Ministry of natural resources and environmental protection of the Russian Federation

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Progress in integrated assessment modelling in the Russian Federation

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Main problems of atmospheric air protection:

- Air Pollution
- Ozone layer depletion
- Climate change
- Transboundary transport of air pollutant
The scheme of pollutants distribution in atmosphere

- **EMISSIONS**
  - Traffic
  - Heatings
  - Industries
  - Biogenic
  - Sources

- **DISPERSION** (transport and turbulence)
  - CO
  - VOC
  - PM
  - NOx
  - CO2
  - SO2

- **TRANSFORMATION** (chemistry)
  - Photooxidants (O3, PAN)
  - HNO3
  - H2SO4

- **POLLUTANT DISTRIBUTION**
  - Sun
  - Humidity
  - Rain

**Primary pollutants**
- Heavy metals
- PM

**Secondary pollutants**
- PM
- Photooxidants (O3, PAN)
- HNO3
- H2SO4

**Effects**
- Health
- Vegetation growth
Pollutant emissions data in subjects of the Russian Federation in 2008 (th. t)
Comparison of total income of sulfur (S) in subjects of the Russian federation with emissions (th. t)

- Arkhangelskaya obl.: 110, 57
- Kaliningradskaya obl.: 12, 8
- Novgorodskaya obl.: 24, 2,4
- Pskovskaya obl.: 26, 3,2
- Republic of Karelia: 55, 40
- Saratovskaya obl.: 39, 6
- Ivanovskaya obl.: 19, 1
Density distribution of total losses of SOx on ETP (mg/m²)  
(a)  

Share of transboundary losses of SOx in % of total losses  
(b)  

2006
Article 20. Transboundary pollution of atmospheric air

With purpose of reducing transboundary air pollution caused by the sources of harmful contaminants situated on the territory of the Russian Federation, the Russian Federation provides activities on reduction of harmful (polluting) substances emissions into atmospheric air, and undertakes other actions in accordance with international obligations of the Russian Federation in area of atmospheric air protection.
Convention Protocols:


2. The Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent 1985

3. The Sofia Protocol on Persistent Organic Pollutants (POPs) 1988

4. The Geneva Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes 1991

5. The Oslo Protocol on Further Reduction of Sulphur Emissions 1994


8. The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone. 1999
Functions of the head federal executive agency responsible for the execution of obligations under the Convention on Long-Range Transboundary Air Pollution are performed by the Ministry of Natural Resources and Environmental Protection of the Russian Federation.

Overall objective of the Project:

To increase the awareness level regarding the air pollution challenge and to strengthen the political profile of the activities carried out in Russia under the Convention.
Practical purposes of the project

1. To study the possibility of the GAINS Model application for the ecologico-economical optimization of business and other activities in the Russian Federation.

2. To develop the Russian GAINS Module
Extended grid of EMEP

spatial grid step = 50 km on the latitude 60°,
132x159 cells
Meeting of the State Council Presidium on 27 May 2010

The President of the Russian Federation D.A. Medvedev sets a task of radical reform of the system of state environmental management.

This will demand:

1. Improvement of environmental legislation
2. Implementation of advanced environmental standards at the enterprises within the framework of production modernization
3. Realization of energy-saving program
4. Development of new alternative energy sources
5. Raising environmental awareness
Basic legislative environmental policy acts of the Russian Federation

- Constitution of the Russian Federation;
- Ecological doctrine of the Russian Federation (2002);
- Climate doctrine of the Russian Federation (2009);
- Concept of long-term socio-economic development of the Russian Federation for the period till 2020 (2008);
- National security strategy of the Russian Federation for the period till 2020 (2009);
- Energetic strategy of Russia for the period till 2030 (2009);
- Aquatic strategy of the Russian Federation for the period till 2020 (2009);
- Concept of transition to sustainable development of the Russian Federation (1996);
- Federal law on protection of environment;
- Federal law on protection of atmospheric air;
- other legal acts determining state strategy.
Fundamentals of environmental policy of the Russian Federation for the period till 2030

developed in accordance with paragraph 17 of the order of the Government of the Russian Federation of 12 June 2010 № VP-P9-3955, edited in conformity with the list of orders of the President of the Russian Federation of 6 June 2010 № Pr-1640 following the meeting of the State Council Presidium of 27 May 2010 on issue of «Improvements in a state regulatory system in area of environmental protection».

The document was prepared with participation of federal executive bodies, authorities of the subjects of the Russian Federation, scientific community organizations.
Main purposes of environmental policy of the Russian Federation for the period till 2030

- creation of a safe environment favorable for human habitation, meeting basic biological and esthetic needs;
- development of environmental legislation of the Russian Federation;
- prevention and minimization of adverse impact of economic and other activities on human beings and environment;
- preservation and restoration of environment, recovery of damaged ecosystems;
- conservation of biological diversity;
- elimination of accumulated environmental damage related to past economic activities;
- ensuring the balance between economic prosperity and environmental well-being of society;
- creation of qualitative social infrastructure with purpose of satisfying social needs of a man;
- creation of resource- and energy-effective economy providing the greatest economic effect with the least adverse environmental impact;
- Participation and consideration the views of the interested parties in taking important environmental decisions.
Ecological situation in Russia

Air emissions

- 42% Automotive transport
- 9% Petroleum industry
- 9% Electrical and heat energy

2009: 34.6 million tonnes

Discharges into water

- 62% Municipal and industrial waste
- 7% Forest industry
- 7% Black and non-ferrous metallurgy
- 4% Energy industry

2009: 3.4 cubic km

Waste formation

- 55% Coal mining
- 16% Non-ferrous metallurgy
- 12% Ferrous metallurgy
- 17% Other

2009: 3,626 million tonnes
Permissible impact standards
Based on calculating techniques for pollutant concentrations of enterprises' emissions and waste dumping in air and water. Background contamination is considered.

System of quality standards consists of:

- **Sanitary and hygienic standards:**
  - 2130 pollutants for atmospheric air
  - 1356 pollutants for reservoirs for household purposes

- **Fisheries standards:**
  - 1071 pollutants for reservoirs for fishery purposes

Disadvantages:

- The standards established for enterprises are significantly stricter than in the rest of the world
- The standards can not be observed with existing technologies
- The impossibility of instrumental estimating of the amount of pollutants

Rigidity of standards is compensated with non-observance.

Creates unlimited possibilities for corruption.
Division of enterprises into groups according to their environmental impact

Insignificant impact ~ 700 000 enterprises
- declaration
- No permission

Moderate impact ~ 290 000 enterprises
- standards setting

Significant impact (environmentally dangerous objects) ~ 11 000
- integrated permission

Environmentally dangerous objects (99% of adverse impact)
- 11445 enterprises

Sectors with greatest environmental impact
- Housing and utilities, chemicals, petrochemicals, pulp and paper production, energy, metallurgy

Air emissions
- 64 enterprises
- 50% emissions

Discharges into water
- 110 enterprises
- 50% emissions

Rationing based on BAT
Transition to new BAT-based rationing system

TRANSITION TO NEW RATIONING SYSTEM WILL TAKE 10 YEARS

In the EU the transition to the BAT took 10 years, implementation costs of advanced technologies are 1-2% GDP.

CONCLUSION:

EFFECTIVE MOTIVATION AND PROMOTION METHODS ARE NEEDED

TRANSITION CONDITIONS:

- Increased payments for adverse impact
- Economic encouragement of production modernization with aim of reducing burden on economy
- Provision of state support for branch modernization programs
Implementation of economic encouragement measures for production modernization

**Methods of encouragement**
- Tax deductions
- Accelerated amortization
- Subsidized rates
- Other economic mechanisms

**Measures proposed**
- Property tax exemptions for BAT implementation
- Provision of investment tax credits
- Reduction of tax cost base for equipment acquisition
- Fees reduction up to 70% by deducting environmental investments
- Payment rate reduction of 50% after transition to BAT

**Way of implementation**
- "On amending certain legislative acts of the Russian Federation" (improvements in rationing in area of environmental protection and implementation of economic encouragement measures for economic agents with aim of BAT implementation)
- Amendments to the Tax Code
- Amendments to the Budget Code
GAINS MODEL

is a tool for analyzing environmental impacts of different economic scenarios and for evaluating the effectiveness of different strategies for pollutants and greenhouse gases reduction.

Model developer

International Institute for Applied Systems Analysis

IIASA
Russian GAINS module

–
an effective environmental decision-making tool

–
permits making rapid environmental impact assessment of economic decisions on state and regional levels

*Inter alia:*

- making rapid assessments of changes in pollutant emissions in a region
- making health and environment impact assessment in a region under study and in other regions of the Russian Federation
- cost-effectiveness evaluation of planned emission control measures
- and other.
GAINS training session in IIASA
February, 2009
Указ Президента РФ от 23 июня 2010 г. N 780
"Вопросы Федеральной службы по экологическому, технологическому и атомному надзору"

Обзор документа

Федеральная служба по экологическому, технологическому и атомному надзору (Ростехнадзор) передана из ведения Минприроды России под непосредственное руководство Правительства РФ. При этом Служба наделена функциями по выработке и реализации государственной политики и нормативно-правовому регулированию в сфере технологического и атомного надзора.

Полномочия Ростехнадзора по ограничению негативного техногенного воздействия в области обращения с отходами, а также в сфере государственной экологической экспертизы возложены на Росприроднадзор.

Указ вступает в силу со дня его подписания.
ПРИКАЗ
от 29 сентября 2010 года № 975/282

О взаимодействии Федеральной службы по экологическому, технологическому и атомному надзору и Федеральной службы по надзору в сфере природопользования и их территориальных органов по реализации постановления Правительства Российской Федерации от 13 сентября 2010 г. № 717

В целях реализации Указа Президента Российской Федерации от 23 июня 2010 г. № 780 «Вопросы Федеральной службы по экологическому, технологическому и атомному надзору», постановления Правительства Российской Федерации от 13 сентября 2010 г. № 717 «О внесении изменений в некоторые постановления Правительства Российской Федерации по вопросам полномочий Министерства природных ресурсов и экологии Российской Федерации, Федеральной службы по надзору в сфере природопользования, Федеральной службы по экологическому, технологическому и атомному надзору», а также организаций работы, связанной с передачей функций администратора доходов и финансирования по реализации данных функций Федеральной службой по экологическому, технологическому и атомному надзору (далее – Ростехнадзор) Федеральной службе по надзору в сфере природопользования (далее – Росприроднадзор) приказываю:

Head of the Federal Service for Ecological, Technological and Nuclear Supervision (Rosatomnadzor)

Nikolai Kutyin

Head of the Federal Service for the Oversight of Natural Resources (Rosprirodnadzor)

Vladimir Kirillov
Region
Russia, St. Petersburg

Region
Russia, Kola and Karelia
Without implementation of control strategies

With implementation of IIASA control strategies
Display Emissions

This option displays emissions for a selected scenario (combination of activity pathway and emission control strategy), and provides details on the emission-relevant input data used for the calculations.

The emissions can be displayed in different resolutions, i.e., with varying level of detail:

- **Summary:**
  Only regional or national totals are provided.

- **Aggregated Results by:**
  For all pollutants emissions can be aggregated into GAINS-specific categories:
  - activity,
  - sector, and
  - activity-sector,
  as well as displayed following the international emission reporting standards:
    - CORINAIR SNAP1,
    - UN-ECE NFR1, and
    - UN-ECE NFR2.

- **Detailed Results by:**
  For all pollutants emissions can be shown by:
  - GAINS-specific source categories (this option includes implied emission factors and is very useful for comparison of GAINS results with various inventories for which, typically, such factors can be also derived),
  - control option (this option represents the most detailed level at which the actual calculation is performed and is useful for the analysis of impact of specific legislation in a given sector).

For selected pollutants additional display options are available.

Select the pollutant of interest in the upper left combo box, then choose a display option in the scroll left menu bar. You will be asked to select scenario, regions, and in some cases year in the menu appearing on the right side.

Emissions of NOx
HP ProLiant ML150 Generation 5 (G5) Server

(470064-718)
2008 country-to-country blame matrices for oxidised sulphur deposition, t

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Rest part of EMEP
The objectives of the Guidebook

- to introduce the GAINS methodology to Russian users
- to provide the practical clearly evident guidance on use of individual modules of the GAINS model

The Guidebook is designed for

- the dedicated Russian governmental environmental protection agencies
- institutions and organizations carrying out activities in the field of air protection
- scientific-research and educational institutions
- other institutions and organizations …
The Guidebook is used for:

- assessment of economics and environmental decision-making
- evaluation of costs
- optimization of emission level reductions
- development of decisions on accession to international agreements
Energy development options on the European territory of Russia till 2020

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</table>

In 2020 in comparison with 2010 coal consumption will increase in business as usual option twice, in investment option nearly three times.
Calculation scenarios

- without application of emission reduction measures (control strategies),

- with the control strategies developed by the experts of the IIASA within the revision of the Gothenburg Protocol and

- with the control strategies of the optimization scenario developed for Sweden (CIAM1/2010 National BL (COB)).
## Emissions according to the 1-st scenario

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>2010</th>
<th>2020</th>
<th>“Business as usual”</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SO(_x), SO(_2) th. tonnes /year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>3499,6</td>
<td>8203,7</td>
<td></td>
<td>11249,7</td>
</tr>
<tr>
<td>by fuel type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coal</td>
<td>3212,4</td>
<td>5217,2</td>
<td></td>
<td>7844,2</td>
</tr>
<tr>
<td>fuel oil</td>
<td>268,5</td>
<td>471,4</td>
<td></td>
<td>508,3</td>
</tr>
<tr>
<td>gas</td>
<td>18,7</td>
<td>17,5</td>
<td></td>
<td>22,8</td>
</tr>
<tr>
<td>other fuel</td>
<td>0,0</td>
<td>2492,6</td>
<td></td>
<td>2874,5</td>
</tr>
<tr>
<td><strong>NO(_x), NO(_2) th. tonnes /year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>1304,0</td>
<td>1780,8</td>
<td></td>
<td>2269,4</td>
</tr>
<tr>
<td>by fuel type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coal</td>
<td>578,7</td>
<td>858,0</td>
<td></td>
<td>1301,7</td>
</tr>
<tr>
<td>fuel oil</td>
<td>64,9</td>
<td>104,0</td>
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<td>113,2</td>
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<tr>
<td>gas</td>
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<td>702,4</td>
<td></td>
<td>718,7</td>
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<tr>
<td>other fuel</td>
<td>0,0</td>
<td>116,4</td>
<td></td>
<td>135,8</td>
</tr>
<tr>
<td><strong>PM, th. tonnes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,5</td>
<td>9,4</td>
<td></td>
<td>10,1</td>
</tr>
<tr>
<td>by fuel type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coal</td>
<td>0,0</td>
<td>0,0</td>
<td></td>
<td>0,0</td>
</tr>
<tr>
<td>fuel oil</td>
<td>5,0</td>
<td>8,8</td>
<td></td>
<td>9,5</td>
</tr>
<tr>
<td>gas</td>
<td>0,4</td>
<td>0,5</td>
<td></td>
<td>0,5</td>
</tr>
<tr>
<td>other fuel</td>
<td>0,0</td>
<td>0,0</td>
<td></td>
<td>0,0</td>
</tr>
<tr>
<td><strong>GG, mio t CO(_2)eq./year</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>459,2</td>
<td>689,3</td>
<td></td>
<td>854,5</td>
</tr>
<tr>
<td>by fuel type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>coal</td>
<td>182,4</td>
<td>296,2</td>
<td></td>
<td>445,3</td>
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<tr>
<td>fuel oil</td>
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<td>43,8</td>
<td></td>
<td>47,3</td>
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<tr>
<td>gas</td>
<td>251,9</td>
<td>301,0</td>
<td></td>
<td>360,3</td>
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<tr>
<td>other fuel</td>
<td>0,0</td>
<td>48,3</td>
<td></td>
<td>55,7</td>
</tr>
</tbody>
</table>
Loss of statistical life expectancy as a result of PM$_{2.5}$ impact, $months$

- **2010 baseline**
- **2020 “business as usual”**
- **2020 investment**
Critical loads exceedances for acidity

2010 baseline
2020 “business as usual”
2020 investment
Critical loads exceedances for nutrient nitrogen

2010 baseline

2020 “business as usual”

2020 investment
Analysis of the control strategies implementation effects

2020, “business as usual” option

The European territory of the Russian Federation

Gothenburg Protocol revision
National 2010 Baseline

- NOx emission reduction by 8%
- SO2 emission reduction by 28%
- PM emission reduction by 14%

- Estimated cost: 54 mln. Euros
- Estimated cost: 1930 mln. Euros
- Estimated cost: 7.5 mln. Euros

CIAM1/2010 National BL (COB)

- NOx emission reduction by 41.5%
- SO2 emission reduction by 34.5%
- PM emission reduction by 54%

- Estimated cost: 4906 mln. Euros
- Estimated cost: 1296 mln. Euros
- Estimated cost: 37 mln. Euros
Analysis of the control strategies implementation effects

The European territory of the Russian Federation

2020, investment option

Gothenburg Protocol revision
National 2010 Baseline

- NOx emission reduction by 9%
- SO2 emission reduction by 29%
- PM emission reduction by 14%

- Estimated cost: 78.5 mln. Euros
- Estimated cost: 2778 mln. Euros
- Estimated cost: 8 mln. Euros

CIAM1/2010
National BL (COB)

- NOx emission reduction by 34%
- SO2 emission reduction by 29%
- PM emission reduction by 54%

- Estimated cost: 5052 mln. Euros
- Estimated cost: 1503 mln. Euros
- Estimated cost: 40 mln. Euros
Loss in statistical life expectancy attributable to PM$_{2.5}$, months

2020, investment option

Without CS

Gothenburg Protocol revision
National 2010 Baseline

CIAM1/2010
National BL (COB)
Exceedance of acidity critical loads

2020, investment option

Without CS

Gothenburg Protocol revision
National 2010 Baseline

CIAM1/2010
National BL (COB)
Exceedance of nutrient nitrogen critical loads

2020, investment option

Without CS

Gothenburg Protocol revision
National 2010 Baseline

CIAM1/2010
National BL (COB)
Activity plan for the 3 Step of the Project

- collection and verification of the input information for modeling for the regions of the Russian Federation;
- refinement of the cost and regional coefficients put in the GAINS model, with participation of experts of the relevant agencies;
- establishing dependency coefficients “emissions-losses” by the grid cells for particular administrative units of the Russian Federation using the EMEP model calculations. Input of such dependencies to the GAINS model for calculating losses from particular regions of Russia to assess the interaction “region-to-region” and the impact on ecosystems (in terms of exceedance of CL) and on human health;
- carrying out experimental calculations with the GAINS model for solving environmental problems of the RF and preparation of decisions on accession to the Protocols of the Convention.