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EXECUTIVE SUMMARY OF THE NATIONAL COMMUNICATION OF

THE RUSSIAN FEDERATION

Submitted under articles 4 and 12 of the United Nations
Framework Convention on Climate Change

In accordance with decision 9/2 of the Intergovernmental Negotiating Committee of the Framework Convention on Climate Change (INC/FCCC) and endorsed by the Conference of the Parties in its decision, 3/CP.1 (FCCC/CP/1995/7/Add.1), the secretariat is to make available, in the official languages of the United Nations, the executive summaries of the national communications submitted by Annex I Parties.

Note: Executive summaries of national communications issued prior to the first session of the Conference of the Parties bear the symbol A/AC.237/NC/... .

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Copies of the national communication of the Russian Federation may be obtained from the following address:

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EXTENDED EXECUTIVE SUMMARY

To protect the climate from dangerous anthropogenic effects and avert the undesirable consequences of such effects, the States Members of the United Nations in 1992 signed the United Nations Framework Convention on Climate Change; Russia ratified the Convention in late 1994.

The Russian Federation is taking steps to comply with all provisions of the Convention. It plans to carry out a large number of activities in two main areas: first, devising and applying measures to limit and reduce anthropogenic emissions and increase sinks of greenhouse gases, in particular carbon dioxide; second, identifying industries and economic spheres in Russia that are vulnerable to climate changes and devising and applying measures to adapt the economy to forecast changes in the climate.

The Federation's activities under the Convention are described in its first national report, the main points of which are reflected in this extended summary.

Developments in the power industry in the Russian Federation

Many problems in complying with the Convention are associated with activities in the power industry. A new Federal energy policy is being formulated to address the underlying problems of development in the Russian Federation's fuel/energy complex under the conditions now obtaining there. The main provisions of a comprehensive State fuel and energy programme for the Russian Federation over the period up to the year 2010 - "An Energy Strategy for Russia" - were drawn up in 1993-1994. The principal objectives are:

- To define the course of, and bring about conditions permitting, the optimum use of energy resources and the fuel/energy complex's production potential;

- To secure a leading role for energy as a vital factor in increasing productivity and a means of improving living standards for the public at large;

- Substantially to reduce the impact of the fuel/energy complex on the environment.

In setting priorities in new energy policy, the Energy Strategy gives top priority to improving the efficiency of energy use and to saving energy. Combined with specific structural, technical and financial/economic policy elements, this approach will bring about significant reductions in emissions of greenhouse gases.

Inventory of anthropogenic emissions and sinks of greenhouse gases

The method of defining emissions of greenhouse gases affecting the climate that was used in preparing this report draws significantly on the recommendations of the International Panel on Climate Change. Emissions of the main greenhouse gases - CO_2, CH_4 and N_2O - were calculated from figures on

the various activities concerned and IPCC relative emission coefficients. The figures on activities were obtained from State and governmental statistics. In some cases, available emissions statistics were used. Emissions of greenhouse gas precursors - CO, No_x and non-methane hydrocarbons from fixed sources - are quoted from State statistics. The emissions figures given below may be corrected later.

Industrial CO_2 emissions

Approximate calculations of industrial CO_2 emissions derived from the fuel/energy balance of the Russian Federation and figures on cement production are given in table 1.

Table 1

Industrial CO_2 emissions in Russia (1990)

Source	Unit emission, tC/tonne of standard fuel 1/	Fuel consumption 2/ mt standard fuel	CO_2 emissions 3/	
			mt C/yr	%
Coal	0.756	278	210	32.3
Oil and condensed gas	0.586	319	187	28.7
Natural and associated gas	0.448	531	238	36.5
TOTAL	0.563	1 128	635	97.5
Cement production		132	11	1.7
		- 4/		
On-site flaring of associated gas	0.448	11	5	0.8
TOTAL	**0.572**	**1 139**	**651**	**100**

1/ 1 t of standard fuel = 29,308 GJ.

2/ Including bunkered fuel.

3/ Including emissions from bunkered fuel.

4/ Not counting fuel used in cement production: these emissions are already included in preceding entries in table 1.

Over 98 per cent of total emissions relate to fossil fuel, i.e. are categorized as "energy-related" under the IPCC scheme.

CO_2 emissions/sinks in forests and marshland

Breaks in the carbon cycle and balanced CO_2 exchange between the atmosphere and terrestrial ecosystems can induce both atmospheric emissions and uptake of CO_2 in forest and marshland ecosystems. In Russia, where vast areas of land are covered in forest (table 2) and marshes, such fluxes may be particularly large. Research in Russia and elsewhere shows that forests in intermediate and northerly latitudes are a sink for gaseous carbon dioxide. Peat formation in marshes can also serve as a significant CO_2 sink.

The country's forest lands fall into two categories: wooded and unwooded land (hayfields, pasture land, etc.). Wooded land is divided, in turn, into thickly and sparsely wooded (glades and similar).

Table 2

Aggregate figures on forest lands in the Russian Federation as on 1 January 1993

Total area ('000 ha)	1 180 882
Including wooded land ('000 ha)	886 538
- of which thickly wooded land ('000 ha)	763 502
Standing timber reserves, bn m^3	80 676

The country's forest lands occupy 1.181 million ha, of which 1,110.5 million are under the management of the Federal Forestry Service. Wooded land amounts to 886.5 million ha and thickly wooded land, to 763.5 million ha, 92 per cent of which is under Federal Forestry Service management. Standing timber reserves amount to 80.7 bn m^3, of which 73.0 bn m^3 are on land managed by the Federal Forestry Service.

Survey data indicate that the total area of forests fell slightly between 1988 and the end of 1993; this is chiefly due to more accurate determination of areas in inaccessible regions. Changes in the age of forests are no less important than changes in their overall extent. It is difficult to arrive at an accurate determination of such changes in Russia since around half of the forests are of mixed age. The area of young and middle-aged forest is estimated to have increased slightly, and that of mature forest and old growth, to have declined slightly.

Work on clarifying CO_2 sinks is now in progress. It is based on the inventorying and modelling of the complete carbon cycle in the main types of Russian forest, taking account of the small climatic changes that have already taken place. The quantity of carbon sequestered in forests and marshes is put at 200 mt C/year: 160 mt C/year in forests and 40 mt C/year in marshland.

Anthropogenic CH_4 emissions

Anthropogenic CH_4 emissions by source type are shown in table 3. Emissions linked to natural and associated (petroleum) gas are the leading form of anthropogenic methane emissions in the Russian Federation. An average value for methane emissions, 16 mt/year, has been used in calculating total methane emissions in Russia in this and the following tables.

Table 3

Anthropogenic CH_4 emissions in Russia (1990)

Emission source	Emissions, mt/year
Extraction, transport and use of natural and associated gas	16
Farm animals and waste from livestock raising	4.9
Burial of solid waste (landfill)	2.4
Coal mining	1.9
Oil extraction and transport	1.7
Waste water treatment	no data
Rice production	0.1
Other farming	no data
TOTAL	**27**

Other gases

Emissions of greenhouse gas precursors from fixed sources are 8.1 mt/year of CO, 3.0 mt/year of NO_x (in NO_2 equivalent) and 4.1 mt/year of non-methane hydrocarbons.

Aggregate and equivalent emissions of greenhouse gases

Anthropogenic emissions of the main greenhouse gases and Russia's share of worldwide emissions in 1990 are shown in table 4.

Table 4

Anthropogenic emissions of greenhouse gases in the Russian Federation (1990)

Gas	Russian Federation emissions/sinks, mt/year	Worldwide emissions, mt/year 1/	Russian share of worldwide emissions, %
CO_2 mt C	651/200 2/	6 100	10.7
CH_4 mt CH_4	27	375	7.2
N_2O mt N_2O	0.82	8.2	10.0

1/ IPCC figures.

2/ Allowing for the gas sequestered, net emissions are 451 mt C per year.

Table 5 shows the absolute and relative values of equivalent emissions of the three main greenhouse gases, CO_2, CH_4 and N_20 (for 1990). IPCC 1994 global warming potentials for a 100-year time horizon were used in the calculations.

Table 5

Equivalent anthropogenic emissions of greenhouse gases in the Russian Federation (1990)

Gas	Global warming potential	Equivalent emissions (CO_2 equivalent)		
		absolute, mt CO_2	expressed in terms of CO_2 emissions	proportion of total emissions, %
CO_2	1.0	2 387	1.00	72
CH_4 1/	24.5	662	0.28	20
N_2O	320.0	262	0.11	8
TOTAL		3 311	1.39	100

1/ Taking account of direct and indirect greenhouse effects.

Greenhouse gas emissions in the Russian Federation are at present lower than in 1990, and this situation will persist for several years at least.

Regulation of anthropogenic emissions of greenhouse gases and greenhouse gas sinks - policy and measures

Regulation of CO_2 emissions

The new energy policy limits national emissions of CO_2 primarily through a series of measures advanced as high-priority responses to the dual (socio-economic and environmental) challenge of developing and improving the country's energy supplies in the context of sustainable socio-economic development, efficient use of modern science and technology, and the transition to a market economy.

The most important measures in this area, which ultimately determine the level of fossil fuel consumption, include:

1. Increasing the efficiency of energy use and boosting energy saving in various parts of the economy: the power industry itself (energy production and transformation), transport, industry, the communal services sector and farming;

2. Structural policy measures in the energy supply domain: improving the efficiency of natural gas use and raising the share of natural gas in domestic energy consumption; increasing the use of non-traditional, chiefly renewable resources (solar, wind and geothermal energy, gas from coal mines, biogas etc.);

3. A technical policy designed to improve economic, energy and environmental efficiency at all stages of raw energy extraction, processing, distribution and consumption, including the development and use of qualitatively new technologies and equipment in crucial sectors of the economy;

4. A rational pricing and taxation policy to bring about energy savings and economically efficient uses of raw energy under the conditions now obtaining.

Inefficient use of energy resources has left Russia with a huge untapped potential for energy savings. According to An Energy Strategy for Russia, this amounts to 460-540 mt of standard fuel, or 40-45 per cent of present energy consumption. One third of this potential, which it would be much cheaper to exploit than to increase fuel extraction, is concentrated within the fuel/energy complex itself, chiefly in electricity generation and heating. Another third is to be found in industry (including 7-8 per cent in metal-working, 4-5 per cent in the building materials industry), around 20 per cent in the communal services sector and farming and another 10 per cent in transport.

The programme for the use of the economically justifiable part of this potential contains a series of initial energy-saving measures and priorities for the subsequent renewal of technologies. The strategy contemplates two energy-saving scenarios, optimistic and probable, depending on the extent to which these measures are put into practice and their success (table 6).

Table 6

Energy-savings scenarios: mt of standard fuel per year (relative to 1992)

	2000		2010	
	probable	**optimistic**	**probable**	**optimistic**
Savings in energy resources	80	180	300	470
- **from organizational improvements**	50	80	80	110
- **from energy-saving technology**	30	100	220	360

Source: An Energy Strategy for Russia, 1994.

The optimistic scenario assumes the realization by 2010 of all the economically justified energy-savings potential. This will require very heavy investment in energy saving and a complete structural overhaul of the economy, which may be unrealistic. The probable scenario therefore assumes the exploitation of the unquestionably efficient part of the potential only - the part that will bring benefits to businesses themselves and not require special incentives.

Moves to limit CH_4 emissions

Programmes to limit methane emissions into the atmosphere are in development and undergoing trials. They seek to:

- Use the methane that forms in refuse landfills for power generation;

- Use the methane encountered in coal mining for power generation.

Increasing CO_2 uptake by forests in the Russian Federation

Russia's forests have enormous potential as CO_2 sinks. Potential measures might also include: increasing the area of wooded land by approximately 80-100 m ha; altering the age structure of forests on over 200 m ha of woodland; drainage, and increasing forest density; protection against forest fires; improvements in felling and transport equipment; lengthening the reproductive cycle by replacing leafy forest with conifers over an area of 120-140 m ha.

Between 1989 and 1993, the areas of land planted to forest remained virtually constant, at 490-500 thousand hectares per year. This is roughly 20 per cent less than over the preceding five years (1983-1988), and 40 per cent less than in 1978-1983. The area of land on which natural

reafforestation is being encouraged has scarcely changed over the past five years, at around 900,000 hectares per year - 10 per cent more than in 1983-1988.

The Federal Forestry Service has already launched a first pilot project in Saratov *oblast*, with a view to testing the methods that will be used. The project is also of great importance as regards nature conservancy. It is being carried out by the Federal Forestry Service in conjunction with the International Forest Institute (Moscow) and Oregon State University (United States of America). Trees have been planted on three plots totalling around 500 ha on abandoned farmland, pasture and slashes which, were there no project, would be sources of CO_2. Proposals for larger-scale projects in Vologda *oblast* and in the Far East are in preparation.

Emission scenarios for greenhouse gases and evaluation of the measures planned

On the basis of the possible scenarios (optimistic, probable and pessimistic) for Russia's economic development and pursuit of one or other of the energy-savings options available, the figures in table 7 show the maximum and minimum levels of energy requirements realistically to be expected.

Table 7

Energy requirements in the Russian economy

Form of energy	1990	1995	2000	2010
Electricity, bn kWh	1 073	840-970	850-990	1 080-1 270
per capita consumption, kWh 000	7.22	5.5-6.0	5.8-6.6	7.1-8.3
Heat (centrally supplied), m Gcal	2 075	1 850-1 880	1 870-1 950	1 900-2 050
Motor fuel, mt	104	74-76	76-80	83-95
Raw energy sources - total, mt of standard fuel	1 257	990-1 050	950-1 090	1 010-1 200
per capita consumption, mt standard fuel	8.46	6.7-7.1	6.5-7.3	6.6-7.8

Source: An Energy Strategy for Russia, 1994.

Hence, and bearing in mind possible developments in the fuel/energy complex, CO_2 emissions have been assessed for two scenarios of raw energy consumption in Russia - scenario A (minimum energy consumption) and scenario B (maximum consumption), as shown in table 8.

Table 8

Assessed anthropogenic CO_2 emissions (value ranges for two scenarios (A and B) of raw energy consumption) (mt C)

Fuel	1990	1995	2000	2010
Solid	210	135-138	132-141	156-167
Oil	187	145-147	146-149	150-159
Natural gas	238	238-238	248-262	267-283
TOTAL	635	518-523	526-552	573-609

The assessments show that if these scenarios come to pass, anthropogenic CO_2 emissions in the Russian energy sector will not exceed 1990 levels in the year 2000, or even in 2010. In round terms, emissions under scenario A would be 83 per cent of 1990 levels in the year 2000; under scenario B, they would be 87 per cent.

It should be emphasized that the expected reduction in real national emissions of CO_2 is a function of the following main factors:

1. The grave crisis in the Russian economy during the first half of the 1990s, leading to a decline in CO_2 emissions. In 1995-1996 emissions may amount to around 80 per cent of 1990 levels. Forecast growth in output - not especially rapid - between 1996 and 2000 will not significantly affect emission levels.

2. Between 1995 and 2010, Russia intends to effect substantial improvements in the efficiency of energy use and in energy savings through the introduction of new technologies and equipment and a new structural policy. These will enable it to limit CO_2 emissions to roughly 1990 levels while satisfying the country's growing energy requirements.

3. Thanks to an extensive range of forestry activities, and bearing the effects of climatic factors in mind, it is expected that the CO_2 sink in Russian forests may increase by the year 2000, and again by 2010, by comparison with 1993; this will provide additional scope for reducing overall CO_2 emissions.

Effects of climate change and adaptive measures

Changing climate in Russia may have the following effects:

- an alteration in the geographical distribution of precipitation, in river flow patterns and soil humidity;

- an increase in the extent of drought-prone land;

- shifts in the positions of natural zones;

- substantial changes in the condition of biota and agricultural crop yields;

- changes in continental glaciers and a decrease in the permafrost zone;

- a rise in sea levels;

- an increase in plant growth rates owing to the growth in atmospheric CO_2 concentration.

These changes may seriously affect climate-sensitive sectors of the economy - farming, forestry, water and fisheries in particular.

It has been shown that if global warming progresses according to IPCC scenarios, Russia's grain harvests can be expected to decline by 12 per cent on average, while fodder grass yields will grow by 5 per cent. If, however, the arrival of a warmer and increasingly arid climate coincides with anthropogenic degradation of the soil, it is calculated that there will be a 26 per cent decline in grain yields and a 10 per cent fall in overall plant crop yields. Should climate change follow paleoclimatic scenarios, according to which good rainfall/snowfall patterns are to be expected over Russia, an increase in agricultural crop yields may be forecast. In all cases, action must be taken to prevent soil degradation and increase soil fertility in order to avoid a significant decline in yields.

The proposed adaptations in the economy of the Russian Federation cover the following points:

1. Development of a conceptual framework for the regulation of the Russian economy as it adapts to the expected changes in climate;

2. The state of the economy and structural reorganization of the economy to allow for the expected changes in climate;

3. Assessment of the vulnerability of and economic consequences in various economic sectors.

Scientific programmes, research and international cooperation

All activities under the Convention in the Russian Federation are coordinated by the Federal Government's Interdepartmental Commission on the Problems of Climate Change. In a broader context, solutions to all problems arising out of anthropogenic climate change will be presented in the special-purpose Federal "Prevention of dangerous climatic changes and their undesirable consequences" programme now in preparation.

Work in the Russian Federation is proceeding under the following Federal and State scientific programmes designed to reduce anthropogenic emissions and promote conservation:

1. Fuel and energy;

2. High-speed, environmentally friendly transport;

3. Environmentally clean energy;

4. Resource-conserving, environmentally benign mining and metallurgical techniques;

5. Environmentally benign chemical techniques and technology;

6. Russian forests;

7. Comprehensive exploitation and regeneration of timber resources;

8. Modern bio-engineering methods;

9. The technology, machines and manufacturing of the future;

10. Promising farming techniques;

11. Promising techniques in the processing industries associated with the agro-industrial complex;

12. Advanced technology for the comprehensive exploitation of Russia’s fuel and energy resources;

13. Global changes in the environment and climate;

14. Safety of the general public and of important economic facilities, given the risk of natural and man-made disasters;

15. Interdisciplinary research on the world’s oceans, the Arctic and Antarctica;

16. Russian ecology (since 1993, "Russian environmental safety").

Training in climatology is offered in nine institutes of higher learning. The public is kept informed on the problems of anthropogenic climate change through many scientific and popular science journals and through the mass media.

Russia was an active participant in the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, and remains active in the Conference of the Parties to the Convention, of which Mr. A.I. Bedritsky, the Chief of the Federal Hydrometeorology and Environmental Monitoring Service, is a Vice-President.

Many scientists from the Russian Federation have made serious contributions to the Intergovernmental Panel on Climate Change and its working groups. Academician Y.A. Izrael is the Vice-Chairman of the Panel. Russian experts are involved in many of the World Meteorological Organization's global programmes. Under the World Climate Programme (WCP), they are participating in the Climate System Monitoring and Climate Change Detection projects. Academician G.S. Golitsyn is a member of the Joint WMO/International Council of Scientific Unions Scientific Committee on the World Climate Research Programme.

At the intergovernmental level, the following international projects on the problems of anthropogenic climate change are in progress:

1. Climate plans in the framework of meteorological cooperation among CIS countries;

2. Russian-American accord on collaboration in the protection of the environment and natural resources. Working Group VIII: Influence of environmental change on climate;

3. "Russian Federation research into climate change" - a project under the Russian-American accord on climate change research.
