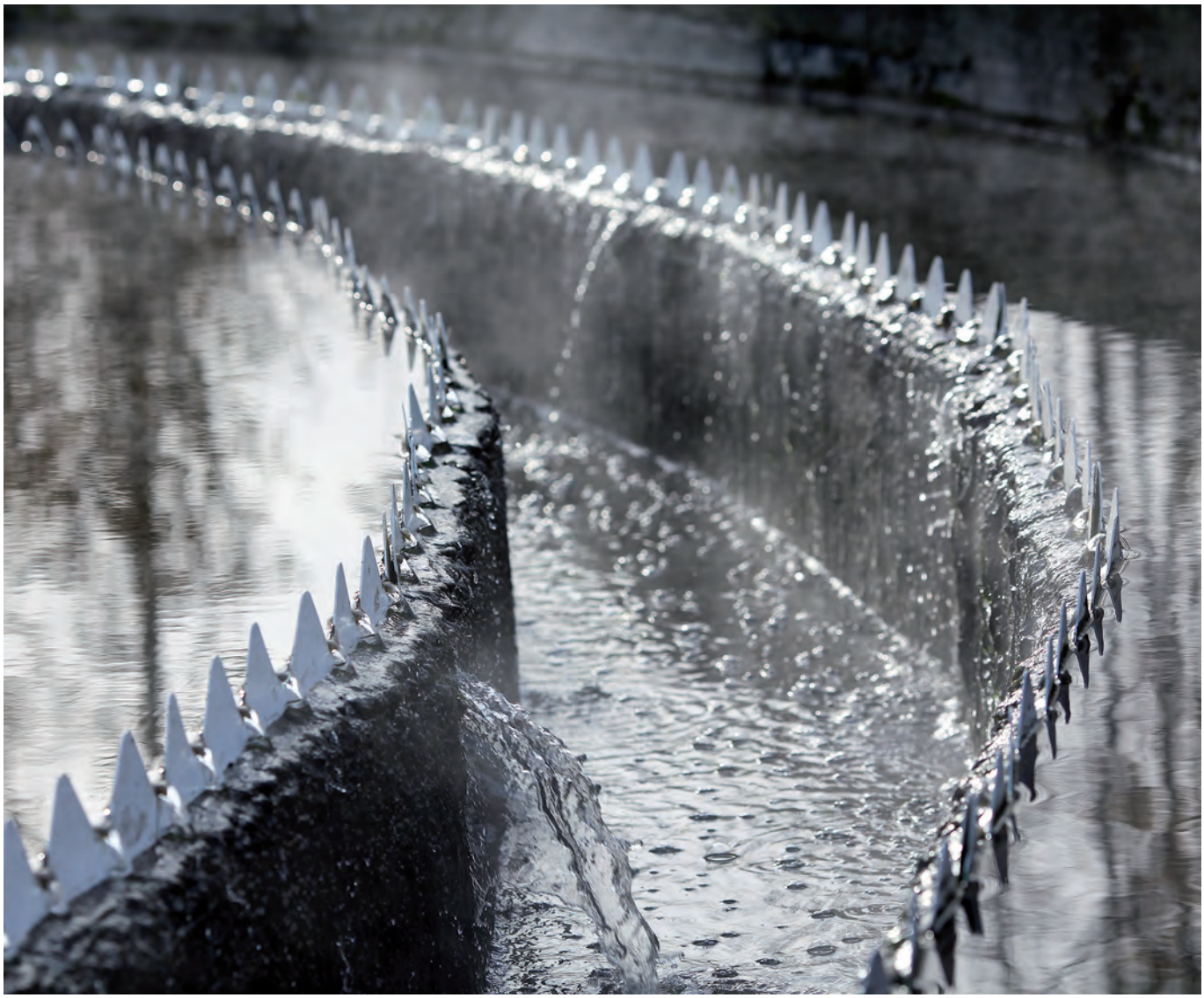
Assessment of the Barents Hot Spot Report

Describing the state of 42 original Barents environmental 'hot spots'



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BARENTS ENVIRONMENTAL HOT SPOTS

NEFCO

THE BARENTS EURO-ARCTIC REGION

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Front page figure: map with the Barents environmental "hot spots". Source: barentsinfo.fi

The assessment was carried out and the report produced on behalf of NEFCO/BHSF.

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Abbreviations

AMAP	-	Arctic Monitoring and Assessment Programme
BAT	-	Best Available Technology
BEAC	-	Barents Euro-Arctic Council
BEAR	-	Barents Euro-Arctic Region
BHSF	-	Barents Hot Spot Facility
BOD	-	Biochemical Oxygen Demand
BRC	-	Barents Regional Council
CBC	-	Cross Border Cooperation
CH	-	Hydrocarbons
COD	-	Chemical Oxygen Demand
EBRD	-	European Bank for Reconstruction and Development
EMS	-	Environmental Management System
ENPI	-	European Neighbourhood and Partnership Instrument
EU	-	European Union
GDP	-	Gross Domestic Product
GRP	-	Gross Regional Product
HEG	-	"Hot spot" Exclusion Group
HPP	-	Heat and Power Plant
ICA	-	Index of Contamination of Atmosphere
ISO	-	International Organization for Standardization
JSC	-	Joint Stock Company
LOC (VOC)	-	Light (Volatile) Organic Compounds
MAC	-	Maximum Allowable Concentration
MAD	-	Maximum Allowable Discharge (of contaminants to water) level
MAE	-	Maximum Allowable Emission (of contaminants to air) level
MMC	-	Mining and Metallurgical Combine
MNR	-	Ministry of Nature Resources
MNRE	-	Ministry of Nature Resources and Ecology
n/d	-	not defined
NDEP	-	Northern Dimension Environmental Partnership
NEFCO	-	Nordic Environment Finance Corporation
NGO	-	Non-Governmental Organisation
NIB	-	Nordic Investment Bank
PPM	-	Pulp and Paper Mill
SCEP	-	State Committee for Environmental Protection – Goskomekologii
SER	-	State Environmental Review
SHE	-	Sub-group on "Hot Spots" Exclusion
TAD	-	Temporary Agreed Discharge (of contaminants to water) level
TAE	-	Temporary Agreed Emission (of contaminants to air) level
WGE	-	Barents Euro-Arctic Council Working Group on Environment
WHO	-	World Health Organization

Foreword

The present report, "Assessment of the Barents Hot Spot Report describing the state of 42 original Barents environmental 'hot spots' ", has been prepared by Akvaplan-niva AS, Norway, and the System Development Agency, Russia, within the implementation of the Nordic Environment Finance Corporation (NEFCO) Assignment.

NEFCO assigned Alexei Bambulyak, General Manager Russia at Akvaplan-niva, Tromsø, Norway, as lead Nordic consultant, and Svetlana Golubeva, Director General of the System Development Agency Ltd., Moscow, Russia, as a Russian consultant. The working team included experts from Akvaplan-niva, Vladimir Savinov, Adviser, and Salve Dahle, Director of the company and team supervisor, who carried out assessments and drafted the first and second NEFCO/AMAP reports published in 1995 and 2003.

The period of the Assignment was from December 2012 to May 2013. In February-March 2013, we visited all five of the Russian Barents regions to meet lead experts of environmental authorities, research institutes and nature protection organisations to hold discussions and obtain their inputs, which formed the basis of the assessment. The draft report was presented and discussed at the meetings of the Sub-group on Hot Spots Exclusion (SHE) and the Working Group on Environment of the Barents Euro-Arctic Council (WGE) held in Rovaniemi in April 2013 and also sent to the Russian regions for their comments. We studied and reflected on all the comments received on the draft report in this final version.

Throughout the assessment and summing up of its results in the report, we obtained valuable inputs from consultants and experts from Russia, Finland, Sweden and Norway, as well as continuous support from colleagues in our companies.

We would like to express our gratitude to the members of the regional Hot Spot Exclusion Groups, the Sub-group on Hot Spots Exclusion and the Barents Hot Spot Facilities for allowing us to be with them during the "hot spot" discussion process. We especially wish to mention and give our personal thanks to Riitta Hemmi and Henna Haapala from Finland, Maria Dronova from Russia, Åke Mikaelsson and Nadezhda Maslova from Sweden, Anne Berteig from Norway, Henrik Forsström and Ruslan Butovsky from NEFCO, and indisputably to the experts in the Russian Barents regions who welcomed and hosted us during our study trips at short notice: Kirill Sinitsky, Ivan Popov, Nataliya Gunkina, Viktor Kuznetsov, Roman Ershov, Galina Zaitseva and Igor Studyonov in Arkhangelsk; Sergey Chibisov, Ludmila Rocheva, Vladimir Bezumov, Konstantin Ponomaryov, Dmitry Medvedev and Sergey Kungurtsev in Naryan-Mar; Viktor Valdaev, Larissa Kolokolnikova, Alexander Shirlin and Valery Solomonov in Petrozavodsk; Yury Lisin, Vladimir Kabantsev, Tatyana Tyupenko, Alexander Popov and Ludmila Kabantseva in Syktyvkar; Alexey Smirnov, Fyodor Shveitser, Elvira Makarova, Vladimir Masloboev, Vladimir Khrutsky, Viktor Kaimov, Andrey Merenkov, Vassily Korenev and Oleg Sutkaytis in Murmansk. This report contains a large amount of their professional and personal inputs.

Alexei Bambulyak
Tromsø, Norway
30 May, 2013

1. Summary

The objective of the NEFCO Assignment for the 2013 assessment was to obtain comprehensive information on the status of each of the original 42 "hot spots" listed in the NEFCO/AMAP report from 2003 in the light of the target set by the Barents Euro-Arctic Council Ministers to launch environmental measures in all of the "hot spots" by 2013. This report, prepared by Akvaplan-niva, Norway, in co-operation with the System Development Agency, Russia, presents the results of the analyses carried out in Part I of the Assessment.

The first NEFCO/AMAP report "Proposals for Environmentally Sound Investment Projects in the Russian Part of the Barents Region" was published in 1995 as the results of the first phase of the NEFCO Barents Region Environmental Programme of 1994. A total of 71 projects were identified and 22 projects recommended – 17 (out of 66) concerned non-radioactive contamination and 5 comprehensive nuclear safety projects in the Murmansk region, the Republic of Karelia and the Arkhangelsk region, including the Nenets Autonomous District.

The aim of the 2003 NEFCO/AMAP study was to identify the projects whose implementation was important to the further improvement of the environmental situation in the region and to present the report with the updated list.

Assessment priorities for the 2003 NEFCO/AMAP report:
1. Reduction of industrial gas emissions
2. Preservation of freshwater resources, including improvement of the drinking water supply
3. Solid waste
4. Prevention of marine pollution in the White Sea and the Kola Fjord
5. Environmental issues concerning energy consumption and energy savings

A number of priorities were set for the 1995 NEFCO/AMAP study and the report, namely:
- Environmentally safe operation of nuclear installations
- Handling and storage of radioactive waste; preservation of forest resources
- State of the environment and lifestyle of the indigenous and traditional population in the region
- The development of an integrated environmental and human health monitoring system was not included in the 2003 NEFCO/AMAP assessment.

The joint Nordic-Russian Expert group selected the most urgent areas of concern related to pollution sources in the Russian part of the Barents Region based on the data and information obtained and outlined them as an updated "hot spot" list. The method to identify "hot spots" was based on a general approach to select major polluters and/or define major environmental risk issues in each of the study regions looking at potential "hot spot" contribution to the regional environmental pollution and taking into account general pollution input, specific contaminants and trends in environmental impact since the first NEFCO/AMAP report. This was the "hot spot" inclusion method, thus specific "hot spot" inclusion criteria were not described in the 2003 report.

The second NEFCO/AMAP report, "Updating of the Environmental 'Hot Spots' List in the Russian Part of the Barents Region: Proposals for Environmentally Sound Investment Projects", was published in 2003, with the list of 42 "hot spots" identified and 52 investment projects proposed. Comparing the 2003 and 1995 lists, 3 out of 17 "non-radioactive" projects recommended by the 1995 NEFCO/AMAP report were mentioned in 3 out of 42 "hot spots" of the 2003 NEFCO/AMAP report, and 28 out of 66 "non-radioactive" projects identified in 1995 were noted in 18 out of 42 "hot spots" in 2003 (note that the Republic of Komi was not part of the 1995 assessment).

In terms of regions, the 2003 NEFCO/AMAP report listed 10 "hot spots" in the Murmansk region, 10 in the Republic of Karelia, 10 in the Arkhangelsk region, 8 in the Republic of Komi and 4 in the Nenets Autonomous District.

In terms of environmental problems, there were 15 "hot spots" of industrial air emission concern, 12 with wastewater discharge issues, 10 on waste management, 6 on drinking water supply and 6 issues of past (accumulated) environmental damage.

The 2003 NEFCO/AMAP report did not set a prioritisation order for the proposed projects, but it included a limited priority "hot spot" list that could provide stakeholders with environmental justifications for investments. It proposed that the environmental work in the region be assessed by the number of "hot spots" removed from the list. It also stated a need to update the report periodically, i.e. every five years.

The Nordic-Russian expert group did not include in the 2003 "hot spot" list those identified problem areas that were on good track to being resolved, such as the drinking water supply in Syktyvkar and Arkhangelsk where investment projects with international participation had been started. The experts investigated the general possibility of working with an environmental issue and implementing an investment project in a certain area. They did not include problem areas in which co-operation was not feasible, military objects or oil and gas production sites in the list. Segezha Pulp and Paper Mill was off the list due to the uncertain economic status of the enterprise. Some of the "hot spots" were on a kind of "waiting list", such as Kondopoga, where an industrial air emission issue should have been resolved by converting a heat and power plant from burning coal and heavy fuel oil to burning natural gas. An investment project was therefore not proposed for that "hot spot".

The 2003 NEFCO/AMAP "hot spot" list was drawn up with joint participation and an environmentally sound investment approach. The list was not a decision but a proposal.

In 2003, the BEAC Environmental Ministers endorsed the recommendations given in the NEFCO/AMAP report and, in 2005, set the target to launch relevant investment projects in all of the Barents environmental "hot spots" by 2013 with the aim of eliminating these "hot spots".

Since 2007, much effort has been put into establishing a proper organisation for the management of the Barents environmental "hot spot" exclusion process, with involvement of national/federal environmental authorities in Sweden, Finland, Norway and Russia in that process, as well as regional authorities in Russia, as only the Russian part of the Barents Region was studied in 2003. The criteria and procedure for "hot

spot" exclusion were elaborated. The temporary Sub-group on "Hot Spots" Exclusion (SHE) was established under the Barents Euro-Arctic Council Working Group on Environment (WGE), and "Hot Spot" Exclusion Groups (HEG) were formed in all five of the Russian Barents regions. In 2011, three "hot spots" were excluded from the list. In the last two years, HEGs and SHE have taken most of the responsibility for screening and analysing the "hot spots" listed in 2003 and for proposing selected "hot spots" for exclusion. Following the exclusion criteria and procedures, the "hot spot" owners and HEGs proposed excluding 10 of the remaining 39 "hot spots" from the list and to continue or launch joint actions for 29 of the "hot spots" defined in 2003. SHE involved national experts to study exclusion proposals and give their opinions and advice. In 2013, SHE proposed partially excluding one "hot spot" from the list.

The objective of the NEFCO Assignment for the 2013 Assessment was to obtain comprehensive information on the status of each of the original 42 "hot spots" in the light of the target set by the Ministers to launch environmental measures in all of the "hot spots" by 2013.

This report presents the results of the assessment and gives the status of all of the original 42 Barents environmental "hot spots" listed in the 2003 NEFCO/AMAP report. Short descriptions of each "hot spot" are given in Chapter 5, and the summary status table is presented in Chapter 6.

The conclusion of the assessment is that since 2003, certain measures aimed at solving environmental problems or issues associated with the 42 "hot spots" identified and listed in the second NEFCO/AMAP report have been launched in 42 out of 42 "hot spots". Those measures were and are of different levels in terms of: a) character – from the elaboration of management plans to the modernisation of industry or elimination of waste; b) stage of implementation – from launched to completed; and c) scale – in terms of investment, target area and environmental effect.

2. Introduction

The Russian part of the Barents Region covers territories of five administrative subjects of the Russian Federation, namely the Republic of Karelia, the Republic of Komi, the Murmansk region, the Arkhangelsk region and the Nenets Autonomous District. The Barents Environmental "Hot Spot" List published in 2003 originally contained 42 "hot spots", including 10 in the Murmansk region, 10 in the Republic of Karelia, 10 in the Arkhangelsk region, 4 in the Nenets Autonomous District and 8 in the Republic of Komi.

In order to carry out the "hot spot" list assessment and to collect relevant up-to-date information, the project team visited all five federal subjects and held meetings with regional environmental authorities, regional departments of federal environmental authorities (Rosprirodnadzor and Rostekhnadzor), international departments, nature protection organisations, and research and consultancy institutes. "Hot spots" were described using Screening-and-Analysis reports prepared by the regional Hot Spot Exclusion Groups, annual federal and regional reports on the state and protection of the environment published in 2003-2012, industrial environmental monitoring and pollution control reports, reports on the socio-economic development of the regions, official press releases and statements. Environmental data and information obtained during the assessment served as a basis for evaluation and description of the environmental state, trends of environmental changes, environmental management and protection systems and mechanisms, as well as environmentally sound measures taken at "hot spots". Discussions with members of the Sub-group on Hot Spots Exclusion, regional Hot spot Exclusion Groups, experts and other stakeholders formed part the assessment that resulted in the present report.

The report consists of eight chapters, including the "Summary" and "References", and four appendices.

We start Chapter 3, "The Barents environmental hot spot process", with a short description of the Barents Euro-Arctic Region and key facts relating to the Barents Environmental "Hot Spot" List. We also give a brief history of the initiation and compilation of the two NEFCO/AMAP reports published in 1995 and 2003, and the Barents organisation established to facilitate the elimination of the environmental "hot spots" defined in 2003.

In Chapter 4, "Environmental Management System in Russia from 1991 to 2012", we try to review 20 years of the state environmental management system reorganisation in Russia, as we believe it is important to see and understand these processes also in connection with the definition of priorities and the implementation of joint environmental activities in the Barents Euro-Arctic Region.

Chapter 5, "Environmental Status and 'Hot Spots' of the Russian part of the Barents Region", is the core of our assessment and the present report. In this chapter, we go through all five Russian Barents regions and the "hot spots" on their territories. We give brief information on the environmental status of the region based on federal and regional reports on the state and protection of the environment prior to presenting its "hot spots". The "hot spots" are presented with regard to their current status and progress since 2003. The names of some of the "hot spots" were changed, not in terms of

re-naming them or re-focusing, but in terms of giving the correct up-to-date name and keeping the original problem addressed. Each "hot spot" description starts with a status table in which we shorten some of the terms. "Emission to air" means emission of contaminants to air and "Discharge to water" means discharge of contaminants with wastewater. The descriptions of the "hot spots" are based on screening and analyses of the reports prepared by the "hot spot" owners and the Hot Spot Exclusion Groups in the regions, notes by environmental authorities, press releases by the companies and state reports on the environmental status and protection in the regions.

References to "hot spot" owners are given where possible. All "hot spots" with air emission of contaminants issues are owned by industrial enterprises, and these "hot spots" are named respectively; wastewater discharge "hot spots" are owned by the industry or municipality; "hot spots" addressing drinking water issues are municipal; "hot spots" on waste management are complex – waste disposal sites are owned by the respective industry or municipality, and waste management programmes are elaborated and coordinated by the regional environmental authority. The "hot spots" with past environmental damage are federal or municipal responsibility.

The summary table with the "Status of 42 Barents Environmental 'Hot Spots' identified in 2003" is presented in Chapter 6.

In Chapter 7, we give our "Conclusions" of the assessment report.

The appendices with the list of the Sub-group on Hot Spot Exclusion members, the table with the 8-step "hot spot" exclusion procedure, the flow chart of the changing federal environmental management authorities in Russia in 1991-2012, and the list of the NEFCO Barents Hot Spot Facility projects are essential parts of the present report.

3. The Barents environmental hot spot process

The Barents Euro-Arctic Region (BEAR) co-operation was launched with the signing of the Kirkenes Declaration on 11 January 1993. The co-operation was established at two levels: intergovernmentally with Norway, Finland, Sweden, Russia, Denmark, Iceland and the European Union as members of the Barents Euro-Arctic Council (BEAC) and interregionally with member regions from northern Norway, Finland, Sweden and Russia on the Barents Regional Council (BRC). The Kirkenes Declaration paid special attention to environmental issues, emphasising that *the environmental dimension must be fully integrated into all activities in the Region, inter alia, through the establishment by the states in the Region of common ecological criteria for the exploitation of natural resources and the prevention of pollution at source and recognized that solving the existing major transboundary environmental problems will be important in realising the potential for broader cooperation in the Region*. Working groups on the environment have been established at both international level under BEAC and interregional level under BRC. In 1994, the first Barents Region Environmental Action Programme was adopted by the Barents Environmental Ministers.

Now, BEAR includes 13 member regions: Finnmark, Troms and Nordland in Norway; Lapland, Oulu and Kainuu in Finland; Norrbotten and Västerbotten in Sweden; Murmansk, Arkhangelsk, Karelia, Komi and Nenets in Russia (see Figure 3.1).

Figure 3.1. Map of the Barents Euro-Arctic Region with the regional capitals and largest cities

The Nordic Environment Finance Corporation (NEFCO) was established in 1990 by five Nordic countries: Denmark, Finland, Iceland, Norway and Sweden, to provide loans and make capital investments in order to generate positive environmental effects of interest to the Nordic region or "Norden".

The Arctic Monitoring and Assessment Programme (AMAP) was established in 1991 by the ministers of eight Arctic countries: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States to implement parts of the Arctic Environmental Protection Strategy. Now, AMAP is one of five working groups of the Arctic Council.

In 1994, the Government of the Nordic countries initiated the NEFCO Barents Regional Environmental Programme with the goal to assist the Russian authorities in their efforts to improve the environmental situation and decrease pollution problems, as well as to support the economic development in the Russian part of the Barents Region. The NEFCO programme consisted of three phases: identification and recommendation of potential investment projects; carrying out feasibility studies and giving priorities to some recommended projects; and implementation of the selected projects. The AMAP Secretariat was engaged to carry out the first phase of the NEFCO programme, and, in 1995, the first NEFCO/AMAP report, "Proposals for Environmentally Sound Investment Projects in the Russian Part of the Barents Region", which consisted of two volumes, was issued. The 1995 NEFCO/AMAP report recommended 17 investment projects to amend non-radioactive disturbance to the environment and human health and 5 projects concerning radioactive contamination issues.

The 1995 NEFCO/AMAP report was presented to the Second Meeting of the Environmental Ministers of BEAC held in December 1995 in Rovaniemi, and the Barents Council *welcomed the NEFCO/AMAP proposals for environmental investment projects in the Russian part of the Barents Region*.

In 2003, NEFCO, on the initiative of the BEAC Working Group on Environment (WGE), in co-operation with the AMAP Secretariat, initiated the project on updating the list of environmentally sound projects, the implementation of which was important to the further improvement of the environmental situation in the Barents Region. The results of the project were presented in the NEFCO/AMAP report "Updating of the Environmental 'Hot Spots' List in the Russian Part of the Barents Region: Proposals for Environmentally Sound Investment Projects" published in 2003. The report identified 42 "hot spots" and proposed 52 investment projects aimed at mitigating the environmental impacts from those "hot spots".

The 2003 NEFCO/AMAP report was presented to the Sixth Meeting of the Environmental Ministers of BEAC held in August 2003 in Luleå, and the BEAC Environmental Ministers *welcomed the update of the NEFCO/AMAP Hot Spot list, endorsed the recommendations therein and emphasized the need to make effective use of existing as well as new and emerging financing possibilities*.

In 2004, the Barents Hot Spot Facility (BHSF) was established within NEFCO with the purpose of promoting project development related to hot spots in the Russian part of the Barents Region.

At the Seventh Meeting of the Environmental Ministers of BEAC held in October 2005 in Rovaniemi, the BEAC Environmental Ministers *welcomed the establishment of BHSF* and *agreed that the target is to launch relevant investment projects in all of the Barents environmental hot spots by 2013 with the aim of eliminating these hot spots*.

The BEAC Environmental Ministers, at their Eighth Meeting heldin in Moscow in November 2007, *endorsed the decision of the WGE to create the Ad-hoc Task Force on elaboration of procedures and criteria on excluding hot spots from the List with participation of all relevant stakeholders in its work*.

The Ad-hot Task Force presented the report on the elaboration of criteria and procedures for excluding Barents environmental "hot spots" from the list to the Ninth Meeting of the Ministers of Environment of BEAC held in February 2010 in Tromsø. The BEAC Environmental Ministers *welcomed the report* and *recommended that the Ad-hoc Task Force should continue in the capacity of the temporary Sub-group under the Working group on Environment … with the mandate to facilitate the process of excluding "hot spots" from the list*. The Ministers also *encouraged further efforts to strengthen and build on the work for existing regional working groups on "hot spots"*.

The Tenth Meeting of the Ministers of Environment of BEAC was held in November 2011 in Umeå. The Environment Ministers *assented to the exclusion* of three Barents environmental "hot spots" from the list and a*nticipated further exclusion by the next ministerial meeting*. The Ministers *invited WGE to consider revising and up-dating the NEFCO/AMAP Hot Spot Report to be presented at the next Ministerial Meeting describing the state of all 42 original environmental hot spots*.

3.1 The first NEFCO/AMAP report of 1995. Initiative, goals and outcome

The first NEFCO/AMAP report "Proposals for Environmentally Sound Investment Projects in the Russian Part of the Barents Region" was published in 1995 as the results of the first phase of the 1994 NEFCO Barents Region Environmental Programme implementation. The programme, which aimed to assist the Russian authorities in their efforts to improve the environmental situation and reduce the pollution problems as well as support the economic development in the Russian part of the Barents Region, was based of three phases: 1 – identification and recommendation of potential environmental investment projects; 2 – feasibility studies of recommended projects and prioritising some of them as pilots; and 3 – implementation of selected projects in cooperation with other financial bodies.

The identification and selection of environmentally sound investment projects in the Russian part of the Barents Region was based on a screening process of the environmental conditions carried out by two AMAP expert groups that worked with radioactive and non-radioactive contamination. NEFCO supplied funding for carrying out those studies. The AMAP expert groups consisted of Nordic experts – representatives of research institutes, and Russian experts – representatives of regional environmental authorities. The results of the project were supervised by the Steering Committee comprising members of the Ministry of Environmental Protection and Nature Resources and the Ministry of Defence of the Russian Federation, regional

environmental authorities of the Republic of Karelia, the Murmansk and Arkhangelsk regions, Nordic countries, NEFCO and the AMAP Secretariat.

The AMAP Expert groups visited Murmansk, Arkhangelsk, Petrozavodsk and Naryan-Mar, gathered information on the state of the environment and sources of anthropogenic impact on the Russian part of the Barents Region[1] and paid particular attention to the project proposals presented by the regional environmental authorities. Based on the available information, a total of 71 projects were identified and 22 recommended – 17 (out of 66) projects concerning non-radioactive contamination and 5 comprehensive nuclear safety projects. The 17 recommended projects of non-radioactive contamination concern included 7 projects in the Murmansk region, 4 in the Republic of Karelia, 5 in the Arkhangelsk region including Nenets Autonomous District, and 1 project in the entire Barents Region.

The project findings were published in two volumes of the NEFCO/AMAP report (Volume One on non-radioactive contamination and Volume Two on radioactive contamination), with all 71 project proposals presented and 22 recommended projects described in more detail. It was emphasised that it was not an authorised list but a presentation of possible actions introduced to the expert groups.

The report was presented to the Second Meeting of the Environmental Ministers of BEAC held in December 1995 in Rovaniemi, and the Barents Council *welcomed the NEFCO/AMAP proposals for environmental investment projects in the Russian part of the Barents Region*.

3.2 The second NEFCO/AMAP report of 2003 on Updating the Environmental "Hot Spot" List. Goals and outcome – 42 "hot spots"

In 2003, NEFCO in collaboration with the AMAP Secretariat initiated the project on updating the list of environmentally sound projects in the Russian part of the Barents Region, following the Barents Euro-Arctic 10 Year Anniversary Declaration in which the Heads of Governments of BEAC did *support the instrumental role of NEFCO in implementing small and medium-sized environmental and cleaner production projects*, and addressed the BEAC Working Group on Environment.

The aim was to identify those projects whose implementations were important to further the improvements in the environmental situation in the region and to present the report with the updated list to the meeting of the BEAC Environment Ministers.

The joint Nordic-Russian expert group, headed by the AMAP Secretariat, selected the most urgent areas of concern related to pollution sources in the Russian Barents Region based on the information obtained, and it outlined them as an updated "hot spot" list. The updated report was drawn up taking into account lessons learned after the first NEFCO/AMAP report and changes since 1995. Nuclear safety projects were not discussed and military installations were not included in the study. The report did not set a prioritisation order for the proposed projects but included the limited priority "hot

[1] In 1995, the Russian part of the Barents Region consisted of the Murmansk region, the Republic of Karelia and the Arkhangelsk region with the Nenets Autonomous District.

spot" list that could provide stakeholders with environmental justifications for investments. It was proposed that the environmental work in the region be assessed by the number of "hot spots" removed from the list. It was stated that there was a need to update the report periodically, i.e. every five years.

The issues of industrial gas emissions, protection of marine and fresh water, drinking water supplies, solid waste management, and energy savings were studied to identify the "hot spots". Besides the environmental aspects, the selection of enterprises and other actual or potential pollution sources for the list was made with consideration for their economic state and capability to take part in the implementation of the projects.

The regional environmental authorities, i.e. Departments of Nature Resources and Environmental Protection of the Ministry of Nature Resources of Russia in the Republics of Karelia and Komi, the Murmansk and Arkhangelsk regions and the Nenets Autonomous District, played the key role in addressing environmental problems and project proposals for their inclusion in the list.

The results of the study were presented in the NEFCO/AMAP report "Updating of the Environmental 'Hot Spots' List in the Russian Part of the Barents Region: Proposals for Environmentally Sound Investment Projects" published in 2003, with the list of 42 "hot spots" identified and proposals for 52 investment projects aimed at mitigating the environmental impacts of those "hot spots". Some of the project proposals from the 1995 NEFCO/AMAP report were transferred to the 2003 "hot spot" list; others were not included for environmental, management or economic reasons.

The list included 10 "hot spots" in the Murmansk region, 10 in the Republic of Karelia, 10 in the Arkhangelsk region, 8 in the Republic of Komi and 4 in the Nenets Autonomous District. In terms of environmental problems, there were 15 "hot spots" of industrial air emission concern, 12 with wastewater discharge issues, 10 on waste management, 6 on drinking water supply and 6 addressing issues of past environmental damage.

The report was presented to the Sixth Meeting of Environmental Ministers of BEAC held in 2003 in Luleå, where the BEAC Environmental Ministers *welcomed the update of the NEFCO/AMAP Hot Spot list, endorsed the recommendations therein and emphasized the need to make effective use of existing as well as new and emerging financing possibilities*

3.3 "Hot spots" exclusion process and procedure

The BEAC Working Group on Environment (WGE), made up of officials from ministries of environment of Norway, Sweden, Finland and Russia, took the lead in the "hot spot" exclusion process with the decision of the BEAC Environment Ministers meeting in 2003. The Ministers *requested the BEAC Working Group on Environment continue the process of implementing the NEFCO/AMAP Hot Spot list, led by the Working Group on Environment, in collaboration with NEFCO and relevant federal, regional and local partners, in order to develop actions within ten years aimed at eliminating these Hot Spots*.

In 2004, the Barents Hot Spot Facility (BHSF) was established within NEFCO with the purpose of promoting project development related to hot spots in the Russian part of the Barents Region.

The BEAC Environmental Ministers, at their meeting in 2005, *agreed that the target is to launch relevant investment projects in all of the Barents environmental hot spots by 2013 with the aim of eliminating these hot spots*.

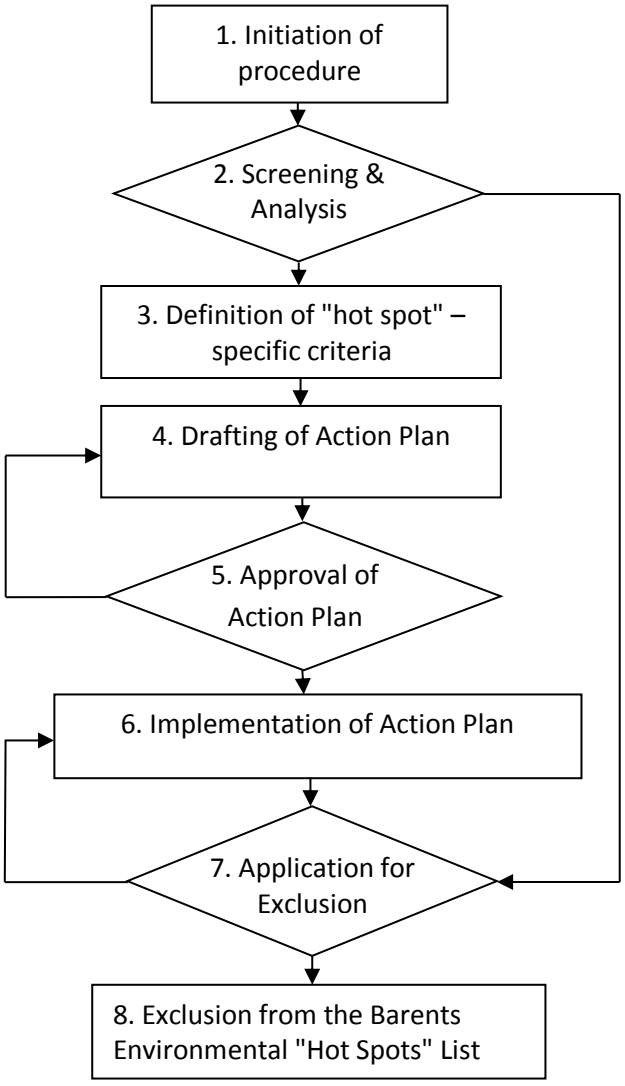
The Working Group on Environment decided to establish the Ad-hoc Task Force to elaborate the procedures and criteria on excluding "hot spots" from the list. That decision was endorsed by the BEAC Ministers of Environment at their meeting in 2007.

The Ad-hoc Task Force comprised appointed representatives from environmental authorities in Finland, Norway, Russia and Sweden, and, led by BHSF of NEFCO, it operated from 2008 to 2010. The Final Report of the Ad-hoc Task Force on Elaboration of Procedures and Criteria on Exclusion of the Barents Environmental "Hot Spots" was presented to the meeting of the BEAC Environment Ministers in 2010.

Table 3.1: Scheme of 8-step "hot spot" exclusion procedure

Step	Responsible organisation
1	Assigned Federal Authority(ies)
2	Assigned Federal Authority(ies)
3	Assigned Federal Authority(ies) after consultation with WGE
4	"Hot spot" owner assisted by Addressed Authority
5	Addressed Authority after consultation with WGE
6	"Hot spot" owner
7	"Hot spot" owner assisted by Addressed Authority after consultation with WGE
8	WGE => Ministerial Meeting

Flow chart



In terms of criteria, the Ad-hoc Task Force noted that there were no pre-defined criteria or procedure for inclusion of the "hot spots" in the list, but exclusion criteria and a procedure were going to be established. As a general rule it was proposed that a "hot spot" should qualify for exclusion from the Barents Environmental "Hot Spots" List if the negative impact, as addressed in the list, did not violate the relevant environmental legislation and requirements of the Russian Federation and internationally accepted principles. In its final report, the Ad-hoc Task Force acknowledged that the term "hot spot" had no legal basis as such, and the environmental "hot spot" in the list should be understood as a "problem area".

At their meeting in 2010, the BEAC Environmental Ministers welcomed the report and recommended that the Ad-hoc Task Force should continue in the capacity of temporary sub-group under the WGE and they encouraged the development of regional working groups on "hot spots" in all five Russian Barents regions.

The temporary Sub-group on "Hot Spots" Exclusion (SHE), formally established in 2010, includes appointed representatives from Russia, Finland, Sweden, Norway and NEFCO, as an observer, and it is co-chaired by Russia and the BEAC WGE chairing country (see Appendix 1).

By the end of 2011, the regional "Hot Spot" Exclusion Groups (HEGs) were established in all five federal subjects of the Russian part of the Barents Region. HEGs include representatives of environmental authorities and are led by the environmental department – ministry or committee of the regional Government.

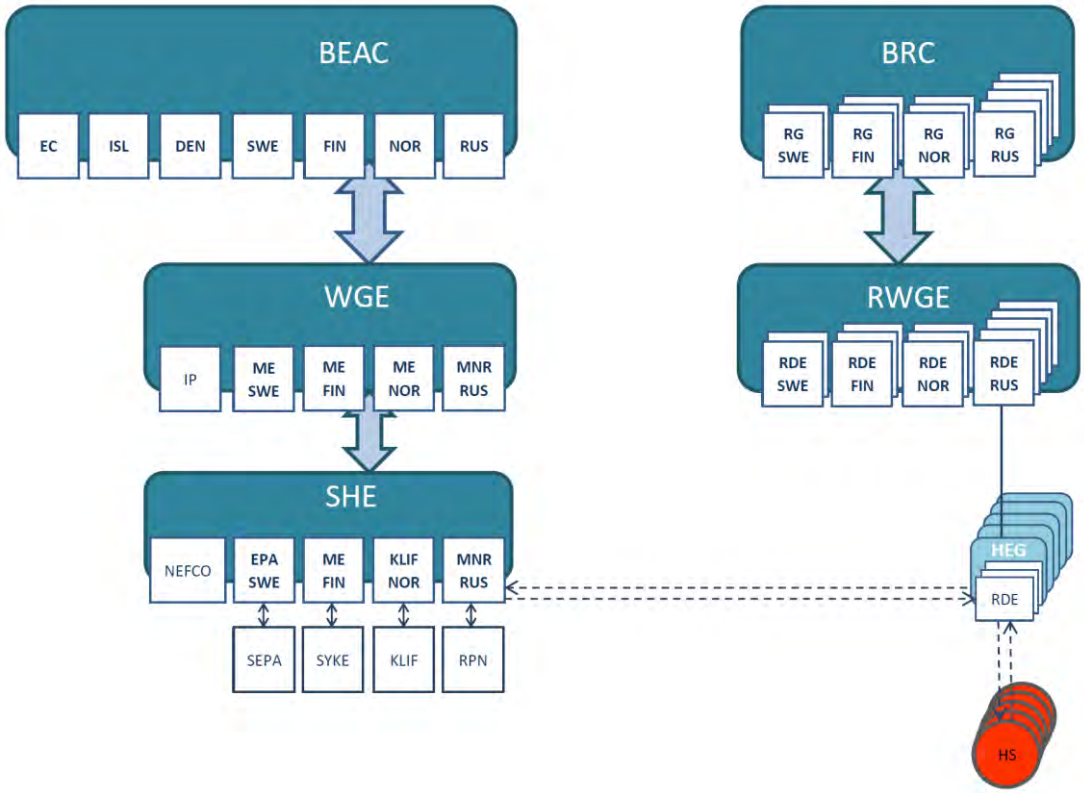


Figure 3.2. Chart of the Barents Euro-Arctic Region organisation related to "hot spots" exclusion. Note: ME – Ministry of Environment, IP – Indigenous peoples (left), RG – Regional Governor, RDE – Regional Department of Environment, HS – "hot spot" owner (right)

During the Swedish chairmanship of the BEAC WGE in 2010-2011, much of SHE's effort was put into development and application of the 8-step "Hot Spot" Exclusion Procedure proposed by the Ad-hoc Task Force (see Appendix 2). The final 8th step with the formal exclusion of the "hot spot" from the Barents Environmental "Hot Spots" List is to be made by the BEAC WGE and a revised list presented to the BEAC Environmental Ministers.

In 2011, the Ministers of Environment of BEAC at their Tenth Meeting *assented to the exclusion of the following Barents environmental "hot spots" from the list: Mercury-containing waste (Murmansk M-8), Stocks of obsolete pesticides (Karelia K-10), Stocks of obsolete pesticides (Arkhangelsk A-10), and anticipated further exclusions by the next ministerial meeting.* Thus, since November 2011, the Barents Environmental "Hot Spot" List includes 39 "hot spots".

SHE established a General Exclusion Plan to be agreed between SHE and HEGs. Through the implementation of the General Exclusion Plan, SHE and HEGs addressed the issue of re-naming some of the "hot spots" defined in 2003 in order to actualise them and/or make them assessable by the agreed criteria.

The long-term objective, as stated in the SHE Work Programme for 2012-2013, is the final exclusion of all 42 "hot spots" from the list in accordance with agreed criteria and procedures, and the short-term objective is to reach the target to launch environmental measures in all of the "hot spots" on the list by 2013.

4. Environmental management system in Russia from 1991 to 2012

By the mid-1990s, Russia had established the environmental management system (EMS), with legal and institutional elements and the basic technical and management capacity to support it. However, in the last decade, the EMS has been characterised by frequent and inadequately formulated changes to its institutional structure and legal and regulatory framework at the federal, regional and municipal levels (see Appendix 3).

The principal changes were those initiated in 1996, when the Ministry of Environmental Protection and Natural Resources was reorganised and became the State Committee for Environmental Protection.

In general, Russia's State Committee for Environmental Protection (SCEP), known as Goskomekologii, was responsible for the environmental protection system, environmental legislation enforcement, and administration of Russia's international environmental protection commitments. In 1998, there were 5819 federal-, regional-, and district-level state environmental inspectors and 2500 employees in 238 environmental analytical laboratories. In 2009, there were 448 federal- and 2000 regional-level state environmental inspectors.

In May 2000, SCEP was abolished and its functions, including forestry management functions formerly performed by the abolished Federal Forestry Service, transferred to the Ministry of Nature Resources (MNR).

In 2002, following through on preparatory work involving the environmental community, the President of Russia approved the Environmental Doctrine of the Russian Federation, which is the most recent strategic document on environmental protection. The Doctrine formulated ambitious strategic goals, objectives and priorities for public environmental policy and outlined a wide range of policy implementation methods, but it remained a declarative document.

In the 2000s, the Government undertook major legal initiatives in environmental protection and the use of natural resources by enacting the new basic Law on Environmental Protection (2002), Land Code (2001), City Planning Code (2004), Water Code (2006) and Forestry Code (2006), and by introducing major amendments to the Law on State Environmental Expertise/Review and the preparation of project design documentation, such as the Urban Construction Code, as amended in 2004. However, these initiatives, to some extent, weakened the environmental requirements and compounded EMS deficiencies. Simplifying the maze of obsolete technical regulations and standards is a slow process.

In 2004, a broad administrative reform redistributed environmental protection functions among the MNR, the Federal Service for Supervision of Natural Resources of Russia (Rosprirodnadzor), reporting to MNR, and the Federal Service for Ecological, Technological and Nuclear Supervision of Russia (Rostekhnadzor), reporting directly to the Government. The division of responsibilities was unclear, resulting in many gaps and overlaps in functions and deficient coordination among federal supervisory bodies. Widespread staff reductions depleted the capacity of structural units responsible for environmental control and enforcement, and precipitated a decline in staff

qualifications. The reforms also left gaps and overlaps as almost one-third of the functions stipulated in the Federal Law on Environmental Protection (2002) were not delegated to any of these institutions.

In 2004, the MNR's regional Chief Departments of Natural Resources and Environmental Protection were abolished, one of the most significant reorganisations among numerous institutional changes. The situation evolved so that each region had five federal entities, instead of one, to perform environmental protection administrative and governance functions. In addition to Rostekhnadzor and Rosprirodnadzor, there were regional Administrations of the Federal Agency for Subsoil Use (Rosnedra), the Federal Forestry Agency (Rosleskhoz) and the Federal Agency for Water Resources (Rosvodresursy).

Redistributing responsibilities among federal, regional and municipal authorities was an inconsistent and contradictory process that complicated environmental protection activities. The initial changes to the distribution of responsibilities date back to 2003. Federal Law 95-FZ of 4 July 2003, which essentially prohibited duplication of responsibilities among levels of government, necessitated a revision of the entire set of environmental protection laws to delimit the terms of reference of the federal and regional authorities. The issue of responsibility distribution was to be addressed by the Federal Law on Changes to Federal Legal Acts and Invalidation of Selected Federal Legal Acts (122-FZ of 22 August 2004). Pursuant to the Law, the Russian regions were virtually deprived of all basic governance and state control responsibilities relating to environmental protection, but, in less than a year, this decision was reversed and most of functions eliminated earlier were returned to the Subjects of the Federation, including further delegation of responsibility for waste management to the municipal level.

Criteria in the Government Resolution on the List of Facilities Subject to Federal State Environmental Control (777 of 29 October 2002) established that such control shall cover over 80 000 businesses or about 10% of the total number of facilities to be monitored.

Since 2004, the State Environmental Review (SER) falls under Rostekhnadzor and Rosprirodnadzor, but SER-related responsibilities and functions were not clarified between the two federal agencies, creating confusion and conflict between nature users and environmental protection authorities at federal and local levels.

The list of projects and economic activities subject to the SER has been dramatically reduced since 1 January 2007, following the enactment of the Federal Law on Changes to the Urban Construction Code of the Russian Federation and Specific Legal Acts of the Russian Federation (232-FZ of 18 December 2006) to exclude hazardous facilities such as nuclear and hydroelectric power plants, oil pipelines, and chemical and petrochemical industries.

According to expert assessments, over 90% of all planned economic projects that could have a significant negative impact on the environment were excluded from SER scrutiny. Therefore, the institute of environmental review has essentially lost its major function, that is *to exercise the constitutional right of Russian citizens to a favourable environment by preventing a negative impact of economic and other activities on the natural environment* (the Preamble of the Federal Law on Environmental Review).

Many environmental issues have now been settled but only after intervention by prosecutors. Procuracy supervision practice demonstrates that law enforcement is still relevant to the selection of landfill or municipal solid waste sites, which are often allocated in violation of statutory procedure.

The incidence of illegal infringements continues to grow with respect to fauna protection – conservation of fish stocks and aquatic biological resources that are seriously affected by poaching. Fish poaching control is a priority activity for prosecutors, especially in regions where aquatic biological resources are targeted by commercial fishing.

With the recent reorganisation in May 2008, Rostekhnadzor and the Federal Service for Hydrometeorology and Environmental Monitoring of Russia (Roshydromet) started to report to MNR, and MNR became the Ministry of Nature Resources and Ecology (MNRE).

During the past decade, institutional reforms have undermined EMS functioning: regional- and municipal-level reorganisation has reduced the overall institutional capacity. The delegation of environmental protection and control responsibilities to the subjects of the Federation has affected the continuity of environmental control in the regions. Now there are two parallel structures at the regional and federal levels with disjointed lists of controlled entities.

According to the Resolution of the Government of Russia (53 of 27 January 2009) "On Implementation of the State Control in Environmental Protection", the state environmental control consists of 12 types of state control of geological, water and land use; control and supervision of use and reproduction of wildlife and their habitats; control and supervision of the organisation operation of protected areas; control of air quality, waste management, forest control in protected areas; control over the protection of Lake Baikal and control in internal waters, territorial sea, the exclusive economic zone and the continental shelf of the Russian Federation.

In 2006, Russia enacted changes in the distribution of the environmental charges (fees and fines) between the levels of government: 20% of all proceeds shall be transferred to the federal budget, 40% to the regional budget and 40% to local budgets. Pursuant to current legislation, proceeds shall be "untied" or "non-targeted" money, which is not used in full for environmental activities. At the regional level, environmental charges are administered by the regional departments of Rosprirodnadzor. Environmental charges are not earmarked for environmental use but part of the regular budget. At regional level, the collected charges are comparable to the environmental protection expenditure, while in the municipalities (which have budget deficits), proceeds cover other expenditure than environmental protection.

The total environmental expenditure as a share of GDP in Russia declined from 2.2% in 1997 to 1.3% in 2006, and environmental investment expressed as a share of total investment declined from 1.9% in 2000 to 1.5% in 2006. In 2010, the total environmental expenditure from the federal budget was 0.2%, as stated by the Accounts Chamber of the Russian Federation.

5. Environmental status and "hot spots" in the Russian part of the Barents Region

5.1 Environmental status and "hot spots" in the Murmansk region

5.1.1 Environmental status of the Murmansk region

The Murmansk region covers 144.9 thousand square km. The population of the region is 836.7 thousand, of which the urban population makes up 90%, and the population density is 5.8/km^2. The main cities are Murmansk (309.4 thousand), Apatity (61.3 thousand), Severomorsk (53.3 thousand), Monchegorsk (47.6 thousand), Kandalaksha (35.7 thousand) and Kirovsk (28.6 thousand). The GRP in 2011 was 257 784 million rubles.

The main rivers are Ponoy, Varzuga, Umba, Niva and Tuloma. There are many lakes in the Murmansk region, the largest of which are Imandra, Umbozero and Lovozero.

Key environmental indicators in 2011

Total atmospheric emissions per unit of GRP, tons/million rubles	1.3
Percentage of population living in cities with high and very high levels of air pollution (ICA > 7)	0%
Proportion of contaminated wastewater of the total wastewater discharges, %	19.6%
Quality of drinking water (percentage of water samples that meet the quality standards), %	63.6%
Formation of waste per unit of GRP, tons/million rubles	841

Atmospheric emissions

In 2011 the volume of industrial emissions was 263.132 thousand tons, which is 8.5% less than it was in 2010 (287.6 thousand tons), however, over the same period, transport emissions have increased from 55.5 thousand tons to 63.6 thousand tons. Overall, the decline in total emissions was typical of the 2003-2011 period, both in absolute terms and per unit of GRP.

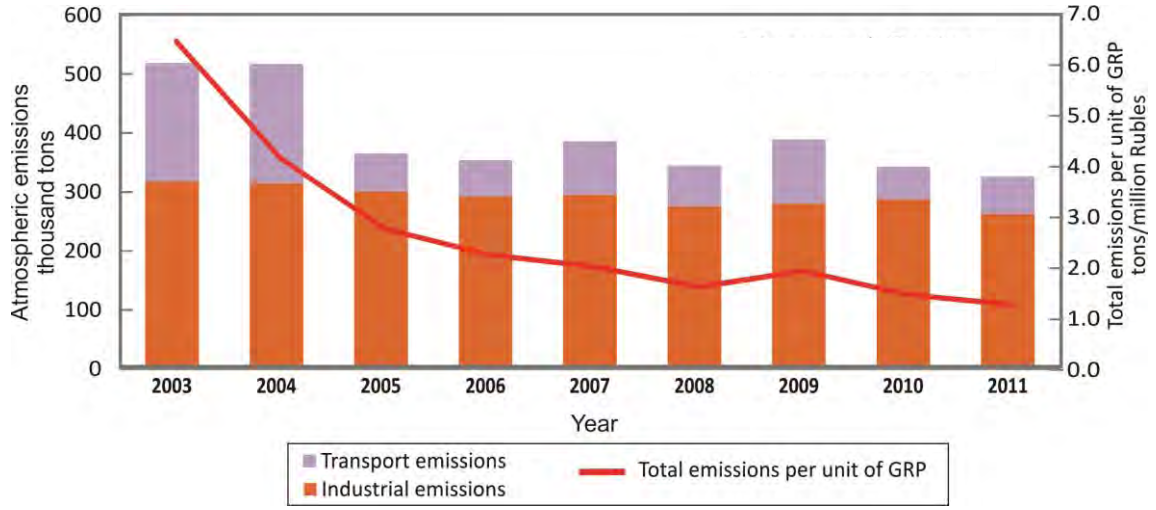


Figure 5.1.1. Dynamics of atmospheric emissions in the Murmansk region in 2003-2011

The main contribution to the total industrial emissions (70%) was made by the following companies: Pechenganickel and Monchegorsk industrial site of Kola GMK JSC – a subsidiary of Norilsk Nikel JSC, Murmansk HPP JSC, Apatit JSC and KAZ – SUAL Branch. In general, the structure of industrial emissions in 2011 did not differ from that in 2002: the proportion of liquid and gaseous pollutants was 89.4% (in 2011) and 87% (in 2002), with a predominance of SO_2, whose proportion reached 71.6% (in 2002) and even 75.8% (in 2011) of the total volume of industrial emissions.

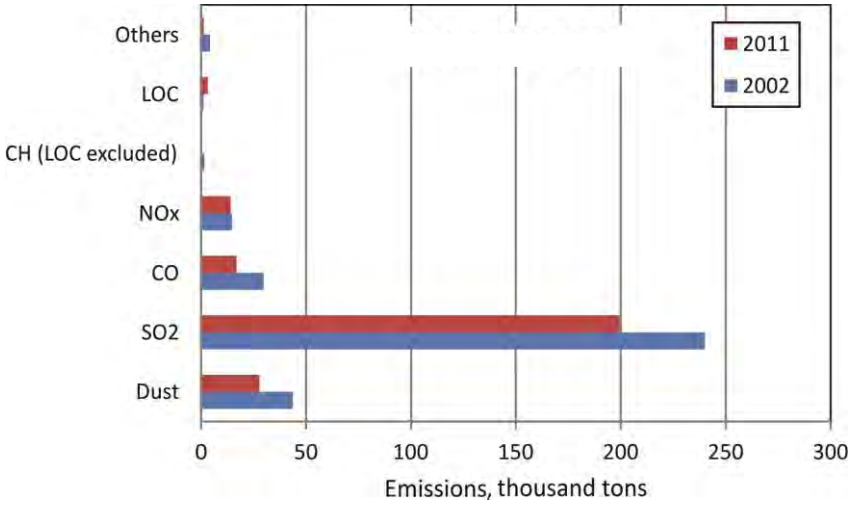


Figure 5.1.2. Structure of industrial emissions in the Murmansk region in 2002 and 2011

Urban air quality

In 2011, the level of air pollution in Apatity, Kandalaksha, Kola, Kovdor and Olenegorsk was low, while in Murmansk and Monchegorsk the air pollution level increased, mainly due to the presence of nitrogen dioxide, phenol, carbon monoxide, formaldehyde and benzo(a)pyrene. During the 2002-2011 period, high levels of air pollution were only registered in 2007 and 2009 in cities with a population equal to 6-7% of the total urban population of the Murmansk region.

Wastewater

In 2011, the total volume of discharged wastewater was 1705.32 million m^3, including 334.16 million m^3 of polluted wastewater. Both of these values are the lowest when compared with those registered in the period from 2002 to 2010.

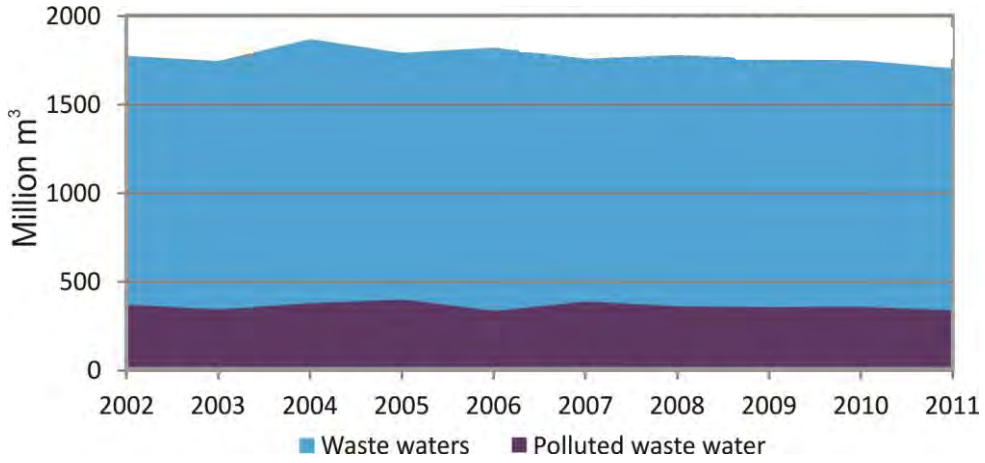


Figure 5.1.3. Dynamics of wastewater discharges in the Murmansk Region in 2002-2011

The main sources of contaminated wastewater discharge were Apatit JSC, Murmanskvodokanal and Kovdorsky GOK JSC; their total contribution was 67% of the contaminated wastewater discharges in the Murmansk region.

Drinking water

During the last decade there has been a gradual degradation in the quality of water in the reservoirs, which are the sources of water supply, as a result of increasing human and industrial impact. This has led to a decrease in the proportion of tap water that meets the standards by chemical indicators from 90.8% in 2002 to 63.6% in 2011.

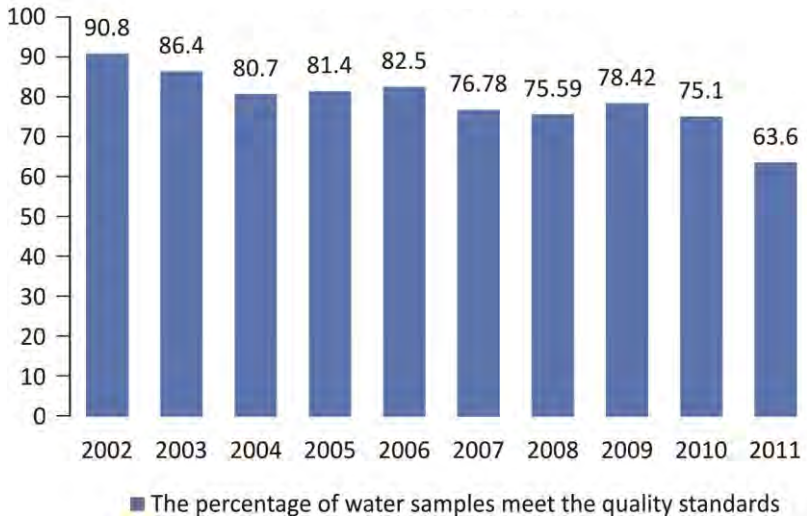


Figure 5.1.4. Change in the quality of drinking water in the Murmansk region in 2002-2011

Production and consumption waste

In 2011, the total volume of production and consumption waste was 236.4 million tons, which is the highest value in the last decade (2002-2011). However, the specific volume of waste per unit of GRP for the same period declined from 2441 tons/million rubles in 2002 to 841 tons/million rubles in 2011.

The total contribution of such enterprises as Apatit JSC, OLKON JSC and Kovdorsky GOK JSC to the total production of waste in the Murmansk region is 80%.

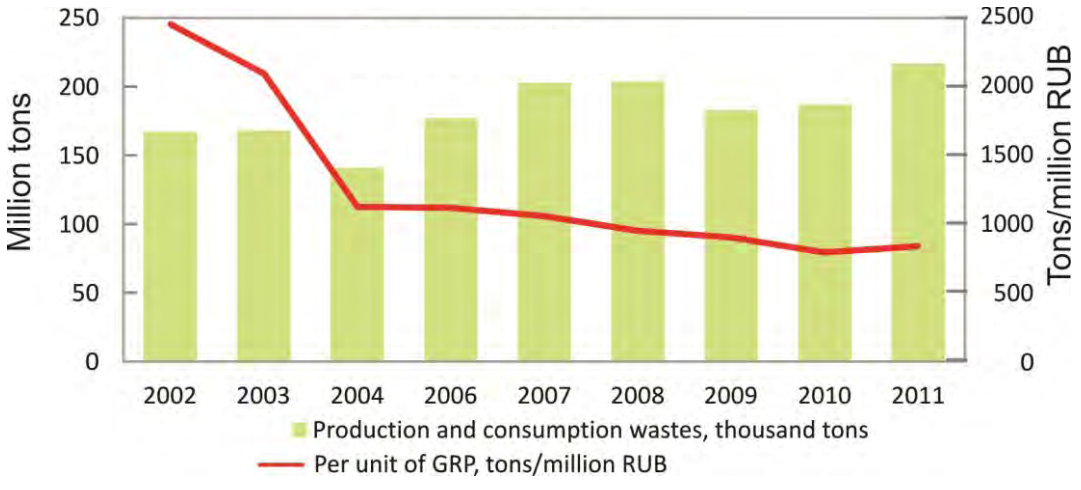


Figure 5.1.5. Production and consumption waste formation in the Murmansk region in 2002-2011

5.1.2 Environmental "hot spots" in the Murmansk region

The 2003 NEFCO/AMAP report defined 10 environmental "hot spots" and proposed 13 environmentally sound investment projects connected to them in the Murmansk region. In this chapter, we present the list of these "hot spots" as they were defined and described in the 2003 Report and short summaries of the current status of the "hot spots" based, primarily, on the Screening and Analyses reports provided by the Hot Spot Exclusion Group in the Murmansk region. We also use information from the regional annual reports on the environmental status in the Murmansk region, press releases from the enterprises i.e. "hot spot" owners, and meetings with federal and regional environmental authorities and research institutes in the region.

M1(1): Pechenganickel MMC of Kola GMK JSC, Nikel and Zapolyarny

Name, 2003:	**M1 Pechenganickel combined smelter, Nikel, Zapolyarny**
Reasons, 2003:	The largest emitter of air pollutants, particularly SO_2 in the Murmansk region; large volumes of waste water discharges, particularly salts
Impact, 2003:	SO_2 emission to air: Nikel and Zapolyarny – 124.3 thousand t/year; Wastewater discharge: 24.6 million m^3/year
Impact, 2011:	SO_2 emission to air: Nikel – 55.3 thousand t/year; Zapolyarny – 45.4 thousand t/year; Wastewater discharge: 13.3 mln. m^3/year
Measures taken:	Reconstruction and modernisation of production to reduce industrial emission discharge of contaminants
Measures planned:	Reduction of SO_2 emission to air: completion of modernisation with conversion to briquetting technology in Zapolyarny; reduction of sulphate discharges with wastewater
Investments:	2.2 billion rubles (€ 55 million) project in Zapolyarny
Status:	Proposed for continued joint actions

Short description of the M1 "hot spot" and progress since 2003

In spite of the significant reduction in air emissions since 2002, Pechenganickel is still the major air polluter in the Murmansk region. The Pechenganickel smelter, now the Pechenganickel Mining and Metallurgical Combine (MMC) of the Kola Mining and Metallurgical Company (Kola GMK) of Norilsk Nickel, is located in the northwest part of the Murmansk region, in the Zapolyarny and Nikel towns near the border with Norway. The combine was established in 1946 on open-cast mines and smelting shops built in 1940 by Inco of Canada. The combine comprises four open pits, an enrichment plant, a roasting shop, and smelting and sulphuric acid production shops. Pechenganickel processes its own nickel- and copper- sulphide ore and rich ore from the mine of the Norilsk combine.

There was a plan in early 2000s on a joint project in Nikel and Zapolyarny for USD 175 million, including grants from Norway and Sweden, and a loan from NIB. This project was not implemented and the overall financing was not utilised.

Since 2003, Kola GMK has executed certain measures to reduce industrial emissions and discharges in Zapolyarny and Nikel, including: launch of a project in Zapolyarny on

converting from pelletising-roasting technology to briquetting technology; control of industrial emission sources in Nikel with connection to main chimneys; introduction of recycling water supply and extension of facilities for mining water treatment Controlat Severny mine; reconstruction of the pulp pump station of the tailing dump; turnaround maintenance of recycling water supply coolers in smelting shop; elimination of untreated water discharge from Kotselvaara deposit; introduction of ultraviolet disinfection of household wastewaters instead of chlorine at biological treatment facilities. As a result, the discharge of wastewaters was reduced by 11.3 million m^3 per year (46.1%) to 13.3 million m^3.

Figure M1.1. Pechenganickel smelter in Nikel town on the border with Norway. Photo: Thomas Nilsen, Barentsobserver

In 2011, the Kola GMK discharges exceeded the Maximum Allowable Discharge levels (MAD) with regard to certain contaminants in different outlets in Nikel and Zapolyarny. Local Temporary Agreed Discharge levels (TAD) were set for these pollution sources.

Air emissions exceed the Maximum Allowable Emission levels (MAE) for 8% of the regulated contaminants in Zapolyarny, including SO_2 and Cu, and for 12% in Nickel, including SO_2, Ni, Cu and dust. These contaminants are emitted within Temporary Agreed Emission levels (TAE). In 2011, the air emissions of selected contaminants were SO_2 – 55.3 thousand tons, CO – 45.3 thousand tons, dust – 3.4 thousand tons, Ni – 180 tons and Cu – 134 tons in Nikel; and SO_2 – 45.4 thousand tons, dust – 3.7 thousand tons and Cu – 177 tons in Zapolyarny.

The regional environmental authorities proposed to continue joint actions aimed at reducing the industrial emission to air and discharge to water of specific contaminants.

M2(2): Monchegorsk industrial site of Kola GMK JSC, Monchegorsk

Name, 2003:	**M2 Severonickel combined smelter, Monchegorsk**
Reasons, 2003:	The second largest emitter of air pollutants, particularly SO_2
Impact, 2003:	Emission to air: SO_2 – 41.6 thousand t/year Discharge of wastewater: 15.7 million m^3/year
Impact, 2011:	Emission to air: SO_2 – 31.3 thousand t/year Discharge of wastewater: 14.1 million m^3/year
Measures taken:	Part of the copper production transferred to the roasting-leaching-electro-winning process; gas pipeline reconstructed; gas collector replaced; new catalytic re-combiner installed at one technological line in the sulphuric acid department
Measures planned:	Modernisation aimed at a reduction in contaminants discharge with wastewater – elimination of industrial discharge from nickel converting unit
Investments:	€ 122 million of own means by 2011
Status:	Applied for exclusion from the "hot spot" list (air emission) Proposed for criteria definition (water discharge)

Short description of the M2 "hot spot" and progress since 2003

The former Severonickel combined smelter, which is now an industrial site of Kola GMK in Monchegorsk, is the second biggest emitter of air pollutants, particularly SO_2, in the Murmansk region. The combine was founded in 1938 and is now one of the biggest manufacturers of nickel and cobalt. The combine works on imported raw material. It processes rich copper-nickel ore and converter matte delivered from Norilsk Nickel and Pechenganickel MMC. It also processes breakage, waste products and raw material from other suppliers.

By 2011, the following projects were implemented at the company's expense: switching part of the copper production to the roasting-leaching-electrowinning process; remodelling the gas conduit in the copper production part of the metallurgical shop; replacing (with an upgrade) the fume-laden gas collector in the refining shop; installing a new catalytic re-combiner at one of the process trains of the sulphuric acid shop.

As a result, since 2003, the emissions of SO_2 by Kola GMK in Monchegorsk have been kept within the Maximum Allowed Emission levels (MAE).

The studies confirmed that the biodiversity of the flora and fauna has regenerated in the areas impacted by the Kola GMK in Monchegorsk, and the wildlife populations remained steady in the area. The natural recovery continues in the previously damaged areas.

Concentrations of suspended agents, CO and NO_2 in the air, have not exceeded the applicable sanitary standards. The average annual concentration of SO_2 has remained below the average Maximum Allowable Concentration (MAC). One-time concentrations exceeding MAC were registered in 2011, thus the average monthly concentrations of SO_2 remained below the applicable standards.

Since 2003, Kola GMK has been running activities at Monchegorsk site aimed at reducing contaminants discharged with wastewaters. As a result, the volume of wastewater discharged in 2011 was reduced by 1.6 million m^3/year or 10.2% compared with 2011, and it was at the level of 14.1 million m^3/year. In 2011, 30% of the contaminants discharged with wastewater exceeded the Maximum Allowable Discharge level (MAD). Kola GMK is implementing the project as a reconstruction of the nickel converting unit to reduce the discharge of contaminants with wastewaters.

In 2012, Kola GMK applied for exclusion of the Monchegorsk industrial site from the "hot spot" list.

Regional environmental authorities proposed to exclude M2 from the original "hot spot" list, addressing the issue of air emissions of SO_2 and paying attention to the reduction in the discharge of contaminants with wastewater.

Figure M2.1. Severonickel Combine of Kola GMK in Monchegorsk
Photo: Wikimedia

M3(3): Apatit JSC, Kirovsk

Name, 2003:	**M3 JSC Apatit, Kirovsk**
Reasons, 2003:	Since the 1st Report, industrial emissions increased almost twice, with corresponding increase of all major pollutants. Some increase of wastewater discharge is also documented
Impact, 2003:	Emission to air: SO_2 – 7.0 thousand t/year; CO – 1.8 thousand t/year; NO_X – 3.2 thousand t/year Discharge to water: n/d
Impact, 2011:	Emission to air: SO_2 – 6.0 thousand t/year; CO – 0.6 thousand t/year; NO_X – 2.3 thousand t/year Discharge to water: exceeding MAD on specific contaminants
Measures taken:	A number of measures implemented to reduce industrial air emissions
Measures planned:	Reduction in acidifying compounds and dust emissions; reduction in discharges of organic matter and salts
Investments:	2 million rubles (€ 50 thousand) of own means invested in a wastewater management project in 2011
Status:	Proposed for criteria definition and continued actions

Short description of the M3 "hot spot" and progress since 2003

Apatit JSC of the PhosAgro Group is the world's largest producer of high-grade phosphate ore – phosphate rock and Russia's only producer of nepheline concentrate. The Apatit mining and beneficiation complex was founded in 1929 to mine apatite-nepheline ore from the Khibiny deposit. Apatit is now developing six deposits. The ore is extracted from two underground and two open-pit mines and processed at two apatite-nepheline beneficiation plants (ANBP) # 2 and # 3.

The Apatit JSC production units discharge wastewater into surface water bodies: the rivers Belaya, Zhemchuzhnaya and Vuonnemyok, and the lakes Bolshoy Vudyavr and Kitchepahk.

In order to reduce wastewater discharges, Apatit has carried out projects on the construction of the mine water treatment plant at the underground mines of Kirovsk; reconstruction of household sewage treatment facilities in Titan village; construction of wellpoints at Koashvinsky mine; and establishing reactant treatment of quarry waters at the Koashvinsky mine.

In 2010, discharges of such contaminants as fluorine and aluminium were reduced, mainly due to a reduction of those substances in the content of the exploited rocks. Discharges of certain contaminants, including phosphates, fluorine, sulphates, nitrites and nitrates, aluminium and suspended matters with wastewaters, exceed MAD levels at some releases of the Apatit facilities.

The enterprise introduced technologies of dust control with the use of bitumen emulsion, which resulted in a reduction of annual dust emissions of 2-3% of the possible emissions, and it reduced the maximum one-time concentration of suspended soils into the air of the town of Apatity and surrounding areas.

The industrial air emission of selected contaminants by Apatit JSC exceeded the Maximum Allowable Emission levels (MAE) in 2011.

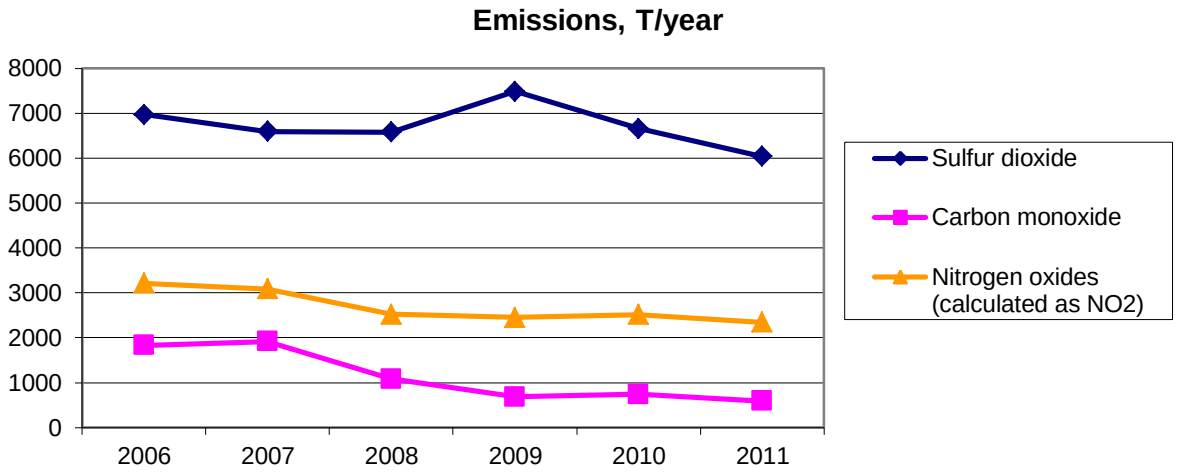


Figure M3.1. Emissions of SO_2, CO and NO_X by Apatit JSC

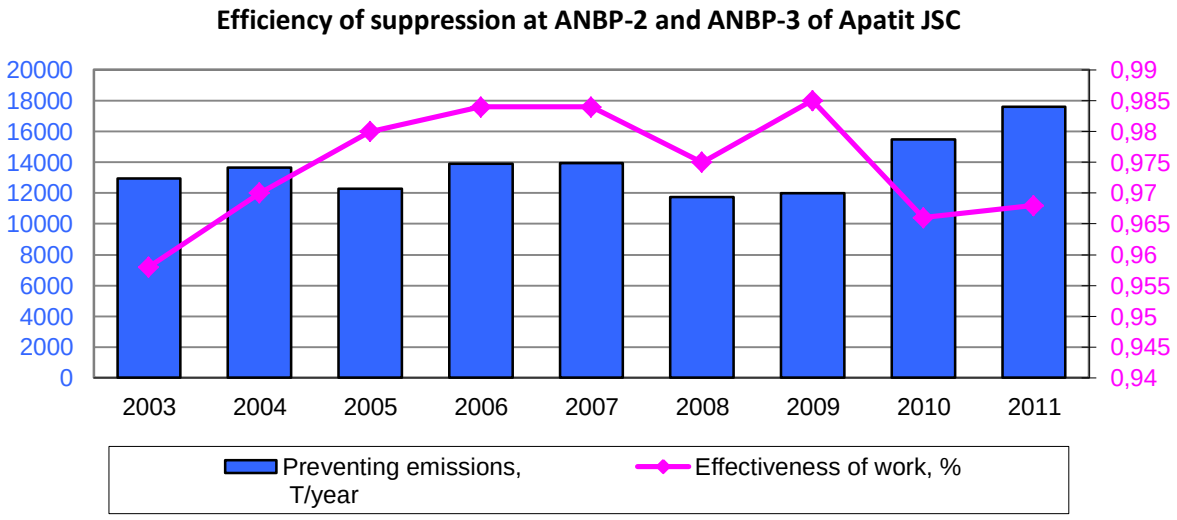


Figure M3.2. Efficiency of dust suppression at ANBP-2 and ANBP-3

M4(4): Apatity Heat and Power Plant of Territorial Generating Company # 1

Name, 2003:	**M4 Heat and Power Plant, Apatity**
Reasons, 2003:	HPP in Apatity is the largest air polluter among HPPs in the Murmansk Oblast, which emits 18 500 tons of contaminants, including almost 12 000 of SO_2 (84% of total air emissions in the town of Apatity)
Impact, 2003:	n/d
Impact, 2010:	Emission to air: SO_2 – 11 013 t/year; NO_x – 2772 t/year
Measures taken:	Equipment modernisation completed (new Venturi pipes installed). In 2000-2006, the Apatity HPP put a system in place on all its active boilers to use spent fire gases in order to desiccate the fuel, thus improving the safety of the fuel preparation process and cutting emissions of nitrogen oxides.
Measures planned:	Introduction of ISO 14001
Status:	Applied for exclusion from the "hot spot" list

Short description of the M4 “hot spot” and progress since 2003

The Apatity HPP branch of Kolenergo JSC was built to provide electricity for the fast-growing local industry in the Kirovsk district and for Apatit Works. The plant uses coal as the main fuel and heavy fuel oil as firing-up fuel. The plant was designed to generate 500 MW of electricity. After refurbishment and upgrading, the Apatity HPP capability to generate heat increased to 735 Gcal/h, but its installed electric capacity reduced to 323 MW.

The main pollutants generated by the Apatity HPP are SO_2, non-organic dust, NO_2 and NO. The main sources of air pollution are the 10 boiler plants of the PK-10p-2 class. Each boiler plant has two smoke exhausts of the D20x2 type, the productivity of each of which is 185 thousand m^3/h.

Fire gases are purified with the aid of Venturi wet scrubbers. The latest scrubber upgrade has brought the operating efficiency ratio of ash filtration up to 97%, reducing the gross emission of solid particles into the air by approximately 1500-2000 tons per year. By maximising its use of low-sulphur coal from the Kuznetskoe field, the Apatity HPP has succeeded in reducing emissions of SO_2. The Apatity HPP is in the process of implementing a system that will supply fire gases into the pulverisation works of the boilers. Coupled with the effort to assure optimal fuel burning modes, this should help to reduce the emission of NO_X. In 2007-2011, the annual air emission of NO_X was between 2.4 and 2.8 thousand tons, and SO_2 between 9.2 and 12.2 thousand tons. Industrial air emissions at Apatity HPP are within the Maximum Allowable Emission levels (MAE) set for the enterprise.

The Apatity HPP is in the process of obtaining an international compliance certificate for ISO 14001:2004.

In 2012, the Apatity HPP applied for exclusion from the "hot spot" list as the enterprise does not exceed the MAE and further equipment modernisation in order to reduce industrial emissions would not be cost-efficient.

M5(5): Kovdorskiy GOK, Kovdor

Name, 2003:	**M5 Kovdor mining and concentration combined enterprise (Kovdor GOC)**
Reasons, 2003:	It is the second largest, after JSC "Apatit" discharger of industrial waste waters. Since the 1st Report, its discharges increased by 40% including more than doubling of sulphates discharges
Impact, 2003:	45.2 million m^3 of wastewater discharged
Impact, 2011:	36.8 million m^3 of wastewater discharged
Measures taken:	Organisational and technical measures to reduce water use and wastewater discharge
Measures planned:	Modernisation of wastewater treatment facilities and reduction of wastewater discharges
Investments:	70.4 million rubles (€ 1.75 million) in 2008 of own means; 9.6 million rubles (€ 240 thousand) in 2011
Status:	Proposed to continue actions within the investment programme of the company

Short description of the M5 "hot spot" and progress since 2003

Kovdorskiy GOK JSC of EuroChem is an integrated mining and processing facility, the second biggest producer of apatite concentrate in Russia and the only producer of baddeleyite concentrate in the world. Its annual production capacity totals 2.7 million tons of apatite, 5.7 million tons of iron ore and 8.85 million tons of baddeleyite.
The water bodies of the city of Kovdor (Kovdora, Mozhel' and Yona rivers) are exposed to the anthropogenic load produced by the Kovdorskiy GOK industrial activities and the city itself with its numerous small enterprises. The most polluted water body is the Kovdor River tributary, Mozhel' River, in the catchment area in which the Kovdorskiy GOK tailing dam is located.
In 2008, 41.8 million m^3 of wastewater was discharged by Kovdorskiy GOK.

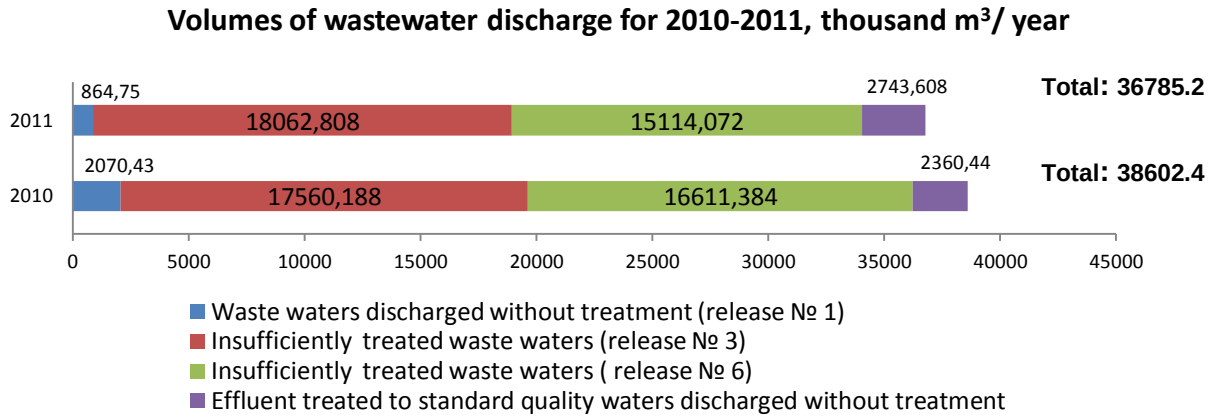


Figure M5.1. Wastewater discharged by Kovdorskiy GOK in 2010 and 2011

During 2008, Kovdorskiy GOK implemented organisational-technical measures to reduce wastewater discharges in order to lower the anthropogenic load on the environment. The total costs of the measures for water use and water discharge reduction amounted to 70.4 million rubles.

Compared with 2009, the discharge of the following substances increased: phosphor (total) by 3.6 tons and nitrites by 3.1 tons.
According to the reports for 2010, the manganese discharge decreased by 0.26 tons.
In 2011, the volume of insufficiently treated wastewater comprised 33.2 million m^3. Two cases of high molybdenum pollution in the Kovdor River were registered. The concentrations of sulphates, phosphates and manganese exceeded the MAC levels in all collected samples.

Figure M5.1. Kovdorsky GOK
Photo: Mikhail Aplesnin

M6(6): Water quality in the Kola River and Bolshoye Lake

Name, 2003:	**Water quality in Kola river and Bolshoye Lake used for drinkinf water supply of Murmansk city**
Reasons, 2003:	More than 6% of drinking water samples in Murmansk do not meet microbiological standards, and 75% - chemical standards. Almost 50% of water used for Murmansk water supply system is extracted from Kola River
Impact, 2003:	The microbiological and chemical standards were not exceeded.
Impact, 2011:	The quality of water is qualified as “low contaminated”.
Measures taken:	A long-term investment programme for the drinking water supply to Murmansk city was launched.
Measures planned:	Implementation of long-term investment programme
Investments:	€ 30.1 million (pending), including project co-financing € 8 million grants from NDEP and EBRD SSF
Status:	Proposed to continue joint actions with the regional investment programme

Short description of the M6 “hot spot” and progress since 2003

Water is supplied to Murmansk city from three sources: the Kola and Tuloma rivers and Bolshoye Lake. The water quality in these surface bodies did not meet sanitary-hygienic standards by the microbiological or chemical indicators. The water quality in the Kola River needs special attention because the river is the major water supply source to Murmansk city. The Bolshoye Lake, which supplies 15% of the drinking water in the Murmansk city is located not far from Murmansk city incineration plant and is exposed to its emissions.
The Kola River is polluted by wastewater discharged by Olenegorsk city, which is located by the upper Kola River (Lake Kolozero) and by agricultural facilities located not far from the Kola River banks, upstream of Murmansk city. The major part of the wastewater dumped into the Kola River by the above sources is composed of rain and filtration water from manure and litter collectors of pig and poultry farms.

In 2011, all the water samples from Kolozero Lake contained high concentrations of Cu exceeding the MAC, and 100% of the samples in the upper Kola River (near Vykhodnoy village) contained Cu exceeding the MAC: 77% – Fe, 15% – Zn and Mn, 33% – Al, and 38% – organic compounds by COD. In Bolshoye Lake, 100% of the water samples had a Cu content exceeding the MAC: 50% – Fe and Zn compounds, 33% – Al, 17% – Mn, hydrocarbons and organic contaminants by COD.

Figure M6.1. Bolshoye Lake near Murmansk city
Photo: fototerra.ru

By 2008, the regional programme Water Supply of the Murmansk Region for 2008-2017 was elaborated. The programme envisaged improving the water supply through modernisation of the existing equipment, replacing of the water supply networks, and prospecting alternative water supply sources, including ground ones.
EBRD and NEFCO have allocated € 15.4 million loan accompanied by grants from NDEP of € 6 million and the EBRD Shareholders Special Fund (SSF) of € 2 million to finance the first phase of the long-term investment programme required for the Murmansk water and wastewater treatment systems. The investment programme should bring the drinking water quality into compliance with Russian requirements and EU standards, and increase wastewater treatment levels from 23% to 76%. The total project cost is € 30.1 million (including capital grant co-financing by NDEP and EBRD SSF). Other donors are the Government of Finland (€ 0.2 million), the Government of Norway (€ 0.35 million) and EBRD (€ 0.83 million).
At present, measures to improve the water supply quality are included in the long-term programme Modernisation of Communal Infrastructure of the Murmansk Region for 2011-2015 and the industrial investment programme of Murmanskvodokanal to 2016.

M7(7): Drinking water supply in Zelenoborsky-1 settlement

Name, 2003:	**M7 Drinking water supply in Zelenoborsky-1 settlement.**
Reasons, 2003:	The settlement is supplied by water from the Bezymyannoe Lake with poor organoleptic quality of water and periodical shortage of water resources
Impact, 2003:	Drinking water samples did not meet sanitary standards.
Impact, 2011:	Lack of water treatment facilities. Water purification/treatment is carried out only by disinfection with chlorine solution. Chlorination units are worn and obsolete. Main distribution network is old, which may cause secondary pollution of water.
Measures taken:	Water supply pipelines in Zelenoborsky were reconstructed within the Kandalaksha district programme in 2008-2009.
Measures planned:	Reconstruction of water supply system in Zelenoborsky in 2012-2015 within the regional and municipal programmes.
Status:	Proposed for joint actions with the regional and municipal programmes

Short description of the M7 "hot spot" and progress since 2003

The Zelenoborsky-1 settlement, Knyazhaya village, is located not far from Kandalaksha town. The settlement population exceeds 2000. It is supplied with water from the Bezymyannoye Lake with poor organoleptic characteristics. The Average water intake from the lake for drinking needs is 1200 m^3/day. In low stream periods, the lake cannot supply the required amounts of drinking water.
In 2008-2009, the Kandalaksha district programme on Quality Water Supply of the Zelenoborsky settlement was implemented, and water pipelines were reconstructed to provide Zelenoborsky with good quality drinking water.
The Murmansk regional Centre of Sanitary-Epidemiological Control reported that by the end of 2011, 1.0% of samples collected in the water supply system of Zelenoborsky-1 did not meet the sanitary standards by the microbiological criteria and 14.4% by the chemical ones.
In 2011, the long-term target programme Complex Development of Communal System Infrastructure of the Murmansk Region for 2012-2015 was adopted. It includes a project on the reconstruction of the water supply system in Zelenoborsky to be financed by the regional budget. In 2012, the municipal programme for the drinking water supply of the settlement was approved.

M8(8): Mercury-containing waste management

Name, 2003:	**M8 Mercury-containing waste**
Reasons, 2003:	Ecord Ltd, Kirovsk, one of two enterprises involved in treatment of used luminescent lamps in the Murmansk region, has outdated facilities that contribute to mercury contamination of the environment
Impact, 2003:	n/d
Impact, 2011:	None (the proportion of deactivated mercury-containing waste is 92.1%)
Measures taken:	The equipment for the recycling of luminescent lamps has been upgraded. Ecotrans Ltd should be able to recycle generated waste during the upcoming 2-4 years.
Measures planned:	Continuing deactivation of mercury-containing waste
Investments:	1.2 million rubles (€ 30 thousand)
Status:	Excluded from the "hot spot" list in 2011

Short description of the M8 "hot spot" and progress since 2003

Mercury-containing waste, mostly used luminescent lamps, provided the main contribution to hazard class 1 in the Murmansk region. In 2003, two companies processed used luminescent lamps: Rick-market Ltd in Kolsky district and Ecord Ltd in Kirovsky district. Rick-market had new equipment for processing mercury waste. Ecord Ltd had outdated equipment that was put into operation in 1994, and the processing plant itself contributed to the mercury contamination of the environment.
In 2010, the Ecord Company was abolished by a court decision. Rick-market has not carried out any activities processing luminescent lamps since 2006.
Since 2006, Ecotrans Ltd has been the only company in the Murmansk region dealing with decontamination of mercury-containing waste. The company used the thermal

demercuration equipment URL-2m with a design capacity of 75 t/year, which was insufficient to process the total volume of mercury-containing waste in the region.
In 2009, Ecotrans purchased a new equipment unit URL-2m with a design capacity of 88-90 t/year. The new unit price was 1.2 million rubles, and the regional allocated grant was 0.5 million rubles.
In 2011, the "hot spot" M8 Mercury-containing waste was excluded from the Barents Environmental "Hot Spots" list.

M9(9): Sunken and abandoned ships in the Kola Bay

Name, 2003:	**M9 Scrapped ships in the Kola Fjord**
Reasons, 2003:	122 scrapped ships located in the Kola Fjord contributing to its pollution, increasing navigation risk and causing economic losses
Impact, 2003:	About 200 ships at dump sites and sunken in the bay
Impact, 2011:	More than 200 sunken and abandoned ships in the Kola Bay
Measures taken:	The dump site near Lavna was partly cleaned (20 ships removed).
Measures planned:	To remove sunken and abandoned ships from the Kola Bay, reuse metal and clean the bay
Investments:	The total budget estimates are between 100 million and 2 billion rubles (€ 2.5-500 million).
Status:	Proposed for joint actions with the federal target programme

Short description of the M9 “hot spot” and progress since 2003

According to the 1995 NEFCO/AMAP report on scrapped ships submerged in the Kola Bay, they pose a serious environmental threat.
In 2003, the Environmental Harmony Evolution Fund (EHEF) in cooperation with the Marine Inspection started work on the elimination of dump sites of abandoned vessels and initiated large-scale works dedicated to inventory and reuse of the scrapped ships. The project revealed that 122 different ships and metallic constructions were disposed of at "ships cemeteries". About 70% of those were owned by the Northern Fleet and not included in the rehabilitation programme.
Besides a special site for the disposal of scrapped ships near Belokamenka, there are a number of illegal sites including: Lavna (19), Rutensky (22), Mishukovo (22), Mys Zelyoniy (9) and others. The inventory revealed nine such illegal sites. Scrapped ships have been disposed of at those sites for a long time.

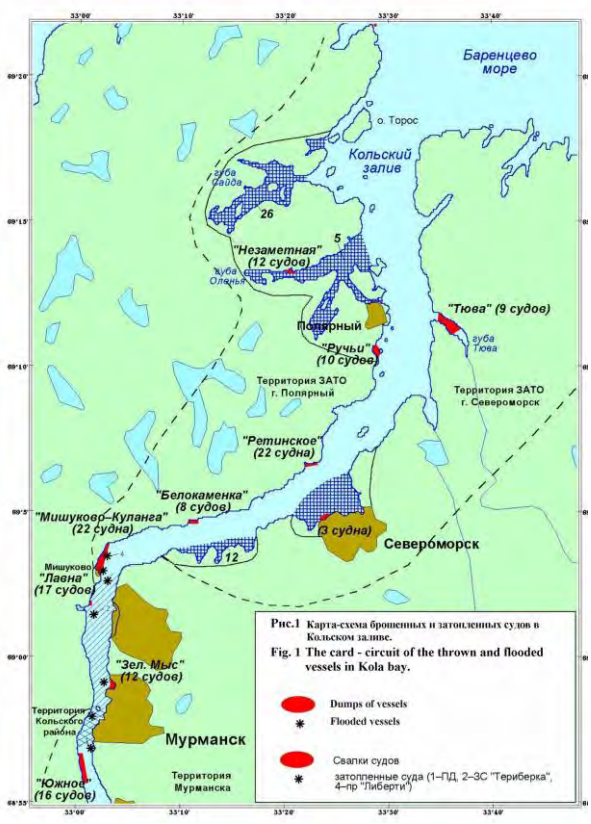


Figure M9.1. Map with sunken and abandoned ships in the Kola Bay, 2005
Author: Vladimir Bakharev, EHEF

In 2003, work was carried out with staff from the commercial port in Murmansk and the Ministry of Nature Resources of the Russian Federation. The first object was the disposal of the dump site Lavna, just one of ten disposal fields in the Kola Bay area. The work was partly financed by the Barents Secretariat.
NEFCO, through the Barents Hot Spots Facility, has financed a project plan that outlines how to lift the sealer boat *Teriberka*, which sunk in the waterway of the Kola Bay. The work on lifting the boat should be carried out by the Russian authorities with support from the regional administration and the Murmansk commercial port authorities.
An analysis of bottom sediments collected at the ships disposal sites demonstrated heightened concentrations of all metals and oil products.
The submerged ships pose not only an ecological threat but also increase the navigation risk and serve as a source of economic damage because they impede development of coastal fishing, fish breeding and recovering of coastal settlements.
The bay's waters are polluted with oil products, heavy metals, concentrations of some of which (copper, iron) exceed the MAC by 1-4 times.
The Kola Bay is an object under federal ownership, thus, it is not possible to include measures for improving the environmental situation in the regional programmes.
In 2013, activities to clean up the Kola Bay from sunken ships were included in the federal target programme (draft) on Elimination of Accumulated Environmental Damage for 2014-2025.

M10(10): Oil-containing waste management

Name, 2003:	**M10 Handling of oil containing wastes**
Reasons, 2003:	Oil containing wastes, particularly solid ones, is an alarming environmental issue in the Murmansk region
Assessment, 2003:	n/d
Assessment, 2011:	3.3 thousand tons of oil sludge formed per year
Measures taken:	Research on the evaluation of the practicability of establishing facilities for processing and decontamination of oil-containing waste
Measures planned:	To launch an experimental clean-up of oil-contaminated soils using oil-oxidising bacteria To construct a site for biological neutralisation of oil-containing wastes for the Murmansk and Kola districts
Investments:	7.5 million rubles (€ 0.18 million) allocated in the regional budget for 2013
Status:	Proposed for joint actions with the regional target programme

Short description of the M10 “hot spot” and progress since 2003

Handling of oil-containing wastes, particularly solid ones, is of special environmental concern due to the increased volumes of oil transit operations and oil waste generation in the region. Several treatment technologies including thermal and chemical are available.
In 2002, the Murmansk company “Arcticeco-A” designed a project for the construction of a special site for biological treatment of oil-containing slams from the Murmansk and Kola districts with a capacity of 800 t/year. It was proposed that the biological disposal and processing site be located at the territory of a poultry manure collector.

By 2008, the oil-loading terminal of the First Murmansk Terminal JSC in the Fishing port and MASKO JSC facilities were used to receive oil-containing wastewater (including bilge water from ships) in the region. The technology and equipment used for oil-containing waste treatment are outdated and inefficient.

Figure M10.1. Heavy fuel oil collected after an accidental oil spill in the Kola Bay in 2009
Photo: BASU Northern branch

In 2008, 404 tons of oil slams were generated (mainly from tank cleaning), 304 tons of which were delivered to other organisations for treatment. By 2009, 208 tons of oil slams were accumulated at the regional enterprises.

In 2009, the long-term target programme Wastes for 2009-2013 was approved by the Government of the Murmansk region. The programme includes a project on design and construction of oil-containing waste disposal and processing facilities. The regional budget allocated 7.5 million rubles (€ 0.18 million) for 2013.

The long-term target programme Environmental Protection of the Murmansk Region for 2011-2016 was approved by the regional Government. The programme plans construction of facilities for the disposal and processing of oil-containing wastes.

In 2013, the Ministry of Nature Resources and Ecology of the Murmansk region proposed to the Ministry of Nature Resources and Ecology of Russia to include the project on experimental clean-up of oil-contaminated soils in the Murmansk region using oil-oxidising bacteria into the federal target programme on Elimination of Accumulated Environmental Damage for 2014-2025.

5.2 Environmental status and "hot spots" in the Republic of Karelia

5.2.1 Environmental status of the Republic of Karelia

The Republic of Karelia covers 180.5 thousand square km. The population of the republic is 639.7 thousand, of which the urban population makes up 75%, and the population density is 3.5/km^2. The main cities are Petrozavodsk (262.0 thousand), Kondopoga (33.0 thousand), Segezha (29.6 thousand), Kostomuksha (28.4 thousand) and Sortavala (19.2 thousand). The gross regional product (GRP) in 2011 was 142 943.8 million rubles.

The main rivers of the Republic of Karelia are Kem, Vyg and Shuya. Lakes occupy 18% of the area of the republic, and the largest are Ladoga and Onega.

Key environmental indicators in 2011

Total atmospheric emissions per unit of GRP, tons/million rubles	1.3
Percentage of population living in cities with high and very high levels of air pollution (ICA > 7)	0%
Proportion of contaminated wastewater of the total wastewater discharges, %	86.7%
Quality of drinking water (percentage of water samples that meet the quality standards), %	91.2%
Formation of waste per unit of GRP, tons/million rubles	883.9

Atmospheric emissions

In the period 2003-2011, the amount of emissions from stationary sources (industrial emissions) decreased from 135.4 thousand tons to 96.0 thousand tons, while transport emissions increased from 53.1 thousand tons to 73.9 thousand tons in the same period. Over the past ten years there has been a trend to reduce the total atmospheric emissions per unit of GRP from 4.0 (in 2003) to 1.3 tons/million rubles (in 2011).

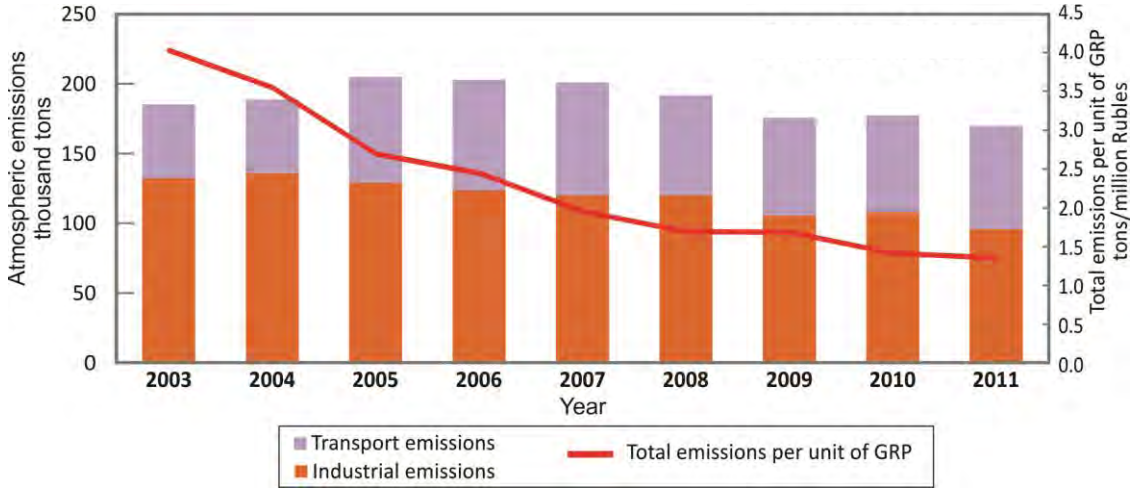


Figure 5.2.1. Dynamics of atmospheric emissions in the Republic of Karelia in 2003-2011

Although the amount of industrial emissions has declined over the last decade, their structure has changed slightly. The proportions of liquid and gaseous pollutants in 2002 and 2011 were quite similar (79.6% and 81.9% respectively), and the relative amounts

of the dominant pollutants (SO_2, CO, NO_X) differed slightly: 56.5%, 16.8% and 4.1% in 2002, and 58.3%, 14% and 7.4% in 2011.

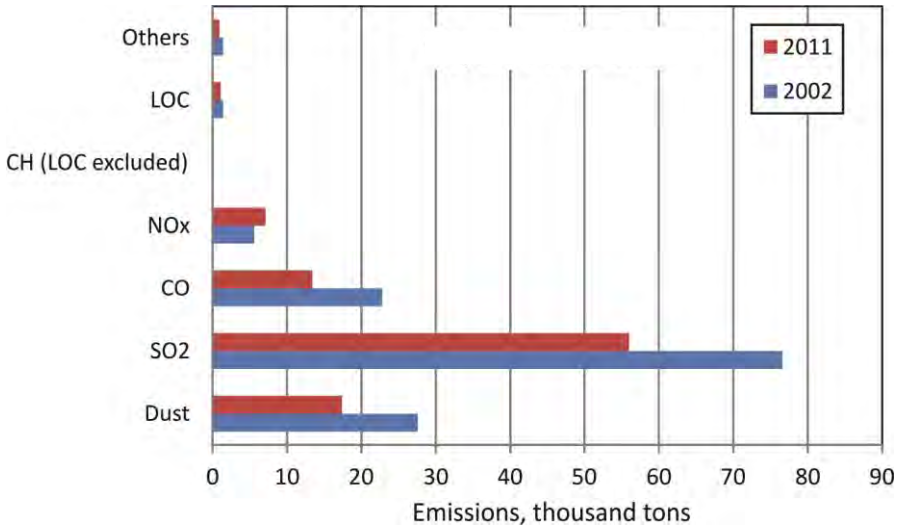


Figure 5.2.2. Structure of industrial emissions in the Republic of Karelia in 2002 and 2011

The main contribution to the total industrial emissions (77.949 tons) comes from Karelsky Okatysh JSC, NAZ-SUAL branch of SUAL JSC, Kondopoga JSC, Segezhsky PPM JSC and CZ Pitkyaranta JSC.

Urban air quality

Over the past ten years, the urban air quality in the Republic of Karelia has improved significantly. Thus, in the period 2002-2007, the proportion of the population living in cities with high or very high levels of air pollution was 53-45%, starting from 2008; this parameter did not exceed 2% and in 2011 it decreased to 0%. However, in the cities of Petrozavodsk and Nadvoitsy there was an elevated level of air pollution. In Petrozavodsk, compared with 2010, the air concentrations of phenol and benzo(a)pyrene had increased, whereas the contamination levels of air with particulate matter and nitrogen oxides had decreased. In Nadvoitsy, the air quality improved by reducing the concentration of hydrogen fluoride and benzo(a)pyrene.

Wastewater

In 2011, the volume of discharged wastewater was 213 million m^3, including 174.5 million m^3 (86.7%) of contaminated wastewater. Although, compared with 2010, the volume of contaminated wastewater has increased; it was noticeably lower than in 2002-2009, when it ranged from 209 to 190 million m^3.

In the past ten years, the proportion of contaminated wastewater of the total volume of water discharged is high (over 80%). The main polluters are Kondopoga JSC, Segezhsky PPM JSC and Petrozavodskiye Kommunalnie Systemy JSC (Petrozavodsk Communal Systems), CZ Pitkyaranta JSC and Karel'sky Okatysh JSC of Severstal. The amount of contaminated wastewater discharged by these companies is 153.93 million m^3, or 88% of the total regional amount.

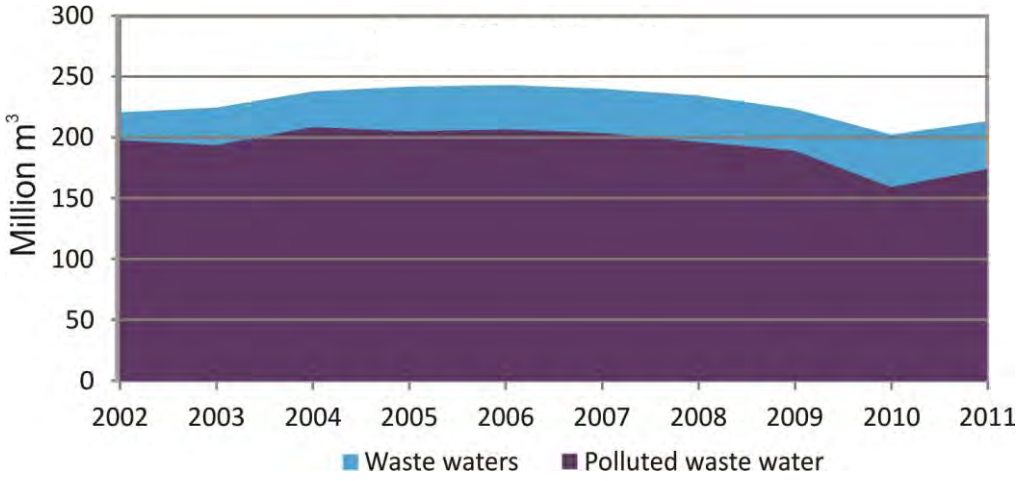


Figure 5.2.3. Dynamics of wastewater discharges in the Republic of Karelia in 2002-2011

Drinking water

During the last decade, the quality of the drinking water in the Republic of Karelia has improved. In 2011, 91.2% of the analysed samples of drinking water met health standards.

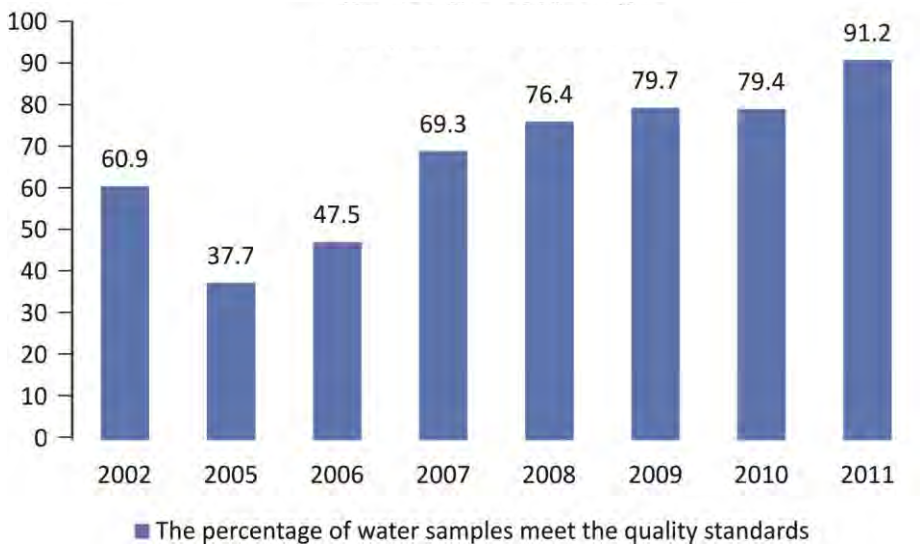


Figure 5.2.4. Change in the quality of drinking water in the Republic of Karelia in 2002-2011

Production and consumption waste

In 2011, the total volume of production and consumption waste was 123.025 million tons, which is 1.6 times higher than in 2002-2004 (67-70 million tons); however, the production of waste per unit of GRP for the period from 2002 to 2011 was almost halved, from 1654 t/million rubles to 884 t/million rubles.

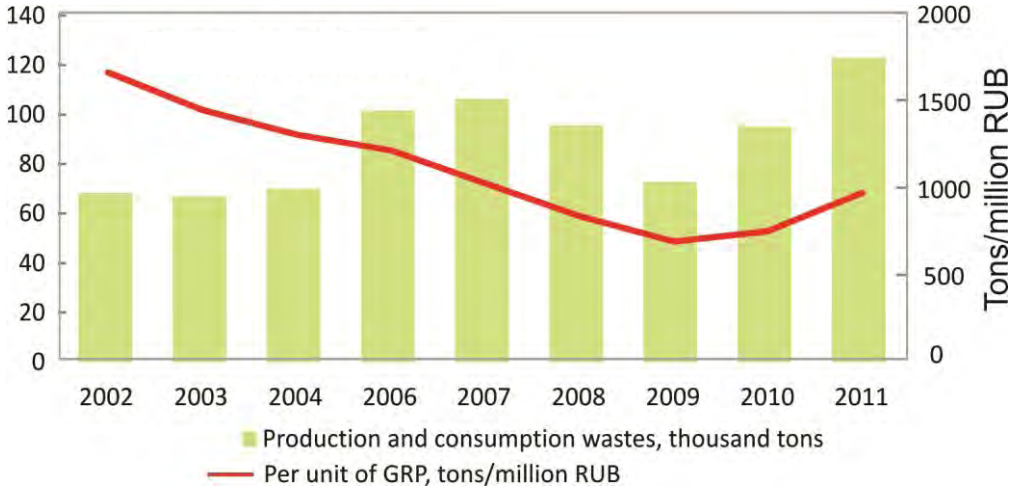


Figure 5.2.5. Dynamics of production and consumption waste formation in the Republic of Karelia in 2002-2011

5.2.2 Environmental "Hot Spots" in the Republic of Karelia

The 2003 NEFCO/AMAP report defined 10 environmental "hot spots" and proposed 15 environmentally sound investment projects connected to them in the Republic of Karelia. In this chapter, we present the list of these "hot spots" as they were defined and described in the 2003 report and short summaries of the current status of the "hot spots" based, primarily, on the Screening and Analyses reports provided by the Hot Spot Exclusion Group in the Republic of Karelia. We also use information from the regional annual reports on the environmental status in the Republic of Karelia, press releases from the enterprises i.e. "hot spot" owners, and meetings with federal and regional environmental authorities and research institutes in Karelia.

K1(11): Kondopoga JSC, Kondopoga

Name, 2003:	**K1(11) Gas emission from Kondopoga pulp and paper combined mill**
Reason, 2003:	Kondopoga PPCM is responsible for 18% of total industrial air emissions in Karelia. It is the only large polluter in the Republic, which emissions increased since 1995
Impact, 2003:	Emission to air: SO_2 – 18 635 t/year; CO – 1299 t/year; NO_X – 1626 t/year; coal ash – 3534 t/year; fuel oil ash – 11 t/year
Impact, 2011:	Emission to air: SO_2 – 2374 t/year; CO – 1915 t/year; NO_X – 1478 t/year; coal ash – 463 t/year; fuel oil ash – 2 t/year
Measures taken:	Modernisation of the heat generation system and change of the company's boiler plants to natural gas instead of coal and fuel oil
Measures planned:	Modernisation of sewage treatment facilities and production processes for the reduction of pollutants discharged to water
Investments:	4054 million rubles (approximately € 100 million) of own means
Status:	Applied for exclusion from the "hot spot" list SHE proposed partial exclusion from the list (air emission).

Short description of the K1 "hot spot" and progress since 2003

Figure K1.1. Kondopoga JSC on the coast of Onego Lake. Photo: Novaya Kondopoga

Kondopoga Pulp and Paper Mill, now Kondopoga JSC, is the largest producer of newsprint in Russia with about 30% share of the country's newsprint production. In 2011, the company produced 769 thousand tons of paper, including 759 thousand tons of newsprint. Kondopoga JSC also operates a heat and power plant (HPP) that produces heat and hot water for the town of Kondopoga, and biological sewage water treatment facilities used for both industrial and communal wastewater. The Kondopoga JSC facilities are located on the eastern shore of Kondopoga Bay of Onega Lake, in the water catchment areas of the Baltic Sea.

The building of Kondopoga PPM began in 1923, and the first paper machine was launched in 1929. The last, tenth, paper machine was put on stream in 2003.

Kondopoga HPP was the biggest contributor of air pollution, responsible for some 85% of the gross emissions to air. In 2002, ground concentrations of some air pollutants exceeded the sanitary threshold levels set for living areas: for SO_2, 1.46 times, and for dust containing less than 70% SiO_2, 1.62 times. The HPP facilities that worked on coal and heavy fuel oil were major contributors to the high ground concentrations of these pollutants. In the period from 2000 to 2011, Kondopoga JSC realised a big two-step modernisation programme to convert the HPP boilers from burning coal and heavy fuel oil to natural gas. In 2004, the natural gas pipeline to Kondopoga was launched. In the period 2000-2006, five boilers of Kondopoga HPP were converted from burning heavy fuel oil to natural gas. From 2007 to 2011, HPP facilities were modernised and three new boilers on natural gas with a capacity 160 t/hour each were built. This resulted in a reduction of the total air pollution emission from almost 26 thousand tons per year in 2003 to 7 thousand tons per year in 2011, with emissions of SO_2 reduced from 18 635 to 2374 t/year and coal ash from 3534 to 463 t/year. In order to mitigate NO_X emissions when converting the HPP facilities from burning coal and heavy fuel oil to natural gas, low NO_X burners were installed.

The modernisation of the HPP facilities allowed Kondopoga JSC to reach and work within the Maximum Allowable Emission levels (MAE) set for the enterprise.

In 2011, the average concentrations of suspended substances (0.084 mg/m^3), SO_2 (0.004 mg/m^3), NO_2 (0.014 mg/m^3), NO (0.002 mg/m^3) and H_2S (0.001 mg/m^3) in the town of Kondopoga did not exceed the Maximum Allowable Concentration (MAC) levels set for living areas.

The investments in the modernisation of the HPP facilities that resulted in a reduction of air emissions of pollutants in 2000-2011 amounted to 4054 million rubles.

In the period from 2000 to 2007, Kondopoga JSC invested approximately 300 million rubles in the modernisation of sewage water treatment facilities. In 2007, the Natrix biofilm process was introduced at biological treatment facilities. Modernisation resulted

in a significant reduction of the concentration of pollutants in discharged waters in 2008 compared with 2000, in particular the concentration of BOD and suspended solids, which decreased by 2.5 times. Reconstruction continued in 2008-2011, resulting in a reduction of the BOD concentration in discharged waters by another 30%.
Kondopoga JSC has been certified with ISO 14001:2004 (GOST R ISO 14001:2007). The environmental analytic laboratory of the enterprise has been accredited and certified with ISO/IEC 17025 for air emission tests and analyses.
In 2011, Kondopoga JSC applied for an exclusion from the Barents Environmental "Hot Spot" List. The exclusion proposal was supported by regional and federal environmental authorities. In 2013, SHE recommended a partial exclusion of Kondopoga JSC from the "hot spot" list in terms of industrial emissions of contaminants to air.

K2(12): Nadvoitsy Aluminium Plant, NAZ-SUAL Branch of RUSAL, Nadvoitsy

Name, 2003:	**K2(12) Gas emission from Nadvoitsy aluminium smelter**
Reason, 2003:	The smelter is responsible for 97% of total air emissions in Nadvoitsy. Emissions from the smelter, particularly of fluorine compounds, create significant human health problems
Impact, 2003:	Emissions to air: 6800 t/year
Impact, 2011:	Emissions to air: 8876 t/year
Measures taken:	Modernisation of the heat generation system and change of the company's boiler plants to natural gas in place of coal and fuel oil
Measures planned:	Modernisation of wastewater treatment facilities and production processes for a reduction of pollutants discharged to water
Investments:	144.2 million rubles (approx. € 3.6 million) of own means
Status:	Proposed for joint actions

Short description of the K2 "hot spot" and progress since 2003

The Nadvoitsy Aluminium Plant, now the NAZ-SUAL branch of the RUSAL Corporation, was put into operation in 1954 when the first production line was launched, and the second production line was completed in 1961. The plant produces primary aluminium and alloys and has an annual production capacity of 81 thousand tonnes of aluminium. The smelter uses Söderberg smelting technology. One of the four potrooms operates using prebaked anode technology.

Figure K2.1. Potroom # 4 of NAZ-SUAL branch of RUSAL in Nadvoitsy. Photo: nadvoicy.su

The NAZ-SUAL branch is a town-forming enterprise of Nadvoitsy located on the shore of Vygozero Lake in the water catchment area of the White Sea. In 2011, the NAZ-SUAL branch was responsible for 9% of all the air emissions of pollutant in the Republic of Karelia. Emissions of fluorine compounds that are specific to aluminium smelters cause health problems for the local population.

In 2003, the NAZ-SUAL branch elaborated and started to realise the project on modernising potrooms with dry off-gas scrubbing to reduce air emission of contaminants, including fluorine compounds.
In 2004, potroom # 4 was reconstructed to use prebaked anodes of Kaiser type (BAT). In 2005, potrooms ## 1-3 of solid-frame electrolyze were reconstructed. In 2007, the photolytic facility for destruction of benz(a)pyrene and other PAH for the period of dry off-gas scrubbing was constructed on the II line of potrooms.
In 2006, NAZ-SUAL was certified with ISO 14001:2004.
Since 2011, NAZ-SUAL has operated within the Maximum Allowable Emission levels set for the plant. In 2011, the concentration of SO_2 (0.004 mg/m^3), NO_2 (0.01 mg/m^3) and CO (1.5 mg/m^3) in Nadvoitsy town did not exceed the Maximum Allowable Concentration (MAC) levels set for living areas. The annual average concentration of HF (0.004 mg/m^3) was 0.8 MAC. The concentration of benz(a)pyrene ($2.5 \cdot 10^{-6}$ mg/m^3) exceeded the MAC and the WHO standard by 2.3 times. During 2008-2011, there was a recorded reduction of hydrogen fluoride and benz(a)pyrene concentration in the air in Nadvoitsy.

K3(13): Drinking water supply in towns and settlements of the Republic of Karelia

Name, 2003:	**K3(13) Drinking water supply in towns and settlements of the Republic of Karelia**
Reason, 2003:	In many towns and settlements, drinking water quality does not correspond to chemical and microbiological sanitary and epidemiological guidelines. Poor water quality presents serious threat to human health
Assessment, 2003:	37.7% of water samples met the quality standards for drinking water.
Assessment, 2011:	91.2% of water samples met the quality standards for drinking water.
Measures taken:	The long-term regional programme "Supply of inhabitants of the Republic of Karelia with drinking water" for the period 2011-2017 was elaborated; the pilot Karelian-Finnish ENPI CBC project is under implementation in Sortavala town
Measures planned:	Implementation of the long-term regional programme for drinking water supply in towns and settlements of the Republic of Karelia
Investments:	23.1 million rubles (€ 580 thousand) used in 2011
Status:	Proposed for joint actions with the regional target programme

Short description of the K3 "hot spot" and progress since 2003

Domestic water consumption in the Republic of Karelia accounts for approximately 17.5% of the total drinking water used, or 36.6 million m^3, including 2.45 million m^3 of ground water, out of 205.9 million m^3 of water used in 2011. According to Russian federal state reports, in 2003, 37.7% of drinking water samples in Karelia met the quality standards, and in 2011, 91.2%.
The percentage of water samples from water objects of the first category (drinking water supply reservoirs) that did not meet hygienic standards in 2011 was 21.1% (70 of

331 samples) on sanitary-chemical criteria and 7.7% (35 of 454 samples) on microbiological criteria on average for the Republic of Karelia. There are 156 sources of centralised water supply in Karelia – 84 of surface and 72 of ground water, and 145 water supply systems. In 2011, 36.9% of water-lines from surface sources did not meet the sanitary requirements due to a lack of water treatment systems, and 21.4% due to the absence of decontaminating facilities; for the water-lines from ground sources these proportions were 6.6% and 4.9% respectively.
In 2011, 49.1% of drinking water samples from water supply systems in Karelia did not meet hygienic standards on sanitary-chemical (organoleptic) criteria and 7.3% on microbiological criteria. The depreciation of water pipes in all settlements is over 70%.
A total of 603 sources of non-centralised water supply sources, including 507 in villages, were inspected in 2011. Of the water samples from these sources, 30.7% did not meet the standards on sanitary-chemical criteria, and 23.1% on microbiological criteria.
The 2003 NEFCO/AMAP report proposed three projects on improvement of the drinking water supply in the towns of Loukhi, Olonets and Sortavala.
In 2011, the long-term programme "Supply of population of the Republic of Karelia with drinking water" for the years 2011-2017 was elaborated and approved by the Head of the Republic of Karelia. The overall budget for the long-term programme is estimated at 6924 million rubles (€ 173 million), including 206.6 million rubles to be invested from the federal budget, 137.4 million rubles from the regional budget and 6580.6 million rubles to be attracted from other sources.

Figure K3.1. Sortavala delegation visiting the Joensuu wastewater treatment station within the Russian-Finnish ENPI CBC project. Photo: projectsortavala.fi

The programme plans to reconstruct and repair existing and construct new water supply systems as well as water treatment facilities in 55 towns and settlements of the Republic of Karelia, including Loukhi, Olonets and Sortavala.
In Loukhi, it is planned to build new and modernise existing sewage water treatment facilities and construct water supply systems, including a water pumping station; in Olonets it is planned to reconstruct sewage pipes, sewage treatment facilities and a water tower.
In Sortavala town, the drinking water supply will be improved within the Russian-Finnish ENPI CBC project "Support of sustainable development of Sortavala town for the improvement of environmental situation" approved in 2010. It is planned to build a new water intake and water treatment facilities close to four direct discharges of sewage waters and transfer of collectors for sewage water treatment facilities.

K4(14): Drinking water quality in the water supply system of Petrozavodsk

Name, 2003:	**K4(14) Poor water quality in water supply network of Petrozavodsk**
Reason, 2003:	The city is supplied with water from Onega lake with water quality that does not meet the existing guidelines. The existing treatment facilities do not allow to get the required water quality, particularly on chemical parameters
Assessment, 2003:	Drinking water samples that did not meet hygienic standards: 41.5% on sanitary-chemical criteria and 2.8% on microbiological criteria
Assessment, 2011:	Drinking water samples that did not meet hygienic standards: 2.4% on sanitary-chemical criteria and 2.25% on microbiological criteria
Measures taken:	In 2011, the construction of the first line of new water treatment facilities with two-stage treatment of drinking water. Hygienic standards on drinking water quality were reached. In 2012, the second line of water treatment facilities with UV-treatment was completed. Drinking water quality meets sanitary-hygienic standards.
Measures planned:	Completion of the third lines of the water treatment facility is planned for autumn 2013.
Investments:	First line – 500 million rubles (€ 12.5 million); second and third lines – 669.34 million rubles (€ 16.7 million)
Status:	Proposed for exclusion from the "hot spot" list

Short description of the K4 "hot spot" and progress since 2003

The city of Petrozavodsk's population totals 262 thousand inhabitants, or more than 40% of the population of the Republic of Karelia. The city is located on the shores of Onego Lake, the second largest lake in Europe, which supplies drinking water to the city and also receives its sewage waters. The raw waters at the city water intake in Onega Lake are characterised by high humus content. In 2011, in Petrozavodsk Bay of Onego Lake, the concentration levels of contaminants exceeding the Maximum Allowable Concentration (MAC) levels for COD, BOD_5, Cu, Fe, NO_2 and oil were registered. The content of coliforms was recorded as high as 2647 bacteria per litre in August 2011.
For many years, raw water from Onega Lake was only chlorine-treated and filtered at the Petrozavodsk water treatment facilities, and the tap water did not meet the hygienic standards on organoleptic criteria (smell, colour). In 1989, the Karelian Government started construction of the first additional line of water treatment facilities, but in 1991 construction works were stopped for financial reasons. In 2005, Petrozavodsk Communal Systems JSC (PCS) signed investment agreements and re-started the project. In 2006-2010, the first phase of the project was realised and the first additional water treatment line was launched. A two-stage water treatment process, with the use of 17-22 filters, was introduced and sanitary standards (SanPiN 2.1.4.1074-01) were reached. In 2010, the tap water colour index was 60 degrees, and in 2011 it was 15 degrees (sanitary standard – 20 degrees), with a water colour index at the intake in Onega Lake of 140 degrees.

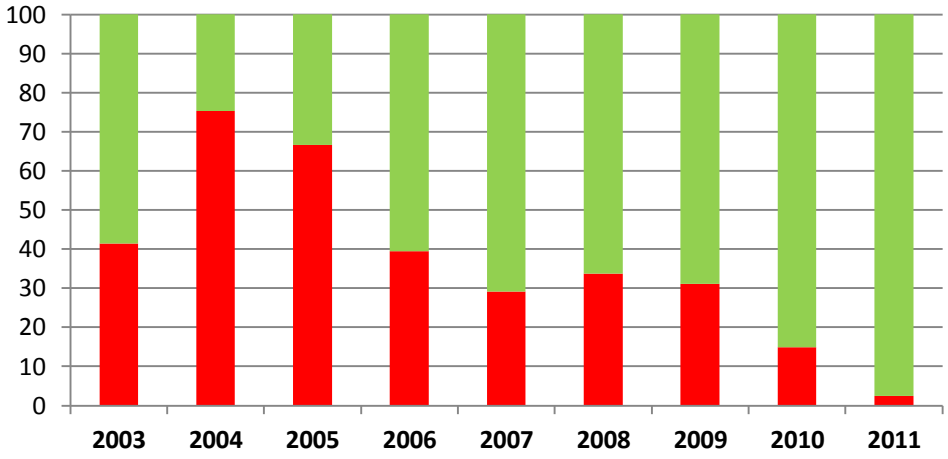


Figure K4.1: Percentage of water samples from the Petrozavodsk drinking water supply system that did not meet standards on sanitary-hygienic criteria (red columns)

In 2012, PCS continued implementation of the project "Construction and reconstruction of water treatment facilities in Petrozavodsk". The second phase of the project includes modernisation of the water pumping station and reagent facilities, and construction of ultraviolet water treatment that should allow drinking water to be treated against all pathogenic microorganisms. The second line was launched in December 2012.
In the third project phase, a stabilisation tank, horizontal flow sediment tank and mechanical dewatering sediments unit will be constructed.
The budget for the first phase of the project was over 500 million rubles (€ 12.5 million), the second phase was 304 million rubles (€ 7.6 million) and the third phase 365 million rubles (€ 9.1 million). The project was realised in cooperation with NEFCO and the Northern Dimension Environmental Partnership (NDEP – grant of € 5 million). NEFCO signed wtih PCS a long-term loan of € 11 million for the reconstruction of water and wastewater treatment systems.

K5(15): Sewage treatment in Petrozavodsk

Name, 2003:	**K5(15) Pollution of Onega Lake with communal waste waters of Petrozavodsk**
Reason, 2003:	Poorly treated effluents are discharged into the Petrozavodsk bay that is the source of potable water supply. High nutrient load promote strong eutrophication in the bay
Impact, 2003:	n/d
Impact, 2011:	The phosphorus concentration in discharged wastewater exceeded the MAC level by 43.6 times.
Measures taken:	The investment project "Modernisation of sewage treatment works in Petrozavodsk" phase 1 for 2011-2015 was elaborated; investment agreements were signed and the project launched.
Measures planned:	Implementation of the investment project on modernisation of the sewage treatment facilities to reduce phosphorus discharge
Investments:	23.1 million rubles (€ 580 thousand) used in 2011 Estimated budget for 2011-2015: 1200 million rubles (€ 32 million)
Status:	Proposed for continued joint actions within investment projects

Short description of the K5 "hot spot" and progress since 2003

Figure K5.1. Petrozavodsk sewage treatment facilities by Onega Lake. Photo: Stolica

Onega Lake water catchment area receives almost half of the discharged wastewater in the Republic of Karelia. In 2011, it received 97 million m^3 of wastewater. Petrozavodsk Communal Systems JSC (PCS) discharged 33 million m^3 of sewage into Onega Lake.

The wastewater treatment works of PCS treats up to 145 thousand m^3 of sewage a day. Originally constructed in 1979, the sewage treatment facilities offer conventional biological treatment for both industrial and municipal wastewater, and this results in a high concentration of phosphorus in the discharged waters. In 2011, the concentration of phosphorus-containing contaminants in discharged waters from the PCS sewage treatment works exceeded the Maximum Allowable Concentration (MAC) levels by 43.6 times.

In 2011, PCS started implementation of the project "Modernisation of sewage treatment works in Petrozavodsk" with a total estimated budget of 1200 million rubles (€ 32 million). The project includes rehabilitation of the wastewater treatment plant with equipment for chemical phosphorus removal. The aim is to reduce the phosphorus content in discharged sewage to 0.5 ml/l or a reduction in phosphorus discharge into Onego Lake of some 60-75 tons per year.

The project is supported by NEFCO, NIB, NDEP and the Finnish Ministry of Environment. Finnish and Swedish trust funds co-financed feasibility studies. NEFCO and NIB approved an € 11 million loan for the PCS investment programme. NDEP allocated a grant of € 5 million for co-financing the modernisation of the wastewater treatment facilities. The Finnish Ministry of Environment co-finances the programme with € 2 million. The Russian Federation, the Republic of Karelia and PCS are investing € 14 million in the programme.

K6(16): Sewage treatment in towns and settlements of the Republic of Karelia

Name, 2003:	**K6(16) Absence of municipal sewage treatment facilities in a number of smaller towns**
Reason, 2003:	Untreated wastewaters are discharged to water bodies close to drinking water intakes. In a number of cases, it creates high epidemiological risk
Impact, 2003:	Wastewater discharge: 22.1 million m^3 (8.9%) without treatment
Impact, 2011:	Wastewater discharge: 11.1 million m^3 (5.2%) without treatment
Measures taken:	Long-term regional programme "Supply of inhabitants of the Republic of Karelia with drinking water" for the period of 2011-2017 was elaborated.
Measures planned:	Implementation of projects and activities within the long-term regional programme
Investments:	23.1 million rubles (€ 580 thousand) used in 2011
Status:	Proposed for joint actions with the regional programme

Short description of the K6 "hot spot" and progress since 2003

In the past ten years, between 200 and 250 million m^3 of freshwater per year was used in the Republic of Karelia, and similar amounts of wastewater were discharged. In 2011, 213.4 million m^3 of wastewater was discharged in the Republic of Karelia. Of this, 202.52 million m^3 of wastewater was discharged to surface water bodies, among them 175.42 million m^3 of contaminated water, including 164.31 million m^3 of insufficiently treated and 11.11 million m^3 without treatment, 25.54 million m^3 of normatively clean water and 1.56 million m^3 of water sufficiently treated at sewage treatment facilities. A further 8.52 million m^3 of wastewater was discharged to other recipients than surface water bodies, and 97 million m^3 was discharged to the Onega Lake basin, 54.4 million m^3 to the White Sea basin and 22 million m^3 to Ladoga Lake.
In 2002-2010, the discharge of contaminated waters (insufficiently treated or without treatment) varied from 160 to 209 million m^3 (highest in 2004, lowest in 2010) and corresponded to 80-90% of the total wastewater discharged annually.
The calculated capacity of the 117 wastewater treatment works in Karelia is 290 million m^3 per annum. In 2011 they had an average load of 56%. There are 92 sewage treatment facilities serving 111 settlements in the republic, of these 49 offer biological treatment, 10 mechanical, 30 biological and mechanical, 1 physico-chemical and 2 full treatments.
Six municipalities – Kem, Belomorsk, Medvezhyegorsk, Pudozh, Loukhi and Kalevala – still do not have sewage treatment facilities, and wastewater is discharged directly to water bodies that are also used as drinking water sources. Wastewater discharged from the abovementioned settlements make up about 2% of the total wastewater discharged in Karelia.
The 2003 NEFCO/AMAP report proposed two projects on the construction of sewage treatment facilities in Medvezhyegorsk and Pudozh, which discharge wastewater into Onega Lake.
In 2011, the long-term programme "Supply of population of the Republic of Karelia with drinking water" for 2011-2017 was elaborated and approved by the Head of the Republic of Karelia. The overall budget of the long-term programme is 6924 million rubles (€ 173 million), including 206.6 million rubles to be invested from the federal budget, 137.4 million rubles from the regional budget and 6580.6 million rubles to be attracted from other investment sources. The programme aims to increase the total amount of treated sewage discharged from 85% in 2010 to 95% in 2017.
The programme plans construction of sewage treatment facilities in the towns and villages of the Republic of Karelia. The plan is to construct modern sewage treatment facilities in the town of Medvezhyegorsk in 2014, with estimated investments of 226.3 million rubles (€ 5.7) and to build sewage treatment facilities with biological treatment and decontamination in Pudozh in 2016, with an estimated project budget of 235.6 million rubles (€ 5.9 million).

Figure K6.1. The town of Medvezhyegorsk with 15 500 people by Onego Lake. Photo: Dmitry Veselovsky

K7(17): Heat and power plants burning fuel oil and coal in the Republic of Karelia

Name, 2003:	**K7(17) Oil and coal burning at boilers**
Reason, 2003:	For production of heat during heating season, one boiler (type PTVM-30) needs 14.8 thousand tons of boiler oil. It forms 0.82 thousand tons of SO_2
Impact, 2003:	Emissions of contaminants to air from stationery sources of: K7-1: Petrozavodskmash – 1563 tons K7-2: Olonets – 1358 tons K7-2: Muezersky – 0.161 tons K7-3: Suoyarvi – 2164 tons
Impact, 2011:	Emission of contaminants to air from stationery sources of: K7-1: Petrozavodskmash – 40 tons K7-2: Olonets – 1476 tons K7-2: Muezersky – 0.003 tons K7-3: Suoyarvi – 1493 tons
Measures taken:	Petrozavodskmash JSC converted its boilers from heavy fuel oil to natural gas in 2009. In Muezersky district, the municipal boiler house in Ledmozero village was converted to biofuel – timber waste.
Measures planned:	In Suoyarvi district, there is a plan to reconstruct the fuel oil boiler house in Veshkelitsa village and build a new boiler house (25 MW) in Suoyarvi burning local biofuel – wood, sawdust, peat. In Olonets district, a new automated heating plant on liquid fuel is due to be constructed in 2013. There is also a plan to build a heat and power plant (20 MW) on peat in Olonets. In Muezersky district, there is a plan to construct a mini-heating and power plant (0.015 MW) in Kimovaari village.
Investments:	125.5 million rubles (€ 3.1 million) invested in local biofuel production in 2007-2010
Status:	K7-1 proposed for exclusion from the "hot spot" list. Other "hot spots" proposed for joint actions

Short description of the K7-1 "hot spot" and progress since 2003

The construction of the machine-building enterprise for the pulp and paper industry was launched in Petrozavodsk in 1960, and, in 1963, Tyazhbummash delivered its first products. Now Petrozavodskmash JSC, the Company of the Atomenergomash Group – the machine-building division of Rosatom State Corporation – is one of the largest machine-building enterprises in Russia. It manufactures packages, tanks and other equipment for the nuclear power, petrochemical and pulp and paper industries. The enterprise is located in the northern industrial part of Petrozavodsk.

Petrozavodskmash was one of the first enterprises in Karelia that joined the regional programme on boiler house gasification. Over several years, one after one of all six boilers of the boiler house of Petrozavodskmash were modernised and converted from burning heavy fuel oil to natural gas. In 2008, a 90-metre high chimney stack of the most power-consuming boiler, # 6 (100 Gkal/hour), was reconstructed. In 2009, the two smallest boilers, PTVM-30 ## 3 and 4, were modernised and the reconstruction of the Petrozavodskmash boiler house, converting it from heavy fuel oil to natural gas, was

completed. As a result, the air emission of pollutants from Petrozavodskmash decreased from 1563 tons in 2003 and 886 tons in 2007 to 40 tons in 2011. After modernisation, the capacity and heat generation of the boiler house was increased, allowing Petrozavodskmash to sell additional produced heat to Petrozavodsk Communal Systems. In 2013, the Ministry of Nature Resources and Ecology of the Republic of Karelia proposed excluding the boiler house of Petrozavodskmash from the "hot spot" list.

Short description of K7-2 and K7-3 "hot spots" and progress since 2003

The Republic of Karelia comprises 127 municipalities, including 16 municipal districts, 2 town districts, 22 towns and 87 villages. About 45% of the housing utilities' services account for the heat and hot water supply. The average wear of equipment in the boiler houses exceeds 60%. Most of the boiler houses in small settlements of Karelia were built for burning coal and heavy fuel oil that was delivered to the region. At the same time, the republic has significant potential for using local biofuel (peat, wood, timber waste) as an energy resource.

The 2003 NEFCO/AMAP report proposed two projects on converting heat and power plants from heavy fuel oil to local biofuels in Olonets and Muezersky, and a project on the construction of the boiler house burning wood-waste in Kaypa village in the Suoyarvi district.

In 2007, the Government of the Republic of Karelia approved the regional target programme on Active Involvement of the Local Fuel and Energy Resources in the fuel and energy sector in the Republic of Karelia for 2007-2010, aimed at reducing the share of imported fuels, such as heavy fuel oil, coal and diesel used for heat and power supply in the region. Through the programme implementation in 2007-2010, 125.5 million rubles (€ 3.1 million) were invested in developing peat and timber waste fuel production. Six hundred hectares of peat fields were prepared for industrial peat production with an overall capacity of 30 thousand tons per year. In 2010, 22 thousand tons of peat was produced for boiler houses in Karelia.

In 2007, the Government of Karelia and Malaya Energetika JSC in co-operation with Karel-Vapo JSC started the implementation of two pilot investment projects on construction and modernisation of boiler houses burning local biofuel in Kaalamo and Helula villages of the Sortavala district. Both projects were completed with investments of 95 million rubles (€ 2.4 million).

The implementation of regional programmes on converting boilers to natural gas and biofuels resulted in a reduction in the shares of coal used from 15.2% in 2005 to 10.5% in 2010, and heavy oil from 27.2% in 2005 to 19.7% in 2010, in the Republic of Karelia's annual fuel consumption.

In 2009, the Government of the Republic of Karelia approved the Regional Strategy on Fuel Sector of the Republic of Karelia

Figure K7.1. Peat production in the Republic of Karelia
Photo: karelia.ru

Development based on Local Energy Resources for the period 2011-2020. Biofuel resources, such as wood, timber-waste and peat, were assessed and priority directions and areas defined. The strategy proposed investment projects on production and using local biofuels for heat and power production in the municipalities of the Republic of Karelia.
There is a plan to construct a new heat and power plant (20 MW) burning peat in Olonets, to build a mini-heat and power plant (0.15 MW) on biofuel in Kimovaari village and to convert the municipal boiler house to timber waste in Ledmozero village in Muezersky district. In Suoyarvi district, there is a plan to reconstruct the fuel oil boiler house in Veshkelitsa village and build a new boiler house (25 MW) in Suoyarvi town burning local biofuel – wood, sawdust and peat.
The investment complex project on Reconstruction and Building of Heat Supply Sources in the Republic of Karelia on Local Fuels is to be realised by 2015, with modernisation and construction of boiler houses in 14 towns and villages of Karelia – Sortavala, Telmana, Haapalampi, Letnerechensky, Elisenvaara, Pyaozersky, Rugozero, Vidlitsa, Harlu, Svyatozero, Essoila, Pudozh, Porosozero and Veshkelitsa.

K8(18): Waste management in the Republic of Karelia

Name, 2003:	**K8(18) Hazardous industrial solid wastes and communal wastes**
Reason, 2003:	Almost 1/3 of 206 landfills in Karelia are illegal. Landfills are often located in green zones, along forest roads, contaminate soil, surface water bodies and aquifers
Assessment, 2003:	67 million tons of production waste, including 66.4 million tons of hazard class 5 and 0.6 tons of classes 1-4; 0.5 tons of waste of hazard classes 1-5 were used and neutralised; 157 domestic waste disposal sites, most of which do not meet ecological requirements; indefinite number of illegal landfills
Assessment, 2011:	123 million tons of production and consumption waste, including 122.3 million tons of hazard class 5 and 0.7 million tons of classes 1-4; 0.6 million tons of waste of classes 1-4 were used and neutralised; 15 waste disposal sites registered officially; 290 illegal landfills identified and 72 eliminated; indefinite number of illegal landfills left
Measures taken:	Long-term regional complex investment programme on production and consumption waste management in the Republic of Karelia for the period to 2024 was elaborated and approved.
Measures planned:	Implementation of the long-term regional investment programme on waste management in the Republic of Karelia with the establishment of 4 licensed waste disposal fields and 14 waste transfer stations by 2017 and the construction of 4 waste processing plants by 2024
Investments:	Estimated budget of the long-term programme: 3380 million rubles (€ 84.5 million) for 2012-2024
Status:	Proposed for joint actions with the regional target programme

Short description of the K8 "hot spot" and progress since 2003

In 2003, 67 million tons of waste of hazard classes 1-5 was produced in the Republic of Karelia and in 2011, 123 million tons, according to official reports of enterprises. Of the waste, 99% was of hazard class 5, and most it (120.5 out of 122.3 million tons in 2011) was formed by Karelsky Okatysh JSC mines in the Kostomuksha area.
In 2011, 123 025.52 thousand tons of waste was produced, including 41.1 tons of waste of (the most dangerous) hazard class 1; 101.8 tons of class 2; 14 798 tons of class 3; and 662 056 tons of hazard class 4. Of the waste, 5.5% was decontaminated, 94.6% disposed of at the enterprises' own sites and 0.2% delivered to other companies. Waste of hazard class 1 (mercury- and trichlorodiphenil-containing devices) was collected and transported from Karelia for treatment. In 2011, two municipalities – Petrozavodsk city and Sortavala district – elaborated plans for collection and transportation of mercury-containing lamps (waste of hazard class 1). Waste of hazard class 2was utilised and neutralised in the republic. In 2011, 57.4% of the waste of hazard class 3 was utilised, 29.1% neutralised, 8.4% placed in storage and 5.1% disposed of. Of the production waste, 87% of hazard class 4 (waste of bark, asphalt, concrete, ash, sludge) was utilised, and 13% disposed of, neutralised or placed in storage. Of the bark waste, 98% was utilised at boiler houses of pulp and paper mills.
About 420 thousand tons of household waste is formed in the republic per year (614 kg per capita). In 2011, storage, transportation and disposal of solid household waste were carried out in 89 settlements of the republic, and scheduled waste transportation was arranged in other settlements. There are 96 landfills and household waste disposal fields operating in the region. Most of the household waste of classes 4-5 is placed for disposal without sorting. Altogether, 15 municipal landfills are officially registered in Karelia. It is estimated that about 30% or 100 thousand tons of household waste is placed in illegal landfills. In 2011, environmental authorities identified 290 illegal landfills with household waste in the Republic of Karelia, 72 of them were eliminated.
The 2003 NEFCO/AMAP report proposed realising projects on organisation of a waste management system in Karelia and construction of a hazardous waste treatment plant.
In 2011, the project Waste Awareness: Sorting, Treatment, Education was launched in Petrozavodsk with support from the Nordic Council of Ministers as a follow-up of the waste sorting project initiated in 2009.
In 2012, the Government of the Republic of Karelia approved the long-term investment programme on Production and Consumption Waste Management in the Republic of Karelia for the period 2012-2024. The programme is aimed at establishing an economically efficient and investment-attractive waste management sector in the Republic of Karelia, reducing the environmental impact of waste by decreasing waste disposal, and increasing waste utilisation and processing. The plan is to build four licensed inter-municipal waste fields in the areas of Petrozavodsk, Kostomuksha, Segezha and Sortavala; establish 14 waste transfer stations; and eliminate 80 landfills in the first phase of the programme implementation by 2017; and to arrange waste sorting, construct four waste processing plants at inter-municipal waste fields and eliminate 179 landfills within the second phase in 2018-2024.
The estimated budget for the first phase of the long-term programme is 560 million rubles (€ 14 million), and 2280 million rubles (€ 57 million) for the second phase.
Following the long-term republican programme, Karelian municipalities are elaborating and approving municipal target programmes on waste management. Such programmes have been approved in 17 municipalities of the republic.

K9(19): Waste dumping ground Gorelaya Zemlya in north Petrozavodsk

Name, 2003:	**K9(19) Negative impact of former municipal dumping ground of sewage on ecosystems of Logmozero and Onego lakes, Petrozavodsk city**
Reason, 2003:	Surface dump of production wastes of JSC Petrozavodskmash is located on a place of a former municipal dumping ground of sewage. Urregulated dumping has converted it into a dumping ground of industrial and municipal wastes of the northern part of the city
Impact, 2003:	Contamination of ground waters with possible impact on the Logmozero and Onego lakes
Impact, 2011:	n/d
Measures taken:	In 2003-2012, an existing dam was reinforced, a soil road expanded, vertical grading of the disposal ground planned, and local environmental monitoring arranged
Measures planned:	Restoration of Gorelya Zemlya waste dumping ground according to the approved project by 2018. Carrying out environmental impact assessments
Investments:	n/d
Status:	Proposed for re-naming and joint actions

Short description of the K9 "hot spot" and progress since 2003

In 1976, Tyazhbummash enterprise, now Petrozavodskmash JSC, received a territory of 6.5 hectares as a waste disposal area for casting process waste – spent moulding mix and core sand – on the area of a former sewage dump on the Peski site on the northern industrial part of Petrozavodsk.
In 1980, the working project, Disposal of Casting Process Waste, was elaborated. The plan was to fill the former sewage dump with burnt soil and to carry out further land restoration. The project was not realised as the area, Gorelaya Zemlya (burnt soil), had long been used for uncontrolled dumping of industrial and municipal waste from north Petrozavodsk. Environmental studies, carried out by regional research institutes in the period 1996-2001, showed that contaminants were washed out of the Gorelaya Zemlya dump site by precipitation and melted snow into an adjusted swamp connected to Logmozero Lake, which also had impacts from other sources of pollution in the lake water catchment area.
The 2003 NEFCO/AMAP report proposed a project on localisation of the negative effects of the former municipal dumping ground on the ecosystems of the Logmozero and Onego lakes.
In 2005, Petrozavodskmash JSC received the safety certificate confirming that casting process waste (spent moulding mix and core sand) is hazard class 4 – low-hazard waste.
In 2006, the project documentation for the construction and measurements aimed at Environmental Protection at the Gorelaya Zemlya dump site in Peski was elaborated and approved. The project implementation period is up to 2018. According to the project, the 6.5 hectare area of the Gorelaya Zemlya dump site and the damaged area of 12 hectares should be restored by filling in 185 941 m^3 of soil. The project proposed using casting process waste as building construction (filling) material. The project on area restoration consists of two stages – technological and biological. The technological stage includes

the digging of catch-water drains, construction of access roads, construction of water treatment facilities, reinforcement of the dam, vertical grading of the dam and restoration of the waterlogged basin. The biological stage includes selection of seeds, trees and bushes for planting and remediation of the area.
In 2003-2012, Petrozavodskmash delivered 213.7 thousand tons of casting process waste to the Gorelaya Zemlya site, reinforced the existing dam, expanded the soil road, planned the vertical grading of the disposal ground and arranged site guarding and local environmental monitoring. Now, the slope of the dump is reinforced with industrial waste as burnt soil (spent moulding and core mix), furnace scrap (furnace broken quartz lining) and ferrous costing slag.
In 2013, the Ministry of Nature Resources and Ecology of the Republic of Karelia proposed carrying out an environmental impact assessment of the Gorelaya Zemlya dump site on the Logmozero and Onego lakes, and to rename the "hot spot".

K10(20): Stocks of obsolete pesticides in the Republic of Karelia

Name, 2003:	**K10(20) Stocks of obsolete pesticides**
Reason, 2003:	2.5 tons of obsolete DDT is stored in Sortavala Agroservice in poor conditions.
Impact, 2003:	High risk of poorly stored hazardous waste impact
Impact, 2011:	Eliminated
Measures taken:	12 tons of obsolete pesticides were destroyed at Ekokem Oy, Finland within the Russian-Finnish project
Measures planned:	n/d
Investments:	€ 35 100
Status:	Excluded from the "hot spot" list

Short description of the K10 "hot spot" and progress since 2003

According to the 2003 NEFCO/AMAP report, more than 20 tons of obsolete pesticides were in stocks in the Republic of Karelia, and some 8.6 tons of these were stored in poor conditions. The report proposed a project on the elimination of a stock of obsolete DDT in Sortavala Agroservice JSC that was produced in 1979 and stored in poor conditions. It also stated that 4.1 tons of an unidentified mixture of pesticides had been stored in Agrokhimiya JSC since 1975 in paper bags in a bad state.
The Russian federal legislation declares that any pesticides or other unusable agricultural chemicals must be decontaminated, processed and destroyed. The Ministry of Agriculture, Fisheries and Ecology of the Republic of Karelia included the project on processing pesticides in the waste sub-programme of the regional task programme Ecology and Nature Resources of the Republic of Karelia for the period 2004-2010.
In 2005, the joint Russian-Finnish project was initiated for the transportation of obsolete pesticides from the Republic of Karelia to Finland for processing, taking into account that there was no specialised facility for processing hazardous waste in Karelia and that Finland could provide those services in compliance with international requirements.
The Russian-Finnish project was realised in 2006-2008 in cooperation between the Government of the Republic of Karelia and the Ministry of Environment of Finland. The Finnish Company Ekokem Oy Ab based in Riihimaki, which provides waste processing

services, was chosen as the project partner for delivery and processing of obsolete pesticides, and the Russian Company Agrokhimiya JSC was chosen to arrange the collection and storage of the pesticides in Karelia. The agreement on the export of 12 tons of obsolete pesticides prohibited for use (including 2315 kg of DDT stored at Sortavala Agroservice) from the Republic of Karelia to Finland was reached in 2007, and 12 tons of obsolete pesticides from 23 different warehouses in Karelia were collected at the specialised storage in Agrokhimiya in Petrozavodsk and repacked for transportation to Finland. All necessary permissions for hazardous waste export, including the permit from the Finnish jurisdiction body of the Basel Convention, were arranged during 2007 and 2008.

Figure K5.1. Twelve tons of obsolete pesticides were collected and stored at Agrokhimiya storage in Petrozavodsk (photo) in 2007, delivered to Finland and destroyed at Ekokem Oy Ab in 2008. Photo: Nina Maentylae, Ekokem Oy

12 tons of pesticides, including 2315 kg of DDT from Sortavala Agroservice, were delivered to Ekokem Oy Ab on 12 June 2008 and destroyed by 08 July 2008 at high-temperature thermal facilities in accordance with the Basel and Stockholm Conventions.

The Russian-Finnish project was financed by the Ministry of Environment of Finland (€ 27 000) and the Ministry of Agriculture, Fisheries and Ecology of the Republic of Karelia (€ 8100).

In 2004-2008, 22.1 tons of obsolete and unused pesticides stored in the Republic of Karelia were processed within the regional task programme implementation, including 12 tons of pesticides exported and destroyed in Finland.

The BEAC Environmental Ministers assented to the exclusion of the Barents environmental "hot spot" stock of obsolete pesticides (K-10) from the list at their meeting in 2011.

5.3 Environmental status and "hot spots" in the Arkhangelsk region

5.3.1 Environmental status of the Arkhangelsk region

The Arkhangelsk region covers 589.9 thousand square km. The population of the region is 1185 thousand, of which the urban population makes up 74%, and the population density is 2.0/km^2. The main cities are Arkhangelsk (355.8 thousand), Severodvinsk (193.6 thousand), Kotlas (60.6 thousand), Koryazhma (39.6 thousand) and Novodvinsk (41.9 thousand). The GRP in 2011 was 210 134.1 million rubles.

The main rivers are the Northern Dvina (with its tributaries Pinega and Vychegda), Onega and Mezen'. There are about 2500 lakes in the Arkhangelsk region.

Key environmental indicators in 2011

Total atmospheric emissions per unit of GRP, tons/million rubles	1.5
Percentage of population living in cities with high and very high levels of air pollution (ICA > 7)	29.8%
Proportion of contaminated wastewater of the total wastewater discharges, %	59.3%
Quality of drinking water (percentage of water samples that meet the quality standards), %	59.1%
Formation of waste per unit of GRP, tons/million rubles	104.6

Atmospheric emissions

In 2011, the volume of industrial emissions was 214.9 thousand tons and the transport emissions were 102.4 thousand tons. In 2003, these parameters were characterised by the values 258.9 and 64.7 thousand tons, respectively. The biggest volumes of industrial emissions (269.4 tonnes) and transport emissions (121.9 thousand tons) were recorded in 2006 and 2007, respectively. In the last five years there has been a trend to reduce emissions. The specific volume of industrial emissions per unit of GRP decreased during the last decade.

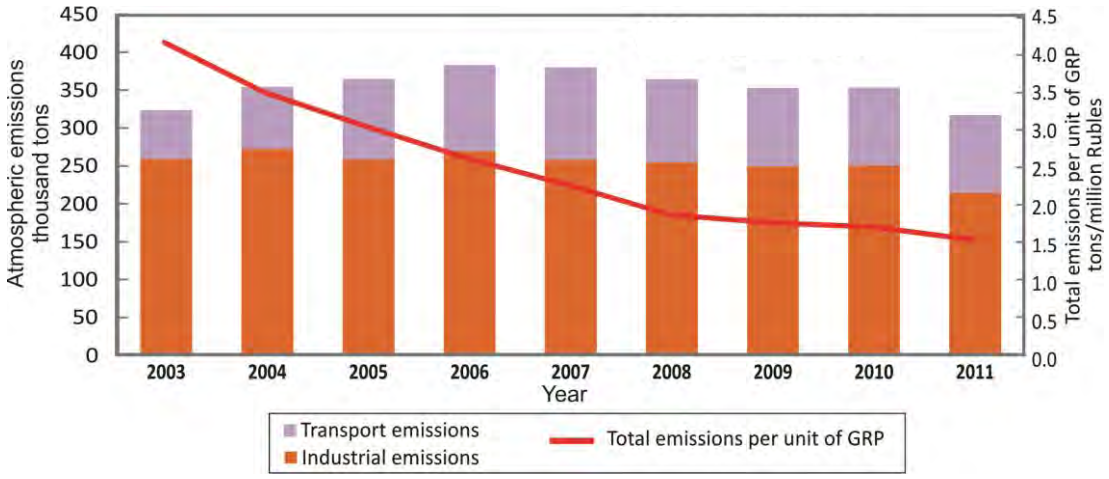


Figure 5.3.1. Dynamics of atmospheric emissions in the Arkhangelsk region in 2003-2011

In 2011, the main contributions to the total volume of industrial emissions were made by companies for the production and distribution of electricity, gas and water (45.8%), pulp and paper industry (29.0%), transport and communication enterprises (15.0%).

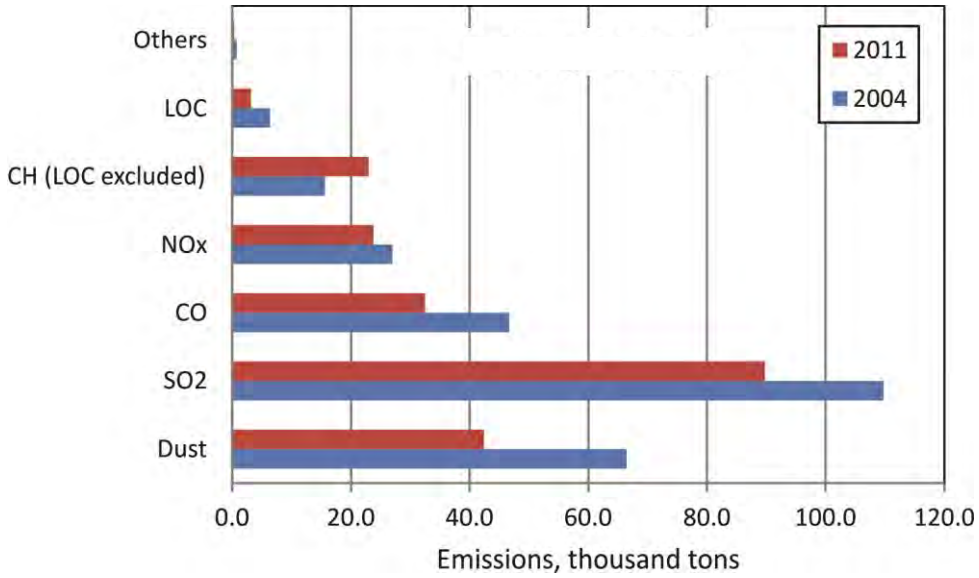


Figure 5.3.2. Structure of industrial emissions in the Archangelsk region in 2004 and 2011

In 2004, liquid and gaseous contaminants made up 75.6% of the total industrial emissions. In 2011, the proportion of these pollutants increased to 80.3%. SO_2, CO, NOx and CH prevailed in the structure of industrial emissions in both 2004 and 2011, however, if the relative contents of SO_2, CO and NO_X in 2004 and 2011 changed slightly, the percentage of CH increased almost two-fold: from 5.7% (in 2004) to 10.7% (in 2011).

Urban air quality

In the Arkhangelsk region, high levels of air pollution with dust and nitrogen oxide were registered in 2011. Several times during this year, high levels of air pollution with benzo(a) pyrene were also recorded. In Severodvinsk, the average concentration of formaldehyde was higher than normal, but high or extremely high levels of air pollution were not registered.

Over the past ten years in the Arkhangelsk region, the level of air pollution with nitrogen dioxide, formaldehyde, carbon monoxide and dust increased, while the average annual concentration of benzo(a)pyrene and sulphur dioxide decreased. In Severodvinsk, the level of air pollution with formaldehyde increased, but the average concentrations of benzo(a)pyrene, sulphur dioxide, carbon monoxide and dust decreased.

Overall, the urban air quality in the Arkhangelsk region improved. The proportion of the population living in cities with high or very high levels of air pollution has decreased from 66-58% in 2002-2008 to 30% in 2011.

Wastewater

In 2011, the total volume of wastewater was 631.93 million m^3, including 374.63 million m^3 (59.3%) of contaminated wastewater. The volume of discharged polluted wastewater decreased by 9.3% (38.4 million m^3) compared with 2010, so the downward trend in wastewater discharge, which took place in the 2002-2010 period, when the volume of wastewater decreased from 513 million m^3 to 413 million m^3, was maintained.

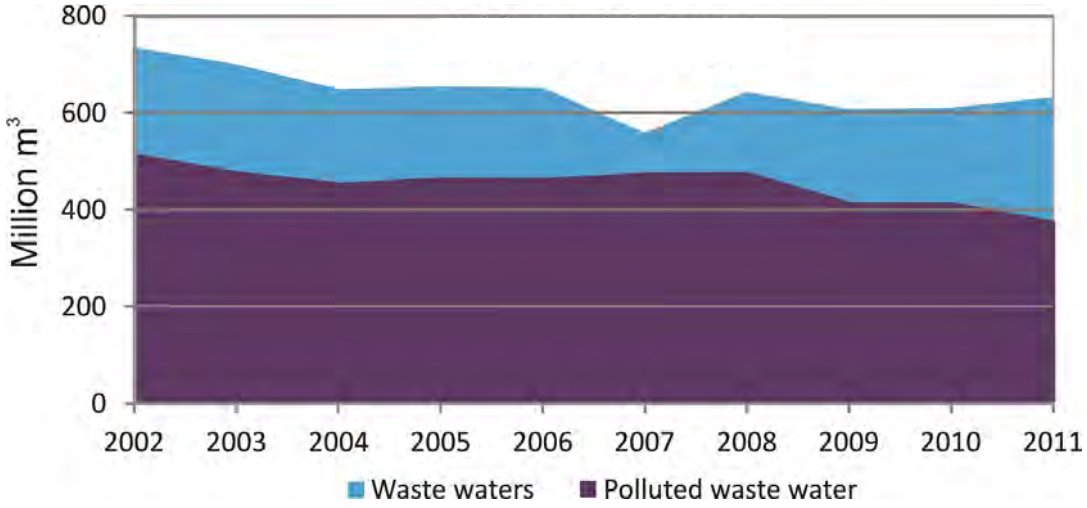


Figure 5.3.3. Dynamics of wastewater discharges in the Arkhangelsk region in 2002-2011.

Over the last decade, the proportion of contaminated water of the total volume of wastewater discharged also decreased from 70% in 2002 to 59.3% in 2011.
Two companies, the Koryazhma branch of the Ilim Group and Arkhangelsk PPM, are the major polluters of water bodies. The contribution by these companies makes up 61.08% of the total discharged polluted wastewater.

Drinking water

Drinking water quality is a major concern of the Arkhangelsk region. In 2011, the proportion of samples of tap water that met the relevant health standards was 59.1%, which is slightly lower than in 2010 (60.1%) but higher than in the period 2002-2009 (46.3-57.8%).

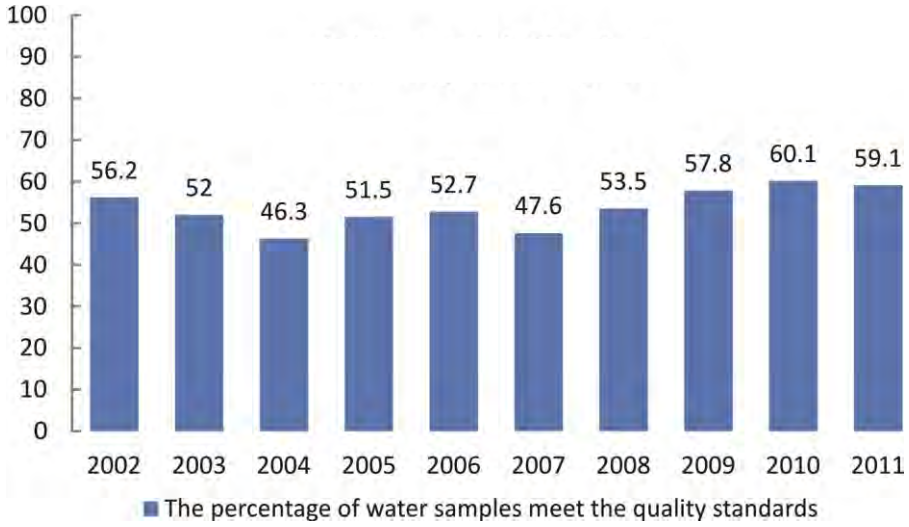


Figure 5.3.4. Change in the quality of drinking water in the Arkhangelsk region in 2002-2011

The main reason for the poor quality of drinking water is that the main sources of centralised water supply are surface water bodies that are contaminated by industrial wastewater. To date, the alternative sources of water supply have not been determined, although work in this direction in the Arkhangelsk region is under way.

Production and consumption waste

The dynamics of the formation of production and consumption waste in the Arkhangelsk region show that in the period from 2002 to 2007, the amount of waste increased from 3.29 million tons to 22.4 million tons. It then declined to 8.1 million tons in 2010 and increased again to 38.431 million tons in 2011. The increase in the volume of waste in 2007, and in 2011, was associated with an increase in digging. In 2011, the main contribution to the increase in waste formation was therefore contributed by the companies extracting minerals, such as Severalmaz JSC and Arkhangelsk Geological and Mining Enterprises JSC, in connection with the development in 2011 of new fields.

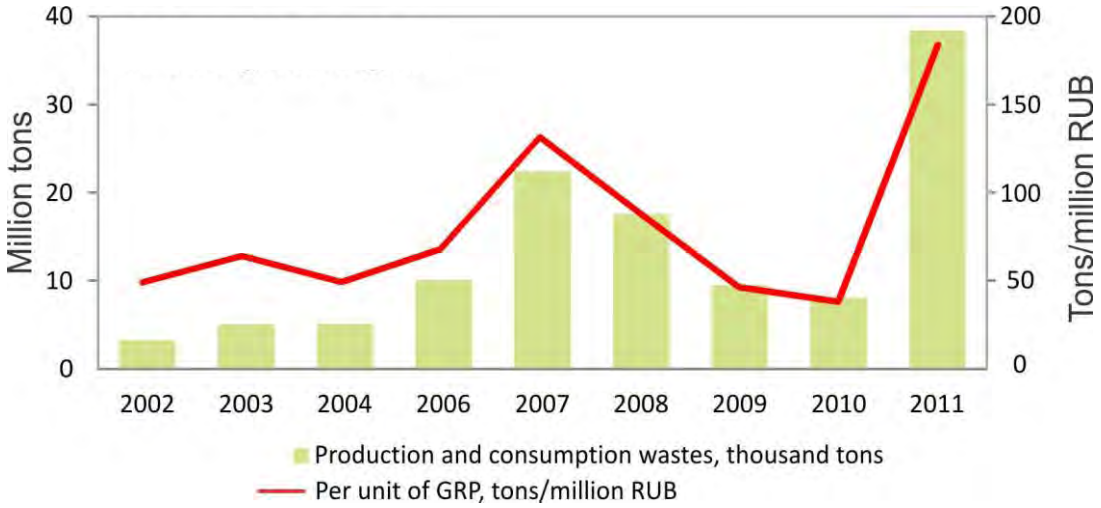


Figure 5.3.5. Dynamics of production and consumption waste formation in the Arkhangelsk region in 2002-2011

5.3.2 Environmental "hot spots" in the Arkhangelsk region

The 2003 NEFCO/AMAP report defined 10 environmental "hot spots" and proposed 14 environmentally sound investment projects connected to them in the Arkhangelsk region. In this chapter, we present the list of these "hot spots" as they were defined and described in the 2003 Report and short summaries of the current status of the "hot spots" based, primarily, on the Screening and Analyses reports provided by the Hot spot Exclusion Group in the Arkhangelsk region. We also use information from the regional annual reports on the environmental status in the Arkhangelsk region, press releases from the enterprises i.e. "hot spot" owners, and meetings with federal and regional environmental authorities and research institutes working in the region.

A1(21): Solombala Pulp and Paper Mill of Solobalales Holding, Arkhangelsk

Name, 2003:	**A1(21) Solombala Pulp and Paper Mill (SPPM), Arkhangelsk**
Reason, 2003:	Air emission is almost 20% of total in Arkhangelsk, all air pollution with specific contaminants and dust originates from SPPM. SPPM waste water treatment plant treats both its own waste waters and communal effluents. In total, it is 85% of total waste water discharge from the city
Impact, 2003:	Emission to air: 8480 t/year Discharge to water: n/d
Impact, 2011:	Emission to air: 6200 t/year Wastewater discharge: 59.9 million m^3/year (2010)
Measures taken:	Boiler # 5 was reconstructed and converted to burning wood waste instead of coal; gas treatment equipment was installed to reduce dust emissions; the soda recovery boiler was reconstructed and an electrical filter installed to reduce the sodium sulphate emissions
Measures planned:	Reconstruction of the sewage treatment facilities to receive and treat up to 165 thousand m^3 of sewage per day
Status:	Proposed for joint actions, elaboration and implementation

Short description of the A1 "hot spot" and progress since 2003

Solombala Pulp and Paper Mill (SPPM) was a leading Russian enterprise in the production and export of coniferous kraft pulp.

SPPM has changed the aeration system in the sewage water facilities and reduced the discharge of specific pollutants with wastewaters. The enterprise has also reduced the amount of water used for production in recent years. The wastewater treatment facilities of SPPM receive industrial wastewater from the enterprise as well as sewage water from Arkhangelsk city delivered by Vodokanal for treatment. SPPM emits 55 contaminants to air, including specific ones such as H_2S and methylmercaptan.

In 2002-2004, boiler unit # 5 of Heating Power Central # 1 was modernised to burn wood waste instead of coal and heavy fuel oil, and an electric filter was installed. This resulted in a reduction of dust, SO_2 and NO_X emissions.

In 2006, gas cleaning equipment was installed to reduce dust emissions. In 2006-2007, the burner on SRB-1 of heating power plant # 2 (HPP-2) was changed and a new electrical filter installed. This resulted in a reduction of the sodium sulphate content in the air emissions. In 2006, SPPM was certified with ISO 14001:2004.

In 2010, SPPM discharged 59.9 million m^3 of wastewaters (within agreed limits), including 59.1 million m^3 from outlet # 1 after biological treatment of the sewage waters from Arkhangelsk city and industrial wastewaters of SMMP; and 0.8 million m^3 from outlet # 2 after mechanical treatment of the wastewaters of Heat and Power Plant # 1 (HPP-1). There were registered one-time concentrations of COD and mercapto lignin exceeding the Maximum Allowable Concentration levels (MAC). SPPM discharges contaminants with wastewater within the Temporary Agreed Discharge limits (TAD).

In 2011, the total emission of pollutants from SPPM was at the level of 6200 t/year, which corresponded to a 3% share for the Arkhangelsk region. The emission levels of methanol, formalin, methylmercaptan, sodium sulphate, non-organic and timber dust exceeded the Maximum Allowable Emission levels (MAE).

A2(22): Arkhangelsk Heat and Power Plant of Territorial Generating Company # 2, Arkhangelsk

Name, 2003:	**A2(22) Arkhangelsk Heat and Power Plant (AHPP), Arkhangelsk**
Reasons, 2003:	AHPP emits almost 45% of total contaminants in the city, mostly acidifying compounds.
Impact, 2003:	Emission to air: 28 068.9 t/year
Impact, 2011:	Emission to air: 13 837.2 t/year
Measures taken:	Conversion of boiler units # 1-6 and water heating unit # 1 from burning heavy fuel oil to burning natural gas
Measures planned:	Reduction of emissions of pollutants to air with the use of natural gas as no less than 90% of the total fuel
Investments:	466.9 million rubles (€ 12 million) of own means
Status:	Applied for exclusion from the "hot spot" list

Short description of the A2 "hot spot" and progress since 2003

The Arkhangelsk Heating Power Plant (AHPP) is part of Territorial Generating Company # 2 JSC (TGC-2). The plant provides heating, hot water and energy for enterprises and residential buildings in the city of Arkhangelsk.

AHHP was put into operation in 1970. It has installed six power boiler units and three water heating boiler units. The installed electricity capacity is 450 MW and the heating capacity is 1168 Gcal/h. The installed electricity capacity is 450 MW.

Until 2011, heavy fuel oil (M-100) was used as the main fuel for boilers at AHPP.

In 2010, boiler units # 1-4 converted from burning heavy fuel oil to natural gas.

In 2011, boiler units # 5-6 and water heating unit # 1 converted to burning natural gas. This resulted in a reduction of total emissions from 38 998.672 t/year in 2010 to 13 837.233 t/year in 2011, with the main reductions being SO_2 – 64.4%, CO – 58.5%, and ashes – 71.3%. Emissions of NO_X were reduced by 11.2%.

In 2012, AHPP planned to reduce the air emissions of pollutants by 90% versus 2010 to reach the level of about 3000 t/year.

AHPP's share of total air emissions of pollutants in the Arkhangelsk region in 2010 was 15.6% and in 2011 it was 6.7%.

In 2011, an external environmental audit confirmed compliance of the TGC-2 integrated management system with ISO 14001:2004, OHSAS 18001:2007 and ISO 9001:2008.

In 2012, Arkhangelsk HPP of TGC-2 applied for exclusion from the Barents Environmental "Hot Spot" List.

Figure A2.1. Arkhangelsk Heat and Power Plant. Photo: Gazpromrg.ru

A3-1(23): Severodvinsk Heat and Power Plant # 1 of TGC # 2, Severodvinsk

Name, 2003:	**A3(23) Severodvinsk Heat and Power Plants**
Reasons, 2003:	HPPs are responsible for 95% of gas emissions in the city. HPP-1 is the matter of particular concern due to emission of 95% of dust
Impact, 2003:	Emission to air: 35 153.58 t/year
Impact, 2011:	Emission to air: 42 057.76 t/year
Measures taken:	Installation of low-emission vortex coal burning technology at one boiler; using coal with better environmental performance (less ash and lower sulphur content) as not less than 25% of the total fuel
Measures planned:	2013-2017: Installation of low-emission vortex technology for burning coal at 3 boilers 2015-2017: Installation of equipment of "wet" purification of gases (KOCH emulsifier) with a 99.5% ash-catching coefficient; using coal with better environmental performance (less ash and sulphur content) as not less than 25% of the total fuel
Investments:	7.324 million rubles (€ 183 000) in 2010 and 2011
Status:	Applied for exclusion from the "hot spot" list

Short description of the A3-1 "hot spot" and progress since 2003

Severodvinsk Heating Power Plant # 1(SHPP-1) is part of TGC-2. The plant provides heating, hot water and energy for enterprises and residential buildings in the town of Severodvinsk.

SHPP-1 was commissioned in 1941. It has installed six PK-10-2 power engine boilers and one PTVM-180 water heating boiler. The installed electricity capacity is 188.5 MW and the heating capacity is 634 Gcal/h. The installed electricity capacity is 188.5 MW.

The main fuel burned in the PK-10-2 boiler units is a mix of coal from Inta, Vorkuta, Kuznetsk and Khakassiya. Heavy fuel oil M-100 is used for kindling and lighting. The annual consumption of heavy fuel oil is less than 5% of the fuel total.

SHPP-1 emits coal ashes, inorganic dust containing 20-70% SiO_2, SO_2, NO_X, fuel oil ashes and CO to the atmosphere.

All PK-10-2 boiler units are fitted with ash removal equipment with Venturi MV tubes. The efficiency of the ash removal installations is 95%.

In 2005, low-emission vortex coal burning technology (VIR technology) was put into use at two of the station's boiler units, # 4 and 8, which helped to reduce the NO_X emissions.

In 2012, VIR technology was introduced at boiler unit # 6, which should result in a four-fold reduction of NO_X emissions in 2012 versus 2008.

In 2010, the total air emission of pollutants from SHPP-1 was 45 480.03 t/year, and in 2011 it was 42 057.76 t/year. SHPP-1's share of the total air emissions in the Arkhangelsk region in 2010 was 18.1%, and in 2011 it was 20.3%. The increase in the share was due to the total reduction of air emissions of pollutants in the region in 2011 versus 2010.

In 2011, the external environmental audit confirmed compliance of the TGC-2 integrated management system with ISO 14001:2004, OHSAS 18001:2007 and ISO 9001:2008.

In 2012, Severodvinsk HPP-1 applied for exclusion from the Barents Environmental "Hot Spot" List.

A3-2(23): Severodvinsk Heat and Power Central # 2 of TGC # 2, Severodvinsk

Name, 2003:	**A3(23) Severodvinsk Heat and Power Plants**
Reasons, 2003:	HPPs are responsible for 95% of gas emissions in the city.
Impact, 2003:	Emission to air: 13 933.731 t/year
Impact, 2011:	Emission to air: 16 893.259 t/year
Measures taken:	2011: Boiler units # 1, 2 and 3 converted to burning natural gas 2012: Boiler unit # 4 and water heating units # 1 and 2 converted to burning natural gas
Measures planned:	Use of natural gas as no less than 90% of the total fuel
Investments:	489.2 million rubles (€ 12.5 million) in 2010 and 2011
Status:	Applied for exclusion from the "hot spot" list

Short description of the A3-2 "hot spot" and progress since 2003

Figure A3.2. Severodvinsk Heat and Power Plant # 2
Photo: Nordportal.ru

Severodvinsk Heating Power Plant # 2 (SHPP-2) is part of TGC-2. The plant provides heating, hot water and energy for enterprises and residential buildings in the town of Severodvinsk.
SHPP-1 was commissioned in 1972. It has installed four energy units, each of which consists of a TGME-464 boiler with a steam capacity of 500 t/h, and a PT-80/100-130/13 combined heat- and power-producing turbine with electricity capacity of 80 MWt in unit # 1, and T-110/120-130 turbines with an electricity capacity of 110 MWt in units # 2, 3 and 4. Four water-heating boilers are installed to cover the top heating loads at SHPP-2. The total installed electrical capacity of SHPP-2 is 410 MWt, and the heating capacity is 1105 Gcal/h.
Until 2010, the heavy fuel oil M-100 was used as the main fuel at SHPP-2, and NO_X, CO, SO_2 and fuel oil ashes were emitted to air. In 2012, natural gas was introduced as fuel at SHPP-2.
In 2010, the total air emission of pollutants from SHPP-2 was 21 490 t/year, and in 2011 it was 16 893 t/year. SO_2 then had an 88.5% share of the total air emissions. The SHPP-1 share of the total air emissions in the Arkhangelsk region in 2011 was 8.2%. In 2012, the total air emissions of pollutants should be reduced to about 88% versus 2011, when SO_2 emissions should be reduced to 89% and fuel oil ashes emissions to 91%.
In 2012, Severodvinsk HPP-2 applied for an exclusion from the Barents Environmental "Hot Spot" List.

A4(24): Arkhangelsk Pulp and Paper Mill JSC, Novodvinsk

Name, 2003:	**A4(24) Arkhangelsk pulp and paper mill (APPM), Novodvinsk**
Reasons, 2003:	A4-1: It is the only PPM in the region that increased its gas emissions since the first NEFCO/AMAP Report. Its annual emission is comparable with total emission in Arkhangelsk city. Emissions of specific contaminants and dust are of particular concern. A4-2: APPM is the large discharger of waste waters in the region (32%). Being located upstream Arkhangelsk in its vicinity, creates permanent environmental and health hazard for the city
Impact, 2003:	Emission to air: 49 547 t/year Discharge to water: 29 278 t/year
Impact, 2011:	Emission to air: 42 124 t/year Discharge to water: 14 545 t/year
Measures taken:	A4-1: Reconstruction of boilers; installation of a steam gas cleaning system (absorber); reconstruction of soda recovery boilers A4-2: Reconstruction of wastewater treatment facilities for pulp production with the introduction of elemental chlorine free pulp production
Measures planned:	Construction of a new line for pulp production, a new evaporator plant, and a new soda recovery boiler equipped with high-performance gas treatment facilities
Investments:	4100 million rubles (€ 102 million) of own means
Status:	Applied for exclusion from the "hot spot" list

Short description of the A4-1 "hot spot" and progress since 2003

Arkhangelsk Pulp and Paper Mill (APPM) in Novodvinsk specialises in the production of cardboard and cardboard transportation packages, commercial bleached pulp, fibreboard, paper and bleached paper goods. From 2003 to 2011, the pulp production volume increased by 8% up to 832 965 tons per year. APPM fully covers the heating and water supply needs of the town of Novodvinsk and carries out the wastewater treatment for the city. The pulp and paper industry creates major problems of air pollution. In 2003, APPM industrial emissions to the atmosphere made up 99% of all the air emissions in Novodvinsk.

As established by the inventories in 2009-2010, APPM possessed 344 sources of emissions of pollutants to air. The sources of emissions are equipped with gas treatment facilities. The efficiency of the treatment corresponds to the design values.

In 2011, the share of SO_2 of the total emissions amounted to 53% while the contribution of coal ashes was 26%. Most emissions from thermal power plant # 1 were performed within the Maximum Allowable Emission levels (MAE), with two exclusions: H_2S and methyl mercaptan. Emissions of these contaminants are within the Temporary Agreed Emission levels (TAE), while the company carries out activities to reach the MAE.

A reduction in the negative environmental impact and introduction of environmental standards in production is part of the business strategy of APPM, allowing for successful competition on the European market. The company is implementing projects for the

Figure A4.1. The town of Novodvinsk and Arkhangelsk Pulp and Paper Mill by the Northern Dvina River
Photo: Severka

reconstruction of the existing capacity and optimisation of the production processes, the introduction of best available technologies (BAT) aimed at lowering the formation of pollutants in the industrial cycle and the introduction of energy-efficient and resource-saving technologies.

In 2003-2011, the following activities were carried to reduce emissions: reconstruction of boiler unit # 5 of heating power plant # 1 with the introduction of a high-efficiency technique for the treatment of flue gases to remove coal ashes (emulgators) as well as technological methods for the suppression of the creation of nitrogen oxides; putting into operation the new boiler in compartment # 10 of heating power plant # 1 with the introduction of a modern technique for the treatment of flue gases to remove coal ashes; reconstruction of boiler unit KM st. # 2 of heating power plant # 3 with the introduction of best available technology (BAT) for the fluidised bed combustion of wood and bark fuel and the replacement of the gas treatment equipment (scrubber) with a high-performance Alstom electric filter; installation of boiler E-75 st. # 1 of heating power plant # 3 and introduction of BAT, i.e. burning wood and bark fuel using fluidised bed combustion and also replacing the gas treatment equipment by an electric filter, mounting of the unit for reception and preparation of wood and bark waste; installation of a system for the treatment of steam and gas (absorber) from the turpentine heat exchangers and the horizontal tank for black liquor in the boiler of the cardboard production workshop; reconstruction of soda recovery boiler # 2 (SRB-2) at the cardboard production unit, including the replacement of the electric filterr; upgrade of the ecl ectic filter SRB-4 at the pulp production unit with the replacement of the settling and coronate systems with equipment delivered by the closed joint-stock company Fingo Engineering, securing high performance treatment of the SRB emissions; upgrade of SRB-3 and SRB-1 including the replacement of the water economisers, and installation of new electric filters with a treatment efficiency of 99%.

In the period 2003-2011, emissions of pollutants into the air decreased by 15%, or 7.4 thousand tons, including: coal ashes by 2100 tons (or 16%), suspended solids by 800 tons (or 67%), sodium sulphate dust by 12 000 tons (or 58%); methylmercaptan by 5 tons (or 25%), hydrogen sulphide by 26 tons (or 30%), turpentine by 400 tons (or 77%), sulphur dioxide by 1200 tons (or 5%), carbon monoxide by 1500 tons (or 42%).

In 2011, according to Rosprirodnadzor, there were registered one-time industrial air emissions of hydrogen sulphide and methylmercaptan from APPM above the Maximum Allowable Emission levels (MAE, g/s). Industrial air emissions of these two contaminants fall within the Temporary Agreed Emission limits (TAE).

Short description of the A4-2 "hot spot" and progress since 2003

APPM is one of the biggest wastewater dischargers in the Arkhangelsk region. In 2003, its contribution to the total wastewater discharge amounted to 32%.
APPM has a biological treatment plant and facilities for the mechanical treatment of conditionally clean industrial and household wastewater from the company and the town of Novodvinsk. Treated wastewater is discharged into the Northern Dvina River.
Currently, most discharges of pollutants into water bodies are within the Maximum Allowable Discharge levels (MAD), except for COD, BOD and suspended solids. Discharges of these pollutants are within the Temporary Agreed Discharge levels (TAD) while the company is carrying out activities to reach the MAD. The main contribution to the total discharge of pollutants is made by the integrated indicator COD at 62%, sulphate lignin at 14 %, BOD at 10% and suspended solids at 11.5%.
In 2003-2011, the following activities were carried out aimed at reducing the contaminants discharge: a reconstruction of the installations for the mechanical treatment of conditionally clean wastewater of stages 1 and 2; an upgrade of the aerotank of stage 1 at the biological treatment plant including the use of the Swedish Kaldnes Anox biofilm technology; reconstruction of the water collector of the secondary clarification tanks including the installation of thin-layered modules; construction of a new timber preparation workshop including the introduction of BAT, i.e. dry barking of timber; an upgrade of the pumping station at the primary clarification tank of stage 2 including the replacement of pumps, valves and fittings and automation of the processes; reconstruction of the pulp production including the transfer to elemental chlorine free (ECF) pulp production; conclusion of the analysis of the technological and service state of the biological treatment installations for wastewater and elaboration of the predesign proposals for the upgrade of the biological treatment plant.
During the 2003-2011 period, discharges of pollutants into the water bodies decreased by 50%, or 14.7 thousand tons, including: suspended solids by 2900 tons (or 63%), sulphate lignin by 2100 tons (or 50.5%), BOD_{tot} by 2100 tons (or 58%), COD by 7700 tons (or 46%).
The relative discharge of pollutants for the indicators COD, BOD, suspended solids and AOX with the biologically treated wastewater from the total production in general corresponds to the industrial standards for the discharge of pollutants established based on BAT for production with bleached sulphate pulp in the EU countries (see Figure A4.2).
APPM has been certified with ISO 9001, ISO 14001 and OHSAS 18001.
In 2012, APPM applied for exclusion from the "hot spot" list.

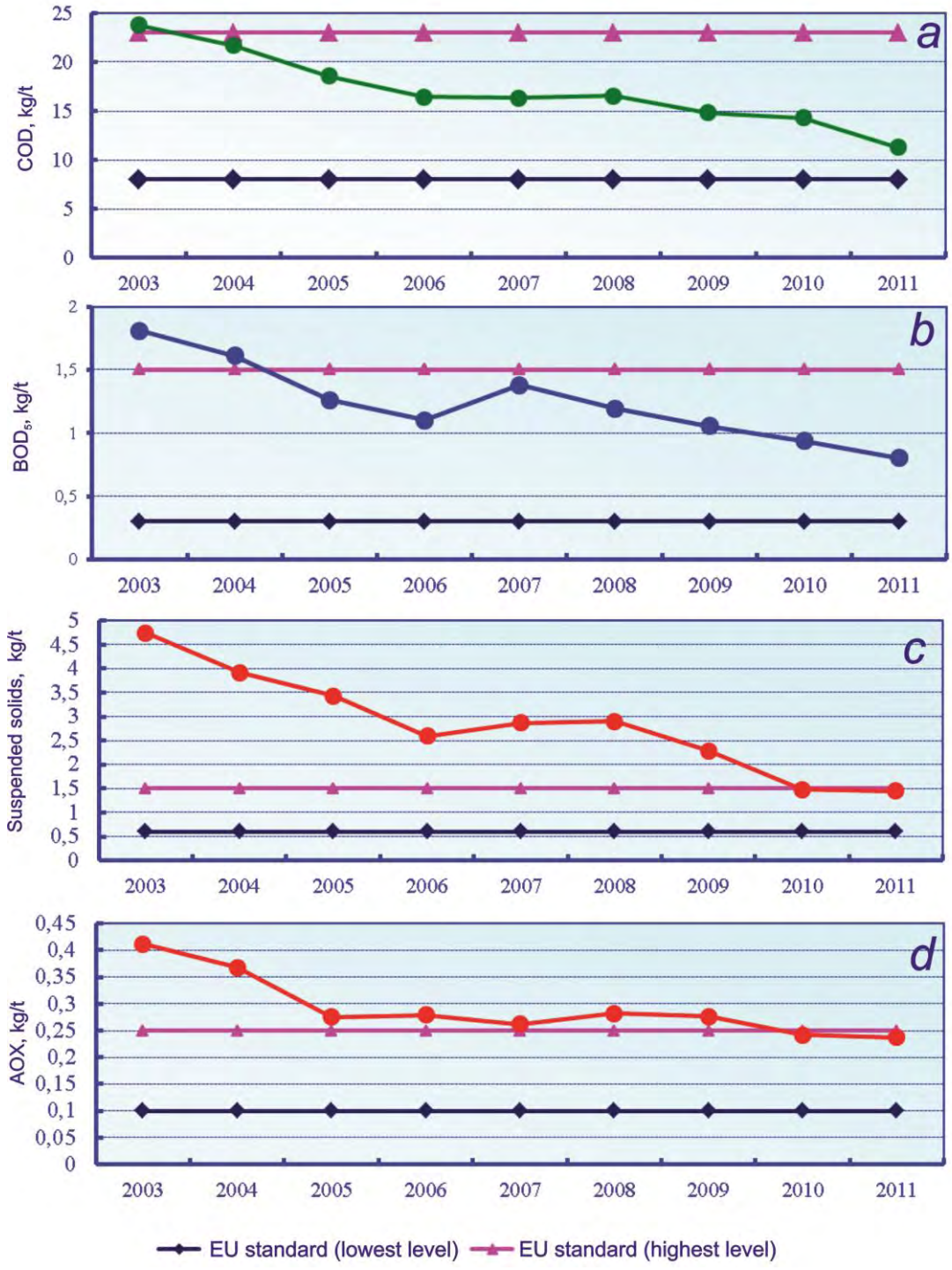


Figure A4.2. Relative discharges of COD (a), BOD (b), suspended solids (c) and adsorbed organically bound chlorine (AOX) (d) with the biologically treated wastewater from APPM

A5(25): Koryazhma branch of Ilim Group JSC, Koryazhma

Name, 2003:	**A5(25) Kotlas Pulp and Paper Mill, Koryazhma (KPPM)**
Reasons, 2003:	A5-1: KPPM is one of major air polluters in the region, particularly with specific contaminants. It emits 4.2 times more methyl mercaptane than APPM. A5-2: KPPM is the largest waste water discharger in the region (almost 50%). Discharge of large amounts of organic and suspended matter strongly impacts aquatic ecosystem. Significant increase of lignosulphonates is of particular concern
Impact, 2003:	Emissions to air: 12 296 t/year, including 45 tons of methylmercaptan and 481.3 tons of H_2S Discharge to water: 124 347 t/year
Impact, 2011:	Emission to air: 11 651 t/year, including 15.5 tons of methylmercaptan and 33.9 tons of H_2S Discharge to water: 10 642 t/year
Measures taken:	A5-1: Upgrade and replacement of the electric filters of the soda recovery boilers; upgrade of the lime recovery kiln of the causticisation and lime recovery section; construction of a new evaporation station with a condensate treatment system and recycling of sulphur compounds; shut down the viscose pulp production A5-2: Replacement of the aeration systems of the aerotanks of the biological treatment station for industrial effluents; upgrade of the raw and activated sludge dewatering section by installing press filters; construction of a recycling water supply station; installation of a local treatment system in the wastewater flow of the wood handling and paper production department; upgrade of the biological treatment plant for industrial wastewater
Measures planned:	Upgrade the roasting, causticisation and reburning of lime; installation of a system for cleaning the emissions of pollutants and dirty condensates to air; eliminate the discharge of untreated flush water from the filtration and clarification facilities to Kopytovka River; upgrade the biological treatment facility for industrial wastewater
Investments:	4300 million rubles (€ 107 million)
Status:	Applied for exclusion from the "hot spot" list

Short description of the A5-1 "hot spot" and progress since 2003

The Koryazhma branch of the Ilim Group JSC, formerly Kotlas Pulp and Paper Mill, specialises in the production of commercial bleached (deciduous) and unbleached (coniferous) pulp, cardboard and paper (sack and offset paper). The company supplies all the heating and water for the town of Koryazhma and also provides wastewater treatment for the town. The production capacity of the company of pulp in 2011 amounted to 1 108 375 tons.

The grounds for inclusion of KPPM on the list of environmental "hot spots" were the considerable volumes of pollutants emitted to air in 1990s and the beginning of the 2000s.

Figure A5.1. Koryazhma branch of Ilim Group
Photo: koradm.ru

The industrial air emissions by Koryazhma contain 23 solid pollutants and 36 in liquid and gas form. The sources of emission are equipped for gas treatment, and all of the equipment is in good condition. The efficiency of the treatment corresponds to the design values.
In 2003-2011, the following activities were carried out aimed at reducing industrial air emissions: upgrading of the electric filters of the soda recovery boilers; upgrading of the lime recovery kiln of the caustisation and lime recovery section; upgrading of soda recovery boiler unit #2 of the energy-technological combined heat and power plant through the replacement of the electric filter, the elimination of the cascade evaporator and the instalment of new concentrators; construction of a new evaporation station with a condensate treatment system and recycling of sulphur compounds; shutdown of the viscose pulp production; reconstruction of soda recovery boiler unit # 5 of the energy-technological heating power station through the upgrading of the electric filter (the installation of a third field); repair of the gas treatment facilities of the chemical reagent production department, replacing the packing of the absorption columns; upgrading the treatment system for the gas and particle emissions from the cake tanks of soda recovery boiler unit # 1 of the energy-technological thermal power station; and installation of automatic gas analysis equipment for the control of emissions of pollutants at the sources of pollution.
Despite the increase in total pulp production of more than 21%, the measures implemented during 2003-2011 have enabled the Koryazhma branch of Ilim Group JSC to reduce the atmospheric emissions by 5.2% or 645 tons, including: methylmercaptan by 29.481 tons (reduction of the relative indicator from 0.049 kg/t to 0.014 kg/t or 71.4%); hydrogen sulphide by 447.43 tons (reduction of the relative indicator from 0.528 kg/t to 0.031 kt/t or 94 %); nitrogen dioxide by 100 tons (a reduction of the relative indicator from 4.004 kg/t to 3.205 kg/t or 20%).
In 2010 and 2011, concentrations of H_2S exceeding the one-time Maximum Allowable Concentration (MAC) levels set for living areas were registered in Koryazhma.

Short description of the A5-2 "hot spot" and progress since 2003

Koryazhma Pulp and Paper Mill discharged significant amounts of contaminants into water bodies with industrial wastewaters in the 1990s and beginning of the 2000s.
The Koryazhma branch of the Ilim Group encompasses facilities for biological treatment of wastewater of the designed capacity of 31 thousand m^3/h and facilities for mechanical treatment (ash deposit area) of the design capacity of 4.8 thousand m3/h. The main contribution to the total discharge of pollutants, according to the 2011 report, is made by the integrated indicator COD at 72%, suspended particles at 9% and BOD at 7%.
The biological treatment facilities for industrial effluents are intended for the treatment of industrial and household wastewater of the plant and the city of Koryazhma. The effluent treatment process consists of four technological stages: mechanical treatment,

equalisation, biological treatment and recycling of the formed sludge and the surplus activated sludge.
In 2003-2011, the company implemented projects aimed at reducing wastewater discharges, including: replacement of the aeration systems of the aerotanks of the biological treatment station for industrial effluents; a total overhaul of the three secondary clarification ponds including the replacement of the spillway system; repair of the deep-water dispersal outflow outlet of the wastewater to the Vychegda River; upgrade of the raw and activated sludge dewatering section by installing press filters; construction of a recycling water supply station; construction of a new evaporator station with a capacity of 600 t/h of evaporated water; upgrade of the washing unit in the flow of the Kamyr 2 pulping unit; redirection of the wastewater outflow from Borshchevka to the biological wastewater treatment plant; installation of a local treatment system in the wastewater flow of the wood-handling department and paper production department; redirection of the rain water flow of the liquor pond to the biological treatment station for industrial wastewater; shutdown of the production of viscose pulp and the bleaching department of the printing paper production unit; upgrading of the biological treatment plant for industrial wastewater; elimination of the discharge of untreated washing water of the filtration and clarification facilities to the Kopytovka River.
The abovementioned measures enabled the Koryazhma branch of the Ilim Group to reduce the discharge of contaminants with wastewater by more than 91% or 113 705 tons, including: suspended solids by 8159 tons, lignin substances by 24 935 tons, BOD_{tot} by 7745 tons and COD by 71 870 tons.
Ilim Group JSC, including its branch in Koryazhma, integrated a production management system certified with ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007.
In 2012, The Koryazhma branch of the Ilim Group JSC applied for exclusion from the "hot spot" list.

A6(26): Waste management in the Arkhangelsk region

Name, 2003:	**A6(26) Toxic solid wastes in the Arkhangelsk region**
Reasons, 2003:	Amount of solid wastes in the Arkhangelsk region increased more than three times since the first NEFCO/AMAP Report
Impact, 2003:	4.7 million tons of waste formed in the region
Impact, 2011:	38.4 million tons of waste formed in the region, including 36.7 million tons of hazard class 5
Measures taken:	Developed a number of activities to improve the waste management system; the Concept of a Technopark for the Processing and Disposal of Solid Household Waste in the city of Arkhangelsk elaborated; action was taken to streamline waste pickup in the city of Arkhangelsk
Measures planned:	Organisation of selective waste collection in Severodvinsk; purchase of a demercuration plant for light bulbs containing mercury; disposal of the rubber waste in Novodvinsk; removal of illegal waste dumps in Novodvinsk
Investments:	153 million rubles (€ 3.8 million) to be invested in 2012-2014
Status:	Proposed for renaming and joint actions with the regional target programme

Short description of the A6(26) "hot spot" and progress since 2003

The waste management system in the Arkhangelsk region had some serious flaws. The “traditional” disposal of waste harms the soil ecosystem, polluting the air (when the waste burns or the so-called biogas is emitted, etc.) and the waterways (both surface and underground).
The inventory of dumps in the Arkhangelsk region that was performed in 2009-2010 identified 480 dumps with over 42 million tons of accumulated waste. Dumps and landfills occupy a total area of 1858 hectares. This is 436 hectares more than in 2002.
In 2011, the regional register of waste disposal sites showed 387 dumps (329 municipal dumps and 58 sites used by industrial companies) with 21 965 950 tons of waste. Dumps and landfills occupied an area of 1949 hectares. The major cities: Arkhangelsk, Severodvinsk and Novodvinsk, generated most industrial and household waste.
In 2011, the enterprises in the Arkhangelsk region produced 38 430 545 tons of waste, which is eight times more than in 2003. In 2011, mining waste (hazard class 5) made up the main contribution to the total amount (92.7%). At the same time, the amount of waste of hazard classes 1-4 produced in 2011 (1 776 100 tons) was 20% lower than in 2002 (2 235 200 tons).
Some of the activities, designed to address the challenges of upgrading the waste management system in the Arkhangelsk region, were completed within the framework of the regional programme on Environment Protection and Environmental Safety in the Arkhangelsk region in 2006-2008, and a programme of the same name for 2009-2011. A number of activities have been carried out during the period of implementation of these programmes: an action plan was developed for the management of industrial and household waste, including existing waste disposal sites in the Arkhangelsk region; facilities for temporary storage for mercury-bearing waste were set up; plants were set up for decontamination of medical waste in Archangelsk, Novodvinsk and Severodvinsk; the Concept of a Technopark for the Processing and Disposal of Solid Household Waste in Arkhangelsk was drafted and approved; organisation of streamline waste collection in the city of Arkhangelsk. Similar activities are being performed within the programme Safe Handling of Industrial and Household Waste in the Arkhangelsk Region in 2012-2014. The total estimated budget is 153 million rubles of combined finances allocated from the regional budget and investments that are to be attracted.
The Agency of Nature Resources and Ecology of the Arkhangelsk region proposed combining "hot spot" A6 (Solid toxic waste in the Arkhangelsk region) and "hot spot" A8 (Spent motor oil) into one "hot spot" on Industrial and household waste in the Arkhangelsk region.

Figure A6.1. Municipal waste disposal site in the city of Arkhangelsk
Photo: Anna Nechay, AiF in Arkhangelsk

A7(27): Areas of past environmental damage in the Arkhangelsk region

Name, 2003:	**A7(27) Sites of former and current military activities as sources of oil contamination**
Reasons, 2003:	Large areas in the Arkhangelsk region are strongly contaminated with petroleum fuel and spent motor oils, particularly due to former and current military activities
Impact, 2003:	By some estimates, a total of about 30-40 thousand tons of aviation fuel and spent lubrication oils were deposited in the areas of Franz Josef Land
Impact, 2011:	Areas at Franz Josef Land are polluted with a large number of barrels and tanks, construction and household waste, scrap metal and petroleum products
Measures taken:	In 2012, clean-up operations with waste removal and restoration of oil-contaminated soil were carried out on Alexandra Land Island and Hooker Island
Measures planned:	Clean-up operations are planned for 2013 on Hoffmann, Hooker and Graham Bell islands
Investments:	€ 40 million for 2012-2013
Status:	Proposed for joint actions with the federal programme

Short description of the A7 "hot spot" and progress since 2003

In the period between 1930 and 1990, the civil and military development on Franz Josef Land (FJL) led to contamination of seven of the 181 islands of the archipelago (Alexandra Land, Graham Bell, Hoffman, Hooker, Hayes, Ziegler and Rudolf islands). By some estimates, a total of about 30-40 thousand tons of aviation fuel and spent lubrication oils are deposited in the areas. The containers are corroded and leak. This situation is particularly alarming since FJL is located in the High Arctic and the environmental release of petroleum hydrocarbons and, particularly, spent lubricating oils can have a strong impact on the whole vulnerable Arctic environment.

Figure K7.1. Past environmental damage – old oil barrels left on Alexandra Land, Franz Josef Land archipelago. Photo: Sevmorgeo

NEFCO co-financed a pilot project on mapping the hazardous chemicals and wastes on FJL in 2007-2008. During an expedition within the framework of this project, a detailed survey and contaminated sites mapping were conducted. On-site barrel recycling methods were tested and some experimental studies on the recultivation of contaminated sites were also performed.

In 2011, the Ministry of Nature Resources of Russia and the State Research Institution Council for the Study of Productive Forces developed a programme to eliminate sources of negative environmental impacts on areas of the Franz Josef Land archipelago and started to implement environmental measures. In the framework of this programme, the results of the environmental survey of four islands (Alexandra Land, Graham Bell, Hoffman and Hooker islands) and the synthesis of existing data on the three islands (Hayes, Ziegler and Rudolf islands), data were obtained on the types and quantities of waste on the islands of FJL. The main pollutants on these islands were the large number of barrels and tanks, construction and household waste, scrap metal and petroleum products.

As an example, the total weight of scrap metal (including 368 677 barrels, 699 oil tanks, 6 pipe lines and 193 vehicle units) was 18 000 tons; the total volume of oil products, including jet fuel, gasoline, diesel fuel, lubricating oil and waste oil, was 7310 m^3; and the total volume of construction and household waste was more than 80 000 m^3.

In 2012, the Federal State Unitary Scientific and Production Company for Marine Geological Prospecting (Sevmorgeo) and the Council for the Study of Productive Forces, contracted by the Russian Arctic National Park on behalf of the Ministry of Nature Resources and Ecology, conducted a survey and worked to improve the environmental situation on the four islands of FJL: Hayes Island, Rudolf Island, Alexandra Land Island and Hooker Island. The aims of the work were to conduct an environmental survey on Hayes Island and Rudolf Island; to reduce the amount of industrial and domestic waste; and to carry out technical restoration of oil-contaminated soil on the Alexandra Land Island and Hooker Island.

In the course of work on Alexandra Land Island and Hooker Island in 2012, 4572 tons of scrap metal, 25 tons of aluminium, 1744 tons of petroleum products and tens of tons of solid waste were prepared for shipment to the mainland for recycling. A technical restoration of the contaminated sites of Alexandra Land Island and Hooker Island was made on a total area of 50 hectares.

In 2013, the clean-up activities will be continued on Alexandra Land, Hoffmann, Hooker and Graham Bell islands.

Figure A7.2. Clean-up operations at Alexandra Land in 2012. Photo: Anton Agarkov, strana.ru

A8(28): Spent motor oil management in the Arkhangelsk region

Name, 2003:	**A8(28) Spent motor oil. Arkhangelsk Region**
Reasons, 2003:	Since 1995, spent motor oil is not collected and treated in the Region, and became a serious source of environmental pollution
Impact, 2003:	5908 tons of spent motor oil has been formed and 5621 tons recycled, decontaminated or delivered for decontamination
Impact, 2011:	318 tons of spent motor oil was formed and 298 tons recycled, decontaminated or delivered for decontamination
Measures taken:	An agreement on the reception of spent motor oil was signed between companies working in the field of maintenance and repair in the transport sector.
Measures planned:	Establishment of centralised collection of oil products with further delivery for treatment for the region
Investments:	n/d
Status:	Proposed for re-naming and joint actions with the regional target programme on waste management

Short description of the A8 "hot spot" and progress since 2003

The choice of this object as a "hot spot" was determined by the concentration of a large amount of spent motor oil being stored in violation of the existing regulations as well as the illegal discharge of it on soil and into water bodies. In 1991-2003 in the Arkhangelsk region, a steady reduction in the collection and processing of used motor oil was observed. In 2002, the regional programme Collection and Recycling of Motor Oil was elaborated but not implemented.

During 2003-2011, according to the annual regional environmental reports, the majority of the spent motor oil was neutralised, used or handed over to special organisations, but hundreds of tons of such waste remained untreated annually.

In 2012, in the Arkhangelsk region, there were 17 companies with the necessary licence to collect, use, neutralise, transport and store spent motor oil. There is agreement on the reception of used motor oil between the transport companies and organisations working with the disposal and processing of waste generated from the repair of means of transport. In the Archangelsk region, there are also many non-registered car service companies that are not under control. Moreover, in the small towns and villages, the owners of transport vehicles either use the spent motor oil for their own purposes or throw it out onto the soil.

There is a need to develop and implement a programme for centralised collection and recycling of used motor oil all over the Arkhangelsk region.

According to the Federal classification of waste, spent motor oil belongs to the hazard class III. The Agency of Nature Resources and Ecology of the Arkhangelsk region proposed combining "hot spots" A6 and A8 into one "hot spot" addressing the waste management issues in the Arkhangelsk region.

A9(29): Dioxin pollution in the Arkhangelsk region

Name, 2003:	**A9(29) Enterprises of pulp and paper and timber industry as sources of dioxin pollution, Arkhangelsk Region**
Reasons, 2003:	A large number of enterprises are considered as significant sources of dioxin pollution
Impact, 2003:	Concentrations of dioxin in surface soil samples from the Onezhsky SWP ranged from 0.2 to 830.0 µgTEQ/kg.
Impact, 2011:	Sources of contamination with dioxin at Onezhsky SWP and Arkhangelsk PPM were eliminated.
Measures taken:	Introduction of elemental chlorine free technology for bleaching cellulose at Arkhangelsk PPM; termination of antiseptic treatment of wood with pentachlorophenol at Onezhsky SWP
Measures planned:	n/d
Investments:	n/d
Status:	Applied for exclusion from the "hot spot" list

Short description of the A9 "hot spot" and progress since 2003

The "hot spot" was included in the 2003 NEFCO/AMAP report as the pollution of dioxins in the soil on the territory by pulp and paper mills, and sawmills and woodworking plants, and the accumulation of these compounds in the bottom sediments of the northern rivers was significant. Studies conducted in 1995-2000 on Onezhsky Sawmill and Woodworking Plant (SWP) showed very high dioxin contamination of the soil – from 0.2 to 730 µgTEQ/kg. Elevated concentrations of polychlorphenol (0.2-0.8 µg/g) were also found in the sediments of the Northern Dvina River.

The main sources of dioxin pollution in the Arkhangelsk region were production of bleached cellulose using elemental chlorine, which led to the formation of polychlorinated dioxins and furans in the discharge water from the bleaching process, and the use of dioxin-containing agent – pentachlorphenolatum of natrium (PCPN) – for antiseptic treatment of timber. Timber was treated by putting it into an alkaline solution with PCPN and then leaving it outside to dry. This process was accompanied by heavy pollution of the local area with pentachlorphenol and dioxins. Throughout the period of antiseptic treatment of timber, the companies situated in the estuary of the Severnaya Dvina River used 5700 tons of PCPN.

In 1999-2002, Arkhangelsk PPM modernised the processes for production of bleached cellulose by changing to bleaching sulphate cellulose with chlorine-dioxide instead of elemental chlorine. As a result, in 2002-2005, the annual discharge of dioxins decreased by an order of magnitude and the factor of emissions of dioxin per ton of cellulose was 0.013 µgTEQ/t, which is lower than the international technological norms based on BAT – 0.06 µgTEQ/t.

Onezhsky SWP has not carried out antiseptic treatment of timber since 1995. Plots of land on which the work with PCPN was carried out have been rehabilitated and fully paved with asphalt.

Sources of dioxin contamination of the environment of the Arkhangelsk region were eliminated or localised. Information on other sources of dioxin pollution in the region is not available.

In 2012, the Agency on Nature Protection and Ecology of the Arkhangelsk region proposed to exclude the A9 "hot spot" from the Barents Environmental "Hot Spot" List.

A10(30): Stocks of obsolete pesticides in the Arkhangelsk region (excluded)

Name, 2003:	**A10(30) Stocks of obsolete pesticides**
Reasons, 2003:	More than 40 tons of obsolete pesticides, many of them in poor storage conditions, are stored in the Arkhangelsk region
Impact, 2003:	42.22 tons of pesticides are stored in the region
Impact, 2011:	No pesticides store
Measures taken:	In 2004-2007, 67.53 tons of pesticides were removed from the region and buried in special landfills
Measures planned:	n/d
Investments:	2.744 million rubles (€ 680 thousand)
Status:	Excluded from the "hot spot" list

Short description of the A10 "hot spot" and progress since 2003

According to the 2003 NEFCO/AMAP report, 42 220 kg of obsolete pesticides were stored in the Arkhangelsk region, but revised data from the Agency of Nature Resources and Ecology of the Arkhangelsk region put their total volume at 67 530 kg.
The inventory and collection of obsolete pesticides was carried out within the ACAP project The Environmental Grounds for Management of Stocks of Obsolete Pesticides in the Russian Federation, in which the Arkhangelsk region was chosen as one of the pilot areas.
The following activities were conducted in the Arkhangelsk region: in 2003, an inventory and laboratory studies of obsolete pesticides were conducted and in 2004-2005, 62 600 kg of banned and obsolete pesticides were transported from the Arkhangelsk region and buried in the specialised landfill of Krasny Bor enterprise in the Leningrad region.
In 2007, within the programme Environmental Protection and Ecological Safety of the Arkhangelsk region in 2006-2008, 4930 kg of chemicals (pesticides) were transported from the Arkhangelsk region and disposed at the landfill of the Signal JSC in Obninsk, Moscow region.
The analysis of the reports on the formation, use, deactivation, conversion and deposition of production and consumption waste for the years 2005-2007 showed that not one company in Arkhangelsk Oblast declared the presence of obsolete or banned pesticides on their sites. All stores of obsolete pesticides (67530 kg) in the Arkhangelsk region were eliminated.
The Barents Euro-Council Environmental Ministers assented to the exclusion of the Barents environmental "hot spot" Stocks of obsolete pesticides (A10) from the list at their meeting in 2011.

5.4 Environmental status and "hot spots" of the Nenets Autonomous District

5.4.1 Environmental status of the Nenets Autonomous District

The Nenets Autonomous District (NAO) covers 176.8 thousand square km. The population of the region is 42 thousand, of which the urban population makes up 47%, and the population density is 0.2/km^2. The only city is Naryan-Mar. The GRP in 2011 was 137 578.2 million rubles. The main river is Pechora.

Key environmental indicators in 2011

Total atmospheric emissions per unit of GRP, tons/million rubles	1.2
Percentage of population living in cities with high and very high levels of air pollution (ICA > 7)	no data
Proportion of contaminated wastewater of the total wastewater discharges, %	9.1%
Quality of drinking water (percentage of water samples that meet the quality standards), %	64.5%
Formation of waste per unit of GRP, tons/million rubles	0.02

Atmospheric emissions

During the last decade (2002-2010), there was an upward trend in atmospheric emissions. The total emissions increased from 45.8 thousand tons (in 2002) to 286.9 thousand tons (in 2010). This trend was broken in 2011, when the total emissions decreased by 44% to 169.9 thousand tons, of which 158.1 thousand tons were emissions from stationary sources.

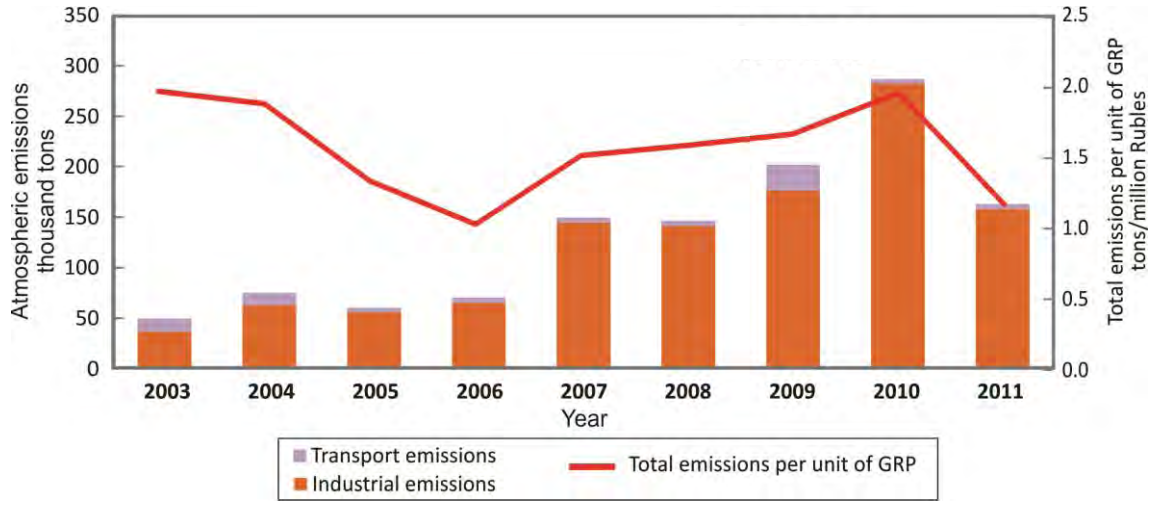


Figure 5.4.1. Dynamics of atmospheric emissions in the Nenets Autonomous District in 2003-2011

Naryanmarneftegaz LLC and Lukoil-Komi JSC produce over 80% of the total emissions from stationary sources in the district. During the last decade (2002-2011), there have been some changes in the structure of industrial atmospheric emissions: the proportions of CO, SO_2 and light (volatile) organic compounds (LOC) have increased (CO from 46.6% to 61.5%, SO_2 from 10.7% to 14.4%, and LOC from 1.1% to 5.1%), while the proportions of NO_X and CH decreased from 13.5 to 2.9% and from 14 to 9%, respectively.

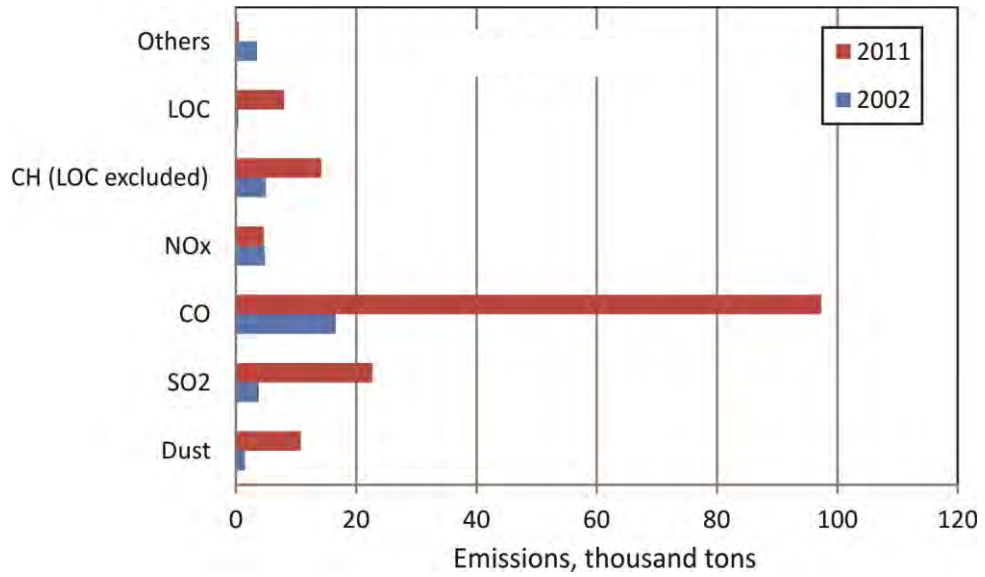


Figure 5.4.2. Structure of industrial emissions in the Nenets Autonomous District in 2002 and 2011

The total amount of emissions per unit of GRP in the period 2002-2011 was low, ranging from 1 to 2 tons/million rubles.

Urban air quality

In accordance with GOST 17.2.3.01-86 "Nature protection. Atmosphere. Rules of the air quality control in settlements", the air quality in Naryan-Mar is not monitored due to the low population and the lack of large industrial enterprises.

Wastewater

During 2002-2010, there was an upward trend in the volume of polluted wastewater discharge in NAO from 1.1 million m^3 in 2002 to 2 million m^3 in 2010, but this trend was broken in 2011, when the volume of discharged contaminated wastewater decreased by one order to 0.2 million m^3.

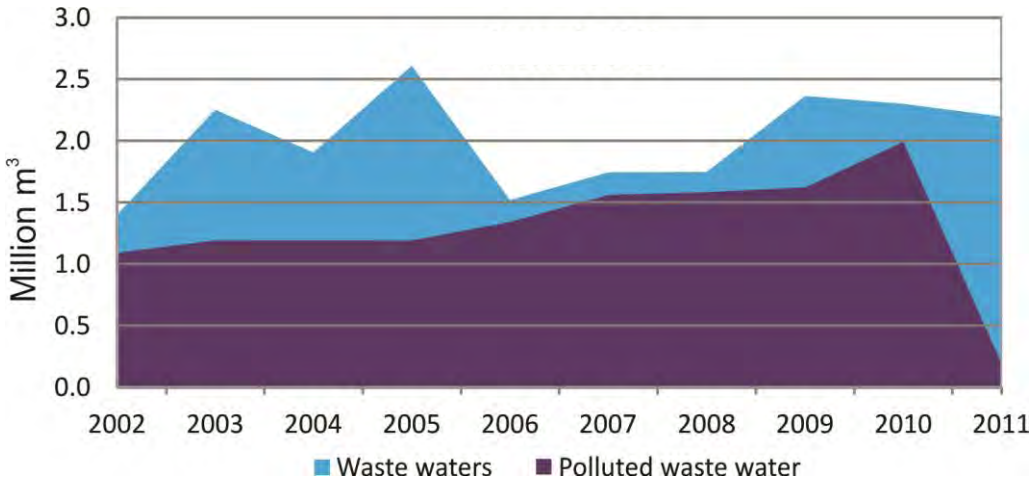


Figure 5.4.3. Dynamics of wastewater discharges in the Nenets Autonomous District in 2002-2011

POCKiTS MU (Naryan-Mar) and Lukoil-Komi JSC discharged 90% of all the contaminated wastewater in the Nenets Autonomous District.

Drinking water

The water quality of the sources of the water supply in the NAO does not, in most cases, meet the requirements of SanPiN 2.1.4.559 "Drinking water. Hygiene requirements for the quality of centralised water supply systems. Quality control". In 2011, more than 35% of the analysed samples of tap water did not meet the quality standards, but it should be noted that in the period from 2007 to 2010, this figure decreased by 10%.

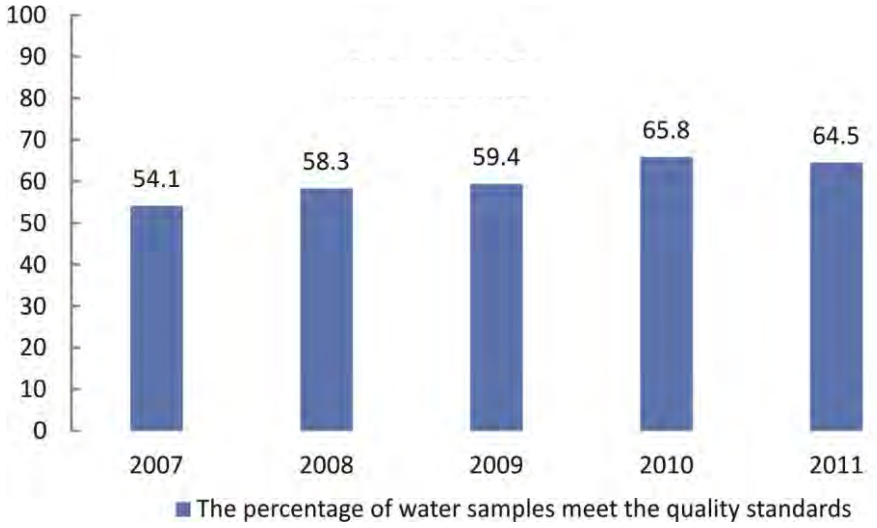


Figure 5.4.4. Change in quality of drinking water in the Nenets Autonomous District in 2007-2011

Production and consumption waste

In the period 2002-2006, the annual waste production ranged from 0.39 to 0.63 million tons. In the next four years, this figure dropped significantly (up to 0.1-0.23 million tons) and, in 2011, the volume of waste was 0.002 million tons (per unit of GRP is 0.015 tons/million rubles).

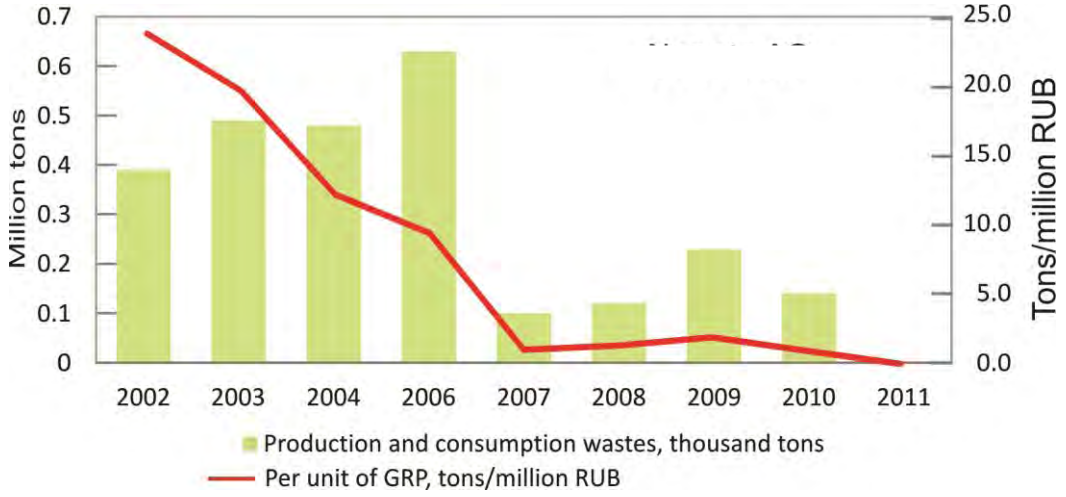


Figure 5.4.5. Dynamics of reduction and consumption waste formation in the Nenets Autonomous District in 2002-2011

5.4.2 Environmental "hot spots" in the Nenets Autonomous District

The 2003 NEFCO/AMAP report defined four environmental "hot spots" and proposed five environmentally sound investment projects connected to them in the Nenets Autonomous District. In this chapter, we present the list of these "hot spots" as they were defined and described in the 2003 report and the short summaries of the current status of the "hot spots" based, primarily, on the Screening and Analyses reports provided by the Hot Spot Exclusion Group in the Nenets Autonomous District. We also use information from the regional annual reports Environmental Status on the territory of the Nenets Autonomous District, as well as meetings with federal and regional environmental authorities and research institutes working in the region.

N1(31): Kumzhinskoye gas and condensate field

Name, 2003:	**N1(31) Accident at well No 9 in Kumzhinskoye field**
Reason, 2003:	The torsh formed at this well due to explosion in the early 1980s lasted until 1987 and led, together with measures to extinguish it, to significant contamination of the area, which belongs to the Nenets Nature Reserve
Impact, 2003:	Marine water contamination with seasonal dam destruction
Impact, 2011:	Occasional pollution with gas condensate springs
Measures taken:	In 2005, the Ministry of Nature Resources of Russia decided to manage the accidental environmental damage by decreasing the formation pressure through gas condensate field development. In 2008, restoration and clean-up of the area was carried out. The programme of Environmental and Subsoil Monitoring was elaborated and agreed
Measures planned:	Decrease formation pressure with the gas condensate field development and carry out environmental restoration measures
Status:	Proposed to rename the "hot spot" and continue actions

Short description of the N1 "hot spot" and progress since 2003

The Kumzhinskoye gas condensate field is located in the delta of the Pechora River south of Korovinskaya Bay and 65 km from the town of Naryan-Mar. The field and well # 9 are now within the territory of the Nenetsky State Nature Reserve established in 1997.

In November 1980, with the drilling at well # 9, there was a gas explosion and open gas, and a condensate blowout started, spewing out about 2 million m^3 of gas and hundreds of tons of condensate per day. This lasted until May 1987. In 1981, an effort was made to stop the blowout with an underground nuclear explosion. The layers were shifted and crashed and a number of mud springs around the well appeared. In May 1987, the Kumzha-9 well was killed and cemented up to the mouth. Apart of the accidental well, more than 10 of the 20 wells drilled at the Kumzhinskoye field are of poor technical condition and hazardous to the environment. The area around well # 9 and open mud springs are surrounded by a dam that is gradually being destroyed by flood waters and hydrocarbons that pollute the Pechora River and sea waters.

In 2005, the Ministry of Nature Resources of Russia took a decision to manage accidental environmental damage by decreasing formation pressure with gas condensate field development.

In 2007, the CH Invest Company of the ALTECH Group obtained a licence for exploration and production at Kumzhinskoye field. The licence included environmental liabilities, such as the reconstruction of the dam and recovery of the natural watercourse of Maliy Gusinets and the restoration of the polluted territory.

Figure N1.1. Accidental Kumzha # 9 well area and a separation dam in the Pechora River delta before reconstruction. Photo: NIAC

CH Invest carried out environmental assessments in the area. The Maximum Allowable Concentration levels of benzo(a)pirene, PCB and heavy metals in soil, water and bottom sediment samples were not found, nor was radiation pollution.

In 2008, CH Invest carried out restoration of the damaged areas and removed more than 900 tons of construction waste and scrap metal from the territory of the Nenetsky State Nature Reserve. The separation dam was reconstructed to prevent environmental pollution. The programmes of Environmental and Subsoil Monitoring and the Environmental Study of the Territory were elaborated and approved.

In 2012, the Department of Nature Resources and Ecology of the Nenets Autonomous District proposed renaming the "hot spot". The decision on exclusion of the "hot spot" from the list will be taken by the Regional Hot Spot Exclusion Group after CH Invest starts development of the field.

N2(32) Drinking water supply in the Nenets Autonomous District

Name, 2003:	**N2(32) Poor drinking water quality in NAO settlements and towns.**
Reason, 2003:	Due to poor quality, drinking water supply is one of the most important tasks for NAO. Water quality problems mostly arise due to natural rather than anthropogenic reasons. The quality of potable water meets sanitary norms at one settlement only (2% of the population), does not meet sanitary norms at 19 settlements (86% of the population)
Assessment, 2007:	45.9% of tap water samples did not meet quality standards
Assessment, 2011:	35.5% of tap water samples did not meet quality standards
Measures taken:	In 2009, the long-term target programme on Clean Water Supply of the Nenets Autonomous District Population started. Geological research and exploration of the ground waters have been carried out at 17 settlements; 2 water intakes have been constructed
Measures planned:	Construction of 2 water intakes; involvement of 12 settlements in the long-term programme activities
Status:	Proposed for joint actions with the regional programme

Short description of the N2 "hot spot" and progress since 2003

Poor drinking water quality in the towns and settlements of the Nenets Autonomous District remains one of the main challenges for the region. There are six drinking water supply systems in Naryan-Mar town, Iskateley, Amderma, Kotkino and Labozhskoye settlements; three of these use surface and three ground water sources. The water quality at the sources supplying water for Naryan-Mar and Iskateley does not meet sanitary standards.

The strong permafrost (up to 400 metres deep) embarrasses the use of the ground water as a drinking water source, the surface waters therefore remain the main drinking water sources of for rural areas.

The drinking water supply problem is being resolved within the long-term target programme Clean Water Supply of the Nenets Autonomous District Population for 2009-2013 approved by the Administration of the Nenets Autonomous District in 2009.

10 water treatment units have been purchased and installed in eight settlements and planned for installation in a further two (Indiga and Ust'-Kara) where water intakes should be constructed. Geological research and exploration works for ground water were carried out in 17 settlements. Programme activities were carried out in 28 settlements out of 40 in the Nenets Autonomous District.

The Administration of the Nenets Autonomous District plans to develop and extend the programme to 2017.

N3(33): Wastewater treatment in Naryan-Mar in the Nenets Autonomous District

Name, 2003:	**N3 Waste waters of Naryan-Mar city and its port discharged into Pechora river**
Reason, 2003:	Technology used in biological treatment of waste waters in Naryan-Mar and capacity of treatment facilities do not ensure surface water protection. The port has no storage tanks, and used waters are directly discharged into Pechora River
Impact, 2003:	2.3 million m^3 of wastewater is discharged, including 1.2 million m^3 of contaminated wastewater (52%)
Impact, 2011:	2.3 million m^3 of wastewater discharged, including 0.26 million m^3 of contaminated wastewater (11%)
Measures taken:	In 2011, the reconstruction of the first line of wastewater treatment facilities in Naryan-Mar completed. In 2013, the reconstruction of the second line started. Projects for construction of wastewater treatment facilities in Kachgort and Bondarka elaborated and approved
Measures planned:	Reconstruction of the second line of wastewater treatment facilities in Naryan-Mar to be completed in 2014. Construction of new wastewater treatment facilities in Kachgort and Bondarka sites to be launched in 2013 and completed in 2014
Status:	Proposed for continued actions

Short description of the N3 "hot spot" and progress since 2003

In the period 2002-2010, between 1.4 and 2.6 million m^3 of wastewater was discharged into the Nenets Autonomous District annually, including between 1.3 and 2.0 million m^3 of contaminated wastewater. In 2010, 2.27 million m^3 of wastewater was discharged to surface water bodies, including 1.6 million m^3 or 70% of insufficiently treated wastewater. In 2011, 2.29 million m^3 of wastewater was discharged, including 0.26 million m^3 or 11% of the contaminated wastewater.
In 2010, the project on the reconstruction of the wastewater treatment facilities in Naryan-Mar started within the Nenets regional programme for a clean water supply. The reconstruction of the first line was completed in 2011.
In 2012, the project for the reconstruction of the second line of wastewater treatment facilities in Naryan-Mar was approved. The project should be completed in 2014.
The regional programme also includes a project on the reconstruction of wastewater treatment facilities in the Kachgort and Bondarka settlements that discharge water to the Pechora River. The project for wastewater treatment facilities in Kachgort has been elaborated and approved. Equipment was purchased, and new facilities should be set in operation in 2014. The project for Bondarka is under elaboration.

N4(34): Mercury-containing waste management

Name, 2003:	**N4 Handling of mercury containing wastes**
Reason, 2003:	Mercury containing used luminescent lamps (1.334 tons) is the most hazardous waste products in NAO
Impact, 2003:	About 1.3 tons of mercury-containing waste has accumulated
Impact, 2011:	5 kg of hazard class I waste was formed in 2011
Measures taken:	In 2007, the collection of luminescent lamps started. In 2012, demercuration equipment was installed and processing of used luminescent lamps started
Measures planned:	Continue processing of luminescent lamps
Status:	Applied for exclusion from the "hot spot" list

Short description of N4 "hot spot" and progress since 2003

Used luminescent, mercury-containing lamps belong to hazard class I waste. Until 2012, in the Nenets Autonomous District there was neither a collecting centre nor a waste facility for processing mercury-containing waste.
In 2007, within the Nenets regional environmental protection and safety programme implementation, 20 thousand used luminescent lamps were collected and delivered for demercuration. According to assessments by the Department of Nature Resources and Ecology of the Nenets Autonomous District carried out in 2008, about 15 thousand used luminescent lamps are produced in the region annually.
In 2011, the demercuration equipment Ecotrom-2 was purchased at the expense of the municipal budget of the Zapolyarniy district for the Poszhilkomservis unitary enterprise. In 2012, Poszhilkomservis received the necessary licences and permits for decontamination and disposal of hazard classes I-IV waste. The Ecotrom-2 was placed at the workshop for component separation, decontamination and processing of Poszhilkomservis and put into operation in 2012. The equipment processes luminescent lamps, transforming mercury into non-soluble mercuric sulphide – the hazard class IV

compound that is deposited at the municipal waste dumping site. The processing capacity of Ecotrom-2 is 300 lamps per hour. The enterprise processes about 150 luminescent lamps per day. By this estimation, the installed equipment can process and decontaminate all mercury-containing waste (luminescent lamps) produced in the Nenets Autonomous District. There was an organised collection of used luminescent lamps, and information on companies and populations in the region.

In 2012, the Department of Nature Resources and Ecology of the Nenets Autonomous District proposed excluding the N4 "hot spot" from the Barents environmental "hot spots" list.

Figure N4.1. Ecotrom-2 demercuration equipment was installed in Iskateley and put into operation in 2012. Photo: Naryana Vynder

5.5 Environmental status and "hot spots" of the Republic of Komi

5.5.1 Environmental status of the Republic of Komi

The Republic of Komi covers 416.8 thousand square km. The population is 889.8 thousand, of which the urban population makes up 75%, and the population density is 2.2/km^2. The main cities are Syktyvkar (250.9 thousand), Ukhta (99.6 thousand), Vorkuta - 69.0 thousand), Pechora (45.5 thousand) and Usinsk (43.3 thousand). The GRP is 352334.5 million rubles (2011). The major rivers are Pechora and Vychegda. Marshes occupy 12 to 15% of the territory.

Key environmental indicators in 2011

Total atmospheric emissions per unit of GRP, tons/million rubles	2.3
Percentage of population living in cities with high and very high levels of air pollution (ICA > 7)	26.8%
Proportion of contaminated wastewater of the total wastewater discharges, %	27.5%
Quality of drinking water (percentage of water samples that meet the quality standards), %	61.5%
Formation of waste per unit of GRP, tons/million rubles	16.5%

Atmospheric emissions

In 2011, the volume of industrial emissions was 712.354 tons, which is 19.8% (117.6 thousand tons) more than it was in 2010. Thus, the downward trend in the volume of industrial emissions that was observed between 2005 and 2010 was broken in 2011, whereas the downward trend in the volume of transport emissions was maintained. Over the last ten years, this represents a decrease from 270.3 thousand tons in 2003 to 89.5 tons in 2011. During the same period, the total emissions per unit of GRP decreased from 8.4 to 2.3 tons/million rubles.

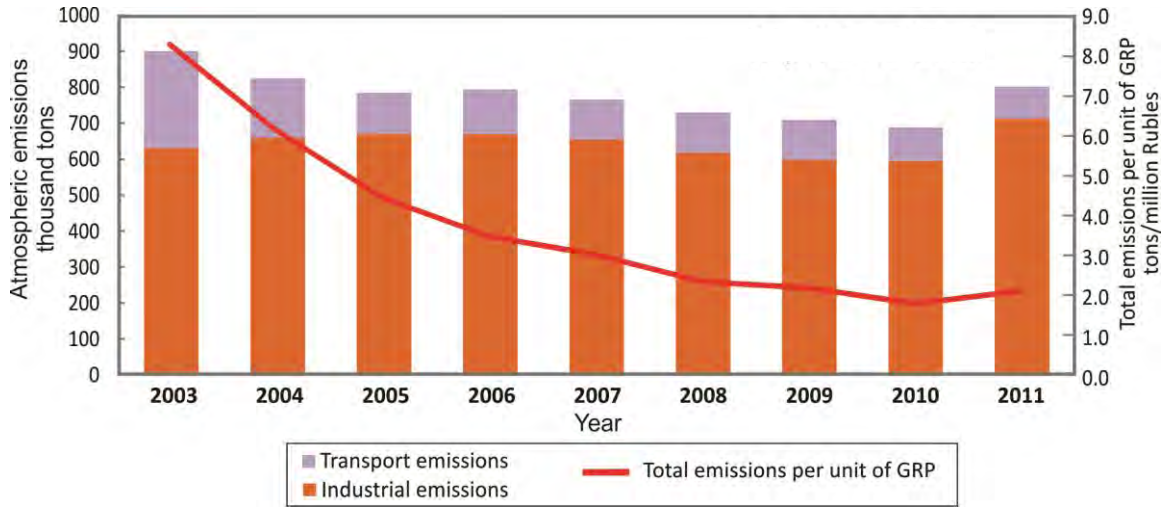


Figure 5.5.1. Dynamics of atmospheric emissions in the Republic of Komi in 2003-2011

The main contribution to the total industrial emissions was made by the following companies: Lukoil-Komi JSC, Vorkutaugol JSC, Gazprom Transgaz Ukhta LLC, TGC-9 JSC, Shakhta Vorgashorskaya 2 JSC, Gazprom Pererabotka LLC and Mondi Syktyvkar JSC.

Hydrocarbons (CH), CO and SO_2 predominate in the structure of industrial emissions. In 2011, the amounts of these substances were 285.9, 212.4 and 107.1 thousand tons, respectively.

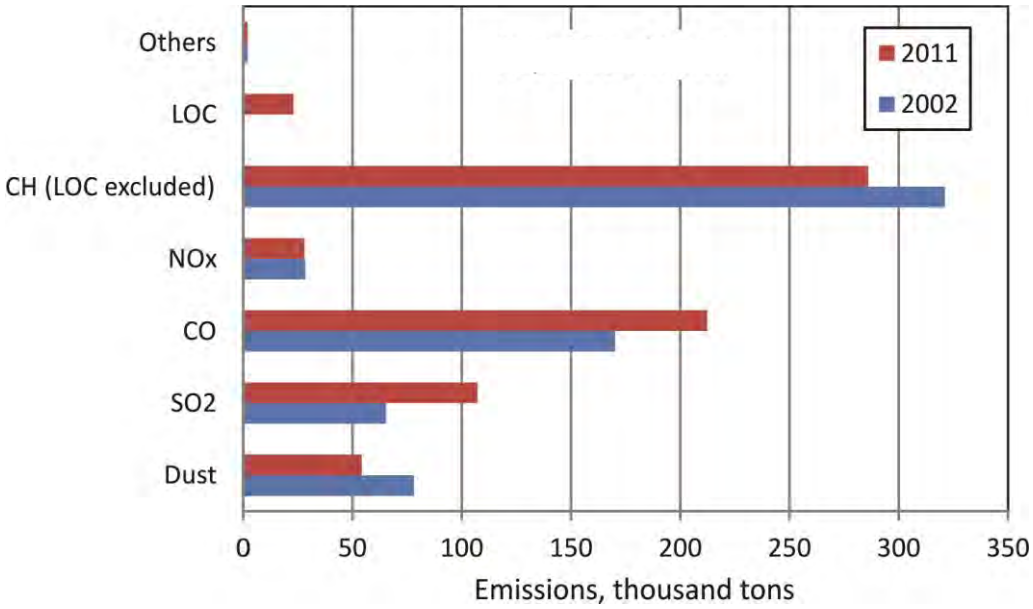


Figure 5.5.2. Structure of industrial emissions in the Republic of Komi in 2002 and 2011

Compared with 2002, in 2011, the portion of hydrocarbons in the total industrial emissions decreased from 48.3% to 40.1%, while the percentage of CO and SO_2 increased from 25.6% to 29.8% and from 9.8% to 15%, respectively.

Urban air quality

In 2011, a high level of air pollution was only recorded in Syktyvkar, whereas in the cities of Vorkuta and Ukhta, the levels of air pollution were classified as elevated and low, respectively.

During 2002-2011, in Syktyvkar, the average concentrations of dust, formaldehyde and nitrogen dioxide increased, but the average concentrations of benzo(a)pyrene decreased. In Vorkuta, the level of dust in the air increased, while the average concentrations of carbon monoxide, formaldehyde, sulphur dioxide and benzo(a)pyrene decreased. In Ukhta, the level of air pollution by carbon monoxide and dust increased. Overall, in the Republic of Komi, in the 2002-2011 period, urban air quality improved and the proportion of the population living in cities with high or very high level of air pollution decreased from 59.1% to 27%.

Wastewater

In 2011, the volume of wastewater discharges to surface water bodies was 468.85 million m^3, including 128.77 million m^3 (27.5%) of contaminated wastewater. In the period 2002-2010, there was a downward trend in the amount of contaminated wastewater discharged from 145 million m^3 (in 2002) to 108 million m^3 (in 2010), but in 2011, this parameter increased compared with 19% in 2010.

The major polluter of water bodies in the Republic of Komi is Mondi Syktyvkar JSC. The total volume of contaminated wastewater discharged by the company is 65.8% of the total contaminated wastewater discharge in the republic.

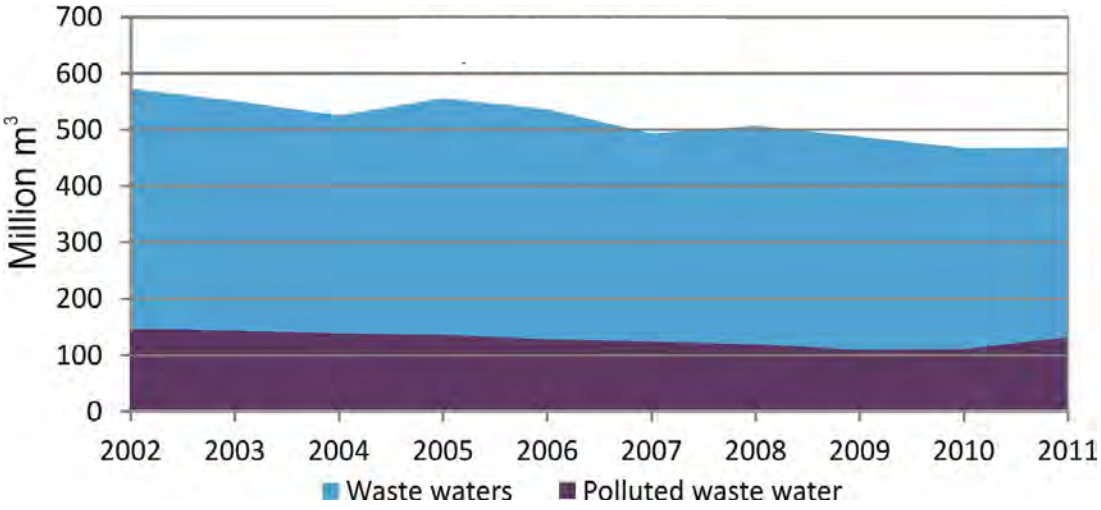


Figure 5.5.3. Dynamics of wastewater discharges in the Republic of Komi in 2002-2011

Drinking water

The quality of the drinking water in the Republic of Komi remains at the level of the beginning of the 2000s. The percentage of the analysed samples of drinking water corresponding to quality standards is 62-63%, while, in 2006-2007, the figure amounted to 76.8%.

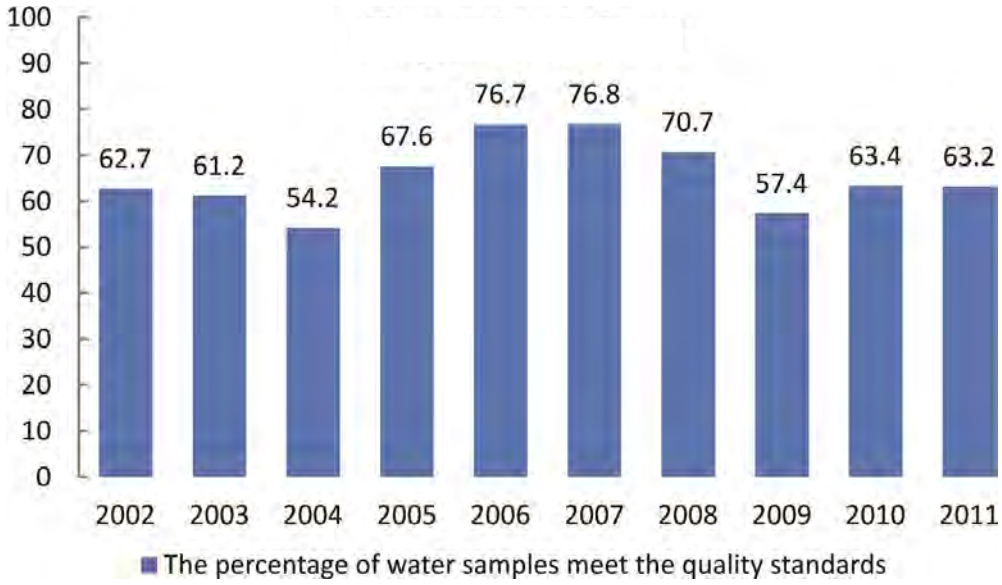


Figure 5.5.4. Change in the quality of drinking water in the Republic of Komi in 2002-2011

Production and consumption waste

In 2011, the total amount of production and consumption waste produced was 5.8 million tons, up to 10.5% (0.69 million tons) less than in 2010, so there was a downward trend in the volume of waste between 2002 and 2010, when this parameter decreased from 13.1 to 6.5 million tons, or (per unit of GRP) from 152.3 tons/million rubles (in 2002) to 18.4 tons/million rubles (in 2010) kept.

The main volume of production and consumption waste was produced by Vorkutaugol JSC and Mondi Syktyvkar JSC (13.7%).

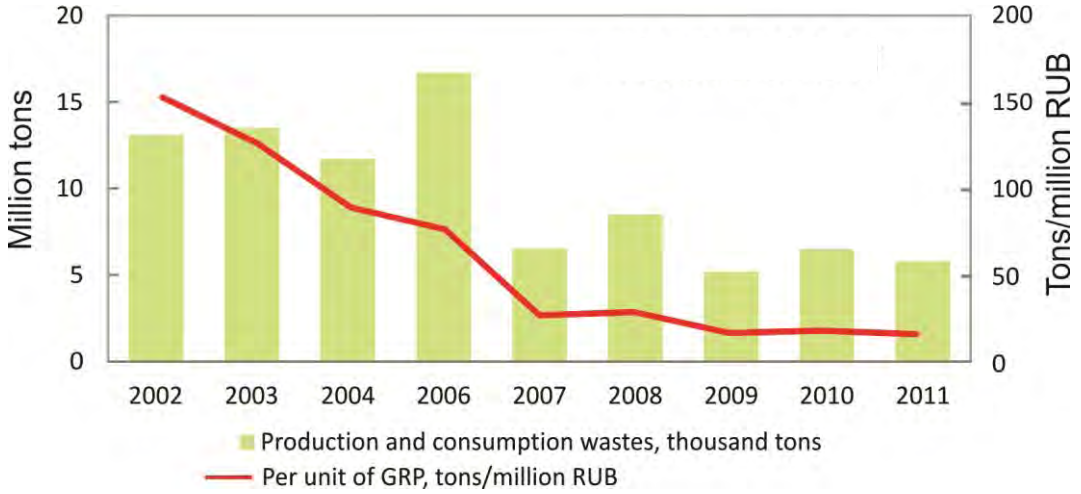


Figure 5.5.5. Production and consumption waste formation in the Republic of Komi in 2002-2011

5.5.2 Environmental "hot spots" in the Republic of Komi

The 2003 NEFCO/AMAP report defined 8 environmental "hot spots" and proposed 10 environmentally sound investment projects connected to them in the Republic of Komi. In this chapter, we present the list of these "hot spots" as they were defined and described in the 2003 report and the short summaries of the current status of the "hot spots" based, primarily, on the Screening and Analyses reports provided by the Hot Spot Exclusion Group in the Republic of Komi. We also use information from the regional annual reports on the environmental status in the Republic of Komi, press releases from the enterprises i.e. "hot spot" owners, and meetings with federal and regional environmental authorities and research institutes in the republic.

Ko1(35): Vorkutaugol coal mines, Vorkuta

Name, 2003:	**Ko1(35) Greenhouse gas emissions to the atmosphere in the Vorkuta coal field**
Reason, 2003:	Coal industry is one of the most significant contributors to greenhouse gas emissions to the atmosphere. Coal mining industry has emitted into the atmosphere 74.2% of total methane, emitted in the Republic of Komi in 2002
Impact, 2003:	Emission to air: 236 746 t/year of hydrocarbons (methane) in Vorkuta
Impact, 2011:	Emission to air: 199 million m^3/year of methane (not utilised) at mines
Measures taken:	Some of the methane is utilised in the boiler houses of Vorkutinskaya, Komsomolskaya and Zapolyarnaya mines, and at the air heating facilities of Severnaya mine; a natural gas-fuelled reciprocating power plant has been built at Severnaya mine
Measures planned:	Construction of gas-fuelled reciprocating power plants for methane utilisation at the remaining four mines
Status:	Proposed for continued actions

Short description of the Ko 1 "hot spot" and progress since 2003

Vorkutaugol JSC, a company of Severstal, is one of the biggest producers of hard cooking coal in Russia and the largest industrial enterprise in the town of Vorkuta in the northeast of the Republic of Komi. The construction of coal mines in the Vorkuta area began in 1931, and in 1934 they delivered the first raw coal. In 1953, 17 mines worked in Vorkuta, and in 1988 maximum production was reached in the Pechora coal basin, when 31.2 million tons of coal was mined per year.

Figure Ko1.1. Vorkutaugol. Photo: Metcoal.ru

In 2003, Vorkutaugol JSC became part of the Severstal JSC Resources Division. Since 2004, the company has mined coal at six sites, including five mines: Severnaya, Vorkutinskaya, Komsomolskaya, Zapolyarnaya and Vorgashorskaya-2, and one open pit, Yunyaginskiy. In 2012, Vorkutaugol mined 13 million tons of raw coal and produced 5.3 million tons of cooking coal concentrate. The coal industry is responsible for one of the most significant contributions to the overall greenhouse gas emissions. Burning coal is a major source of carbon dioxide. During coal mining, an explosive methane-air mixture (methane share of 20-70%) is pumped up from the mines by vacuum-pump stations. Methane is partly utilised at the gas-burning boiler houses of the Vorkutinskaya, Komsomolskaya and Zapolyarnaya mines and at the air-heating facilities of Severnaya mine. In 2011, 104.4 of the 333.3 million m^3 of methane was utilised at the Vorkutaugol mines and in 2012, 108 of the 305.6 million m^3. The share of methane used at the Severnaya mine in 2012 was 28.5%, at Vorkutinskaya it was 31.2%, at Komsomolskaya it was 65.3% and at Zapolyarnaya it was 51.6%.

In order to reduce the methane emission to air, a natural gas-fuelled reciprocating power plant was built at the Severnaya mine. When the new HPP was put on stream and tested, the installation of similar facilities at other mines of Vorkutaugol was considered.

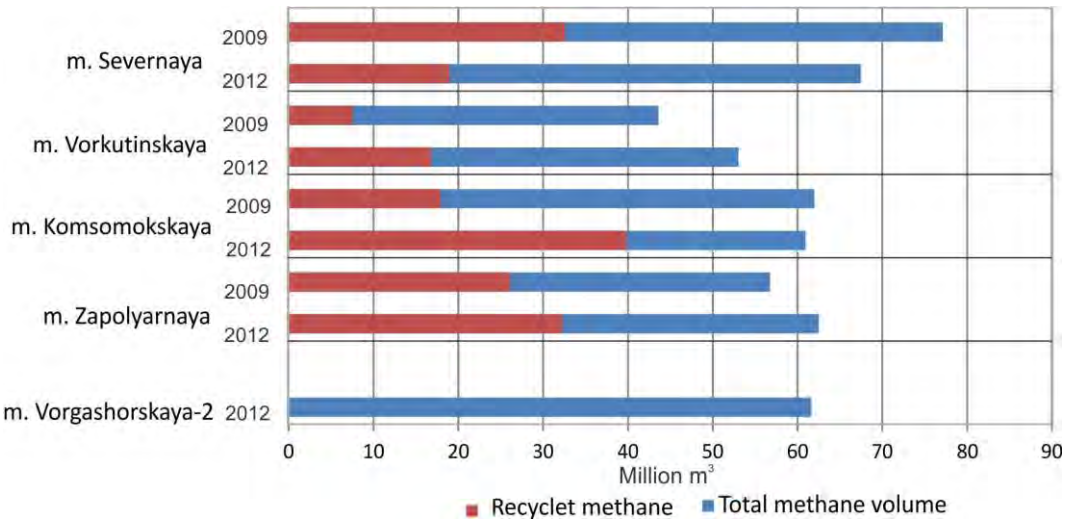


Figure Ko1.1: Methane emission and utilisation at Vorkutaugol coal mines in 2009 and 2012 (in million m^3)

Ko2-1(36): Cement Northern Company, Vorkuta

Name, 2003:	**Ko2(36) High air contamination in Vorkuta city**
Reason, 2003:	A number of enterprises in Vorkuta city emit large amounts of contaminants to the atmosphere. Vorkuta cement plant is responsible for 25% of dust emissions. HPP-1 is the main emitter of SO_2 in the city
Impact, 2003:	Emission to air: 8 400 t/year
Impact, 2011:	Emission to air: dust – 15 700 t/year
Measures taken:	Electric filters constructed to reduce dust emissions to air; action plan for a reduction in the industrial emission impact elaborated
Measures planned:	Implementation of the action plan for a reduction in industrial emission impact
Investments:	77.4 million rubles (€ 1.95 million) in 2008-2012 of own means
Status:	Proposed for joint actions with the action plan

Short description of the Ko2-1 "hot spot" and progress since 2003

Vorkuta Cement Plant, now operated by Cement Northern Company LLC, was set in operation in 1950. The maximum production of the plant in the 1980s was 430 thousand tons of cement and 110 thousand m^3 of break-stone. In 2002, Vorkuta Cement Plant became bankrupt, and in 2003 it was bought by the Driver firm and resumed operations. In 2009, the plant produced 450 thousand tons of cement. In 2011, Vorkutacement was reorganised into Cement Northern Company LLC.

Figure Ko2.1. Cement plant in Vorkuta.
Photo: cement-online.ru

In 2012, the Department of Rosprirodnadzor in the Republic of Komi where the cement plant operated two operated rotary furnaces # 2 and # 3 emitted contaminants without relevant treatment. Experts from the Centre of Laboratory Analysis and Technical Metrology in the Republic of Komi sampled industrial air emissions at furnaces # 2 and # 3. The concentrations of contaminants were as follows: CO – 296 mg/m^3, NO – 167 mg/m^3, NO_2 – 16 mg/m^3 and nonorganic dust up to 20% SiO_2 – 23 900 mg/m^3.

In order to reduce the dust emissions and reach allowable emission levels for nonorganic substances, Cement Northern Company has been carrying out reconstruction of the plant, equipping production facilities with extra dust-trapping units (electro-filters) since 2008. For the period 2008-2012, investments in reconstruction amounted to 62.7 million rubles (€ 1.57 million).

The Vorkuta Cement Plant has been a subject of interest from the ACAP Project Steering Group for Dioxins and Furans, which identified the plant as a potential pilot action project for the reduction or elimination of dioxins and furan emissions. Preparations have been made in cooperation with NEFCO for concrete actions aimed at reducing dust and dioxins emissions for both production lines (furnaces # 2 and # 3).

Cement North Company has elaborated the action plan for a reduction in industrial emission impact, and the Ministry of Nature Resources Use and Environmental Protection of the Republic of Komi has agreed with the terms of Cement North Company to reach the Maximum Allowable Emission levels. Reconstruction works with the installation of electro-filters should be completed by autumn 2013. It is expected that nonorganic dust emissions will be reduced from 15 708 to 785 tons per year.

Ko2-2(36): Vorkuta Heat and Power Plant # 1 of Territorial Generating Company # 9, Vorkuta

Name, 2003:	**Ko2(36) High air contamination in Vorkuta city**
Reason, 2003:	A number of enterprises in Vorkuta city emit large amounts of contaminants to the atmosphere. HPP-1 is the main emitter of SO_2 in the city.
Impact, 2003:	Emission to air: SO_2 – 7548 t/year (above MAE)
Impact, 2012:	Emission to air: SO_2 – 5546 t/year (within MAE)
Measures taken:	In 2010, reconstruction of boiler unit # 7 with the introduction of low-emission vortex coal burning technology (VIR-technology); the plan for optimisation of the heat supply of Vorkuta with closing Vorkuta HPP-1 has been elaborated
Measures planned:	Implementation of the plan for optimisation of the heat supply for Vorkuta and a reduction in the industrial emissions to air
Investments:	n/d
Status:	Proposed for exclusion from the "hot spot" list

Short description of the Ko2-2 "hot spot" and progress since 2003

The construction of Vorkuta Heat and Power Plant # 1 (HPP-1) started in 1940, and the first generator with a 5 MW capacity was launched in 1942. Now, Vorkuta HPP-1 of Territorial Generating Company # 9 (TGC-9) facilities has an installation electricity capacity of 25 MW and heat capacity of 176 Gcal/h.

The main fuel burned at Vorkuta HPP-1 is coal from the Vorkuta field, with heavy fuel oil (M-100) used as starting fuel. Flue gases generated from the combustion with dust, NO_X, SO_2 and CO are transferred to ash collectors through the smoke exhausts and emitted through the common chimney-stalk to the atmosphere. Inertial dry ash collectors, multi-cyclone dust collectors (BC), are used for cleaning flue gases from coal ash. The extent of ash collection at BC amounts to 85% on average.

In 2010, the reconstruction of boiler unit # 7 (BKZ-75-39) with the introduction of low-emission vortex coal-burning technology (VIR-technology) was completed. The main goal was to improve environmental parameters (reduce industrial air emissions) of the boiler unit with optimal technical and economic criteria.

In 2012, the emissions of NO_X, SO_2, CO, black oil ash and coal ash at Vorkuta HPP-1 were within the Maximum Allowable Emission levels (MAE) set for the plant. In 2012 versus 2003, the emissions of SO_2 were reduced from 7548.1 t/year to 5546.8 t/year; CO from 2359.9 t/year to 39.0 t/year; coal ash from 9140.4 t/year to 6691.3 t/year; and fuel oil ash from 30.1 t/year to 0.04 t/year.

In 2013, the Ministry of Nature Resources and Environmental Protection of the Republic of Komi proposed excluding Vorkuta Heat and Power Plant # 1 from the Barents Environmental "Hot Spot" List.

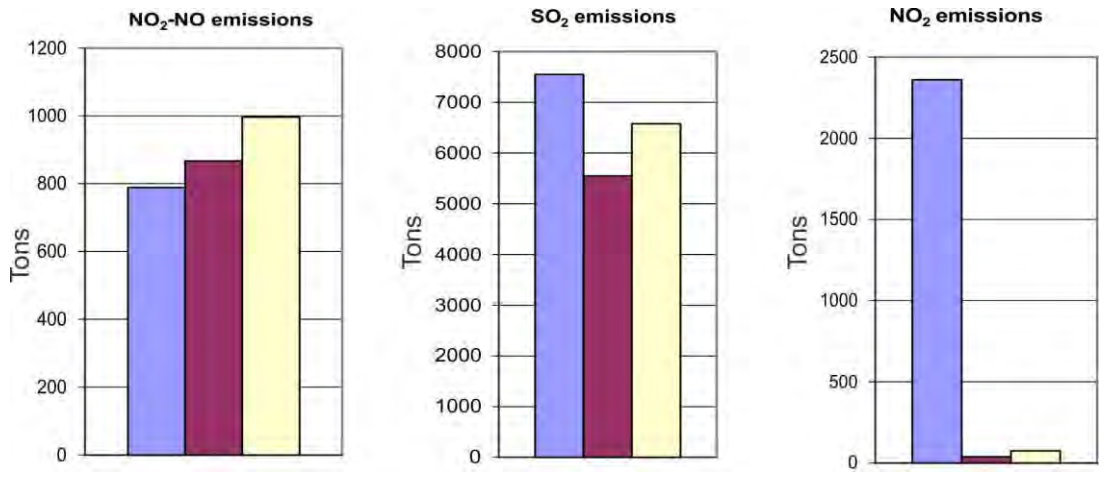


Figure Ko2.1: Emissions of selected contaminants to air at Vorkuta HPP-1 in 2003 (blue) and 2012 (red) and MAE levels in 2012 (yellow)

Ko3(37): Mondi Syktyvkar JSC, Syktyvkar

Name, 2003:	**Ko3(37) Neusiedler Syktyvkar Pulp and Paper Mill (NSPPM)**
Reason, 2003:	NSPPM emits almost 75% of total industrial emissions in Syktyvkar. Emission of specific toxic and organoleptic contaminants is of special concern. It is also responsible to largest volumes of polluted waste waters discharged in the city
Impact, 2003:	Emission to air: CO – 13 187.7 t/year; SO_2 – 672.4 t/year; NO_2 – 2116.0 t/year; H_2S – 182.8 t/year; mercaptans – 70.2 t/year; dust – 2284.6 t/year Discharge to water: n/d
Impact, 2012:	Emission to air: CO – 4484.2 t/year; SO_2 – 57.7 t/year; NO_2 – 4188.9 t/year; H_2S – 30.8 t/year; mercaptans – 3.7 t/year; dust – 197.5 t/year Discharge to water: 94 818 t/year
Measures taken:	Converted to elemental chlorine free (ECF) technology; large-scale reconstruction of soda recovery boiler (SRB) units (STEP project); installation of electric filters at boiler units and regenerators – reduction of emissions of the main contaminants in 2012 versus 2003 of 51% on average; modernisation of wastewater treatment facilities and technological processes, construction of recirculation facilities – reduction of fresh water intake of 31%; of industrial discharge of 21%; of wastewater discharge to Vychegda River of 26% in 2012 versus 2003
Measures planned:	Reconstruction of recovery boiler 3U; modernisation of wastewater treatment facilities
Investments:	Overall budget of STEP project: € 545 million; environmental projects (2004-2012): € 170 million
Status:	Proposed for exclusion from the "hot spot" (air emissions); proposed for continued and joint actions (water discharge)

Short description of the Ko3 "hot spot" and progress since 2003

Mondi Syktyvkar JSC, formerly Syktyvkar Pulp and Paper Mill and Neusiedler Syktyvkar, is one of the leading producers of pulp and paper in Russia. The construction of Syktyvkar Pulp and Paper Mill began in 1963, and the first board machine started-up in 1969.

In 2011, Mondi Syktyvkar harvested 2.2 million m3 of wood to produce close to 700 thousand tons of pulp, which resulted in the production of more than 900 thousand tons of paper and board.

In 2004, Mondi Syktyvkar installed an electric filter at boiler unit 5U and reduced the dust emissions. In 2006, the company carried out a reconstruction of the bleaching unit with conversion to elemental chlorine free (ECF) technology.

In 2010, Moldi Syktyvkar commissioned the sites constructed in the framework of STEP – the biggest investment project in the Russian pulp and paper industry over the last 30 years. The project included construction of new soda recovery boilers (SRB), replacing three old ones and the introduction of a system for collecting non-condensable gases and burning them in SRB. The STEP project implementation resulted in a reduction of emissions of sulphur-containing compounds, dust, CO and non-condensable gases. In 2010, the electric filter was also installed at regenerator # 4, reducing the dust emissions.

In 2012, Moldi Syktyvkar reconstructed regenerator # 3 and reduced the dust and CO emissions.

The implementation of the STEP project and measures in 2004-2012 resulted in a reduction of industrial emissions of the main gases by an average of 51% in 2012 versus 2003. Emissions of CO, in particular, decreased from 13 187.7 t/year in 2003 to 4484.2 t/year in 2012; SO_2 from 672.4 t/year to 57.7 t/year; H_2S from 182.8 t/year to 30.8 t/year; mercaptans from 70.2 t/year to 3.7 t/year; and dust from2284.6 t/year in 2003 to 197.5 t/year in 2012.

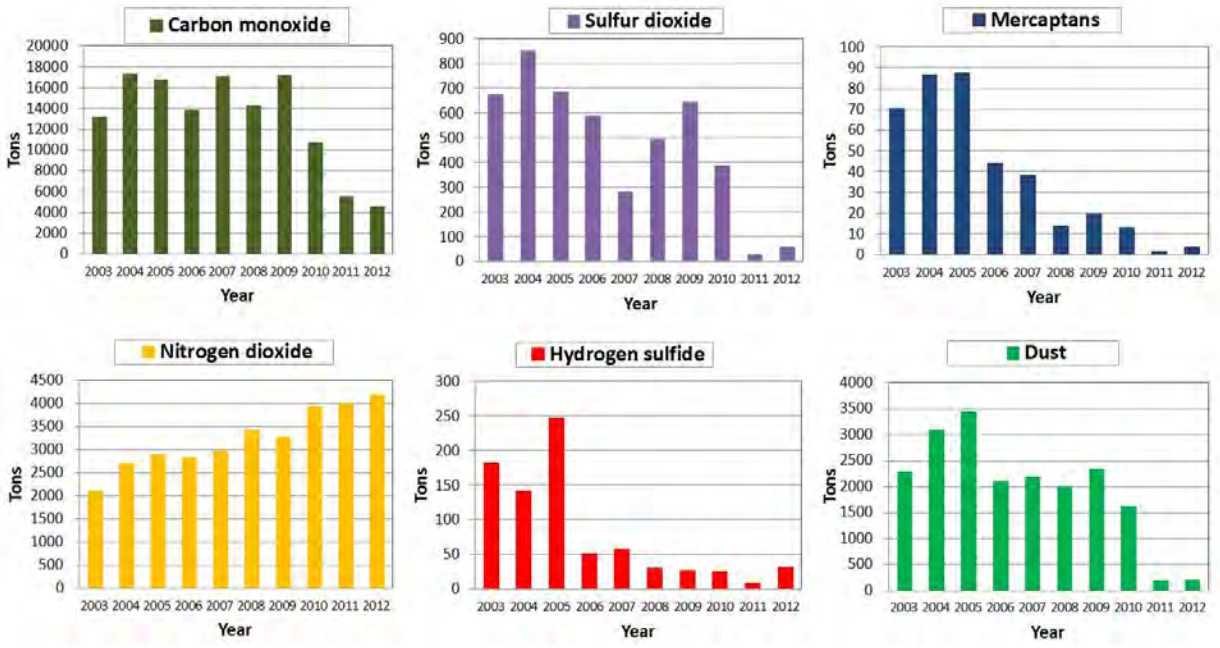


Figure Ko3.1: Dynamics of industrial air emissions of selected contaminants at Mondi Syktyvkar for the period 2003-2012

Figure Ko3.2. Reconstruction of Mondi Syktyvkar within the STEP project. Photo: Omus

The wastewater treatment facilities at Mondi Syktyvkar receive both industrial water from pulp and paper production and municipal water from the city of Syktyvkar for treatment. In 2006-2011, the company implemented a number of projects to reduce the freshwater intake for production and the discharge of contaminants with the wastewater. The introduction of ECF technology in 2006 resulted in a reduction of the discharge of chlorine-bearing compounds. In 2008, Mondi Syktyvkar modernised the water treatment facilities. In 2010, the company constructed a new evaporation station, reduced the contents of specific pollutants in the wastewater and reduced the water intake volumes, with increases in recirculated water use for production. In 2011, Mondi Syktyvkar built a sewerage system for the collection and treatment of rainwater from the production site.

This resulted in a reduction of freshwater intake of 31%; of industrial discharge of 21%; and of wastewater discharge to Vychegda River of 26% in 2012 versus 2003. In 2012, Mondi Syktyvkar discharged 84 million m^3 of wastewater to Vychegda River, including 61 million m^3 of production wastewater. The discharges of all the contaminants with the wastewater to Vychegda River in 2012 amounted 94 817.96 t/year, a decrease of 12% compared with 2003.

During environmental inspections of Mondi Syktyvkar in 2011, it was documented that Vychegda River was polluted with phenol due to poorly treated wastewater discharge (exceeding the MAD level for phenol by 1.6 times) from Mondi Syktyvkar.

Mondi Syktyvkar is certified with ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007 and FSC-C018237.

Environmentally sound investments at Mondi Syktyvkar from 2004 to 2012 aimed to reduce air and water pollution by about € 170 million.

In 2013, the Ministry of Nature Resources and Environmental Protection of the Republic of Komi proposed to exclude Mondi Syktyvkar from the Barents Environmental "Hot Spot" List in terms of industrial air emissions and to prioritise the implementation of projects aimed at improving wastewater treatment and reducing the discharge of contaminants to water.

Ko4(38): Sewage treatment in small settlements in the Republic of Komi

Name, 2003:	**Ko4(38) Communal sewage discharge in small settlements**
Reason, 2003:	Communal sewage treatment facilities in many small settlements are practically absent. Untreated sewage enter water bodies and pose threat to the ecosystem and humans
Impact, 2003:	Discharge of contaminated wastewater in the Republic: 140.5 million m^3/year
Impact, 2011:	Discharge of contaminated wastewater in the Republic: 128.8 million m^3/year
Measures taken:	The long-term republican target programme Clean Water in the Republic of Komi (2011-2017) was elaborated and approved in 2011.
Measures planned:	Implementation of the long-term programme with construction of sewage treatment plants in Schelyayur (2016) and Izhma (2017) settlements
Investments:	The republican long-term programme budget is 630 million rubles (€ 15.7 million)
Status:	Proposed for joint actions with the republican programme

Short description of the Ko4 "hot spot" and progress since 2003

During the past ten years, between 550 and 470 million m^3 of wastewater per year was discharged in the Republic of Komi. In 2011, 531.26 million m^3 of water was used, including 441.79 million m^3 of freshwater from surface bodies. Wastewater discharges to surface water bodies totalled 469.56 million m^3, including 129.03 million m^3 (27.5%) of contaminated wastewater, of which 120.75 million m^3 was insufficiently treated and 8.28 million m^3 was without treatment. A total of 319.52 million m^3 of wastewater was discharged to the Pechora River catchment area (36.69 million m^3 or 11.5% of contaminated water) and 149.41 million m^3 to the Vychegda River catchment area (91.89 million m^2 or 61.5% of contaminated water). The total volume of recycled water in Komi in 2011 was 1484.72 million m^3.
The calculated capacity of the 133 wastewater treatment works in the Republic of Komi in 2011 was 332.51 million m^3.
The 2003 NEFCO/AMAP report proposed the development of municipal sewage treatment facilities in Izhma settlement as a pilot project. In 2003, 1.9 million m^3 of contaminated wastewater was discharged to the Izhma River catchment area, and in 2010 the volume increased by 2.2 times to 4.2 million m^3.
In 2011, the long-term republican target programme Clean Water in the Republic of Komi (2011-2017) was elaborated and adopted by the Government of the Republic of Komi. The programme plans the construction of two sewage treatment facilities in Izhma district – in Schelyayur village in 2016 (11 million ruble budget) and in Izhma village in 2017 (19.35 million ruble budget).
The total investment estimate of the long-term programme to be financed by the budget of the Republic of Komi is 630 million rubles (€ 15.7 million).

Ko5(39): Drinking water supply in the Republic of Komi

Name, 2003:	**Ko5(39) Poor drinking water quality in many towns and districts of the Komi Republic**
Reason, 2003:	High chemical and microbial pollution of drinking water is observed in Ukhta and Usinsk towns, Knyazhpogostsky, Ust'-Vymsky districts. Virus contamination has been found in drinking water of Usinksy, Nyazhpogostsky and Kortkerossky districts
Assessment, 2003:	37.3% of drinking water samples did not meet quality standards.
Assessment, 2011:	36.8% of drinking water samples did not meet quality standards.
Measures taken:	The long-term republican target programme Clean Water in the Republic of Komi (2011-2017) was approved in 2011.
Measures planned:	Implementation of the long-term programme with construction of water treatment and supply systems
Investments:	The programme budget is 630 million rubles (€ 15.7 million).
Status:	Proposed for joint action with the republican programme

Short description of the Ko5 "hot spot" and progress since 2003

The drinking water quality in the Republic of Komi in 2011 was similar on average to that in 2003 – about 63% of the water samples met the quality standards.

In 2003, according to the Centre for Hygiene and Epidemiology in the Republic of Komi, 32.4% of drinking water samples did not meet hygienic standards on sanitary-chemical criteria, and 3.4% on microbiological criteria. Of the urban areas, 86% had water treatment facilities, while for the countryside it was only 9%. Of the water treatment works in urban areas, 8% were not equipped with disinfection facilities and in rural areas it was 23%.

In 2011, 36.6% of drinking water samples did not meet hygienic standards on chemical criteria and 1.9% on microbiological criteria. Of the urban and rural areas 65%, on average, were provided with water treatment facilities. Of the existing water treatment works in urban areas, 19% did not have disinfection facilities and in rural areas it was 12%. The most difficult situation with chemical and microbe contamination of drinking water was in the towns of Ukhta and Usinsk and the districts of Knyazhpogostsky, Kortkerossky and Ust-Vymsky.

The 2003 NEFCO/AMAP report proposed development of a master plan for the drinking water supply in the Republic.

Syktyvkar city, with a drinking water supply issue, was not included in the 2003 NEFCO/AMAP "hot spot" list, as the joint investment project on the reconstruction of water treatment facilities in the Republic of Komi, including the towns of Syktyvkar and Vorkuta, was launched in 2002. The project, with a total cost of € 31.8 million, is financed with a

Figure Ko5.1. WGE delegation visited Syktyvkar water treatment facilities in 2011
Photo: Bnkomi.ru

grant of € 6.04 million from NDEP, loans of € 15 million from investment institutes, including EBRD, and support from Sweden, Finland, Canada and the EU.
The long-term republican target programme Clean Water in the Republic of Komi (2011-2017) was elaborated and adopted by the Government of Komi in 2011.
The programme includes: in Ukhta, reconstruction of water intake and of low pressure water conduits in 2012-2013 (budget 5.5 million rubles), construction of water treatment facilities in 2015-2017 (11 million rubles), reconstruction of water pipelines in 2012-2017 (51 million rubles); in Usinsk, construction of ground water supply systems in rural areas (38 million rubles) and Usinsk town (29 million rubles); in Knyazhpogostsky district, reconstruction of a water supply system in 2012-2017 (20 million rubles); in Kortkerossky district, reconstruction of a water supply system in 2012-2013 (5.3 million rubles) and water treatment facilities in 2016 (10 million rubles) in Bolshelug village; and in Ust'-Vymsky district, the construction of water intake in Zheshart settlement in 2014-2017 (16 million rubles). The implementation of some of the projects started in 2012 with 31.3 million rubles (0.78 million) invested from the republican budget.
The total cost estimate of the long-term programme to be financed by the republican budget is 630 million rubles (€ 15.7 million).

Ко6(40): Waste management in the Republic of Komi

Name, 2003:	**Ko6(40) Formation of industrial and domestic wastes**
Reason, 2003:	11 million tons of industrial and domestic wastes, including 3.5 million tons of toxic waste are formed in Komi annually. Only 1.2% of waste are utilised. The dumping grounds of industrial and domestic wastes are pollution sources for ground waters and surface water bodies, from which water intake for potable water is carried out
Impact, 2003:	13.5 million tons of waste is formed, including 5.1 million tons of hazard class V, 8.2 million tons of class IV, and 0.06 million tons of classes I-III (40 tons of hazard class I)
Impact, 2011:	6.3 million tons of waste formed, including 5.6 million tons of hazard class 5, 0.6 million tons of 4 class, and 0.067 million tons of classes I-III (258.2 tons of hazard class I) 113.7 million tons of waste accumulated at dumping sites
Measures taken:	Long-term republican target programme Industrial and Household Waste Management in the Republic of Komi (2012-2016) was elaborated and approved. The concept on Industrial and Household Waste Management was elaborated. Municipal waste management plans are under elaboration.
Measures planned:	Implementation of the long-term programme
Investments:	2011: 3 million rubles (€ 75 thousand) from Komi and NEFCO 2012: 59 million rubles (€1.47 million) from Komi budget
Status:	Proposed for joint actions with the republican programme

Short description of the Ko6 "hot spot" and progress since 2003

Industrial and household waste management remains a major problem for the Republic of Komi. The Komi region was generating between 11 and 13.5 million tons of waste annually in 2001-2004; 16.5-18.3 million tons in 2005-2006; and 6.3-8.5 million tons in 2007-2011.

In 2011, 76.2% of waste was formed by mining, timber, and oil and gas production companies. Enterprises used 0.9 million tons, or 14.6%, of the waste formed and placed 5.1 million tons at dump sites. The low rate of waste utilisation resulted in an accumulation of 113.67 million tons of waste in the Republic of Komi by autumn 2011.

In 2011, an inventory of the dumping waste ground was carried out and 561 waste storing and disposal sites were identified, about 10% of which operated in compliance with the environmental requirements. The Department of Rosprirodnadzor in the Republic of Komi reported that in 2011, 2 municipal waste disposal sites were officially registered, and 411 illegal landfills were identified of which 167 were eliminated. Most of the household waste is formed in the cities of Syktyvkar, Ukhta and Vorkuta. Household garbage and similar waste is often dumped in landfills. There is hardly any separate collection, processing or recycling of this kind of waste. The Republic of Komi does not possess sufficient resources to organise a centralised system of waste management and technical facilities for collection, use, decontamination, transportation and disposal of medical waste.

The 2003 NEFCO/AMAP report proposed the project on development of waste management system in the Republic of Komi.

The concept (programme activities) for the Management of Industrial and Household Waste in the Republic development was launched in 2011 with finances from the republican budget (1.2 million rubles) and NEFCO (€ 45 thousand). The concept is designed to plan short-term, medium-term and long-term actions up to 2020.

In 2011, the Government of Komi approved the long-term republican target programme on Industrial and Household Waste Management in the Republic of Komi (2012-2016) and urged the municipal administrations to elaborate and adopt local waste management sub-programmes. By autumn 2012, all 20 municipalities in the Republic of Komi had approved municipal waste management programmes and allocated finances from local budgets for programme activities.

The republican budget allocated 888.3 million rubles (€ 22.2 million) for the implementation of programme activities, including 59.2 million rubles (€ 1.47 million) for 24 projects in 2012.

The Ministry of Nature Resources and Environmental Protection of the Republic of Komi, which coordinates the activities of the long-term programme, proposed to rename the Ko6 "hot spot" Formation of production and consumption waste.

Figure Ko7.1. About 1.5 million m^3 of wood waste is put into landfills in the Republic of Komi annually. Significant emission reductions can be achieved if the wood waste is used.
Photo: Hans Borchsenius

Ko7(41): Wood processing industry waste management

Name, 2003:	**Ko7(41) Wastes of timber and pulp and paper industry**
Reason, 2003:	In 2002, timber and pulp and paper industry of the Republic produced 1071.7 thousand tons of wastes, largest part of them was timber waste stored at enterprises and various lanfills
Assessment, 2003:	n/d
Assessment, 2011:	More than 300 thousand m^3 of wood waste accumulated in Komi
Measures taken:	A heat and power unit burning wood waste was launched at Syktyvkar Plywood Mill in 2004. The construction of the biofuel heat and power station in Syktyvkar has started and the plant is due to be completed in 2014. The republican programme on Energy Saving and Energy Efficiency has been approved. The programme includes projects on the construction of a number of fuel pellet and briquette production facilities
Measures planned:	Construction of fuel pellet and brick production facilities, biofuel heat and power plants and boiler houses burning wood waste according to the republican programmes
Status:	Proposed for joint actions with the republican programme

Short description of the Ko7 "hot spot" and progress since 2003

The timber, wood processing and pulp and paper industries are among the main waste producers in the Republic of Komi. The estimates show that more than 300 thousand m^3 of wood waste had accumulated in Komi by 2011.

The 2003 NEFCO/AMAP report proposed a project on recycling timber waste for the production of fuel pellets.

Figure Ko7.2. Mazut-burning municipal heating central in Kortkeross near Syktyvkar that can be converted to burning wood waste
Photo: Bjørn Borgaas

Syktyvkar Plywood Mill LLC is the fifth largest plywood and clipboard producer in Russia. In 2003, the company produced 214.2 thousand tons of plywood and clipboard, resulting in 20.3 thousand tons of wood waste (exceeding the norms) or 9.5% of the production volume, including 16 thousand tons of wood bark. In 2003, 2008 and 2010, Syktyvkar Plywood Mill carried out waste inventory works. The company elaborated the internal waste management and control system, including waste separation. In 2004, the mill launched a 17 MW German Wiesloch heat and power unit (€ 4.4 thousand) for burning wood waste as fuel. The unit processed 16 thousand tons of bark and 4.5 thousand tons of woodchips. This resulted in a reduction of wood waste generation from 20.3 thousand tons in 2003 to 1.9 thousand tons in 2010, while the production increased from 214.2 thousand tons in 2003 to 318.8 thousand tons in 2010. The waste amounted to 0.4% of the finished product in 2010.

Wood waste from Syktyvkar Sawmill is to be used as fuel for a new heat and power station to be constructed in Syktyvkar by Bioenergy Company of Komi in cooperation with Finnish Metso. The Metso Biopower equipment will be installed, and a biofuel power plant should be put into operation in 2014.

The republican programme on Energy Saving and Energy Efficiency includes projects on the construction of a number of biofuel production plants, including for pellets, in the municipalities. The programme estimates those plants can process about 120 thousand tons of wood waste and produce 55 thousand tons of fuel pellets and briquettes a year.
The Ministry of Development of Industry, Transport and Communication of the Republic of Komi elaborated the programme on Use of timber and wood processing industry waste as fuel for production of heat and energy for 2013-2014.
The long-term republican programme on waste management in the Republic of Komi for 2012-2016 includes the project on construction of wood waste placing and storing site in Adzherom village in 2012-2013 (6 million rubles) for converting boiler houses in the Kortkerossky district to burn wood waste.
The Ministry of Nature Resources and Environmental Protection of the Republic of Komi proposed a continuation and launch of joint actions on wood-waste management with the republican target programmes.

Ko8(42): Coal mining industry waste management

Name, 2003:	**Ko8(42) Coal-mining wastes**
Reason, 2003:	Numerous of coal-mining wastes disposed near mines are the sources of land and atmospheric contamination and pose threat of human health
Impact, 2003:	5.1 million tons of waste generated by the coal mining industry, 38% share of regional volume
Impact, 2010:	5.0 million tons of waste generated by the coal mining industry, 75% share of the regional volume
Measures taken:	Management of coal mining waste disposal sites to prevent burning. In 2012, Vorkutaugol stopped burning on 3 disposal sites.
Measures planned:	Implement actions to prevent burning at coal mining waste disposal sites
Investments:	32 million rubles (€ 800 thousand) in 2012 for the reduction of air emissions of contaminants by Vorkutaugol
Status:	Proposed for joint actions

Short description of the Ko8 "hot spot" and progress since 2003

The coal mining industry is responsible for a major part of all waste generated in the Republic of Komi annually. In 2003, coal mining enterprises produced 5.1 million tons of wastes (38% of the regional volume) disposed of at the Vorkuta and Inta dumping sites. In 2010, the coal mining industry formed 5 million tons of waste (76% of the regional volume) with Vorkutaugol JSC generating 4.3 million tons of waste. Most of the coal mining industry waste is of class 5 (not dangerous) hazardous. According to estimates by the Ministry of Nature Resources and Environmental Protection of the Republic of Komi, about 100 million tons of mining waste has been accumulated in the republic.
The 2003 NEFCO/AMAP report proposed the project on Recycling of Coal Mining Waste for the Production of Coal Briquettes.
In 2011, Vorkuta Municipality's administration carried out an inventory of the investment project and excluded the project "Production of coal briquettes from Vorkuta coal mining waste" from the list of priority projects and proposed it for further elaboration to attract investments.

6. Status of 42 Barents environmental "hot spots" identified in 2003

The table below presents the summary status of all 42 Barents Environmental "Hot Spots" listed in the NEFCO/AMAP report "Updating of the Environmental 'Hot Spots' List in the Russian Part of the Barents Region: Proposals for Environmentally Sound Investment Projects". A more detailed description of these "hot spots", their status and progress since 2003 is given in Chapter 5 above. Thus, the information there is also brief, as one report cannot show all the details and aspects of the environmental problems associated with the "hot spots" or the work done to solve these problems and improve the environmental situations.

The 2003 NEFCO/AMAP report listed the "hot spots" with numbers, for example 24(4), where 24 was the number of the "hot spot" in the overall Russian Barents list and 4 the number in the regional (Arkhangelsk) list, and it numbered the proposed investment projects with a letter and a digit, for example K7-2, where K was for the region (Republic of Karelia), 7 for the number of the regional "hot spot" and 2 for the proposed investment project associated with that "hot spot".

In the table below, we use the numbering according to the SHE system, where A4(24) is "hot spot" number 4 in the Arkhangelsk regional list and number 24 in the overall Russian Barents list. The letters are M for the Murmansk region, K for the Republic of Karelia, A for the Arkhangelsk region, N for the Nenets Autonomous District and Ko for the Republic of Komi.

The name of the "hot spot" is given as in Chapter 5. The names of some of the "hot spots" differ from those in the 2003 NEFCO/AMAP report. These "hot spots" were not renamed in terms of changing focus or scope, but names were actualised for 2013, keeping the original environmental issue addressed in 2003.

In terms of environmental problems, "hot spots" listed in the 2003 report addressed issues of industrial air emissions (AE), wastewater discharges (VD), waste management (WM), drinking water supply (DV) and past environmental damage (PD). Some "hot spots" were also relevant to energy-efficiency issues (EE).

The column on measures taken gives the general scope and direction of key activities aimed at solving the environmental problem of the "hot spot".

The status of the "hot spot" is given for 2013 in terms of the original issue addressed in 2003.

The last column on the right shows the "hot spot" owner and/or regional authority proposal for the "hot spot" – either to consider measures taken aimed at solving the original environmental problem identified in 2003 and the results achieved and to exclude the "hot spot" from the list, or to re-confirm the environmental issue as an actual one and to start/continue joint efforts aimed at improving the situation. Three "hot spots" were excluded and one proposed for partial exclusion by SHE, which is also shown in the table.

Table: Summary and status of 42 Barents Environmental "Hot Spots", 2013-2013

HS	Name	2003	Measures taken	2013 status	Owner/ regional proposal
M1(1)	Pechenganickel MMC of Kola GMK, Nickel and Zapolyarny	AE VD	Reconstruction with the aim to reduce industrial emission discharge of contaminants	AE – in progress (TAE) VD – in progressin (TAD)	To continue joint actions
M2(2)	Monchegorsk industrial site of Kola GMK, Monchegorsk	AE	Reconstruction with the aim to reduce industrial emission of contaminants	AE – solved (MAE)	To exclude (AE); to set criteria (VD)
M3(3)	Apatit JSC, Kirovsk	AE VD	Reconstruction with the aim to reduce industrial air emission	AE – in progress (TAE) VD – in progress (TAD)	To define criteria and continue joint actions
M4(4)	Apatity HPP of TGK-1, Apatity	AE	Modernisation with a reduction in air emission of contaminants	AE – solved (MAE)	To exclude
M5(5)	Kovdorskiy GOK of Eurochem, Kovdor	VD	Organisational and technical measures to reduce water use and wastewater discharge	VD – in progress (TAD)	To continue actions
M6(6)	Water quality in the Kola River and Bolshoye Lake	VD DV	Launch of joint long-term investment programme for drinking water supply in Murmansk	VD – in progress DV – partly solved	To continue joint actions
M7(7)	Drinking water supply in Zelenoborsky-1	DV	Reconstruction of water supply pipelines	DV – partly solved	To launch joint actions
M8(8)	Mercury-containing waste management	WM	Upgrade of equipment for recycling of luminescent lamps	WM - solved	Excluded
M9(9)	Sunken and abandoned ships in the Kola Bay	WM PD	Dump site near Lavna was partly cleaned (20 ships removed)	WM – partly solved	To continue joint actions
M10(10)	Oil-containing waste management	WM	Elaboration of long-term target regional programme	WM – in progress	To continue joint actions
K1(11)	Kondopoga JSC, Kondopoga	AE	Reconstruction of HPP with conversion to natural gas, reduction of air emission of contaminants	AE – solved (MAE)	To exclude; SHE – to exclude partially (AE)
K2(12)	NAZ-SUAL branch, Nadvoitsy	AE	Reconstruction and modernisation of production with reduction of industrial air emission of contaminants	AE – partly solved (MAE)	To launch joint actions

HS	Name	2003	Measures taken	2013 status	Owner/ regional proposal
K3(13)	Drinking water supply in towns and settlements of the Republic of Karelia	DV	Elaboration and launch of long-term republican programme Launch of join project in Sortavala	DV – in progress	To continue joint actions
K4(14)	Drinking water quality in water supply system of Petrozavodsk	DV	Launch of joint long-term investment project Reconstruction of water treatment facilities	DV – solved	To exclude
K5(15)	Sewage treatment in Petrozavodsk	VD	Launch of joint investment project on reconstruction of sewage treatment facilities	VD – in progress	To continue joint actions
K6(16)	Sewage treatment in small towns and settlements in the Republic of Karelia	VD	Elaboration of long-term republican programme	VD – in progress	To launch joint actions
K7(17)	HPP burning fuel oil and coal in the Republic of Karelia	AE EE	Conversion of boilers from heavy fuel oil to natural gas at Petrozavodskmash Conversion of boiler to biofuel in Ledmozero Development of regional programme for local biofuel production	AE – in progress EE – in progress	To exclude partially (K7-1); to continue joint actions
K8(18)	Waste management in the Republic of Karelia	WM	Elaboration of the long-term regional investment programme	WM – in progress	To launch joint actions
K9(19)	Waste dumping ground Gorelaya Zemlya in north Petrozavodsk	WM PD	Launch of project on restoration of Gorelaya Zemlya waste dumping ground	WM – in progress PD – partly solved	To rename and continue joint actions
K10(10)	Stocks of obsolete pesticides	WM PD	Removal and incineration of 22.1 tons of obsolete and unused pesticides	WM – solved PD – solved	Excluded
A1(21)	Solombala PPM of Solombalales, Arkhangelsk	AE VD	Reconstruction with the aim to reduce industrial air emission of contaminants	AE – partly solved (TAE) VD – urgent	To launch joint actions
A2(22)	Arkhangelsk HPP of TGC-2, Arkhangelsk	AE	Reconstruction and conversion of boilers from heavy fuel oil to natural gas with the aim of reducing air emission of contaminants	AE – solved (MAE)	To exclude
A3(23)	Severodvinsk HPPs of TGC-2, Severodvinsk	AE	Reconstruction at SHHP-1 and 2 with the aim of reducing air emission of contaminants Conversion of SHPP-2 to burning natural gas	AE – solved (MAE)	To exclude

HS	Name	2003	Measures taken	2013 status	Owner/ regional proposal
A4(24)	Arkhangelsk PPM, Novodvinsk	AE VD	Reconstruction of boilers, SRB and wastewater treatment facilities with the aim of reducing air emissions and water discharges of contaminants	AE – solved VD – solved	To exclude
A5(25)	Koryazhma branch of Ilim Group, Koryazhma	AE VD	Reconstruction of SRB and wastewater treatment facilities with the aim of reducing air emissions and water discharge of contaminants	AE – solved VD – solved	To exclude
A6(26)	Waste management in the Arkhangelsk region	WM	Elaboration of the long-term target regional programme	WM – in progress	To rename and launch joint actions
A7(27)	Areas of past environmental damage in the Arkhangelsk region	PD	Launch of long-term federal programme on clean-up of the Arctic Clean-up of Alexandra Land and Hooker islands at FJL	PD – in progress	To continue joint actions
A8(28)	Spent motor oil management in the Arkhangelsk region	WM	Elaboration of long-term regional programme on waste management Signing agreement on handling spent motor oil	WM – partly solved	To rename and continue actions
A9(29)	Dioxin pollution in the Arkhangelsk region	WM	Change of production processes Clean-up of dumping grounds	WM – solved	To exclude
A10(30)	Stocks of obsolete pesticides in the Arkhangelsk region	WM PD	Removal of 67.53 tons of pesticides from the Arkhangelsk region	WM – solved PD – solved	Excluded
N1(31)	Kumzhinskoye gas and condensate field	PD	Restoration and clean-up of polluted area Decision to start-up gas and condensate production	PD – in progress	To rename and continue actions
N2(32)	Drinking water supply in the Nenets Autonomous District	DV	Elaboration and launch of the long-term regional programme Geological research in 17 settlements Construction of 2 water intakes	DV – in progress	To launch joint actions
N3(33)	Wastewater treatment in Naryan-Mar, Nenets Autonomous District	VD	Reconstruction of sewage treatment facilities in Naryan-Mar Elaboration of projects and start up construction of sewage treatment facilities in Kachgort and Bondarka	VD – in progress	To continue actions

HS	Name	2003	Measures taken	2013 status	Owner/ regional proposal
N4(34)	Mercury-containing waste management	WM	Collection of used luminescent lamps Installation and launch of demercuration equipment	WM – solved	To exclude
Ko1(35)	Vorkutaugol JSC coal mines, Vorkuta	AE EE	Installation of equipment for methane utilisation with the aim of reducing air emissions of methane and using methane as an energy source	AE – in progress EE – in progress	To continue actions
Ko2(36)	Cement Northern Company and Vorkuta HPP, Vorkuta	AE	Elaboration of the action plan for the cement plant and reconstruction of the boiler unit at HPP with the aim of reducing air emission of contaminants	AE – partly solved, in progress	To continue actions
Ko3(37)	Mondi Syktyvkar JSC, Syktyvkar	AE VD	Launch and implementation of the large-scale reconstruction and modernisation project (STEP) with the aim of reducing air emissions and water discharge of contaminants	AE – solved (MAE) VD – in progress	To exclude partly (AE); to launch joint actions (VD)
Ko4(38)	Sewage treatment in small settlements in the Republic of Komi	VD	Elaboration and launch of the long-term republican target programme	VD – in progress	To launch joint actions
Ko5(39)	Drinking water supply in the Republic of Komi	DV	Elaboration and launch of the long-term republican target programme	DV – in progress	To continue joint actions
Ko6(40)	Waste management in the Republic of Komi	WM	Elaboration of the long-term republican target programme, regional concept, and municipal plans	WM – in progress	To continue joint actions
Ko7(41)	Wood processing industry waste management	WM EE	Elaboration and launch of the republican programme Construction of HPP burning wood waste	WM – in progress EE – in progress	To continue joint actions
Ko8(42)	Coal mining industry waste management	WM EE	Elaboration of long-term republican target programme and concept on waste management	WM – in progress EE – to be launched	To launch joint actions

7. Conclusion

The second NEFCO/AMAP report, "Updating of the Environmental 'Hot Spots' List in the Russian Part of the Barents Region: Proposals for Environmentally Sound Investment Projects", which was published in 2003, listed 42 "hot spots" and proposed 52 investment projects connected to them.

The 2003 NEFCO/AMAP report did not set priorities for the proposed projects, but it included the limited priority "hot spot" list that could provide stakeholders with environmental justifications for investments. The "hot spot" list was based on the joint participation and environmentally sound investment approach. The list was not so much of a decision about the main polluters as a proposal for joint actions to work towards solving environmental problems and improving environmental statuses and management.

In 2003, the BEAC Environmental Ministers endorsed the recommendations given in the NEFCO/AMAP report, and in 2005, they set the target to launch relevant investment projects in all of the Barents environmental "hot spots" by 2013 with the aim of eliminating these "hot spots".

Since 2007, much effort has been put into establishing a proper organisation for the management of the Barents environmental "hot spot" exclusion process. Criteria and procedures for "hot spot" exclusion have been elaborated and introduced. The temporary Sub-group on "Hot Spots" Exclusion (SHE) was established under the Barents Euro-Arctic Council Working Group on Environment (WGE), and "Hot spot" Exclusion Groups (HEG) were formed in all five Russian Barents regions.

In 2011, three "hot spots" were excluded from the list. Following the exclusion criteria and procedures set by SHE, "hot spot" owners and HEGs proposed excluding 10 out of the remaining 39 "hot spots" from the list and to continue or launch joint actions for 29 "hot spots" defined by the 2003 NEFCO/AMAP report. In 2013, SHE proposed partially excluding 1 "hot spot" from the list.

The objective of the present assessment carried out in 2013 was to obtain comprehensive information on the status of each of the original 42 "hot spots" listed in 2003 in light of the target set by the Barents Euro-Arctic Council Ministers to launch environmental measures in all of the "hot spots" by 2013.

The conclusion of the assessment is that since 2003, certain measures aimed at solving environmental problems or issues associated with the 42 "hot spots" identified and listed in the second NEFCO/AMAP report have been launched at 42 out of 42 "hot spots". These measures were and still are at different levels in terms of: a) character – from the elaboration on management plans to the modernisation of industry or decontamination of waste; b) stage of implementation – from launched to completed; and c) scale – in terms of investment, target area and environmental effect.

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Appendices

1. Sub-group on Hot Spots Exclusion (SHE) members and observers
2. 8-step "Hot Spot" Exclusion Procedure, table
3. Federal environmental management authorities in Russia in 1991-2012, flow chart
4. NEFCO Barents Hot Spot Facility projects, table

Appendix 1

Sub-group on Hot Spot Exclusion (SHE) members and observers

Members

Finland: Riitta Hemmi – Co-chair
Consulate General of Finland in St. Petersburg

Henna Haapala – WGE Chair
Finnish Ministry of the Environment

Russia: Maria Dronova – Co-chair
Ministry of Nature Resources and Ecology of the Russian Federation

Norway: Anne Berteig
Norwegian Climate and Pollution Agency

Sweden: Åke Mikaelsson
Swedish Environmental Protection Agency

Nadezhda Maslova – supplementary representative
Swedish Environmental Protection Agency

Observers

NEFCO: Henrik Forsström
Barents Hot Spot Facilities, NEFCO

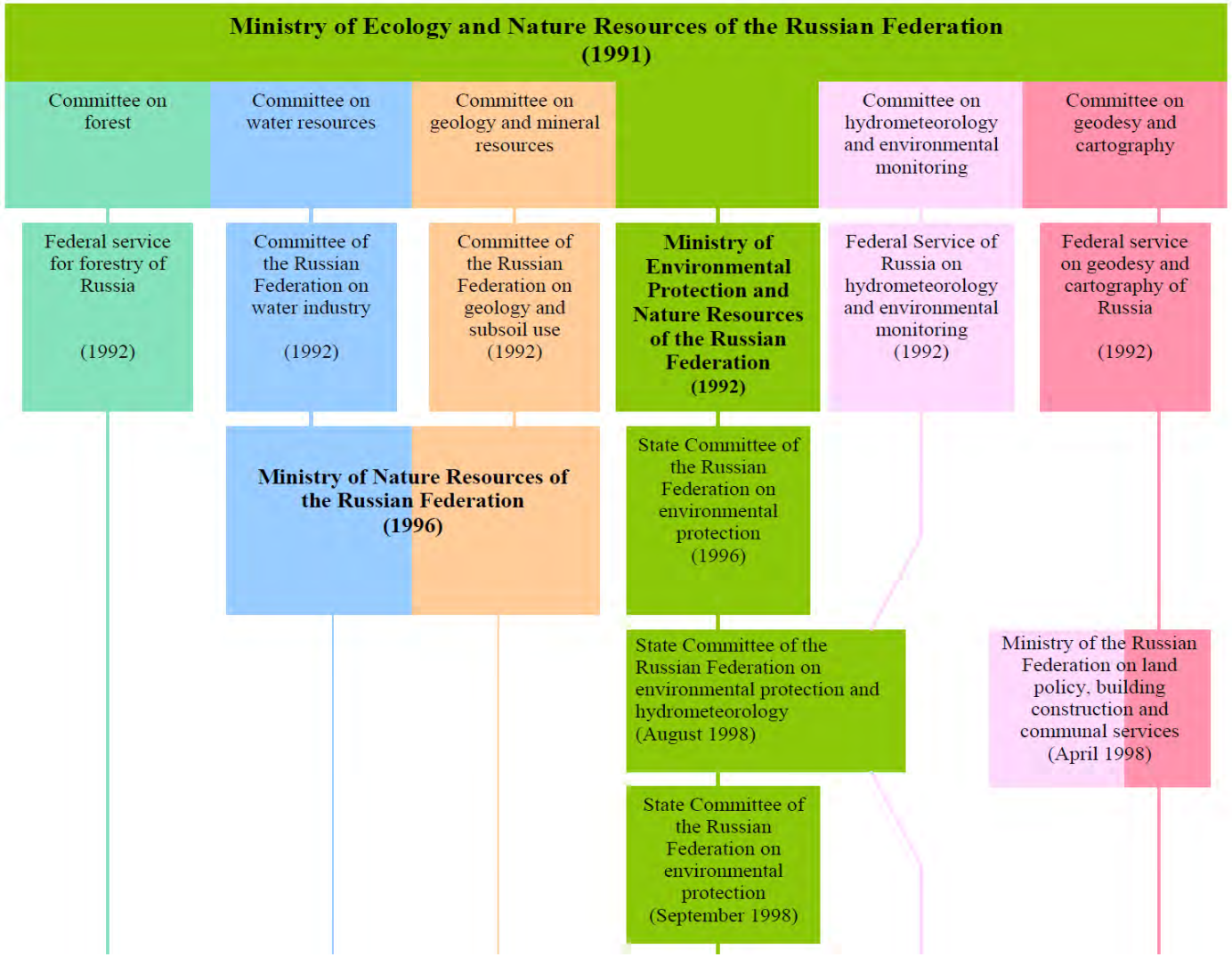
Ruslan Butovsky – supplementary representative
Fund for Sustainable Development

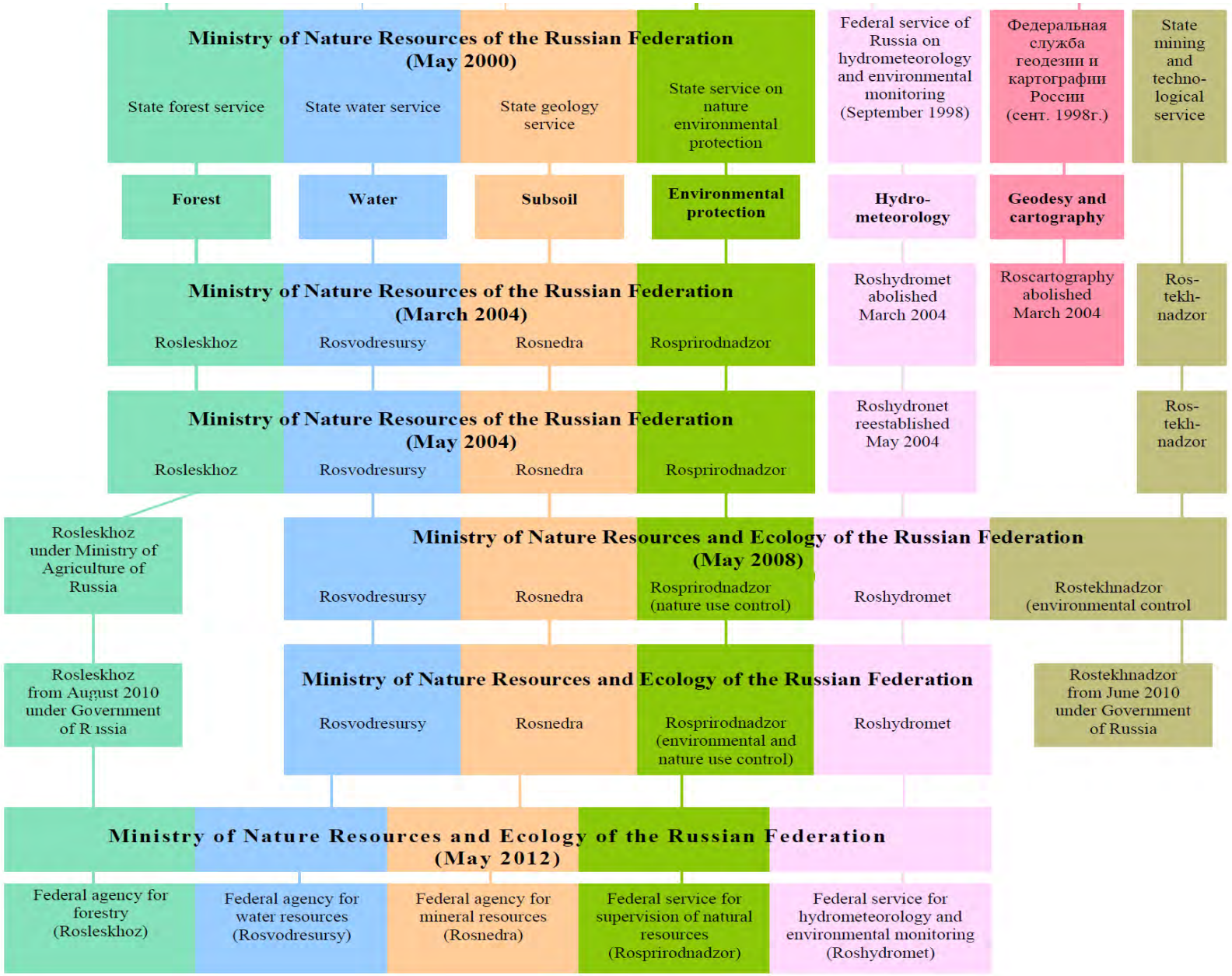
8-step "hot spot" exclusion procedure

Steps	Ordinary hot spot exclusion procedure	Fast Track Exclusion procedure	Initiating organisation	Executing organisation	Document to Verify Fulfillment
№1 Initiation of procedure	P1a. Appointment of the "Assigned Federal Authority" (AFA) to initiate the Screening and Analysis of the Hot Spots		Minpriroda RF	Minpriroda RF	D1a: Official letter on appointment and responsible staff at central and territorial levels of AFA
	P1b. Appointment of cross-organisational, regional "Hot Spots Exclusion Group" (HEGs) in each of the five Federation Subjects		Minpriroda RF	Federal Subjects	D1b1: Official letter with Mandate to the HEGs D1b2: Official response with contact information on all assigned officials in each of the five Federation Subjects
	P1c. Elaboration of exclusion order for HSE from all five Federation Subjects		Minpriroda RF	HEG	D1c1: HEGs general description and assessment of their respective Hot Spots D1c2: HEGs proposed priorities for exclusion
	P1d. Formulation of priorities and guidance for the exclusion work in all five Federation Subjects		Minpriroda RF + SHE	Minpriroda RF	D1d. Decision on a "General Exclusion Plan" (GEP) prioritising and guiding the exclusion work in all five Federation Subjects
№2 Screening & Analysis	P2a. Initiation of Screening and Analysis for the Hot Spots currently envisaged by the General Exclusion Plan (GEP)		Minpriroda RF	HEG	D2a. Official letter initiating the Screening and Analysis
	P2b. Execution of Screening and Analysis of the Hot Spots. Reformulation of unclear formulated names of HS.		HEG	HEG	D2b. Report on Screening and Analysis according to prepared by SHE guidelines. Proposals for renaming of the certain HS
	P2c. Selection of Information for publication on the website		HEG	HEG+SHE	D2c. Preparation of information from the Screening & Analysis that should be publish on the www.beac.st website
№3 Definition of HS Specific Criteria	P3a. Definition of Hot Spot issue and HS Specific Exclusion Criteria.		HEG	HEG after consultation with WGE	D3a. 1) Decision regarding specific exclusion criteria for HS (applicable norms, techniques, standards etc.) 2) Inclusion of geographical and thematical boarders, levels of expectation in the name of HS
	P3b. Choice on continued procedure IF Hot Spot complies to applicable Russian environmental standards => Step 7 "Fast Track Procedure" IF NOT complies => Step 4 "Ordinary Procedure"		HEG	HEG	D3b. 1) Assessment of provided Screening and Analysis report regarding exclusion criteria and 2)decision regarding the continuation of the procedure (=>Step 4 OR =>Step 7)
№ 4 Development of Action Plan	P4a. Iniciation of Action Plan preparation		HEG	HEG	D4a. Request to HS owner to prepare Action Plan according to SHE quidelines
	P4b. Development of an Action Plan (may be based on earlier developed plans)		HEG	HS owner	D4b. Draft Action Plan, incl. 1) Problem definition, 2) Owner definition, 3) Site specific exclusion criteria, 4) Review of BAT and BEP, 5) Project formulations, 6) Time schedule, 7) Budget & Financing, 8) Control Programme, 9) Reporting scheme, 10) Application Procedures for Exclusion
	P4c. Continuous contact with HS; possible support and consultations to HS owner		HEG	HEG + SHE	D4b. Report on Communication and Consultations with possible proposals for further support to the HS Owner

№ 5 Approval of Action Plan	P5a. Application for Assessment of the Action Plan	HS owner	HEG	D5a Provided Action Plan with application letter for assessment
	P5b. Assessment of the Action Plan	HEG	HEG after consultation with WGE	D5b. Assessment of the Action Plan including report for HS owner with comments and recommendations for improvement
	P5c. Taking a decision regarding the approvement of the Action Plan	HEG	HEG after consultation with WGE	D5c. 1) Decision on Approval or Rejection of Action Plan 2) Decision on Continued Exclusion Procedure and 3) Possible Request to strat the implementation of Action Plan IF APPROVED => Step 6 and the colour changes to "yellow" IF REJECTED => back to Step 4
	P5d. Selection of information for publication on the website	HEG	HEG after consultation with WGE	D5d. Implementation Decision on Information from the Action Plan to be publish on the www.beac.st website
№ 6 Implementation of Action Plan	P6a. Implementation of the Action Plan	HEG	HS owner	D6a. Report on Completion of Action Plan includes evidences on fulfillment of the Specific Exclusion Criteria
	P6b. Continuous contact with HS, Progress Monitoring of & Possible Implementation of Support Activities for the Action Plan	HEG with support from SHE	HEG, SHE, experts	D6b. Report on Communication, Consultations and (if relevant) Completed Support Activities (e.g. such as education and knowledge transfer on BAT required for proper implementation of the Action Plan)
№ 7 Application for Exclusion	P7a. Application for Exclusion	HS owner	HEG	D7a. Official Application for Exclusion
	P7b. Assessment of Action Plan completion report and decision regarding processing of the HS.	HEG, Minpririda RF	HEG, Minpririda RF, SHE	D7b. 1) Approval or rejection of the report 2) Feedback with possible recommendations for improvements and 3) Decision on Continued Exclusion Procedure IF APPROVED => Step 8 and Colour changed to "Green", IF REJECTED => Back to Step 6
	P7c. Selection of Information for publication on the website	HEG	HEG	D7c. Decision on Information from the Implementation of the Action Plan to be publish on the www.beac.st website
№ 8 Exclusion from the "Hot Spots" List	P8a.Declaration of the Hot Spot as "Green"	HEG	WGE	D8a. WGE Announcement that the Hot Spot is Green (in the period between the BEAC Minister Meetings, Hot Spots may be announced as "partially green" while remaining efforts are made to satisfy also the residual of the Specific Criteria)
	P8b.Recommendation for Exclusion of the "Hot spot"	WGE	Ministers of environment from the BEAC countries	D8b. Protocol from BEAC WGE Ministerial Meeting, declaring the exclusion of the Hot Spot

Federal environmental management authorities in Russia in 1991-2012




Ministry of Nature Resources of the Russian Federation (May 2000)
State forest service
State water service
State geology service
State service on nature environmental protection
Federal service of Russia on hydrometeorology and environmental monitoring (September 1998)
Федеральная служба геодезии и картографии России (сент. 1998г.)
State mining and technological service
Forest
Water
Subsoil
Environmental protection
Hydro-meteorology
Geodesy and cartography
Ministry of Nature Resources of the Russian Federation (March 2004)
Rosleskhoz
Rosvodresursy
Rosnedra
Rosprirodnadzor
Roshydromet abolished March 2004
Roscartography abolished March 2004
Ros-tekh-nadzor
Ministry of Nature Resources of the Russian Federation (May 2004)
Rosleskhoz
Rosvodresursy
Rosnedra
Rosprirodnadzor
Roshydronet reestablished May 2004
Ros-tekh-nadzor
Rosleskhoz under Ministry of Agriculture of Russia
Ministry of Nature Resources and Ecology of the Russian Federation (May 2008)
Rosvodresursy
Rosnedra
Rosprirodnadzor (nature use control)
Roshydromet
Rostekhnadzor (environmental control
Rosleskhoz from August 2010 under Government of R ıssia
Ministry of Nature Resources and Ecology of the Russian Federation
Rosvodresursy
Rosnedra
Rosprirodnadzor (environmental and nature use control)
Roshydromet
Rostekhnadzor from June 2010 under Government of Russia
Ministry of Nature Resources and Ecology of the Russian Federation (May 2012)
Federal agency for forestry (Rosleskhoz)
Federal agency for water resources (Rosvodresursy)
Federal agency for mineral resources (Rosnedra)
Federal service for supervision of natural resources (Rosprirodnadzor)
Federal service for hydrometeorology and environmental monitoring (Roshydromet)

Appendix 4

NEFCO Barents Hot Spot Facility projects

Note: Ongoing projects are in bold letters.

Name of project	Allocated (€)	Hot spot
Database for Barents Environmental Hot Spots	12000	All
Database for Hot Spots – development & maintenance (to 2013)	80000	All
Support to WGE/SHE and general work on HS exclusion process	200000	All
Support to project development with Norwegian Min. of Envir.	200000	All
Hot Spots and Cleaner Production in the Russian Barents Region	35000	All
Oil-polluted water in the Russian Barents Region	25000	All
Modular concept for renewable energy in NW Russia	30000	Sector
Inventory of Nordic competence related to oil pollution	27000	A-7, M-10
Project preparation support for BHSF	48000	All
Collection of information: Renewable energy & energy efficiency	30000	All
Paper & Pulp Industry	14000	Sector
Mining & Metallurgical Industry – Extended	19000	Sector
Potential for "joint implementation" project development at hot spots	16000	Sector
ACAP Mercury-Containing Waste Study for NAO/NW Russia	35000	N-4/M-8
Recycling of Mercury Lamps in Naryan-Mar – revised project follow-up	6000	N-5
Integrated energy and environment at Kolguyev Island	60000	N-2
Fuel conversion from mazut and coal in municipal boilers	160000	K-7
"Bundling" of fuel conversion projects	16500	K-7
Waste management in Petrozavodsk	170000	K-8
Landfill management in Petrozavodsk – methane measurements	50000	K-8
ToR – Wastewater management in Petrozavodsk	5000	K-5
Central Boiler House & Rigachina Boiler in Petrozavodsk – Extended	100000	K-7
ToR – Communal drinking water in Karelia	5000	K-3
Communal drinking water in Karelia	100000	K-3
Communal drinking water in Karelia – addition	15000	K-3
ToR – Communal wastewater in Karelia	5000	K-6
Communal wastewater in Karelia	100000	K-6
Small-scale hydropower in Karelia	220000	K-7
Waste management in small Karelian municipalities	32000	K-8
Management of obsolete pesticides and other specific waste categories	60000	K-10
Energy & Environment at Valaam, Kizhi, Priladozhie and Prionezhie	130000	K-7
Sustainable utilisation of pulp and wood waste in Karelia	24000	K-7
Integrated energy supply with conversion to bioenergy in Valday	60000	K-7
Conversion to biomass-based heat supply in Sortavala	110000	K-7
Replacement of obsolete diesel stations in Karelia	80000	K-7
Energy Plan for City of Kostamuksha	30000	K-7
Framework for ToR for energy sector investment projects in Karelia	28000	K-7
Intitial investigation of waste dumping ground at Petrozavodskmash	4000	K-9
Recycling of hydrocarbons and oil waste clean-up measures in AR-NAO	170000	A-8
Franz Josef Land survey	200000	A-7

Name of project	Allocated (€)	Hot spot
Large CHP and other energy and pollution issues in AO	26000	A-2/A-3
Small-scale wastewater for small and remote villages – Kenozero NP	21000	K6/N2/Ko4
Demonstration Project for small-scale wastewater in Kenozero NP	240000	K6/N2/Ko4
Integrated sustainable energy and environment at Solovki – Extended	45000	A
Study on waste sector in Arkhangelsk region & Nenets AO	26000	A-6
Medical waste management	32000	A-6
Inventory and database of oil pollution in Archangelsk Oblast	60000	A-7
Demonstration project concerning oil pollution in Mezen	32000	A-7
Oil pollution in Mezen – phase 2	70000	A-7
Modular programme for conversion of small boilers in AO (A-D)	80000	A-2/A-3
Evaluation of oil pollution in Krasnoye	30000	A-7
Sunken ships in Murmansk region – Pre-feasibility Study	4000	M-9
Sunken ships in Murmansk region – Teriberka	30000	M-9
Sunken ships in Murmansk region – Database	50000	M-9
Sunken ships in Murmansk region – Lavna & Tri Ruchya	30000	M-9
Sunken ships in Murmansk region – Project follow-up	30000	M-10
Oil waste in Murmansk region	4000	M-10
Murmanskvodokanal – investment priorities	16000	M-6
Murmanskvodokanal-2: Development & Strategy/(Pre-)feasibility study	87500	M-6
Re-vegetation of tailings ponds	12000	M-1,2,3,5
Waste Management in Murmansk Oblast	21000	M-8/M-10
Oil sanitation at fishery port terminal in Murmansk	30000	M-9/M-10
System for oil spill response in Murmansk Oblast	60000	M-9/M-10
Waste Management in Komi/Syktyvkar	190000	Ko-6
Waste Sector Study in Komi	36000	Ko-6
Demo project with ACAP – dioxin emissions at Vorkutacement	60000	Ko-2
Strategy and action plan for waste management in Komi Republic	*45000*	Ko-6
Oil wells in Komi – measures at Voivozhskoye oil field	12000	Ko-6
Development of waste sector investment projects in Komi Republic	24000	Ko-6/Ko-7