IMPLEMENTING ARRANGEMENT
ON
TECHNICAL COOPERATION ON PARTICULATE MATTERS MONITORING
BETWEEN
THE DEPARTMENT FOR SUSTAINABLE DEVELOPMENT, ENVIRONMENTAL DAMAGE AND EUROPEAN UNION AND INTERNATIONAL AFFAIRS
OF THE MINISTRY FOR THE ENVIRONMENT, LAND AND SEA OF THE REPUBLIC OF ITALY (IMELS)
AND
BEIJING MUNICIPAL ENVIRONMENTAL PROTECTION BUREAU
(Beijing EPB)
(Hereinafter referred to as the Signatories)

Recalling the Sino-Italian Collaboration Program for Environmental Protection, started in 2002, between the Italian Ministry for the Environment, Land and Sea and the People's Government of Beijing Municipality (BMG), mainly the "Green Olympics Commitment" project, which strongly contributes to improve environmental quality in Beijing.

Taking into account the "Agreement IMELS-Beijing Municipality for the Establishment of a Sino-Italian Environmental Cooperation for Sustainable Beijing Fund (SIEC SUB)" signed on the 14th of May 2005, between the Signatories, to financially contribute for projects' implementation by the Signatories.

Aware that Beijing Clean Air Action Plan 2013-2017 requires emission and concentration of fine particles' reduction.

Considering that the cooperation between the Signatories should be framed in a mutually beneficial partnership as an important opportunity to create value for a fruitful business exchange and *taking into account* that the Signatories intend to define a working program based on the agreement signed on the 15th of November 2013; Beijing has launched a laboratory capacity building program emphasizing particulate matter monitoring.

It is hereby agreed as follows

Art.1 – General Provisions

In order to assist the Municipality of Beijing in the implementation of Beijing Clean Air Action Plan 2013-2017, with particular attention to the air pollution control campaign in Jing-Jin-Ji area, the Signatories arrange to develop a project, addressed to enhance the capabilities of Beijing EPB on air quality management.

Art.2 – Objectives

The Project aims at:

2.1 Developing the capacity for air quality monitoring and pollution monitoring of several important items, in particular on fine particles (PM2.5), which is known to be critical for the successfully initiatives of air pollution control;

2.2 Fostering commercial cooperation among Italian and Chinese enterprises and institutions.

Art. 3 – Activities

The Project is composed by the following main activities:

- technical assistance by providing consulting services and training for Beijing technicians, in the field of: data-monitoring and assessment, source apportionment, effectiveness of the control measures, environmental health effects. Testing of Italian instruments to assess their suitability in Beijing's monitoring network;
- Procurement of instruments for improving Beijing's air quality monitoring system;

Activities will be implemented according to the structure, content, and schedule described in the Annex 1 to this Implementing Arrangement and in accordance with the provisions of the Article 4.

The Signatories will jointly agree upon eventual modifications in the working plan.

Art. 4 - Cooperation Methodology

Beijing EPB will be responsible for project management, in coordination with IMELS and its Project Management Office in Beijing. Beijing Municipal Environmental Monitoring Centre will be the Chinese project implementing agency. Beijing EPB will select through Chinese procedures the Italian technical partner able to guarantee a productive and effective expertise, as well as identify qualified suppliers of the instruments for test use. Procurement of instruments for normal application will be proceeded by bidding process, according to Beijing's funding rules.

Art. 5 – Financial Resources

The project total budget is 1,738,000 Euro. The Signatories will all make necessary financial contribution for a successful implementation of the Project, following the guidelines listed here below:

- IMELS will contribute with 547,200 Euro, accounting for around 30% of the total project budget. The above mentioned amount has been already transferred by IMELS to SIEC-SUB fund, according to the "Project Implementation Agreement on Beijing Clean Air Action Cooperation" signed on the 15th of November 2013.
- Beijing EPB will contribute with 1,190,800 Euro, accounting for around 70% of the total project budget.

The project's budget is detailed according to the Annex 2 attached to this Implementing Arrangement.

Art. 6 - Accounts and auditing

Financial statement and detailed budget accountability on the use of IMELS funds in the project shall be submitted to IMELS, along with the final report. IMELS reserves the right to demand third party auditing.

Art. 7 – Settlement of Disputes

Any dispute arising from the interpretation and implementation of this Implementing Arrangement will be settled through consultation among the Signatories.

Art. 8 – Withdraw

At any time, each of the Signatories may withdraw from this arrangement by written notification.

Annexes

The following annexes are integral part of this Implementing Arrangement:

- Annex 1 - Project Proposal for Technical Support on Regional PM Pollution
- Annex 2 – Project Budget Breakdown.

Signed for acknowledgement and acceptance, in 2 copies in English, in Milan on August 3rd 2015.

For the Department for Sustainable Development, Environmental Damage and European Union and International Affairs of the Italian Ministry for the Environment, Land and Sea (IMELS)	**For Beijing Municipal Environmental Protection Bureau (Beijing EPB)**
Mr. Francesco La Camera Director General	Mr. Chen Tian Director General

ANNEX 1

Project's background

Beijing Municipality developed significant efforts for a substantial reduction of atmospheric pollutants. The 2008 Olympiads events provided International showcases that demonstrated the attitude of Beijing in producing results, in such a difficult task. Unfortunately, the technical and economic pressures towards a better air quality were limited by the "regional nature" of air pollution. Beijing is just a portion of Beijing–Tianjin–Hebei region (called the 'Jing–Jin–Ji' region – Jing for Beijing, Jin for Tianjin, and Ji for Hebei). Beijing has invested significant efforts and resources in air pollution control. However, local air quality is far from being considered in line with the international benchmark. The deterioration of air quality can be ascribed to the significant increase in the number of motor vehicles in Beijing in the last years, and to the rapid development of polluting industries in the nearby provinces. This means that the major issue for reducing air pollution consist of a joint regional air pollution control in the Jing–Jin–Ji region.

Switching air pollution control from local to regional level poses problems of technical and administrative nature which should be faced in a proper way if successful objectives are to be reached in a relatively short timeframe. Regional pollution management is an interesting topic which has been tackled by the Italian Ministry for Environment, Land and Sea (IMELS). In fact, Italy is heavily suffering major pollution problems in Po Valley where local sources of air pollutants are contributing to regional pollution due to the poor ventilation of the Valley, especially during wintertime where atmospheric stagnation is very common.

Taking into account the positive past experience in Italy and in Beijing, IMELS and BJMEPB, recognising the importance and the effectiveness of a cooperation in regional air pollution problems, decided to launch another program addressed to technical assistance to BJMEPB in this important aspects of air pollution management.

Since 2012, Beijing Municipal Environmental Monitoring Centre (BJMEMC) has set up an air quality monitoring network in Beijing, which consists of 35 stations equipped with online monitors for PM2.5 and other pollutants. And real-time air quality data has been publicized through TV programs, newspapers, radio broadcasting, and mobile phone APP, etc. Therefore, citywide public involvement was brought along, and understanding of and supporting for air quality control policies as well. By cooperating with institutions such as Peking University, BJMEMC has also achieved success in a recent research project on PM2.5 source apportionment, which strongly supported air pollution policy making. In 2015, a PM2.5-component monitoring network was set up aiming at evaluating the improvement of air quality and supporting further

control and prevention policy making. This network comprises 8 sites where filter samples are collected, and watersoluable ions and cations, OC/EC,28 inorganic elements in PM2.5 are analysed and measured. These large amount of component data build a strong base for PM2.5 source apportionment. Beijing carried our PM2.5 source apportionment research in collaboration with Peking University, and the results has successfully supported for the air quality management policy decision. However, BJMEMC still has technical difficulties in and short of experience on PM2.5 monitoring criteria, network maintenance, sampling and measuring of PM2.5 emission sources, and analysing of the organic components in PM2.5. So from the Sino-Italian cooperation project, BJMEMC expects professional training for the personnel and learning up-to-date technology and administrative methodology.

Project's activities

The project is composed by two parts as described as follows:

Part I: Technical Assistance

The project (Part I) will include activities related to technical and institutional issues related to regional air pollution with a specific target to the 'Jing–Jin–Ji' region. These activities are described below.

1. Consulting Service

Activity 1.1 - Monitoring and Assessment

Technical assistance in order to provide data for fine particles (PM2,5) characterised by high accuracy and precision. The activity will include the interpretation of monitoring data and acceptability criteria from instruments intended for standard and high frequency measurements (i.e, one hour or less). In addition, data related to PM2,5 concentration will be related to available information on chemical composition in order to increase the knowledge of the basic processes leading to air pollution episodes which includes the formation of photochemical oxidants and of secondary fine particles. In addition, technical problems related to harmonisation of monitoring data on a regional basis will be also taken into account. An important part of the activity, includes initiatives aimed to technical information addressed to population and public administrators taking into proper consideration Italian and European experience in this field.

In the air quality monitoring and evaluation, it is recommended to increase depth and breadth of intensive training :

(1) the training for PM2.5, O3 and related pollutants monitoring technology, monitor equipment, QA&QC regulations of EU and hand-on experience;

(2) the intensive training of EU reference method on Particulate matter in air and pollutant source, includes the selection of sampling points, quality assurance, quality control measures;

(3) research results and study on comparing measurement for PM2.5Concentration and its performance Test, between the EU reference methods and US reference methods.

(4) The selection of super station location, monitoring, data analysis and operation management.

(5) Chemical components and organics in particulate matter: the new research progress or anlaysis technology of organic speices in PM2.5; the analysis methods of organic tracers such as PAHs, N-alkanes and orgnic acids

(6) the atmospheric VOCs (especially low carbon VOCs and OVOCs) monitoring instruments, monitoring method and control index and evaluation criterion in European Union, etc; atmospheric oxidation ability of monitoring technology and characterization technology, the relationships between atmospheric oxidation ability and heavy pollution formation, etc;

Activity 1.2 - Source Apportionment

Assistance in identification and characterisation of particulate polluting sources with the objective to plan control programs and activities aimed to the general reduction of pollution levels. The collaboration involves the improvement of techniques related to analysis of data, including emission inventory, especially during periods of critical pollution levels, and research about sources of inventory formation techniques and source apportionment in Italy and the European Union, especially the emission factor and total accounting method of VOC and NH_3 sources.

Technical assistance in the interpretation of the chemical processes related to the formation of secondary pollution which is responsible for the formation of small particles, Ozone and other important photochemical pollutants, and assistance in Pollution monitoring techniques:

(1)study on detail information of fine particulate matter, VOCs and NH_3 monitoring technology, equipment and related EU or Italian regulations;

(2) intensive training on the new monitoring equipment and hand-on experience on field test of pollution source, such as performance and applications of portable gas chromatography, portable ion chromatography, portable GC-FTIR equipment, etc..

Development of support activities in the definition of a reliable system for the identification of the sources (Source apportionment), in order to provide information at reasonable high frequency (less than two hours).

Activity 1. 3 - Effectiveness of control measures

Recently, Beijing Municipality and the Ministry of Environment of China have issued a proper legislation for air pollution control in order to achieve acceptable air quality standards. The issues aimed to pollution control are very detailed and complex. In addition, most of them could provide a considerable reduction in the emission levels on the long term basis (several years). The expected reductions of emitting sources will clearly lead to a reduction in concentration level. However, it is very difficult to predict what will be the real environmental benefits, in particular for pollutants of a secondary nature such as PM2,5 and Ozone. Through a proper analysis of pollution and meteorological data, in addition, when available, to a detailed chemical composition of fine particles, it will be possible to check the effectiveness of the proposed measures. The main goal is to verify, within shorter time intervals, if the application of the measures is actually leading to the environmental benefit expected in the planning phase. The results can be used to improve the suggested measures toward a more efficient economic and environmental cost/benefit ratio.

The evaluation of effectiveness of control measures, includes the evaluation of short term control measures like the warning of regional heavy air pollution, and the air quality service for the important events like APEC; also includes the evaluation of long term control measures, like the five-years plan and the clean air plan. The detailed contents: the evaluation of the emission reductions of control measures; the comparative analysis of monitoring data; the simulation of the effect of the control measures; the optimization and operational application of the regional models system; the use of Statistical post processing techniques (PESCO model); improving the accuracy of chemical transport models; use eFESTo interfacing tool, interfacing the emission inventories with the chemical transport models, combining the emission data from the surrounding provinces and national data; improving of the emission data input for the models; the comparison of the application of regional chemical models; use the AODEM tool, comparing models with remote sensing data; use the regional integrated assessment software tool (RIAT+) to design detailed air quality action plans. The forecasting techniques and warning system of heavy air pollution, Supporting the implementation of chemical transport models in a wider spatial domain to support the prevention of pollution in the Huabei Region.

Activity 1.4 –Environmental Health Effects

Introduction of research methods to monitor and evaluate the health effects of fine particulate matter, the main contents are:

1) the effect of PM2.5 and its major toxic components on human health; how to evaluate the harm on human health when exposure to toxic and hazardous substances; the research progress on the correlation between the cardiovascular dysfunction and PM2.5 particulate matter characteristics; the research progress in PM2.5 pathogens in the human body's major hazards and evaluation methods.

2) research progress and planning of air pollution health impacts in Italy and in the European Union; review the research and operations on the health effects of air pollution; proposed planning advice on research and operational work of the health effects of air pollution in Beijing, mainly including the establishment of institutions, cooperation mode, data requirements, operational mechanisms and technology evaluation and research methods, the final form of a recommendation report.

Activity 1. 5 – Common and across activities

A) Assistance on public information activities.

B) Assistance to the development of institutional relationships within the region. It is expected that a common management approach to regional pollution reduction might rise unavoidable problems within institutions and administration. The European and the Italian experience will be a good starting point to open discussions in this field and the development of possible solutions.

C) Capacity building. In addition to on site activities, the activities will be integrated by proper study tour and meetings in Italy and Europe arranged for the purpose of learning experiences on designing and enforcing effective regional air pollution control.

2. Capacity Building and study tour

Technical exchange tour 1 for Chinese experts: a visit 4 Beijing experts to Italy for 7 days technical discussion, and the main contents could be monitoring of PM2.5, the pollutants sources monitoring and the components analysis.

Technical exchange tour 2: 4 Chinese experts to Italy for 7 days study on the PM2.5 monitoring technologies, verification and value transfer, QA&QC, data management and how to build publicly supported; inspect on the management of pollutant sources and emission inventory, key on the monitoring technology of VOC and NH3

(3) Long-term training: a training program for 4 Beijing experts in Italy for 1 months. The Italian sides could provide professional training for instruments and technologies, which including: 1) the operational management of PM2.5 monitoring system; 2) the monitoring methods of organic tracers in PM2.5 such as PAHs, N-alkanes and orgnic acids;3) source sampling and monitoring;4) Air quality forecast technology.

(4) Technical investigation: 6 Beijing experts/institutional representatives to Italy and EU Countries.

(5) Workshop and Training course in Beijing: 4 Italian experts to Beijing for one week technical training and instruction in Beijing, focused on special theme and the progress of the project, once a year.

3. Instrument Investigation and Test

Investigation will be carried out on instruments produced by Italian companies (or EU countries companies) for air quality monitoring. A number of instruments identified to be suitable will be purchased for test use in Beijing.

1) PM2.5 monitoring equipment based on EU statutory methods;

2) The gas composition and PM10/PM2.5 aerosol automatic monitoring system;

3) small monitoring stations(ETL stations) base on Solid State Sensors.

4) total non-methane hydrocarbon (NMHC) monitoring equipment ;

5) VOCs species monitoring equipment;

An evaluation report will be generated on the investigation and test use of Italian instruments with the recommendation for its use.

Part II Procurement of Instruments

In the framework of Beijing Municipality's plans and investments to upgrade its own air quality monitoring system and network for PM2.5 monitoring, this second part project's activities will consist on setting up the procedures for procurement of necessary instruments for this purpose.

Based on the Project's Part I evaluation report on instruments produced by Italian companies and EU countries companies for air quality monitoring, it will be identified the BAT on PM 2.5 monitoring equipments based on EU statutory methods, the gas composition and PM10/PM 2.5 areosol automatic monitoring system and small monitoring stations based on Solid State Sensor.

Project Outputs

Inter alia:

General report on the project activities

Evaluation report of the tested Italian Instruments on their applicability in Beijing and China

Final Workshop for distribution of the project output, including the evaluation of the Italian instruments.

Project's timetable

The program will be developed according to the general streamlines already successfully experienced in the past. It is expected to develop the program according to the following steps:

Step 1 (1 month) – Preparation of detailed deliveries and timing through discussions, targeted meetings and presentations during a technical visit to Beijing. This meeting should be organised at the latest by end of April.

Step 2 (1 month) – Finalisation and approval of the work plan. This step would end with a joint technical meeting to be held in Beijing where most of participating institutions will examine issues presented by BJMEPB on regional air pollution (1 day meeting). An additional day could be spent in order to finalise the common and across activities according to the point 4 above. This meeting should be organised by the middle of May and should coincide with the signature of the contract.

Step 3 (24 or more months) – Implementation of the program according to the main streamlines presented above.

Detailed Project Schedule:

1) 1st Workshop, in Beijing:

The first workshop is scheduled in the first and second quarter. During the meetings the Partners will define the detailed technical exchange program. Two to three Italian experts will participate the workshop for discussion and guiding the research work for 1 to 2 weeks in Beijing.

2) 1st Technical Investigation for Chinese experts in Italy:

The first Technical Investigation is scheduled in the third and fourth quarter. The first study focused on Italy PM2.5 monitoring technology, money transfer, quality control management, data auditing and publishing, public information and the like;

3) Technical exchange for Chinese experts in Italy:

The activity is organized for 6 experts along 2 week in the 4th and 5th quarter of the cooperation program. The experts are mainly major in PM2.5 monitoring, pollution monitoring, component analysis. The Italian Side will provide the organization of trips, selection of lectures and experts, provision of working stations for technical exchange.

4) 2nd Technical Investigation for Chinese experts in Italy:

The second Technical Investigation is scheduled in the 5th and 6th quarter. the second batch of study focused on pollution monitoring and management, such like VOC, NH3 monitoring techniques, and the total emissions inventory management;

5) long-term training in Italy:

The activity is organized for 2 experts to Italy for 1~3 months training in the 6 and 7 quarter of the cooperation program. The Italian sides could provide professional training for instruments and technologies, helping to solve the corresponding difficulties.

6) Final Workshop in Beijing:

The final workshop is organized for the following issues:

- Overall evaluation of the cooperation
- Evaluation of outputs
- Lessons learned
- Recommendations and follow up actions

7) Final report

A detailed technical and economical final report will be produced by both Sides.

	1st quarter	2nd quarter	3rd quarter	4th quarter	5th quarter	6th quarter	7th quarter	8th quarter
1st Seminar, Beijing								
1stTechnical Exchange tour ,Italy								
technical exchange for Chinese experts								
2ndTechnical Investigation, Italy								
Long-term training								
2nd Seminar, Beijing								
final report and distribution of output								

Management of the program

The two Parties will establish working teams that will be coordinated by the Italian Ministry for Environment, Land and Sea and the Municipality of Beijing.

Annex 2 Project Budget Breakdown

	Contents	Categories	IMELS	Beijing Municipality	Total
PART I	**Technical assistance**				
	Consulting service	Activities 1.1 – 1.5	**€ 241.200,00**	**€ 52.800,00**	**€ 294.000,00**
	2 Study visits to Italy (including local costs in Italy 46.000 Euro and 24.000 Euro flights tickets China-UE)	Beijing experts travel to Italy for technical investigation and training	**€ 46.000,00**	**€ 24.000,00**	**€ 70.000,00**
	6 travel expenses China-EU	BJ EPB travel to Italy for technical investigation		**€ 14.000,00**	**€ 14.000,00**
	Workshop and training in Beijing	Project workshop and training in Beijing	**€ 40.000,00**		**€ 40.000,00**
	Instruments investigation, Assessment of Italian instruments and dissimination of results	procurement of Italian instruments	**€ 20.000,00**	**€ 80.000,00**	**€ 100.000,00**
		Assistance to Italian Companies	**€ 20.000,00**		**€ 20.000,00**
Total			**€ 367.200,00**	**€ 170.800,00**	**€ 538.000,00**
PART II	**Procurement of instruments**				
			€ 180.000,00	**€ 1.020.000,00**	**€ 1.200.000,00**
TOTAL I+II			**€ 547.200,00**	**€ 1.190.800,00**	**€ 1.738.000,00**