



UNITED
NATIONS



Framework Convention
on Climate Change

Distr.
RESTRICTED

FCCC/IDR.1/LAT
20 June 1997

ENGLISH ONLY

LATVIA

Report on the in-depth review of the national communication of Latvia

Review team:

Edward Radwansky, Poland
Patricia Ramirez, Costa Rica
Seppo Oikarinen, Finland
Fiona Mullins, OECD secretariat
Mukul Sanwal, UNFCCC secretariat, Coordinator

Also available on the World Wide Web (<http://www.unfccc.de>)

Under Articles 4 and 12 of the Convention, Parties are required to prepare national communications on their implementation of the Convention. Guidelines for the preparation of national communications and the process for their review were agreed on by the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, by its decisions 9/2 and 10/1, and by the Conference of the Parties, at its first session, by its decisions 2/CP.1 and 3/CP.1 (see FCCC/CP/1995/7/Add.1). In accordance with these decisions, a compilation and synthesis of the first 33 national communications from Annex I Parties was prepared (FCCC/CP/1996/12 and Add.1 and Add.2).

When reviewing the implementation of the Convention by Parties, the subsidiary bodies and the Conference of the Parties will have this report available to them in English as well as the summary of the report in the six official languages of the United Nations. (These bodies will also have before them the executive summary of the first national communication of Latvia and country-specific information drawn from a compilation and synthesis report covering all countries that have submitted national communications.)

Summary¹

1. The in-depth review was carried out between April and November 1996 and included a visit by the team to Riga, from 13 to 15 May 1996. The team included experts from Costa Rica, Finland, Poland, and the Organisation for Economic Co-operation and Development (OECD).
2. In its first national communication Latvia has followed the reporting guidelines for national communications to the extent possible. Latvia has partially followed the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (1994). Latvia has provided, with varying levels of detail, information on policies and measures that will help to mitigate climate change, and has also provided projections of greenhouse gas emissions for the year 2000. Supporting documentation was made available to the review team during the country visit which enabled a fuller understanding of the information in the national communication.
3. Latvia expects to achieve about 25-30 per cent lower emission levels in the year 2000 as compared to 1990 levels. Emissions of greenhouse gases (GHG), in global warming potential terms, have dropped by over 50 per cent between 1990 and 1996 as a result of restructuring, energy price reform, the decline in production, removal of energy subsidies, and the breakup of the collective farms. Latvia also has policies to make greater use of renewable energy sources, such as wood, and to promote energy efficiency and conservation in the large combined heat and power plants that provide residential heating, which accounts for more than one-fourth of total energy consumption. With almost half the country covered by managed forest, an equivalent of nearly two thirds of the emissions of carbon dioxide are currently sequestered by sinks. Latvia's national policy priorities include environmental protection strategies in various economic sectors, some of which will also help reduce GHG emissions.
4. Latvia's approach to climate change is influenced by its geographical situation and the ongoing transition to a market economy. Energy security is the overriding policy objective. Currently 30 per cent of electricity and 90 per cent of primary fuel are imported. The economic restructuring, as well as removal of subsidies and an increase in prices for imported energy to world market levels, have reduced primary energy consumption, and provided incentives for the introduction of new technology, energy efficiency and energy conservation measures. Lack of finance and institutional capacity to develop and manage investments projects is likely to hinder the implementation of measures to reduce emissions of GHGs in the short term. Fiscal instruments have recently been introduced as a policy tool, but it is too early to assess their impact.

¹ In accordance with decision 2/CP.1 of the Conference of the Parties, the full draft of this report was communicated to the Latvian Government, which had no further comments.

5. Latvia has in place a strategic framework for environmental protection. Sustainable development objectives are pursued by integrating environmental considerations into economic sectors through the National Environmental Policy Plan, the Energy Master Plan, and the National Development Programme of Motor Transport and Forestry Development Policy. The role of environmental information, institutions and organizations and public awareness in the implementation of policy is formally recognized by the Government. These factors should help Latvia to adopt policies and measures in the future for reducing its emissions.

6. The measures described in the national communication target the energy and transformation sector, which is the main source of GHG emissions in Latvia - accounting for more than one third of total CO₂ emissions in 1990. The Government's policy priorities are to improve energy security, economic efficiency and local air quality. In the national communication, separate projections have been made for emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), nitrogen oxides (NO_x), carbon monoxide (CO), and non methane volatile organic compounds (NMVOC), and three CO₂ scenarios have been presented based on different gross domestic product (GDP) assumptions. These scenarios incorporate the effects of several measures - rehabilitation of district heating networks, installation of heat meters, and taxes that provide incentives for increased use of natural gas rather than liquid fuels - planned to achieve sustainable development.

7. No information was included in the national communication on vulnerability and adaptation. The review team was informed that work has been initiated to develop a national climate programme. Latvia has a wind turbine project in Ainazi as an Activity Implemented Jointly with the Government of Germany. An environmental data centre has been established to collect data on air, water and soil pollution. The centre proposes to integrate information on energy and socio-economic data. The national communication reported on improvements in the quality of environmental programmes in the schools.

8. Latvia does not have a specific policy to mitigate climate change but includes climate policy within a combination of environmental policy and development strategies in various economic sectors. It was stressed to the review team that the future pattern, structure and pace of economic growth remain highly uncertain, thereby preventing the Government drawing up specific measures to reduce emissions of greenhouse gases.

I. INTRODUCTION AND NATIONAL CIRCUMSTANCES

9. Latvia ratified the Convention on 23 March 1995. Its national communication was received by the secretariat on 20 September 1995.

10. The in-depth review of the national communication was carried out between April and November 1996, and included a visit by the review team to Riga from 13 to 15 May 1996. The team included Mr. Edward Radwansky (Poland), Ms. Patricia Ramirez (Costa Rica),

Mr. Seppo Oikarinen (Finland), Ms. Fiona Mullins (Organization for Economic Co-operation and Development) and Mr. Mukul Sanwal (UNFCCC secretariat, Coordinator). In the course of the visit, the team met representatives of the ministries concerned and members of the scientific and academic community, as well as a representative of a non-governmental organization.

11. Latvia is situated on the shores of the Baltic Sea and the edge of the north-eastern European plain. The total land area of 64,600 sq. km. includes 44 per cent of forest and 39 per cent of cultivated land. It has a moderate climate. The population of Latvia shows a declining trend, and is expected to come down to about 2.5 million in 2000 from about 2.7 million in 1990.

12. The Ministry of Environment and Regional Development was set up in 1993 and a National Environmental Policy Plan (NEPP) was formulated in 1995. The plan lays down basic environmental policy goals for the next 20-30 years, principles upon which the policy should be based and instruments for its implementation. Its policy goals emphasize the value of public information and recognize that an information system, environmental institutions and organizations and public awareness are three major prerequisites to develop and successfully implement environmental policy. The plan is based to a large extent on the conclusions of the United Nations Conference on Environment and Development (UNCED) regarding the need for sustainable development. It is expected that the plan will be used by various ministries in drafting their sectoral strategies.

13. Latvia meets about 10 per cent of its energy needs from domestic sources. Nearly two-thirds of its electricity needs are produced domestically; of this, half was hydroelectricity in 1990, and the rest was produced from combined heat and power plants run on natural gas. A small amount of coal and peat and an increasing amount of wood are also used as energy sources.

14. In 1990, Latvia's per capita emissions were about half the average of the countries with economies in transition and two fifths of the average of the OECD. The major primary sources of emissions were oil (60 per cent) and natural gas (20 per cent). In sectoral emissions, district heating had the largest share (40 per cent), followed by transport (20 per cent). The introduction of world market prices for energy and the loss of traditional markets are the major cause of the decline in industrial activity as well as emissions by over 50 per cent since 1990. Residential heating continues to be the biggest energy end-use and offers a significant potential for energy saving. The fuel efficiency of the vehicle fleet is improving as newer vehicles replace old ones, but these improvements are offset by increases in the number of vehicles. It is not clear at present whether these trends will continue to offset each other or emissions from transport will rise at some point in the future.

15. Since 1990 there has been a significant decline in the agricultural sector because of the change from State to private ownership of farms. Methane emissions show a decrease of 50 per cent due to the reduction in the number of animals, and there is little likelihood of full recovery in this sector by the year 2000. There is a strong tradition of silviculture in Latvia.

Forests cover over 44 per cent of the land area, and are entirely managed. An equivalent of almost two thirds of Latvia's CO₂ emissions are at present sequestered, and sequestration of carbon in sinks is expected to continue at this level for some time.

16. Latvia has referred to Article 4.6 of the Convention, and has interpreted "flexibility" in terms of the statistics presented in the communication relating to the inventory and projections of emissions. It does not have complete information on various sectors of the economy for the year 1990, the base year for inventory data. It has not been able to assess activity in the industries and sectors utilizing solvents. Latvia was able to assess the effects of measures in the energy sector, but this assessment has limitations because of lack of experience in the implementation and assessment of the impact of economic instruments. Additional data and information were provided to the review team as a result of work that has been carried out after the preparation of the national communication. This information clarified issues relating to the policies and measures and projections, which enhanced the comprehensiveness and transparency of the information presented in the national communication.

17. The review team was informed that transition from a centrally-planned to a market economy required basic changes in legislative, administrative and fiscal arrangements, making it difficult to develop policies and measures and assess their effects. The statistics system has undergone major modifications. Lack of resources and the difficulty in making major investments in the context of low economic growth and an uncertain economic environment make implementation of policies difficult. The review team noted that steps are being taken to design strategies for sustainable economic development, and that the policies and measures included in the first national communication are being reviewed by the Government.

II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS

18. The national inventory of anthropogenic emissions and removals by sinks was carried out under the leadership of the Ministry of Environmental Protection and Regional Development. Support was received for this work from the Latvian-Dutch Project for the Country Case Study on GHGs, with technical assistance from the Institute of Environmental Studies, in the Netherlands, and the Foundation for Energy Efficiency, in Poland. The inventory includes estimates of CO₂, CH₄, as well as N₂O, CO, NO_x, and NMVOC for 1990. The methodology and emission factors recommended in the draft IPCC Guidelines for National Greenhouse Gas Inventories (1994) were used. Additional information was provided to the review team to facilitate an understanding of trends in GHG emissions and removals.

19. In Latvia, in 1990, aggregated emissions using the IPCC's 1994 100-year global warming potential (GWP) amounted to 27,640 Gg of carbon dioxide equivalent. Of this total, carbon dioxide contributed 83.1 per cent; methane 14.1 per cent; and nitrous oxide 2.8 per cent. Of the total emissions, fuel combustion accounted for 84.5 per cent; energy transformation (30.2 per cent) and transport (20.7 per cent), were the main contributors, while emissions from cement production accounted for 1.3 per cent. CO₂ emissions were estimated

at 22,976 Gg, while removals of CO₂ by sinks, presented separately as required by the guidelines, were estimated at 14,300 Gg, giving a net emission of 8676 Gg. Enteric fermentation and animal wastes contributed 70 per cent of CH₄ emissions, and waste dumps 27 per cent; Latvia has no landfills. Agricultural soils contributed 57 per cent of N₂O emissions. Other emissions from incomplete combustion of fuels and fugitive emissions from gas storage include NO_x (90 Gg), CO (363 Gg), NMVOC (63 Gg). No information has been provided on emissions of HCFCs, PCFs and SF₆.

20. The default IPCC emissions factors and a top-down methodological approach from aggregated data were used for the inventory calculations. The information was not presented in the IPCC standard tables in the national communications. Data in the IPCC standard tables were provided to the team during the country visit, these include emissions from wood, and local emission factors, increasing the total CO₂ emissions to 23,151 Gg (as against 22,976 Gg in the national communication).

21. The team was informed that credible activity data were not available for 1990 because before 1991 the statistical system in use in the country did not provide complete statistics about activities related to GHGs. For 1990, the activity data are based on expert judgement. In the industrial sector, emissions have been estimated only for cement production. The inventory data for the transport and agriculture sectors are particularly uncertain. Detailed information provided by the Ministry of Agriculture on the number of animals was used for the inventory estimations, but there was no information about livestock management, and the default values for enteric fermentation emissions provided by the IPCC methodology for developed countries were used. Emissions of CO₂ from conversion of grasslands into cultivated areas were not taken into consideration because data on land use for the period 1965-1990 were incomplete.

22. The inventory shows significant sequestration of CO₂ in forests. The forest area increased by 0.5-1 per cent every year during the period 1990-1994. Carbon sequestration in forests, shrubs and groves was calculated on the basis of the Forest Service database of the Ministry of Agriculture, applying the United States Environmental Protection Agency methodology. National experts found this more appropriate for the data available in the country than the IPCC guidelines, since the available Latvian statistics did not differentiate between primary and secondary forests. The review team noted that estimates of sequestration presented in the national communication are marginally lower than those that could be obtained by applying IPCC coefficients.

23. Estimates of emissions and sequestration were made for different forest species, taking into account area covered, average age of trees, and volume of annual harvest. This figure includes annual growth of standing forest and reforestation. All the biomass removed from the forest in the base year was estimated as emitting CO₂ in the same year, as required in the draft IPCC guidelines. Forestry regulations in Latvia require reforestation of the area felled within three years. Such areas were accounted for in the inventory calculation as afforestation. However, sequestration from new growth in abandoned lands was not taken into account owing to the lack of estimates of the regrowth.

24. The review team observed that NMVOC emissions from solvent use are likely to have been underestimated as not all paint applications were included. Emissions from agricultural waste burning were not calculated since agricultural residues are applied to the land and not burned. CH₄ emissions from gas storage and leakages from gas pipelines were not estimated; emissions from waste water were not taken into account, because both municipal and industrial waste waters are treated aerobically.

III. POLICIES AND MEASURES

25. In its national communication, Latvia described policy goals and indicated measures which are expected to reduce GHG emissions and enhance sinks. All measures reported in the national communication are described as planned or proposed, as no measures particularly addressing climate change had been enacted at the time the national communication was submitted. The review team was informed that several measures which would have an impact on reducing emissions of GHGs, reported in the national communication and included in the "with measures" projection of CO₂ emissions, have been implemented. These are rehabilitation of district heating networks; installation of gas and heat meters; a natural resources tax and an excise tax on fuel.

26. Policies and measures in place, or planned, to achieve sustainable development, which will have an impact on emissions and removals of GHGs, for example, measures that will reduce or sequester GHG emissions, are being considered in the context of abatement of regional transboundary air pollution. Two of the most important areas for action are energy conservation and energy efficiency, and a transition to alternative energy sources. In energy supply, efficiency improvements are being made through use of new technologies and co-generation of electricity and heat, and, in the residential heating sector improvements are being made through the use of heat-insulating materials in the construction of houses. Increased use of alternative energy sources such as wind generators, hydropower plants on small rivers, and biomass for heating is planned. Legislation on a natural resources tax and differentiated tariffs for energy use has been enacted.

27. Estimates of the effects of the measures, that have been implemented in the energy sector, were given in the national communication, but no information was provided on how the measures interact. The communication emphasizes the importance of monitoring and of intermediate indicators of progress, but it is too early to monitor the effects of measures because they have just been introduced. It is also too early to identify the costs of measures, or measures that are particularly innovative or promising. The team was informed that a lack of finance and institutional capacity may make it difficult for Latvia fully to implement all the measures and monitor their progress consistently.

28. The measures described in the national communication target the energy and transformation sector, which is the main source of GHG emissions in Latvia. The Government's policy priorities are to improve energy security, economic efficiency, and local air quality.

A. Energy sector

29. Latvia drew up its Energy Master Plan in 1994. Additional information on the country's fuel mix given to the review team during the country visit showed that primary energy consumption in 1994 was 45 per cent below 1990 levels because of drastic reduction in economic activity.

30. At the time of the visit, the structure of energy production had changed since 1990, largely because energy prices have been increased to international market levels. Gas and light fuel oils have lost their market share to cheaper fuels, such as heavy fuel oil and fire wood, although gas and light oil products still make up a large share of the fuel mix - each providing close to 30 per cent of total energy supply. Coal has a very minor share of the fuels used (only 7 per cent). The team was informed that there were no direct subsidies on any form of energy in Latvia, and no cross-subsidies for residential consumers of electricity and heat. Combined heat and power plants that are used to generate district heat - and account for one fourth of the total energy consumption - are fuelled by gas, oil, peat and small amounts of coal. Hydropower provided up to two thirds of Latvia's electricity needs in 1994 (but the proportion of hydropower varies depending on demand and river flow, and new capacity is limited by the fact that the most favourable sites have been already used). The remaining electricity requirements, around 30-35 per cent (50 per cent in 1990), are satisfied by imports from Estonia, Lithuania and the Russian Federation. Latvia plans to increase its self-sufficiency in electricity production to 80 - 85 per cent by 2010 through increased use of wood and peat in the combined heat and power plants. Latvia has some demonstration projects for such small renewables as micro-hydropower, wind energy and solar power. Availability of finance is likely to be a constraint on the development and installation of more efficient power plants, or plants using alternative fuels.

31. Residential heating is the biggest energy end-use (26 per cent of total energy consumption in 1994) and also provides the largest potential for energy savings. About 70 per cent of households in Latvia are connected to district heating schemes. District heating pipelines are being rehabilitated by the municipal governments, as funding becomes available. The review team was informed that about 40 per cent of the energy that is used for residential heating could potentially be saved by rehabilitating the local distribution networks, co-generation, installing modern boiler technology, and improving the insulation in buildings. Of the large, high-pressure pipelines, only 20 km. out of a total of 600 km. have been replaced. As far as local distribution networks in cities (2,400 km.) are concerned, however, negligible amounts have been replaced. Much of the local distribution network, which belongs to municipalities, is likely to be repaired rather than replaced due to lack of funding.

32. Legislation requiring improved thermal insulation of buildings was introduced in 1991. The State-owned gas utility is installing gas meters in all apartments, and by 1997 every household is expected to have a gas meter. Through this measure, the Government expects to save gas and reduce the cost of importing and transporting gas to households. Municipal governments are also installing heat meters in apartment buildings. Latvia has estimated that

making consumers more aware of their energy use through heat meters could reduce CO₂ emissions by 3 per cent; emissions of the other GHGs and precursors CH₄, N₂O, CO and NMVOCs would also be reduced. The team was informed that other measures include charging per unit of energy consumed rather than a flat rate based on floor area, installing equipment for modulating heat in flats and insulating buildings.

33. A natural resource tax came into effect on 1 January 1996 (based on the Natural Resource Law adopted in October 1995). The review team was informed that a proposed carbon dioxide component of this tax was not approved. Under the natural resource law, three types of charge have been implemented: taxes on extraction of natural resources, including peat; emission charges related to pollution of air, water and soil; and environmental charges on products such as batteries based on life-cycle assessment of the costs. The natural resource tax is expected to be an incentive for the spread of new technology, energy conservation and natural gas. The excise tax at present varies according to fuel type and sulphur dioxide content - with the objective of improving local air quality, mitigating transboundary pollution and reducing dependence on imported fuel. Natural gas is excluded from the proposed charges, so the tax effectively encourages the use of natural gas rather than oil; motor fuel is also excluded, but there is a small excise tax on gasoline.

34. The review team noted that small electricity producers (under 2 MW) enjoy a guaranteed price, which is double the normal market price for electricity. This preferential tariff encourages micro-hydro and wind power, and co-generation. The potential for developing these forms of electricity in Latvia is very small, however, even with the price guarantee. There is considerable potential for Latvia to reduce GHG emissions through the use of wood waste for residential heating. More than 2 million tons of wood waste are produced each year and are not currently used.

B. Industry

35. Specific measures to reduce GHG emissions in the industrial sector have not been planned in Latvia. The increase in energy prices to world market levels and the loss of traditional East European markets has caused a dramatic fall in production in industry. Production of cement has currently been reduced by 73 per cent.

C. Transport

36. Latvia introduced a national development programme for motor transport in 1994. There was a rapid rise in the number of passenger cars at the beginning of the 1990s, but the trend is now stabilizing. Though the number of trucks and buses has increased, goods traffic has been gradually declining and is at the moment only 50 per cent of what it was in 1990. Goods transport is expected to increase, but is not expected to reach 1990 levels by the year 2000. A differentiated customs duty on vehicles has been introduced according to their age and engine capacity; road taxes vary according to the weight of the vehicle. An excise tax has been imposed on motor fuels (which are excluded from the natural resources tax), and

there is a sales tax on cars. Vehicle fuel efficiency is expected to improve, through the increasing use of more fuel-efficient cars.

37. The National Environmental Policy Plan (NEPP) recognizes that transport plays a significant role in the development of the national economy and in raising the standard of living of the population. It considers that high a quality transport infrastructure helps form a good basis for the development of the national economy. As a bridge between the East and the West, Latvia aims to promote the efficient operation of its transport infrastructure (roads, bridges and railways) and transportation service. The NEPP also recognizes that "in general transport systems are known to have a negative effect on the global environment".

D. Agriculture, forestry, land-use change

38. Latvia formulated a forest development policy in 1994, and has a long tradition of managing its extensive forests. Forest coverage is expected to grow to 51 per cent of total land area by 2020, and there are policies to preserve parks, recreation areas and wetlands. Forestry regulations enforce reforestation, within three years, of any forest cut. The policy of returning land to its previous owners is expected to have a beneficial impact on sink capacity as the owners are encouraged to plant trees. The Government has a policy to promote environmental friendly forest management and the afforestation of degraded land for recreational use. It is also expected that privatization of farmsteads will bring about better use of manure.

E. Waste

39. Waste policy focuses on management of hazardous waste and there are no policies likely to have an impact on emissions in the near term. At present Latvia only has waste dumps; landfills with anaerobic conditions are planned for the future, which could increase CH₄ emissions.

F. Measures in preparation

40. The draft energy policy of the Republic of Latvia, which was being developed at the time of the visit, outlines broad principles for improving energy security and energy efficiency. A proposed National Development Programme for Latvian Energy would improve energy efficiency, lower dependence on imported energy, and raise the quality of imported fuel. At the time of the visit, the programme had been costed and was to be submitted to the Government for consideration.

41. A wide range of proposed measures to control GHGs are reported in the national communication, but, with the exception of those described above, they have not yet been implemented. Institutional and economic problems, and the lack of investment make it unlikely that many of these measures will be fully implemented before the year 2000.

IV. PROJECTIONS AND ESTIMATES OF THE EFFECTS OF MEASURES

42. The methodology used for the projections was briefly described in the national communication, and further details were given to the review team during the visit. Latvia did not use an energy-sector or economy-wide model at the time the national communication was produced, and the emission scenarios were developed using expert judgement about expected economic parameters and associated energy consumption in each sector. Assumptions concerning GDP, activities, energy consumption and emission factors for process industries were provided in the national communication, but information on energy prices was not provided. There is no estimate of the total effects of all measures.

43. Latvia has made separate projections for emissions of CO₂, CH₄, N₂O, NO_x, CO, and NMVOCs. In the national communication, Latvia presented three CO₂ scenarios based on different GDP assumptions. The three scenarios assume a growth rate of 3-4 per cent beginning in 1996, a uniform growth rate of 6 per cent per annum, and a growth rate of 4 per cent in 1995 rising to 7-8 per cent in 1998-1999. These scenarios incorporate the effects of several measures - rehabilitation of district heating networks, installation of heat meters, and taxes that provide incentives for increased use of natural gas rather than liquid fuels. They thus represent "with measures" scenarios. The review team was informed that "without measures" scenarios were also developed in order to estimate the "with measures" scenarios, and could be presented in future communications. Although the base year for the inventory is 1990, the base year adopted for the projections is 1993 because of data difficulties in the years prior to 1993, as well as structural changes in the energy sector.

44. Emissions of GHG in terms of GWP have been calculated to drop by 27 per cent between 1990-2000. Disaggregated projections were provided for all gases (CO₂, CH₄, N₂O, NO_x, CO, NMVOC) by emission sources, which gave an indication of the expected changes in emissions for the main sectors. An estimate of the uncertainty of the projections for each gas was given, reflecting the uncertainty associated with macroeconomic factors. In the opinion of the review team, the uncertainty levels of the data indicated in the communication (5.4 per cent for CO₂, 1.6 per cent for CH₄, and 9.4 per cent for N₂O) seem rather low given the transitional nature of the Latvian economy.

45. The team was informed that 300,000 hectares of abandoned land are expected to be reforested in the next few years because of land privatization, changes in agricultural policies, and government support for forestry activities; regrowth in abandoned land is also expected to increase. However, owing to the increase in the volume cut, which increased from 4.5 million cubic metres in 1990 to 8.4 million cubic metres in 1995, it is expected that sequestration will not increase from present levels by the year 2000. About 40 per cent of the annual cut is expected to be exported.

46. The review team was informed that GDP assumptions have been revised downward since the national communication was submitted. GDP is now expected to remain close to current levels, rising only very slightly or in an optimistic scenario, to increase by 3 per cent per year up to the year 2000. The projections have not yet been recalculated to reflect the

changed GDP assumptions, but the assumptions now considered "optimistic" (3 to 4 per cent annual GDP growth) correspond to those in the lowest projected emissions scenario in the national communication. According to the most recent GDP figures, the projections in the national communication are very likely to overestimate CO₂ emissions for 2000. The uncertainties of projecting future emissions in view of rapid changes in the economy were emphasized to the review team.

V. IMPACTS OF CLIMATE CHANGE AND ADAPTATION MEASURES

47. No information was included in the national communication on vulnerability and adaptation. There are a number of research projects on climate change problems, related to possible impacts, but no comprehensive vulnerability studies have been carried out. First steps have been taken to develop a national climate programme, but the team was informed that financial constraints might hamper progress.

VI. INTERNATIONAL COOPERATION

48. The review team was informed that the main areas for international cooperation were energy supply diversification, linking the Baltic electricity networks, improving security of energy supply by developing underground gas storage in geological formations, improving transmission services and restructuring the energy sector. Latvia has a wind turbine project in Ainazi as an Activity Implemented Jointly with the Government of Germany.

VII. RESEARCH AND SYSTEMATIC OBSERVATION

49. Studies carried out by the Latvian Science Council, based on 23 observation stations with more than 100 years of records, show that Latvia is growing warmer. In the first 50 years of this century the average temperature increased by 0.2°C and in the most recent half the increase has been 0.5°C. In the latter period the city of Riga showed an increase of 1°C in the mean temperature, and annual precipitation has risen in the last 50 years. Monitoring climate has been an important activity in the past, but because of the economic situation the observation network is becoming difficult to maintain. At the moment the main priority for the agencies responsible for climate monitoring is to sustain and modernize that network.

50. An environmental data centre has been established to collect data on air, water and soil pollution. The centre proposes to integrate information on energy and socio-economic data. The database is on Internet and is expected to serve as a support for the implementation of international agreements, including the UNFCCC.

51. Research is being carried out on methods to conserve heat and increase the efficiency of energy production. Latvia is continuing to work toward improving the methodology for

energy planning and assessing technology costs, training and capacity building for activities such as energy audits, assessing the renewable energy potential and planning and management under conditions of uncertainty. National experts expressed their interest in taking part in international programmes as a means to develop research activities. Interest was expressed in integration with the ongoing International Geosphere-Biosphere Programme and the Human Dimensions of Global Change Programme. The need for financial support to participate in international programmes was stressed to the review team.

VIII. EDUCATION, TRAINING AND PUBLIC AWARENESS

52. The communication reported on improvements in the quality of environmental programmes in the schools. Lack of information and education material, especially in the national language, was referred to as one of the main difficulties in raising public awareness and education. The need to upgrade library resources on the environmental sciences, including climate change related subjects, was also mentioned to the review team.

53. The level of education in the natural sciences is high, but not in environmental subjects. This background could be an advantage for building up capacity in environmental issues, including climate change, provided financial resources are available. The University of Latvia has established a centre for environmental science and management studies, which focuses on sustainable development and is providing training in this subject with emphasis on the human aspects of sustainable development.

- - - - -