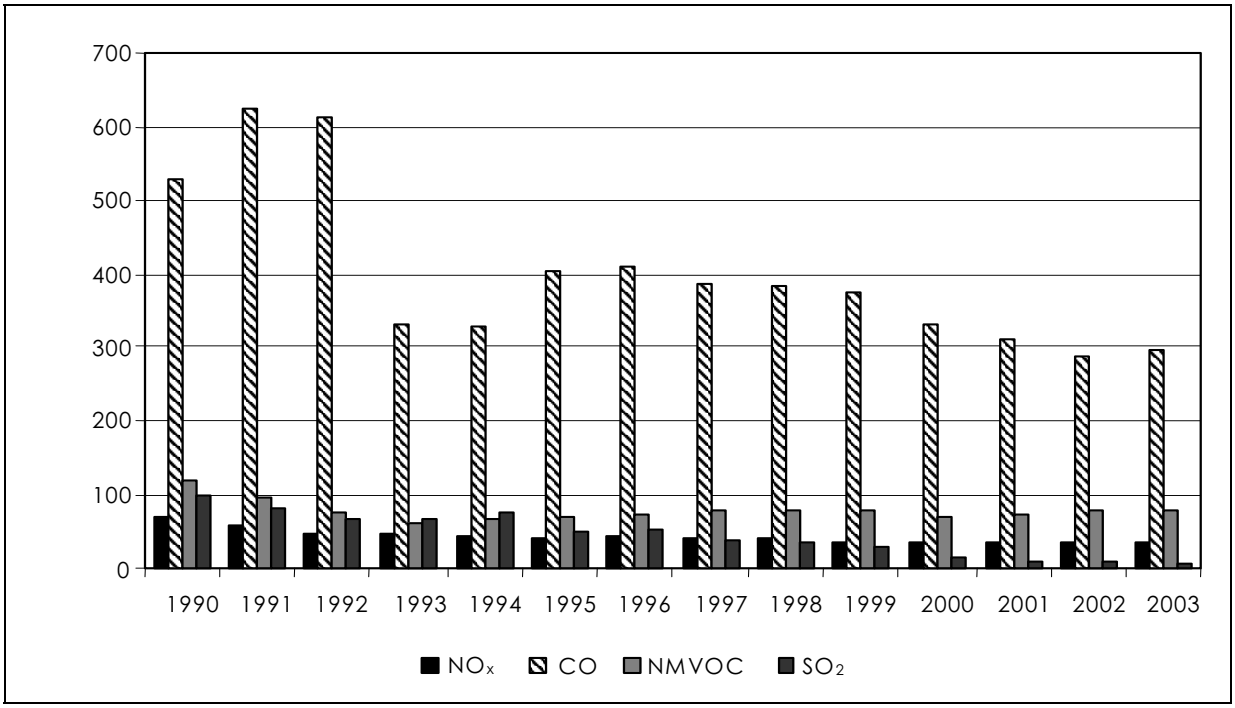

Figure 3.5
Source: Latvian Environment, geology and meteorology agency

Amount of indirect GHG and SO_2 emissions by sector in the time period 1990 – 2003 is included in Annex 4. Detailed information on indirect GHG and SO_2 emissions in each sector is provided in the following chapters.

3.4.1 Energy (1A, B)

The energy sector was the key source of indirect GHG and SO_2 emissions in 2003. Transport emitted 57.7% of all NO_x and 26.5% of CO emissions. In the estimation of leakage of volatile organic compounds from from oil products, only the losses of petrol in the distribution and consumption process is registered – in this sector NMVOC emissions accounted for 0.6% of all emissions from the energy sector (including transport). Energy sector was the largest source of SO_2 emissions contributing 98% of the total amount.

3.4.2 Industrial processes (2A, C, D)

In 2003, 9.24 Gg of NMVOC emissions (11.6% of the total emissions in the industry sector) occurred in the industry sector, of which the food industry accounted for 53,6%, emissions of the road paving with asphalt – 46.2% and steel production – 0.2% of these emissions. Compared to the previous years, fluctuations have been observed in NMVOC emissions that could be explained with fluctuations of the production levels in the country, directly affecting the level of emissions from industrial processes.

3.4.3 Solvent and other product use (3)

In 2003, 44% of the total NMVOC emissions were created by the use of solvents and other products, of which varnish and paint accounted for 74%, solvents used in households 12%, the remainder – from the production of glue, graphics and printing works, industrial painting and cleaning. Rapid emission growth is evident in this sector, compared to previous years, caused by the development of construction and improvements in macroeconomic indicators.

3.4.4 Land-use, land-use change and forestry (5B)

CH_4, N_2O, CO and NO_x emissions are calculated on the basis of the amount of wood residues from wood felling burnt on-site, using an equation by specified an expert. It is assumed that in the time period 1990 – 1999, 50% of the residues are incinerated and the remaining 50% are left on-site. In 2000, 30% of the felling residues are burnt and 70% are left on-site. 2/3 of the incinerated amount are burnt on-site and the the remaining part is burnt as fuelwood.

NO_x and CO emissions in the land-use, land-use change and forestry sector are presented in Table 3.4.

NO_x and CO emissions in the land-use, land-use change and forestry sector in 1990 – 2000, Gg

Emissions	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
NO_x	0.68	0.81	0.74	0.88	1.06	1.27	1.25	1.65	1.85	1.98	1.22
CO	24.09	28.58	26.11	30.99	37.30	44.83	44.03	58.09	65.29	69.66	42.97

Table 3.4
Source: Latvian Environment, geology and meteorology agency

Table 3.4 shows that indirect GHG emissions increase starting from 1995; that is explained by the growth of wood felling volumes.

3.5 GHG emissions expressed in aggregated form

CO_2, CH_4, N_2O and HFCs, SF_6 emissions are given in aggregated form in CO_2 equivalents, considering their global warning potential values for a 100-year period (1, 21 and 310 respectively) and presented in Figure 3.6.

Aggregate GHG emissions in 1990 – 2003, Gg CO_2 eq.

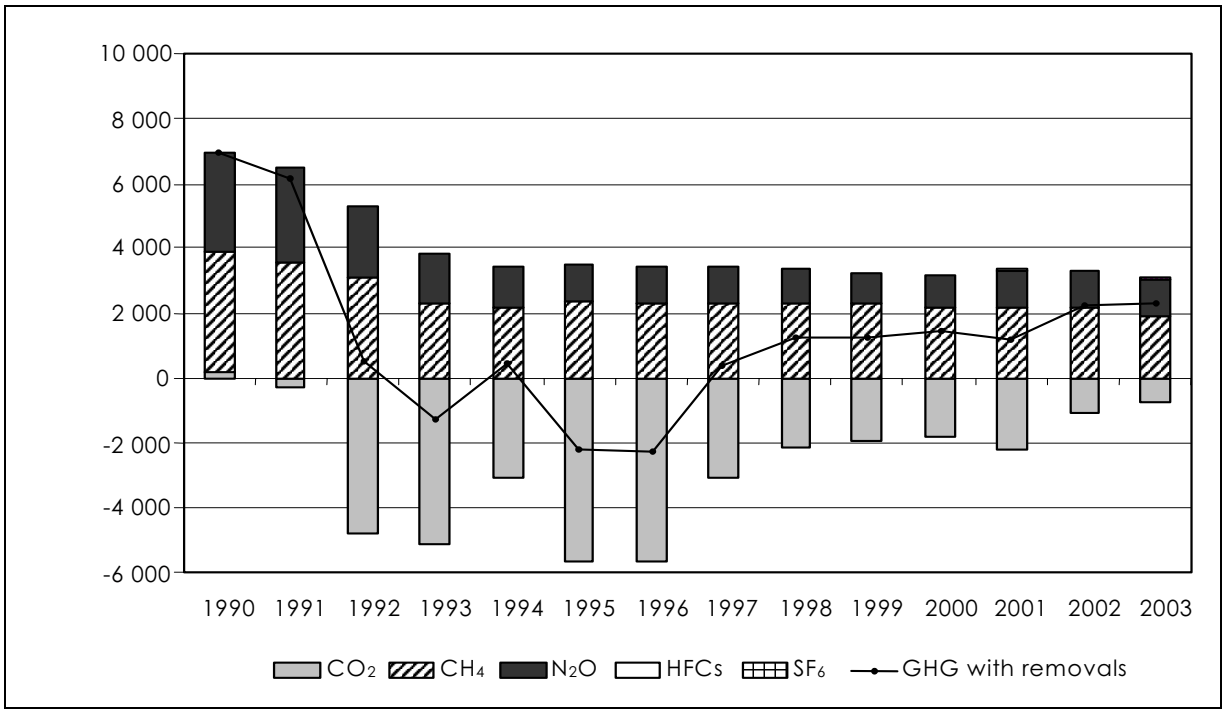

Figure 3.6
Source: Latvian Environment, geology and meteorology agency

From 2001, the total aggregated amount of GHG emissions has a decreasing trend. It is mainly related to the decrease in CO_2 and CH_4 emissions (by 35%), whereas N_2O, HFCs and

SF_6 emissions have increased by 5%, 25% and 55% respectively. It means that the distribution of direct GHG emissions has changed as well (Table 3.5 and Figure 3.7).

Share of different sectors in the aggregate GHG emissions in 1990 – 2003, %

Year	GHG emissions, Gg CO_2 eq.	Energy (including transport)	Industrial processes	Solvent and other product use	Agriculture	Waste
1990	25,414.02	73.80	1.98	0.41	20.3	3.23
1991	23,633.30	73.32	1.48	0.38	20.92	3.57
1992	18,605.08	73.17	0.86	0.28	20.72	4.58
1993	15,755.24	78.11	0.37	0.28	15.82	4.88
1994	14,910.70	78.43	1.34	0.41	13.88	5.26
1995	12,453.26	75.06	1.36	0.51	14.88	7.22
1996	12,613.30	75.59	1.44	0.55	14.23	7.25
1997	12,176.25	74.44	1.68	0.70	14.15	7.74
1998	11,532.40	73.11	1.84	0.78	13.99	8.76
1999	10,648.33	71.86	2.34	0.89	13.34	9.82
2000	10,053.54	70.81	1.97	0.85	14.42	10.79
2001	10,732.43	71.55	2.05	0.93	14.81	10.64
2002	10,620.55	71.19	2.23	1.02	14.81	10.73
2003	10,528.82	72.24	2.35	1.09	15.41	8.89

Table 3.5
Source: Latvian Environment, geology and meteorology agency

Considering the sectoral structure of GHG emissions, it can be concluded that for the period 1990 – 2003 the share of the energy sector has decreased by 1.56 percentage points and the share of the agriculture sector – by 4.89 percentage points, whereas the share of the waste sector has increased by 5.66 percentage points. Emissions from industrial processes and solvent and other product use remained comparatively very low, although they had fluctuated sharply over this period.

Sectoral distribution of aggregate GHG emissions in 1990 – 2003, Gg CO_2 eq.

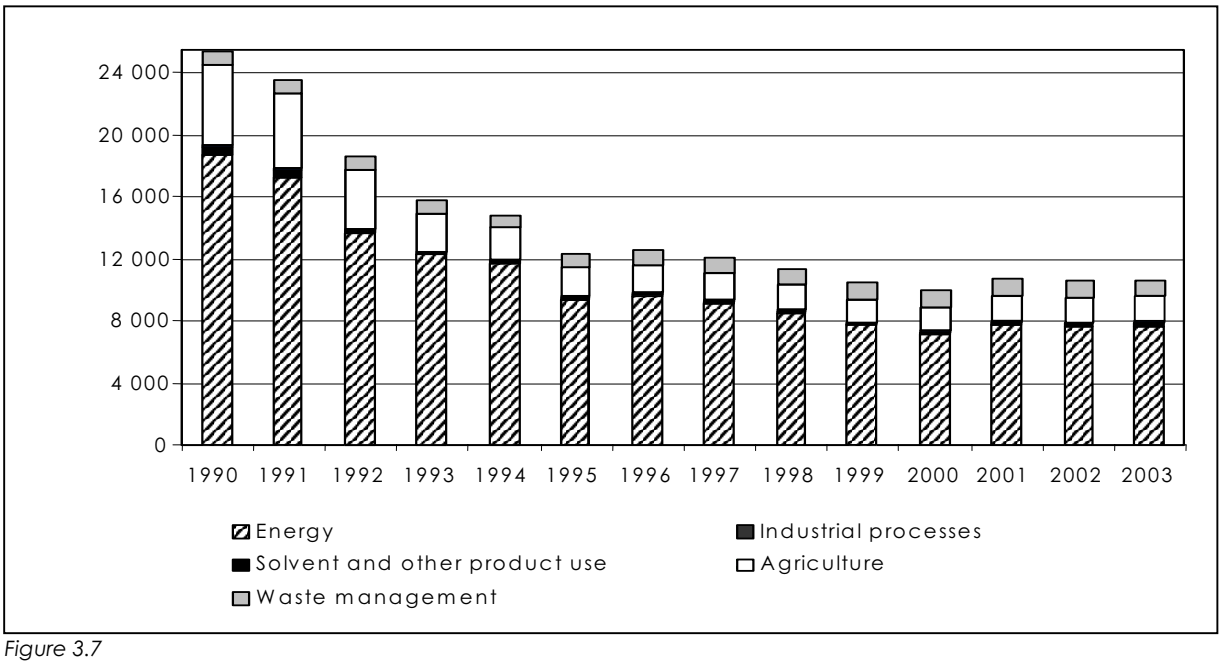

Figure 3.7
Source: Latvian Environment, geology and meteorology agency

4. POLICIES AND MEASURES TO LIMIT AND REDUCE GREENHOUSE GAS EMISSIONS AND INCREASE CO_2 REMOVALS

The climate change mitigation policy in Latvia is gaining higher priority in line with the common policy and concerns about climate change in the world and the European Union. The latest document on the climate change mitigation policy is the "Climate Change Mitigation Programme for 2005 – 2010". The primary goal of this programme – to ensure that starting with 2008, the total amount of GHG emissions does not exceed 92% of 1990 level – is to be achieved by implementing activities in the following climate change policy areas:

1) increase the share of renewable energy sources in the energy balance;
2) increase efficient and rational use of energy resources;
3) develop an environmentally friendly transport system;
4) promote the implementation of the best available techniques, environmentally friendly technologies and cleaner production;
5) promote the implementation of environmentally sound agricultural methods that reduce direct GHG emissions;
6) increase CO_2 removals in forestry;
7) establish an up-to-date municipal waste management system;
8) participate in the EU emission allowance trading scheme and the Kyoto Protocol flexibility mechanisms;
9) promote the implementation of environmental management systems and the inclusion of environmental considerations in consumer decisions.

A description of measures and activities to be implemented in each sector in order to realise the outlined policy, along with a description of policy instruments to be used, is provided in the following chapters

Many EU-level legal acts have been adopted within the climate change policy of the EU; their requirements are binding for Latvia as well. Climate change policy in Latvia is based on EU climate policy. Majority of the policy instruments and measures implemented in Latvia are similar to those of other EU countries. Appendix 2 contains a summary of measures implemented in Latvia to enforce the EU climate change mitigation policy. This appendix contains information on the transposition status of requirements stated in EU legal acts and policy planning documents, and the anticipated impact of the policy and measures on the reduction of GHG emissions.

4.1 Review of policies and measures

In the following subchapters a description of policies and the most important measures to reduce GHG emissions or increase CO_2 removals are provided. The policies and measures are grouped according to the division of the national economy sectors as defined in the IPCC Common reporting format, providing a short description of the sector relevant to GHG emissions, references to the main legislative acts and policy planning documents, as well as listing the targets to be achieved and the policy instruments used. A summary of the policies and measures is enclosed in the Appendix 1.

4.1.1 Policies and measures for the reduction of CO_2 emissions

In 2003, energy sector accounted for 95% of the total amount of CO_2 emissions (including energy generation and transmission – 33%, industrial processes and construction – 13%, transport – 35%), industrial processes – 3%, solvent and other product use – 1.5%, waste – 0.5%.

Energy, including transport

According to the IPCC Common reporting format, GHG emissions from fuel consumption in all sectors of the national economy (power and thermal energy generation, processing and mining industry, construction, transport, agriculture, households, trading, public services) and volatile emissions of fuel are estimated in the energy sector. As the energy sector has the most significant share in the total amount of GHG emissions (above 70% and projections demonstrate that the share of emissions from the sector will approach 80% in 2020), the reduction of GHG emissions in this sector, particularly in the production and transmission of electricity and thermal energy, industry and transport sectors, is the most important objective of the climate change mitigation policy.

The development of the energy sector is guided, using the mechanisms that are transposed into the "Energy Law", "Law on Excise Tax" and "Natural Resources Tax Law" and in several policy planning documents – in the plan "Energy Policy in the Power Sector" (2001), "State Energy Efficiency Strategy" (2000), etc. In 2005, it is planned to elaborate aStrategy on Renewable Energy Sources.

Policy: Increase the share of renewable energy sources in the energy balance

In 2003, the share of renewable energy sources in the primary energy balance in Latvia was 34.2%. Since 1990, the consumption of local renewable energy resources in Latvia has increased from 44 PJ (in 1990) to 69 PJ (in 2004) and the largest contribution was made by wood.

Pursuant to the "Energy Law", the Cabinet of Ministers (CM) with the help of special regulations annually determines the total amount of newly installed capacity and the share of each kind of power generation, if renewable energy resources are used for the production of electricity. The purchase prices of electricity (feed-in tariffs) differ and are defined in different levels of legislation.

Measure: Promotion of biomass use

The share of biomass in the primary energy balance is around 29% (consumption – 12.5 PJ, potential – 9 million m^3 or 63 PJ per year).

In Latvia, agricultural land takes up 38.3% of the total area, thus there is a great potential to use straw for power generation. Currently, there is one boiler house in Latvia, financially supported by the Danish Energy Agency where straw is used as fuel. 20 TJ of thermal energy is generated there annually, using 1.3 thousand tons of straw[18].

In order to promote and at the same time regulate the use of other renewable energy resources obtained from biomass, CM regulations on bio-oils are developed in 2005 according to the "Law on Biofuel".

Environmental Investment Fund (EIF) has invested more than 2 million LVL in renewable energy source projects by 2004 (six small hydropower plants, one wind turbine and 17 biomass incineration projects were financed).

Over the time period 2001 – 2004, a fuel-switch project financed by the UN Development Programme and Global Environment Fund was carried out in heat supply companies owned by municipalities, replacing imported fuel (heavy fuel oil, coal, natural gas) with local renewable energy resources – wood residues or other biomass. Many fuel-switch projects are related to the introduction of restrictions regarding the sulphur content of fuels. In addition to the installation of heat nodes and heat measuring equipment, repairs of heat mains, introduction of automatic heat consumption registration, as well as other technical

[18] Source: Baltic Environmental Forum, "Renewable energy sources in Estonia, Latvia and Lithuania: strategy and policy targets, current experiences and future perspectives", 2003, Riga

improvements and informative measures, also reconstruction of boiler houses and replacement of boilers were carried out at the municipalities.

Information on the possible funding sources for such projects and other measures described henceforth, is summarised in the Table 4.2.

Measure: Promotion of biogas use

For energy generation it is possible to use biogas originating in the decomposition processes of organic substances in waste management (also in wastewater treatment plants), agriculture, public catering and food processing. In Latvia, the amount of biomass, from which it would be possible to obtain biogas, in 2004 comprised: manure – 5.8 million t, biodegradable municipal waste – 400 thousand t, animal origin waste – 34 thousand t, wastewater sludge – 180 thousand t (36 thousand t dry-weight), as well as waste from public catering and food processing.

Currently, three biogas cogeneration plants are operational in Latvia with the total production capacity of 7.5 MW. The potential of biogas is estimated to be 121 million m^3 per year, of which 2 PJ of energy could be obtained per year.

The "Energy Law" states that electricity that is produced in installations with capacity not exceeding 7 MW, using municipal waste or its by-products (biogas) and starting operation prior to 1 January 2008, for eight years from the beginning of operation of the installation is purchased for a price corresponding to the average tariff of electricity sale.

In 2005, the draft "Biogas Generation and Development Programme" was elaborated and it is planned to start the implementation of a pilot project to generate and use biogas from by-products of animal breeding in 2006.

Measure: Support for energy generation in small hydropower plants (HPP)

Since the beginning of 1990s, active renovation of small hydropower plants of regional importance, as well as manufacturing of equipment for the needs of small hydropower plants has started in Latvia. In 2003, the total installed capacity of 150 small hydropower plants was 26.2 MW. The potential of the small hydropower plants is estimated to be 0.18 PJ. In May 2004, 148 small hydropower plants were operational in Latvia, generating 1.24% of the electricity produced in Latvia[19].

It should be noted that some problems still exist with the construction of small hydropower plants, on the one hand, and requirements to preserve fish resources and nature conservation, on the other hand. Restrictions to build hydropower plants and other mechanic obstacles on particular rivers or parts of rivers according to the "Fishery Law" are defined in the Regulations of the Cabinet of Ministers No. 27 "Regulations on Rivers (Parts of Rivers) where Building and Restoration of Hydropower Plant Dams and Building of any Artificial Dams is Prohibited for Fish Conservation Purposes" (15.01.2002).

The support for small hydropower plants is defined in the "Energy Law", according to which, electricity from small hydropower plants with capacity not exceeding 2 MW, which have started operation prior to 1 January 2003, for eight years from the beginning of operation of the power plant is purchased for a price corresponding to double of the average tariff of electricity sale. After this period, the Public Utilities Commission determines the purchase price.

Measure: Support for wind power production

Currently, the use of wind energy for power generation in Latvia is carried out on a small scale. In Latvia's energy balance, the share of wind energy has increased from 0.06% in 2001

[19] Source: Latvian Environment Agency, "Evaluation of resource consumption", 2004

to 0.84% in 2003 (48 GW, installed capacity 27 MW). Experts believe that the theoretic potential of wind energy in Latvia fluctuates between 0.6 and 4.6 PJ[20] per annum. However, in some areas where the construction of wind turbines would be technically feasible, various laws restricting economic activities are in force, thus the theoretic potential is reduced by approximately 20%.

In order to proceed to develop a co-ordinated use of wind energy, it is necessary to gather and disseminate information about the territories where both the climate and geographic conditions are favourable, the use of wind energy is economically feasible for power generation and laws do not restrict economic activities.

Pursuant to the "Electricity Market Law", in 2005 the Regulations of CM No. 250 "Regulations on the total amount of capacity for installation in 2005 and specific amount for each type of electricity generation, if renewable energy resources are used for electricity generation" were adopted, and it is planned to develop regulations on the establishment of wind farms, regulating environmental requirements, procedure for connection to the grid and technical requirements.

Measure: Promotion of solar energy use

Provisions for the use of solar energy in Latvia are contained in the "Electricity Market Law" (2005). Research on a new type of solar collectors with high heat conductivity are carried out in Latvia, and experimental and industrial solar collectors for obtaining hot water are being developed. Scientists have developed and already tested combined systems of solar collectors operating together with photovoltaic (PV) cells. Several types of combined systems have been developed to use solar energy together with traditional energy resources (gas, liquid fuel or electricity).

In Latvia, solar energy for heating is used on sites in Aizkraukle, Bauska and Iecava; solar energy for electricity production is currently not used. The same electricity purchase regulations apply to electricity producers using solar energy, as those using wood.

To facilitate the development of projects for solar energy use, it is necessary to disseminate the positive experience obtained during the implementation of pilot projects, as well as to collect and disseminate information about the potential sites where the use of solar energy would be feasible and develop mechanisms/instruments for the support of such projects.

Measure: Support for biofuel production and promotion of biofuel use

Pursuant to the Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport, by 31 December 2010 2% of the total consumption of petrol and diesel (in energy units) in the transport sector in Latvia has to be covered by biofuels, by 2020 the share of biofuels has to reach 5.75%. To achieve these goals, it would be necessary to produce and use at least 20 thousand tons of biofuel already in 2005 and at least 75 thousand tons in 2010, or this amount of biofuel has to be imported[21]. The Cabinet of Ministers has declared that agricultural raw materials produced in Latvia should be given the priority in the production of biofuel and the biofuel produced in Latvia should be given the priority in the use of biofuel.

The production and use of biofuel in Latvia up to 2010 is planned according to the programme "Production and Use of Biofuel in Latvia (2003 – 2010)". The promotion of the use of biodiesel fuel in diesel engines, in the amount of 40% of the total consumption of diesel fuel used in agriculture, is stated as one of the priorities in this document. Measures to realise the priorities stated in the programme are described in the Action plan for the implementation of the programme, "The Law on Biofuel" and "The Programme of Agricultural Development for 2003".

[20] Source: PHARE, "Programme for renewable energy resources. Final Report", 2000
[21] Source: "Action plan for the Programme,"Prodution and use of biofuel in Latvia"", 2004

Currently, two biofuel production units are operating in Latvia - each with a capacity of 2500t biodiesel fuel per year. Although the current levels of consumption of biofuel are very low, they are increasing rapidly: in comparison to 2004, when 59t of biodiesel fuel were produced, 36t were consumed and 768t of bioethanol were added to petrol, in 2005, already 629t of biodiesel fuel were produced, 747t – were consumed, however the consumption of bioethanol in petrol had decreased to 180t.

Since 2005, the state provides direct support to biofuel manufacturers. Every year financially supported allowances for biodiesel fuel and bio-ethanol are determined. In 2005, the allowance was 11.4 million litres of bio-ethanol and 12.5 million litres of biodiesel. The amount of direct support was 170 LVL for 1000 litres of produced biodiesel and 140 LVL for 1000 litres of produced bio-ethanol in 2005.

In 2005, the Regulations of the Cabinet of Ministers No. 712 of 13 September 2005 "The Order for allocation of state support for the production of minimal annual amount of biofuel and for determination of financially supported allowance for biofuel" and the Regulations of the Cabinet of Ministers No. 498 of 5 July. 2005 "The Order of Administration of turnover of fuel containing bio-products and the respective excise tax" were adopted.

Policy: Increase efficient and rational use of energy resources

Latvia has ratified the European Energy Charter, which stresses that improvements in energy-efficiency refer to all stages of the energy cycle, including the consumption of energy. In the area of energy audit, the two most significant EU directives are the Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE) and the Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.

To promote energy performance measures, the National Energy Efficiency Strategy has been developed and approved in 2000, the aim of which is to determine a set of energy efficiency measures to reduce the primary energy consumption in Latvia by 25% per unit of GDP by the year 2010. In order to implement the requirements of the European directives, in 2004 the Ministry of Economics prepared the draft Concept "On Implementation of the Directives of the European Council to Improve Energy Performance of Buildings"

Measure: Support for the construction of combined heat and power generation plants and energy efficiency projects

Cogeneration plants allow simultaneous production of thermal energy and electricity, thus the fuel is used more efficiently (by 20–30% compared to production of thermal energy or electricity only) and urban ecological problems can be solved by closing the small, inefficient boiler houses that operate without flue gas treatment. The amount of thermal energy produced by cogeneration (in general and enterprise cogeneration plants) is increasing every year: 23% in 1990, 34% in 1995, 45% in 2003 and 48% in 2004[22].

If at least 75% of the power in the cogeneration plant is produced from renewable energy resources, then electricity is purchased for special tariffs depending on the installed capacity of the plant (less than 0.5 MW, 0.5–4 MW, higher than 4 MW – the price is determined by the Public Utilities Commission). These tariffs do not apply to the cogeneration plants that have received their licences before 16 January 2001. Currently, 36 cogeneration plants with the total installed capacity of 590 MW are operational in Latvia.

[22] Source: Central Statistical Bureau of Latvia

Measure: Support for energy efficiency projects in thermal energy generation and transmission

23 projects to increase energy efficiency in energy generation and transmission have been implemented in Latvia in 2000 – 2003, including 19 environmentally friendly heat supply projects where biomass, biofuel or biogas is used instead of fossil fuel, thermal energy distribution systems have been renovated, and new boiler-houses have been constructed.

Implementation of these projects reduced GHG emissions considerably in the period from 2000 to 2003, with no adverse effect on the availability and quality of the service. Annual CO_2 emissions reduction after the completion of these projects is estimated to be 95 $GgCO_2$.

With the adoption of the Regulations of the Cabinet of Ministers No.125 "On restriction of sulphur content in certain types of liquid fuel" (02.03.2004), the use of high sulphur content fuel is forbidden as of 1 May 2004. The Ministry of Economics has developed a national programme "Improvement of Heat Supply Systems, Reducing the Sulphur Content of fuel" to attract funding from the EU structural funds to solve this problem. The support from the structural funds is available to the municipalities, businesses that provide public services, i.e., ensure the execution of the permanent functions of local authorities to organise public services to the residents and thermal energy users in the public sector pursuant to the "Law on Local Authorities" (1994).

The implementation of EU LIFE project (time period from 2004 to 2006) "Energy Certification in Construction pursuant to the Directive 2002/91/EC of 16 December 2002" has been started (total costs – 300 thousand LVL). In 2004, an energy performance project was implemented in Lielplatone elementary school, heat supply system reconstruction projects have been implemented in several local authorities (Cesvaine, Skaune, Vilaka, etc.).

Measure: Support for projects improving energy performance of buildings

Currently, a unified system is being developed in Latvia for the determination of the energy consumption of buildings. Application of energy consumption standards to new and existing buildings, that are being reconstructed. A building certification system is being developed (energy audit of the buildings). A national energy certification for buildings is anticipated to be implemented from 2006.

In the National Energy Efficiency Strategy, the improvement of energy performance in buildings is determined as one of the priorities. The implementation of energy audit is one of the most effective methods to increase energy performance in buildings. Experts have estimated that energy savings of 10–15% can easily be achieved, if the energy audit is actively implemented and the consumers are informed about the energy saving possibilities.

In 2004, the State Agency "Housing Agency" has carried out energy audit in 27 apartment buildings in Aizkraukle, Balvi, Bauska, Cesis, Daugavpils, Salacgriva, etc. within the long-term project "Housing Energy Performance".

With funding from the EU environmental financing programme LIFE III, two projects have been started: "Energy Labelling in Apartment Buildings" and "Development of Environmentally Friendly Ventilation Systems".

On 17 March 2003 the Ministry of Environment and the German Federal Ministry for Environment, Nature Protection and Nuclear Safety signed a co-operation agreement on the implementation of a joint environment protection pilot project "Initiative for the Reconstruction of Buildings to Save Energy".

The project is implemented jointly by the German Federal Ministry for Environment, Nature Protection and Nuclear Safety, German Development Bank (*Kreditanstalt für Wiederaufbau*), Ministry of Environment of the Republic of Latvia, Environmental Investment Fund and the Mortgage and Land Bank of Latvia. The project offers an opportunity to receive a loan for financing the complex heat insulation of apartment buildings with very favourable financial

conditions. The credit resources to implement the project constitute 5 million EUR. In October 2004, the renovation of the first five houses in Riga and Saldus was completed.

The loan can be obtained by local authorities, societies of apartment owners (co-operative societies of apartment owners, limited liability companies, etc.) and apartment owners as well (as a group of natural persons). Germany has agreed to extend the project implementation term and it will continue in 2005.

Improving the energy performance of buildings in Latvia has turned into a national scale activity. To implement it, the development of regulations is required in the area of energy audit and certification of buildings, thermal energy measurement, equipment standards etc. and state support is necessary to implement energy performance measures.

Policy: Develop environmentally-friendly transport system

GDP share of the transport sector has been increasing since 2000 – in 2003 it was 11.5%. The demand for transportation services currently mostly depends on the internal demand, 2/3, and 1/3 depends on the external demand (mainly transit services; in 2003 they represented a 22.5% share in the transport sector).

The main objectives and trends of the transport sector are defined by the following legislative acts and policy planning documents: National Programme of Transport Development for 2000 – 2006, the "Law On Excise Tax", "National Programme for Bicycle Transport" and "Programme for Bicycle Transport Development in Riga", "Riga Traffic Concept for 1999 – 2003", "Riga Environmental Strategy for 2000 – 2010". The most important policy planning projects are "Riga Development Plan for 2006 – 2018", "Riga Historical Centre Preservation and Development Plan" and "Riga Public Transportation System Concept for 2005 - 2018" which is part of the "Riga Traffic Concept for 2005 – 2018".

Measure: Optimisation of the traffic flow in cities

The number of vehicles in Latvia is increasing rapidly – in the previous ten years the number of vehicles on average increased by 4–6% annually[23]; as a result the pollution caused by transportation is also increasing. Therefore the issue of a long-term agreement on the priority of railroad for passenger transportation has become topical, although at the same time residents are not offered adequate transportation services with other modes of transport. To look for solutions to the problem, "National Order Concept on Passenger Traffic over the Railroad" was approved in 2005. In this document, the national policy for the following 10 years is defined to secure the implementation of the objectives set in the "Strategy for Public Transport Development, 2005–2014".

As of 1 May 2007 Latvia has to apply EU requirements for financing of the public transport that prohibit subsidies in this sector and require the compensation of loss incurred in passenger transportations, hence the issue of policies and investments on national and local level in this significant transportation system will have to be resolved.

The most important policy planning document in traffic improvement is "Riga Traffic Concept for 1999–2003" developed in 1999 and approved by the Riga City Council.

Optimisation of the traffic flow in cities has been approved as one of the measures eligible to receive financing from the EU Cohesion Fund (according to the Objective 1 Programme of the "Development Plan (Single Programming Document) for Latvia, 2004–2006").

[23] Source: Central Road Traffic Safety Department

Measure: Facilitation of public transport use in Riga

The overall objective of the "Riga Traffic Concept for 1999 – 2003" is providing convenient, safe and integrated public transportation system to passengers, determining the public transport as a priority over other means of transportation in the central streets of the city. The competitiveness of the public transport can be secured by the price and quality of the provided service – speed, safety, regularity, frequency and convenience. The public transport has to be environmentally and user friendly. Riga public transportation development project for 2005 – 2018 envisages the development of an integrated public transportation system, including further development of the electric transport network and introduction of low floor tram, integration of railroad transport in the common transportation network of the city, etc.

Further development of the electric public transportation network in Riga would reduce the amount of emissions of CO, CO_2, nitrogen oxides and volatile organic compounds by 15–20% in the city centre. The introduction of higher class buses will reduce harmful emissions into the atmosphere as well.

The implementation of the "Riga Traffic Concept for 1999 – 2003" has provided for the start of the renovation of the rolling-stock, development of the infrastructure of the stops and passenger transportation, though the public transport zones are not always marked on the streets and bridges. The modernisation and procurement of the transport rolling-stock has to be continued (for example, 155 million LVL are necessary for the modernisation of the tram system by 2018 and 47.54 million LVL are necessary to renovate the rolling-stock of trolleybuses), priority status of public transport must be established in the traffic stream, including at the street lights, and high quality well-maintained transport infrastructure (streets, bridges, traffic transmissions) is necessary[24].

Measure: Development of bicycle transport infrastructure

At present, the share of bicycle transport as a mode of transport in the city is insignificant. It is mainly used for recreation and sport purposes, as the current level of safety in the traffic flow is far from sufficient. The lack of popularity of bicycle transport in Latvia and Riga is determined by changing weather conditions, comparatively short season of use (May – October), lack of the necessary infrastructure (bikeways, bicycle stands, etc.), as well as ambiguous attitude of the community.

In 2000, the Ministry of Transport approved the National Development Programme of Bicycle Transport for 1999 – 2015, thus creating the basis for the development of the bicycle transport as an alternative mode of transport. In 2000, the Riga City developed and approved the Riga City Bicycle Transport Development Programme that is directly related to the "Development Plan of Riga City" and "Riga City Environmental Strategy". The development of bicycle transport infrastructure in Riga has begun: in 2001, the bikeway Imanta – Old Riga was built, several technical projects have been developed (Centre – Bergi, Centre – Vecmilgravis, in the planning phase: Vecmilgravis – Vecaki and preliminary investigation for Centrs – Darzini), however, the funding available for their implementation and completion is insufficient.

4.1.2 Policies and measures to reduce other GHG emissions

As CO_2 emissions comprised more than 90% of all emissions of the energy sector, they are separated but information on policy and measures for reduction of other GHG – CH_4, NO_2, CO, NO_X and NMVOC emissions is summarised in this chapter.

[25] Source: Draft "Riga public transport development concept, 2005 - 2018"

4.1.2.1 Industrial processes

According to the IPCC Common reporting format, in the industrial processes sector only emissions not related to fuel consumption are estimated, whereas emissions that originate from energy consumption in industrial enterprises are included in the energy sector (Chapter 4.1.1).

In the industry sector, GHG emissions decreased considerably at the beginning of 1990s due to the decline in output volumes and restructuring of the sector to compete in open market conditions. Currently, the production volumes are increasing.

The share of GHG emissions generated in industrial processes in the total GHG balance has been insignificant – around 2%, although it has an increasing trend. In 2003, the share was 2.4 %, of which 75.3% were accounted for in the production of mineral products, 17.8% – in the process of metal production and 6.9% – from fluorinated GHG use. Fluorinated GHG are not produced in Latvia and the emissions originating from the use of products containing these gases, are comparatively small. However, there is a considerable number of equipment units and products used and maintained in Latvia. Some of the information on industrial output volumes is of restricted access, therefore only the total amount of GHG emissions from the sector can be presented. The most important GHG emission sources in Latvia's industry are the production of cement and lime, steel, asphalt, chemical and pharmaceutical preparations.

Since the Law "On Pollution" (2001) entered into force, the environmental impact generated by industrial enterprises is regulated through the issuance of integrated pollution permits. Pursuant to this law, the best available techniques (BAT) and emission limit values are fully applicable to category A operations. The increasing stringency of environmental legislation to reduce environmental pollution stimulates enterprises to implement new, economically feasible high quality technologies and management systems – such as Good Manufacturing Practice (GMP), quality management systems ISO 9001 and ISO 14001.

Currently, the primary policy objective is to promote the implementation of the best available techniques and cleaner production methods in the industry sector.

Development trends of the industry sector are set in the following policy planning documents: "Strategy for the Development of Industry, 2004 – 2013", "National Concept on Innovations" and "National Programme of Innovations, 2003 – 2006".

Measures for the reduction of emissions from industry and prevent their increase with the growth of industry output volumes and construction of new industrial operations, can be divided into two groups: direct measures, carried out by industrial enterprises, and indirect measures to be carried out by state institutions, sector associations and non-governmental organisations. Actions to be carried out by the industrial enterprises are directly related to the improvement of technological processes, increasing production efficiency and reducing the amount of emissions (increase of the energy efficiency of technological processes and recycling of materials). The most appropriate measures are determined individually for each enterprise and to a great extent are related to the procedure for receiving category A and category B permits according to the provisions of the Law "On Pollution".

As CO_2 emissions in the production of mineral products and steel form as by-product and their amount depends on the chemical composition of raw materials, there are few economically feasible measures for the reduction of CO_2 emissions per unit of production. Therefore, the GHG emissions reduction policy in the industrial sector is focused on the improvement of general operational practice.

The following medium term development objectives have been set for the industrial sector: integration in the single market of the EU, sector productivity increase, growth of the share of innovative technologies in the industrial structure, increase of annual export volumes, the dominance of output growth over the rates of environmental pollution and consumption of resources.

Several legislative documents regulating the circulation of products and equipment containing fluorinated greenhouse gases have been adopted in Latvia. On 6 September 2005, the Cabinet of Ministers adopted regulations on the ozone layer depleting substances and fluorinated GHG that are used as refrigerants, thus laying down special restrictions (leakage control and prevention, licensing rules, procedure for the certification of specialists) for activities with the fluorinated GHG that are used as refrigerants. Up to now, information on the locations where fluorinated GHG are used, the amounts, labelling, recovery, recycling, destruction and emissions has been quite fragmented and based on individual research.

Policy: Promote the implementation of the best available techniques, environmentally firendly technologies and cleaner production

The implementation of BAT is closely linked to the permitting procedure for integrated pollution prevention and control. The concept of integrated permits appeared in Latvia's environmental protection legislation with the transposition of EU environmental legislation, specifically – the Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control. Thus a transition to an integrated permitting system has continued since 2001, where three categories – A, B and C, depending on the type and amount of polluting activities, are identified. Approximately 113 companies in Latvia fall under the scope of the directive on integrated pollution prevention and control (category A operations).

Integrated permits in Latvia are issued according to the provisions stated in the "Law On Pollution" (2001) and Regulations of the Cabinet of Ministers No. 294 of 9 July 2002 "On application of category A, B and C polluting activities and permitting of A and B polluting activities". They state that all A category operations have to receive integrated permits by 31 October 2007.

4.1.2.2 Solvent and other product use

Currently, there is no legislation in Latvia that would directly affect the reduction of GHG emissions in this sector. Existing legislation – "Law on chemical substances and chemical products" (1998) and the subordinate Regulations of the Cabinet of Ministers No. 466 of 22 October 2002 "Regulations on registration procedure and data base of chemical substances and chemical products", Regulations of the Cabinet of Ministers No. 340 of 6 August 2002 "Procedure for Import, Declaration and Risk Assessment of New Chemical Substances", Regulations of the Cabinet of Ministers of 12 March 2002 No. 117 "Regulations on Utilisation and Labelling Requirements for Equipment and Products Containing Certain Hazardous Chemical Substances and on the List of Environmentally Hazardous Goods" and also the "Law On Pollution" (2001) and the subordinate Regulations of the Cabinet of Ministers No. 319 of 23 July 2002 "Regulations on Inventory, Identification, Storage, Packing, Labelling and Registration of Shipments of Hazardous Waste", Regulations of the Cabinet of Ministers No. 726 "Environmental requirements for the chemical treatment (impregnation) of wood" and other regulations relating to activities with solvents and other products.

Considering the relatively insignificant share of GHG emissions from this sector in the total national GHG emissions, specific measures are not implemented and planned in this sector .

4.1.2.3 Agriculture

Although the share of agriculture in the GDP of Latvia is small (2.6% in 2002, 2.4% – 2003), it has a significant place in the national economy. In 2003, 104 thousand or 10.4% of total number of employed worked in this sector. About one third of Latvia's population lives in rural area.

In the period 1990 – 2003, the share of GHG emissions from agriculture in the total GHG emission balance decreased from 20% to 15%. Both economical crisis and reduced use of

mineral fertilizers contributed to that. In 2003, agriculture emitted 15.4% of the total GHG emissions in Latvia (including 35.2% from enteric fermentation processes of domestic animals, 13.3% from manure management and 51,5% from agricultural soils).

Currently, the basis of agricultural policy and strategy is set by the "Law on Agricultural and Rural Development" (2004) and several policy planning documents, such as "On Agricultural Development in Latvia's Rural Areas 2003 – 2006", "Biological Agriculture Development Program 2003 – 2006", "Action Program for Specially Sensitive Territories" and others.

Specific measures to reduce GHG emissions from agriculture have not been developed, however the implementation of general agricultural policy by carrying out activities to protect the environment will also promote the implementation of climate change mitigation policy.

Policy: Promote the implementation of environmentally sound agricultural methods that reduce direct GHG emissions

Measure: Improving and construction of manure storage facilities

In order to reduce nitrate emissions from agricultural activities, it is necessary to improve the existing manure storage facilities and construct new ones that conform with environmental protection requirements: the capacity of the storage facilities must be sufficient to ensure storage of collected manure corresponding to at least six months' operation for dung storages, and seven months – for storages of liquid manure.

Currently, the legal acts[25] in Latvia include measures and requirements that promote the reduction of GHG emissions, for example, requirements to improve manure management facilities and animal rearing farms with more than 10 livestock, in the other territory of Latvia within a ten year period, etc.

Measure: Sustainable use of agricultural resources

In accordance with the European Commission Regulation 1268/99 of 21 June 1999 on pre-accession measures for agriculture and rural development in the applicant countries of Central and Eastern Europe, as from December 2001, Latvia received EU support within the Special Assistance Programme for Agriculture and Rural Development (SAPARD). The funding provided through this programme in the period up to 2003 reached 72 million LVL. In the period 2001 – 2003, 1,785 project applications for receipt of SAPARD funding were approved.

Currently, applications for SAPARD funding are no longer registered, instead financing is available from the "Rural Development Plan" approved by the European Commission on 23 June 2004. The objective of the development of the plan is to ensure a co-ordinated, appropriate in the local circumstances use of national and EU co-financed financial support for the development of the Latvian rural area in the period 2004 – 2006, according to the requirements stated in EU and national legislation.

The following rural development activities can receive financing within the implementation framework of the "Development Plan (Single Programming Document) of Latvia for 2004 – 2006": Investment in agricultural companies, Promotion of the restructuring and development of rural areas, Local development initiatives ("LEADER +" type initiatives), Support to young farmers, Training, Improvement of processing and marketing of agricultural products, Forestry development.

In the second half of 2005, the government has provided from the Regional Fund more than 460 thousand LVL for the co-financing of projects in the "National Programme for Specially

[25] Regulations of the Cabinet of Ministers of 18 December 2001 No. 531 "On water and soil protection against pollution caused by nitrates from agricultural activities ", Regulations of the Cabinet of Ministers of 27 July 2004 No. 628 "Special environmental requirements for polluting activities in animal farms", Regulations of the Cabinet of Ministers of 27 July 2004 No. 626 "Regulations on methods for the detection of odours from polluting activities and on the order for limiting the spread of these odours"

Supported Territories" in order to promote activities in aimed at modernisation of agricultural equipment, development of biological agriculture, extension and establishment of production units, etc.

Measure: Development of environmentally friendly agriculture and promotion of Good Agricultural Practice

Good Agricultural Practice (GAP) covers the main sectors of agricultural activities that contribute to the pollution of water, air or soil, and provides advice for the prevention or reduction of pollution.

At the basis of the measures to reduce the emissions of ammonia, which are regulated by legal acts, is subordinated to the Law "On Pollution" Regulations of the Cabinet of Ministers No. 531 "On Water and Soil Protection Against Pollution Caused by Nitrates from Agricultural Activities" (18.12.2001.) and Regulation of the Cabinet of Ministers No. 484 "Statutes of the Council for Especially Sensitive Territories Management Coordination" (20.11.2001.). In order to fulfil the requirements of legislative acts in this field, Latvian agricultural and environmental protection specialists in cooperation with the specialists of Danish Agriculture Consultations Centre have developed "Good Agriculture Practise Conditions".

Measures that have the potential to reduce emissions of ammonia are mainly related to the use of progressive methods suggested by GAP, for livestock feeding (rationing and controlling the amount of proteins), using closed facilities for the storage of organic and mineral fertilisers, and correct application of fertilisers to the soil taking into account the weather conditions. With the increase of the level of direct payments in agriculture (using EU structural funds), the implementation of all these measures can be improved considerably, providing a reduction of ammonia emissions in the order of 20% of the current levels.

4.1.2.4 Land-use, land-use change and forestry

The long-term objectives and principles of the forestry development strategy are stated in the "Latvian Forest Policy", approved in 1998. The task of the forest policy is to balance community interests with the benefits of economic development, by creating favourable conditions for economic development and, at the same time, preserving the ecological value and the capacity of the forests to perform social functions. The main principles of sustainable forest management are analysed in several programmes and projects developed in recent years, including the National Program of Biological Diversity, and their implementation is stated by the "Law on Forests" and subordinate legal acts.

In order to protect the land and its resources from degrading human activities, restrictions on the use of land are set in the "Law On Protected Belts" (1997). Restrictions on economic and other types of activities according to the preservation and protection needs of nature values that are characteristic to the respective territories, are also stated in the "Law On Specially Protected Areas" (1993) and the subordinate Regulations of the Cabinet of Ministers. In order to secure sustainable development of the state, taking into account the particularities and opportunities and, at the same time, aiming to reduce the disadvantaging differences in different parts of the country, the "Law on Regional Development" and the "Law on Territory Planning" were adopted in 2002. The regional policy of Latvia for the next ten years will be guided by the "Strategy for Regional Policy" (2004).

The mechanism of direct payments in Latvia, according to the common policy to support the development of agriculture also in less favourable territories of the EU member states, is described in the "Concept on Agriculture Direct Support Payments in 2005" (2004).

In 2003, a number of research projects were carried out within the scope of the project "Formulation of Strategic Goals for Forestry Sector and Human Resources Development in Strategic Planning" as part of the "National Programme on Latvian Forests and Related Sectors".

Marshes, wetlands and lakes typical in Latvia, are as significant in climate stabilisation (preservation of hydrological regime) as forests. Accordingly, projects of large scale, financed by LIFE – Nature, are implemented in Latvia.

The comparatively unspoilt nature in Latvia is often mentioned as the most important national resource performing various functions. In order to secure the preservation of nature values, a system for the management of specially protected areas has been developed in Latvia. This system, incorporated in the *NATURA 2000* network, covers 12.24% of the territory of Latvia. The majority of the specially protected areas in Latvia, is covered by forests – 49% and agricultural lands – 24%, then water – 12%, marshes – 14% and other biotopes – 1%.

Policy: Increase CO_2 removals in forestry

The amount of emissions not related to changes in growing stocks of forest stands is comparatively small, therefore measures promoting CO_2 removals have the greatest significance in the climate change mitigation context: sustainable management of forest and forest land, increase of forest stand productivity and afforestation of unmanaged agricultural land. Thease measures coincide with the goals defined in "Forest Policy". Restrictions on conversion of forest land are also implemented. Experts believe that the implementation of these principles would provide for an increase of the share of forest land to 48–52% of the territory of Latvia within the next 20–25 years, correspondingly increasing CO_2 removals.

Measure: Increase of forest stand productivity

Increase of forest stand productivity is a measure to be implemented constantly. The primary objectives of this measure are of economic and ecological nature, however they promote the achievement of climate change mitigation goals as well. The state supports such measures both by providing co-financing in investment projects (tree nurseries, melioration within SAPARD programme) and funding from the Forest Development Fund for scientific research and various activities to raise public awareness and educate forest owners.

Measure: Afforestation of unmanaged agricultural land

Investment in land afforestation is a long-term measure with a long repayment period, therefore financial support is necessary to trigger the implementation of afforestation projects. The expected financial support available within the SAPARD Subprogramme 1.2 "Afforestation of Agricultural Lands", amounts to more than 6 million EUR and can be used to cover 50% of implemented project costs; this will facilitate the afforestation of approximately 4 thousand ha of land. As a result of the implementation of this measure for the development of rural environment and diversity, providing a considerable increase in the value of abandoned agricultural land and wood resources, 2,405.95 ha of abandoned agricultural land have already been converted to forest land, of which 470 ha (in 51 units) were afforested with coniferous trees, 788 ha (in 51 units) – deciduous trees and 1,147 ha (in 81 units) – mixed species of trees. As a result of the afforestation activities, 183 agricultural units gained alternative source of income, simultaneously extending employment opportunities in rural areas.

4.1.2.5 Waste

The "Law on Waste Management" (2000) and the "National Plan for Waste Management, 2006 – 2012" define the waste management policy in Latvia, setting the following hierarchy of waste management priorities: prevention of waste generation, reduction of the volume and harmfulness of waste, recycling for material and energy reocovery, safe and environmentally

friendly disposal, close and restore existing dumpsites and establish new municipal waste landfills.

The use of economic incentives in achieving waste management goals is defined in the "Law on Natural Resources Tax" (2005) and subordinate normative acts. Essential instrument to promote the recycling of packaging waste is the application of an 80% natural resources tax refund of the amount payable for packaging to enterprises that participate in the voluntary programs of packaging waste management. Natural resources tax is also applied for waste disposal in municipal waste landfills.

Objectives to reduce GHG emissions fall within the general objectives of reducing the impact of waste management on the environment (pollution of soil and underground water, odours). Climate change mitigation policy and measures are defined, considering the order of priority of waste management measures, commitments pursuant to EU legislation and the restructuring of the waste management system already being carried out.

Policy: Establish an up-to-date municipal waste management system, ensuring collection of biogas in municipal waste landfills

In accordance with the "National Plan for Waste Management for 2003 – 2012", several municipal waste management projects are being implemented, using funding from the Cohesion Fund (previously also Instrument for Structural Policies for pre-Accession resources). In various regions in Latvia, 11 waste management projects have been developed, providing comprehensive approach to waste management, including establishment of facilities for separate collection of recyclable waste, installation of sorting, processing and disposal equipment and establishment of biogas collection systems in municipal waste landfills.

Measure: Processing of biologically degradable waste

A network of stations for the collection of sorted municipal waste will be established in Latvia. The European Regional Development Fund (hereinafter, – ERDF) provides support for the establishment of waste collection and sorting areas on the basis of the waste management plan of the respective region. As part of the ISPA programme, a municipal waste management project has been implemented in Liepaja District (including the establishment of energy cells and cogeneration plant and creation of 26 waste collection areas in all counties), solid municipal waste management project in Ventspils District (including recycling of paper and cardboard) and municipal waste management project in the North Vidzeme Region (including establishment of nine waste sorting places). In order to ensure the purity of raw materials supplied for recycling, waste management organisations launch different information campaigns to encourage separate collection of recyclable waste.

In 2003, the EU LIFE project "Treatment of Biodegradable Organic Municipal Waste Using Composting Technologies" was launched. In two Latvian municipalities – Stopini and Kekava, biodegradable organic waste sorting and recycling is carried out, using two different methods: open-air composting and bioreactor method. Proposals are being prepared for implementing biodegradable organic waste treatment methods in the municipal waste management systems of other Latvian municipalities.

A specific component in the waste stream is packaging waste. Packaging waste, suitable for recycling, constitutes 20–30% of the total amount of municipal waste. The biodegradable component of paper, for example, constitutes approximately 72% of the total mass. Currently, there are nine packaging management organisations in Latvia with more than 1,000 companies participating in their voluntary programmes of packaging waste management. The companies implement these programmes using the resources, received as a refund in the amount of 80% of the packaging-related part of natural resource tax payment. It should be noted that the development of packaging waste management systems advances improvements in municipal waste collection and sorting systems.

Measure: Collection of biogas from municipal waste landfills

Considering that the majority of biodegradable organic waste is still disposed of, unseparated from the main flow, in municipal waste landfills, thus generating CH_4 in anaerobic degradation process, collection of biogas and its use in production of thermal energy or electricity has a considerable potential to reduce GHG emissions from the waste sector (see Chapter 4.1.1)

In 2004, the waste landfill "Getlini Eko" Ltd carried ot the collection of waste gas and energy generation: 12.6 million m^3 of biogas were collected, containing 6.5 million m^3 or 4,654 tons of relatively pure methane[26]. In 2005, 163,244 Nm^3 of biogas were collected in Grobini landfill and 1,007,533 Nm^3 of biogas were collected in the waste landfill "Skede" and used for the production of 658,033 kWh of electricity.

Measure: Restoration of small municipal dumpsites not meeting environmental requirements

One of the most significant problems of in municipal waste management is the large number of small municipal waste dumpsites and the negative impact they have on the environment. Of more than 500 dumpsites identified during the elaboration of the State Investment Programme "Strategy for Municipal Waste Management in Latvia, 500-", 176 dumpsites with the total area of 261 ha were restored in the period 1998-2004, that is, 33% of the total number of dumpsites. Nevertheless, in the territory of Latvia 28% of the waste dumpsites that were initially identified as not meeting environmental requirements, are still operational. Annually, on average about 4% of the identified dumpsite areas are restored.

Within the municipal waste management projects of North Vidzeme, Ventspils and Liepaja regions, 24 municipal waste dumpsites with a total area of 50.5 ha have already been restored. Within the municipal waste management project of East Latgale region, the construction of a new regional municipal waste landfill and restoring of existing dumpsites is planned in the county of Ozolaine, Rezekne district. The municipal waste management project of Zemgale region will cover the districts of Dobele, Jelgava and Bauska and foresees establishment of a network of stations for separate collection of recyclable waste, construction of municipal waste landfill in Livberze county, Jelgava district, restoring of existing dumpsites and informtion campaign for the community. Similar projects are planned in Piejura, Vidusdaugava, Viduskurzeme and Riga regions[27]. All of these projects are implemented with the help of co-financing from the EU Cohesion (ISPA) fund and financial resources from the European Regional Development Fund.

4.1.2.6. Cross-sectoral policies and measures

Climate change mitigation policies and measures simultaneously affecting more than one of the sectors described above, are also implemented in Latvia.

Policy: Implement the EU GHG emission allowance trading scheme

Realising that it would be difficult for many EU member states to fulfil GHG emission reduction commitments stated in the Kyoto Protocol without joint EU domestic policy, the European Parliament and Council on 13 October 2003 adopted the Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

Latvia has transposed the provisions of this directive in the national legislation (Appendix 1) and in the period 2005 – 2007, 91 installations were participating in the emission allowance trading scheme. 13,706,012 emission allowances will be emitted, including 1,572,037 emission allowances for installations that would start operation after 2005.

[26] Source: "Getlini Eko" Ltd
[27] Source: Ministry of Environment, "Catalogue of Environment Protection Infrastucture Projects, 2004"

Latvia has allowed voluntary participation in the trading scheme of installations with smaller production capacity or output volumes than those stated in the directive.

On 23 November 2005 Greenhouse gas emission unit registry started operation in Latvia The allocation, registration of distribution, accumulation, transfer, surrender, reinstatement and annulment of emission allowances is carried out in the registry.

Participation in the EU emission allowance trading scheme provides valuable experience in emissions trading, and allows Latvia to prepare for successful participation in the international emissions trading mechanism under the Kyoto Protocol, starting with 2008.

Policy: Participate in the Kyoto Protocol flexibility mechanisms

Latvia as a Party to the the Kyoto Protocol of the United Nations Framework Convention on Climate Change, has the opportunity to participate in the flexibility mechanisms under the Kyoto Protocol: joint implementation (hereinafter – JI), clean development mechanism (hereinafter – CDM), and international emissions trading (hereinafter – IET), of which two – JI and IET – in Latvia can be used to attract additional financial resources.

In accordance with the provisions for CDM, Latvia can participate in this mechanism by investing in the application of environmentally friendly technologies in developing countries. Considering the substantial reductions in GHG emissions in Latvia (Figure 7.2.1), the use of CDM is currently not necessary for Latvia. Latvia has not yet decided about participation in CDM; before a political decision is taken, evaluation of the financial feasibility would need to be carried out.

GHG emission projections suggest that Latvia has the potential to participate in IET, offering its unused "emission rights" in international market. Currently, Latvia has not yet taken a decision on participation in IET.

In 2005, the draft "Concept on the participation of Latvia in International Emissions Trading" was prepared. If the government supports Latvia's participation in IET, appropriate legal framework would be established to ensure that the acquired resources are invested in measures further reducing GHG emissions or increasing CO_2 removals, as well as supporting scientific research, raising public awareness and other measures for the successful implementation of climate change mitigation policy.

Measure: Active participation in Joint Implementation projects

Due to considerable interest of investors to implement JI projects in Latvia[28], "Concept on the Implementation of JI Projects under the Kyoto Protocol to the UN Framework Convention on Climate Change, 2002 – 2012" and "Strategy of JI Projects under the Kyoto Protocol to the United Nations Framework Convention on Climate Change for 2002 – 2012" were adopted in 2002.

Four options are offered in the concept for the management of JI projects and fulfilment of commitments under the UN Framework Convention on Climate Change. The Cabinet of Ministers approved the option stating that Latvia would participate in JI actively – local specialists identify and prepare potential JI projects and announce tenders for investors for their implementation. The strategy sets up the institutional system for identifying of potential projects and attraction of investors, specifying the competence areas in JI process management of the Cabinet of Ministers, the JI Commission, the Ministry of Environment, the JI Supervisory group and its chairman, JI project-owners, Accredited Independent Entities, GHG registry and the Latvian Environment, geology and meteorology agency. Implementation of the strategy will initiate the development of the technical, financial and administrative management system and preparation of project portfolio. JI commission approves projects, assigning them JI status and decide about contract signing between

[28] 27 JI pilotprojects have already been implemented in Latvia reducing GHG emissions by 370 Gg CO_2 -equivalent

foreign partners, Latvian partners and Latvian government as well. To fulfil assignments, stated in the JI strategy, JI commission has been established. Department of Climate and Renewable Energy of the Ministry of Environment fulfils JI group functions.

Latvia has signed bilateral co-operation agreements in the climate change sector with Denmark (2003), Austria (2003), Germany (2003 and 2004), the Netherlands (2000) and Finland (2000). Latvia has also joined the agreement on "Establishment of the Testing Ground for Flexible Mechanisms of the Kyoto Protocol" within the framework of the Baltic Sea Region Energy Co-operation (BASREC) in 2004, coordinated by the Ministry of Economics. The treaty has been signed by Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, the Russian Federation and Sweden, and its goal is to promote cross-border investment projects in the energy sector, using the JI mechanism.

Currently, one JI is being implemented in Latvia – Liepaja municipal waste management project (Table 4.1) and other JI projects are planned in the near future – biogas collection in agricultural farms.

Liepaja waste management project (2002 – 2012)

Flexibility mechanism under the Kyoto Protocol	Project objective	Beneficiary country	Project financing, mln LVL		Legal act approving the implementation of the project	Status	Project life cycle	Planned amount of emission reduction, 2008-2012, t CO_2-eq.	Emission reduction before 2008, t CO_2 -eq.	Implementation type for
Joint implementation	To improve the solid municipal waste management system by collecting and using biogas in Liepaja City and Liepaja region	Latvia	Financing from the StateInvestment Programme	0.8	Regulation of the Cabinet of Ministers of 12 December 2000 No. 604 "On the emission reduction unit purchase agreement between the Republic of Latvia and the International Reconstruction and Development Bank – assignee of the Carbon Prototype Fund "	Project is presently implemented	Project implementation starts in 2002 and finishes on 31 December 2020	204,052	180,720	Track 2[1]
			World Bank credit	1.3						
			Nordic Investment Bank loan	0.9						
			Financing of Prototype Carbon Fund	1.5						
			Liepaja City financing	0.4						
			Liepaja region municipality financing	0.2						
			Swedish International Development Agency	0.7						
			ISPA financing	2.8						

Table 4.1

[1] Pursuant to Decision 16/CP.7 of the 7th session of the Conference of the Parties, the Article 6 Supervisory Committee approves the JI project baseline and approves the emission reduction volumes

Policy: Promote the implementation of environmental and energy management systems

An ever growing number of companies in Latvia implement environmental management systems in a wide range of economic activities. Many of them have received the internationally recognised ISO 14001 certificate. Eco-Management and Audit Scheme (EMAS) registry has been set up. The Latvian National Accreditation Bureau performs the accreditation of environmental verifiers and supervises their activities, has developed and maintains a register of environment verifiers.

In cooperation with the Finnish Environmental Institute, the Finnish Ministry of Environment has financed a project to improve the EMAS system in Latvia. Attention is paid particularly to the training of specialists from the institutions responsible for the implementation of the system and support for the public awareness raising and information dissemination measures.

In 2000 – 2002 the Trade and industry agency of Denmark financed the programme "Environmental Management in Eastern Europe", with the aim of improving the environmental management system. Several independent environmental management system projects in various industrial sectors were carried out under this programme. Currently projects in food, pharmaceutical, chemical, metal production and manufacturing industries are implemented. The programme is planned to be continued, paying particular attention to the chemical industry (production of chemical reagents, pesticides and agrochemical preparations, paint, solvents, cleaning agents and synthetic fibre) and gradually involving companies from other industrial sectors. The Finnish Ministry of Environment financially supported a similar project in the cement industry. Companies that participate in these projects have the opportunity to receive the international ISO 14001 certificate or to register in the EMAS registry[30].

In 2003, the Baltic States and Poland initiated a new programme – "Green Industry". The programme is financed by the Norwegian Ministry of Foreign Affairs and is managed by the Norwegian Energy-Efficiency Group (NEEG). The "Gren Industry" programme combines the environmental management system (for example, ISO 14001 or EMAS) with energy management in an integrated Energy management and environmental management system. Within the framework of the programme, close co-operation with local consultancy companies, energy-efficiency centres, cleaner production centres, universities and industrial companies is developed in every country to provide the continuation of the programme continuation withouth further external assistance. Up to now, 10 food industry enterprises, 6 universities, consultancy companies, cleaner production centres and energy-efficiency centres have already joined this programme in Latvia. The Industrial Department of the Ministry of Economics supports the programme in Latvia. The implementation of the "Green Industry" will continue for five-years, including all industrial sectors that have a significant in economy of the Baltic States and Poland: food processing industry, wood processing industry, etc. The programme will continue the co-operation with universities to ensure continuous exchange of experience and long-term results[31].

Policy: Promote the inclusion of environmental considerations in consumer decisions

In addition to the measures described above, which are mainly directed to stimulate the manufacturers of products and providers of services to reduce GHG emissions, there is a potential to motivate the GHG emitters indirectly by carrying out measures that have an impact on market demand for their products and services. Inclusion of environmental considerations in consumer decisions at the national and municipal, as well as individual level can provide additional motivation for the implementation of cleaner production, better environmental management and more effective energy use.

[30] Pursuant to the Regulation (EC) No. 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary particiaption by organisations in a Community eco-management and audit scheme (EMAS)
[31] Source: http://www.ekodoma.lv/latvian/goi.htm

As the public procurement policy is one of the main components of the Common EU Monetary policy (as stated by the Council Directive 93/36/EEC of 14 June 1993 coordinating procedures for the award of public supply contracts that coordinates the procedure for the assignment of public supply contracts and facilitates the integration of environmental criteria in the public procurement), one of Latvia's future priorities in the environmental sector is to facilitate wider inclusion of environmental considerations in the state and municipal procurement procedures (so called "Green Procurement"). Considering the large share of national and municipal procurement in the national economy, this measure might indirectly facilitate also climate change mitigation efforts, supporting cleaner technology, use of more energy effective equipment and materials. It would bring the additional benefit of educating the community and developing public awareness of environmental issues.

To implement the concept of "green procurement", it is necessary to assess what kind of considerations it is possible and would be useful to include in the tendering criteria, how to provide objective assessment of their fulfilment and what importance should be attached to them compared to other criteria. and amend the legal acts regulating purchase procedures, accordingly. It is planned to perform this assessment in 2005.

Companies, whose activities result in the generation of packaging waste, are motivated to establish and finance systems for the management of this waste (facilities for separate collection of recyclable waste, sorting, and recycling) by providing refund of the natural resources tax payable for packaging. Currently, there are nine packaging management organisations in Latvia with more than 1,000 companies participating in their voluntary packaging waste management programmes.

Over the time period 2004 – 2005, the state energy sector was reorganised, liberalizing the electricity and gas markets. The legal framework was revised, the energy supply company "Latvenergo" was restructured, the electricity and gas market regulation systems were modified. However, the price for electricity is not expected that could considerably increase consumption and hamper the implementation of energy-efficiency measures. This reorganisation together with the strengthening of the consumer rights prodection, opens possibilities to introduce new policy instruments to facilitate the use of renewable energy resources ("green certificates", "green procurement") and strengthen the operation of the instruments currently employed (allowances for renewable energy generation, "green tariffs").

4.2 Review of policy instruments

For the effective implementation of climate change mitigation policy and in order to achieve the GHG emissions reduction targets, a wide range of policy instruments is used in Latvia. Most commonly, direct regulation or the so called "command and control" instruments are used; nonetheless, market-based incentives have an important impact as well. The role of voluntary agreements and informative and educational measures is increasing as well.

4.2.1 Regulatory instruments

Environmental Impact Assessment (EIA) procedures

The Law "On Environment Impact Assessment" lists the activities and criteria for the assessment of the potential impact on the environment, to be carried out as early as possible in the planning stage, in order to prevent or reduce adverse effects. On the basis of assessment results, the inception of activities could be even prohibited if legal requirements are expected to be violated. For the construction of new, GHG emitting installations of significant capacity, it may be necessary to carry out the EIA procedure.

Permitting regimes

In Latvia, companies receive category A or B permits or category C certification to carry out polluting activities, the conditions of which and the level of control depend on the type and capacity of the polluting activity, as defined in the Law "On Pollution" and subordinate regulations of the Cabinet of Ministers. Installations for which greenhouse gas emissions permit is required, are also defined in this law. Regulations of the Cabinet of Ministers subordinate to the Law "On Pollution", describe the procedures for the issuance of category A and B permits, category C certificates and and greenhouse gas emissions permits, including the information to be provided in the permit and the application, monitoring and reporting requirements, etc.

Standards

Pursuant to the Law "On Environmental Protection", environmental quality regulations and standards are mandatory for all users of environmental and natural resources.

In order to reduce the loss of volatile oil products and protect the soil and underground water, environmental quality standards for fuel filling stations, oil depots and mobile tanks are imposed.

Environmental requirements, defining additional restrictions for category C polluting activities, since 2005 apply to approximately 1,300 small boiler houses depending on the installed heat capacity and type of fuel used. These requirements in all of the small boiler houses have to be met within five years of the entry into force of the regulations.

Restrictions and prohibitions

In Latvia, the import, distribution and use of heavy fuel oil with sulphur content exceeding 1% (percents of mass) is prohibited. Exceptions of this prohibition apply, if the air quality standards for sulphur dioxide emissions are met.

Pursuant to the requirements of the Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants, limits for the emissions of sulphur dioxide, sulphur oxide, ammonia and volatile organic compounds in Latvia are defined for 2010.

To ensure nature protection in sensitive and ecologically valuable territories, different prohibitions or restrictions for economic activities have been defined in legislation, including conditions that have to be considered in land use planning. Restrictions in forest and forest land management (including forest conversion, forest regeneration requirements) are regulated by the Forest Law and subordinate Regulations of the Cabinet of Ministers.

4.2.2 Economic instruments

Taxes

Natural resources tax

Natural resources tax is calculated and collected for the use of natural resources, environmental pollution and use of environmentally hazardous products. The tax is aimed at providing economic incentive for the use of new, more energy-effective and less polluting technologies and accumulating resources for the financing of environmental protection measures. Taxpayers who finance projects to reduce environmental pollution or the consumption of natural resources by carrying out technological improvements or other environmental protection measures, may apply for a tax refund. Since the adoption of the Law "On Natural Resources Tax" in 1995, it has been amended several times and a new "Natural Resources Tax Law" will enter into force in 2006. Natural resources tax is also charged for the disposal of municipal waste as well. The law also defines penalties for carrying out

polluting activities without a valid environmental permit and unreported extraction of natural resources or environmental pollution.

Excise tax for energy resources
In Latvia, the excise tax is applied to oil products that are imported, exported, produced, processed, stored, sold, received or sent. Tax reductions and exemptions are applied according to the type and use of oil products (for example, for biofuels). The objective of the excise tax on oil products is to restrict oil product consumption because of their hazardous impact on the environment and to provide national revenue. Part of the revenue is used for motor road reconstruction, repair and maintenance. Due to the planned liberalisation of the electricity and gas markets in the near future, changes in the tax base and rates are expected, including tax application to electricity and natural gas.

User charges (tariffs)

The function of the Public Utilities Commission of Latvia is to provide sustainable opportunity for consumers to receive services of good quality for economically justified prices, stimulating the service providers to operate effectively and guaranteeing them reasonable profit. In the energy sector, the following tariffs are regulated:

- natural gas supply;
- liquefied gas companies;
- electricity supply (also from cogeneration plants), transmission and distribution services;
- electricity generated by Daugava HPP;
- electricity generated in cogeneration plants.

Until 2005, the national policy with regard to renewable energy resources was implemented by defining on an annual basis allowances for the installation of new power production capacities. Energy purchase from these capacities was guaranteed at fixed prices (the so called feed-in tariffs).

A feed-in tariff support has been provided for electricity production from renewable energy sources. However, the conditions for receiving the support have often changed. Currently, there are power producers in Latvia that use the same type of renewable energy resources but are subject to different conditions for the purchase of electricity generated – double tariffs, average sale tariff, tariff specified by the regulator and contractual price. In 2005, the Energy Law was amended, deleting the chapters that regulate support for electricity generation from renewable energy resources, and the Electricity Market Law was adopted that does not define fixed tariffs. Therefore, it can be said that support in the form of feed-in tariffs is not available anymore, however there are still companies receiving it according to previously concluded agreements. By January 2006, ne regulations of the Cabinet of Ministers are expected, that will regulate the procedure for setting the price of electricity produced from renewable energy resources.

The Public Utilities Commission also issue licences for the transmission, storage, distribution and sale of natural gas, the sale, storage and filling of liquefied gas. the transmission, distribution and sale of electricity as well as the production of electricity and thermal energy.

Financial instruments

Extensive range of financial instruments is used in Latvia in almost all sectors related to climate change. The main groups of support instruments are investment support and subsidies.

The state has received different types of financing from different sources (international funds, funds of the European Union, bilateral co-operation assistance). Support for the implementation of different projects is also available from the state and local governments (Table 4.2). Sometimes financing for a project is provided from several sources, for example,

the co-operation partners the World Bank in the sector of environment protection and climate change mitigation in Latvia are the Swedish International Development Agency, Prototype Carbon Fund, Global Environment Facility; Nordic Investment Bank.

Financial sources and application sectors

	Renewable energy sources	Heat supply systems	Co- generation	Energy performance of buildings	Transport	Clean technology in industry	Agriculture	Forestry	Waste management	Environmental management	Research and education
International funds Prototype Carbon Fund	V		V	V					V		
Global Environment Facility	V			V					V		
International Finance Corporation						V		V			
World Bank		V					V		V		V
EU funds LIFE				V							
PHARE											
ISPA*					V				V		
SAPARD**							V	V			
ERAF	V	V		V	V				V		
Cohesion Fund			V		V				V		
European Agricultural Guidance and Guarantee Fund							V				
Organisation for the Promotion of Energy Technologies	V	V	V	V		V					
Bilateral co-operation Holland	V	V		V		V					
Denmark	V	V	V	V							
Sweden									V		
Finland				V		V				V	
Norway	V			V							
Germany			V	V					V		
National support State Investment Programme		V			V				V		
Environmental Investment Fund	V	V		V		V			V		
Latvian Environmental Protection Fund	V	V							V		V
Local government support		V			V				V		

Table 4.2

Notes.
** - Since 1 May 2004 this financing instrument is no longer available for Latvia – instead, resources from the Cohesion Fund are available.*
*** - Since 1 May 2004 this financing programme is no longer available for Latvia – instead, resources from the European Agricultural Guidance and Guarantee Fund are available.*

Examples of successful projects can be found in all groups of financial instruments. For example, the project "Latvian National Capacity Self Assessment in the areas of biological diversity, climate change and soil degradation" was implemented in co-operation with the Global Environment Facility in order to describe and analyse the present capacity of Latvia in the climate change area, analysing the positive experience and identifying institutional, social, administrative, organisational, legal, informative and technical barriers and identifying possible improvements and streamlining opportunities. Since the development of the project conclusions and proposals, considerable changes have taken place, noticeably increasing Latvia's capacity to fulfil the international commitments. In the climate change area, for example, the Climate and Renewable Energy Department in the Ministry of Environment has been established (Chapter 4.3) and the "Climate Change Mitigation Programme for 2005 – 2010" has been elaborated.

With the help of the European Community Financial Instrument for the Environment (LIFE), several significant projects have been implemented in Latvia that directly or indirectly relate to climate change issues, for example, projects for improving waste management systems.

In 2002, the Ministry of Environment and institutions under its supervision have concluded bilateral co-operation assistance agreement "Latvian and Ukrainian co-operation programme in environment protection" to promote the exchange of experience.

Considering the state budget limitations, the government is not planning to assign more resources in the near future for the financial support of energy performance measures. However, the financing and crediting of projects for the reconstruction of municipal centralised heat supply systems will be continued within the framework of the State Investment Programme, as well as the implementation of individual pilot projects, including subsidised loans from the Environment Investment Fund. It is possible to attract addititonal resources in these sectors from participation in the International Emissions Trading and international co-operation programmes for climate change mitigation.

4.2.3 Flexiblility mechanisms under the Kyoto Protocol

The Kyoto Protocol defines three international mechanisms with the help of which the Parties to the Kyoto Protocol can jointly implement their emissions reduction commitments: the CDM, JI and IET.

Latvia is also participating in the EU emission allowance trading scheme. In the first trading period 2005 – 2007, 91 stationary installations will participate in the scheme.

The Ministry of Environment in co-operation with the Ministry of Economics and the Ministry of Finance has developed the project "Concept on the participation of Latvia in International Emissions Trading". The concept has been elaborated to ensure the decision-making on the issue of Latvia's participation in the International Emissions Trading mechanism under the UN Framework Convention on Climate Changes and its Kyoto Protocol. The overall objective of the concept is to promote global climate change mitigation efforts.

The concept offers two options for available to Latvia regarding participation in IET – not to participate in the first commitment period of the Kyoto Protocol, 2008 – 2012, or participate as of 2008.

EU member states have to transpose by 13 November 2005 in their national legislation the Directive 2004/101/EC of European Parliament and Council of 27 October 2004 amending the Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance

trading within the Community, in respect of the Kyoto Protocol's project mechanisms. Pursuant to amendments in the Law "On the Kyoto Protocol to the United Nations Framework Convention on Climate Change", the draft Regulations of the Cabinet of Ministers "Regulations on the order in which the project mechanisms under the Kyoto Protocol to the United Nations Framework Convention on Climate Change are developed, approved, implemented and monitored" have been elaborated, defining the issues related to the implementation of JI and CDM mechanisms, including the procedure for assigning units stated in the Kyoto Protocol (emission reduction units, certified emission reduction units, removal units and assigned amount units).

4.2.4 Voluntary agreements

Quality and environmental management systems

A constantly increasing number of enterprises in Latvia have implemented environmental management systems in a wide spectrum of economic activities. Part of them have received the internationally recognised ISO 14001 certificate. Eco-Management and Audit Scheme registry has been established in Latvia. "Latvian National Accreditation Bureau" provides a common system for conformity assessment of laboratories, certification and inspection bodies, and environmental verifiers.

Packaging waste management programmes

Companies, whose activities result in the generation of packaging waste, are motivated to establish and finance systems for the management of this waste (facilities for separated collection of recyclable waste, sorting, and recycling) by providing refund of the natural resources tax payable for packaging. Currently, there are nine packaging waste management organisations in Latvia with more than 1,000 companies participating in their voluntary packaging waste management programmes.

4.2.5 Other

Over the time period 2004 – 2005, the state energy sector was reorganised, liberalizing the electricity and gas markets. The legal framework was revised, the energy supply company "Latvenergo" was restructured, the electricity and gas market regulation systems were modified. However, the price for electricity is not expected that could considerably increase consumption and hamper the implementation of energy-efficiency measures. This reorganisation together with the strengthening of the consumer rights protection, opens possibilities to introduce new policy instruments to facilitate the use of renewable energy resources ("green certificates", "green procurement") and strengthen the operation of the instruments currently employed (allowances for renewable energy generation, "green tariffs").

The Council Directive 93/36/EEC of 14 June 1993 coordinating procedures for the award of public supply contracts, provides the options for integrating environmental criteria in the government purchase. The public procurement policy is one of the main components of the Common EU Monetary policy. Options for the application of "green procurement" principles in the state and local government purchases will be evaluated also in Latvia.

4.3 Institutions for the implementation of policies and measures The Ministry of Environment is the competent national institution for the coordination of the measures to ensure compliance with the requirements of the Convention and the Kyoto Protocol[32]. Currently, the Ministry of

[32] Pursuant to the Law "On the United Nations Framework Convention on Climate Change" (adopted on 9 March 1995), Order of the Cabinet of Ministers of 16 August 2005 No.462 "On implementation of the law "On the United

Environment, the Ministry of Economics, the Ministry of Finance, the Ministry of Transport, the Ministry of Agriculture, Latvian Environment, Geology and Meteorology Agency and Latvian Investment and Development Agency are involved in the development and implementation of climate change mitigation policy.

The Ministry of Environment is the leading state administration institution in the environment protection area covering also the climate change issues. The Ministry of Environment elaborates national environmental policy, organises and coordinates the implementation of environmental policy and integration of environmental policy principles in policy planning in other sectors. A permitting system is established to ensure the compliance of specific polluting activities with environmental requirements, and the Ministry of Environment and its subordinate institutions perform control (inspection) of the implementation of environmental requirements.

To ensure effective implementation of the climate change related legislation, linking it to facilitating the use of new and innovative technologies in the energy sector and increasing the share of renewable energy sources, the Climate and Renewable Energy Department has been operational in the Ministry of Environment since 2004. Besides, substantial reorganisation has been carried out in the institutions operating under the supervision of the Ministry of Environment.

Since 2005, all institutions performing supervision and control functions (the regional environmental boards, Marine Environmental Board and Environmental State Inspectorate) have been merged to establish the State Environmental Service[33]. This institution was established, considering experience of other EU member states and recommendations by international experts, keeping one amalgamated institution for issuing permits and monitoring the compliance with the provisions stated in the permits, with these functions separated internally. This reform would facilitate uniform application of normative acts throughout the country and improve methodological work on the issuance of permits and supervision.

Since 2005, the institutions involved in gathering and processing information related to environmental protection and sustainable development and responsible for environmental monitoring and information dissemination to the public (the Latvian Hydrometeorological Agency, Latvian Environmental Agency and State Geological Survey) have also been merged, establishing the state agency Latvian Environment, Geology and Meteorology Agency[34] (LEGMA). Such a merger was necessary to optimise the distribution of functions and thus save financial resources.

Since 1 January 2005, the Environmental Impact Assessment State Bureau is renamed to Environment State Bureau, corresponding more closely with its functions[35]. The Environment State Bureau performs the environmental impact assessment of planned activities and planning documents, implements the assignments related to the issuance of category A and B permits for polluting activities as defined in the Law "On Pollution", reviews applications and complaints and takes decisions related to environmental protection according to the legal provisions. The Bureau also provides information to the community on its work in conformity with the national legal requirements and the Aarhus Convention "On Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters".

The climate change mitigation policy covers all sectors of the national economy, therefore policies and measures to reduce GHG emissions and increase CO_2 removals, besides the

Nations Framework Convention on Climate Change" and the Law " On the Kyoto Protocol to the United Nations Framework Convention on Climate Change" (adopted on 30 May 2002)

[33] Order of the Cabinet of Ministers of 29 September 2004 No. 714 "On Reorganisation of Environmental State Inspectorate, Marine Environmental Board and Regional Environmental Boards and Establishment of State Environmental Service"

[34] Order of the Cabinet of Ministers of 29 September 2004 No. 713 "On Reorganisation of the State Agency "Latvian Hydrometeorological Agency", Latvian Environmental Agency and Latvian Geological Service and Establishment of the State Agency "Latvian Environment, Geology and Meteorology Agency"

[35] Pursuant to the Regulations of the Cabinet of Ministers of 23 November 2004 No. 969 "Amendments to the Regulations of the Cabinet of Ministers of 6 January 2004 No. 4 "Statutes of the State Bureau for Environmental Impact Assessment""

Ministry of Environment have also been implemented by the following ministries and institutions:

- the Ministry of Foreign Affairs performs activities within its competence for UN conventions and other treaties to come into force in the national territory and coordinates the development of national positions and the circulation of information related to Latvia's membership in the European Union;
- the Ministry of Economics elaborates and implements the structural policy of national economy, industrial policy, construction policy, energy policy, foreign economic policy, the policy for the domestic market (goods and services), policy for the development of entrepreneurship, investment policy, the policy for protection of consumers' rights;
- the Ministry of Agriculture develops agricultural and forestry policy, organises and coordinates the implementation of agriculture and forestry policy;
- the Ministry of Transport and Comunications is responsible for the development of environmentally friendly transport system;
- the Ministry of Education and Science develops the educational and science policy and coordinates the implementation of this policy;
- the Ministry of Finance develops the financial policy and coordinates its implementation;
- the Ministry of Regional Development and Local Government ensures the adequate inclusion of environmental requirements in the territorial planning and the implementation of the national environmental policy on local level;
- the State Agency "Housing Agency" is responsible for the improvement of energy-management (energy-performance) and control in buildings, systems of utilities, the regulation of lighting and maintenance of electrical equipment.

The involvement of local municipalities, scientific institutions, universities and the community is also invaluable in the climate change mitigation process.

5. PROJECTIONS OF GREENHOUSE GAS EMISSIONS AND CO_2 REMOVALS AND RESULTS OF IMPLEMENTATION OF POLICIES AND MEASURES

This Chapter is aimed at assessing the trends of GHG emissions and CO_2 removals up to 2020, taking into account the present economic and social development level, and implemented and approved policies and measures. When assessing the impact of measures on GHG emissions, only the direct GHG – CO_2, CH_4, N_2O, HFC, PFC and SF_6 are considered.

5.1 Projections

Pursuant to the provisions of the Decision No 280/2004/EC of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol, the projections of GHG emissions and CO_2 removals are evaluated for two scenarios – scenario "with measures" resulting from the implementation of adopted policyl documents and legal acts, and the second scenario "with additional measures" resulting from the additional implementation of planned policy documents and legal acts. In the assessment of the impact of measures on GHG emissions, only the direct GHG – CO_2, CH_4, N_2O, HFC, PFC and SF_6 are considered. Projection calculations are carried out, using the IPCC Common reporting format and the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.

Both of the aforementioned scenarios are based on a long-term macroeconomic projection for the time period 2000 – 2020 (macroeconomic indicators and indicators used in emissions projections for particular sectors, are summarised in Appendix 3). This projection is the basis for modelling of further development, GHG emissions and CO_2 removals in the main economic sectors.

The long-term macroeconomic projection is drawn up on the basis of long-term macroeconomic projections developed by the Ministry of Economics. The macroeconomic model used for the balancing of target indicators mentioned in the "Framework Economic Strategy for Latvia" and for the calculation and forecasting of strategy implementation scenarios, was used in the calculations (for more details, see Chapter 5.4.1). The following assumptions are used in the model:

1) with regard to the capacity of internal growth of the national economy:

- upon Latvia's accession to the EU, the process of active structural reforms continues, allowing to increase the economic competitiveness, that is, business environment is improved, there are substantial investments in the improvement and development of the base infrastructure, innovations are promoted, investment in human resources is increasing, balanced regional development and environmental protection system are provided;
- the macroeconomic stability is ensured – the budget discipline is implemented; since 1 January 2005 the exchange rate between the national currency, the Lat (LVL), and Euro (EUR)[37] has been fixed and in 2008 Latvia accedes to the European Economic and Monetary Union;
- political and social stability is preserved in Latvia;

2) with regard to the external environment:

- the world economy is developing steadily – there are no notable recession periods;
- EU is developing harmoniously, targets set in the Lisbon strategy are being fulfilled;

[37] Source: http://www.bank.lv/lat/main/monetarapolitika/mp/

- stable political and economic situation in the neighbouring countries, including in the central trading partner Russia;

In case of such a development scenario, the macroeconomic proportions can be characterised as follows:

- high annual GDP growth rates in the first half of the period – up to 7%, possibly decreasing to 5% after 2010, considering the high production level achieved;
- the GDP growth will mainly be defined by increasing productivity, to a smaller extent – by increase in the employment;
- after the rapid increase of inflation at the end of 2003 and in 2004, it decreases to 2–3% per year. The relatively high inflation is caused by the low price level in the economy and the inevitable wage growth since the current level of wages is also very low. Service prices will increase more rapidly than prices for goods;
- rapid annual growth of export volumes as the major condition for the development of the manufacturing industry;
- high share of import in the economy continues, stimulated by the stable internal demand, foreign direct investment inflow and opportunities to use EU structural funds. Possible equaliation of the export and import volumes can take place after 2010;
- structural changes in the national economy continue – the share of agriculture is decreasing, the share of services increasing;
- the growth of the share of the sector of innovative technologies in the economy will reduce the risk to intensify the sectors depleting resources.

5.1.1 Energy, including transport

MARKAL is a generic model used to estimate projections in the energy sector and COPERT III model (version 2.2) (for more detailed model descriptions, see Chapter 5.4.2) is used in the transport sector. The indicators used to estimate the projected emission levels from the energy and transport sectors are summarised in Appendix 4. Energy demand is directly related to economic development, and long-term macroeconomic projection is used to forecast its increase.

The measures described in Chapter 4.1.1 are included in the energy sector scenario "with measures". The following conditions play a significant part in the projections:

- more extensive use of renewable energy resources in power generation in accordance with the Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market - in 2010 Latvia has to provide 49.3% of total electricity consumption with renewable energy resources;
- provision of biofuel share in accordance with the Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport – Latvia has to achieve a biofuel share of 2% by 31 December 2005 and 5.75% by 31 December 2010 for fuel and diesel used in transport;
- emission ceilings for air pollutants (sulphur dioxide, nitric oxide, ammonia and volatile organic compounds) in 2010 (Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants);
- natural resources tax for installations emitting GHG into the environment as a result of carrying out activities listed in Appendix 2 of the "Law on Pollution";

- excise tax in accordance with the Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of on energy products and electricity and the Council Directive 2004/76/EC of 29 April 2004 amending Directive 2003/49/EC as regards the possibility for certain Member States to apply transitional periods for the application of a common system of taxation applicable to interest and royalty payments made between associated companies of different Member States. The "Law On Excise Tax" defines the procedure for the levy of excise tax on the excise products. Currently, the tax is levied on oil products but in future it is planned to extend it also to natural gas, coal, coke, electricity.

The following planned measures are included in the scenario "with additional measures":

- more extensive use of renewable energy resources in power generation where Latvia has to provide 51.8% of total electricity consumption with renewable energy resources in 2015 and 54.3% – in 2020;
- fossil fuel replacement with alternative fuel (biofuel) in accordance with the target set in the Green Book of the European Commission "Towards a European strategy for for the security of energy supply" to replace 20% of fossil fuel consumption with alternative fuels in the road transport sector by 2020 (it is assumed that in 2015 the biofuel share in the transport sector will be 10%, in 2020 – 20%);
- revision of the rates of natural resources tax (as from 2009 the rate for a ton of CO_2 is 1 LVL).

Results of modelling for the scenario "with measures" are summarized in Figure 5.1 and 5.2.

Primary energy consumption in 1999 – 2020, PJ

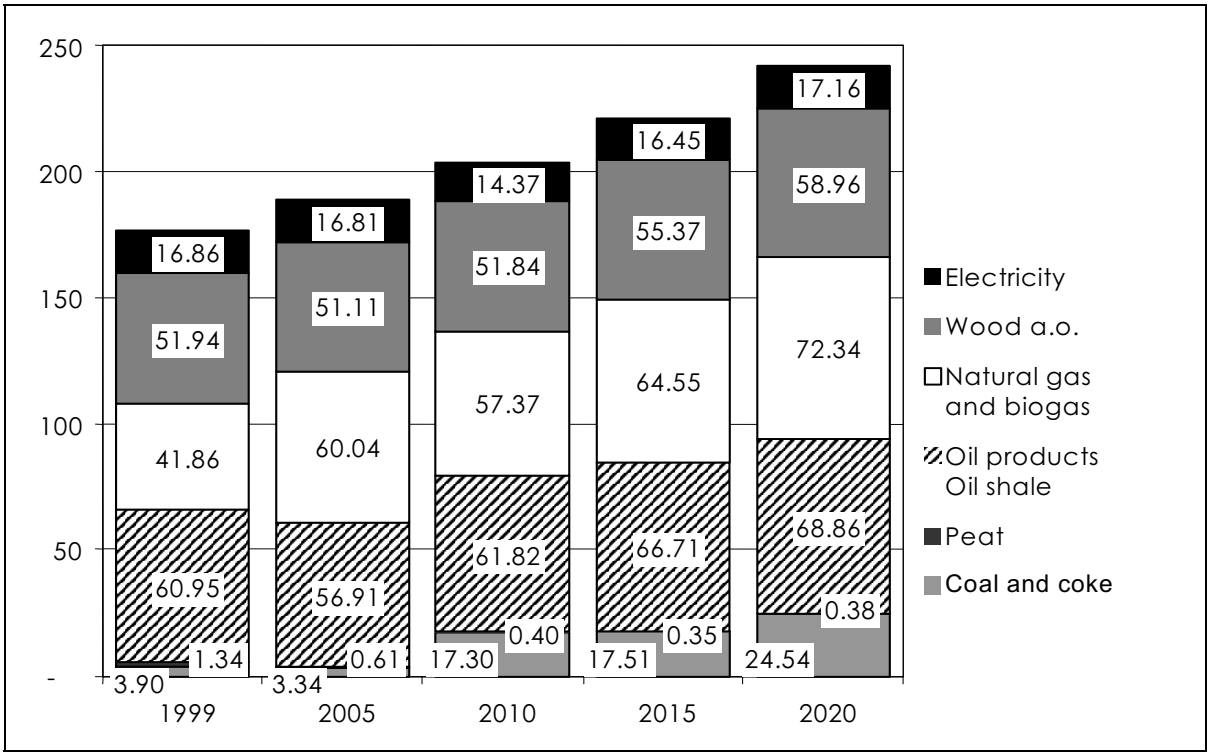

Figure 5.1
Source: Reķis, 2004

Final energy consumption, 1999 – 2020, PJ

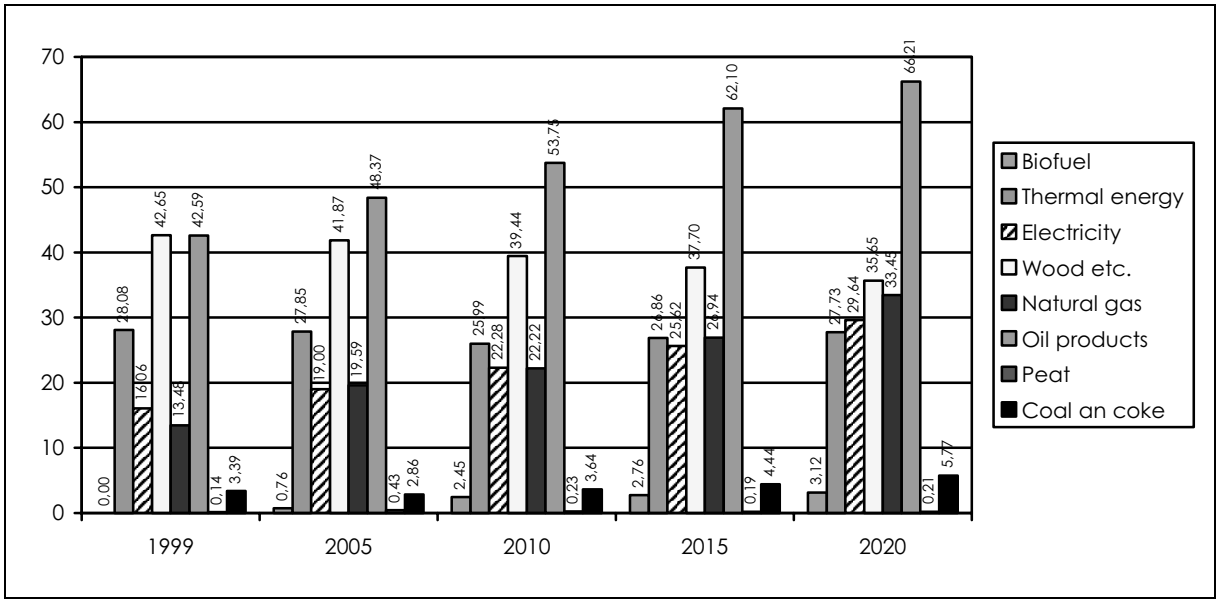

Figure 5.2
Source: Reķis, 2004

Figure 5.1 demonstrates an increase in the primary energy consumption of all types of energy resources, with the most rapid increase in the demand for coal. Regarding the consumption of final energy (Figure 5.2), the consumption of oil products, natural gas, electricity and biofuel is increasing.

The projections of direct GHG emissions in the sector have been estimated, based on the projections of the consumption of primary and final energy. The calculations are made, using the IPCC Common reporting format and the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. The projections of CO_2, CH_4 un N_2O emissions in the energy sector, including transport, are presented in Table 5.1 and 5.3, separately for the transport sector – in Figure 5.4.

CO_2, CH_4 and N_2O emissions from energy, including transport, 1990 – 2020

	1990	1995	2000	2003	2005	2010	2015	2020
					scenario "with measures"			
CO_2, Gg including transport	18,044.84 2,445.12	8,734.24 1,851.24	6,576.86 2,119.84	7,058.19 2,589.51	8,778.11 3,789.22	9,934.42 3,828.44	10,963.97 4,434.72	12,484.83 5,136.71
CH_4, Gg including transport	25.94 0.68	23.56 0.56	19.80 0.51	18.63 0.58	19.3 0.95	18.16 0.95	17.53 0.78	16.38 0.77
N_2O, Gg including transport	0.54 0.26	0.38 0.15	0.41 0.19	0.51 0.26	0.7 0.48	0.73 0.5	0.84 0.59	0.88 0.61
Direct GHG emissions in total, Gg CO_2 eq. including transport	18,757.26 2,538.97	9,347.54 1,908.62	7,118.95 2,190.29	7,606.09 2,682.95	9,400.41 3,958.28	10,542.41 4,002.47	11,593.08 4,634.94	13,112.81 5,342.89

					scenario "with additional measures"			
CO_2, Gg including transport					8,136.77 3,141.87	9,239.76 3,181.09	9,788.56 2,904.26	10,022.49 2,811.39
CH_4, Gg including transport					19.16 0.81	18.02 0.81	17.32 0.56	15.77 0.53
N_2O, Gg including transport					0.67 0.45	0.7 0.46	0.74 0.49	0.77 0.5
Direct GHG emissions in total, Gg CO_2 eq. including transport					8,746.9 3,297.26	9,833.81 3,341.46	10,381.59 3,066.52	10,591.6 2,977.02

Table 5.1
Source: Latvian Environment, Geology and Meteorology Agency

Aggregate direct GHG emissions from energy, including transport in 1990 – 2020, Gg CO_2 -eq.

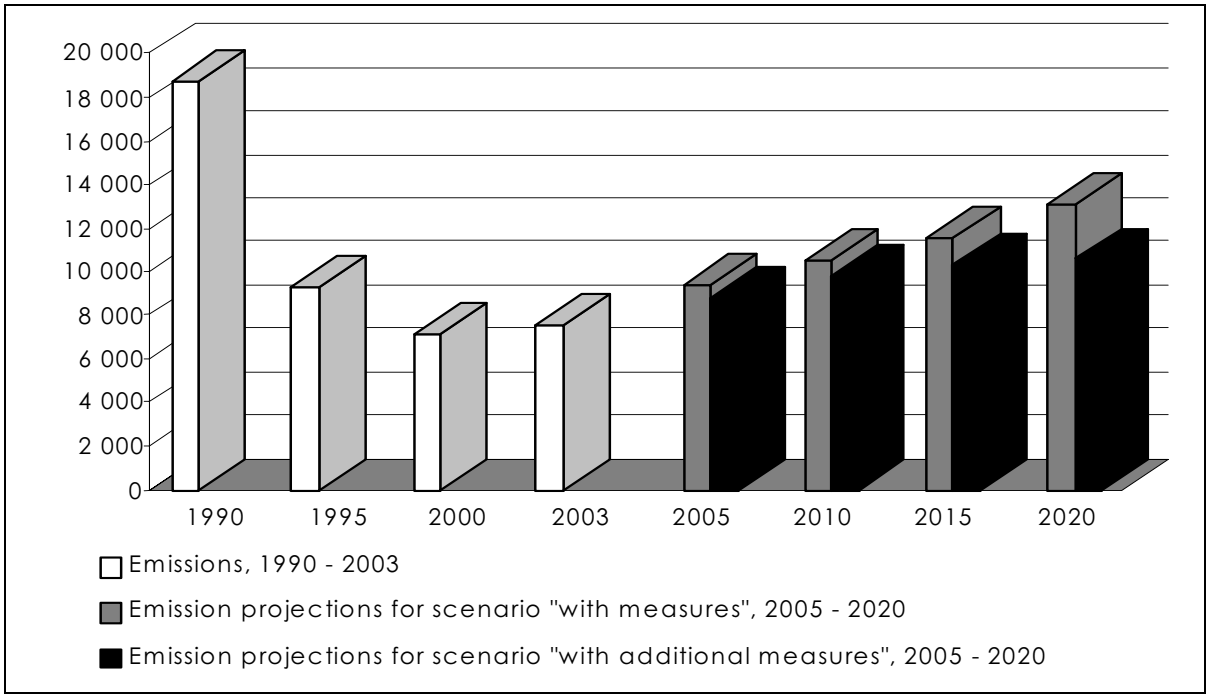

Figure 5.3
Source: Latvian Environment, Geology and Meteorology Agency

Aggregate direct GHG emissions from transport in 1990 – 2020, Gg CO_2 -eq.

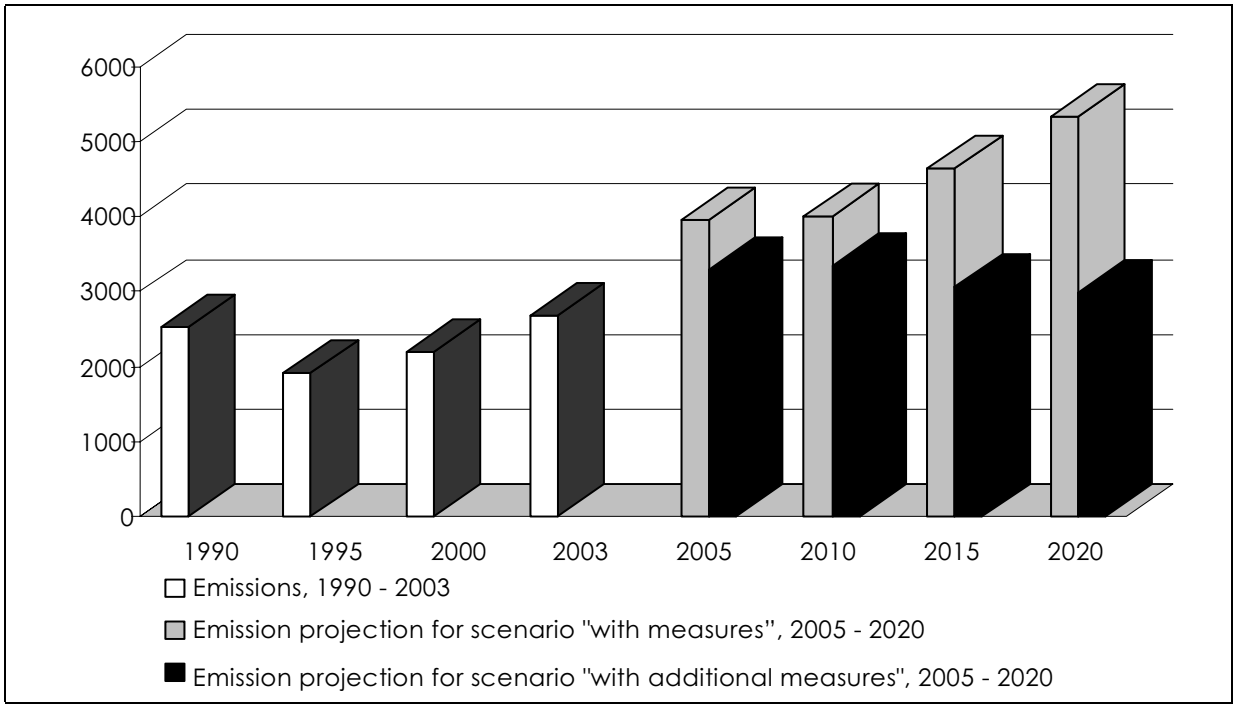

Figure 5.4
Source: Latvian Environment, Geology and Meteorology Agency

5.1.2 Industrial processes

The emission projection for industrial processes is based on analysis of statistical data for the volumes of manufacturing output in the time period 1990 – 2003, long-term macroeconomic projection, current and anticipated levels of foreign trade and trends regarding the expected amount of products (for a detailed description of models, see Chapter 5.4.3).

Only the scenario "with measures" is considered due to the lack of information on planned policy and legislation that would have an impact on the amount of GHG emissions in the industrial sector. The policies and measures listed in chapter 4.1.2.1 are included in the scenario "with measures". The following assumptions have considerable importance in projection estimations:

- due to Latvia's accession to the EU and positively solved issue on import at dumping prices, significant growth of cheap import cement is not expected;
- the share of locally produced cement will remain in the order of 70% of the total consumption;
- the consumption of cement follows the growth in the construction sector, though the increase is slightly slower due to the increasing use of other construction materials. The growth rate is expected to be more rapid at the beginning of the forecasting period, gradually slowing down towards the end of the period;
- the production volumes of asphalt, oil bitumen, bitumen compounds and bituminous concrete are directly dependent on the scale of building and particularly on the developments in the motorway construction sector. Statistical data demonstrate a stable increase in production volumes – 39% on average in a year as of 2000. Due to the incoming resources from EU funds for infrastructure projects, including for motorway construction, the rapid increase in production volumes is expected to continue at least until 2010, when it should stabilise;
- fluorinated gas emissions will stay at the level of 2003.

Projections of direct GHG emissions in the sector of industrial processes are based on the projected production volumes. Projections are calculated, using the IPCC Common reporting format and the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories . The projections of CO_2, HFC and SF_6 emissions are presented in Table 5.2 and 5.5.

CO_2, HFC and SF_6 emissions from industrial processes in 1990 – 2020

	1990	1995	2000	2003	2005	2010	2015	2020
CO_2, Gg	503.75	169.37	189.10	231.08	261.52	317.37	338.04	355.40
HFC, Gg CO_2 eq.	NO/NE	0.29	8.6	12.83	12.83	12.83	12.83	12.83
SF_6, Gg CO_2 eq.	NO/NE	0.25	1.28	4.41	4.41	4.41	4.41	4.41
Direct GHG emissions in total, Gg CO_2 eq.	503.75	169.91	198.98	248.33	278.76	334.61	355.28	372.64

Table 5.2
Source: Latvian Environment, Geology and Meteorology Agency

Aggregate direct GHG emissions from industrial processes in 1990 – 2020, Gg CO_2-eq.

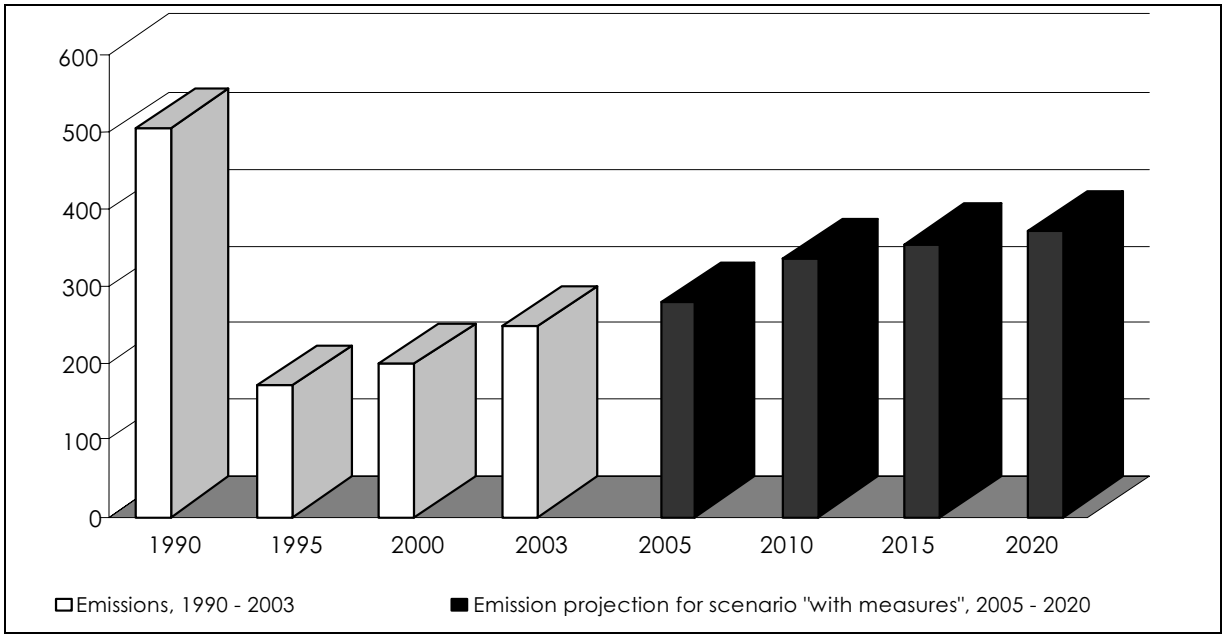

Figure 5.5
Source: Latvian Environment, Geology and Meteorology Agency

5.1.3 Solvent and other product use

The emissions projection from solvent and other product use is based on long-term macroeconomic projection and analysis of statistical data on production volumes, import and use of paint and varnish materials in the time period 1990 – 2003 (for a detailed description of the model, see Chapter 5.4.4). The assumption that the present correlation between the scale of building in Latvia and the production, import and use of paint and varnish materials will remain the same in the future, and that the present increasing trend in production volumes and import will continue is important in projection estimations.

Considering the small share of GHG emissions by this sector in the total amount of GHG emissions (Chapter 4.1.3), particular measures are not implemented and planned in this sector, therefore the emissions from solvent and other product use are projected only for the scenario "with measures".

The projections of CO_2 and N_2O emissions in this sector are presented in Table 5.3 and 5.6.

CO_2 and N_2O emissions from solvent and other product use, 1990 – 2020

	1990	1995	2000	2003	2005	2010	2015	2020
CO_2, Gg	105.71	59.33	82.73	108.89	134.93	190.34	271.31	372.75
N_2O, Gg	NS/NN	0.01	0.01	0.02	0.02	0.02	0.02	0.02
Direct GHG emissions in total, Gg CO_2 -eq.	105.71	63.86	85.83	114.84	140.89	196.33	277.33	378.8

Table 5.3
Source: Latvian Environment, Geology and Meteorology Agency

Aggregate direct GHG emissions from solvent and other product use in 1990 – 2020, Gg CO2 -eq.

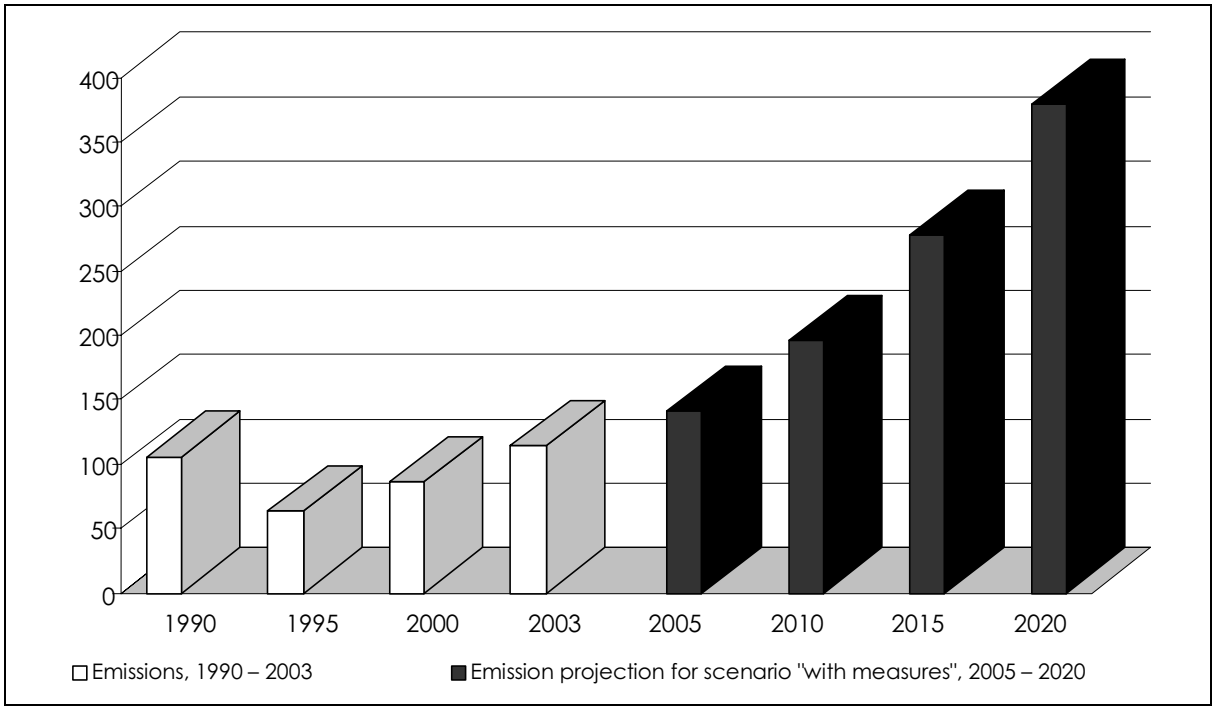

Figure 5.6
Source: Latvian Environment, Geology and Meteorology Agency

5.1.4 Agriculture

The emissions projections for the agriculture sector are based on analysis of statistical data for the time period 1990 – 2003, long-term macroeconomic projection and present and projected external trade volumes, as well as trends in the production volumes of agricultural produce (for a detailed description of the model, see Chapter 5.4.5).

The measures implemented in agriculture sector as described in Chapter 4.1.5 are included in the scenario "with measures". The following assumptions and conditions are of importance in projection calculations:

- the number of cattle will decrease by 2014 according to the milk production allowances given to Latvia;
- with the development of biofuel production, the amount of rape output will triple by 2020 compared to 2002, an additional area of 70–100 thousand ha will be farmed with cultivated plants (rape, wheat) for biofuel production (see the

activity "Support for production of biofuel and promotion of the use of biofuel", Chapter 4.1.1);

- total output of wheat will reach the level of 2002 and stabilise;
- total output of rye will stabilise at the level of 2001 – 2002.
- liming material applied to the soil and treated area will increase or remain at the level of 2002 – 2003;
- the amount of a mineral fertilizer applied to the soil will increase, however considerable increase in use of mineral fertilizer is not expected, considering the increase of the price of mineral fertilizer on average by 27% upon Latvia's accession to the EU.

The following measures have been considered in developing the scenario "with measures":

- investment in agricultural companies (supported sectors are dairy industry; growing fruit and berry, cereals; producing mutton, goat, beef, pork, poultry and eggs, vegetables, energy crops, fibre crops; beekeeping and growing oil plants) – a 3–7% increase in the number of cattle as well as increase in the productivity of dairy cows and areas of field crops are expected;
- support to young (18–40 years old) farmers – the measure might increase agricultural land areas and areas sowed with field crops by 3–5%;
- fossil fuel replacement with alternative fuel (biofuel) in accordance with the target set in the Green Book of the European Commission "Towards a European strategy for rthe security of energy supply" to replace 20% of fossil fuel consumption with alternative fuels.

The projections of CH_4 and N_2O emissions in agriculture are presented in Table 5.4.

CH_4 and N_2O emissions from agriculture in 1990 – 2020

	1990	1995	2000	2003	2005	2010	2015	2020
					scenario "with measures"			
CH_4, Gg	111.27	44.64	30.6	31.20	32.4	33.72	35.46	36.5
N_2O, Gg	9.11	2.96	2.61	3.12	2.99	3.08	3.15	3.3
Direct GHG emissions in total, Gg CO_2 -eq.	5,161.21	1,853.66	1,450.52	1,622.54	1,607.23	1,662.41	1,721.44	1,789.18
					scenario "with additional measures"			
CH_4, Gg					33.64	35.38	36.87	38.87
N_2O, Gg					3.07	3.21	3.32	3.24
Direct GHG emissions in total, Gg CO_2 -eq.					1,657.46	1,737.23	1,803.28	1,819.71

Table 5.4
Source: Latvian Environment, Geology and Meteorology Agency

Aggregate direct GHG emissions projections of agriculture sector in the scenario "with measures" and scenario "with additional measures" are presented in Figure 5.7.

Aggregate direct GHG emissions from agriculture in 1990 – 2020, Gg CO_2 -eq.

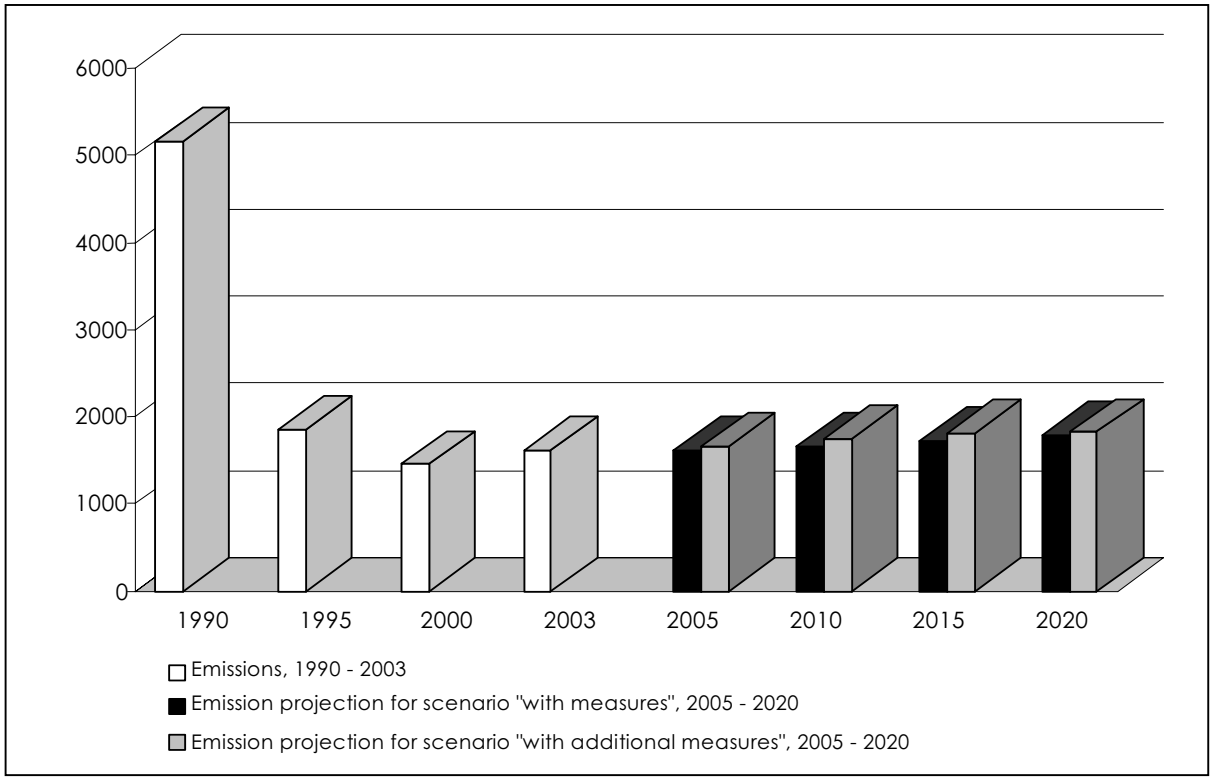

Figure 5.7
Source: Latvian Environment, Geology and Meteorology Agency

5.1.5 Land-use, land-use change and forestry

The following sources of information were use for the projection of the forestry sector development: database of the State Forest Service, data from the State Land Service, research and modules developed by experts for the "Latvian National Programme for the Development of Forestry and Related Sectors", as well as assessments by specialists from the Ministry of Agriculture and other forestry experts (for more detailed model description, see Chapter 5.4.6).

The scenario "with measures" includes measures that provide sustainable forest management, particularly stressing the increase of the forest area, related to afforestation activities and strict forest land-use change restrictions. Afforestation volumes are projected in accordance with anticipated state support for afforestation of agricultural land and shrubs and is estimated at 1,000 ha per year. The area of unmanaged agricultural land that is covered with shrubs will continue to grow because more than 500 thousand ha of agricultural land is currently unmanaged. The rate of coverage is assumed to remain 10 thousand ha a year up to 2005, and it will increase rapidly in thefollowing years; all unmanaged agricultural land will be covered with shrubs by 2020. In this scenario, considerable changes to any of the growth rate indicators for the growing stock are not foreseen until 2010. In 2015 and 2020, it is expected that due to changes in the age structure of forest stands, the total growing stock in forest stands will decrease; currently a large proportion of forest stands are of average age and thus experiencing the highest growth rates. However, this effect will be more apparent after 2020. The annual increase of the growing stock will attain 5.6 m^3/ha in 2015 and 2020, and the total increase of growing stock in forest stands will remain 16.3 mln m^3 per year. It is expected that the total growing stock in forest stands will decrease by 10%. The scenario "with measures" projects that with the present felling volumes, the cleared area and unfinished reforestation area will not be changed in 2005 and 2010 but will decrease in 2015 and 2020 due to the decrease in felling volumes, including decrease of areas of clear felling.

In the scenario "with measures" it is projected that all unmanaged agricultural land will be used for afforestation or unconventional agriculture, including the growing of forest plantations, Christmas trees or used for other purposes. In order to afforest all of the agricultural land identified for this purpose – 200 thousand ha and part of the area covered by shrubs (40 thousand ha) by 2020, it is necessary to afforest an area of 16 thousand ha every year on the condition that the existing restrictions for forest conversion remain. By afforestation of this land, the forest land area will reach 3,180 thousand ha in 2020 and will cover 49% of of the total national territory. In this scenario an increase of the area of particularly preserved territories was not foreseen, thus the total area of managed forests will not decrease due to this reason. Although a rapid growth in the forest land area is projected, the new forest stands will not have a significant impact on the total growing stock in forest stands during the first few years, thus in 2015 and 2020 the total growing stock in forest stands will decrease as projected in the scenario "with measures".

The projections of direct GHG emissions and CO_2 removals in the land-use, land-use change and forestry sector are presented in Table 5.5.

CH_4, N_2O and CO_2 emissions and CO_2 removals from land-use, land-use change and forestry in 1990 – 2020

	1990	1995	2000	2003	2005	2010	2015	2020
					scenario "with measures"			
CH_4, Gg	2.75	5.12	4.91	0	0	0	0	0
N_2O, Gg	0.02	0.04	0.03	0	0	0	0	0
Net CO_2 emissions, Gg CO_2 -eq., including:	-18,453.38	-14,630.26	-8,640.01	-8,186.76	-7,736.93	-8,323.54	-12,663.24	-13,141.6
changes in forest and other woody biomass stocks	-18,587.8	-14,696.48	-8,611.50	-8,111.06	-7,599.74	-7,639.91	-11,503.87	-11,543.08
CO_2 emissions and removals from soil	134.42	116.45	94.69	114.61	119.48	123.04	123.97	124.81
Direct GHG emissions and CO_2 removals, Gg CO_2 -eq.	-18,389.7	-14,511.76	-8,526.43	-8,186.76	-7,736.93	-8,323.54	-12,663.24	-13,141.6
					scenario "with additional measures"			
CH_4, Gg					NA	NA	NA	NA
N_2O, Gg					NA	NA	NA	NA
Net CO_2 emissions, Gg CO_2 -eq., including:					-7,798.53	-8,210.61	-13,263.04	-13,875.5
changes in forest and other biomass stocks					-7,721.44	-8,335.69	-13,388.6	-14,002.4
CO_2 emissions and removals from soil					120.91	125.08	125.57	126.9
Direct GHG emissions and CO_2 removals, Gg CO_2 -eq.					-7,798.53	-8,210.61	-13,263.04	-13,875.5

Table 5.5
Source: Latvian Environment, Geology and Meteorology Agency

Aggregate projections of direct GHG emissions in the land-use, land-use change and forestry sector in the scenario "with measures" and scenario "with additional measures" are presented in Figure 5.8.

Aggregate direct GHG emissions from land-use, land-use change and forestry in 1990 – 2020, Gg CO_2 -eq.

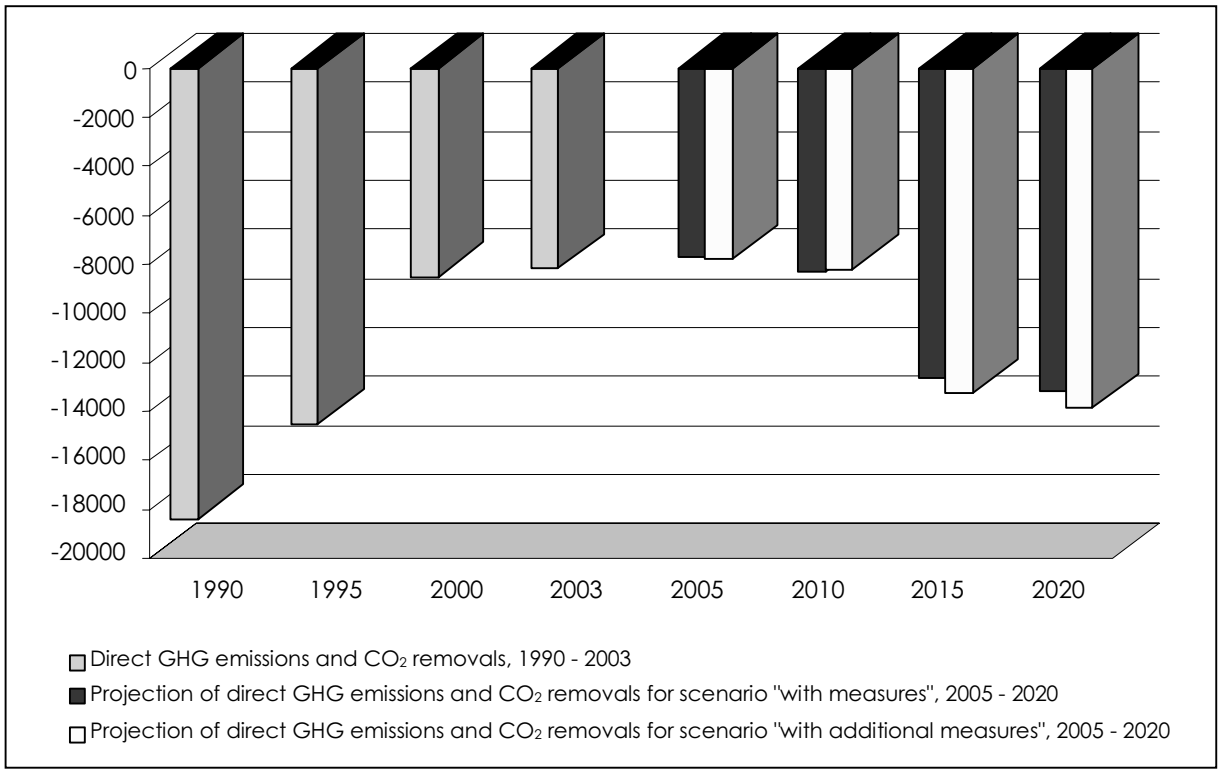

Figure 5.8
Source: Latvian Environment, Geology and Meteorology Agency

5.1.6 Waste

The projection of emissions in the waste sector is based on analysis of statistical data for the time period 1990 – 2003 and long-term macroeconomic projection (for more detailed model description, see Chapter 5.4.7).

In Latvia, 57% of the total amount of municipal waste is biologically degradable and this proportion does not change by the increase of waste amount. Pursuant to the Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, the share of biologically degradable waste disposal in Latvia must not exceed 75% in 2010, 50% in 2013 and 35% in 2020 compared to the amount of biologically degradable waste produced in 1995. It is assumed that Latvia will fulfil the requirements of this directive. Although accurate projections on processing volumes are not available, they are expected to increase as rapidly as in recent years.

The factor that has the greatest effect on CH_4 emissions in the waste sector is the collection of biogas from municipal waste landfills. In Latvia, 10–12 municipal waste landfills with installed biogas collection systems are planned to be built.

The second most important factor that has an impact on CH_4 emissions in the waste sector is the amount of waste disposed in dumpsites. In the scenario "with measures" it is assumed that waste processing will increase at the same rate as in the past three years, although it is possible that waste processing might increase more rapidly due to recommendations of the European Commission. That would considerably reduce the amount of disposed waste, thus CH_4 emissions would also decrease. Waste sorting also contributes to the reduction of the

amount of disposed waste and it is one of the priorities in the waste management system. Currently, in Latvia waste sorting is not widely used, though it is projected that the amount of sorted waste will increase every year. These amounts are difficult to forecast due to the lack of concrete targets for the proportion of municipal waste to be sorted, defined in the legal acts and policy planning documents. With increase of sorted waste amount, waste processing or export for processing will increase as well.

The amount of waste generated by people is possible to project, based on average GDP growth in the country and changes in the number of population. Calculating this way, the projected amount of waste generated by people is increasing, therefore the total amount of generated and disposed waste is increasing.

The projections of CH_4 and N_2O emissions in the waste sector are summarised in Table 5.6.

CH_4 and N_2O emissions from waste in 1990 – 2020

	1990	1995	2000	2003	2005	2010	2015	2020
					scenario "with measures"			
CH_4,Gg	36.46	40.29	49	40.86	41.16	42.15	36.95	40.76
N_2O, Gg	0.18	0.17	0.16	0.16	0.16	0.15	0.15	0.15
Direct GHG emissions in total, Gg CO_2 -eq.	822.6	899.79	1,085.72	937.02	913.46	933.02	822.98	902.33
					scenario "with additional measures"			
CH_4,Gg					41.67	41.73	36.32	39.84
N_2O, Gg					0.16	0.15	0.15	0.15
Direct GHG emissions in total, Gg CO_2 -eq.					913.46	924.32	809.75	883.04

Table 5.6
Source: Latvian Environment, Geology and Meteorology Agency

Projections of aggregate direct GHG emissions in the waste sector, implementing the scenarios "with measures" and "with additional measures" are presented in Figure 5.8.

Aggregate direct GHG emissions from waste in 1990 – 2020, Gg CO_2 -eq.

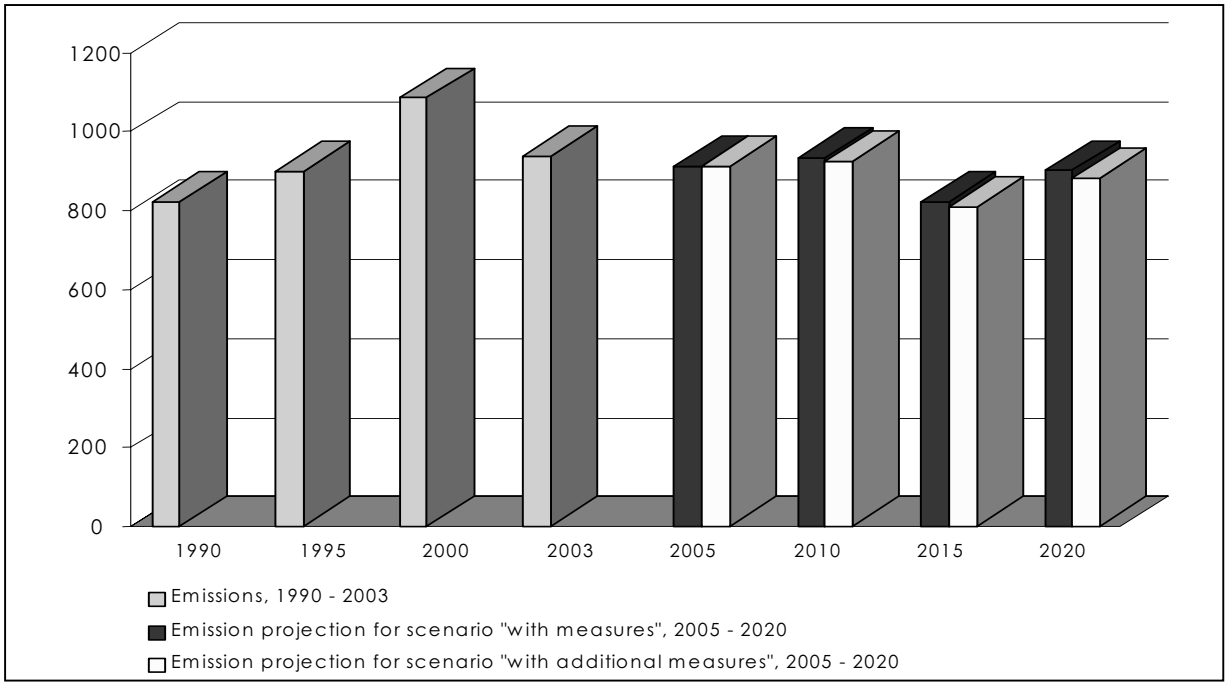

Figure 5.9
Source: Latvian Environment, Geology and Meteorology Agency

5.2 Total result of the implementation of measures

Aggregate national direct GHG emissions and their projections in the scenarios "with measures" and "with additional measures" are presented in Figure 5.9.

Aggregate direct GHG emissions in 1990 – 2020, Gg CO_2 -eq.

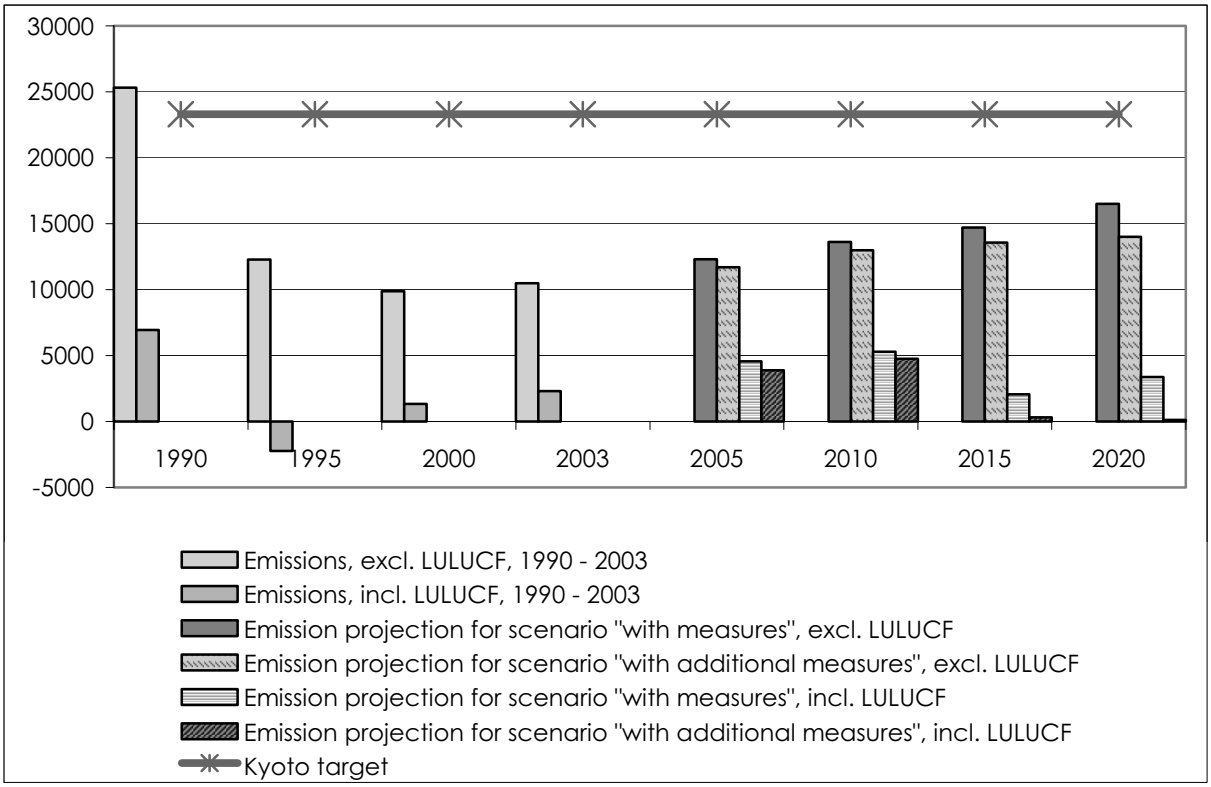

Figure 5.10
Source: Latvian Environment, Geology and Meteorology Agency

The distribution of direct GHG emissions by sectors (Table 5.7) demonstrates that the share of the energy sector (including transport) in the total emissions as of 2003 will increase by approximately 7%. Increase in the share of solvent and other product use is expected to be more rapid than the increase in the share of industrial processes (possibly, this is determined by the correlation between the construction volumes in Latvia, which are also increasing, and the use of paint and varnish materials). Due to the successful waste management policy (sorting and processing of municipal waste, reducing the share of biodegradable waste in municipal waste landfills and dumpsites, restoration of the waste dumpsites, biogas collection in waste landfills), the share of waste sector in the total GHG emissions will slightly decrease.

Share of sectors in aggregate direct GHG emissions, 1990 – 2020, %

	1990	1995	2000	2003	2005	2010	2015	2020
					scenario "with measures"			
Energy, including transport	73.99	75.79	71.62	72.24	76.19	77.13	78.49	79.20
Industrial processes	1.99	1.38	2.00	2.36	2.25	2.45	2.40	2.25
Solvent and other product use	0.42	0.52	0.87	1.09	1.14	1.44	1.88	2.29
Agriculture	20.36	15.02	14.59	15.41	13.02	12.16	11.66	10.81
Land-use, land-use change and forestry	0	0	0	0	0	0	0	0
Waste	3.24	7.29	10.92	8.90	7.40	6.82	5.57	5.45
In total (without CO_2 from LULUCF)	100	100	100	100	100	100	100	100
					scenario "with additional measures"			
Energy, including transport					74.52	75.49	76.18	75.41
Industrial processes					2.38	2.57	2.61	2.65
Solvent and other product use					1.20	1.51	2.04	2.70
Agriculture					14.12	13.34	13.23	12.95
Land-use, land-use change and forestry					0	0	0	0
Waste					7.78	7.09	5.94	6.29
In total (without CO_2 from LULUCF)					100	100	100	100

Table 5.7
Source: Latvian Environment, Geology and Meteorology Agency

In accordance with the provisions of the Kyoto Protocol, the total GHG emissions in Latvia in the period 2008 – 2012 have to be reduced by 8%, thus average annual GHG emissions in this period must not exceed 23,323 Gg CO_2 -eq. Figure 5.10 demonstrates that GHG emissions in the scenario "with measures" will decrease by 46% in 2010, compared to 1990 level and in the scenario "with additional measures" – by 49%; in 2020, these figures will be 35% and 45%. respectively That means that Latvia will be able fulfil its international commitments to reduce GHG emissions as stated in the Kyoto Protocol to the UN Framework Convention on Climate Change, also if no additional measures to reduce GHG emissions are implemented.

5.3 Methodology

The IPCC Common reporting format has been used for calculations of GHG emissions and CO_2 removals projections for scenarios "with measures" and "with additional measures". The amounts of GHG emissions and CO_2 removals in each sector were projected, considering measures described in Chapter 4.1. As different projection methods were used in each sector, short description of each method is presented below.

5.3.1 Long-term macroeconomic projection

The long-term macroeconomic projection up to 2020 is based on the long-term macroeconomic projections developed by the Ministry of Economic. The macroeconomic model for balancing the target indicators mentioned in the "Framework Economic Strategy

for Latvia", and calculation and forecasting of strategy implementation scenarios, was used in the calculations.

The macroeconomic model is developed on the basis of the National account system and consists of 7 interconnected parts.

1. The demography block defines the population size, its structure by sex and age groups.
2. Supply and price block comprises the consumer and producer prices, GDP deflator and deflators for sectors of the national economy and GDP consumption positions. In this block, growth rates for sectors of the national economy, productivity indicators, the number of employed, work payment level etc. are defined.
3. The demand block defines the GDP structure.
4. The income distribution block is contributed to the indicators of total revenue generation.
5. The budget block comprises an estimation of indicators for generation of tax revenues and budget expenditure.
6. The foreign trade block defines export and import structure by groups of products and services.
7. The correlation between the current account and capital and finance account is formed in the payment balance block.

GDP is projected in real and comparable prices (average prices of 2000). EUR is given in GDP real prices as well, considering that the Bank of Latvia has pegged LVL to EUR from 1 January 2005 at the exchange rate of the end of December 2004[38].

Latvian GDP is also given in purchasing power parity standard (in PPS units), using EUROSTAT data for 2000 – 2003.

Projections by economic sectors are calculated at two aggregation levels: the highest aggregation (8 sectors corresponding to the letter level of NACE[39] classification) and the lowest aggregation for processing industry subsectors (12 sectors that correspond to two-digit level of NACE classification). Projection data are summarised also in the aggregation of three sectors – agriculture, industry, and services.

5.3.2 Energy, including transport

The MARKAL model is used to obtain the results described in this report. In Latvia, this model has been used since 1995 when the first energy system description in the model was made. Latvian MARKAL system is constantly improved.

MARKAL (Market allocation) is a linear programming model for the flexible optimisation of a national energy system. It was developed to assess the impact of introduction of new energy technologies on the national and regional energy systems in and the environment. The MARKAL code is written in GAMS (General Algebraic Modeling System) language. GAMS is a modelling system for mathematic programming.

MARKAL is technologically orientated bottom-up model where both the supply and the demand of energy resources are considered. With MARKAL it is possible to model the flow of energy carriers in the energy system. The model chooses the optimal structure of energy system for each time period, minimising the costs and considering different restrictions. Such an approach has several advantages, for example, MARKAL does not require prioritisation of

[38] 1 EUR = 0.702804 LVL; source: http://www.bank.lv/lat/main/monetarapolitika/mp/
[39] Statistic classification of EU economic activities

GHG reduction measures as an input parameter, because the model itself chooses the best technologies and arranges them according to their economic indicators.

MARKAL model – for input information – needs projections on prices of energy resources as well as net energy demand or other parameters (energy service demands), for example, area of heated premises or mileage that would be covered reflecting the demand for energy. The consumption of electricity and centralised thermal energy is calculated by the model.

Changes in the amount of GHG emissions are influenced, among other factors, by the level of net energy demand. Net energy demand is specified for different subsectors. These net energy demands serve as input parameters in the MARKAL model, they are projected outside of the model. The demand for energy is directly related to the economic development. Growth rates of the total demand for net energy of the national economy sectors (households, services, industry, transport) and other parameters modelled by MARKAL, are presented in Table 5.8.

Growth rates of total demand for net energy by national economy sectors modelled by MARKAL, 1999 – 2019, %

	1999[40]	2004[41]	2009	2014	2019
GDP annual growth	3.3	8.9	6.2	5.6	5.1
Annual growth of net energy demand	-4.6	1.6	2.0	2.1	1.9
Agriculture	-17.3	1.2	1.5	1.2	1.2
Services	-11.7	1.9	2.8	2.5	2.2
Households	0.5	0.9	0.6	0.6	0.6
Industry	-3.5	0.7	3.5	3.7	3.0
Transport	-0.7	6.3	2.4	2.5	2.6
Flexibility (consumption increase / GDP growth)	-1.25	0.18	0.33	0.38	0.38

Table 5.8
Source: Ministry of Economics

Price projections for imported energy resources (oil products, natural gas, coal) are made, using the projections given by the World Energy Organisation (WEO) in 2002. Prices for local energy resources depend no the geographical location, therefore they can differ in a great amplitude.

Costs for the supply of energy resources (transportation costs) are considered for each sector in the model. Internal cargo transportation, storage, fuel filling station and other costs are included in the supply price of energy resources. The supply systems for electricity, centralised heating and natural gas are presented as separate technologies in the model.

Emissions from the road transport are estimated, using the COPERT III model (Version 2.2) but for other means of transport not used in road traffic and other mechanisms – using fuel consumption projections by the MARKAL model.

COPERT III (Computer Programme to calculate Emissions from Road Transport) is MS Windows programme for calculation of emissions of air polluting substances from motor transport. COPERT calculates emissions of all defined substances that are polluting air (CO_2, CH_4, CO, NO_x, NMVOC, SO_2 etc.), from different types of vehicles (cars and lorries, mopeds and motorbikes). The COPERT III model is part of CORINAIR programme.

The following parameters are used in the COPERT III model for the calculation of emissions:

- number of vehicles by type (cars, freight cars, trucks, buses, mopeds, motorbikes);
- breakdown by the type of fuel (petrol, diesel, gas);

[40] Source: Central Statistical Bureau of Latvia
[41] Macroeconomic projection is drawn up on the basis of long-term macroeconomic projections up to 2020 developed by the Ministry of Economics

- breakdown by the age and the type of engine (for cars), mass and fuel (for trucks and buses);
- driving regimes (city, highway, roads with gravel covering) etc.

By using the data of the Ministry of Transport about the mileage of different types of vehicles, its growth on roads of different significance, fuel consumption and its projections for the respective years, it was possible to assess indirectly also the total number of vehicles of the different types, assuming that the average mileage of vehicles does not change considerably over time (the calculation of emissions in 1990 – 2002 supports this assumption indicating that the average mileage does not change considerably over time). Therefore, it was assumed that the number of vehicles increases proportionally to the number of projected kilometres.

The following main conditions were included in the transport sector:

- equipping the cars that use petrol and diesel with catalysers that considerably reduce CH_4 emissions, however, at the same time increasing N_2O emissions. By 2020, practically all cars will be equipped with catalysers;
- as CO_2 emissions in the transport sector are directly dependent on the amount of fuel consumed, in the scenario "with measures" they continue to grow together with the increase of fuel consumption. In 2020, GHG emissions in the scenario "with additional measures" are approximately 45% lower. This is due to increasing consumption of biofuel (20% of the total fuel consumption) and lower average fuel consumption per kilometer, compared to previous years;
- CH_4 and N_2O emissions are directly dependent on the fuel consumption and technologies in the transport sector. The number of vehicles consuming the respective types of fuel is equal in the two scenarios, the difference in emissions explained by lower fuel consumption in the scenario "with additional measures".

5.3.3 Industrial processes

In the development of projections for the production volumes of particular products, the following main assumptions were used:

- the demographic trends characterised by gradual decrease of the population of Latvia, will continue;
- stable and comparatively rapid economic growth will continue without considerable crises;
- growth rates of the construction volumes will remain high, particularly up to 2010. It is considered that significant financing of EU funds will be diverted for infrastructure development, building and motor road construction included, int.al. also in next period of fund planning after 2007;
- upon Latvia's accession in EU, active process of structural reforms is going on that allows increasing of economic competitiveness, that is, business environment is improving, there is an essential investment in arrangement and improvement of infrastructure, innovations are facilitated, investment in the development of human resources is increasing, balance regional development is provided and effective system for environmental protection is organised;
- in correspondence with tasks set in the documents of planning economic policy, gradual share growth of high and medium technologies will take place in total value added structure of industry and export structure and added value and labour force productivity will increase as well in the sectors of traditional industry. Therefore, the growth of volume of output expressed in physical units of

measurement will stay behind from the growth rates estimated in terms of money in several projected sectors in most of cases;

- with regard to products and product groups where in Latvia there are only one or several manufacturers of a respective product, it is assumed that new relevant companies will not be established that could not be, of course, fully excluded.

The models and methodology used in projections were chosen individually for each type of production. An initial qualitative research was carried out, evaluating the number of producers in Latvia, the main consumers of the product, the most important factors affecting consumption levels of the product, the extent to which foreign trade influences the production volumes, potential correlation of the production volumes with the population size or the dynamics of particular macroeconomic indicators.

The collection and analysis of statistical data was the next stage in the development of projection. It should be noted that pursuant to the "State Statistics Law", the actual volume of output for several types of projected products is confidential information because only one company or a small number of companies produce this type of prouct in Latvia. Where official production statistics were not available, information provided directly by producers or expert assessments were used, taking into account statistical data from previous years, development trends of the sector and the production capacities available in Latvia.

Finally, when all of the above-mentioned information was collected, appropriate methodology and model were chosen for each production type. The models used comprise mathematic projection methods, expert assessment methods and combinations of these.

5.3.4 Solvent and other product use

The projection of emissions from solvent and other product use is based on long-term macroeconomic projections and analysis of statistical data on production, import and consumption of paint and varnish in the period 1990 – 2003. In the development of projections of GHG emissions for companies manufacturing paint and varnish materials, the following input parameters were considered:

- data on dynamics of actual volume of output, import and export in Latvia;
- data on dynamics of the construction volumes in Latvia;
- projections of the Ministry of Economics on the growth of construction volumes up to 2020.

5.3.5 Agriculture

In the "Scenario of macroeconomic development and fiscal policy for 2004 – 2008" developed by the Ministry of Economics, it is stated that different factors will have an impact on the development of agriculture in next years, including the growth of private consumption, adaptation of agricultural production units and products to international standards and quality criteria and the production intensification. Agricultural development will also be influenced by the growth of external demand, mainly from Russia. Thus the volumes of agricultural output are expected to grow by approximately by 3–4% annualy in comparable prices in the following years. In the medium term a considerable reduction of the number of employees in agriculture and an increase in productivity are expected. The development of the sector will also depend on the implementation of the national rural policy and the use of financial and non-financial means of support, the most significant of which are SAPARD, measures described in the "Rural Development Plan" and "Development Plan (Framework Document) for Latvia for 2004 – 2006", direct area-dependent payments (additional direct payments for areas of field crops and forage crops, etc.) and national subsidies for agriculture. Due to Latvia's accession to the EU, the output growth will depend

on agricultural quotas allocated by EU. The GDP share of agriculture is expected to gradually decrease in the medium term.

To prepare this chapter, the following documents prepared by the Ministry of Agriculture were used: "The Rural Development Plan of Latvia for the Implementation of the Rural Development Programme for 2004 – 2006", "Rural report of 2003", the programme "Production and Use of Biofuel in Latvia for 2003 – 2010" and the "Action Plan to Implement the Programme "Production and Use of Biofuel in Latvia"".

5.3.6 Land-use, land-use change and forestry

For the projection of the forestry sector development, information from the State Forest Service database, data from the State Land Service and modules and studies developed by experts within the "Latvian National Programme for the Development of Forestry and Related Sectors" have been used, as well as assessments by specialists from the Ministry of Agriculture and other forestry experts.

In the projections of the changes in the forest land area, surveillance data of agricultural land reflecting the trends in the management of agricultural land, are considered as well as the anticipated support for afforestation of unmanaged agricultural land and shrubs according to the "Development Plan of Latvia".

The annual increase in the growing stock in forest stand and the total growing stock volume are modelled, using data from the State Register of Forests. The total growing stock in the scenarios is estimated in accordance with wood resources available for logging.

For the scenario "with measures" it is assumed that:

- the changes in the areas of forest land will not be influenced by the conversion of forest to other types of land-use and increase of forest area will be equal to the new areas of forest;
- the ratio of coniferous and deciduous trees in managed forests will not change, assuming that the specially protected territories where no commercial activities may take place will be established proportionally in both coniferous and deciduous forests, and the cutovers will be regenerated using the same tree species;
- in accordance with the defined support, 1000 ha of agricultural land will be afforested anew every year;
- the present ratios of tree species will remain unchanged, that is, 35% of the established new forest will be coniferous forest and 65% - deciduous forest;
- the regeneration of forest areas will not be done with a different tree species;
- the proportion of cutovers not restored in time specified in regulatory acts, will remain the same;
- the area of shrubs (other areas covered with trees) will not change;
- 90% of all unmanaged agricultural lands earlier or later (by 2020) will get covered with trees and shrubs;
- forest establishment will take place in areas, which are not covered naturally with trees and shrubs;
- annual growth of growing stocks (m^3/ha) will not change (neither due to climate change, nor as a result of purposeful forestry practice) and forest stands will retain the present growing speed, annual growth of growing stocks will not change for shrubs, cutting areas and unfinished afforestation, as well as shrubs in unmanaged agricultural land.

For the scenario "with additional measures" it is assumed that:

- support for the afforestation of unmanaged agricultural land will increase and annually 2000 ha of new forest will be established by 2020;
- the area of specially protected territories will not change;
- the regeneration of the cutting areas will not be done by changing the species;
- the area of shrubs will decrease, since forest will be established in both agricultural areas and the areas of shrubs;
- areas unmanaged agricultural land will reduce proportionally because of afforestation activities or non-traditional agricultural practices.

Wood resources available for felling are modelled, using a model developed especialy for this purpose.

Pursuant to the "Forest Law", different approaches exist for setting criteria for clear-felling, depending on forest ownership (state/other). Thus, in other forests the criteria for clear-felling, is the age or minimum average diameter of the trees of prevailing species in the forest stand. Potential felling volumes in the state forests are estimated using the Moyseev algorithm, which essentially levels out the distribution of forest stands according to the age classes. Where the distribution of existing stands by age is unbalanced, the fully grown or overgrown stands need to increase or new stands need to be felled which is in contradiction with age restrictions stated in the "Forest Law".

5.3.7 Waste

The projection of emissions from the waste sector is based on analysis of statistical data in the time period of 1990 – 2003, analysis of data in the database "Waste – 3" maintained by the Latvian Environment, Geology and Meteorology Agency and the long-term macroeconomic projection.

In the development of projections of GHG emissions from the waste sector, the following input parameters were considered:

- macroeconomic projection on dynamics of the population size up to 2020 and GDP growth in the sector of industry and agriculture;
- assumption on the amount of municipal waste generated per capita;
- dynamics of the total amount of waste generated and the amount of waste recycled in Latvia;
- requirements of the Directive 1999/31/EC that define that the amount of biologically degradable waste for disposal must not exceed 75% in 2010, 50% – in 2013, 35% – in 2020 of the amount of biodegradable waste for disposal in 1995.
- amount of CH_4 collected in "Getlini EKO" Ltd. landfill will increase by 6.5 mln m^3 up to 8 mln m^3 in 2009 and then stabilise, "Liepaja RAS" Ltd. will produce 1.9 mln m^3 CH_4 emissions annually.

5.4 Sensitivity analysis of projections

The main risk of the macroeconomic projections is related to fluctuations of external demand. Poor external demand will slow down the development of national economy, particularly in the sector of industry. A decrease of external demand by 1% reduces the development of the manufacturing industry by 0.8 percentage points, accordingly the GDP development will decrease by 0.75 percentage points.

The internal demand has greater impact on the GDP growth in the near future. The determining factors for the internal demand are household consumption and investment – the main stimulus for growth in the past three years.

The price change factor has greater impact on the short-term projections compared to long-term projections. the rapid inflation growth last year made The Bank of Latvia and the Ministry of Finance change the projections of price dynamics several times. However, GDP projection in comparable prices and emission projections based on it, are influenced insignificantly by the uncertainty of prices. Rapid increase of prices affects the nominal value of GDP both in LVL and EUR which may make international comparisons more difficult.

A rapid increase in the price of a particular product, especially for energy resources as it was observed recently, results in changes in relative prices and affects the choice of resources. The projection model includes these price fluctuations only in short-term projections. This impact is minimal in long-term projections.

Changes of the amount of GHG emissions are also influenced by the level of net energy demand. For the the scenario "with measures ", the average annual growth of net energy demand for the time period 1999 – 2019 is 1.9%. In 1999 – 2004, the net energy demand increased by 0.22 – 0.38 percent for one GDP growth percent or 0.30 percent for one GDP growth percent for the time period 1999 – 2019.

Considering that the share of the energy sector in the total aggregated GHG emissions is close to 80%, GHG emissions from energy, including transport, are compared for scenario "with measures" at 5% higher and 5% lower level of net energy demand in 2010 and 10% higher and 10% lower demand level in 2015 and 2020, using the MARKAL model (Figure 5.3.1).

GHG emissions from energy, including transport, for scenario "with measures" at different levels of net energy demand, Gg CO_2 -eq.

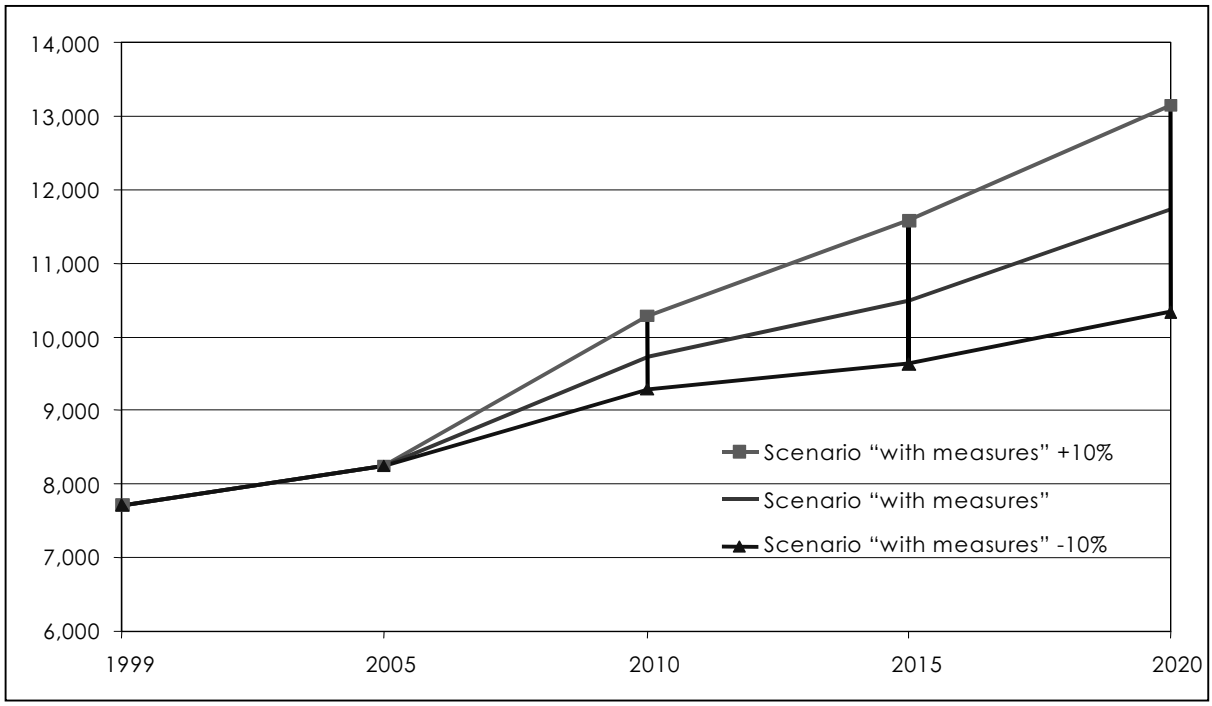

Figure 5.11

Factors of EU agricultural policy may considerably affect the projections in **agriculture**. EU has adopted the thesis that agriculture fulfils three mutually dependent crucial tasks – ensure the output of relevant agricultural products in respective climatic conditions, carry out environmental and nature protection measures and keep rural areas inhabited. The essence of the agricultural policy is:

- to decrease the prices of agricultural produce to make it more competitive in the global market;
- introduction of compensation payments to cover losses incurred by the decrease in the prices of agricultural produce;
- provide compensation for the introduction of particular restrictions in the production of agricultural products (reduced use of mineral fertilizers, extensive management, afforestation of agricultural land, etc.).

Climatic factors may also introduce corrections in the projections and they are practically beyond human influence.

Further developments in the modernization of cereal and rape pre-processing (currently the drying capacity is insufficient) can introduce corrections in the projections as well, particularly – in years with rainy harvesting conditions. Also the insufficient capacity of modern storage facilities may present difficulties.

The projection risk in the **forestry** sector is related to the availability of support mechanisms for the owners of unmanaged agricultural land and private forests. Without the support payments, landowners lack motivation to carry out the forest establishment activities in unmanaged agricultural land. Likewise, sustainable management of private forests and forest lands will be endangered, if investment is not attracted for the improvement of the economic, ecologic and social value of forest. In small forest properties (on average 8 ha), it is considerably more difficult to implement sustainable forest management principles. Besides, new owners of forests lack knowledge about forest management and market economics. In the the past ten years, 41–75% of the total annual growth was felled in Latvia. The felling volumes in private forests, mainly in due to poor economic situation in rural areas, exceeds forest regeneration by several times.

In order to maintain the availability of sustainable resources and compensate for the losses in the ten years of independence, the forest regeneration has to be carried out in the area of 18 thousand ha and the cultivation of young forest stands in the area of 43 thousand ha every year in private forests.

6. CLIMATE CHANGE IMPACT, VULNERABILITY ASSESSMENT AND ADAPTATION MEASURES

6.1 Climate change impact

Studies of seasonal and long-term fluctuation dynamics of climatic indicators (air temperatures, precipitation aggregate, wind, air humidity, snow cover, cloudiness, radiation balance, etc.) are essential aspects of the global warming impact assessment. Direct indicators of climate change in Latvia can be obtained from meteorological and hydrological observations carried out by LEGMA.

Calculations and surveys carried out by LEGMA demonstrate that increase of the mean annual air temperature in the 20th century has been around 1°C. According to observations in 22 meteorological stations, the mean temperature in the territory of Latvia in the long-term period (1950 – 2003) is + 5,8°C. the range of fluctuations of the mean annual air temperature is 2,2°C; the lowest annual temperature +4,7°C has been detected at Zoseni meteorological station, located in Vidzeme highland and at Aluksne meteorological station (Figure 6.1), whereas the highest temperature of +6,9°C was detected at meteorological station of the University of Latvia located in Riga and Liepaja meteorological station located in the coastal lowland.

Annual mean air temperature (C°) for 1950 – 2003

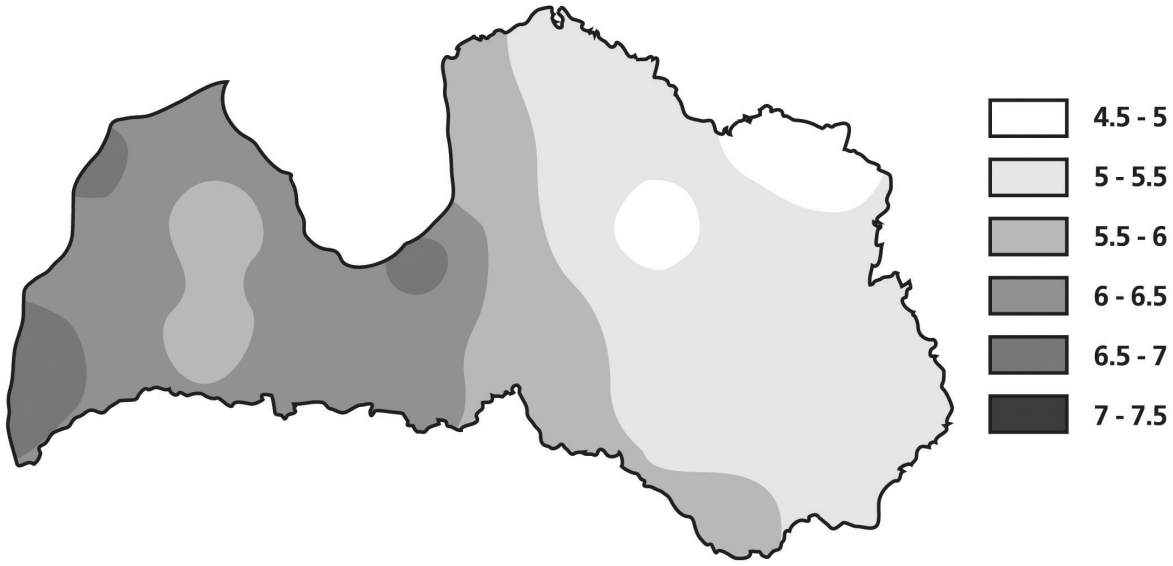

Figure 6.1
Source: Biology institute of the University of Latvia (in accordance with observations of LEGMA)

In order to identify long-term trends, the non-parametric Man-Kendal test[41] was applied. This test has been developed for evaluation of the variation of hydro meteorological phenomena that are characterised by high seasonal variability and presence of extreme values. Man-Kendal test was applied to each variable at each sampling point with the significance level of $p<0.05$. The test determines that a trend is statistically significant at 5% level, if the result of the test is above 2.0 or below -2.0.

Results of Man-Kendal test testify that annual mean air temperature for the period of 1950 –2003 has considerably increased in all 22 meteorological stations.

[41] Source: Hirsh and Slack, 1984

Prevailing west flow provides the whole territory of Latvia with a sufficient amount of precipitation – on average 703 mm annually. The minimum amount of precipitation is in the period of February and March, when the mean monthly amount of precipitation is 26–39 mm (Figure 6.2).

Monthly mean, maximum and minimum precipitation sums for 1950 – 2003 (summary of precipitation sums from observations in 24 stations)

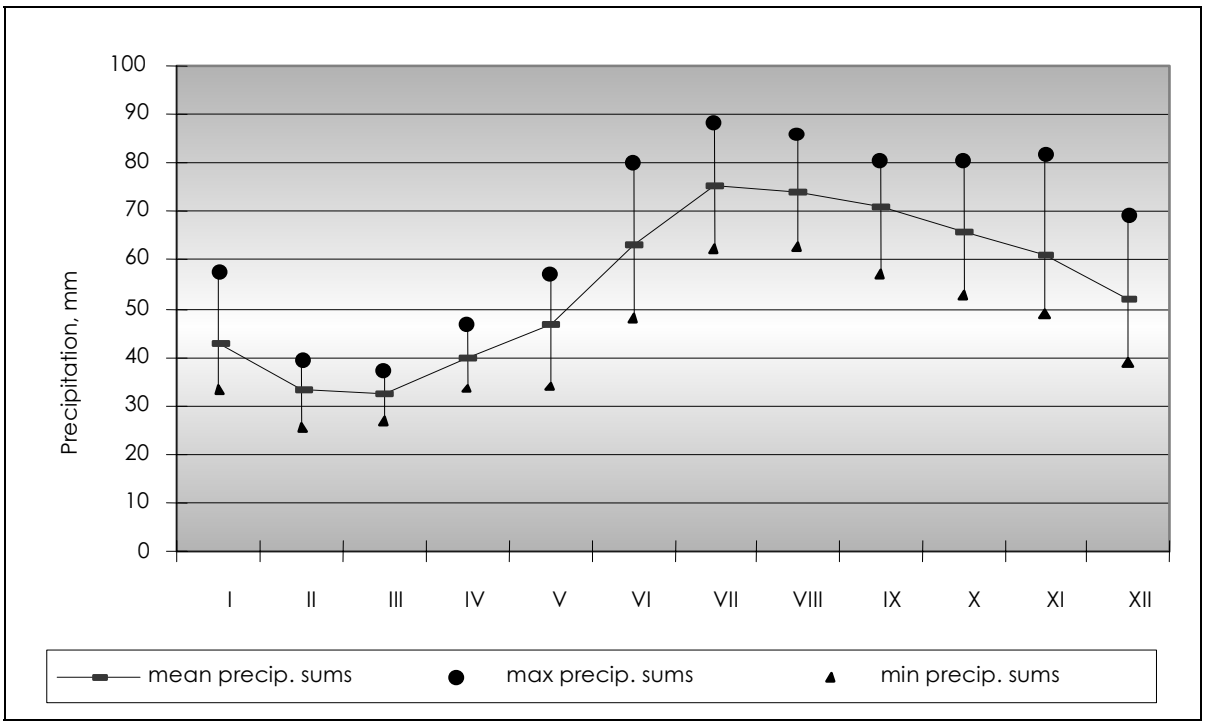

Figure 6.2
Source: Latvian Environment, Geology and Meteorology Agency

Analyses of long-term precipitation series testify that in general the sums of precipitation in Latvia for the period of the past 50 years tend to increase. Months during which the amount of precipitation had maximum increase since 1950 are January, March and February. Whereas, trend of significant decrease in the precipitation amount in the annual period is identified only in September.

A sensitive climate change indicator is the snow cover, as it is directly dependant on air temperature and precipitation amount. Thickness of snow cover and its existence time are important aspects for growth of various plants but particularly for agriculturally cultivated plants. In the cold period of the year when the air temperature is mostly below zero, snow cover is typical for Latvia but snow cover existence time varies regionally and is determined by the distribution of air temperatures.

Results of calculations carried out by LEGMA demonstrate that in the period 1951 – 2000, on average every fifth winter in Riga, every third – in Liepaja has been without stable, persistent snow cover. Long-term fluctuation character of snow cover may be considered as an important climate change indicator. In order to evaluate the long-term fluctuation character of snow cover, the non-parametric Man-Kendal test was applied. Calculation results of trends for snow cover long-term fluctuation character demonstrate that in general, the length of snow cover period in Latvia during the past 50 years has decreased (except fluctuations of snow cover length in Dzerbene and Liepaja stations where the snow cover existence time, although statistically not significantly, has increased).

Investigations of ice regime are important due to three reasons: a) the dates of freezing and melting of many lakes and rivers have been registered in Latvia long before scientific

observations were carried out, b) ice regime effects hydrological regime in the period of maximum discharge of accumulated atmospheric precipitation; c) ice regime is a sensitive and objective indicator of climate change.

Using data from LEGMA coastal observation stations, the dates of the first ice appearance and total ice disappearance and trends of their change in the long-term were analysed. Results of analyses indicated that changes of ice regime in the coastal area of the Baltic Sea and the Gulf of Riga are not similar. For the winter period 1928/1929 to the winter period 1999/2000, dates of initial ice appearance on the coast of the Baltic Sea (Liepaja) tend to become earlier but in the Gulf of Riga (Salacgriva) – later (Figure 6.3).

Dates of appearance of the first ice and trends

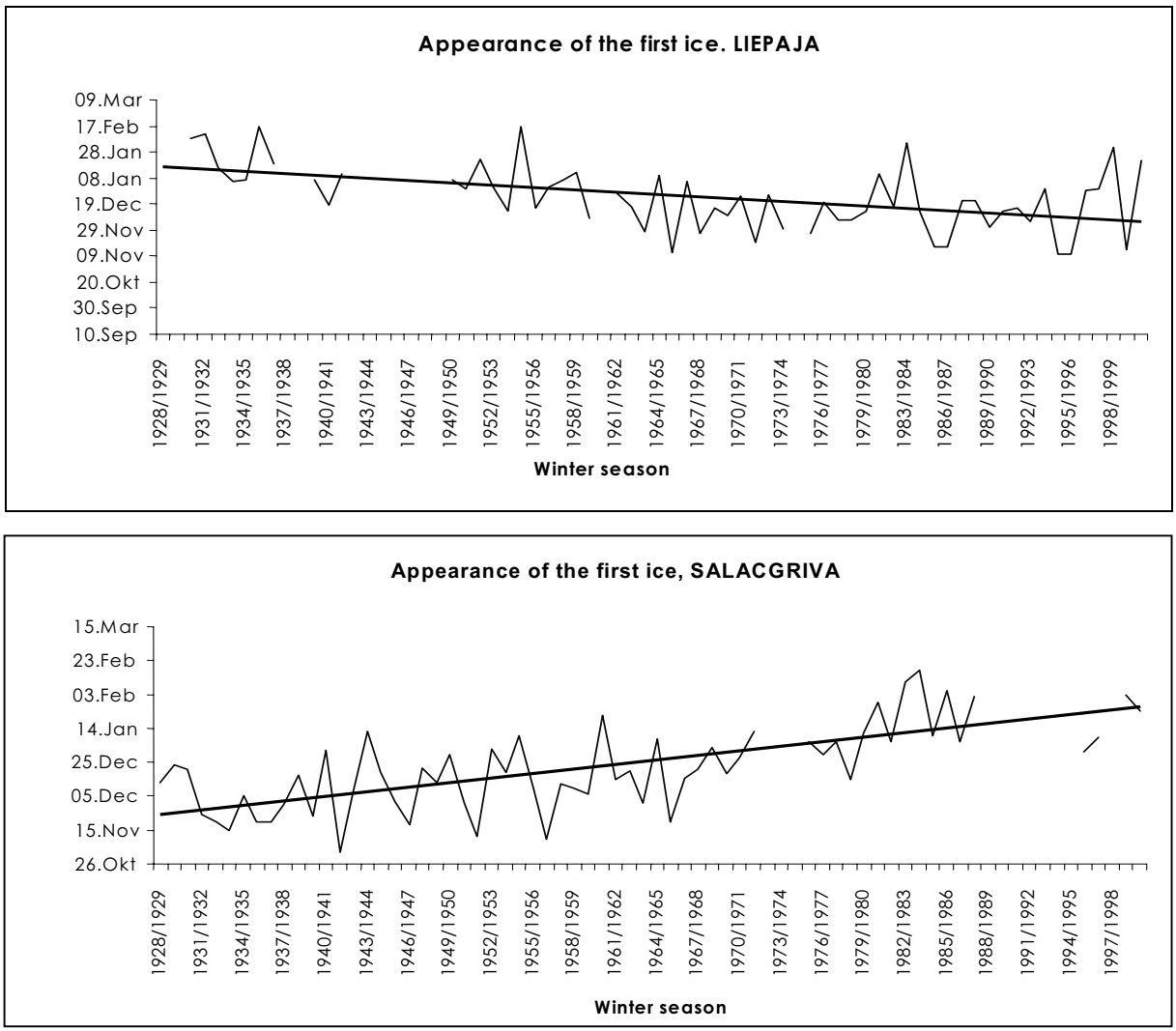

Figure 6.3
Source: Latvian Environment, Geology and Meteorology Agency

The dates of the start of ice moving in rivers tend to become earlier, therefore the start of high-water is earlier as well, which explains the increase of winter runoff in the rivers of Latvia.

6.2 Vulnerability assessment

6.2.1 Changes in the coastal zone

The total length of the Latvian coastal zone is 496.5 km. It mainly consists of sandy beaches and dunes. Gravel, pebble or boulder covered beaches are more rare and there are hardly any steep coasts. In the areas of sand accumulation beyond the beach, 1–4 m high pre-dunes with typical vegetation have formed. Beyond these, there is typically a belt of grey dunes and forest-covered coastal dunes dominated by pinetrees.

The impact of climate change in Europe and the territory of Latvia can be detected also by long-term changes in the coastal zone. One of the most dangerous consequences that may take place as a result of climate change is the increase of sea level in the coastal areas and consequently, overflowing and wash-off of the coastal zones. Fluctuation of water level in the Baltic Sea and the Gulf of Riga depend mostly on the wind-borne ebbs and flows.

Results of analysis of data from LEGMA coastal observation stations on the long-term sea level changes, led to the conclusion that the water level of the Baltic Sea coast for the period from the end of 19th century to the beginning of the 21st century (1875 – 2000) tends to rise.

One of the features of climate change is the increasing frequency and intensity of extreme natural phenomena. This is demonstarted, among others, by the increasing trend of the extreme values for the sea level. In the latest water level rise observed in January 2005 during a storm, the sea level rapidly rose in all observation stations, and the maximum water level in the stations of the western coastal area of the Gulf of Riga (Mersrags, Roja, Kolka) exceeded the respective maximum values observed during the rising in 1969 and 1967.

The main threats for the coastal area of Latvia are presented by the relatively frequent and severe South-West, West and North direction storms that make considerable drifts of the Baltic Sea water mass in the coastal zone with the relative sea level rises of 1,7m – 2m and higher. Due to that, the overflow of low coastal territories and wash-off of the coast, dunes, populated territories, buildings, roads and forest and agricultural areas occur.

Studies made in Latvia[42] demonstrate that over the past 100 years land areas in some places have extended by 50–200 m (in Irbe Strait from Luzna to Mikeltornis), however in most cases, the territories of land have receded and the width of the washed off coastal belt is 50–150m (in Nida, Bernatu Dune, in the section of Ulmale-Jurkalne bluff at the Baltic Sea coast, also in the Gulf of Riga in the coastal area of Kolka, Engure, Bigaunciems). By the end of 1970s, the erosion rate of the coast was 0.5-1 m, at some locations 1.5 m per annum, however during the past decades the erosion rate has increased 2–5 times.

6.2.2 Vegetation changes according to phenological observations

In the 21st century the importance of phenology, the research subject of which is the regularity of seasonal natural phenomena, is increasing, as phenological observation data provide good characterisation of the periodicity and interlinkages of natural phenomena as well as their dependency on environmental conditions and climate indicators. Long-term phenological changes may serve as global climate change indicators.

The vegetation period in Latvia has increased on average by 8 days. Over the time period 1965 – 2000, the mean vegetation period of the birch-tree was 144 days, in the past decade – 152 days.

The rapid transformation of biota is also demostrated by changes in the forest stand structure (the most conservative element of the landscape vegetation) in the 20th century. Typically, the ratio of coniferous stands has decreased and the ratio of deciduous stands has increased in this period. Changes in the ratio of various tree species is related mainly to land-use change (natural and artificial afforestation of non-agricultural lands) and climate impact (increase of temperature and precipitation), as well as soil eutrofication.

[42] Source: Eberhards, 2004

Transformation of plant and animal species and their systems occurs under the impact of three main, interconnected factors: environmental factors – human economic activities, climate fluctuations (currently, the climate warming) and environmental enrichment (eutrophication). Currently, the indicators for intensive biota transformation in Latvia are the change in the number of species and in the share of the prevailing tree species in forest stands ocurring as a result of the above mentioned environmental factors.

Over the time period of the past 10 years (1995 – 2005), the area occupied by coniferous trees has decreased by 5% (spruce by 10%, pine-trees by 3%); the area occupied by deciduous trees has increased by 12% (aspen by 52%, grey alder by 27%, black alder by 13%, birch by 6%). Increase in the area covered by deciduous tree stands is related to the rapid advancing (intensive use of forests, afforestation of agricultural lands) of forest pioneer species (birch, aspen, grey alder). Whereas, one of the main reasons for increase of the areas of black alder is increase of precipitation amount.

In recent years, the area covered by stands of broad–leaved trees has decreased: oaks by 2%, – and the more widespread broad-leaved tree species, the ash-tree – by 12%.

During the past decades, the biota of Latvia, and environment in general, has become more dynamic, the invasion of new species of flora and fauna occurs considerably faster, biocenosis and biotopes are changing. This process is reflected by the increase of the number of foreign species that has occured during the past decades of the 20th century. Especially adverse impacts to the economic development of the country already in the near future, may be caused by the rapid increase of the ratio of unstable forest pioneer stands (birch, aspen and grey alder) and the degradation of stable or so called climax forest stands (stands of spruce, oak and ash-tree).

6.3 Regional and global measures to adapt to climate change

Monitoring and science may create the preconditions for the development and implementation of adaptation measures. The "National Program on Biological Diversity" comprises the conclusions that the need for different environmental protection measures and change of sectoral development policies, development of corresponding legal acts and economic instruments, can be justified by observation of natural processes and accumulating information as well as studying individual indicator species or ecosystems.

As the cultivation of forest is one of the most important measures on the global scale, and Latvia has always been rich in forests, the following measures can be considered to be of national importance:

- preservation of biological diversity and quality of forests (by preserving the regulation of climate and water regime and protecting soil from desiccation as well);
- afforestation of non-agricultural lands, thereby increasing CO_2 removals;
- maximum rational use of wood and its products;
- improving the knowledge of forests owners, managers and general public on the issues of biological diversity of forests and the significance of forests in ecological improvement.

Latvia typically has a mosaic-type landscape formed as a result of the development of natural factors, land management and the community. The structure of land-use demonstrates that in 2003 45% of the land was covered by forests, 38% – by agricultural lands, 4% – by water, 4% – by marshes, 2% was taken up by roads, 2% – by shrubs and 4% – other.

The rate of afforestation in the future is projected according to the expected state support to afforestation of shrubbery and unmanaged agricultural land, whereby about 1000 ha of the new forest land are expected every year.

In the past 20–30 years, the force of devastating autumn and winter storms in Latvia (as observed also elsewhere in Europe and globally) is increasing and the drifts of wind born water mass in the coastal area are getting higher. At the same time, winters are getting warmer – without coastal ice in the shallow sea zone and freezing of soil. As a result, erosion of the coast increases. As 62% of the 496.5 km long coastal line (corresponding to 27% of the total border length) in Latvia is considered as an area of increased risk from erosion, every year the monitoring of the geological processes on the sea coast is carried out within the scope of the National Environmental Monitoring Program. The low sandy coasts with dunes (the Baltic Sea coast from Pape to Jurmalciems and around the furthest point on the western coast of Latvia) are most vulnerable to erosion.

About 2% of the total coastal line is occupied by coastal areas reinforced with hydro-technical constructions and port territories. Therefore one of the essential measures to minimise the adverse effects on the coastal processes leeward of piers (to decrease erosion of the coast) caused by ports, the external hydro-technical structures and navigation channels is the dumping of the ground regularly removed from port aquatoria and ship waterways in these shallow water zones (5–6 m).

It is worth noting that more than one million inhabitants constituting a little less than half of the total population, live in a 5–10 km wide area along the coast of the Baltic Sea and the Gulf of Riga. It is important to protect the pre-dunes from trampling (especially in the summer) and construction. The "Law on Protected Belts" (1997) defines the principles for establishing a protected zone along the coast of the Baltic Sea and the Gulf of Riga – this belt is established to decrease the impact of pollution on the Baltic Sea, preserve forests for their protective function, avert the development of erosion process, protect the coastal landscape, ensure protection, preservation and sustainable long-term use of coastal nature resources and other important public territories, including those needed for leisure activities and tourism.

Aware of the vulnerability of Latvia to the expected climate change impacts in the Baltic Sea region (change of precipitation, temperature, river run-off and ice regime, vegetation period, increased frequency of severe storms and flooding, change of flora and fauna, etc.), a national adaptation programme will be elaborated.

7. RESEARCH AND SYSTEMATIC OBSERVATIONS

7.1 Scientific research

In Latvia government funding is available for scientific research on the use of environmentally friendly, GHG emissions reducing and innovative technologies. The "National Innovation Programme for 2003 – 2006", aimed to facilitate an increase in the national innovation capacity, and the "National Lisbon Programme of Latvia for 2005 – 2008", stating that one of the priority tasks in scientific activities is the development of applied research of innovative technologies, were adopted in 2003. Currently, the national innovation system in Latvia in general is underdeveloped and does not ensure innovation capacity needed to increase state competitiveness. According to data of a survey, carried out by the Central Statistical Bureau of Latvia, only 18.6% of all enterprises on average were innovative in the period 2001 – 2003.

One of the main factors, delaying the development of applied science, the market penetration of research results and innovative business development in Latvia, is the low level of public and private investments in research and development. In the "Framework Economic Strategy for Latvia" it is stated that in 2010 expenditure on innovation should reach about 1.5% of GDP. To provide the necessary number of qualified young scientists and specialists, the "National Lisbon Program of Latvia for 2005 – 2008" envisages an increase in the number of positions financed by the national state budget, in natural, engineering and environmental sciences, by providing additional government funding of 1.2 million LVL.

Research on technologies for the use of various alternative energy sources (biomass, solar, wind) and tentative technological solutions to increase energy performance, are carried out by several scientific research institutes and higher education establishments in Latvia: Institute of Physical Energetics of the Latvian Academy of Sciences, Institute of Solid-state Physics and Institute of Microbiology and Biotechnology of the University of Latvia, Riga Technical University, Latvia University of Agriculture. Every year Latvian Council of Science allocates funding for fundamental and applied research projects, thereby increasing support to scientific research on climate change impacts and adaptation. Current support to scientific research in the area of climate change impact is provided in several sectors.

Over the time period 2001 – 2004, the following studies with climate change relevance were funded by Latvian Council of Science:

1) "Biofuel production technology and implementation potential in Latvia", implementation period 1997 – 2001, total funding allocated – 122,446 LVL;
2) "Methodologies for determining tariffs and prices of energy resources and fuels for a balanced development of the energy sector in Latvia", implementation period 2001 – 2003, total funding allocated – 16,343 LVL;
3) "Optimisation of fuel reserves in energy market liberalisation environment", implementation period 2001 – 2004, total funding allocated – 7,567 LVL;
4) "Methodical aspects of the use of local and renewable energy sources, technical, economical and ecological problems in the environment of innovative economics", implementation period 2001 – 2004, total funding allocated – 7,567 LVL;
5) "Identification of possibilities for energy accumulation and processing for the energy supply of Latvia", implementation period 1997 – 2001, total funding allocated – 2,456 LVL;
6) "Strategy on energy efficiency and energy savings for the development of fuel and energy complex of Latvia", implementation period 2001 – 2003, total funding allocated – 5,540 LVL;

7) "Application of modelling methods for the assessment of the development of fuel and energy complex of Latvia, including energy, economic and environmental factors", implementation period 2001 – 2004, total funding allocated – 22,606 LVL;

8) "Power activity of multi-component biofuel in internal combustion engines", implementation period 2001 – 2003, total funding allocated – 30,964 LVL;

9) "Development of energy-efficiency and technical measures needed to provide pig keeping conditions compliant with EU requirements, by using biogas produced from agricultural waste and other alternative energy sources", implementation period 2001 – 2003, total funding allocated – 38,714 LVL;

10) "Study of the characteristics of wood produced in Latvia and the potential to use wood processing waste and energy-wood", implementation period 2001 – 2003, total funding allocated – 6,588 LVL;

11) "Assessment of the potential of environmentally balanced fuel production and use in the energy balance of Latvia", implementation period 2004 – 2007, funding allocated in 2004 – 1,279 LVL;

12) "Integration of rational energy use technologies for the development of the fuel and energy complex in Latvia, 2002 – 2005", implementation period 2002 – 2005, funding allocated for 2002 – 2004 – 131,703 LVL;

13) "Biotechnological conversion of renewable resources and the use of the products, 2002 – 2005" implementation period 2002 – 2005, funding allocated for 2002 – 2004 – 111,000 LVL.

The national budget program "Latvian Environmental Protection Fund" provides funding for various research projects on GHG emission reduction and implementation of related environmentally friendly technologies. In 2005 this program funded the following climate change related projects:

1. "Introduction of long-term planning instruments in the assessment of development scenarios for climate change, emissions reduction and renewable resources";
2. "Development of method for modelling emission projections and reduction strategies and its application in the transport sector";
3. "Global fluctuations of climate and measures to reduce their impact in Latvia";
4. "Potential of biofuel, possibilities and setbacks with regard to the implementation of EU Directive 2003/30/EC in Latvia";
5. Studies "Providing education on climate change in Latvia" and "Financial resources, financial investments and activities to provide technologies";
6. "GHG emissions reduction by increasing energy performance of public buildings";
7. "Mapping of territories unsuitable for construction of wind farms in Kurzeme according to the requirements of EU Birds Directive and Natura 2000 network".

Financing for scientific research is provided also by commercial organizations allocating funds for research they are particularly interested in (e.g. Joint Stock Company "Latvia State Forests" – on preservation of biological diversity and sustainable use of forests etc.).

In 2005, the following studies were carried out to elaborate the "Strategy for Renewable Energy Sources": "Introduction of long-term planning instruments in the assessment of development scenarios for climate change, emissions reduction and renewable resources", "The potential, opportunities and barriers for biofuels regarding the implementation of EU

Directive 2003/30/EC in Latvia" and "Identification of development zones for wind energy equipment and development of measures to reduce their impact". A study on "Biogas production possibilities in Latvia, using by-products of agricultural production and processing of agricultural produce" was commissioned within the scope of research work carried out to elaborate the "Program for biogas production and development". Research work is also carried about target groups of biofuel users (public transport, internal water transport vehicles, wood processing equipment) and consumption volumes, potential for the development of environmental technologies in Latvia, policy instruments and main directions of activities to facilitate the development and use of these technologies, fluorinated GHG use.

7.2 Systematic observations

7.2.1 Meteorological observations

The first systematic meteorological observations in the territory of Latvia started at the end of the 18th century (in 1795 in Riga), and permanent meteorological observation network was already established by the end of the 19th century. Data of these observations present valuable material for research on climate change in the territory of Latvia.

In the course of time, the observation timing, instruments, location of observation stations have changed, therefore research on homogeneity of historical observation series is important in order to obtain reliable results.

Nowadays, meteorological observations of LEGMA are carried out in 63 observation stations, spread over the entire territory of Latvia.

A complete set of meteorological observations is carried out in 22 of the stations operating in Latvia. These include measurements of the physical conditions in the ground-level atmosphere as well as the elements characterising land surface: air temperature and humidity, wind direction and speed, atmospheric pressure, meteorological visibility, cloudiness, atmospheric precipitation, parameters of snow cover, atmospheric phenomena, soil surface conditions and temperature. Most of these observations are carried using automatic meteorological sensors allowing continuous observations of the main meteorological parameters over 24 hours. Observation series of these meteorological stations cover more than 50 years. 50% of all observation series cover at least 70 years but several stations have been operating for more than 100 years.

Observations of the meteorological elements most variable in space – atmospheric precipitation, snow cover, extreme air temperatures and some atmospheric phenomena, are carried out in 41 observation stations. The location of the stations is optimal to obtain detailed characteristics of Latvia's weather conditions and climate.

In the near future, the monitoring of atmospheric conditions will be significantly improved. Dopler's meteorological radar was installed in 2005, providing precise and regularly updated information on physical characteristics and processes in the atmosphere also in the higher atmospheric layers. Since 1 January 2005 Latvia is an associate country of the European Meteorological Satellite Organization (*EUMETSAT*) which will promote the use of satellite technologies for atmospheric monitoring above the territory of Latvia.

7.2.2 Hydrological observations

The first hydrological observations in the territory of Latvia date back to the 16th century when the recording of ice moving phenomena on the river Daugava near Riga began in 1530. Observations of the water level in the coastal area of the Baltic Sea started in 1841 in Daugavgriva by applying a water level-meter. Later in 1865, water level observations with a level-meter started also in Liepaja, in 1873 – Ventspils and in 1884 – Kolka.

Hydrological observations of terrestrial rivers are carried out in 53 observation stations located near rivers and reservoirs of Latvia, monitoring water level, flow, water temperature, ice

phenomena and ice thickness. Measurements of water level, temperature, salinity, wave and ice phenomena in the Baltic Sea and the Gulf of Riga are carried out in 9 stations. Modern technical equipment, automatic observation sensors and mobile communication devices provide the possibility to receive water level and temperature data in real time regime and perform operative information follow-up and correction of possible inaccuracies.

Two of the terrestrial hydrological observation stations have been operating for more than 100 years. Data series in more than half of the stations cover over 70 years of observations.

4 of 9 coastal observation stations have observation data series for more than 100 years.

All of the coastal observation stations have systemic observation data series for more than 70 years.

7.2.3. Environmental quality observations

LEGMA also provides environmental quality observations. Atmospheric air quality monitoring, assessment of the impact of air quality on ecosystems and monitoring of the impacts of trans-boundary air pollution on ecosystems is carried out within the scope of several international programs: GAW - Global Atmosphere Watch program, EMEP-Cooperative Programme for the Monitoring and Evaluation of Long Range Air Pollutants in Europe, ICP-Integrated Monitoring - International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystems.

All observation data are kept in LEGMA archives in paper format. Part of observation data is digitalised. Current systematic observation data are stored in observation databases. The quality of operative observation data and the quality and homogeneity of historical measurement data series is controlled and analysed on a regular basis. Observation data are available without restrictions.

On-line information on air pollution as well as monthly analysis of air quality and meteorological and hydrological observation data are available on LEGMA web page.

Compliant to the Law on Public Agencies, other observation data and historical observations are available in LEGMA data archives (in paper format).

Monitoring data are also exchanged on a regular basis within the frameworks of international projects and programs.

Meteorological observation data of Liepaja observation station are sent to the World Data Centre for Meteorology, Asheville, USA within the framework of the program "Implementation of the Global Climate Observation System Surface Network".

Meteorological observation data of 6 stations and aerological observations from Riga observation station, as well as data of 4 sea coastal observation stations are sent for observation data exchange within the framework of GTS – Global Telecommunication System.

Precipitation observation data of 6 stations operating are sent to the German weather service climate centre (Climatology Centre Deutscher Wetterdienst, Offenback, Germany) within the framework of Regional Basic Synoptic Network programme.

Data of 4 hydrological stations on daily runoff are sent to the Global Runoff Data Centre, Federal Institute of Hydrology, Koblenz, Germany.

Information from the Global atmosphere observation stations that are operating within the framework of Global Atmosphere Watch programme are sent to several international institutions:

- information on atmospheric precipitation – to the World Meteorological Organisation (WMO) World Data Centre for Precipitation Chemistry, Albany, USA;

- information on GHG – to the WMO World Data Centre for Greenhouse Gases, Meteorological Agency, Japan;
- information on sprayers – to the WMO World Data Centre for Aerosols, Ispra, Italy.

Information on air and precipitation quality from stations operating within the framework of EMEP monitoring program (Co-operative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe) is sent to the Chemical Coordinating Centre hosted by the Norwegian Institute for Air Research.

Information on environmental, water quality and hydro-meteorological data within the framework of Integrated monitoring program (ICP-IM International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystem) is regularly sent to the Finnish Environment Institute and the Surface water acidification monitoring program centre.

Surface water acidification monitoring (within the framework of IPC-Waters program) data are sent to Norwegian Institute for Water Research.

Data on atmospheric precipitation, river flow and air quality on a regular basis are sent to the European Commission EIONET database in the Netherlands.

7.2.4 Databases of LEGMA

LEGMA maintains databases and registers where information on meteorology, terrestrial and marine hydrology, environmental quality, emission amounts, underground nature resources, chemicals is entered, controlled and revised.

Description of the current databases (see Table 7.1), summary tables and thematic maps on human-induced environmental load are publicly available on LEGMA web page. More detailed information can be obtained upon request.

Databases of the Latvian Environment, Geology and Meteorology Agency

Databases	Information stored
On state of environment and natural resources	• Lake passports • Surface water quality monitoring • Microreserves • Specially protected nature territories • Register of polluted and potentially polluted sites • Areas of protected species of plants • Specially protected trees
On environmental load	• Emissions in the air (Air – 2) • GHG emissions • Waste (Waste – 3) • Water use and emissions in the water (Water-2) • Register of chemical substances and products • Register of hazardous substances • Register of fuel stations and oil bases
On actions	• Water use permits • Natural resource tax

Table 7.1

On-line access to all main databases ensures that institutions subordinate to the Ministry of Environment and more than 200 other electronically registered users (both organizations and private persons) can directly obtain free and operative information. Various public reports ("Report on environmental and surface water quality in Latvia", "Report on environmental indicators", "Report on sustainable development indicators", "Report on load in the environment" and others) are developed by summarising and processing the collected information held in databases.

8. EDUCATION, TRAINING AND FORMATION OF PUBLIC ENVIRONMENTAL AWARENESS

8.1 Main political tools for the development of education, training and public environmental awareness

Public awareness on impacts of climate change is demonstrated by climate friendly actions in any aspect of the daily activities of human life (work, leisure and social activities) and in active participation in climate related decision-making process. The effectiveness of solutions to environmental problems is directly dependent on the knowledge and awareness level of each member of the society – be it politician, expert, housekeeper, scientist, student or simply resident – about the responsibility and opportunities to contribute to the global climate change mitigation efforts. The results depend to a great extent on both the education of specialists and the forms and character of initiatives to raise public awareness.

On 4 February 2004, the Cabinet of Ministers approved the "National Environmental Policy Plan for 2004 – 2008" where two sections (3.2 Environmental information and public participation, 3.3 Environmental education and science) are related to public awareness and education, providing a description of the situation, problems, political goals and results to be reached. The main target groups for environmental awareness raising and education are as follows:

- state administration institutions;
- local governments and their representative organisations;
- residents;
- business organisations;
- non-governmental organisations;
- mass media;
- organisations of public education;
- establishments for higher education, science and technology research.

8.2 Educational establishments

Environmental education in Latvia has been developing at all levels, building on internationally recognised priorities and taking into consideration the traditions and experience in education (Table 8.1). The current educational system in Latvia has developed through considerable revisions of past practices.

The main levels of environmental education

Levels of environmental education	Tasks
Primary and general environmental education	Incorporation of environmental education elements in pre-primary, primary and general school curricula
Higher basic education in environmental science	Integration of basic concepts of environmental education and sustainability development in the higher education curricula
General higher environmental education	Well educated environmental specialists
Professional environmental education	Specialists in subsections of environmental sciences
Lifelong and further education in environmental science	Providing further education in areas of environmental science

Table 8.1

8.2.1 General education establishments

Implementation of environmental education in primary schools and secondary schools is defined by the "Guidelines of Environmental Education" approved by Ministry of Education and Science.

Essential input in climate education is provided by global climate change training programmes in comprehensive schools: *GLOBE* (*Global Learning and Observations to Benefit the Environment*) is an international environmental science and environmental education programme. Its objective is to facilitate the awareness among school children of the global environmental problems, at the same time increasing understanding of natural sciences and developing skills of information technology use. More than 10 000 schools from 95 countries are involved in *GLOBE* research. In Latvia this this program has been functioning for eight years and is coordinated by the Children's Environmental School. Currently, 9 Latvian schools are participating in the project.

8.2.2 Professional general education establishments

There are several professional general education establishments where study activities are closely related to environment, for example, Olaine College of Mechanics and Technology, vocational schools of Kazdanga, Viski, etc.

8.2.3 Higher education establishments

Studies of environmental science and related subjects take place at the University of Latvia, Riga Technical University, Rezekne Higher Education Institution, Daugavpils University, Liepaja Academy of Pedagogy, and Latvia University of Agriculture. This testifies to the popularity of environmental science as a study subject and the role of environmental science in restructuring environmental management in general. The variety of study programmes offered covering environmental issues reflect various directions and specialisation levels, pursuing different approaches; however most of these are more closely related to natural sciences.

8.2.4 Further education

Challenges presented by climate change are examined in various training programmes related to improvement of specialist qualification and postgraduate training. Further education is carried out in different ways:

1. Training courses:

Issues and problems of climate change are included in various in-service training and post-graduate training programmes. Within the Organisation for the Promotion of Energy Technologies (OPET) programme – an initiative of the European Commission, the Institute of Environmental and Energy Science (IEES) was established. The programme aims to inform participants on possible measures improve the effectiveness and quality of the operation of enterprises by reducing the consumption of natural resources and environmental impact. This programme helps participants to orientate in cleaner production issues: effectiveness of energy, water and material use. Special attention in IEES study programmes is paid to issues related to GHG emissions reduction and emissions trading.

2. Other long-distance training programmes implemented within the framework of international cooperation programmes:

Public universities and long-distance learning – extramural training by the use of specially developed tutorials, individual learning speed and special assessment systems – is becoming more popular all over the world. Application of modern information technologies in long-distance learning provides the possibility to organise studies more effectively and use time

and other resources more efficiently. Life-long learning concept in Latvia is not yet widespread but might present an important means of climate change education in the future.

8.3 Information sources

Information on global climate change is available in various information sources and in different forms:

a) in mass media, both national and regional level – TV, press, radio, information provided by news agencies;

b) in brochures, books, materials from workshops and training courses, computer programmes.

The development of information technologies and improved access to these technologies, Internet is one of the most successful means to disseminate information.

Organizations within their resource limitations maintain their Internet web pages, providing brief descriptions of the most topical issues and contacts. In the web page of the Ministry of Environment of the Republic of Latvia (www.vidm.gov.lv) information about the issues related to global climate change, education possibilities, informative materials, tendering procedures and other current events is updated on a regular basis.

Mass media, used daily by the majority of Latvian population, has the central role in raising public awareness on climate chage and environmental issues. Therefore, the quality and correct interpretation of the information provided by journalists is of great importance.

Information on climate change issues is also available on an irregular basis in specialised press publications on environmental issues, e.g.: in magazines "Environmental News" (issued by Environmental Protection Club), "Energy and Automation", "Energy & World" (covering technologies and innovations, scientific research in the energy sector), as well as in informative publications of the Association of Environmental Educators, Latvian coalition "On Clean Baltic", representation of the Regional Environmental Center (for Central and Eastern Europe) in Latvia and other organizations.

8.4 Involvement of non-governmental and public organisations

The modern community life in democratic countries is composed of three main components or sectors – governmental sector, business sector and public sector. The definition of environment includes various integrated factors, accordingly, a broad spectrum of non-governmental organizations may participate in the formation of public awareness, including those aiming to preserve environmental values of cultural heritage, ensure careful management of natural and transformed environment and those opposing environmental degradation. Therefore, not only those organisations, which call themselves as environmental non-governmental organisations (ENGO) – according to information from NGO Centre there are about 200 of such organisations in Latvia, but also many others can actively participate in promoting environmental education and environmental protection. By promoting the participation of various public organisations in environmental education, an increasingly larger part of the population is reached, thus facilitating the formation of public environmental awareness. It should be noted that NGOs were the initiators of the work on environmental education and communication both in Latvia and the world.

Currently none of the non-governmental organizations operating in Latvia have declared climate change as their top priority, with their main goals, tasks and activities related to climate change only, however, there are several organizations, which along other issues, also pay attention to the issues of climate change.

8.5 Community information measures

Community information has a special role in the climate education and formation of public awareness. Information measures are carried out by:

- Governmental institutions

Ministry of Environment in cooperation with other institutions and public organizations provide funding for various community information measures, such as workshops, publications, TV programmes and Internet web pages.

- Public and non-governmental organizations

Public information campaigns indirectly related to climate change impact are implemented under various programmes. Several public information campaigns have been carried out within the framework of three different programmes supported by the Global Environmental Fund.

- Mass media (radio, TV, Internet)

International Exhibition Corporation BT-1 in cooperation with sectoral professional associations organizes annual international exhibition "Environment and Energy" which focuses on technologies for efficient use of energy and natural resources. Thematic seminars including climate change are organised within the framework of these events.

In the future, regular community information and education will be provided on global climate change, necessity to prevent it, measures to be carried out and their potential costs, as well as risks and possible consequences, if nothing is done to reduce GHG emissions or climate change mitigation efforts are insufficient.

8.6. Participation in international projects

Another effective form of information for particular community groups is participation in international projects and programmes. Participation in a project provides more in-depth information on climate change issues to specialists from specific sectors. Such specialists then develop and disseminate ideas further.

The project "Changes in climate change policy" (2000), supported by REC, Climate Change Network in Central and Eastern Europe and extra-subsidy program of the NGO Centre, was carried out in 3 countries (Latvia, Check Republic and Hungary) with the aim to evaluate Joint Implementation project activities in the region and increase public awareness of the application of Joint Implementation project tools for climate policy making and to encourage local organizations to participate in the 6th meeting of ministers on climate change that was held in the Hague in 2000.

The project "Municipal networks for energy efficiency" (*MUNEE*), implemented in Latvia by "Ekodoma" Ltd. in the period 2001 – 2002, introduced engineering, economic and climate aspects of energy efficiency to more than 300 specialists from various municipalities and business companies.

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Ministry of Finance of the Republic of Latvia: http://www.fm.gov.lv

Central Road Safety Department: http://www.csdd.lv

Latvian Environment, Geology and Meteorology Agency: http://www.lvgma.gov.lv

ANNEXES

Annex 1

Summary of policies and measures to reduce GHG emissions and increase CO_2 removals

Name of policy / measure	Objective	GHG affected	Type of policy instrument	Status	Implementing entity	Estimated reduction of GHG emissions, Gg CO_2			
						1995	2000	2005	2010
Energy									
Policy: Increase the share of renewable energy sources in the energy balance Measure: Promotion of biomass use	To increase the share of wood resources in the fuel mix for centralised production of thermal energy	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; Economic: tariff policy; Financial: subsidies, grants, subsidised loans; Informative: training, workshops, dissemination of information	A	Municipalities	NE	NE	NE	NE
Measure: Promotion of biogas use	To increase the share of renewable sources in the energy balance	CO_2, N_2O, NO_x, CO	Regulatory: standards; Economic: tariff policy; Financial: subsidies, grants, subsidised loans; Informative: training, workshops, dissemination of information	A	State, municipalities and enterprises	NE	NE	NE	NE
Measure: Support for energy generation in small hydropower plants	To increase the share of renewable sources in the energy balance	CO_2, N_2O, NO_x, CO	Regulatory: standards; Economic: tariff policy; Financial: subsidies, grants, subsidised loans; Informative: training, workshops, dissemination of information	A	Enterprises, energy-efficiency fund	NE	NE	NE	NE
Measure: Support for wind power production	To increase the share of renewable sources in the energy balance	CO_2, N_2O, NO_x, CO	Regulatory: standards; Economic: tariff policy; Financial: subsidies, grants, subsidised loans; Informative: training, workshops, dissemination of information	A	JSC "Latvenergo", other enterprises	NE	NE	NE	NE

Name of policy / measure	Objective	GHG affected	Type of policy instrument	Status	Implementing entity	Estimated reduction of GHG emissions, Gg CO_2			
						1995	2000	2005	2010
Measure: Promotion of solar energy use	To increase the share of renewable resources in the energy balance	CO_2, N_2O, NO_x, CO	Economic: tariff policy; Informative: training, workshops, dissemination of information	A	Alternative energy department of the Danish Energy Agency, High school of Aizkraukle and "Aizkraukles Siltums" Ltd	NE	NE	NE	NE
Measure: Support for biofuel production and promotion of biofuel use	To increase the share of renewable resources in the energy balance	CO_2, N_2O, NO_x, CO, NMVOC	Regulatory: standards; Financial: subsidies; Voluntary: quality and environmental management systems	A	Enterprises	NE	NE	NE	NE
Policy: Increase effective and rational use of energy resources	More effective use of fuel, simultaneously producing heat and electricity, reducing energy loss and emissions	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Economic: tariff policy, licences; Financial: grants, ans, subsidies; Informative: training, workshops, dissemination of information	A	State, municipalities and private enterprises	NE	95	NE	NE
Measure: Support for energy efficiency projects in thermal energy generation and transmission									
Measure: Support for the construction of combined heat and power generation plants and energy efficiency projects	More effective use of fuel, simultaneously producing heat and electricity	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; Economic: increased purchase tariffs; Financial: subsidies; Informative: training, workshops, dissemination of information	A	Municipali-ties, energy service companies (ESCO), European Reconstruc-tion and Development Bank, Environment Investment Fund, World Bank	NE	NE	NE	NE

Name of policy / measure	Objective	GHG affected	Type of policy instrument	Status	Implementing entity	Estimated reduction of GHG emissions, Gg CO_2			
						1995	2000	2005	2010
Measure: Support for projects improving energy performance of buildings	Involving end–users to increase energy performance of buildings, thus reducing energy consumption and the amount of emissions	CO_2	Regulatory: standards; Financial: subsidies; Informative: training, workshops, dissemination of information	A	State and private enterprises, end-users (inhabitants)	NE	NE	NE	NE
Transport									
Policy: Develop an environmentally friendly transport system Measure: Optimisation of the traffic flow in cities	To improve the penetrability of streets; provide of comfortable, safe and competitive public transport system	CO2, CH4, CO, N2O, NOx, NMVOC, SO2	Regulatory: standards; Economic: excise tax for oil products; Informative: training, workshops, dissemination of information	A	Riga City Council, Ministry of Transport, inhabitants	NE	NE	NE	NE
Measure: Promotion of the use of public transport services in Riga	To improve the penetrability of streets; provide of comfortable, safe and competitive public transport system	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; Economic: excise tax for oil products; Informative: training, workshops, dissemination of information	A	Riga City Council, Ministry of Transport, municipal enterprises	NE	NE	NE	NE
Measure: Development of bicycle transport infrastructure	To develop alternative means of transport that is environmentally friendly and convenient	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Informative: training, workshops, dissemination of information	A	Riga City Council, Ministry of Transport, inhabitants	NE	NE	NE	NE
Industrial processes									
Policy: Promote the implementation of best available techniques (BAT), environmentally friendly technologies and cleaner production	To promote the implementation of best available techniques and cleaner production	CO_2, NOx, NMVOC	Regulatory: standards, permit regimes; Economic: natural resources tax refunds, subsidies; Informative: training, workshops, dissemination of information; Voluntary: environment audit, BAT	U	State, municipalitiesand enterprises	NE	NE	NE	NE

Agriculture									
Policy: Promote the implementation of environmentally sound agricultural methods that reduce direct GHG emissions Measure: Improving and construction of manure storage facilities	To promote the development of environmentally friendly agriculture and implementation of Good agricultural practice	CH_4, NO_2	Regulatory: restrictions; Economic; Financial: subsidies;	U	State, municipalities and enterprises	NE	NE	NE	NE
Measure: Sustainable use of agricultural resources	To preserve and improve the environmental and natural resources for sustainable agricultural production	CO_2, CH_4, NO_2	Economic: subsidies; Informative: training, seminars, information dissemination; Voluntary: BAT	A	State, municipalities and enterprises	NE	NE	NE	NE
Measure: Development of environmentally friendly agriculture and promotion of Good Agricultural Practice	To preserve and improve the environmental and natural resources for sustainable agricultural production	CO_2, CH_4, NO_2	Economic: subsidies; Informative: training, seminars, information dissemination; Voluntary: BAT	A	State, municipalities and enterprises	NE	NE	NE	NE
Land-use, land-use change and forestry									
Policy: Increase CO_2 removals in forestry Measure: Increase of forest stand productivity	Increase CO_2 removals, provide woodworking industry and energy sector with raw materials	CO_2	Regulatory: restrictions and prohibitions; Financial: subsidies; Informative: research, workshops, training, dissemination of information	U	State, municipalities and private enterprises, research institutes, individual forest owners	NA	NA	NA	NA

Measure: Afforestation of unmanaged agricultural land	Increase CO_2 removals, provide woodworking industry and energy sector with raw materials	CO_2	Regulatory: restrictions and prohibitions; Financial: subsidies; Informative: research, workshops, training, dissemination of information	U	State, municipalities and private enterprises, research institutes, private forest owners	NA	NA	NA	NA
Waste									
Policy: Establish an up-to-date municipal waste management system Measure: Processing of biologically degradable waste	To reduce by 2020 the amount of biodegradable waste for disposal by 35% of the amount of biodegradable waste for disposal in 1995; increase the share of biodegradable waste recovery (recycling and energy recovery)	CH_4, CO_2	Regulatory: standards; Economic: natural resources tax refunds; Financial: subsidies; Voluntary: BAT; Informative: research, workshops, training, dissemination of information	U	State, municipalities and private enterprises	NA	NA	NA	NA
Measure: Collection of biogas from municipal waste landfills	Reduce GHG emissions in the atmosphere, at the same time generate heat energy or electricity – rational use of energy resources	CH_4	Regulatory: standards; Economic: natural recources tax refunds; Financial: subsidies; Voluntary: BAT; Informative: research, workshops, training, dissemination of information	U	Municipalitie, state institutions, private enterprises	NA	NA	NA	NA
Measure: Restoration of small municipal dumpsites not meeting environmental requirements	Closing of existing dumpsites by 2009 and their complete restoration by 2012	CH_4	Regulatory: standards; restrictions and prohibitions; Informative: research, workshops, training, dissemination of information	U	Municipalitie, state institutions, private enterprises	NA	NA	NA	NA

Cross-sectoral policy: Implement the EU GHG emission allowance trading scheme		CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; restrictions and prohibitions; Informative: research, workshops, training, dissemination of information	I	Ministry of Environment, enterprises	NA	NA	NA	NA
Cross-sectoral policy: Participate in the Kyoto Protocol flexibility mechanisms Measure: Active participation in Joint Implementation projects	To facilitate global climate change mitigation efforts, attract investment for projects reducing GHG emissions	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; restrictions and prohibitions; Informative: research, workshops, training, dissemination of information	U	Ministry of Environment, enterprises, Nordic Investment Bank, Carbon Prototype Fund, Liepaja municipality, Swedish International Development Agency, ISPA	NA	NA	NA	NA
Cross-sectoral policy: Promote the implementation of environmental and energy management systems	By receiving international ISO 14001 certificate or registering in EU EMAS, to maintain compliance with particular management standards, ensuring environmentally friendly operation	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; Financial: subsidised loans; Voluntary: BAT; Informative: research, workshops, training, dissemination of information	U	Enterprises	NA	NA	NA	NA
Cross-sectoral policy: Promote the inclusion of environmental considerations in consumer decisions	To motivate GHG emitters to implement cleaner technologies, better environmental management practices and more effective energy use	CO_2, CH_4, CO, N_2O, NOx, NMVOC, SO_2	Regulatory: standards; Financial: subsidised loans; Voluntary: BAT; Informative: research, workshops, training, dissemination of information	A	State, municipalities, inhabitants	NA	NA	NA	NA

Explanations:
I – implemented, A – adopted, P – planned

Annex 2

Measures for the implementation of the European Community legislation and policy

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Directive 2003/87/EC of the European Parliament and the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC			
Amendments to the Law "On Pollution" (adopted on 18 December 2003)	Implemented	0.26 $MtCO_2$ for 2005-2007	
Amendments to the Law "On Natural Resources Tax" (adopted on 6 April 2004)			The Law states CO_2 tax application to combustion equipment from 01.07.2005. Equipment, involved in the EU emission allowances trading scheme is exempted from this tax.
Amendments to the Latvian Administrative law disturbance code (adopted on 9 September 2004)			
Regulations of the Cabinet of Ministers of 22 April 2004 No. 400 „Order for application for and issuing of GHG emissions permit"			
Regulations of the Cabinet of Ministers of 3 August 2004 No. 661 "Order for carrying out activities with emissions allowances and for establishment of pools of installations"			
Regulations of the Cabinet of Ministers of 7 September 2004 No 778 "Order for monitoring of greenhouse gas emissions and verification and approval of annual reports of greenhouse gas emissions"			

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Order of the Cabinet of Ministers of 27 April 2004 No.270 "National Allocation Plan for 2005 – 2007"			
Order of the Cabinet of Ministers of 5 October 2004 No.722 "Amendments to the National Allocation Plan for 2005 – 2007"			
Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity			
Amendments to the Law "On excise tax" (adopted on 31 March 2004)	Implemented	Not estimated	
Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market			
Law "On Energy" (adopted on 22 September 1998)	Implemented	Not estimated	
Energy policy in the power sector (adopted on 11 September 2001)			
Regulations of the Cabinet of Ministers of 15 January 2002 No.29 "Order for establishing and placing of new power production capacities if renewable energy resources are used for the production of electricity"			
Regulations of the Cabinet of Ministers of 15 January 2002 No.28 "On total amount of capacity installation in 2004 and specific amount for each kind of electricity production if renewable energy resources are used for production of electricity"			
Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC			
Law "On Energy" (adopted on 22 September 1998)	Implemented	Not estimated	
Energy policy in the power sector (adopted on 11 September 2001)			

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Regulations of the Cabinet of Ministers of 8 January 2002 No.9 "Requirements for cogeneration plants and procedure for defining purchase price for redundancy of produced electricity"			
The conceptual document for "Preconditions to establish electricity market in Latvia"			Law "On electricity market" is currently elaborated
Draft project of Law "On electricity market" (announced at the meeting of State Secretaries on 11 November 2004)	Not implemented		The purpose of the law is to develop legal framework for effective operation of the electricity market to ensure secure supply of electricity of high quality for reasonable prices to all users.
Engine test program as voluntary European Union program to improve energy-efficiency for car engine production companies (adopted on February 2003)			
Not implemented	Not implemented		
Regulation of European Parliament and Council (EC) No. 761/2001 (adopted on 19 March 2001)			
Law "On conformity assessment"(adopted on 20 August 1996)	Implemented	Not estimated	
Regulations of the Cabinet of Ministers of 20 April 2004 No.320 "Order for development and maintenance of register of Eco-Management and Audit Schemes and keeping of records"			
Regulations of the Cabinet of Ministers of 3 August 2004 No.689 "Regulations on laboratory tests and calibration, on certification and inspection institutions, and on accreditation and monitoring of environmental verifications"			

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Amendments to Law "On Energy" (adopted on 17 March 2005)	Not implemented		Amendments to the law establish additional mutual rights and duties for land owners and energy entrepreneurs. Cabinet defines the order for entrepreneurs who have received licensees for entrepreneurship with heavy oil products (fuel) and entrepreneurs who import heavy oil products (fuel) for their own use, establish and keep reserves of heavy fuel oil and other products to ensure provision of heavy oil products during periods of oil crises.
Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings			
Draft regulations and political documents have been prepared for transposing of requirements of Directive (Draft project of Law "On energy efficiency" and others)	Not implemented	Not estimated	Law "On energy efficiency" Member states should transpose the requirements of Directive till January 2006

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Different Directives of the European Parliament and of the Council with regard to energy labelling of household electric refrigerators, freezers and their combinations – Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations; Commission Directive 2002/40/EC of 8 May 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric ovens; Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners and Directive 99/9/EK of 26 February 1999 amending Directive 97/17/EK; Directive 98/11/EK of 27 January 1998, Directive 96/89/EK of 17 December 1996 amending Directive 95/12/EK, Directive 96/60/EK of 16 September 1996 and Directive 92/75/EK of 22 September 1992.			
Law "On protection of consumers rights" (adopted on 1 April 1999)	Implemented	Not estimated	
Regulations of the Cabinet of Ministers of 28 May 2002 No.212 "Regulations for labelling of household dish washing machines and information included in distance agreement" with amendments No.558 adopted on 30 June 2004			
Regulations of the Cabinet of Ministers of 28 May 2002 No. 210 "Regulations for labelling of household electric bulbs and information included in distance agreement"			
Regulations of the Cabinet of Ministers of 28 May 2002 No.209 "Regulations for labelling of household washing machines, drying machines and combined washing and drying machines and information included in distance agreement" with amendments No.556 adopted on 30 June 2004			
Regulations of the Cabinet of Ministers of 28 May 2002 No.208 "Regulations for labelling of household refrigerators and freezers and information included in distance agreement" with amendments No.438 adopted on 27 April 2004			

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Regulations of the Cabinet of Ministers of 2 March 2004 No.119 "Regulations for labelling of household ovens and information included in distance agreement"			
Regulations of the Cabinet of Ministers of 2 March 2004 No.120 "Regulations for labelling of air-conditioners and information included in distance agreement"			
Council Directive 92/42/EEC of 21 May 1992 on efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels			
Law "On conformity assessment" (adopted on 20 August 1996)	Implemented	Not estimated	
Regulations of the Cabinet of Ministers of 4 April 2000 No.128 "On toy safety" with amendments No.439 adopted on 27 April 2004			
Regulations of the Cabinet of Ministers of 30 April 2001 No.181 "Order for conformity assessment of construction products in reglamented sector" with amendments No.371 adopted on 20 April 2004			
Regulations of the Cabinet of Ministers of 24 April 2004 No.416 "On hot-water boilers"			
Commissions recommendation (adopted on 5 February 1999 and 13 April 2000) for reduction of CO_2 emissions from cars			
Not implemented	Not implemented		

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Directive 2001/12/EC of the European Parliament and of the Council of 26 February 2001 amending Council Directive 91/440/EEC on the development of the Community's railways; Directive 2001/13/EC of the European Parliament and of the Council of 26 February 2001 amending Council Directive 95/18/EC on the licensing of railway undertakings; Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification; Commission Directive 2001/49/EC of 28 June 2001 amending Annex I to Council Directive 91/414/EEC concerning the placing of plant protection products on the market to include DPX KE 459 (fluorsulphurous-methyl) as an active substance; Commission Directive 2001/50/EC of 3 July 2001 amending Directive 95/45/EC laying down specific purity criteria concerning colours for use in foodstuffs; Council Directive 2001/51/EC of 28 June 2001 supplementing the provisions of Article 26 of the Convention implementing the Schengen Agreement of 14 June 1985; Regulation No.881/2004 (29of April 2004)			
Law "On railways " (adopted on 7 May 1998)	Implemented	Not estimated	Existing legislation is not contradictory to Directive 2004/51/EC. According to Regulation 881/2004 Latvia participates in several activities of European Railway Agency and participate in Council work.
Regulations of the Cabinet of Ministers of 5 January 1999 No.4 "On licensing of railway operators"			
Regulations of the Cabinet of Ministers of 15 December 1998 No.457 "Methodology for establishing protected belts for railway"			
Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of bio fuels or other renewable fuels for transport			
Program for "Production and Use of Biofuel in Latvia for 2003 – 2010" (adopted on 19 December ,2003)	Implemented partially		

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Law "On biofuel" (adopted on 17 March 2005)		Pursuant to the Directive, biofuel should cover at least 2% of the total national consumption in the transport sector by 31 December 2005 and at least 5.75% by 31 December, 2010	A new agro-industrial sector – production of biodiesel fuel for transport has been established using local agriculture raw materials. This could develop preconditions for use of biofuel and bioethanol in different kinds of transport. There are no specific climate and technical aspects that could influence state economy in the field of use of biofuel.
Directive 1999/94/EC of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars			
Regulations of the Cabinet of Ministers of 27 December 2002 No.585 "On labelling and advertising information for consumers about fuel consumption and CO_2 emissions"	Implemented	Not estimated	
Council Regulation (EC) No 1782/2003 of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers and amending Regulations (EEC) No 2019/93, (EC) No 1452/2001, (EC) No 1453/2001, (EC) No 1454/2001, (EC) 1868/94, (EC) No 1251/1999, (EC) No 1254/1999, (EC) No 1673/2000, (EEC) No 2358/71 and (EC) No 2529/2001			

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Law "On Agriculture and rural development" (adopted on 23 April 2004)	Implemented partially	Not estimated	For the new Member states the regulation entered in to force on 1 May 2004. Will be transposed fully after the adoption of decision on direct payment system.
Regulations of the Cabinet of Ministers of 22 April 2004 No.412 "Order for granting of state and European Union support in the agriculture and rural development"			
Regulations of the Cabinet of Ministers of No.584 (adopted on 6 July 2004) "Procedure for allowance of state and European Union support in the agriculture and rural development"			
Council Regulation (EC) No 1783/2003 of 29 September 2003 amending Regulation(EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF)			
"Rural Development Plan for Implementation of Rural Development Program of Latvia for 2004-2006" (adopted on 9 September 2003)	Implemented partially	Not estimated	The "Rural Development Plan of Latvia" is developed pursuant to the regulation No. 1257/1999 for 2004-2006 and provides co-financing from the European Agriculture Agency and Guarantee Fund. In accordance to regulation No. 1783/2003 the "Rural Development Plan of Latvia" includes measure changes for level point.

National measure	Status of implementation	Quantitative estimate of the effect of policies and measures on GHG emissions and removals	Other information
Regulations of the Cabinet of Ministers of on 6 December 2004 No.1002 "Order of implementation of program document "Development Plan for Implementation of Rural Development Program for 2004-2006.""			
Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste			
Law "On waste management" (adopted on 01 March 2001) with amendments (adopted on 23 March 2004)	Implemented	Not estimated	
Regulations of the Cabinet of Ministers of 3 January 2002 No.15 "On Requirements for Siting of Landfills and for Management, Closure and Restoration of Landfills and Dumpsites"			
"Waste Management Plan for 2003-2012 (adopted on by Cabinet on 6 July 2002)		129 tCO_2	Reduction of emissions from "Getlini EKO" Ltd.

Annex 3

List of the projection indicators

Indicator	2000	2001-2005	2006-2010	2011-2015	2016-2020
Macroeconomics					
Population (in thousand, average number in the last year of the period)	2373.0	2299.2	2247.5	2207.6	2177.2
Gross Domestic Product (GDP) increase (%, average annual growth rates of the period)	6.9	7.3	6.0	5.5	5.0
Structure of Gross Domestic Product (GDP) breakdown by sectors of national economy (% in the last year of the period)					
GDP	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Agriculture, fishery, mining industry	4.7	4.3	3.6	3.0	2.8
Manufacturing industry	13.5	14.1	14.9	15.2	16.3
Electricity, gas, water	3.5	2.8	2.3	2.1	2.1
Construction	6.1	6.1	7.0	8.0	8.9
Trade	17.6	19.7	21.5	22.0	22.0
Transport and communications	14.2	15.7	15.6	15.8	15.9
Public services	17.2	14.7	13.5	13.2	11.9
Other services	23.2	22.6	21.5	20.7	20.0
GDP growth rate breakdown by sectors of national economy (%, average annual growth rates of the period)					
Agriculture, fishery, mining industry	11.4	4.7	3.0	3.0	3.0
Manufacturing industry	6.8	9.2	8.0	7.0	6.5
Electricity, gas, water	-4.0	4.0	3.2	5.0	5.0
Construction	8.2	10.5	8.0	8.0	7.0
Trade	9.2	10.4	7.7	6.0	5.0
Transport and communications	7.0	7.7	6.0	5.7	5.2
Public services	0.2	2.8	3.0	3.0	3.0
Other services	11.3	6.5	5.0	4.5	4.0

Indicator	2000	2005	2010	2015	2020
Macroeconomics					
Price for imported energy resources. EUR (2000)/GJ					
Heavy fuel oil	2.08	2.77	2.93	3.20	3.48
Petrol	4.27	6.24	6.25	6.84	7.45
Diesel	3.80	4.99	5.00	5.48	5.96
Natural gas	2.25	2.45	2.67	2.87	3.13
Coal	1.30	1.60	1.80	2.00	2.06
Energy					
Primary energy consumption, PJ	163,.4	188.81	203.09	220.94	242.26
Import, PJ	105.75	126.47	137.95	151.57	168.19
Coal, PJ	2.79	2.98	16.91	17.07	24.06
Coke, PJ	0.26	0.35	0.40	0.44	0.49
Petrol, PJ	14.83	14.35	16.28	18.43	20.84
Heavy fuel oil, PJ	10.88	10.68	5.83	6.55	6.08
Electricity, PJ	7.59	6.50	2.03	3.37	3.01
Diesel, PJ	19.10	29.30	31.56	36.37	39.11
Liquefied gas, PJ	2.14	2.09	2.16	2.31	2.53
Natural gas, PJ	45.73	59.72	62.36	66.67	71.77
Oil shale, PJ	2.44	0.50	0.42	0.36	0.30
Primary energy generation, PJ	66.36	62.65	67.24	71.29	76.34
Hydropower, PJ	10.15	10.14	12.17	12.54	12.63
Methane, PJ	0.00	0.30	0.57	0.57	0.57
Peat, PJ	2.49	0.62	0.40	0.36	0.39
Wind energy, PJ	0.01	0.17	1.26	1.33	2.53
Peat, etc., PJ	53.70	51.42	52.84	56.49	60.22
Export, PJ	-8.37	-0.31	-2.10	-1.92	-2.27
Peat, etc., PJ	-7.17	-0.31	-1.00	-1.12	-1.26
Electricity, PJ	-1.16	0.00	-1.10	-0.80	-1.01
Peat, PJ	-0.04	0.00	0.00	0.00	0.00
Transformation sector – energy consumption, PJ	48.20	54.32	62.10	64.88	74.51

Indicator	2000	2005	2010	2015	2020
Power stations, PJ	0.00	0.00	12.89	12.89	18.62
Coal, PJ	0.00	0.00	12.89	12.89	18.62
Cogeneration plants, PJ	21.50	31.27	31.18	38.62	44.59
Heavy fuel oil, PJ	2.80	5.19	0.00	0.00	0.00
Peat, PJ	1.98	0.00	0.00	0.00	0.00
Wood, etc., PJ	0.00	0.00	2.78	9.11	14.34
Diesel, PJ	0.04	0.00	0.00	0.00	0.00
Oil shale, PJ	0.39	0.00	0.00	0.00	0.00
Methane, PJ	0.00	0.30	0.57	0.57	0.57
Natural gas, PJ	16.29	25.78	27.83	28.94	29.68
Boiler houses, PJ	26.96	23.05	18.03	13.37	11.30
Electricity, PJ	0.00	0.02	0.01	0.01	0.01
Heavy fuel oil, PJ	2.60	1.93	1.47	1.12	0.85
Liquefied gas, PJ	0.00	0.00	0.00	0.00	0.00
Peat, PJ	0.12	0.05	0.04	0.03	0.02
Wood, etc., PJ	8.33	8.16	6.24	4.76	4.70
Diesel, PJ	0.08	0.04	0.03	0.02	0.02
Oil shale, PJ	0.91	0.27	0.21	0.16	0.12
Coal, PJ	0.48	0.48	0.77	0.18	0.15
Natural gas, PJ	14.16	12.10	9.26	7.09	5.43
Transformation sector – energy generation, PJ	-36.59	-43.45	-46.24	-48.03	-53.48
Cogeneration plants, PJ	-16.66	-23.39	-24.20	-29.92	-34.38
Thermal energy, PJ	-11.93	-15.41	-15.66	-19.22	-22.00
Electricity, PJ	-4.37	-7.98	-8.54	-10.70	-12.38
Power stations, PJ	0.00	0.00	-6.19	-6.19	-8.94
Electricity, PJ	0.00	0.00	-6.19	-6.19	-8.94
Boiler houses, PJ	-19.93	-20.06	-15.85	-11.92	-10.16
Thermal energy, PJ	-19.93	-20.06	-15.85	-11.92	-10.16
Final energy consumption, PJ	135.26	160.71	169.99	186.62	201.78
Agriculture, PJ	3.87	4.42	4.77	5.05	5.35
Thermal energy, PJ	0.05	0.08	0.10	0.10	0.11
Electricity, PJ	0.57	0.67	0.71	0.76	0.80
Petrol, PJ	0.04	0.00	0.00	0.00	0.00
Heavy fuel oil, PJ	0.24	0.24	0.29	0.30	0.32
Liquefied gas, PJ	0.00	0.00	0.00	0.00	0.00
Peat, PJ	0.00	0.00	0.00	0.00	0.00
Wood, etc., PJ	0.75	0.83	0.90	0.96	1.02
Diesel, PJ	1.66	1.73	1.86	1.97	2.08
Coal, PJ	0.06	0.10	0.10	0.10	0.11
Natural gas, PJ	0.51	0.77	0.81	0.86	0.91
Services, PJ	21.66	25.79	27.08	30.78	34.47
Thermal energy, PJ	5.62	6.22	5.22	5.95	6.69
Electricity, PJ	5.81	7.37	7.82	8.58	9.36
Heavy fuel oil, PJ	0.61	0.40	0.30	0.29	0.21
Liquefied gas, PJ	0.00	0.05	0.06	0.07	0.09
Peat, PJ	0.03	0.18	0.00	0.00	0.00
Wood, etc., PJ	4.86	4.80	6.22	6.95	7.69
Diesel, PJ	1.36	2.09	1.57	1.54	1.12
Coal, PJ	1.48	1.53	1.92	2.40	3.01
Natural gas, PJ	1.89	3.15	3.97	5.00	6.30
Industry, PJ	23.91	30.38	35.96	42.95	49.92
Thermal energy, PJ	0.62	0.69	0.66	0.90	1.13
Electricity, PJ	4.91	5.59	7.42	9.25	11.01
Heavy fuel oil, PJ	2.76	2.00	2.77	3.73	3.47
Liquefied gas, PJ	0.05	0.05	0.06	0.08	0.10
Peat, PJ	0.00	0.15	0.14	0.12	0.15
Wood, etc., PJ	4.21	7.72	7.18	5.77	7.18
Coke, PJ	0.26	0.35	0.40	0.44	0.49
Diesel, PJ	1.19	1.17	2.72	4.61	4.33
Oil shale, PJ	0.12	0.23	0.21	0.20	0.18
Coal, PJ	0.23	0.18	0.37	0.42	0.82
Natural gas, PJ	8.67	12.25	14.03	17.43	21.06
Households, PJ	55.29	60.58	57.63	57.55	55.21
Thermal energy, PJ	18.41	20.85	20.01	19.91	19.80
Electricity, PJ	4.28	4.87	5.75	6.38	7.71

Indicator	2000	2005	2010	2015	2020
Heavy fuel oil, PJ	0.00	0.00	0.00	0.00	0.00
Liquefied gas, PJ	1.18	1.00	0.86	0.74	0.63
Peat, PJ	0.01	0.10	0.08	0.07	0.06
Wood, etc., PJ	28.23	28.52	25.13	24.03	19.77
Diesel, PJ	0.00	1.21	1.07	0.91	0.82
Coal, PJ	0.51	0.69	0.86	1.08	1.35
Natural gas, PJ	2.66	3.34	3.87	4.43	5.07
Transport, PJ	30.52	39.54	44.55	50.29	56.83
Electricity, PJ	0.56	0.50	0.57	0.66	0.75
Petrol, PJ	14.52	14.35	16.28	18.43	20.84
Heavy fuel oil, PJ	0.00	0.08	0.06	0.05	0.04
Liquefied gas, PJ	0.87	0.99	1.18	1.42	1.71
Diesel, PJ	13.38	21.25	22.23	25.01	28.20
Jet fuel, PJ	1.12	1.54	1.70	1.87	2.07
Biodiesel, PJ	0.00	0.32	1.05	1.19	1.35
Methanol, PJ	0.00	0.44	1.40	1.57	1.77
Natural gas, PJ	0.07	0.07	0.08	0.09	0.10
Transport					
Number of vehicles by type:					
- cars	313,828	471,409	471,409	546,533	633,369
- cargo transport <3.5 t	9,066	28,490	28,490	34,244	39,624
- cargo transport >3.5 t	32,076	26,000	26,000	36,277	42,098
- buses		4,523	4,523	5,229	6,058
Fuel consumption, tons					
- petrol	304,912	597,591	597,591	695,002	806,709
- diesel	269,719	497,777	497,777	577,984	671,859
Agriculture					
Crop farming:					
Land used in agriculture, th. ha, incl.:	2,486	2,470	2,460	2,450	2,440
- arable land, th. ha	969.9	955.8	983.6	1,011.4	1,039.2
- perennial plantations (fruit gardens), *th. ha*	29.2	29.2	29.5	29.8	30
Nitrogenous mineral fertiliser inputs in soil for harvest of respective year (converting 100% nutrients) to total area of 1 ha sowing, th. tons	23.00	31.88	32.48	32.69	32.92
Lime application to the soil for 1 ha limed area, tons	3.3	9.7	10.5	10.4	10.5
Total harvest of separate cereal crop (in barn weight), th. tons	927.50	922.00	936.20	945.99	956.78
Cereals	923.60	916.72	930.34	939.68	949.98
Leguminous plants	3.90	5.28	5.86	6.31	6.80
Livestock breeding					
Livestock, in thousands	367.00	393.86	413.95	435.06	457.26
int.al. milking cows, in thousands	204.00	197.70	200.64	195.65	205.63
Pigs, in thousands	393.00	442.70	447.27	449.92	453.38
Sheep, in thousands	29.00	33.22	34.51	34.66	34.92
Goats, in thousands	10.00	13.16	13.59	13.64	13.74
Horses, in thousands	20.00	18.24	17.98	18.15	18.30
Birds, in thousands	3,105.00	3,820.08	3,876.19	3,896.32	3,926.22
Waste					
Waste disposed (th. tons)	600.0	627.3	748.4	704.5	856.5
Waste generated per capita, kg	270.0	221.8	246.8	271.8	296.8
Waste disposed, if waste generation by residents is estimated from GDP growth and population size, th. tons		642.8	802.7	797.4	993.7
Forestry					
Forest – ecosystem in all its development stages dominated by trees that can reach the height of at least seven meters at this location, and that at present have or potentially can reach crown projection of at least 20% of the area occupied by the forest stand					
Forest area, th.ha	2,888	2,925	2,930	2,935	2,940
Managed forests, th.ha int.al.	2,868	2,905	2,910	2,915	2,920
- coniferous trees	1,721	1,656	1,659	1,662	1,664

Indicator	2000	2005	2010	2015	2020
- deciduous trees	1,147	1,249	1,251	1,253	1,256
Protected forests (where no commercial activities take place), th. ha	20	20	20	20	20
Areas of shrubs (other areas grown with trees), th.ha	120	116	116	116	116
Unmanaged land that could be used in agriculture, th.ha	34	70	220	350	470
Total growth of growing stocks in forest land, mln m^3	16.3	16.3	16.3	16.3	16.3
Growth of annual growing stock: for coniferous trees, m^3/ha mln m^3	5.5 9.4	5.7 9.3	5.7 9.3	5.7 9.3	5.7 9.3
for deciduous trees, m^3/ha mln m^3	6.0 6.90	5.7 7.0	5.7 7.0	5.7 7.0	5.7 7.0
Growth of growing stock in parks and gardens (total), th.m^3	800	800	800	800	800
Annual forest logging, mln m^3	11	12	12	9	9

Annex 4
Greenhouse Gas Inventory 2005 - Summary and Trend Tables

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1990
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	$HFCs^{(1)}$		$PFCs^{(1)}$		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**18 654.30**	**-18 453.38**	**176.42**	**9.85**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**70.37**	**528.14**	**120.84**	**99.14**
1. Energy		**18 044.84**		**25.94**	**0.54**							**69.67**	**504.05**	**75.62**	**97.80**
A. Fuel Combustion	Reference Approach[2]	18 527.00													
	Sectoral Approach[2]	18 044.84		12.89	0.54							69.67	504.05	72.64	97.80
B. Fugitive Emissions from Fuels		NO/NE		13.05	0.00							**ND/NA**	**ND/NA**	2.98	**ND/NA**
2. Industrial Processes		**503.75**		**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**0.02**	**0.00**	**11.34**	**1.35**
3. Solvent and Other Product Use		**105.71**			**NO/NE**							**ND**	**ND**	**33.88**	**ND**
4. Agriculture [3]		**IE**	**NE**	**111.27**	**9.11**							**ND/NA**	**ND/NA**	**ND/NA**	**ND**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -18 453.38**	**2.75**	**0.02**							**0.68**	**24.09**	**ND**	**ND**
6. Waste		**NO**		**36.46**	**0.18**							**ND**	**ND**	**ND/NA**	**ND**
7. Other		**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Memo Items:															
International Bunkers		**1 869.48**		**0.11**	**0.19**							**32.70**	**9.92**	**2.54**	**23.15**
Aviation		217.33		0.00	0.01							0.92	0.31	0.15	0.07
Marine		1 652.16		0.10	0.18							31.78	9.62	2.39	23.08
Multilateral Operations		**ND**		**ND**	**ND**							**ND**	**ND**	**ND**	**ND**
CO_2 Emissions from Biomass		**2 964.18**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Latvia
(Sheet 1 of 1) 1990
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Kopā
	CO_2 ekvivalents (Gg)						
Total (Net Emissions) [(1)]	**200.92**	**3 704.86**	**3 055.04**	**ND/NA**	**ND/NA**	**ND/NA**	**6 960.82**
1. Energy	**18 044.84**	**544.68**	**167.73**				**18 757.26**
A. Fuel Combustion (Sectoral Approach)	18 044.84	270.63	167.73				18 483.21
1. Energy Industries	9 863.48	10.08	25.61				9 899.17
2. Manufacturing Industries and Construct	2 538.15	4.04	19.91				2 562.10
3. Transport	2 445.12	14.32	79.53				2 538.97
4. Other Sectors	3 198.10	242.19	42.68				3 482.97
5. Other	IC	IC	IC				IC
B. Fugitive Emissions from Fuels	**ND/NA**	274.05	**ND/NA**				274.05
1. Solid Fuels	**ND/NA**	**ND/NA**	**ND/NA**				**ND/NA**
2. Oil and Natural Gas	**ND/NA**	274.05	**ND/NA**				274.05
2. Industrial Processes	**503.75**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**503.75**
A. Mineral Products	459.55	NA	NA				459.55
B. Chemical Industry	NO	ND/NA	ND	ND	ND	ND	ND
C. Metal Production	44.19	ND/NA	ND		ND	ND	44.19
D. Other Production	NA						NE
E. Production of Halocarbons and SF_6				ND	ND	ND	ND
F. Consumption of Halocarbons and SF_6				ND	ND	ND	ND
G. Other	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	**105.71**		**NO/NE**				**105.71**
4. Agriculture	**0.00**	**2 336.75**	**2 824.46**				**5 161.21**
A. Enteric Fermentation		2 057.23					2 057.23
B. Manure Management		279.52	301.18				580.69
C. Rice Cultivation		NA					0.00
D. Agricultural Soils [(2)]		ND	2 523.29				2 523.29
E. Prescribed Burning of Savannas		NA	NA				NO
F. Field Burning of Agricultural Residues		ND/NA	ND				ND/NA
G. Other		ND	ND				ND
5. Land-Use Change and Forestry [(1)]	**-18 453.38**	**57.81**	**5.87**				**-18 389.70**
6. Waste	**NA**	**765.62**	**56.98**				822.60
A. Solid Waste Disposal on Land	**NA**	418.62					418.62
B. Wastewater Handling		347.00	56.98				403.98
C. Waste Incineration	**NA**	**NA**	**NA**				NA
D. Other	**NA**	**NA**	**NA**				NA
7. Other *(please specify)* [redacted]	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
	NA	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:							
International Bunkers	**1 869.48**	**2.21**	**58.90**				**1 930.60**
Aviation	217.33	0.03	1.90				219.26
Marine	1 652.16	2.18	57.00				1 711.34
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**2 964.18**						**2 964.18**

[(1)] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported.
Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	5 219.78	-23 807.58	-18 587.80			-18 587.80
B. Forest and Grassland Conversion	NO/NE		NO/NE	57.81	5.87	63.68
C. Abandonment of Managed Lands	NO	NO	NO			NO
D. CO_2 Emissions and Removals from Soil	134.42	NE/NO	134.42			134.42
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	5 354.20	-23 807.58	-18 453.38	57.81	5.87	-18 389.70

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [(a)]	25 350.53
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [(a)]	6 960.82

[(a)] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1991
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**17 171.46**	**-17 480.33**	**169.46**	**9.37**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**57.96**	**624.26**	**92.53**	**81.09**
1. Energy		**16 729.83**		**21.63**	**0.47**							**57.13**	**595.69**	**54.54**	**79.52**
A. Fuel Combustion	Reference Approach[2]	17 142.01													
	Sectoral Approach[2]	16 729.83		9.06	0.47							57.13	595.69	54.54	79.52
B. Fugitive Emissions from Fuels		ND/NA		12.57	0.00							ND/NA	ND/NA	ND/NA	ND/NA
2. Industrial Processes		**351.59**		**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**0.02**	**0.00**	**9.14**	**1.57**
3. Solvent and Other Product Use		**90.04**			**ND/NA**							**NO**	**NO**	**28.85**	**NA**
4. Agriculture [3]		**IE**	**ND**	**107.10**	**8.69**							**ND/NA**	**ND/NA**	**ND/NA**	**NA**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -17 480.33**	**3.27**	**0.02**							**0.81**	**28.58**	**NA**	**NA**
6. Waste		**NA**		**37.46**	**0.18**							**NA**	**NA**	**NA/ND**	**NA**
7. Other		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:															
International Bunkers		**742.27**		**0.03**	**0.04**							**10.17**	**3.15**	**0.85**	**7.03**
Aviation		293.86		0.00	0.01							1.24	0.41	0.21	0.10
Marine		448.41		0.03	0.03							8.93	2.74	0.65	6.94
Multilateral Operations		**ND**		**ND**	**ND**							**ND**	**ND**	**ND**	**ND**
CO_2 Emissions from Biomass		**1 540.72**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Latvia
(Sheet 1 of 1) 1991
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Kopā
	CO_2 ekvivalents (Gg)						
Total (Net Emissions) [1]	**-308.87**	**3 558.58**	**2 903.26**	**ND/NA**	**ND/NA**	**ND/NA**	**6 152.97**
1. Energy	**16 729.83**	**454.19**	**144.24**				**17 328.27**
A. Fuel Combustion (Sectoral Approach)	16 729.83	190.22	144.24				17 064.30
1. Energy Industries	9 085.95	8.59	21.44				9 115.97
2. Manufacturing Industries and Construction	1 527.16	3.45	16.74				1 547.35
3. Transport	1 696.54	8.49	74.08				1 779.10
4. Other Sectors	4 420.19	169.69	31.98				4 621.86
5. Other	IC	IC	IC				IC
B. Fugitive Emissions from Fuels	**ND/NA**	263.97	**ND/NA**				263.97
1. Solid Fuels	**ND/NA**	**ND/NA**	**ND/NA**				NO/NE
2. Oil and Natural Gas	**ND/NA**	263.97	**ND/NA**				263.97
2. Industrial Processes	**351.59**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**351.59**
A. Mineral Products	340.60	NA	NA				340.60
B. Chemical Industry	NO	NA	NA	NA	NA	NA	0.00
C. Metal Production	10.99	ND/NA	NA		NA	NA	10.99
D. Other Production	ND						ND
E. Production of Halocarbons and SF_6				NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6				NA	NA	NA	NA
G. Other	ND	ND	ND	ND	ND	ND	ND
3. Solvent and Other Product Use	**90.04**		**NO/NE**				**90.04**
4. Agriculture	**0.00**	**2 249.11**	**2 695.23**				**4 944.34**
A. Enteric Fermentation		1 987.31					1 987.31
B. Manure Management		261.80	298.66				560.45
C. Rice Cultivation		NA					NA
D. Agricultural Soils [2]		ND	2 396.57				2 396.57
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		ND/NA	ND				ND/NA
G. Other		ND	ND				ND
5. Land-Use Change and Forestry [1]	**-17 480.33**	**68.59**	**6.96**				**-17 404.78**
6. Waste	**NA**	**786.69**	**56.82**				843.51
A. Solid Waste Disposal on Land	**NA**	444.78					444.78
B. Wastewater Handling		341.91	56.82				398.73
C. Waste Incineration	NA	NA	NA				NO
D. Other	NA	NA	NA				NO
7. Other *(please specify)* [redacted]	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA
Memo Items:							
International Bunkers	**742.27**	**0.64**	**13.22**				**756.14**
Aviation	293.86	0.04	2.57				296.47
Marine	448.41	0.60	10.65				459.66
Multilateral Operations	**ND**	**ND**	**ND**				**ND**
CO_2 Emissions from Biomass	**1 540.72**						**1 540.72**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	6 193.19	-23 807.58	-17 614.38			-17 614.38
B. Forest and Grassland Conversion	ND/NA		ND/NA	68.59	6.96	75.55
C. Abandonment of Managed Lands	NA	NA	NA			NA
D. CO_2 Emissions and Removals from Soil	134.05	ND/NA	134.05			134.05
E. Other	ND	ND	ND	ND	ND	ND
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	6 327.25	-23 807.58	-17 480.33	68.59	6.96	-17 404.78

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	23 557.75
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	6 152.97

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1992
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**13 304.91**	**-18 065.91**	**148.87**	**7.01**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**47.47**	**612.60**	**76.38**	**67.25**
1. Energy		**13 090.52**		**19.21**	**0.38**							**46.72**	**586.50**	**52.59**	**66.21**
A. Fuel Combustion	Reference Approach[2]	13 266.28													
	Sectoral Approach[2]	13 090.52		7.75	0.38							46.72	586.50	50.18	66.21
B. Fugitive Emissions from Fuels		ND/NA		11.46	ND/NA							ND/NA	ND/NA	2.41	ND/NA
2. Industrial Processes		**161.17**		ND/NA	ND/NA	ND/NA	ND/NA	ND/NA	ND/NA	ND/NA	ND/NA	**0.01**	**0.00**	**6.73**	**1.04**
3. Solvent and Other Product Use		**53.21**			ND/NA							**NA**	**NA**	**17.05**	**NA**
4. Agriculture [3]		**IE**	**NE**	**88.77**	**6.43**							**ND/NA**	**ND/NA**	**ND/NA**	**NA**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -18 065.91**	**2.98**	**0.02**							**0.74**	**26.11**	**NA**	**NA**
6. Waste		**NA**		**37.91**	**0.18**							**NA**	**NA**	**ND/NA**	**NA**
7. Other		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:															
International Bunkers		**711.33**		**0.03**	**0.04**							**9.98**	**3.10**	**0.82**	**7.06**
Aviation		272.39		0.00	0.01							1.15	0.38	0.19	0.09
Marine		438.94		0.03	0.03							8.82	2.72	0.63	6.97
Multilateral Operations		**ND**		**ND**	**ND**							**ND**	**ND**	**ND**	**ND**
CO_2 Emissions from Biomass		**1 686.43**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines. A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
1992
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Kopā
	CO_2 ekvivalents (Gg)						
Total (Net Emissions) [1]	**-4 761.01**	**3 126.36**	**2 173.82**	**ND/NA**	**ND/NA**	**ND/NA**	**539.17**
1. Energy	**13 090.52**	**403.42**	**119.32**				**13 613.26**
A. Fuel Combustion (Sectoral Approach)	13 090.52	162.76	119.32				13 372.60
1. Energy Industries	6 844.01	7.98	21.15				6 873.13
2. Manufacturing Industries and Construction	1 293.35	2.79	7.05				1 303.19
3. Transport	1 587.53	8.24	60.97				1 656.73
4. Other Sectors	3 365.64	143.75	30.15				3 539.54
5. Other	IC	IC	IC				IC
B. Fugitive Emissions from Fuels	ND/NA	240.66	ND/NA				240.66
1. Solid Fuels	ND/NA	ND/NA	ND/NA				ND/NA
2. Oil and Natural Gas	ND/NA	240.66	ND/NA				240.66
2. Industrial Processes	**161.17**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**161.17**
A. Mineral Products	155.61	NA	NA				155.61
B. Chemical Industry	NA	NA	NA	NA	NA	NA	NA
C. Metal Production	5.56	NA/ND	NA		NA	NA	5.56
D. Other Production	ND						ND/NA
E. Production of Halocarbons and SF_6				NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6				NA	NA	ND/NA	ND/NA
G. Other	ND	ND	ND	ND	ND	ND	ND
3. Solvent and Other Product Use	**53.21**		**ND/NA**				**53.21**
4. Agriculture	**0.00**	**1 864.21**	**1 992.00**				**3 856.21**
A. Enteric Fermentation		1 664.64					1 664.64
B. Manure Management		199.57	279.40				478.97
C. Rice Cultivation		NA					0.00
D. Agricultural Soils[2]		ND	1 712.60				1 712.60
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		ND/NA	ND				ND/NA
G. Other		ND	ND				ND
5. Land-Use Change and Forestry[1]	**-18 065.91**	**62.65**	**6.36**				**-17 996.90**
6. Waste	**NA**	**796.08**	**56.14**				852.22
A. Solid Waste Disposal on Land	**NA**	472.22					472.22
B. Wastewater Handling		323.85	56.14				379.99
C. Waste Incineration	NA	NA	NA				NA
D. Other	NA	NA	NA				NA
7. Other *(please specify)* [redacted] [redacted]	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA
Memo Items:							
International Bunkers	**711.33**	**0.63**	**11.48**				**723.44**
Aviation	272.39	0.04	2.38				274.81
Marine	438.94	0.59	9.10				448.63
Multilateral Operations	**ND**	**ND**	**ND**				**ND**
CO_2 Emissions from Biomass	**1 686.43**						**1 686.43**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	5 657.11	-23 807.58	-18 150.47			-18 150.47
B. Forest and Grassland Conversion	ND/NA		ND/NA	62.65	6.36	69.01
C. Abandonment of Managed Lands	NA	NA	NA			NA
D. CO_2 Emissions and Removals from Soil	84.55	ND/NA	84.55			84.55
E. Other	NA	NA	NA	NA	NA	NA
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	5 741.66	-23 807.58	-18 065.91	62.65	6.36	-17 996.90

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	18 536.07
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	539.17

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1993
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)				(Gg)					
Total National Emissions and Removals		**11 894.35**	**-17 000.15**	**111.47**	**4.90**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**47.50**	**330.62**	**60.58**	**66.92**
1. Energy		**11 791.08**		**19.33**	**0.36**							**46.61**	**299.64**	**40.82**	**66.73**
A. Fuel Combustion	Reference Approach[2]	12 334.15													
	Sectoral Approach[2]	11 791.08		8.37	0.36							46.61	299.64	38.48	66.73
B. Fugitive Emissions from Fuels		ND/NA		10.96	**ND/NA**							ND/NA	ND/NA	2.34	ND/NA
2. Industrial Processes		**59.18**		**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**0.01**	**0.00**	**5.63**	**0.19**
3. Solvent and Other Product Use		**44.09**			**ND/NA**							**NA**	**NA**	**14.13**	**NA**
4. Agriculture [3]		**IC**	**ND**	**54.60**	**4.35**							**ND/NA**	**ND/NA**	**ND/NA**	**NA**
5. Land-Use Change and Forestry		[4] **0.00**	[4] **-17 000.15**	**3.54**	**0.02**							**0.88**	**30.99**	**NA**	**NA**
6. Waste		**NA**		**34.00**	**0.18**							**NA**	**NA**	**ND/NA**	**NA**
7. Other		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:															
International Bunkers		**858.03**		**0.05**	**0.06**							**15.78**	**4.85**	**1.18**	**12.01**
Aviation		82.62		0.00	0.00							0.35	0.12	0.06	0.03
Marine		775.41		0.05	0.06							15.43	4.74	1.12	11.99
Multilateral Operations		**ND**		**ND**	**ND**							**ND**	**ND**	**ND**	**ND**
CO_2 Emissions from Biomass		**1 958.90**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
1993
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Kopā
	CO_2 eqv. (Gg)						
Total (Net Emissions) [1]	**-5 105.80**	**2 340.80**	**1 520.09**	**ND/NA**	**ND/NA**	**ND/NA**	**-1 244.91**
1. Energy	**11 791.08**	**405.84**	**110.23**				**12 307.14**
A. Fuel Combustion (Sectoral Approach)	11 791.08	175.68	110.23				12 076.98
1. Energy Industries	6 024.91	7.33	19.81				6 052.05
2. Manufacturing Industries and Construction	930.19	1.62	5.26				937.06
3. Transport	1 982.40	12.73	58.08				2 053.21
4. Other Sectors	2 853.59	154.00	27.08				3 034.66
5. Other	IC	IC	IC				IC
B. Fugitive Emissions from Fuels	ND/NA	230.16	ND/NA				230.16
1. Solid Fuels	ND/NA	ND/NA	ND/NA				ND/NA
2. Oil and Natural Gas	ND/NA	230.16	ND/NA				230.16
2. Industrial Processes	**59.18**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**59.18**
A. Mineral Products	39.20	NA	NA				39.20
B. Chemical Industry	NA	NA	NA	NA	NA	NA	NA
C. Metal Production	19.98	ND/NA	NA		NA	NA	19.98
D. Other Production	ND						ND
E. Production of Halocarbons and SF_6				NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6				NA	NA	ND/NA	ND/NA
G. Other	ND	ND	ND	ND	ND	ND	ND
3. Solvent and Other Product Use	**44.09**		**ND/NA**				**44.09**
4. Agriculture	**0.00**	**1 146.57**	**1 347.14**				**2 493.70**
A. Enteric Fermentation		1 026.40					1 026.40
B. Manure Management		120.17	208.32				328.49
C. Rice Cultivation		NA					NA
D. Agricultural Soils [2]		ND	1 138.82				1 138.82
E. Prescribed Burning of Savannas		NA	NA				ND
F. Field Burning of Agricultural Residues		ND/NA	ND				ND/NA
G. Other		ND	ND				ND
5. Land-Use Change and Forestry [1]	**-17 000.15**	**74.37**	**7.55**				**-16 918.23**
6. Waste	**NA**	**714.02**	**55.18**				769.20
A. Solid Waste Disposal on Land	**NA**	498.24					498.24
B. Wastewater Handling		215.79	55.18				270.97
C. Waste Incineration	NA	NA	NA				NA
D. Other	NA	NA	NA				NA
7. Other *(please specify)* [redacted]	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA
Memo Items:							
International Bunkers	**858.03**	**1.05**	**19.20**				**878.28**
Aviation	82.62	0.01	0.72				83.36
Marine	775.41	1.04	18.48				794.93
Multilateral Operations	**ND**	**ND**	**ND**				**ND**
CO_2 Emissions from Biomass	**1 958.90**						**1 958.90**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	**CO_2 equivalent (Gg)**					
A. Changes in Forest and Other Woody Biomass Stocks	6 715.17	-23 807.58	-17 092.41			-17 092.41
B. Forest and Grassland Conversion	ND/NA		ND/NA	74.37	7.55	81.92
C. Abandonment of Managed Lands	NA	NA	NA			NA
D. CO_2 Emissions and Removals from Soil	92.25	ND/NA	92.25			92.25
E. Other	ND	ND	ND	ND	ND	ND
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	6 807.42	-23 807.58	-17 000.15	74.37	7.55	-16 918.23

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	15 673.32
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	-1 244.91

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1994
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**11 450.16**	**-14 481.86**	**104.35**	**4.09**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**43.74**	**326.81**	**65.60**	**76.90**
1. Energy		**11 188.21**		**19.56**	**0.31**							**42.67**	**289.50**	**38.24**	**76.81**
A. Fuel Combustion	Reference Approach[2]	10 610.50													
	Sectoral Approach[2]	11 188.21		8.85	0.31							42.67	289.50	36.00	76.81
B. Fugitive Emissions from Fuels		NO/NE		10.71	**ND/NA**							**ND/NA**	**ND/NA**	2.24	**ND/NA**
2. Industrial Processes		**199.98**		**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**ND/NA**	**0.01**	**0.00**	**7.50**	**0.09**
3. Solvent and Other Product Use		**61.97**			**ND/NA**							**NO**	**NO**	**19.86**	**NA**
4. Agriculture [3]		**0.00**	**0.00**	**45.78**	**3.58**							**ND/NA**	**ND/NA**	**ND/NA**	**NA**
5. Land-Use Change and Forestry		[4] **0.00**	[4] **-14 481.86**	**4.26**	**0.03**							**1.06**	**37.30**	**NA**	**NA**
6. Waste		**NA**		**34.75**	**0.18**							**NA**	**NA**	**ND/NA**	**NA**
7. Other		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:															
International Bunkers		**808.32**		**0.05**	**0.06**							**14.92**	**4.59**	**1.11**	**11.40**
Aviation		76.53		0.00	0.00							0.32	0.11	0.05	0.02
Marine		731.79		0.05	0.05							14.59	4.48	1.06	11.37
Multilateral Operations		**ND**		**ND**	**ND**							**ND**	**ND**	**ND**	**ND**
CO_2 Emissions from Biomass		**2 610.43**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Latvia
(Sheet 1 of 1) 1994
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Kopā
	CO_2 ekvivalents (Gg)						
Total (Net Emissions) [1]	**-3 031.70**	**2 191.32**	**1 269.22**	**ND/NA**	**ND/NA**	**ND/NA**	**428.84**
1. Energy	**11 188.21**	**410.66**	**96.89**				**11 695.76**
A. Fuel Combustion (Sectoral Approach)	11 188.21	185.75	96.89				11 470.85
1. Energy Industries	4 781.72	8.81	21.03				4 811.56
2. Manufacturing Industries and Construction	1 708.99	3.02	8.19				1 720.20
3. Transport	1 736.54	12.36	38.89				1 787.78
4. Other Sectors	2 960.96	161.56	28.78				3 151.30
5. Other	IC	IC	IC				IC
B. Fugitive Emissions from Fuels	ND/NA	224.91	ND/NA				224.91
1. Solid Fuels	ND/NA	ND/NA	ND/NA				ND/NA
2. Oil and Natural Gas	ND/NA	224.91	ND/NA				224.91
2. Industrial Processes	**199.98**	ND/NA	ND/NA	ND/NA	ND/NA	ND/NA	**199.98**
A. Mineral Products	167.33	NA	NA				167.33
B. Chemical Industry	NA	NA	NA	NA	NA	NA	NA
C. Metal Production	32.65	ND	NA		NA	NA	32.65
D. Other Production	ND						ND
E. Production of Halocarbons and SF_6				NA	NA	NA	NA
F. Consumption of Halocarbons and SF_6				NA	NA	ND/NA	ND/NA
G. Other	ND	ND	ND	ND	ND	ND	ND
3. Solvent and Other Product Use	**61.97**		**NO/NE**				**61.97**
4. Agriculture	**0.00**	**961.30**	**1 108.87**				**2 070.18**
A. Enteric Fermentation		852.67					852.67
B. Manure Management		108.64	180.82				289.46
C. Rice Cultivation		NA					NA
D. Agricultural Soils [2]		ND	928.05				928.05
E. Prescribed Burning of Savannas		NA	NA				NA
F. Field Burning of Agricultural Residues		ND/NA	ND				ND/NA
G. Other		ND	ND				NA
5. Land-Use Change and Forestry [1]	**-14 481.86**	**89.53**	**9.09**				**-14 383.25**
6. Waste	**NA**	**729.83**	**54.37**				784.20
A. Solid Waste Disposal on Land	**NA**	522.39					522.39
B. Wastewater Handling		207.43	54.37				261.81
C. Waste Incineration	**NA**	**NA**	**NA**				NO
D. Other	**NA**	**NA**	**NA**				NO
7. Other *(please specify)* [redacted]	[redacted] **NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
	NA	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Memo Items:							
International Bunkers	**808.32**	**0.99**	**17.68**				**826.99**
Aviation	76.53	0.01	0.67				77.21
Marine	731.79	0.98	17.01				749.78
Multilateral Operations	**ND**	**ND**	**ND**				**ND**
CO_2 Emissions from Biomass	**2 610.43**						**2 610.43**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	**CO_2 equivalent (Gg)**					
A. Changes in Forest and Other Woody Biomass Stocks	8 083.60	-22 678.98	-14 595.38			-14 595.38
B. Forest and Grassland Conversion	ND/NA		ND/NA	89.53	9.09	98.61
C. Abandonment of Managed Lands	NA	NA	NA			NA
D. CO_2 Emissions and Removals from Soil	113.52	ND/NA	113.52			113.52
E. Other	ND	ND	ND	ND	ND	ND
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	8 197.12	-22 678.98	-14 481.86	89.53	9.09	-14 383.25

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	14 812.09
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	428.84

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

Common Reporting Format for the provision of inventory information by Annex I Parties to the UNFCCC

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1995
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**8 962.94**	**-14 630.26**	**113.61**	**3.56**	**0.00**	**0.29**	**0.00**	**0.00**	**0.00**	**0.00**	**41.93**	**404.01**	**70.74**	**47.76**
1. Energy		**8 734.24**		**23.56**	**0.38**							**40.65**	**359.18**	**43.88**	**47.68**
A. Fuel Combustion	Reference Approach[2]	9 101.92													
	Sectoral Approach[2]	8 734.24		13.13	0.38							40.65	359.18	41.70	47.68
B. Fugitive Emissions from Fuels		NO/NE		10.43	NO/NE							NO/NE	NO/NE	2.18	NO/NE
2. Industrial Processes		**169.37**		**NO/NE**	**NO/NE**	**0.00**	**0.29**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**7.84**	**0.08**
3. Solvent and Other Product Use		**59.33**			**0.01**							**NO**	**NO**	**19.02**	**NO**
4. Agriculture [3]		**IE**	**NE**	**44.64**	**2.96**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		[4] **0.00**	[4] **-14 630.26**	**5.12**	**0.04**							**1.27**	**44.83**	**NO**	**NO**
6. Waste		**NO/NE**		**40.29**	**0.17**							**0.00**	**0.00**	**0.00**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**553.20**		**0.03**	**0.05**							**9.68**	**2.96**	**0.74**	**7.10**
Aviation		76.53		0.00	0.00							0.32	0.11	0.05	0.02
Marine		476.67		0.03	0.04							9.35	2.85	0.69	7.07
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**4 768.09**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
1995
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [(1)]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [(1)]	**-5 667.32**	**2 385.80**	**1 103.98**	**0.29**	**0.00**	**0.25**	**-2 177.00**
1. Energy	**8 734.24**	**494.70**	**118.60**				**9 347.54**
A. Fuel Combustion (Sectoral Approach)	8 734.24	275.67	118.60				9 128.51
1. Energy Industries	4 106.09	9.02	20.06				4 135.17
2. Manufacturing Industries and Construction	1 309.83	3.13	5.63				1 318.58
3. Transport	1 851.24	11.82	45.56				1 908.62
4. Other Sectors	1 467.08	251.70	47.35				1 766.13
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	219.03	NO/NE				219.03
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NO/NE	219.03	NO/NE				219.03
2. Industrial Processes	**169.37**	**NO/NE**	**NO/NE**	**0.29**	**0.00**	**0.25**	**169.92**
A. Mineral Products	142.27	NO	NO				142.27
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	27.11	NO/NE	NO		NO	NO	27.11
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				0.29	0.00	0.25	0.54
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**59.33**		**4.53**				**63.86**
4. Agriculture	**0.00**	**937.42**	**916.25**				**1 853.66**
A. Enteric Fermentation		825.62					825.62
B. Manure Management		111.80	179.68				291.48
C. Rice Cultivation		NO					NO
D. Agricultural Soils [(2)]		NE	736.56				736.56
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [(1)]	**-14 630.26**	**107.58**	**10.92**				**-14 511.76**
6. Waste	**NO/NE**	**846.10**	**53.69**				899.79
A. Solid Waste Disposal on Land	NO	643.95					643.95
B. Wastewater Handling		202.14	53.69				255.83
C. Waste Incineration	NE	NO	NE				NO/NE
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**553.20**	**0.65**	**14.14**				**567.99**
Aviation	76.53	0.01	0.67				77.21
Marine	476.67	0.63	13.47				490.78
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**4 768.09**						**4 768.09**

[(1)] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	` emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	9 714.00	-24 410.49	-14 696.48			-14 696.48
B. Forest and Grassland Conversion	NO/NE		NO/NE	107.58	10.92	118.50
C. Abandonment of Managed Lands	NO	-50.23	-50.23			-50.23
D. CO_2 Emissions and Removals from Soil	116.45	NE/NO	116.45			116.45
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	9 830.45	-24 460.72	-14 630.26	107.58	10.92	-14 511.76

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [(a)]	12 334.76
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [(a)]	-2 177.00

[(a)] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

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Common Reporting Format for the provision of inventory information by Annex I Parties to the UNFCCC
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SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1996
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**9 155.64**	**-14 841.23**	**111.41**	**3.60**	**0.00**	**1.33**	**0.00**	**0.00**	**0.00**	**0.00**	**43.86**	**409.03**	**74.04**	**54.38**
1. Energy		**8 910.24**		**23.51**	**0.42**							**42.60**	**365.00**	**44.23**	**54.22**
A. Fuel Combustion	Reference Approach[2]	8 954.75													
	Sectoral Approach[2]	8 910.24		13.46	0.42							42.60	365.00	42.23	54.22
B. Fugitive Emissions from Fuels		NO/NE		10.05	NO							NO/NE	NO/NE	1.99	NO/NE
2. Industrial Processes		**180.91**		**NO/NE**	**NO/NE**	**0.00**	**1.33**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**9.14**	**0.16**
3. Solvent and Other Product Use		**64.48**			**0.02**							**NO**	**NO**	**20.67**	**NO**
4. Agriculture [3]		**IE**	**NE**	**41.86**	**2.96**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		[4] **0.00**	[4] **-14 841.23**	**5.03**	**0.03**							**1.25**	**44.03**	**NO**	**NO**
6. Waste		**NO/NE**		**41.01**	**0.17**							**0.00**	**0.00**	**0.00**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**406.59**		**0.02**	**0.04**							**6.35**	**1.93**	**0.52**	**4.35**
Aviation		98.00		0.00	0.00							0.41	0.14	0.07	0.03
Marine		308.59		0.02	0.03							5.94	1.80	0.45	4.31
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 110.28**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
1996
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-5 685.59**	**2 339.55**	**1 116.49**	**1.33**	**0.00**	**0.29**	**-2 227.93**
1. Energy	**8 910.24**	**493.61**	**131.16**				**9 535.01**
A. Fuel Combustion (Sectoral Approach)	8 910.24	282.56	131.16				9 323.96
1. Energy Industries	4 412.39	10.07	22.66				4 445.12
2. Manufacturing Industries and Construction	1 219.25	4.08	9.09				1 232.42
3. Transport	2 022.05	12.18	51.45				2 085.68
4. Other Sectors	1 256.55	256.23	47.96				1 560.74
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	211.05	NO/NE				211.05
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NO/NE	211.05	NO/NE				211.05
2. Industrial Processes	**180.91**	**NO/NE**	**NO/NE**	**1.33**	**0.00**	**0.29**	**182.53**
A. Mineral Products	155.28	NO	NO				155.28
B. Chemical Industry	NO	NO	NO	NO	NO	NO	0.00
C. Metal Production	25.64	NO/NE	NO		NO	NO	25.64
D. Other Production	NE						0.00
E. Production of Halocarbons and SF_6				NO	NO	NO	0.00
F. Consumption of Halocarbons and SF_6				1.33	0.00	0.29	1.62
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**64.48**		**5.12**				**69.60**
4. Agriculture	**0.00**	**879.04**	**916.14**				**1 795.19**
A. Enteric Fermentation		778.81					778.81
B. Manure Management		100.23	168.01				268.25
C. Rice Cultivation		NO					NO
D. Agricultural Soils [2]		NE	748.13				748.13
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [1]	**-14 841.23**	**105.67**	**10.72**				**-14 724.83**
6. Waste	**NO/NE**	**861.23**	**53.35**				914.58
A. Solid Waste Disposal on Land	NO	661.59					661.59
B. Wastewater Handling		199.64	53.35				252.99
C. Waste Incineration	NE	NO	NE				NO/NE
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**406.59**	**0.42**	**11.49**				**418.50**
Aviation	98.00	0.01	0.86				98.87
Marine	308.59	0.41	10.63				319.63
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 110.28**						**5 110.28**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	9 541.75	-24 412.08	-14 870.33			-14 870.33
B. Forest and Grassland Conversion	NO/NE		NO/NE	105.67	10.72	116.40
C. Abandonment of Managed Lands	NO	-73.33	-73.33			-73.33
D. CO_2 Emissions and Removals from Soil	102.44	NE/NO	102.44			102.44
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	9 644.19	-24 485.42	-14 841.23	105.67	10.72	-14 724.83

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	12 496.90
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	-2 227.93

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1997
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**8 742.32**	**-11 793.88**	**110.48**	**3.58**	**0.00**	**2.48**	**0.00**	**0.00**	**0.00**	**0.00**	**42.78**	**385.80**	**78.92**	**39.97**
1. Energy		**8 460.06**		**22.25**	**0.44**							**41.11**	**327.71**	**41.31**	**39.87**
A. Fuel Combustion	Reference Approach[2]	8 372.40													
	Sectoral Approach[2]	8 460.06		12.87	0.44							41.11	327.71	39.48	39.87
B. Fugitive Emissions from Fuels		NO/NE		9.38	NO/NE							NO/NE	NO/NE	1.83	NO/NE
2. Industrial Processes		**202.05**		**NO/NE**	**NO/NE**	**0.00**	**2.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**11.84**	**0.09**
3. Solvent and Other Product Use		**80.22**			**0.02**							**NO**	**NO**	**25.77**	**NO**
4. Agriculture [3]		**IE**	**NE**	**39.19**	**2.91**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -11 793.88**	**6.64**	**0.05**							**1.65**	**58.09**	**NO**	**NO**
6. Waste		**NO/NE**		**42.40**	**0.17**							**0.00**	**0.00**	**0.00**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**322.58**		**0.01**	**0.03**							**4.64**	**1.41**	**0.39**	**2.97**
Aviation		98.00		0.00	0.00							0.41	0.14	0.07	0.03
Marine		224.58		0.01	0.03							4.23	1.27	0.33	2.93
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 182.92**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Latvia
(Sheet 1 of 1) 1997
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-3 051.55**	**2 320.00**	**1 110.94**	**2.48**	**0.00**	**0.51**	**382.37**
1. Energy	**8 460.06**	**467.21**	**137.39**				**9 064.66**
A. Fuel Combustion (Sectoral Approach)	8 460.06	270.23	137.39				8 867.68
1. Energy Industries	3 843.41	10.77	22.73				3 876.90
2. Manufacturing Industries and Construction	1 487.46	4.24	12.08				1 503.78
3. Transport	2 021.00	11.90	57.06				2 089.97
4. Other Sectors	1 108.19	243.32	45.52				1 397.03
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	196.98	NO/NE				196.98
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NO/NE	196.98	NO/NE				196.98
2. Industrial Processes	**202.05**	**NO/NE**	**NO/NE**	**2.48**	**0.00**	**0.51**	**205.03**
A. Mineral Products	157.67	NO	NO				157.67
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	44.38	NO/NE	NO		NO	NO	44.38
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				2.48	0.00	0.51	2.98
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**80.22**		**5.36**				**85.58**
4. Agriculture	**0.00**	**823.00**	**901.12**				**1 724.12**
A. Enteric Fermentation		729.09					729.09
B. Manure Management		93.91	156.91				250.82
C. Rice Cultivation		NO					NO
D. Agricultural Soils [2]		NE	744.22				744.22
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [1]	**-11 793.88**	**139.42**	**14.15**				**-11 640.31**
6. Waste	**NO/NE**	**890.37**	**52.92**				943.29
A. Solid Waste Disposal on Land	NO	691.72					691.72
B. Wastewater Handling		198.66	52.92				251.57
C. Waste Incineration	NE	NO	NE				NO/NE
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**322.58**	**0.31**	**10.07**				**332.96**
Aviation	98.00	0.01	0.86				98.87
Marine	224.58	0.29	9.21				234.09
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 182.92**						**5 182.92**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	12 588.55	-24 439.85	-11 851.30			-11 851.30
B. Forest and Grassland Conversion	NO/NE		NO/NE	139.42	14.15	153.57
C. Abandonment of Managed Lands	NO	-55.37	-55.37			-55.37
D. CO_2 Emissions and Removals from Soil	112.79	NE/NO	112.79			112.79
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	12 701.34	-24 495.21	-11 793.88	139.42	14.15	-11 640.31

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	12 022.68
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	382.37

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1998
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	$HFCs^{(1)}$		$PFCs^{(1)}$		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**8 129.69**	**-10 273.84**	**110.84**	**3.45**	**0.00**	**4.62**	**0.00**	**0.00**	**0.00**	**0.00**	**40.39**	**383.50**	**79.43**	**35.84**
1. Energy		**7 835.71**		**21.87**	**0.44**							**38.52**	**318.21**	**39.57**	**35.71**
A. Fuel Combustion	Reference Approach[2]	7 847.26													
	Sectoral Approach[2]	7 835.71		12.87	0.44							38.52	318.21	37.85	35.71
B. Fugitive Emissions from Fuels		NO/NE		9.00	NO/NE							NO/NE	NO/NE	1.72	NO/NE
2. Industrial Processes		**207.97**		**NO/NE**	**NO/NE**	**0.00**	**4.62**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**12.25**	**0.13**
3. Solvent and Other Product Use		**86.01**			**0.01**							**NO**	**NO**	**27.60**	**NO**
4. Agriculture [3]		**IE**	**NE**	**35.86**	**2.78**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -10 273.84**	**7.46**	**0.05**							**1.85**	**65.29**	**NO**	**NO**
6. Waste		**NO/NE**		**45.65**	**0.17**							**0.00**	**0.00**	**0.00**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**135.85**		**0.00**	**0.02**							**1.06**	**0.30**	**0.13**	**0.19**
Aviation		88.79		0.00	0.00							0.38	0.13	0.06	0.03
Marine		47.07		0.00	0.02							0.68	0.18	0.07	0.16
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 342.12**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS Latvia
(Sheet 1 of 1) 1998
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-2 144.15**	**2 327.62**	**1 069.77**	**4.62**	**0.00**	**0.71**	**1 258.57**
1. Energy	**7 835.71**	**459.34**	**136.28**				**8 431.32**
A. Fuel Combustion (Sectoral Approach)	7 835.71	270.34	136.28				8 242.32
1. Energy Industries	3 525.00	9.44	19.87				3 554.31
2. Manufacturing Industries and Construction	1 327.03	4.76	12.50				1 344.28
3. Transport	1 982.86	11.33	57.40				2 051.59
4. Other Sectors	1 000.82	244.82	46.50				1 292.14
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	189.00	NO/NE				189.00
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NE/NO	189.00	NO/NE				189.00
2. Industrial Processes	**207.97**	**NO/NE**	**NO/NE**	**4.62**	**0.00**	**0.71**	**213.31**
A. Mineral Products	160.66	NO	NO				160.66
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	47.31	NO/NE	NO		NO	NO	47.31
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				4.62	0.00	0.71	5.33
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**86.01**		**3.89**				**89.89**
4. Agriculture	**0.00**	**753.02**	**861.25**				**1 614.27**
A. Enteric Fermentation		664.99					664.99
B. Manure Management		88.03	143.66				231.69
C. Rice Cultivation		NO					NO
D. Agricultural Soils [2]		NE	717.59				717.59
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [1]	**-10 273.84**	**156.70**	**15.90**				**-10 101.24**
6. Waste	**NO/NE**	**958.56**	**52.45**				1 011.01
A. Solid Waste Disposal on Land	NO	759.59					759.59
B. Wastewater Handling		198.97	52.45				251.42
C. Waste Incineration	NE	NO	NE				NO/NE
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**135.85**	**0.07**	**5.96**				**141.88**
Aviation	88.79	0.01	0.78				89.58
Marine	47.07	0.05	5.18				52.31
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 342.12**						**5 342.12**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	14 148.98	-24 430.75	-10 281.77			-10 281.77
B. Forest and Grassland Conversion	NO/NE		NO/NE	156.70	15.90	172.60
C. Abandonment of Managed Lands	NO	-84.33	-84.33			-84.33
D. CO_2 Emissions and Removals from Soil	92.27	NE/NO	92.27			92.27
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	14 241.24	-24 515.08	-10 273.84	156.70	15.90	-10 101.24

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	11 359.81
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	1 258.57

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
1999
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**7 412.62**	**-9 349.54**	**107.74**	**3.11**	**0.00**	**6.79**	**0.00**	**0.00**	**0.00**	**0.00**	**37.92**	**374.25**	**78.61**	**29.49**
1. Energy		**7 075.80**		**21.28**	**0.42**							**35.91**	**304.59**	**38.41**	**29.38**
A. Fuel Combustion	Reference Approach[2]	6 669.22													
	Sectoral Approach[2]	7 075.80		12.70	0.42							35.91	304.59	36.76	29.38
B. Fugitive Emissions from Fuels		NO/NE		8.58	NO/NE							NO/NE	NO/NE	1.66	NE/NO
2. Industrial Processes		**242.06**		**NO/NE**	**NO/NE**	**0.00**	**6.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**10.92**	**0.11**
3. Solvent and Other Product Use		**91.22**			**0.01**							**NO**	**NO**	**29.26**	**NO**
4. Agriculture [3]		**IE**	**NE**	**31.35**	**2.46**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -9 349.54**	**7.96**	**0.05**							**1.98**	**69.66**	**NO**	**NO**
6. Waste		**3.53**		**47.15**	**0.17**							**0.01**	**0.00**	**0.02**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**120.24**		**0.00**	**0.02**							**0.80**	**0.23**	**0.11**	**0.04**
Aviation		88.79		0.00	0.00							0.38	0.13	0.06	0.03
Marine		31.45		0.00	0.01							0.43	0.11	0.05	0.01
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 356.45**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
1999
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-1 936.92**	**2 262.60**	**965.37**	**6.79**	**0.00**	**0.98**	**1 298.82**
1. Energy	**7 075.80**	**446.88**	**129.95**				**7 652.63**
A. Fuel Combustion (Sectoral Approach)	7 075.80	266.70	129.95				7 472.45
1. Energy Industries	3 134.14	8.48	17.74				3 160.36
2. Manufacturing Industries and Construction	1 056.50	4.40	11.08				1 071.98
3. Transport	1 948.81	11.12	54.68				2 014.61
4. Other Sectors	936.35	242.69	46.46				1 225.50
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	180.18	NO/NE				180.18
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NE/NO	180.18	NO/NE				180.18
2. Industrial Processes	**242.06**	**NO/NE**	**NO/NE**	**6.79**	**0.00**	**0.98**	**249.82**
A. Mineral Products	196.28	NO	NO				196.28
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	45.78	NO/NE	NO		NO	NO	45.78
D. Other Production	NE						0.00
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				6.79	0.00	0.98	7.76
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**91.22**		**4.28**				**95.50**
4. Agriculture	**0.00**	**658.42**	**762.13**				**1 420.54**
A. Enteric Fermentation		578.00					578.00
B. Manure Management		80.41	126.63				207.05
C. Rice Cultivation		NO					NO
D. Agricultural Soils [2]		NE	635.49				635.49
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [1]	**-9 349.54**	**167.18**	**16.97**				**-9 165.39**
6. Waste	**3.53**	**990.13**	**52.05**				1 045.72
A. Solid Waste Disposal on Land	NO	794.22					794.22
B. Wastewater Handling		195.91	52.05				247.96
C. Waste Incineration	3.53	NO	NE				3.53
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**120.24**	**0.05**	**4.73**				**125.02**
Aviation	88.79	0.01	0.78				89.58
Marine	31.45	0.04	3.95				35.44
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 356.45**						**5 356.45**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	15 095.03	-24 434.98	-9 339.96			-9 339.96
B. Forest and Grassland Conversion	NO/NE		NO/NE	167.18	16.97	184.14
C. Abandonment of Managed Lands	NO	-102.67	-102.67			-102.67
D. CO_2 Emissions and Removals from Soil	93.09	NE/NO	93.09			93.09
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	15 188.11	-24 537.65	-9 349.54	167.18	16.97	-9 165.39

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	10 464.21
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	1 298.82

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
2000
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**6 854.65**	**-8 640.01**	**104.31**	**3.22**	**0.00**	**8.60**	**0.00**	**0.00**	**0.00**	**0.00**	**34.77**	**332.93**	**70.07**	**14.70**
1. Energy		**6 576.86**		**19.80**	**0.41**							**33.52**	**289.96**	**34.69**	**14.60**
A. Fuel Combustion	Reference Approach[2]	6 203.31													
	Sectoral Approach[2]	6 576.86		11.86	0.41							33.52	289.96	34.46	14.60
B. Fugitive Emissions from Fuels		NO/NE		7.94	NO/NE							NO/NE	NO/NE	0.23	NE/NO
2. Industrial Processes		**189.10**		**NO/NE**	**NO/NE**	**0.00**	**8.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**8.75**	**0.09**
3. Solvent and Other Product Use		**82.73**			**0.01**							**NO**	**NO**	**26.57**	**NO**
4. Agriculture [3]		**IE**	**NE**	**30.60**	**2.61**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		[4] **0.00**	[4] **-8 640.01**	**4.91**	**0.03**							**1.22**	**42.97**	**NO**	**NO**
6. Waste		**5.94**		**49.00**	**0.16**							**0.02**	**0.00**	**0.05**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**104.74**		**0.00**	**0.01**							**0.68**	**0.20**	**0.09**	**0.03**
Aviation		79.58		0.00	0.00							0.34	0.11	0.06	0.03
Marine		25.16		0.00	0.01							0.34	0.09	0.04	0.01
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 017.70**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
2000
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-1 785.37**	**2 190.60**	**998.47**	**8.60**	**0.00**	**1.28**	**1 413.58**
1. Energy	**6 576.86**	**415.72**	**126.37**				**7 118.95**
A. Fuel Combustion (Sectoral Approach)	6 576.86	248.98	126.37				6 952.21
1. Energy Industries	2 708.21	8.01	16.10				2 732.32
2. Manufacturing Industries and Construction	932.20	4.03	6.78				943.01
3. Transport	2 119.84	10.63	59.82				2 190.29
4. Other Sectors	816.61	226.32	43.66				1 086.59
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	166.74	NO/NE				166.74
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NE/NO	166.74	NO/NE				166.74
2. Industrial Processes	**189.10**	**NO/NE**	**NO/NE**	**8.60**	**0.00**	**1.28**	**198.98**
A. Mineral Products	143.61	NO	NO				143.61
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	45.49	NO/NE	NO		NO	NO	45.49
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				8.60	0.00	1.28	9.87
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**82.73**		**3.10**				**85.83**
4. Agriculture	**0.00**	**642.67**	**807.85**				**1 450.52**
A. Enteric Fermentation		564.42					564.42
B. Manure Management		78.26	123.13				201.39
C. Rice Cultivation		NO					NO
D. Agricultural Soils[2]		NE	684.72				684.72
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry[1]	**-8 640.01**	**103.12**	**10.47**				**-8 526.43**
6. Waste	**5.94**	**1 029.09**	**50.69**				1 085.72
A. Solid Waste Disposal on Land	NO	831.23					831.23
B. Wastewater Handling		197.86	50.69				248.55
C. Waste Incineration	5.94	NO	NE				5.94
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**104.74**	**0.04**	**3.86**				**108.63**
Aviation	79.58	0.01	0.70				80.28
Marine	25.16	0.03	3.16				28.35
Multilateral Operations	**NE**	**0.00**	**0.00**				**0.00**
CO_2 Emissions from Biomass	**5 017.70**						**5 017.70**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	15 518.25	-24 129.75	-8 611.50			-8 611.50
B. Forest and Grassland Conversion	NO/NE		NO/NE	103.12	10.47	113.58
C. Abandonment of Managed Lands	NO	-123.20	-123.20			-123.20
D. CO_2 Emissions and Removals from Soil	94.69	NE/NO	94.69			94.69
E. Other	NE	NE	NE	NE	NE	0.00
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	15 612.94	-24 252.95	-8 640.01	103.12	10.47	-8 526.43

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	9 940.01
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	1 413.58

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
2001
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
					P	A	P	A	P	A				
	(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals	**7 412.86**	**-9 594.20**	**104.06**	**3.62**	**0.00**	**9.82**	**0.00**	**0.00**	**0.00**	**0.00**	**37.68**	**310.03**	**73.39**	**10.63**
1. Energy	**7 098.70**		**20.64**	**0.47**							**37.62**	**310.03**	**36.72**	**10.53**
A. Fuel Reference Approach[2]	6 847.71													
Sectoral Approach[2]	7 098.70		12.94	0.47							37.62	310.03	36.48	10.53
B. Fugitive Emissions from Fuels	NO/NE		7.70	NO/NE							NO/NE	NO/NE	0.24	NE/NO
2. Industrial Processes	**208.74**		**NO/NE**	**NO/NE**	**0.00**	**9.82**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**6.93**	**0.10**
3. Solvent and Other Product Use	**92.30**			**0.03**							**NO**	**NO**	**29.64**	**NO**
4. Agriculture [3]	**IE**	**NE**	**32.07**	**2.96**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry	[4] **0.00**	[4] **-9 594.20**	**NA/NO/NE**	**NA/NO/NE**							**NA/NO/NE**	**NA/NO/NE**	**NO**	**NO**
6. Waste	**13.11**		**51.36**	**0.16**							**0.04**	**0.00**	**0.11**	**0.00**
7. Other	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:														
International Bunkers	**695.61**		**0.04**	**0.14**							**10.89**	**3.14**	**0.96**	**0.51**
Aviation	79.58		0.00	0.00							0.34	0.11	0.06	0.03
Marine	616.04		0.04	0.14							10.55	3.03	0.90	0.48
Multilateral Operations	**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass	**5 469.69**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines. A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
2001
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-2 181.34**	**2 185.36**	**1 122.53**	**9.82**	**0.00**	**1.98**	**1 138.35**
1. Energy	**7 098.70**	**433.37**	**147.24**				**7 679.31**
A. Fuel Combustion (Sectoral Approach)	7 098.70	271.67	147.24				7 517.61
1. Energy Industries	2 600.17	7.87	15.64				2 623.68
2. Manufacturing Industries and Construction	896.35	4.71	10.37				911.43
3. Transport	2 561.52	12.23	73.95				2 647.70
4. Other Sectors	1 040.66	246.86	47.28				1 334.80
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	161.70	NO/NE				161.70
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NE/NO	161.70	NO/NE				161.70
2. Industrial Processes	**208.74**	**NO/NE**	**NO/NE**	**9.82**	**0.00**	**1.98**	**220.54**
A. Mineral Products	164.25	NO	NO				164.25
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	44.49	NO/NE	NO		NO	NO	44.49
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				9.82	0.00	1.98	11.80
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**92.30**		**8.43**				**100.73**
4. Agriculture	**0.00**	**673.46**	**916.42**				**1 589.88**
A. Enteric Fermentation		589.64					589.64
B. Manure Management		83.82	130.68				214.49
C. Rice Cultivation		NO					NO
D. Agricultural Soils[2]		NE	785.75				785.75
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry[1]	**-9 594.20**	**0.00**	**0.00**				**-9 594.20**
6. Waste	**13.11**	**1 078.53**	**50.44**				**1 142.08**
A. Solid Waste Disposal on Land	NO	877.02					877.02
B. Wastewater Handling		201.52	50.44				251.95
C. Waste Incineration	13.11	NO	NE				13.11
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**695.61**	**0.78**	**42.65**				**739.05**
Aviation	79.58	0.01	0.70				80.28
Marine	616.04	0.77	41.96				658.77
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 469.69**						**5 469.69**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	14 602.67	-24 124.58	-9 521.91			-9 521.91
B. Forest and Grassland Conversion	NO/NA		NO/NA	0.00	NO/NA	0.00
C. Abandonment of Managed Lands	NO	-163.53	-163.53			-163.53
D. CO_2 Emissions and Removals from Soil	91.24	NE/NO	91.24			91.24
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	14 693.92	-24 288.12	-9 594.20	0.00	0.00	-9 594.20

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	10 732.55
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	1 138.35

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
2002
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**7 336.64**	**-8 424.90**	**103.11**	**3.56**	**0.00**	**11.84**	**0.00**	**0.00**	**0.00**	**0.00**	**36.81**	**289.67**	**77.32**	**9.10**
1. Energy		**6 973.99**		**20.69**	**0.49**							**36.71**	**289.67**	**34.91**	**9.00**
A. Fuel Combustion	Reference Approach[2]	6 619.76													
	Sectoral Approach[2]	6 973.99		12.66	0.49							36.71	289.67	34.68	9.00
B. Fugitive Emissions from Fuels		NO/NE		8.03	NO							NO/NE	NO/NE	0.23	NE/NO
2. Industrial Processes		**222.70**		**NO/NE**	**NO/NE**	**0.00**	**11.84**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**9.28**	**0.10**
3. Solvent and Other Product Use		**102.43**			**0.02**							**NO**	**NO**	**32.90**	**NO**
4. Agriculture [3]		**IE**	**NE**	**32.31**	**2.89**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		**[4] 0.00**	**[4] -8 424.90**	**NA/NO/NE**	**NA/NO/NE**							**NA/NO/NE**	**NA/NO/NE**	**NO**	**NO**
6. Waste		**37.52**		**50.11**	**0.16**							**0.08**	**0.00**	**0.23**	**0.00**
7. Other		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**733.63**		**0.04**	**0.12**							**11.98**	**3.52**	**1.01**	**0.60**
Aviation		82.62		0.00	0.00							0.35	0.12	0.06	0.03
Marine		651.00		0.04	0.12							11.63	3.41	0.95	0.57
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 606.47**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
2002
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-1 088.26**	**2 165.31**	**1 103.53**	**11.84**	**0.00**	**3.38**	**2 195.81**
1. Energy	**6 973.99**	**434.55**	**152.49**				**7 561.03**
A. Fuel Combustion (Sectoral Approach)	6 973.99	265.92	152.49				7 392.40
1. Energy Industries	2 459.98	8.71	17.21				2 485.90
2. Manufacturing Industries and Construction	950.12	4.87	11.60				966.59
3. Transport	2 559.75	12.16	77.31				2 649.22
4. Other Sectors	1 004.14	240.18	46.36				1 290.69
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	168.63	NO/NE				168.63
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NE/NO	168.63	NO/NE				168.63
2. Industrial Processes	**222.70**	**NO/NE**	**NO/NE**	**11.84**	**0.00**	**3.38**	**237.92**
A. Mineral Products	178.18	NO	NO				178.18
B. Chemical Industry	NO	NO	NO	NO	NO	NO	NO
C. Metal Production	44.52	NO/NE	NO		NO	NO	44.52
D. Other Production	NE						NE
E. Production of Halocarbons and SF_6				NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6				11.84	0.00	3.38	15.22
G. Other	NE	NE	NE	NE	NE	NE	NE
3. Solvent and Other Product Use	**102.43**		**5.95**				**108.38**
4. Agriculture	**0.00**	**678.44**	**895.03**				**1 573.47**
A. Enteric Fermentation		592.11					592.11
B. Manure Management		86.33	132.93				219.26
C. Rice Cultivation		NO					NO
D. Agricultural Soils [2]		NE	762.10				762.10
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [1]	**-8 424.90**	**0.00**	**0.00**				**-8 424.90**
6. Waste	**37.52**	**1 052.32**	**50.07**				1 139.91
A. Solid Waste Disposal on Land	NO	859.31					859.31
B. Wastewater Handling		193.02	50.07				243.08
C. Waste Incineration	37.52	NO	NE				37.52
D. Other	NO	NO	NO				NO
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**733.63**	**0.84**	**37.42**				**771.89**
Aviation	82.62	0.01	0.72				83.36
Marine	651.00	0.83	36.70				688.53
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 606.47**						**5 606.47**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	15 782.06	-24 123.53	-8 341.47			-8 341.47
B. Forest and Grassland Conversion	NO/NA		NO/NA	0.00	NO/NA	0.00
C. Abandonment of Managed Lands	NO	-190.30	-190.30			-190.30
D. CO_2 Emissions and Removals from Soil	106.88	NE/NO	106.88			106.88
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	15 888.94	-24 313.83	-8 424.90	0.00	0.00	-8 424.90

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	10 620.71
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	2 195.81

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

SUMMARY 1.B SHORT SUMMARY REPORT FOR NATIONAL GREENHOUSE GAS INVENTORIES (IPCC TABLE 7B)
(Sheet 1 of 1)

Latvia
2003
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		CO_2 emissions	CO_2 removals	CH_4	N_2O	HFCs[1]		PFCs[1]		SF_6		NO_x	CO	NMVOC	SO_2
						P	A	P	A	P	A				
		(Gg)				CO_2 equivalent (Gg)						(Gg)			
Total National Emissions and Removals		**7 427.44**	**-8 186.76**	**90.69**	**3.80**	**0.00**	**12.83**	**0.00**	**0.00**	**0.00**	**0.00**	**37.27**	**295.41**	**79.46**	**7.58**
1. Energy		**7 058.19**		**18.63**	**0.51**							**37.18**	**295.40**	**35.06**	**7.46**
A. Fuel Combustion	Reference Approach[2]	6 808.94													
	Sectoral Approach[2]	7 058.19		12.35	0.51							37.18	295.40	34.84	7.46
B. Fugitive Emissions from Fuels		NO/NE		6.28	NO/NE							NO/NE	NO/NE	0.22	NO/NE
2. Industrial Processes		**231.08**		**0.00**	**0.00**	**0.00**	**12.83**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**9.24**	**0.11**
3. Solvent and Other Product Use		**108.89**			**0.02**							**0.00**	**0.00**	**34.96**	**0.00**
4. Agriculture [3]		**0.00**	**0.00**	**31.20**	**3.12**							**NE/NO/NA**	**NE/NO/NA**	**NE/NO/NA**	**NO**
5. Land-Use Change and Forestry		[4] **0.00**	[4] **-8 186.76**	**NA/NO/NE**	**NA/NO/NE**							**NA/NO/NE**	**NA/NO/NE**	**NO**	**NO**
6. Waste		**29.28**		**40.86**	**0.16**							**0.06**	**0.00**	**0.19**	**0.00**
7. Other		**0.00**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Memo Items:															
International Bunkers		**700.49**		**0.04**	**0.11**							**11.16**	**3.30**	**0.94**	**0.57**
Aviation		107.14		0.00	0.00							0.45	0.15	0.08	0.03
Marine		593.35		0.04	0.10							10.70	3.15	0.86	0.53
Multilateral Operations		**NE**		**NE**	**NE**							**NE**	**NE**	**NE**	**NE**
CO_2 Emissions from Biomass		**5 695.35**													

P = Potential emissions based on Tier 1 approach of the IPCC Guidelines.

A = Actual emissions based on Tier 2 approach of the IPCC Guidelines.

[1] The emissions of HFCs and PFCs are to be expressed as CO_2 equivalent emissions. Data on disaggregated emissions of HFCs and PFCs are to be provided in Table 2(II) of this common reporting format.

[2] For verification purposes, countries are asked to report the results of their calculations using the Reference approach and to explain any differences with the Sectoral approach in document box of Table1.A(c). Where possible, the calculations using the Sectoral approach should be used for estimating national totals. Do not include the results of both the Reference approach and the Sectoral approach in national totals.

[3] See footnote 4 to Summary 1.A.

[4] Please do not provide an estimate of both CO_2 emissions and CO_2 removals. "Net" emissions (emissions - removals) of CO_2 should be estimated and a single number placed in either the CO_2 emissions or CO_2 removals column, as appropriate. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

SUMMARY 2 SUMMARY REPORT FOR CO_2 EQUIVALENT EMISSIONS
(Sheet 1 of 1)

Latvia
2003
Submission 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 [1]	CH_4	N_2O	HFCs	PFCs	SF_6	Total
	CO_2 equivalent (Gg)						
Total (Net Emissions) [1]	**-759.31**	**1 904.59**	**1 179.54**	**12.83**	**0.00**	**4.41**	**2 342.06**
1. Energy	**7 058.19**	**391.30**	**156.61**				**7 606.09**
A. Fuel Combustion (Sectoral Approach)	7 058.19	259.39	156.61				7 474.19
1. Energy Industries	2 416.41	9.44	18.53				2 444.38
2. Manufacturing Industries and Construction	948.83	5.04	11.63				965.50
3. Transport	2 589.51	12.19	81.25				2 682.95
4. Other Sectors	1 103.44	232.72	45.19				1 381.36
5. Other	IE	IE	IE				IE
B. Fugitive Emissions from Fuels	NO/NE	131.90	NO/NE				131.90
1. Solid Fuels	NO/NE	NO/NE	NO/NE				NO/NE
2. Oil and Natural Gas	NE/NO	131.90	NO/NE				131.90
2. Industrial Processes	**231.08**	**0.00**	**0.00**	**12.83**	**0.00**	**4.41**	**248.33**
A. Mineral Products	186.92	0.00	0.00				186.92
B. Chemical Industry	NO	0.00	0.00	NO	NO	0.00	0.00
C. Metal Production	44.16	0.00	0.00		NO	0.00	44.16
D. Other Production	NE						0.00
E. Production of Halocarbons and SF_6				NO	NO	0.00	0.00
F. Consumption of Halocarbons and SF_6				12.83	0.00	4.41	17.24
G. Other	NE	0.00	0.00	NE	NE	0.00	0.00
3. Solvent and Other Product Use	**108.89**		**5.95**				**114.84**
4. Agriculture	**0.00**	**655.27**	**967.26**				**1 622.54**
A. Enteric Fermentation		571.14					571.14
B. Manure Management		84.14	131.08				215.22
C. Rice Cultivation		NO					NO
D. Agricultural Soils [2]		NE	836.18				836.18
E. Prescribed Burning of Savannas		NO	NO				NO
F. Field Burning of Agricultural Residues		NE/NO/NA	NE				NE/NO/NA
G. Other		NE	NE				NE
5. Land-Use Change and Forestry [1]	**-8 186.76**	**0.00**	**0.00**				**-8 186.76**
6. Waste	**29.28**	**858.02**	**49.72**				**937.02**
A. Solid Waste Disposal on Land	NO	664.31					664.31
B. Wastewater Handling		193.70	49.72				243.43
C. Waste Incineration	29.28	0.00	0.00				29.28
D. Other	NO	0.00	0.00				0.00
7. Other *(please specify)*	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
	NO	NO	NO	NO	NO	NO	NO
Memo Items:							
International Bunkers	**700.49**	**0.78**	**32.73**				**734.00**
Aviation	107.14	0.02	0.94				108.09
Marine	593.35	0.76	31.79				625.90
Multilateral Operations	**NE**	**NE**	**NE**				**NE**
CO_2 Emissions from Biomass	**5 695.35**						**5 695.35**

[1] For CO_2 emissions from Land-Use Change and Forestry the net emissions are to be reported. Please note that for the purposes of reporting, the signs for uptake are always (-) and for emissions (+).

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions	CO_2 removals	Net CO_2 emissions / removals	CH_4	N_2O	Total emissions
Land-Use Change and Forestry	CO_2 equivalent (Gg)					
A. Changes in Forest and Other Woody Biomass Stocks	16 352.00	-24 463.07	-8 111.06			-8 111.06
B. Forest and Grassland Conversion	NO/NA		NO/NA	0.00	NO/NA	0.00
C. Abandonment of Managed Lands	NO	-190.30	-190.30			-190.30
D. CO_2 Emissions and Removals from Soil	114.61	NE/NO	114.61			114.61
E. Other	NE	NE	NE	NE	NE	NE
Total CO_2 Equivalent Emissions from Land-Use Change and Forestry	16 466.61	-24 653.37	-8 186.76	0.00	0.00	-8 186.76

Total CO_2 Equivalent Emissions without Land-Use Change and Forestry [a]	10 528.82
Total CO_2 Equivalent Emissions with Land-Use Change and Forestry [a]	2 342.06

[a] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report emissions and removals from Land-Use Change and Forestry.

EMISSION TRENDS (SUMMARY)

Latvia
2003
Submission 2005

GREENHOUSE GAS EMISSIONS	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	CO_2 equivalent (Gg)														
Net CO_2 emissions/removals	200.92	200.92	-308.87	-4 761.01	-5 105.80	-3 031.70	-5 667.32	-5 685.59	-3 051.55	-2 144.15	-1 936.92	-1 785.37	-2 181.34	-1 088.26	-759.31
CO_2 emissions (without LUCF) [6]	18 654.30	18 654.30	17 171.46	13 304.91	11 894.35	11 450.16	8 962.94	9 155.64	8 742.32	8 129.69	7 412.62	6 854.65	7 412.86	7 336.64	7 427.44
CH_4	3 704.86	3 704.86	3 558.58	3 126.36	2 340.80	2 191.32	2 385.80	2 339.55	2 320.00	2 327.62	2 262.60	2 190.60	2 185.36	2 165.31	1 904.59
N_2O	3 055.04	3 055.04	2 903.26	2 173.82	1 520.09	1 269.22	1 103.98	1 116.49	1 110.94	1 069.77	965.37	998.47	1 122.53	1 103.53	1 179.54
HFCs	0.00	0.00	0.00	0.00	0.00	0.00	0.29	1.33	2.48	4.61	6.76	8.55	9.70	11.69	12.83
PFCs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SF_6	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.29	0.51	0.71	0.98	1.28	1.98	3.38	4.41
Total (with net CO_2 emissions/removals)	**6 960.82**	**6 960.82**	**6 152.97**	**539.17**	**-1 244.91**	**428.84**	**-2 177.00**	**-2 227.93**	**382.37**	**1 258.56**	**1 298.79**	**1 413.53**	**1 138.22**	**2 195.66**	**2 342.06**
Total (without CO_2 from LUCF) [6]	**25 414.20**	**25 414.20**	**23 633.30**	**18 605.08**	**15 755.24**	**14 910.70**	**12 453.26**	**12 613.30**	**12 176.25**	**11 532.40**	**10 648.33**	**10 053.54**	**10 732.43**	**10 620.55**	**10 528.82**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[1]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	CO_2 equivalent (Gg)														
1. Energy	18 757.26	18 757.26	17 328.27	13 613.26	12 307.14	11 695.76	9 347.54	9 535.01	9 064.66	8 431.32	7 652.63	7 118.95	7 679.31	7 561.03	7 606.09
2. Industrial Processes	503.75	503.75	351.59	161.17	59.18	199.98	169.92	182.53	205.03	213.29	249.79	198.93	220.42	237.77	248.33
3. Solvent and Other Product Use	105.71	105.71	90.04	53.21	44.09	61.97	63.86	69.60	85.58	89.89	95.50	85.83	100.73	108.38	114.84
4. Agriculture	5 161.21	5 161.21	4 944.34	3 856.21	2 493.70	2 070.18	1 853.66	1 795.19	1 724.12	1 614.27	1 420.54	1 450.52	1 589.88	1 573.47	1 622.54
5. Land-Use Change and Forestry [2]	-18 389.70	-18 389.70	-17 404.78	-17 996.90	-16 918.23	-14 383.25	-14 511.76	-14 724.83	-11 640.31	-10 101.24	-9 165.39	-8 526.43	-9 594.20	-8 424.90	-8 186.76
6. Waste	822.60	822.60	843.51	852.22	769.20	784.20	899.79	914.58	943.29	1 011.01	1 045.72	1 085.72	1 142.08	1 139.91	937.02
7. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Base year is 1990
[2] The information in these rows is requested to facilitate comparison of data, since Parties differ in the way they report CO_2 emissions and removals from Land-Use Change and Forestry.

Indicators:
NO - not occured