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Report on the in-depth review of the second national communication of Lithuania

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I. NATIONAL CIRCUMSTANCES RELEVANT TO GREENHOUSE GAS EMISSIONS AND REMOVALS

A. Introduction

1. The secretariat received Lithuania's second national communication under the United Nations Framework Convention on Climate Change (UNFCCC), hereinafter referred to as the NC2, on 21 January 2003.[1] An in-depth review was carried out between May 2004 and April 2005, including a visit to Vilnius from 17 to 21 May 2004. The review team consisted of Ms. Branca Bastos Americano (Brazil), Mr. Bhawan Singh (Trinidad and Tobago), Mr. Dimcho Kanev (Bulgaria), Mr. Jürg Stephan Füssler (Switzerland) and Mr. Harald Diaz-Bone (UNFCCC secretariat, coordinator).

2. The review team had a number of meetings and discussions on all aspects of the Lithuanian climate policy as outlined in the NC2. During these meetings with government officials, academics, and business and environmental non-governmental organizations (NGOs), the team was given some additional materials and information which supported and updated the information provided in the NC2.

B. National circumstances

3. ***Geography:*** Lithuania is situated in the very centre of Europe, on the eastern coast of the Baltic sea. Its national territory has an area of 65,301 km^2 and borders on Latvia in the north, Belarus in the east and the Kaliningrad Region of the Russian Federation in the south. The landscape is characterized by lowlands and hills, many scattered small lakes and generally fertile soil; 54 per cent of the territory is agricultural land and 30 per cent is forest. Lithuania is rich in mineral resources, including fossiliferous rocks, deposits of anhydrides, dolomite, limestone, clay, gravel, gypsum, chalk and mineral water. Forest wood and peat are the only important domestic energy sources.

4. ***Demography:*** Lithuania's population decreased slightly from 3.69 million in 1990 to 3.47 million in 2000, and is characterized by a decreasing birth rate and constant emigration. Between 1991 and 1996, more than twice as many people emigrated from Lithuania as arrived there (77,505 and 28,027, respectively). The driving force for this migration was a change in the political status of the country, economic and political reforms leading to the return of Lithuanians exiled during the Soviet period, and the departure of ethnic minorities back to neighbouring countries. About 68 per cent of the population lives in towns and cities. The three biggest cities are Vilnius, Kaunas and Klapeida.

5. ***Economy:*** Lithuania's declaration of independence from the Soviet Union in March 1990 was followed by a military conflict in August 1991 and a three-year economic blockade lasting from April 1990 to August 1993. Being cut off from its former import sources for energy and other resources resulted in a drastic decrease of economic output, by one third in 1992 and by one fourth in 1993. Subsequently, Lithuania has undergone a radical economic transition process from a centrally planned to a market economy. Among other reform programmes, privatization of formerly state-controlled enterprises and price liberalization during the course of the 1990s managed to reverse the declining economic trends. In the period 1994–2002, the gross domestic product (GDP) grew annually by 4.67 per cent on average. In 2002, when GDP was still 19.3 per cent below the 1990 levels, the services sector accounted for the largest share of GDP (58 per cent), followed by industry (35 per cent) and agriculture (7 per cent).

6. Despite its record of achievements over the past decade, Lithuania faces considerable economic challenges in the period ahead. Foreign debts account for more than 20 per cent of GDP, per capita GDP

[1] The submission date was 30 November 2001 (decision 11/CP.4).

is at 30 per cent of the European Union (EU) average, and unemployment rose to 10.9 per cent in 2002. The energy sector in particular encountered some difficulties and delays in its transformation process; the three largest Lithuanian power companies (Ignalina Nuclear Power Plant (NPP) and the joint-stock companies AB Lietuvos Energija and AB Mažeikiu Nafta) altogether made up 83 per cent of the total capital of the state enterprises. It is recognized that a stable legal, regulatory and institutional framework needs to be in place before restructuring and privatization can be completed.

Table 1. Main macro-economic indicators and GHG emissions for Lithuania[a]

	1990	1994	1998	2002	Change (%) 1990–1998	Change (%) 1998–2002
Population (millions)	3.69	3.66	3.56	3.47	–3.7	–2.4
Gross domestic product – GDP (billions USD of 1995[b])	37.1	21.70	26.94	31.26	–27.4	16.0
Total primary energy supply – TPES (Mtoe[c])	17.80	8.08	9.32	8.59	–47.7	–7.8
Electricity consumption (TWh)	16.40	9.14	10.03	9.81	–38.8	–2.2
CO_2 emissions[d] (Tg[e])	38.92	n.a.	15.85	12.22	–59.3	–22.9
GHG emissions[d] (Tg CO_2 equivalent)	51.48	n.a.	22.37	20.24	–56.5	–9.5
GHG emissions per capita (Mg CO_2 equivalent)	13.95	n.a.	6.29	5.83	–54.9	–7.3
GHG emissions per GDP unit (kg CO_2 equivalent per USD of 1995)	1.33	n.a.	0.83	0.65	–40.2	–22.0

n.a. = not available.

[a] Data for population, GDP, TPES and electricity are from "Energy balances of OECD countries, 1999–2002", OECD/IEA, Paris, 2004. Greenhouse gas (GHG) data are from Lithuania's inventory submissions in 2003 and 2004.

[b] Calculated using the method of purchasing power parities (PPP).

[c] Millions of tonnes of oil equivalent.

[d] Without accounting for land-use change and forestry (LUCF).

[e] One teragram (Tg) is equal to 1,000 gigagrams (Gg) or one million tonnes (Mt).

7. ***Energy:*** Since the early 1990s, the Lithuanian energy profile has changed considerably. A sharp increase in primary energy prices and loss of the former eastern energy export markets resulted in a noticeable decline in domestic energy production and exports by 1994. The consumption of oil products fell by more than 60 per cent and electricity consumption fell by more than 40 per cent. Between 1994 and 2002, the total primary energy supply (TPES) increased by 6 per cent. In 2001, the most important energy sources were nuclear energy (37.2 per cent) and oil products (30.1 per cent), followed by natural gas (27.1 per cent) and combustible renewable energy sources (RES), including peat and wood (8.2 per cent). Other energy sources, including coal (1.1 per cent), hydropower (0.35 per cent) and other non-combustible RES (0.19 per cent), accounted for less than 2 per cent. The sharp decrease in greenhouse gas (GHG) emissions, by more than 60 per cent during 1990–2002, reflects these dramatic changes in the energy profile (see table 1).

8. ***Electricity:*** In 2001, total electricity output amounted to 14.6 TWh, after a sharp increase of 29 per cent compared to 2000, due to a threefold increase in export volumes. Domestic electricity consumption amounted to 7.16 TWh, or around half of the electricity generated. The Ignalina NPP produced the lion's share (77.2 per cent) of total electricity output; thermal power plants (17.6 per cent), hydropower plants (4.7 per cent) and private power plants (0.5 per cent) made up the remainder. Unit 1 of the Ignalina NPP was closed down by the end of 2004, and the plant is scheduled to be decommissioned by the end of 2009.

9. ***Political structure:*** Lithuania is a parliamentary republic. The democratic constitution passed in 1992 vests legislative power in the Seimas, a one-chamber parliament with 141 members. The President is the head of State and may put forward draft laws to the Seimas. The Government, chaired by the Prime Minister, is responsible for domestic and foreign policy. The country is divided into 10 districts, of which Vilnius (850,700 inhabitants) and Kaunas (703,200 inhabitants) are the most populous.

10. ***Institutional arrangements:*** The Ministry of the Environment (MoE) is the national focal point for domestic climate policy. The Interministerial Committee on Climate Change, established in 1996, is

responsible for the overall coordination of the National Climate Change Strategy and Action Plan (NCCAP). It comprises representatives from the MoE, Ministry of Economy (MoEc), Ministry of Finance, Ministry of Transport (MoT), Ministry of Agriculture, Ministry of the Interior, and Ministry of Education and Science. MoEc is responsible for the energy sector, and the National Control Commission for Prices and Energy regulates access to the energy network, sets energy prices and issues licences. The Environment Protection Agency (EPA) is responsible for the monitoring, assessment and projections of environmental quality, and the gathering and archiving of environmental data and information. The Energy Efficiency Agency coordinates the implementation of energy efficiency polices and programmes.

11. The review team noted that the Interministerial Committee has met only sporadically since its establishment, and that ministries other than MoE do not actively integrate climate policy into their policy fields. During the visit to Vilnius, the need for building capacity and strengthening institutional arrangements was stressed by several host-country representatives.

C. Key developments in climate change policies

12. Lithuania ratified the **UNFCCC** in March 1995 and has submitted two national communications, in 1998 and 2003. During the review, the team analysed the information provided in the NC2 together with data from the two most recent inventory submissions of Lithuania to the UNFCCC secretariat, which contain data on emissions trends for 1990, 1998, 2001 and 2002. The results of this analysis suggest that Lithuania contributed to achieving the aim of the Convention, as its total GHG emissions decreased by 61 per cent in the period from 1990 to 2002, without considering CO_2 from land-use change and forestry (LUCF), and by 71 per cent if CO_2 from LUCF is considered.

13. In January 2003, Lithuania ratified the **Kyoto Protocol**, thus committing itself to reducing its aggregate emissions of GHGs, so that average annual emissions in the period 2008–2012 are at least 8 per cent lower than 1990 levels. It is generally assumed that Lithuania will meet these commitments (the "Kyoto target") without additional efforts, because of the decline of industrial production and of related GHG emissions since the early 1990s. The review team noted that, in conjunction with the ratification of the Kyoto Protocol, no further institutional or policy arrangements for its implementation have been made.

14. In May 2004, Lithuania became a member of the **EU**. The review team recognized that there is considerable overlap between EU membership and national climate policy, since many measures that are undertaken to comply with EU directives also have clear benefits in the field of climate change. The review team noted that the accession treaty also has strong implications for the national energy policy, as it includes the decommissioning of the Ignalina NPP (see paragraph 8).

15. Given the challenges both of the economic transition and of the accession to and integration into the EU, climate change policy is not seen as a **political priority** in Lithuania at the beginning of the twenty-first century. This observation is underlined by the fact that key documents and strategies, such as the National Energy Efficiency Plan (NEEP) and the National Energy Strategy (NES), neither explicitly mention climate change nor refer to the commitments under the Kyoto Protocol. Furthermore, the review team noted a low financial budget and very limited administrative capacity in the field of climate change.

16. Nevertheless, Lithuania has expressed the intention to fulfil its Kyoto target, to make use of the **flexibility mechanisms** of the Kyoto Protocol and to participate in the EU emissions trading scheme (EU-ETS). Lithuania participated in the Activities Implemented Jointly (AIJ) scheme in collaboration with Sweden (10 projects), France (7 projects) and Denmark (12 projects). The AIJ projects included boiler conversion, renovation of district heating networks, biomass and biogas use, and one project on

geothermal energy. In May 2004, MoE and MoEc approved a strategy on joint implementation (JI). Furthermore, in April 2004, MoE published a draft National Allocation Plan (NAP) for GHG emission allowances under the EU-ETS for the period 2005–2007. After approval by both MoE and MoEc, the NAP was forwarded to the European Commission in December 2004.

17. The review of NC2 and the additional information provided during the visit allowed the review team to conclude that **Lithuania's NC2** reflected only to some extent the status of Lithuania's climate change policy at the time it was prepared and published. It covers the GHG inventory, policies and measures, impact assessment of climate change and some other topics required by the UNFCCC reporting guidelines on national communications.[2]

II. GREENHOUSE GAS INVENTORY INFORMATION

A. Inventory preparation and reporting

18. ***Institutional arrangements:*** MoE is responsible for preparing and reporting the Lithuanian national GHG inventory. It also compiles the data and prepares the report. Other ministries or governmental agencies are not involved in the inventory process. In 2004, for the first time MoE submitted the relevant reports (common reporting format (CRF) and national inventory report (NIR)) to the UNFCCC secretariat. During the visit to Vilnius, the review team raised its concern about the current institutional arrangements, which were found to be extremely limited for the development of a complete and reliable national GHG inventory under the UNFCCC. The review team noted with interest plans to hand over the task of GHG inventory preparation and reporting to EPA.

19. ***Coverage:*** The NC2 provides data on the GHG emissions inventory by sources and removals by sinks for the years 1990 and 1998, and for the period 1992–1997. It includes emission data for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), as well as for nitrous oxides (NO_X), carbon monoxide (CO) and non-methane volatile organic compounds (NMVOC). Due to a lack of official statistical data, emission estimates for hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) were not reported. During the visit to Vilnius, the review team was provided with a draft 2004 GHG inventory submission to the UNFCCC, containing data for the years 1990, 1998, 2001 and 2002, and covering the above-mentioned GHGs and most major source and sink categories. The review team's findings are based on these recent inventory data.

20. The review team noted that important GHG sources (e.g. CO_2 from Intergovernmental Panel on Climate Change (IPCC) categories 1.A.5, 2.B, 6.A; and CH_4 from 1.B.2, 4.B and 4.D) are included for only some of the reporting years. Estimates for GHG emissions and removals from LUCF are provided. The review team also noted that emissions of CO_2 from biomass burning included those from the burning of peat, which is not in line with the provisions of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). Emissions of GHG emissions from international marine bunker fuels were reported. The review team noted that emissions from international and domestic aviation were not separated and were included in the national totals. The review team noted that these emissions would be better placed in international bunkers, as Lithuania has no commercial domestic flights.

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[2] "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications", hereinafter referred to as UNFCCC guidelines. Document FCCC/CP/1999/7.

21. ***Methodology:*** Lithuania applied the Revised 1996 IPCC Guidelines methodology in preparing its national GHG inventory for the years 1998, 2001 and 2002, but not for the base year 1990. Tier1 methodologies were mainly used, as well as IPCC emission factors. The NC2 refers to some country-specific emission factors; however, during the visit to Vilnius, the review team was informed that these emission factors are a compilation of other countries' emission factors as well as IPCC emission factors. Activity data are gathered from the statistical yearbooks of the national Department of Statistics. The NIR mentions that a quality assurance/quality control (QA/QC) system (in accordance with the IPCC good practice guidance)[3] still has to be put into place and that the necessary improvements will be built into the development of future inventories.

22. ***Uncertainty assessment:*** An uncertainty assessment according to the IPCC good practice guidance was not performed. However, the NIR mentions some factors that influence the degree of uncertainty in Lithuania's GHG emissions inventory. These include the lack of a dedicated data collection system for inventory purposes, the broad use of IPCC default emission factors in the absence of national emission factors, the use of different methodologies for different years (2002 is only the second year for which an inventory has been established in the CRF format and has made full use of the Revised 1996 IPCC Guidelines wherever possible), and the lack of a QA/QC system.

23. ***Compliance with reporting guidelines:*** The review team noted that the NC2 section on GHG emission inventory complies only to some extent with the UNFCCC guidelines. Summary information from the national GHG inventory, including CO_2-equivalent and emissions trend tables given in the CRF, were provided for the period 1990–1998 and for the three main GHGs, namely CO_2, CH_4 and N_2O. After reviewing the inventory data as shown in the NC2 and in the draft 2004 inventory submission , the review team noted that the transparency, consistency and completeness of the Lithuanian GHG inventory need to be improved. In particular, transparency and consistency of the GHG inventory could be enhanced by carrying out recalculations[4] and uncertainty assessments, and the establishment of a QA/QC system. Completeness could be enhanced by filling the gaps in the available time series for the years 1990–2002, and by including all GHGs and all source categories of the CRF tables. Identification of key sources and an estimation of emissions from these sources using tier 2 and higher methods would help in quantifying and reducing the uncertainty of the overall GHG emission inventory.

B. Emission profile and trends

24. ***Emissions profile:*** The following analysis of the GHG emissions profile and trends is based on the data reported in Lithuania's draft 2004 GHG inventory submission for the years 1998, 2001 and 2002. The review team considered the 1990 estimates as preliminary. Nonetheless, some references to the 1990 estimates were made. The review team noted that because of the methodological shortcomings described in section A above, these references should be interpreted with caution.

25. The Lithuanian emissions profile shows the clear dominance of the energy sector, with CO_2 as the main GHG. Emissions of GHGs (without LUCF) totalled 20,239 Gg CO_2 equivalent in 2002, after having declined by 10 per cent during the period 1998–2002. This decline mainly resulted from a 22 per cent decrease in the energy sector, which was partly offset by a 44 per cent increase in agriculture. Estimates for total GHG emissions (without LUCF) in 1998 were 57 per cent below the 1990 value. Table 2 shows the emissions trends by sector in the period 1998–2002, and the estimated values for 1990.

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[3] *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.*

[4] The 2004 NIR reports on recalculations of the 2002 inventory data on international aviation bunkers that were carried out in response to the discussions with the review team during the visit to Vilnius.

Table 2: Greenhouse gas emissions by sector, 1990 and 1998–2002

Greenhouse gas source and sink	Gg CO_2 equivalent				Change (%) 1990–1998[a]	Change (%) 1998–2002
	1990	1998	2001	2002		
Energy	38 217	15 250	12 625	11 877	–60	–22
Industrial processes	2 641	2 711	3 182	3 181	3	17
Agriculture	7 143	2 541	2 972	3 669	–64	44
Land-use change and forestry (net emissions)	–5 482	–7 558	–7 335	–6 721	38	–11
Waste	3 480	1 869	1 563	1 513	–46	–19
Total (with LUCF net emission)	45 999	14 813	13 006	13 519	–68	–9
Total (without LUCF)	**51 482**	**22 371**	**20 342**	**20 239**	**–57**	**–10**

[a] Due to major inconsistencies in the methodology applied for 1990, data in this column should be interpreted with caution.

26. ***Overall GHG emissions:*** In 1990, the energy sector (including transport) accounted for 74 per cent of total GHG emissions (without LUCF), followed by agriculture (14 per cent), waste (7 per cent) and industrial processes (5 per cent). This pattern changed notably in the period 1990–2002, at the end of which the energy sector accounted for 59 per cent, followed by agriculture (18 per cent), industrial processes (16 per cent) and waste (7 per cent). Correspondingly, the share of CO_2 in total GHG emissions dropped from 76 per cent in 1990 to 60 per cent in 2002, while the shares of CH_4 and N_2O increased from 16 to 18 per cent and from 8 to 22 per cent, respectively.

Table 3: Carbon dioxide emissions by source, 1990 and 1998–2002

Greenhouse gas source and sink	Gg				Change (%) 1990–1998[a]	Change (%) 1998–2002
	1990	1998	2001	2002		
Energy	36 717	14 465	12 207	11 100	–61	–23
Energy industries	*16 352*	*6 808*	*5 948*	*5 311*	*–58*	*–22*
Manufacturing industries and construction	*5 379*	*2 287*	*1 733*	*1 086*	*–57*	*–52*
Transport [b]	*5 791*	*3 933*	*3 481*	*3 594*	*–32*	*–9*
Other sectors	*9 195*	*1 438*	*1 045*	*1 108*	*–84*	*–23*
Industrial processes	2 203	1 198	1 119	1 119	–46	–7
Mineral products	*2 203*	*447*	*308*	*308*	*–80*	*–31*
Chemical industry		*751*	*811*	*811*		*8*
Land-use change and forestry	–5 482	–7 558	–7 335	–6 721	38	–11
Waste	not available	187	not available	not available		
Total emissions / removals with LUCF	33 438	8 292	5 990	5 499	–75	–34
Total emissions without LUCF	**38 920**	**15 850**	**13 326**	**12 219**	**–59**	**–23**
Memo item: Biomass use [c]	615	2 122	2 791	2 814	245	33

[a] Due to major inconsistencies in the methodology applied for 1990, data in this column should be interpreted with caution.
[b] Including emissions from international aviation.
[c] Including emissions from burning of peat.

27. ***Carbon dioxide:*** Total emissions of CO_2 (without LUCF) were 12,219 Gg in 2002. The main source was energy industries (43 per cent of total CO_2 emissions), followed by fuel combustion in transport (29 per cent), industrial processes, energy use in manufacturing industries and construction, and energy use in other sectors (9 per cent each). Net removals of CO_2 by LUCF equalled 55 per cent of total CO_2 emissions. Emissions of CO_2 from biomass and peat equalled 23 per cent.

28. As shown in table 3, the 23 per cent decline in total CO_2 emissions between 1998 and 2002 was determined by the decrease of emissions in all energy subsectors, especially in energy industries (–22 per cent) and in manufacturing industries and construction (–52 per cent). Estimates for energy-related CO_2 emissions in 1998 were 61 per cent below the 1990 value.

29. The notable decline of CO_2 emissions from energy use in manufacturing industries and construction and in energy industries can be explained by structural changes in the economy and energy system (see paragraph 7), a reduction in energy-intensive production, and improvements in energy

efficiency that resulted in an overall decline of energy consumption. Changes in the statistical system and accounting methodologies might also have contributed to these drastic changes.

30. The 33 per cent increase in estimates for the emissions from biomass and peat resulted to some extent from successful promotion campaigns on the use of RES. Biomass and peat were also regarded as a cleaner and cheaper energy source. Furthermore, a number of boiler-houses switched from heavy fuel oil to biomass as a result of AIJ programmes mainly with Scandinavian countries. The review team was informed that estimates for the emissions from biomass included those from burning of peat and noted that following the Revised 1996 IPCC Guidelines, peat should be considered as a solid fuel, contributing, if burned, to the anthropogenic GHG emissions.

Table 4: Methane emissions by source, 1990 and 1998–2002

Greenhouse gas source and sink	Gg CO_2 equivalent				Change (%) 1990–1998[a]	Change (%) 1998–2002
	1990	1998	2001	2002		
Energy	1 206	614	251	647	–49	5
Fugitive emissions from fuels	*548*	*365*	*not available*	*421*	*–33*	*15*
Agriculture	3 795	1 800	1 357	1 397	–53	–22
Enteric fermentation	*3 304*	*1 575*	*1 177*	*1 210*	*–52*	*–23*
Manure management	*491*	*226*	*180*	*187*	*–54*	*–17*
Waste management	3 480	1 682	1 563	1 513	–52	–10
Solid waste disposal on land	*3 402*	*1 545*	*1 142*	*1 092*	*–55*	*–29*
Waste-water handling	*78*	*138*	*421*	*421*	*77*	*206*
Total emissions	**8 485**	**4 097**	**3 172**	**3 556**	**–52**	**–13**

[a] Due to major inconsistencies in the methodology applied for 1990, data in this column should be interpreted with caution.

31. ***Methane:*** Emissions of CH_4 amounted to 3,556 Gg CO_2 equivalent in 2002. The main source was waste management (43 per cent), followed by agriculture (39 per cent) and energy (18 per cent).

32. As shown in table 4, CH_4 emissions declined by 13 per cent between 1998 and 2002. This can be partly attributed to the decline of emissions from solid waste disposal on land (–29 per cent) and from livestock production (enteric fermentation, –23 per cent). A substantial reduction in livestock population, stemming from the transition process and the implementation of the rules of the EU Common Agricultural Policy, was the major reason for the reduction in emissions from enteric fermentation. The review team was unable to analyse the trend in emissions from waste-water handling because the data were incomplete. Fugitive emissions from fuels increased by 15 per cent, following the increase in coal use and refinery production. Estimates for CH_4 emissions in 1998 were 52 per cent below the 1990 value.

Table 5: Nitrous oxide emissions by source, 1990 and 1998–2002

Greenhouse gas source and sink	Gg CO_2 equivalent				Change (%) 1990–1998[a]	Change (%) 1998–2002
	1990	1998	2001	2002		
Energy	295	171	167	130	–42	–24
Energy industries	*112*	*62*	*43*	*37*	*–44*	*–40*
Transport	*59*	*47*	*43*	*47*	*–21*	*0*
Industrial processes	434	1 513	2 062	2 062	249	36
Chemical industry	*434*	*1 513*	*2 062*	*2 062*	*249*	*36*
Agriculture	3 348	741	1 615	2 272	–78	207
Manure management	*not available*	*273*	*205*	*211*	*–*	*–23*
Agricultural soils	*3 348*	*468*	*1 411*	*2 062*	*–86*	*340*
Total emissions	**4 077**	**2 424**	**3 844**	**4 464**	**–41**	**84**

[a] Due to major inconsistencies in the methodology applied for 1990, data in this column should be interpreted with caution.

33. ***Nitrous oxide:*** Emissions of N_2O amounted to 4,464 Gg CO_2 equivalent in 2002. Emissions from agriculture accounted for the largest share of N_2O emissions (51 per cent), followed by industrial processes (nitric acid production, 46 per cent) and energy (3 per cent).

34. As shown in table 5, total N_2O emissions increased by 84 per cent between 1998 and 2002. More than two thirds of this increase is attributed to a steep growth in emissions from agricultural soils, where emissions increased by 340 per cent, partly as a result of increased fertilizer application on agricultural soils. The 36 per cent increase of N_2O emissions from nitric acid production can be explained by increased production rates following the higher demand from export markets. The sharp drop in emissions from energy industries is largely attributed to the closing down of some inefficient industrial production units. Estimates for N_2O emissions in 1998 were 41 per cent below the 1990 value.

III. POLICIES AND MEASURES

A. Overview

35. ***Institutional arrangements:*** The National Committee on Climate Change, established in 1996, is responsible for the overall coordination of the NCCAP (see paragraph 10). The most important institutions responsible for the formulation and implementation of policies and measures affecting GHG emissions are the Ministries of Environment, Economy, Transport, Education, Social Security and Labour, as well as related bodies such as the Energy Agency and the Lithuanian Environmental Investment Fund (Lietuvos aplinkos apsaugos investicij fondas – LAAIF). LAAIF, a public company under MoE, will be responsible for the evaluation, approval and monitoring of JI projects and for the EU-ETS and the National Registry. The municipalities are responsible for the development and implementation of local energy development plans, and for the management and maintenance of district heating systems.

36. ***Coverage and compliance with UNFCCC reporting guidelines:*** The NC2 provides an overview on policy options and some policies and measures that have a mitigation effect on CO_2 emissions from energy, transport, forestry and agriculture, and on CH_4 emissions from energy. The review team noted that this section of the NC2 followed the UNFCCC guidelines only to some extent. However, summary tables on policies and measures by sector were missing,[5] estimates on the effectiveness of policies and measures were incomplete, and the status of the reported policy options was lacking in transparency; it was difficult on the basis of the NC2 to distinguish between implemented and planned policies. Like the review team for the NC1, the current review team sought clarifications on these issues and had to rely on additional information provided by Lithuania and also policy documents such as the NES and the NEEP.

37. ***Main drivers for climate policy:*** In Lithuania, climate change policy is not seen as a political priority at the beginning of the twenty-first century. Instead, the requirements for EU integration, such as the implementation of Directive 2001/77/EC on the promotion of renewable electricity production and Directive 2003/96/EC on excise taxes on fossil fuels, are the key drivers for the implementation of energy and environmental policies. Climate change mitigation is seen as a co-benefit of such EU-wide common and coordinated policies. Sectoral targets for GHG emission reduction have not been set in Lithuania.

38. ***Monitoring and evaluation:*** A mechanism for systematic monitoring and evaluation of the effectiveness of policies and measures is currently not in place or planned. The responsibility for supervising implementation lies with the relevant ministries; for example, MoEc should supervise the implementation of the NEEP. After the visit to Vilnius, the review team was provided with a technical report that contained estimates for mitigation potentials of individual policies and measures.[6]

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[5] See paragraph 17 and table 1 of the UNFCCC guidelines.

[6] Streimikienė, D., Bubnienė, R. and Parker, C. (2004): Technical Report No. 28-1. Projections of GHG from fuel combustion sector. Ref. EUROPEAID/112892/D/SV/LT/4. On behalf of the Ministry of Environment.

Nonetheless, the review team noted that additional efforts would be needed to arrive at a robust and comprehensive picture of policies and measures and their mitigation effect on GHG emissions.

B. Cross-sectoral policies and measures

39. ***Emissions trading:*** As an EU member State, Lithuania intends to participate in the EU-ETS. In April 2004, MoE published a draft National Allocation Plan (NAP) for GHG emission allowances under the EU-ETS for the period 2005–2007. It covers cement and lime production (2 installations), glass, brick and ceramic production (11 installations), oil processing (1 installation), industrial enterprises using fuel to generate energy for their own needs and paper production (23 installations), and heat and power supply (70 installations). After approval by both MoE and MoEc, the NAP was forwarded to the European Commission in December 2004.

40. ***Fiscal measures:*** Lithuania is considering the introduction of a CO_2 tax. In this context, two studies have been carried out,[7,8] but the review team was informed that the results of these studies did not give a clear signal to policy makers. Although a CO_2 tax of EUR 13.10 per tonne of CO_2 would result in marked CO_2 reductions and fiscal revenues, the associated shift from oil products towards natural gas raised concerns about national energy security, as dependence on energy imports from the Russian Federation would increase.

C. Energy

41. In 2002, the energy sector (without transport) accounted for 41 per cent of total GHG emissions. Between 1998 and 2002, emissions from this sector dropped by 27 per cent. The 1998 estimates were 65 per cent below the 1990 value.

42. After the restoration of independence in 1991, all economic sectors of the country, including energy, underwent complicated changes. A very abrupt increase in primary energy prices and the loss of access to the former eastern European market resulted in a decline of national energy industries and foreign trade in energy. Energy demand and energy generation have decreased almost by half. In 1995, electricity consumption was only 53 per cent of the 1990 value.

43. The NC2 section on energy policies and measures focuses on policy options on RES, including hydropower, solar, wind and geothermal energy, firewood and straw, biogas and CH_4 from industrial and municipal waste. During the visit to Vilnius, the review team was provided with a summary table on the main policies and measures in the energy sector, including the NES, the NEEP and the implementation of some EU directives (see table 6).

1. Energy industries

44. In 2002, energy industries accounted for 26 per cent of total GHG emissions. Between 1998 and 2002, emissions from this subcategory dropped by 22 per cent. The 1998 estimates were 58 per cent below the 1990 value.

45. ***National Energy Strategy:*** The extensive energy sector inherited from the Soviet period did not comply with the rules of a modern energy market in terms of efficiency, management principles or structure. The 2002 NES therefore focused primarily on the substantial reorganization and privatization of energy industries, as well as the implementation of the relevant EU directives.

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[7] Swedish Environmental Research Institute, IVL: Economic Instruments in the Lithuanian Energy Sector, Draft Final Report, 2003 December.

[8] Danish Energy Authority: Environmental related energy sector programme – Lithuania. Enhancement of the Use of Local and Renewable Energy Sources – Lithuania. Draft final report. Danish Energy Management.

Table 6: Summary of policies and measures in the energy sector

Name of policy or measure	Objective and/or activity affected	GHG affected	Type of instrument	Status	Implementing entities	Estimated mitigation potential in 2010 (Mt CO_2-eq.)[a]
Decommissioning of Ignalina NPP	Replace nuclear power by increasing the load of existing fossil fuelled power plants	CO_2, CH_4, N_2O	Regulatory	Implemented (in the framework of the NES)	Government of Lithuania	–4.0 - -5.5
Promotion of renewable electricity production (Implementation of Directive 2001/77/EC)	Increase the share of renewable electricity produced to 7 per cent by 2010 through fixed feed in tariffs for renewable electricity	CO_2, CH_4, N_2O	Economic	Implemented (since 2002 in the framework of the NES)	MoEc, MoE, Energy Agency	0.302
Promotion of RES	Increase the share of RES in TPES to 12 per cent by 2010 through exemption from VAT and pollution tax	CO_2, CH_4, N_2O	Fiscal	Implemented (since 2002 in the framework of the NES)	MoEc, MoE, Energy Agency	3.2
Promotion of CHP	Increase the share of CHP in electricity generation to 35 per cent by 2020	CO_2, CH_4, N_2O	To be determined (EU-ETS)	Planned (in the framework of the NES)	MoE, MoEc, Energy Agency	0.344
NEEP (2001)	Identify energy savings potentials in industry.	CO_2, CH_4, N_2O	Research, information	Planned	MoE, MoEc, MoT, Energy Agency	0.48
Housing Strategy (2004) (Implementation of Directive 2002/91/EC)	Identify energy savings potential in buildings sector, promote improvements in the energy performance of buildings	CO_2, CH_4, N_2O	Research, information	Planned	MoE	0.12
Increase excise taxes on fossil fuels (Implementation of Directive 2003/96/EC)	Increase of excise taxes by April 2004. Exemptions: Coal and coke until 2007 Electricity until 2010, Orimulsion until 2016 Natural gas: remains completely exempted	CO_2, CH_4, N_2O	Fiscal	Implemented	MoEc	not available

[a] Data on estimated mitigation potential was taken from technical background material (see footnotes 9 and 15).

46. ***Privatization and liberalization of energy markets:*** As noted during the review team's visit, the energy sector of the country is undergoing major restructuring, in particular the largest power company, AB Lietuvos Energija (see paragraph 6). About 30 per cent of the electricity market had been liberalized as of mid-2004. Starting in 1997, combined heat and power (CHP) plants were handed over to local municipalities, and at present, municipal power plants are being rented out to foreign and local operators. One CHP is in the process of being sold. Two distribution companies have been privatized and some newly formed companies will follow.

47. ***Combined heat and power:*** Since 2000, Lithuanian municipalities have started to lease heating utilities to private investors. The full privatization of some CHP companies may be expected in the near future. The review team was informed that attracting foreign direct investment into energy efficiency improvements of Lithuania's CHPs and energy distribution networks, which are municipally owned and inefficiently managed, was seen as a challenge. The NES requires the share of CHP in electricity production to increase to 35 per cent by 2020. The mitigation potential of this measure was estimated at 0.344 Mt CO_2 equivalent for 2010, based on the assumption that CHP will account for 29 per cent of electricity production by 2010.

48. ***Renewable energy sources:*** Since 1999, the installed capacity of small hydropower doubled from about 8 MW to 16 MW in 60 hydropower plants in 2003, while electricity generation increased from 25 GWh to 50 GWh. This was partly due to the implementation of Directive 2001/77/EC on the promotion of renewable electricity production, which requires that the share of renewable electricity should increase to 7 per cent by 2010. The review team was informed that the potential for small hydropower plants in Lithuania is almost exhausted, given that dam building on most potentially suitable watercourses was prohibited for nature conservation reasons in 2003. A 60 kW wind energy installation was built near the coast in 2004. The mitigation potential of this measure was estimated at 0.302 Mt CO_2 equivalent for 2010, based on the assumption that the 7 per cent goal will be met by then.

49. Other implemented RES projects include small-scale heat-only wood boilers (251 MW in 69 plants), straw (5 MW) and biogas (13.7 MW). In Klaipeda, a 17 MW geothermal district heating system has been installed. The review team was informed that its performance remained below the projected benchmarks and the costs of operation are much higher than expected. Some community-based small-scale projects for the use of biomass and the rehabilitation of district heating systems are supported by the Global Environment Facility (GEF) through a regional environmental centre. The NES requires that the share of RES in TPES should increase to 12 per cent by 2010. The mitigation potential of this measure was estimated at 3.2 Mt CO_2 equivalent for 2010, based on the assumption that the 12 per cent goal will be met by then.

50. ***Excise tax on fossil fuel use:*** In implementing Directive 2003/96/EC, MoEc increased excise taxes on the use of fossil fuel in April 2004. These increases will enter into force by 2007 for coal and coke, by 2010 for electricity, and by 2016 for orimulsion (a tar-like substance produced in Venezuela). Natural gas remains completely exempted from this tax increase.

51. ***Nuclear energy:*** In the context of its accession to the EU, Lithuania committed itself to the decommissioning of unit 1 of the Ignalina NPP before 2005 and unit 2 before 2010. These closure plans are subject to sufficient funding provided by the EU and other donors. According to the NES, the decommissioning of the Ignalina plant will require modernization of three thermal power plants (the Lithuanian Power Plant, Vilnius CHP and Kaunas CHP), renovation of the Kaunas Hydropower Plant by 2007, construction of new CHPs and combined cycle natural gas power plants, and reconstruction of existing boiler-houses, if necessary.

52. Host country representatives identified the decommissioning of the Ignalina NPP as the single most important measure that will significantly increase national GHG emissions over the next decade. According to a recent study by the International Atomic Energy Agency (IAEA),[9] after unit 2 of Ignalina is decommissioned, CO_2 emissions are projected to increase by 4.0 Mt if replacement capacity comes from a new combined cycle gas turbine or by 5.5 Mt if it comes from modernization of the Lithuanian thermal power plants (basic economic growth scenarios).

[9] IAEA (2004): Energy supply options for Lithuania: a detailed multi-sector integrated energy demand, supply and environmental analysis.

53. ***Mitigation effect:*** Although some preliminary data on the technical potential have been provided, no robust and consistent quantitative estimates of the effect of policies and measures in the energy supply sector on Lithuania's GHG emissions have been presented. The mitigation potential of the measures to promotes CHP and RES totalled 3.846 Mt CO_2 equivalent in 2010. The review team noted that making full use of these potentials would require the adoption of concrete implementation laws and the application of effective policy instruments.

2. Energy use in the residential and commercial sector

54. In 2002, energy use in the residential and commercial sector accounted for 7 per cent of total GHG emissions. Between 1998 and 2002, emissions from this subcategory dropped by 21 per cent.

55. ***Decentralization of heat supply:*** In recent years the Lithuanian heating utility sector has been decentralized. In 1997, the district heating sector was split off from AB Lietuvos Energija and local heating services companies were handed over to municipalities. The review team was informed that there is a great need for energy efficiency upgrades and retrofits in the district heating sector. Also, on the demand side, energy losses result from insufficient building insulation, the absence of heat regulation (valves, control systems) and billing systems that provide no consumer incentives for energy savings.

56. ***Energy efficiency plans:*** The NEEP, the NES and the Housing Strategy provide valuable indications for potential demand-side measures in residential or institutional buildings. For example, the NEEP estimates the potential for energy savings through improvements in energy efficiency to be as much as 20–50 per cent of the currently consumed energy resources, equating to a mitigation potential of 0.12 Mt CO_2 equivalent in 2010. The review team noted that achieving these quantified efficiency potentials would require concrete implementation and follow-up activities, in terms of the selection of instruments, allocation of funding, monitoring and evaluation, and strengthening of institutional arrangements.

57. In particular, the review team was informed that incentives and instruments to promote energy efficiency of residential buildings, such as the installation of heat cost allocators and thermostatic valves, have not been put in place. The review team noted that, in contrast to other central European countries where these measures have proved to result in large energy savings, the large potential for demand-side energy savings is currently not addressed in Lithuania. The adoption of EU standards for new buildings according to Directive 2002/91/EC is expected to gradually improve the demand-side efficiency of residential heating over the next decades.

D. Industry

58. In 2002, energy use in manufacturing industries and construction accounted for 5 per cent of total GHG emissions, while emissions from industrial processes accounted for 16 per cent. Between 1998 and 2002, emissions from these two subcategories fell by 52 per cent and increased by 17 per cent, respectively.

59. ***Energy use in industry:*** Natural gas and fuelwood are the two main energy sources used in industry. In 2002, gaseous fuels held the largest share of CO_2 emissions from energy use in manufacturing industries and construction (39 per cent), followed by biomass (24 per cent), liquid fuels (22 per cent) and solid fuels (16 per cent). The NEEP and the NES both identify considerable potentials for the increase of energy efficiency in industry, amounting to 0.48 Mt CO_2 equivalent in 2010 (see table 6). The review team noted that the implementation of an adequate policy framework to achieve these potential savings is still pending.

60. ***Industrial processes:*** Direct GHG emissions from industrialized processes were reported from the production of nitrogen fertilizer (90 per cent) and cement (10 per cent). The output of both these industrial products fluctuates widely, in line with national construction activity and price fluctuations in export markets.

61. Policies and measures to mitigate emissions from chemical processes were not reported. During the visit to Vilnius, the review team was informed that host-country experts assessed the costs for measures in this field, for example catalytic reduction of N_2O in nitric acid production, as very low. Some measures, for example the use of biomass waste and mineral components in cement production, were assessed to be profitable (i.e. their costs were negative).

E. Transport

62. In 2002, fuel combustion in transport, including international aviation, accounted for 18 per cent of total GHG emissions. Between 1998 and 2002, emissions from this sector declined by 9 per cent. The 1998 estimates were 32 per cent below the 1990 value.

63. ***Transport:*** The road infrastructure and the fleet of road vehicles grew rapidly during the 1990s. Between 1992 and 2002, the number of passenger cars more than doubled. Most passenger cars were imported used cars from Western Europe, so the average age of the car fleet is rather high: only 4 per cent are less than five years old. In 2002, more than half of the fuel used in transport was diesel fuel (54 per cent), followed by gasoline (33 per cent) and liquefied petroleum gas (13 per cent).

64. ***Energy efficiency in transport:*** The NEEP and the NES both identify considerable potential for the increase of energy efficiency in transport, leading to the reduction of GHG emissions from fossil fuel combustion (see table 7). The resulting mitigation potential amounts to 0.422 Mt CO_2 equivalent in 2010. The NEEP suggests, inter alia, the development of the road network on all levels, improvement of fuel quality, promotion of public transport and efficiency improvement of vehicle engines. The review team noted that the implementation of an adequate policy framework to achieve these potential efficiency gains is still pending.

Table 7: Summary of policies and measures in the transport sector [a]

Name of policy or measure	Objective and/or activity affected	GHG affected	Type of instrument	Status	Implementing entities	Estimated mitigation potential in 2010 (Mt CO_2-eq.)[b]
NEEP (2001)	Identify potential for energy savings in transport	CO_2, CH_4, N_2O	Research, information	Planned	MoE, MoEc, MoT, Energy Agency	0.442
Promotion of biofuel use in transport (Implementation of Directive 2003/30/EC)	Increase the share of biofuels to 12 per cent of total transport fuels by 2010 through tax exemptions and preferential market access (Law on biofuels)	CO_2	Fiscal, regulatory	Implemented (since 2003, in the framework of the NES)	MoE, MoEc	0.255

[a] Only policies and measures with a potential direct impact on GHG emissions were included here.
[b] Data on estimated mitigation potential was taken from technical background material (see footnote 15).

65. ***Shift to lower-carbon fuels in transport:*** The NES stipulates that biofuels used in transport are exempt from value-added tax and pollution tax. The review team noted that this measure is encouraging oil companies to blend gasoline with bioethanol and therefore may have a noticeable mitigation effect on GHG emissions from transport. The resulting mitigation potential was estimated at 0.255 Mt CO_2 equivalent in 2010.

F. Agriculture

66. In 2002, agriculture accounted for 18 per cent of total GHG emissions. It accounted for 39 per cent of CH_4 emissions, mainly from enteric fermentation by animals, and for 51 per cent of N_2O emissions, mainly from agricultural soils. Between 1998 and 2002, GHG emissions from this sector increased by 44 per cent. The 1998 estimates were 64 per cent below the 1990 value.

67. ***Agricultural reform process:*** Like other economic sectors, agriculture underwent sudden changes and reforms during the period 1992–1997. These reforms, which included land privatization and the liberalization of prices for agricultural products, led to substantial changes in agricultural production: from mainly livestock production in 1990 (55 per cent) towards crop production in 2000 (62 per cent). The review team was informed that accession to and integration into the EU may result in further deep structural changes in this sector.

68. In 1993, the TATULOS programme was introduced. The goal of this reform programme is to introduce and implement sustainable agricultural practices based on ecological farming. It is aimed at rationalizing the use of mineral fertilizer, and reducing diffuse pollution runoffs and N_2O emissions into the atmosphere from agricultural fields.

69. In 2000, the Code of Good Practice in Agriculture (CGPA), which is administered by the Water Management Institute of Lithuania and facilitated by the Danish Agricultural Consultancy Centre, was introduced. The objective of this new initiative is the pursuit of ecologically sustainable farming practices by means of training, legal and technical guidelines, elimination of pollution from livestock farms, including through manure management, rationalization in the use of chemical fertilizers and monitoring and evaluation of sustainable agricultural practices.

70. ***Mitigation component of agricultural policies:*** The review team noted the lack of a cohesive effort to address climate change issues and mitigation measures in agriculture. Apart from marginally addressing N_2O emissions from agricultural soils through the TATULOS organic farming project and N_2O emissions from manure management (CGPA), little or no attention was paid to CO_2 emissions and sequestration from agricultural soils or CH_4 emissions from enteric fermentation in animals.

71. The review team acknowledged the progress made between the NC1 and the NC2 by introducing and providing training in sustainable farming practices aimed at reducing water pollution and at improving water quality, the security of food production and the health of the Lithuanian population. These measures include capacity-building and the elimination of pollution from livestock farms.

G. Forestry and land-use change

72. Removals of CO_2 due to changes in biomass stocks and abandonment of managed lands accounted for 12,685 Gg CO_2 in 2002. At the same time, CO_2 emissions deriving from changes in biomass stocks and forest soils accounted for 5,965 Gg CO_2. As a result, a net removal of 6,721 Gg CO_2 was calculated for the LUCF sector, equalling 33 per cent of total GHG emissions.

73. ***Analysis of activity data:*** During 1998–2002, Lithuania's forest area expanded by 66,900 ha (1 per cent), the total growing stock volume of the forests increased from 347,600 m^3 to 382, 600 m^3, and

the average age of forest stands increased from 51 to 53 years. The most common species were conifers (60 per cent), followed by soft broadleaves (36 per cent) and hard broadleaves (5 per cent).

74. ***Afforestation, reforestation and deforestation:*** During 1998–2002, annual afforestation rates consistently ranged from 9,000 to 11,000 ha. The review team noted that these statistical data should indicate an increase in the CO_2 sink capacity of Lithuania's forests. In 2002 the felling of forest trees in Lithuania accounted for 5.9 million m^3 of wood, an increase of 8 per cent compared to 2000. Furthermore, the felling rate is projected to rise to 6.2 million m^3, an increase of 5 per cent, over the next decade. About 25 per cent of felled forest area is left for natural regeneration.

75. The Lithuanian Forest Increase Programme 2004–2020 aims at increasing forest cover by 3 per cent over the next 20 years through various afforestation and reforestation projects, in order to increase the CO_2 sink capacity of the forestry sector. After a preparatory phase (2004–2006) with afforestation of 5,000 ha per year (4,000 ha in agricultural land and 1,000 ha of new forest), a so-called "phase of sustaining of forest resources" (2007–2020) follows, with annual afforestation of 7,000 ha.

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

H. Waste management

77. In 2002, CH_4 emissions from waste management (including waste-water handling) accounted for 7 per cent of total GHG emissions. Emissions from solid waste disposal on land have decreased by 29 per cent since 1998. Estimates for emissions from waste-water handling were incomplete.

78. The NC2 does not report on policies and measures in waste management. During the visit to Vilnius, MoE provided the review team with information on policies and measures in this field. The review team encouraged Lithuania to include these measures in its climate change strategy.

79. ***Analysis of activity data:*** At present, about 4 million tonnes of non-hazardous waste are produced in Lithuania annually. Municipal solid waste (MSW) constitutes 1 million tonnes, ranging from 300 kg per capita in larger cities to 70 kg in rural areas. The organic content in MSW is about 32 per cent. Currently, MSW is disposed in landfills without any prior sorting. At present, only 3 of the 350 landfills in use are in line with EU requirements. The remaining 347 active landfills, as well as about 500 closed landfills, are simple dumping sites without cover, collection or treatment of leachate.

80. ***Waste collection and management systems:*** In implementing EU legislation, the National Waste Management Plan (NWMP) was adopted in 2002. The review team was informed that a sustainable waste management system will be implemented, based on the NWMP. Lithuania plans to introduce comprehensive waste collection and management systems, close down old (uncontrolled) landfills and build 10–12 new controlled sanitary landfills with gas collection and flaring or heat/power generation. The review team noted that these measures would decrease CH_4 emissions from waste management.

81. Furthermore, a new infrastructure for the sorting and recycling of waste from households, and for the composting of degradable waste is planned to be installed by 2009. The review team noted that composting, if primarily anaerobic, does not necessarily reduce CH_4 emissions compared to disposal on unmanaged landfills. Activities for the reduction of the amount of waste generated are limited to packaging waste. Reduction of other waste fractions is not targeted.

82. ***Waste water treatment:*** In 2003, 38 per cent of all waste water was fully treated (i.e. with phosphorus and nitrogen removal); 47 per cent underwent mechanical and biological treatment; 14.4 per cent was treated mechanically and the remaining 0.6 per cent was discharged without any treatment. Since 2001, the amount of treated waste water has doubled. Construction and reconstruction of waste-water treatment plants is supported by EU funding.

83. Waste-water treatment sludge accounts for one third of all non-hazardous waste. In the absence of sludge management systems, waste-water treatment sludge is stored at the production sites. Some is also used for agricultural purposes, if quality standards are met. The review team was informed that a programme for sludge management is in preparation. Plans for the use of CH_4 from waste management for heat or power production were not reported.

IV. PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

A. Reporting on projections

84. ***Institutional framework:*** The MoE is responsible for coordinating the preparation of projections for the NC2. The Energy Institute is responsible for the preparation of projections on energy demand and supply. The NC2 projections on CO_2 emissions from energy were prepared by the Energy Institute in the framework of the NES.

85. ***Coverage:*** The NC2 section on projections of GHG emissions[10] contains a brief description of energy scenarios by sector under different assumptions on economic growth (slow, medium and fast) and on energy efficiency development (basic and high efficiency), a projection of final energy demands by fuel type until 2020, and projections of CO_2 emissions from fuel combustion until 2012 for two different scenarios: operation of unit 2 of the Ignalina NPP continues beyond 2010 (scenario 1), and closure of unit 2 of Ignalina NPP in 2010 and subsequent energy generation by combustion power plants (scenario 2). Projections for the non-CO_2 GHGs (CH_4 and N_2O) and the non-energy sectors (industrial processes, agriculture, LUCF, waste management) are not presented.

86. ***Compliance with guidelines:*** The NC2 section on projections complies with the UNFCCC guidelines only to a limited extent. The review team noted that the projections did not cover all sectors and GHGs, as required by the guidelines.[11] The presented scenarios were not defined in accordance with the guidelines (i.e. without measures, with measures, with additional measures).[12] The estimated and expected total effects of implemented and adopted policies and measures were not reported.[13] Relevant information on factors and activities for each sector were reported only to a limited extent.[14]

87. During the visit to Vilnius, the review team identified the following potential areas for improvement of reporting on projections: preparing and reporting on projections on all GHGs and all sectors, more detailed description of the key factors and main assumptions for the developed projections; enhanced elaboration on the methodology used for the estimation of the different projections; presentation of the results by sector and by gas in the developed scenarios; and more detailed discussion of the impact of the closure of the Ignalina NPP.

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[10] The NC2 projections are presented in chapter 3.13 ("Projections of greenhouse gas emissions") and not in chapter 5 ("Projections and impact of policies and measures").

[11] See paragraphs 34 and 35 of the UNFCCC guidelines.

[12] See paragraph 29 of the UNFCCC guidelines.

[13] See paragraphs 39 and 40 of the UNFCCC guidelines.

[14] See paragraph 48 of the UNFCCC guidelines.

88. ***Updated projections:*** After the visit to Vilnius, the review team was provided with an updated set of projections of GHG emissions from fuel combustion until 2020, hereinafter called the 2004 projections.[15] Most of the following elaborations are based on these 2004 projections.

B. Scenarios, models and assumptions underlying future emission trends

89. The 2004 projections were developed in the context of the 2002 revision of the NES. They are based on energy development scenarios for final energy demand in economic sectors (including oil refining, electricity and heat production, industry, services, transport, agriculture, and households) and TPES differentiated by energy sources, including coal, peat, natural gas, gasoil, other oil products, natural petroleum gases, liquefied petroleum gas, heavy fuel oil, and orimulsion.

90. ***Scenarios:*** A "with measures" scenario is presented, covering all measures of the NES (including decommissioning of unit 2 of the Ignalina NPP by the end of 2009, promotion of RES and CHP, emission ceilings for NO_X and SO_2, and tightened fuel quality standards) as well as the potentials for energy savings of policy options identified in the 2001 revision of the NEEP. The effects of cross-sectoral policies and measures (EU-ETS and CO_2 tax, see section III.B) were not taken into account. The review team noted that this scenario contains not only measures that are adopted and implemented, but also those that are planned, as well as some policy options that are not yet in the planning stage: it therefore broadly follows the definition of a "with additional measures" scenario.

91. ***Methodology:*** The energy supply and demand projections were prepared by applying the 2000 version of the Model of Analysis of Energy Demand (MAED), developed by the Argonne National Laboratory (United States of America). The least-cost development plan until 2020 is carried out using the software product WASP IV. The GHG emissions inventory year 2000 was taken as the base year.

92. ***Assumptions underlying future emission trends:*** The review team was informed that the following key variables were identified: GDP growth, increase in energy efficiency in the different economy sectors, structural changes in the economy, and changes in fuel prices. Three scenarios for GDP growth were developed (table 8). The energy demand projections are based on the baseline scenario. The review team noted that during 2001–2002, GDP growth rates were much closer to the fast economic growth scenario (6.5 per cent and 6.7 per cent, respectively). The final energy intensity of GDP was assumed to converge to average EU levels by 2020.

Table 8: Main assumptions underlying future emission trends

	Annual GDP growth rate (%)		
	2000–2010[a]	2011–2020	2000–2020
Fast economic growth scenario	7.0	3.0	5.2
Baseline scenario	4.7	3.0	4.0
Slow economic growth scenario	2.0	3.0	2.4

[a] GDP growth rate for 2001 and 2002 were 6.5 per cent and 6.7 per cent, respectively.

93. Primary energy demand in the basic scenario is assumed to increase by approximately 30 per cent until 2020. However, the total demand for fossil fuel is assumed to almost double from 5 Mtoe in 2000 to 9.4 Mtoe in 2020. A scenario considering the continued operation of the Ignalina plant was not reported.

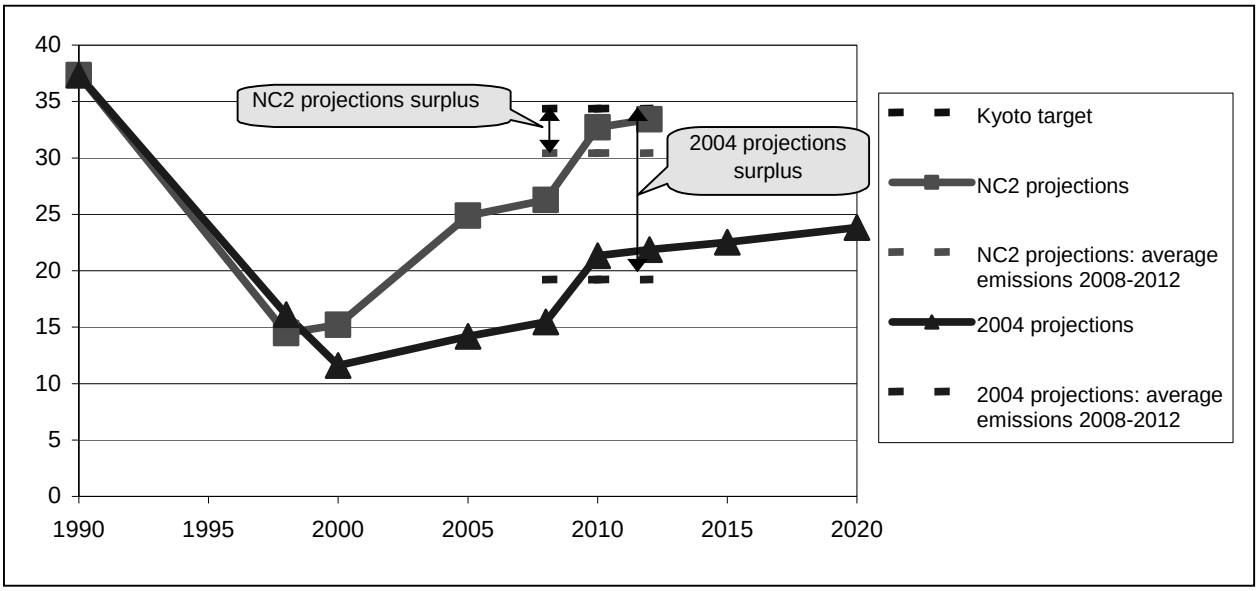
[15] Streimikienė, D., Bubnienė, R. and Parker, C. (2004): Technical Report No. 28-1. Projections of GHG from fuel combustion sector. Ref. EUROPEAID/112892/D/SV/LT/4. On behalf of the Ministry of Environment.

94. The review team was informed that the impacts of electricity market liberalization on GHG emissions were not taken into account. The liberalization of the electricity market is stipulated by the Electricity Law,[16] which was approved by the Parliament in 2000.

C. Results of projections

95. ***Results:*** On a "with measures" basis, CO_2 emissions from fuel combustion are estimated in the 2004 projections to decline by 49 per cent, from 37.3 Mt CO_2 in 1990 to 19.2 Mt CO_2 on average during the first commitment period (figure 1). The Kyoto target, calculated as 92 per cent of the 1990 value,[17] is 34.2 Mt CO_2. The resulting surplus for the first commitment period was calculated as 15.1 Mt CO_2. However, given that CO_2 emissions from fuel combustion accounted for only 59 per cent of total GHG emissions (in 2002), the review team noted that emission trends in non-energy sectors might considerably change this picture. Beyond the first commitment period, emissions are projected to increase slightly, to 23.8 Mt in 2020.

Figure 1. Projected carbon dioxide emissions from fuel combustion (Mt)



96. The estimated surplus is about four times larger (+286 per cent) in the 2004 projections than in the NC2 projections. Under a similar "with measures" scenario, CO2 emissions from fuel combustion were estimated in the NC2 projections to decline by 19 per cent, from 37.3 Mt CO2 in 1990 to 30.4 Mt CO2 on average during the first commitment period. The resulting surplus for the NC2 projections can be calculated as 3.9 Mt CO2.

[16] According to the Electricity Law, liberalization takes effect in three steps, starting with direct electricity purchase contracts for major electricity consumers in 2001, extending to medium-sized electricity consumers in 2002 and including all consumers by 2010.

[17] Due to major inconsistencies in the GHG inventory data, the result of the calculation of the Kyoto target should be considered as preliminary (see paragraph 24).

Table 9: Comparison of projected carbon dioxide emissions from fuel combustion

	NC2 projections		2004 projections		Difference	
	Mt	% 1990[a]	Mt	% 1990[a]	Mt	Change (%)[b]
Emissions in 1990	37.3	100	37.3	100	0.0	0
Emissions in 1998	14.5	39	16.1	43	1.6	11
Emissions in 2000	15.2	41	11.6	31	–3.6	–24
Emissions in 2005	24.9	67	14.2	38	–10.7	–43
Emissions in 2008	26.3	70	15.5	41	–10.8	–42
Emissions in 2010	32.7	88	21.3	57	–11.4	–35
Emissions in 2012	33.4	90	21.9	59	–11.5	–35
Average emissions 2008–2012	30.4	81	19.2	51	–11.2	–37
Kyoto target [c]	34.3	92	34.3	92	0.0	0
Surplus	**3.9**	**11**	**15.1**	**41**	**11.2**	**286**

[a] Per cent of 1990 value.
[b] Per cent of NC2 projections value.
[c] Calculated as 92 per cent of emissions in 1990. Due to major inconsistencies in the GHG inventory data, the result of these calculations were considered as preliminary.

97. ***Consistency of NC2 and 2004 projections:*** The review team noted that the two sets of projections were broadly consistent in scope and methodology. The emissions levels for the base years (1998 and 2000) were also broadly consistent with the inventory estimates for 1998 and 2001.

98. ***Comparison of NC2 and 2004 projections:*** The review team noted that the main reason for the large difference (11.2 Mt) in the two estimates of the surplus in CO_2 emissions from fuel combustion is the effect of the closure of unit 1 of the Ignalina NPP, which was estimated to be considerably less in the 2004 projections than in the NC2 projections: the 2004 projections show an increase in CO_2 emissions of only 2.6 Mt between 2000 and 2005, compared to an increase of 9.7 Mt for the same time period in the NC2 projections. The review team was informed that reduced electricity exports and lower than expected domestic consumption were the main reasons for this effect.

99. The second most important reason for the increase in surplus estimate is the emissions trend between 1998 and 2000: the 2004 projections show a decrease in emissions of 4.5 Mt between 1998 and 2000, compared to an increase in CO_2 emissions of 0.7 Mt for the same time period in the NC2 projections. The review team was informed that a lower than expected GDP growth rate, higher than expected energy prices and a reduction in energy intensity of GDP were the main reasons for this effect.

100. The estimated effect of the closure of unit 2 of the Ignalina NPP changed only slightly: the 2004 projections show an increase in CO_2 emissions of 5.9 Mt between 2008 and 2010, compared to an increase of 6.5 Mt for the same time period in the NC2 projections. The review team noted that this estimated effect was broadly consistent with the findings of a recent IAEA study (5.5 Mt, see paragraph 52).

101. ***Uncertainty levels and sensitivity to key variables:*** Key factors for uncertainties in GHG emissions projections were reported as: assumptions of GDP growth rates, energy efficiency improvements, and price development of primary energy resources on domestic and export markets. Uncertainty levels were not quantified. A sensitivity analysis was not reported. The review team noted that the inconsistency of inventory data (see paragraph 24) and the uncertainty of activity data for the year 1990 increased noticeably these uncertainties of projections.

V. VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES

102. The NC2 reports on vulnerability assessments and climate change impacts on natural ecosystems and biological diversity in Lithuania. These studies, based on research conducted at the Department of Hydrology and Climatology at the University of Vilnius, were carried out by the Institute of Ecology in the context of the 1996 NCCAP. The NC2 focuses on the impacts on climate and hydrology, and habitat changes and their influence on the pattern of bird migrations. The review team found the NC2 section broadly consistent with the UNFCCC guidelines.

103. ***Climate scenarios for the twenty-first century:*** Three atmosphere–ocean general circulation models (AOGCMs) were considered as a basis for studies of impacts and adaptation: GFDL (General Fluid Dynamics Laboratory), UKTR (United Kingdom Transient) and MPI (Max Planck Institute). After initial analyses, based on replicability of Lithuanian conditions, suitable scale, availability of data and IPCC recommendation, the GFDL scenario was used for predicting future climate parameters, mainly temperature and precipitation. Also, a single scenario of sea-level rise (3 mm per year, or 9 cm by 2030), is used to project potential impacts of climate change on the Baltic coast of Lithuania. The review team noted that the observed rate of eustatic sea-level rise on this coast was 3.3 mm per year in 1976–1994. The rate of sea-level rise is expected to accelerate under a climate change scenario, so the chosen scenario might be too conservative in its assumptions.

104. ***Impact assessment:*** Studies of climate impacts and adaptation measures are based on historical trends of temperature and precipitation, including duration and persistence of extreme cold and warm events for three Lithuanian meteorological stations (Vilnius, Klaipeda and Kaunas), and on the observed and potential biophysical impacts of climate change on biodiversity and habitat modifications, and consequently on bird populations and migration in Lithuania. For instance, using the selected GFDL climate scenario, an increase in temperature of 3–4° C in summer and of 4–7° C in winter, as well as a decrease in summertime precipitation, are projected for Lithuania towards the end of this century.

105. In the NC2 some mention is also made of the potential impacts of cold spells on crops and of winter temperatures near the freezing point on buildings and transport. The review team noted that information relating to the versions of the climate model used and the radiative forcing scenarios applied (IS92, SRES) was limited. Furthermore, the review team noted that regional climatic models or downscaled AOGCMs were not considered and uncertainties relating to climate scenarios were not evaluated.

106. ***Vulnerability assessment and adaptation measures:*** Impacts of climate change on the dynamics of the Baltic coast of Lithuania and the possibilities of increased coastal inundation and erosion and salinization of freshwater lenses were qualitatively discussed. The review team noted that reporting on impacts and vulnerability of the Baltic coastal zone of Lithuania was limited in detail. Adaptation measures in the vulnerable sectors, namely water resources, agriculture, forestry, coastal zone ecosystems and infrastructure, fisheries, transport and human health, were not reported.

107. ***Comparison to NC1:*** The review team acknowledged the quality of the vulnerability assessments for the two sectors discussed: climate and hydrology, and biodiversity and bird habitats. However, the team noted a backward step in reporting on vulnerability assessment and climate impacts, compared to Lithuania's NC1, insofar as very little effort was devoted to water resources, agriculture, forestry, coastal resources and infrastructure and human health. The NC1 identified these sectors as vulnerable to GHG climate change. The review team was informed of a more detailed study conducted in 2001, the results of which are forthcoming.

108. The review team was made aware of the fact that lack of capacity, funding and institutional arrangements limited the efforts of Lithuania to effectively undertake studies in this field.

VI. RESEARCH AND SYSTEMATIC OBSERVATION

109. Lithuania's NC2 provides an overview of efforts in research and systematic observation. Research in the field of climate change was mainly carried out by the Department of Hydrology and Climatology and the Institute of Ecology at Vilnius University; the University of Agriculture of Lithuania; some government institutions, including MoE; and some NGOs, including the Lithuanian Environmental Investment Fund.

110. ***Research:*** The areas of research in Lithuania relating to climate change focus on past trends and anomalies in temperature, precipitation and extreme weather events, and on the impacts of climate change and vulnerability on ecosystems and bird habitats. The NC2 reported on research on the impact of global warming on agro-climatic resources, and on a programme of national research and prognosis of terrestrial and water ecosystems, biological diversity, fauna and flora, under the NCCAP. A programme of research and prognosis in agriculture and forestry was briefly mentioned. During the visit to Vilnius, the review team was informed of several research participation efforts at the international level, including the participation of Vilnius University in the European Flood Forecasting System project under the fifth Framework Programme of the European Commission (2000–2003).

111. ***Systematic observation:*** A network of six meteorological stations carries out monitoring of climate parameters, as part of Lithuania's requirements and responsibilities under the Global Climate Observation System.

112. The review team was made aware of the fact that lack of capital and human resources and infrastructure and institutional arrangements limited Lithuania's efforts to undertake in-depth research and monitoring activities in relation to climate change.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS

113. The Department of Hydrology and Climatology of Vilnius University is responsible for education, training, and raising public awareness. The NC2 provides some information on current activities in this field. During the visit to Vilnius, the review team was provided with the following additional information:

(a) Climate change is included in the curriculum of regular courses in natural sciences in a number of secondary education schools;

(b) Vilnius University offers a one-semester course covering a broad set of topics that relate to climate change. Climate change and an introduction to the provisions of the Kyoto Protocol are also part of some other courses in environmental economics and environmental impact assessment at Vilnius University and the Technical University of Kaunas;

(c) An NGO (the Lithuanian Ecologic Movement, supported by MoE) regularly publishes articles on matters relating to climate change in a specialized state-owned journal, and in some newspapers;

(d) Some television and radio broadcasts on climate change are supported by the Department of Hydrology and Climatology of Vilnius University;

(e) A publicly accessible Internet web site[18] and some brochures are published by MoE in collaboration with some NGOs;

(f) Activities of NGOs in the field of climate change are limited.

114. The review team was informed that the main drivers behind activities in the field of education, training and public awareness raising in Lithuania are highly motivated governmental officials, experts, lecturers and teachers who try to include climate change and environmental policy in their daily work. During the visit to Vilnius, the review team gained the impression that the institutional arrangements and the state funding of activities under Article 6 of the UNFCCC are limited. Host-country representatives agreed that the low level of activities and number of people targeted resulted in a limited awareness of climate change among the general public and some governmental institutions in Lithuania.

VIII. CONCLUSIONS

115. The review of the second national communication of Lithuania and the additional information provided during the visit to Vilnius led the review team to conclude that the Lithuanian NC2 reflects most of the important aspects of the Lithuanian climate change policy at the time it was prepared and published. In general, the NC2 complies only to a limited extent with the structure laid down in the UNFCCC guidelines. Major potentials for increasing completeness and transparency of reporting were identified, especially in the chapter on inventories (data quality, analysis of drivers behind trends, see paragraph 23), policies and measures (summary table, see paragraph 36), projections (description of method, key assumptions and results, see paragraph 86), and vulnerability and impact assessment (see paragraph 107). The review team noted three main barriers that prevented the full use of these potentials in Lithuania: limited capacity, limited financial means allocated to climate change issues, and unclear responsibilities in the overall coordination of climate change policy.

116. During the review, the team analysed the information provided in the NC2 together with data from the two most recent inventory submissions of Lithuania to the Convention secretariat, which contain data on emission trends for 1990, 1998, 2001 and 2002. The results of this analysis suggest that Lithuania contributed to achieving the aim of the Convention, as its total GHG emissions decreased by 61 per cent in the period from 1990 to 2002, without considering CO_2 from LUCF, and by 71 per cent if CO_2 from LUCF is considered. The review team regarded this trend analysis as preliminary, because the inventory data lacks consistency and completeness.

117. In January 2003, Lithuania ratified the Kyoto Protocol, thus committing itself to reducing its aggregate emissions of GHGs such that average annual emissions in the period 2008–2012 are at least 8 per cent lower than 1990 levels. It is generally assumed that Lithuania will meet these commitments without additional efforts, because of the decline of industrial production and of related GHG emissions since the early 1990s. Results of recent projections for CO_2 emissions from fuel combustion show a surplus of 15.1 Mt CO_2, or 41 per cent of the 1990 levels. These results include the planned decommissioning of the Ignalina NPP, the country's primary source of electricity, before the end of 2009. The review team noted that data on GHG emissions inventory and projections should be interpreted with caution as they show a high level of uncertainty.

118. The review team noted that, in conjunction with the ratification of the Kyoto Protocol, no further institutional or policy arrangements for its implementation have been made in Lithuania. Given the challenges both of the economic transition and of the accession to and integration into the EU, climate change policy is not seen as a political priority in Lithuania at the beginning of the twenty-first century.

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[18] Ministry of Environment of Lithuania: <www.am.lt>; Lithuanian Environmental Investment Fund: <www.laaif.lt>.

This observation is underlined by the fact that key documents and strategies, such as the National Energy Efficiency Plan and the National Energy Strategy, neither explicitly mention climate change nor refer to the commitments under the Kyoto Protocol. Furthermore, the review team noted a low budget and very limited administrative capacity for monitoring, evaluation and reporting on climate policy, research and administration.

119. Nonetheless, a number of policies and measures were reported as being planned or implemented in the energy sector, including the promotion of energy efficiency, renewable energy sources and combined heat and power. Furthermore, during the visit to Vilnius, the review team was informed about some policies and measures in the non-energy sectors. The review team encouraged Lithuania to include these measures in its climate change strategy.

120. Lithuania intends to make use of the flexibility mechanisms of the Kyoto Protocol (joint implementation and emissions trading). The review team noted that the successful implementation of the UNFCCC requirements is a condition for the use of these mechanisms. Host-country representatives and the review team agreed that considerably more effort is needed in order to arrive at the level of preparation in most other countries with economies in transition.

121. Lithuania participated in the Activities Implemented Jointly (AIJ) scheme in collaboration with Sweden (10 projects), France (7 projects) and Denmark (12 projects). The AIJ projects included boiler conversion, renovation of the district heating network, biomass and biogas use and one project on geothermal energy. Further success stories include the promotion of RES (biomass use for heating, small-scale hydro), GEF- and EU-funded projects on a number of aspects relating to climate change, and the implementation of several EU directives that provide instruments and funding for mitigation and adaptation measures.

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