



**PROMOTING INTER-REGIONAL AIR QUALITY MANAGEMENT  
MEASURES IN THE BALTIC SEA AREA**

**Environmental cooperation project between  
the city of St. Petersburg and Finnish cities**

**Final report  
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# 1. Summary

“Promoting Inter-regional Air Quality Management Measures in the Baltic Sea Area (AQM II)” project is the direct successor of the well-established cooperation project between the city of St. Petersburg and Finnish cities, “Enhancing Air Quality Monitoring Measures in St. Petersburg Through Regional Cooperation (later: AQM I). AQM II started its activities in St. Petersburg in September 2006, when the schedule for the project activities was checked and agreed on preliminarily.

During year 2007, AQM II actively continued its activities. Passive sampling measurements were continued according to the plans made in autumn 2006. Intercomparison measurements of gaseous compounds were started after equipment delivery during the spring 2007 and expert visits related to the measurements were implemented. The dispersion modelling cooperation was implemented including workshops. Analysing the results of the work on all themes was started and continued till the end of the year, and the final results were reported in the final seminar in February 2008.

Discussions on future cooperation were started with a mutual strong wish to continue the well-started collaboration. In this respect the international workshop organised in connection with the Lappeenranta Air Quality days on 22 August played an important role regarding possibilities of widening the cooperation to other countries of the Baltic Sea Region. New project ideas were found, and the discussions started now could be continued later when realistic opportunities for financing can be found.

More concrete level the plans for continuation reached during the final seminar of the project in February 2008. A visit to Shepelevo background station was included in the final seminar programme, and there also a workshop for planning continuation for the project took place.

## 2. Project performance

### 2.1 Project objectives and their realisation

The project was designed in the first phase to involve consultation and practical training meetings between Finnish and Russian experts on developing air quality measurements, passive sampling and dispersion modelling. The focus was on design and implementation of joint inter-comparison measurement exercises and quality assurance procedures during measurement campaigns as well as real case studies with dispersion modelling. Finnish expertise and consulting were provided for analysing main sources of emissions and possibilities of their reduction and prevention as well as utilization of the data in decision-making. The goal of the project activities was to establish continuous practical level cooperation on the gaseous pollutants (and later also in PM measurements), passive sampling and dispersion modelling between experts in Finland and St. Petersburg.

Regarding the abovementioned aims, it can be noted that the project succeeded very well. Collaboration on all topics of the project proceeded smoothly, with strong commitment of partners to the joint work. During the relatively short period of the project it was possible to implement many concrete level activities, which resulted to concrete development recommendations to improve the air quality monitoring system in St. Petersburg. These recommendations have been taken into account when preparing future plans in St. Petersburg, and form also the basis for the plans of continuing the well-established cooperation between experts in Finland and St. Petersburg.



In addition to practical level air quality monitoring activities, the project aimed to facilitate and enhance exchange of experiences and best practises acquired in the involved partner cities on developing local air quality monitoring system with special emphasis on air quality information utilization including data management and distribution to citizens. The goal was to identify needs and opportunities for partner cooperation in continuous exchange of information and developing air quality data utilization in decision-making, health risk assessment, information distribution to citizens and procedures in episodes.

Regarding utilisation of the air quality data, the project activities included exchange of experiences in this field. Practical level activities were not part of the project implementation, as e.g. informing the citizens in St. Petersburg is, according to the representatives of the Committee, at the moment on a satisfying level. All activities aimed at quality assurance and quality control of the monitoring benefit in the long run also data utilization, in which the reliability of the data used is of essential role.

The ultimate aim of the project was to enhance reduction and prevention of emissions and discharges that pose a threat to the environment in the Baltic Sea area with special emphasis on improvement of air quality in the St. Petersburg region. This ambitious aim was addressed with concrete level actions to develop the air quality monitoring system, whose reliable functionality and data forms the basis for many of the decisions, which in their turn can affect the air quality itself in St. Petersburg.

## **2.2 Implemented activities**

Project performance with implemented activities and conclusions is described below, dividing the activities into four components of the project plan.

Project coordination measures, including joint meetings among all components, are included and reported in the first component.

### **I Practical level collaboration on air quality monitoring and measurements**

Practical level cooperation involved consultation and practical training meetings between Finnish and Russian experts on developing air quality measurements, passive sampling and dispersion modelling. The focus was on design and implementation of joint inter-comparison measurement exercises and quality assurance procedures during measurement campaigns.

#### **Kick-off**

The project kick-off took place in St. Petersburg on 12-13 September, 2006, gathering together about 15 specialists from Finland and St. Petersburg. The meeting was held in the premises of the state unitary company Mineral, which cooperates closely with St. Petersburg city administration's Environmental Committee. The project's proposed agenda and schedule were discussed and slightly revised during the meeting. It was mentioned that PM measurements were left out from the project activities, due to the cuts on project budget. PM measurements remain in the list of possible cooperation themes for the future. Joint agreement on the approximate timing for project activities was easily reached in the discussions. The measurement stations for the intercomparison exercises were chosen on 13 September when the Finnish experts visited four measurement stations and studied their equipment. After the visits stations number 4 and 9 were selected for the inter-comparison measurement exercises.

#### **Project coordination**

A logo for the project was designed late 2006 and has been used in all documents since then. At the same time The Baltic Institute of Finland launched also the project website. Information about



activities, presentations, reports and documents produced so far have been published in the web. The website is located under the [www.baltic.org](http://www.baltic.org) domain in address: [http://www.baltic.org/st\\_petersburg-tampere/aqm\\_ii/](http://www.baltic.org/st_petersburg-tampere/aqm_ii/)

Agreement on the expertise that FMI provides for the project was prepared in December and signed in January 2007.

The project has been introduced and discussed in City Twinning meetings. Furthermore, it was presented in the Finnish Day, organized by the Ministry for the Environment of Finland in the Finnish Consulate in October 2007. It has also been presented as a good example of successful environmental cooperation between Russia and Finland by BIF in many other occasions.

### **Intercomparison measurements of gaseous compounds**

Planning the intercomparison measurements of gaseous compounds started in kick-off meeting in September 2007 and was continued and finalised during the Mineral expert visit to FMI 31 January – 2 February 2007. During the visit FMI experts trained Mineral experts in maintenance of the measurement equipment and quality assurance of the measurements. It was decided that the gaseous compounds to be measured were SO<sub>2</sub>, NO-NO<sub>2</sub>, O<sub>3</sub> and CO.

After quite substantial preparatory work, the actual delivery of the needed equipment for intercomparison measurements of gaseous compounds was realised during a FMI mission to SPb 19–22 March 2007. Schenker's air cargo was the method used for the delivery. During the mission, the measurement equipment was installed at the measuring stations 4 (transport station) and 9 (industrial station) and first calibrations were made. During the mission Mineral experts were provided with basic training on how to use the equipment and perform the calibration. The actual measurements activities started 5 April 2007.

The next visit of FMI experts to SPb took place on 14-16 May 2007, when calibration of the analyzers at stations number 4 and 9 was conducted and the ozone analyzer at station number 4 was repaired. During these activities further technical and practical training took place and Mineral experts got instructions for continuing the measurements. Further collaboration was discussed during the last day of the visit.

Final calibration took place 25-28 June, after which the intercomparison measurements ended on 28 June 2007. FMI experts implemented final calibration and prepared the equipment to be taken back to Finland. Training on data correction and analysis was given to local experts, and checking and correcting of the data produced during the intercomparison measurements was started. FMI experts also organized a training event on calibration based on gas phase titration.

Further checking and analysing of the data from the intercomparison measurements was continued at the FMI after June. To discuss the results together with experts from the Committee a workshop was organised in St. Petersburg 31 October – 1 November 2007. In the meeting also project continuation and future collaboration in general was discussed together with Committee, VNIIM and Mineral experts. This discussion was continued in the project final seminar in February 2008.

Detailed description of the results of the measurement campaign can be found in Annex I, where also recommendations for future collaboration are given.

### **Passive sampling**

Concrete work in the field of the inter-comparison measurements was started with collaboration on VOC passive sampling exercises. Two FMI experts visited St. Petersburg on 9-12 October 2006 and met both with Mineral and VNIIM experts that would participate in the passive sampling exercises. Those experts were trained, first samplers installed and the exact schedule for the passive sampling, including the delivery of samplers to and from St. Petersburg, was agreed. First samplers were



installed in the measurement stations chosen during the kick-off meeting, and the experts responsible for changing the samplers were trained. Although there was perhaps too little time for actual chemist-to-chemist discussion, the success of the measurements was guaranteed with an agreement that the laboratories will share the results of the analysis as soon as possible and especially if the results are deviating, a meeting between the laboratories shall be arranged as soon as possible.

Since starting passive sampling activities in November 2006, the activities continued as planned at the same stations as intercomparison exercises of gaseous compounds, 4 and 9. Analysis of the samples was done both at FMI in Finland and VNIIM laboratories in St. Petersburg.

Based on the first results from the analysis, a visit of FMI experts was organized on 24-26 April 2007 to St. Petersburg to discuss the methodologies and quality assurance issues with the VNIIM chemist responsible for analytics. Practices and methods used at VNIIM and FMI were discussed and compared, and ideas for improving the work at VNIIM were presented.

Intercomparison measurements of passive sampling ended in June 2007 and chemical analysis of the samples was continued and finished in July-August 2007. Actual analysis of the results was started in autumn 2007 when all the results both from the Russian and Finnish sides were ready. To discuss the results a meeting was organized in St. Petersburg on 31 October – 1 November 2007. At the meeting also future collaboration on passive sampling was discussed, and this discussion was continued in the workshop in February 2008, in connection with the project final seminar.

Analysis results of passive sampling are described in detail in Annex II, in which also recommendations for future collaboration are given.

### ***Conclusions on practical level cooperation on air quality monitoring and intercomparison measurements***

As a general conclusion of the cooperation on intercomparison measurements it can be mentioned that all partner organisations have been actively involved in the planned activities, and the practical cooperation has succeeded relatively well, with strong commitment of partners to the work. However, during the actual measurement campaigns, technical challenges occurred, as well as challenges relating to e.g. the fact that there have been changes in the personnel at Mineral. Also, there were many practical challenges in transferring the measurement equipment from Finland to St. Petersburg. All these facts are something to pay attention to in the future when finalising plans for further collaboration.

### **Final seminar**

The final seminar of the project was organised in St. Petersburg 13-14 February 2008. The seminar started with a workshop on 13 February 2008 organized at Shepelevo background monitoring station, offering Finnish participants from FMI, BIF and the Ministry a possibility to familiarise with the station and to discuss the future collaboration.

The actual seminar on 14 February 2008 gathered together some 30 participants from FMI, BIF, and Ministry for the Environment of Finland, Consulate General of Finland in St. Petersburg, and the Committee for Nature Use, Environmental Protection and Ecological Safety of St Petersburg, State Unitary Enterprise Mineral and VNIIM. Results of the joint work were presented and discussed, and recommendations for future collaboration and further development of the air quality monitoring system were given. The results and recommendations provide ground for planning the next steps in the collaboration.

Programme of the final seminar is available as Annex VI of this final report.



## II Practical level cooperation on dispersion modelling

Dispersion modelling is a field of cooperation activity that is really interesting to the Environmental Committee. Practical utilisation of dispersion modelling in city planning is already taking place in St. Petersburg, and Finnish experiences in this field are very interesting for the Committee. Exchange of experiences and planning of future work were started in the dispersion modelling workshop that took place in Helsinki 19 –20 December 2006. In the meeting, top-level Finnish experts from FMI shared their expertise on the methods, techniques and utilisation of dispersion modelling in Finland. Also the experts from the Environmental Committee shared their experiences on utilising dispersion modelling.

After the meeting in December 2006, the next activity regarding dispersion modelling took place on 24-26 April, when FMI experts visited SPb to have a workshop with experts from the Environmental Committee. The workshop concentrated on studying the characteristics of Russian data and discussing how the Finnish methodology could be utilised with it. During the workshop the next steps were agreed, and the successful workshop ensured effective exchange of information between FMI and the Committee experts.

During the visit, requirements for the input data to be used both for Finnish and Russian modeling systems were studied. Three pilot cases for dispersion modeling were chosen (Kronstadt industrial emissions, transport and energy emissions of St. Petersburg). The Committee experts delivered relevant information to the FMI: GIS and emission data materials. The visit gave a chance to familiarize with the materials and databases of emissions, and to discuss the ways modeling is and could be utilized in city planning and reducing emissions in Finland and in Russia.

Experts of FMI and the Committee simulated the chosen pollutants dispersion in the pilot areas using their own models. The same sources of emission, meteorological parameters and output grids were used. During the work, the materials were specified and complemented by e-mail. Furthermore, FMI experts got meteorological data from international databases and utilizing them processed meteorological material to represent the area of St. Petersburg.

The results of the dispersion modeling work were discussed in a workshop in Helsinki on 4-6 July 2007. Input data used in dispersion modeling was complemented and corrected. Experiences on utilising dispersion modelling in city planning as well as comparability of simulated and measured data were also discussed, as well as future cooperation.

Dispersion modelling related work was continued during summer and autumn 2007, and the next workshop was organised in St. Petersburg 24-26 October 2007. During the meeting, results of the work were compared, discussed and analysed, and content for the future cooperation was discussed. Dispersion modelling was continued with more detailed input data.

### *Conclusions on practical level collaboration of dispersion modelling*

The cooperation on dispersion modelling proceeded with mutual enthusiasm on the issue, and commitment to the work has been intense. First observations from the work are that Russian and Finnish models give rather compatible results. Another observation made during the actual work is that there is room for improvement in the emission data of St. Petersburg.

More detailed description of the results of joint work on dispersion modelling is described in the final report of the results, Annex III.



### **III Promoting exchange of air quality information and collaboration in the Baltic Sea Area**

To address the aims and goals of the third project component “to create possibilities for sustainable environmental cooperation in the BSR by involving also other Baltic cities to utilize the project results in developing wider European cooperation project”, the project coordinator together with FMI experts organised an international session and a workshop in connection to the Lappeenranta Air Quality days on 21- 22 August 2007. This event was seen as a good framework for the project’s events as it was thought that the workshop could attract more international participants when organised in connection to a bigger event.

Draft programme for these two project-related events was prepared and presented to project partners in St. Petersburg on 26 April 2007. The programme was adjusted according to the comments received. Relevant possible participants were contacted from Finland, Estonia, Latvia and Lithuania.

To ensure the success of the workshop and the international session, the project coordinator prepared and submitted an application for additional financing for this event, mainly to cover the travel costs of foreign participants. The application was approved on 16 May 2007.

The workshop “Air Quality Cooperation in the Baltic Sea Region – Present and the Future” was organized 22 August 2007, with the aim of bringing up innovative ideas for cooperation between cities of the BSR, for example in the form of an EU funded project. Limited participant group was planned to consist of representatives from cities from Finland, Russia (St. Petersburg), Estonia, Lithuania and Latvia, of which only the last was missing from the actual event. In total over 20 participants took part in the workshop, representing 16 organizations.

In addition, with the project support it was possible to organize a more general international session “Promoting Clean Air in the Baltic Sea Region” in connection to Lappeenranta AQ Days on 21 August 2007. This session aimed to provide a general framework for exchange of experience on AQ monitoring in participating countries, and its challenges and development needs. The session was open to all AQ Days participants and offered a possibility to distribute information on the theme also outside project partners.

Key project partners in organizing the events in Finland were City of Tampere, City of Lappeenranta and City of Helsinki. The Baltic Institute of Finland, which works under the auspices of City of Tampere, was responsible for the organizational work for the events in cooperation with other partners. Wide contact network of FMI could be utilized in recognizing and inviting correct participants from relevant Baltic cities. The Environmental Committee of the St. Petersburg City Administration was the key Russian project partner in the design and implementation of the events.

#### *Conclusions of promoting exchange of air quality information and collaboration in the Baltic Sea Area*

As it proved to be impossible to implement awareness raising or information distribution activities on AQ in St. Petersburg or other BSR cities, which were mentioned in the project plan, it was decided to focus on organizing as successful and useful events as possible for bringing together BSR cities to discuss the topic and possible future cooperation together. The organized events were able to strengthen the contacts between participating organizations, and the results are available for further planning of concrete cooperation between these organizations. The current political situation in the Baltic Sea Region was reflected in the discussions only to a minor level, proving that cooperation between the countries could be possible when a joint interest is found.

Organizing the events in connection with the bigger AQ event was a good decision, as e.g. attracting media coverage was easier with joint efforts. Furthermore, it was possible to promote the activities



and the project to a larger audience than it would have been possible without Lappeenranta Air Quality Days participants.

More detailed description of the workshop and seminar can be found from Annex IV.

## **IV Sustaining the project results**

Based on the discussions already from the first phase of the project, it is clear that there is a willingness to continue the well-established cooperation with the current partnership. The form and framework of the continuation is to be decided, but one of the project aims has been to find a suitable environment for this.

Starting already in connection to the dispersion modelling workshop in SPb in April 2007, concrete ideas for continuation of the already started collaboration have been presented and discussed. The continuation was also discussed during the working meetings of project experts throughout the year. Themes proposed in those discussions were worked on during the rest of year 2007, and they were also brought to the knowledge of the Ministry for the Environment to be utilised in planning future cooperation between the Committee and the Ministry.

A separate workshop was organised for this purpose also in connection to the project final seminar on 13 February 2008. Three main directions for continuation have been identified:

- exchange of experiences on and further development of background air monitoring stations, including elaboration and testing of protocols for the on-line reciprocal information exchange
- further development of quality control and quality assurance system and methodologies of the air quality monitoring
- further development of methodology for the air quality assessment by modelling of dispersion of pollutants from stationary and mobile sources

It is the wish of all partners to continue the work as soon as possible, starting already in autumn 2008.

Regarding taking the collaboration to a more international level, a concrete activity for this purpose was organising the Baltic Sea Region Air Quality Cooperation seminar in connection with the Lappeenranta AQ days on 21-22 August. The event was utilised to discuss future perspectives for continuing the project activities already with a larger group of participants in the Baltic Sea Region. Possible financing programmes were presented in the event, and ideas for future collaboration were collected for utilisation in the future.

### *Conclusions of sustaining the project results*

It is obvious that the collaboration with the current partnership will continue after the current project with the support of the Finnish Ministry of the Environment. The plan for the follow-up project is under preparation and will be submitted to the Ministry in summer 2008. The jointly decided three directions will serve as the basis for future work: developing the air quality monitoring systems concentrating on quality assurance and quality control work, enhancing building the background monitoring stations in St. Petersburg and creating online information exchange connection between Helsinki and St. Petersburg, as well as further developing dispersion modelling cooperation.

The workshop in Lappeenranta on 22 August gave some concrete ideas for planning a proposal for a larger Europe-wide cooperation project. It is obvious that the interest for such a project is high, although the current political situation may have an effect in the way that the partnership could be built. The most promising financing programme for collaboration in the Baltic Sea Region, the Baltic Sea Region Programme 2007-2013, has been opened, but no application was prepared for the first application round. The programme does not include developing the air quality monitoring systems as



such within the topics it supports, so utilisation of this specific programme for a project on this topic could prove to be hard, even impossible. Other options need to be explored for finding possibilities to support international cooperation on this topic.

### **2.3 Deviations from the project plan**

As the project started, during the joint meetings with the representatives of the Environmental Committee it became obvious that some of the planned activities of the project were to be more challenging than the expert level cooperation on inter-comparison measurements and dispersion modelling, which succeeded well. For example, it was not possible to realise the planned awareness raising activities in St. Petersburg and/or other Baltic city, as this topic is not among the first priorities of the Environmental Committee, and in the project budget there were no financial resources to implement this in other cities. Therefore the project plan needed adjustment regarding implementing the planned pilot activity, and after discussions with the Ministry and the Committee it was decided to leave this out of the project and to concentrate efforts on other parts of the respective component.

Discussions on enlargement the project partnership and planning a BSR wide cooperation project proceeded well and the idea of creating such a project was seen as something worth pursuing already in the framework of the current project. Therefore it was decided to organise a Baltic Sea Region Air Quality Cooperation seminar in connection with Lappeenranta AQ days on 21-22 August. The purpose of the seminar was to offer a good framework for planning these projects. Plans for the BSR seminar were elaborated with the FMI and Committee experts. The seminar was organised in two parts: 1) an international session as part of the AQ days, to give a good opportunity for a more general level speeches and 2) a workshop for brainstorming to discuss actual project ideas to be implemented with EU financing. To make it possible for BSR AQ experts to participate in the seminar and the workshop an application for additional financing for these events was submitted to the Ministry for the Environment in May 2007, and the financing was granted on 16 May 2007.

Regarding the participation of Finnish experts outside FMI, the changed character of Component III lead to their more minor role in project activities. Expertise of informing the public of air quality was not as relevant to the project as originally planned.

## **3. Project results and impact**

Regarding results of the thematic components, concentrating on the actual collaboration on the air quality monitoring system and dispersion modelling, separate reports with results have been prepared. The results have been delivered to the Committee's expert partners and they will be taken into account in their future development work, also outside the next planned project phase. A general observation of the project results and the impact they have had is that all development recommendations provided by the FMI experts to the Committee experts have been taken very seriously, and will certainly affect the way the air quality monitoring system will be developed in the future.

Below are short summaries with recommendations for further actions from each thematic action field of the project:

#### Intercomparison of gaseous atmospheric pollutants in St. Petersburg

The operation and the maintenance of the air quality network is an expert work, which needs good equipments for the measurements and for calibration of the analysers, trained personnel and funds for consumables. In addition the traceability of the calibrations should be organized to the national



metrological institute or to SI-units. The quality system of the network should cover all the actions that are performed either at the field, at the laboratory and for data analysis.

As expected, both laboratories have their own methods for calibration and calculations. Nevertheless methods, final results should be the same. This didn't totally accomplish at the intercomparison trials. In some cases raw data of both of the analyzers are close to each other, but after calibrations and correction the data, final data is not close to each other any more. This could only happen when calibration differs from each other and/or some actions on adjusting the analyser between the calibrations have taken place. It was unclear on what actions had been made to the analyzers during the intermediate between the calibrations.

Data capture has not been very good for several of reason (malfunctioning of the analyzer, power system and the data acquisition system). Conditions at the measurement station could also be one of the reasons for malfunctioning of the analyzers.

Calibration ranges have been very different to the measured concentrations. Clearly this has influenced the accuracy of the data. The calibration range should be around 80 to 90 % of the measurement range. In case of nitrogen monoxide and sulphur dioxide the calibration ranges have been far too large (see in figures 7 and 9).

Traceability to the national metrological institute has not been followed accordingly. The Mineral Company should define the hierarchy of the calibration standards and to calibrate all the working standards against the high quality standards from VNIIM.

The intercomparison exercises are important tools to demonstrate the quality system and the capability of the air quality network. Even when the results were not all satisfactory, the most important thing was achieved: exchange of knowledge and experiences between colleagues and personal contacts for the future co-operations.

### VOC measurements

Diffusive sampling is an inexpensive and simple way of measuring aromatic VOC compounds in urban air. It is especially efficient when pollution levels have to be monitored at several locations. Its disadvantage is that it gives no information concerning short-term variability and peak concentrations that can be harmful to health. The VNIIM laboratory could expand their compound selection from 5 compounds to include also styrene, propylbenzene, ethyltoluenes and possibly also trimethylbenzenes. This would give more information about the air quality for example for ozone formation studies. Also styrene for example is harmful to health and it can be a problem in some industrial areas.

From the analytical point of view, the risk for misidentification of the compounds would be smaller if the analysis could be conducted using mass-selective detector compared to FID detection that is currently used. Also the impurities in peak areas are difficult to detect with FID. Much attention has to be paid on filling the tubes with adsorbent if they cannot be purchased readily filled, so that the tubes are equally packed.

It is also recommended that the standard reference material would be used regularly if possible and to participate in all available intercalibration exercises.

Regarding the future cooperation, the parallel VOC sampling could be continued with more compounds that were previously measured also in rural environment. The study could also include intercalibration exercise involving the FMI calibration laboratory that could provide gas-phase



standards for both participants (VNIIM and FMI). Intercalibration would enable to find out if the discrepancies in parallel sampling results would be due to analysis or sampling.

#### Dispersion Modeling Cooperation

After the comparison calculations of two pilot cases, Finnish experts introduced some practical development recommendations. Firstly, the importance of reviewing and evaluating the emission input data before carrying out dispersion calculations should not be neglected. This is essential part in order to get realistic modeling results. Secondly, quality and coverage of the emission database should also be considered carefully. It is recommended to validate the model by comparing the modeling results with monitored ones.

Methodological improvement recommendations to the OND-86 are the possibility to modify the calculation grid from the equal grid mesh to denser grid mesh around the line sources when calculating the traffic emissions. NO<sub>x</sub> chemistry and deposition algorithms would also be a good addition to the model. Lack of NO<sub>x</sub> chemistry algorithm in the model may cause the problem that model will overestimate the NO<sub>2</sub> emissions while comparing the modelled results to monitored ones.

Exposure modeling and the modeling of fine particulate (PM<sub>2.5</sub>) concentrations have not been done so far in St. Petersburg city. Therefore it is recommended to study also the dispersion of fine particulates in the city due to its health effects.

## **4. Assessment of the sustainability of the project and future plans in air quality monitoring cooperation**

The City Twinning programme between the Finnish Ministry of the Environment and the Committee for Nature Use, Environmental Protection and Ecological Safety has been a well functioning framework for cooperation on air quality monitoring development. Commitment of the project partners to the cooperation has been strong, and the project has been recognized as one of the most beneficial projects to the Committee, providing it with real, concrete possibilities to develop the quality of air quality monitoring in St. Petersburg. Especially the direct expert cooperation has been useful for both parties, bringing also the Finnish Meteorological Institute a unique chance to observe the methods and techniques used in St. Petersburg.

Based on this ground, it has been self-obvious that the cooperation and contacts established in the project should be utilised further. During the negotiations of the project, the concrete plans for the future collaboration have been elaborated and joint aims have been named. The collaboration will concentrate on the other hand on further development of the methodologies and techniques focusing on quality assurance and control, on the other hand on building concrete cooperation on background monitoring stations. Especially regarding the latter aspect, the cooperation is anticipated to lead to sustainable collaboration on data exchange between Finnish and Russian background monitoring stations, enabling better possibilities to register and study changes in the atmospheric air in southern Finland and St. Petersburg.

## **5. Conclusion**

Cooperation in the AQM II project has been successful, resulting with concrete development recommendations for the air quality monitoring system in St. Petersburg and strengthening the connections between Russian and Finnish experts on air quality monitoring. The expert cooperation



between Nature Use, Environmental Protection and Ecological Safety, its collaboration partner Mineral and the Finnish Meteorological Institute is able to provide a concrete method for realising the development recommendations in the future.

Discussions on the future collaboration in the framework of the cooperation agreement between the Committee and the Finnish Ministry for the Environment have been ongoing during and since the last months of the project, and common interests have been identified. In the planned future project the main topics of cooperation will include work on quality assurance and quality control of the monitoring methods and systems, along with developing the scope of the monitored substances. The work is planned to support building of a background monitoring station for the St. Petersburg monitoring system, which also makes it possible to elaborate and test protocols for the on-line reciprocal information exchange between Finland and Russia. Furthermore, there is a strong interest to further develop methodology for the air quality assessment by modelling of dispersion of pollutants from stationary and mobile sources. With the well-established partnership of AQM II, these dimensions of collaboration can be successfully covered.

