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# BACKGROUND INFORMATION

## 1.1 Partner country

Republic of North Macedonia

## 1.2 Contracting authority

Ministry of Environment and Physical Planning of Republic of North Macedonia

## 1.3 Country background

Environmental problems in the Republic of North Macedonia are similar to those in other countries in the region. Numerous problems and deficiencies identified through different projects, studies and planning documents are evident for environmental media and areas, such as: air pollution with different intensity in different parts of the country, lack of regional integrated systems for waste management, insufficient coverage of populated places and municipalities with wastewater treatment plants, soil contamination, proper management with natural heritage etc. A particular problem that applies to all environmental media is the insufficiently developed environmental monitoring system, with emphasis on the absence of historical data, based on which the condition of the media would be determined accurately and actions would be taken towards their progressive mitigation and elimination.

Upon the adoption of most of the laws and bylaws harmonized with the European Union legislation, there is a need to continuously strengthen the capacity and establish the mechanisms for monitoring and law en forcemeat, both at national and local level. The lack of complete and accurate data regarding the polluting substances and polluters, the lack of integrated approach to solving environmental problems, especially in the areas of water resources management and waste management, as well as the lack of capital investments to finance the infrastructure in these areas, result in further slowing down of the processes for setting up an efficient system for environmental protection in the Republic of North Macedonia. The processes of EU approximation and establishment of sustainable development, pointing out the need for overall strengthening of the national system for environmental management and strengthening the capacities of the administration at central and local level concerning the implementation of the national legislation in the area of environment remain top priorities.

The project “Transboundary Air Pollution Health Index Development and Implementation” with project acronym “TRAP” with reference number TRAP-CN1-SO2.3.-SC030 is financed by the Interreg IPA CBC Programme “Greece – Republic of North Macedonia 2014 – 2020” Reference: CCI: 2014TC16I5CB009. The project is implemented by the Centre for climate change Gevgelija, Ministry of environment and physical planning, Environmental centre of western Macedonia in Florina Greece, Municipality of Florina Greece and European regional framework for cooperation Thessaloniki Greece.

The major challenge in the frame of the project is the development of an integrated approach including air quality monitoring, with providing health indicator for vulnerable groups of the population. Through TRAP project a series of issues will be addressed: a) Identification of the emission sources and development of regional and CB emission inventory, b) Assessment of each emission source, c) Development of air quality plans, d) Monitoring data, validation and analysis e) Basic demographic, health and public health profile, f) Air quality and Health Indicators g) Joint CB comparative analyses h) Capacity building at user level (health and authority stakeholders), i) Air quality and health sensitization campaigns, j) Protection of human health, k) Citizen involvement, l) Implementation of Air quality directives.

## 1.4 Current situation in the sector

Pollution of the atmosphere is a phenomenon resulting from rapid technological development and human life in the era of industrialisation. However, we have also witnessed natural sources (earthquakes, floods, volcanoes, fires, etc.) with increasing share in air pollution during the last years. It is well known that human activities (anthropogenic sources) have significant impact on the quality of ambient air in urban environments and harmful effects on people, animals, plants, buildings and materials. The air pollution is increasingly intensified as a result of the rapid development of traffic, the incomplete waste combustion, the industry, the fast urbanisation, the insufficient care for preserving the environment, etc. It is evident that air pollution is not only a local issue. Pollutant transfer induced by atmospheric movements may cause harmful effects at long range. A major portion of pollution originates from sources located several thousand kilometres away.

In general, in the Republic of North Macedonia, the trend of emissions of pollutants into the air is variable with the exception of ammonia, which shows a steady decline in emissions throughout the reporting period 1990-2019. In other substances, there are certain peaks and sudden falls that occur as a result of the changing trend of industrial production in the period of independence of our country. At the same time, certain declines appear as a result of the implementation of measures such as closure of large industrial facilities but also the use of clean fuels and the introduction of BAT, especially after 2006. Namely, energy production participates in the total national emissions of SOx (93%), NOx (27%). In solid particles this share is different and depends on the particle size, in TSP with 23%, then in PM10 with 19% 12% in PM2.5. In heavy metals, Energy sector is participating in Pb (with a share of 21%), Ni (43%), Cd (30%) and in Hg (51%). Combustion in households and administrative facilities is a key source in the total national emissions of solid particles with a share of 36% in TSP, 43% in PM10 to 65% in PM2.5, as well as in the total emissions of carbon monoxide with a share of 56%. Due to the closure of a large number of installations and the introduction of BAT, the industry is no longer the dominant source of emissions for a large number of pollutants. Namely, in solid particles in 2019 it has a share of 12% in TSP, 8% in PM10 and 4% in PM2.5, while in the past until about ten years ago it participated with an average of about 48%. This source however is still key sector for HM emissions Pb (15%), Cd (13%) and Hg (18%). Agriculture, especially livestock breeding is a key source of ammonia emissions - NH3 (91%), while in other sectors it has a much lower share.

Regarding the fulfilment of the requirements in the national legislation for the measured concentrations of pollutants in the air, the data from the measurements of the air quality and in the past year the most critical substance are the solid particles. Thus, exceedances above the limit values of solid particles up to 10 micrometres are observed at all measuring points, especially in the winter period when they are several times higher than the average daily limit value. It is also of a great importance to detect the content of HM in the particulates needed for future determination of emission sources

The polluted atmosphere air causes harmful consequences to human health and other living organisms, as well as their environment, and it also causes damage to man's economy of living. Therefore, it is necessary to provide financial resources and to implement defined actions into the prepared plans and programmes at the local and national level because only with the full implementation of the defined actions, a reduction of pollutants in the air and improvement of air quality might be expected.

## 1.5 Related programmes and other donor activities

So far were conducted following relevant projects in Republic of North Macedonia:

The Twining project “Air quality improvement” was the first Twining project in the area of environment in the Republic of North Macedonia. Within this project the twining partner was Finland represented by the Finnish meteorological institute (FMI) and the junior partner was Austria represented by the Environment Agency Austria (Umweltbundesamt). The overall purpose of the project was to improve air quality in the country.

The second Twinning project “Strengthening the central and local level capacities for environmental management in the area of air quality” aimed to improve the air quality administration. The project was jointly carried out by the Finnish Meteorological Institute, Environment Agency Austria and Italian Ministry for the Environment, Land and Sea.

The third twinning project "Further strengthening the capacities for effective implementation of the acquis in the field of air quality” aimed to improve the air quality administration. The project was jointly carried out by the Finnish Meteorological Institute and Environment Agency Austria.

The “Implementation and ratification of the Heavy Metals Protocol, POPs Protocol and the Gothenburg protocol”project aimed to assist the Western Balkan countries to ratify the mentioned protocols and implement some of their requirements through the preparation of the National action plans. The project was coordinated by UNECE and finances for each of the countries were allocated by the Kingdom of the Netherlands.

# 2. OBJECTIVE, PURPOSE & EXPECTED RESULTS

## 2.1 Overall objective

The overall objective of the project of which this contract will be a part is as follows:

Through TRAP project partners will improve management and protection of areas at both countries by establishing air quality monitoring networks. The measurements of all stations in areas involved in this project will create a system that will display real-time measurements through the internet. Moreover, epidemiological indicators and indicators of air quality, based on the effects of air pollution on human health, will be calculated and displayed on the web. The best way for someone to use an Air Pollution Health Indicator (APHI) is to regularly check the current index value, to pay attention to personal symptoms and self-calibrate to the reported current APHI value.

Strategic objective of TRAP project is the creation of an ICT application integrating Air Quality Monitoring with Air Pollution Health Indicator (APHI) in CB area.

## 2.2 Purpose

The purpose of this contract is to select a Contractor, who will provide external expertise for analysis of the filters in the accredited chemical laboratory, for 1 year measuring campaign of the collected samples.

Within this activity, the economic operator / organization / institution / laboratory is required to perform chemical analysis of already taken samples (filters) in order to:

### Perform chemical analysis of the gathered samples on filters in order to determinate the concentration of heavy metals and PAHs in PM2.5 fraction, by pollutant according to the reference methods defined in the national legislation and within the Directive required in the 2004/107/EC directive and 2008/50/EC with derived conclusions.

### To develop and deliver report to MoEPP of the conducted chemical analysis of the samples with comparative analysis of the results and air quality standards for HM and PAHs, necessary to gather datasets for using the PMF modelling as method for assessment of contribution of different sources of PM2.5 pollution.

## 2.3 Results to be achieved by the contractor

The contract should provide the following specific results:

* Result 1: Conducted QA/QC check of the input data from the samples,
* Result 2: Obtained results from chemical analysis of HM (120 loaded PTFE filters + 15 blanks PTFE filters) and PAHs (120 loaded Quartz filters + 15 blanks Quartz filters) in PM2.5 fraction in samples performed according to the EN standards, in excel format with complete data from chemical analysis,
* Result 3: Developed report with results from the analysis and conclusions in order to get picture of annual variations and for comparison of the results to European AQ limit and target values.

# 3. ASSUMPTIONS & RISKS

## 3.1 Assumptions underlying the project

Possible assumptions related to project implementation:

* Clear and full understanding of the contract objectives and purposes on behalf of the Contractor.
* Continuous communication and provision of information between the Project Team and the Contractor;
* Continuous communication and meetings with MoEPP
* Communication and meetings with data providers.
* Continued commitment of the Contracting Authority Ministry of environment and physical planning, Center for Climate Change, Environmental center of western Macedonia in Florina Greece, Municipality of Florina Greece and European regional framework for cooperation Thessaloniki Greece
* Functional and effective co-operation between Contracting Authority and the selected Contractor;
* The Contractor possesses appropriate expertise, experience and capacity for delivering above listed services

## 3.2 Risks

|  |  |  |  |
| --- | --- | --- | --- |
| Identified risks | Probability | Influence | Risk assessment |
| 1. Delays in the period of start and/or implementation of the contract. | High | Substantial | Moderate |
| 2. Delay in the process of carrying out the assigned tasks by the Contractor.  | Low | Moderate | High |
| 3. Delay in the data delivery by MEPP | Low | Moderate  | High  |
| 4. Damage of the samples through delivery | Low | Substantial | High |
| 5. Low detection limit for some elements | Low | Substantial | Moderate |
| 6. Hindered communication and feedback between the Contractor and the Sub-contractor in the process of implementing the services. | Very low | Moderate | Tolerable |
| 7. Failure to inform the Contractor of all potential problems and other issues that might hinder the provision of the services. | Low | Moderate | High |

# 4. SCOPE OF THE WORK

## 4.1 General

### 4.1.1 Description of the assignment

### The sampling campaign is carried out in accordance with the standard EN 12341: 2014 Ambient air - Standard method of gravimetric measurement for determination of (PM10) or (PM2.5) mass fraction of suspended solid particles. The sampling campaign started in January 2021 and will last until the end of 2021, aiming to determine the concentration of PM2.5. It is carried out with 2 (two) sequential low-volume reference samplers, placed next to the automatic air quality monitoring station Bitola 1 managed by the Ministry of Environment and Physical Planning. The samples are gathered on daily base. HM are gathered on PTFE and PAHs on quartz filter, with 47 mm diameter. Once the contract is signed, MoEPP will provide Contractor with filters and relevant data in excel format (filter labels, type of filters, blank filters, date and duration of measurement, flow rate, air volumes, filter weight both empty and loaded, total mass concentration on the filters and remarks on sampling if any).

### 4.1.2 Geographical area to be covered

Municipality of Bitola

### 4.1.3 Target groups

Local and National Authorities

## 4.2 Specific work

### Activity 1. Chemical analysis of the filters and determination of the concentration of heavy metals and PAHs in PM2.5 fraction

## The Laboratory that is going to perform chemical analysis must be accredited and should meet the general criteria according to the ISO / IEC 17025 standard, general requirements for laboratory competence in testing and calibration. Two different types of filters from the campaign will be given to the contractor for further chemical analysis. HM in the PTFE filters should be determined according to the standard EN 14902 - standard method for determination of the fraction Pb / Cd / As / Ni / Al / Co / Cr / Cu / Fe / Mn / V / Zn in suspended particles of size 2.5 micrometers (PM2.5). The following polycyclic aromatic hydrocarbons (PAHs) will be determined in PM2.5 fraction sampled in Quarz filters: phenantrene, anthracene, fluoranthene, pyrene, benz (a) anthracene, chrycene / triphenylene, benzo (b + j + k) fluoranthene, benzo (a) pyrene, benzo (ghi) perylene, indeno (1,2,3-cd) pyrene, dibenz (a, h + a, c) anthracene.

The analysis for the PAHs should be performed in accordance with EN 15549 - Ambient air quality - Standard method for measuring benzo (a) pure in ambient air (identical to EN 15549) and ISO 12884 in the absence of CEN standard for other PAHs, or another eqivalent method. Results for all numbered PAHs should be shown per pollutant.

When the contract is signed MoEPP will provide to the Contractor all filters sampled until the 1st of November 2021. The rest of the filters sampled in November and December 2021 will be provided to the Contractor until 15th January 2022.

## Activity 2. Prepare and deliver report to MEPP of the conducted chemical analysis of the samples

## All results should be presented in excel sheets. Excel sheets should contain the following parameters: filter lab. number, sample description, sample ID, measured concentration of HM in ng/m3, PAHs in ng/m3, LOD, LOQ, uncertainty [%]. The findings and conclusions from the analysis shall be reported in a document reported format. The Contractor shall communicate and cooperate regularly with Contracting Authority during preparation of the report.

Output 1: Excel file with all relevant data from the chemical analysis

Output 2: Report with findings and conclusions from the analysis

## 4.3 Project management

### 4.3.1 Responsible body

Ministry of Environment and Physical Planning, the Department Macedonian Environmental Information Center, Republic of North Macedonia.

### 4.3.2 Management structure

The Contracting Authority, Ministry of Environment and Physical Planning is responsible for managing of the Contract.

### 4.3.3 Facilities to be provided by the contracting authority and/or other parties

Facilities are not required to be provided by the Contracting authority

# 5. LOGISTICS AND TIMING

## 5.1 Location

Republic of North Macedonia

## 5.2 Start date & period of implementation of tasks

The intended start date is 30.11.2021 and the period of implementation of the contract will be 2 months from this date. Please see Articles 19.1 and 19.2 of the special conditions for the actual start date and period of implementation.

# 6. REQUIREMENTS

## 6.1 Staff

Note that civil servants and other staff of the public administration of the partner country, or of international/regional organisations based in the country, shall only be approved to work as experts if well justified. The justification should be submitted with the tender and shall include information on the added value the expert will bring as well as proof that the expert is seconded or on personal leave.

### 6.1.1 Key experts

Key experts are not required.

### 6.1.2 Other experts, support staff & backstopping

## The Contractor shall secure access to 2 other experts with qualifications as follows:

## Technical expert

## Qualifications and skills

## • University degree, environmental, chemical or other technical sciences is required

## • Excellent communication and organization skills;

## General professional experience

## • Preferably 5 years of experience in the field of environment

## Specific professional experience

## • At least 2 years’ experience in chemical analysis of air samples

## • Experience in at least one project for air quality monitoring

## 6.2 Office accommodation

Office accommodation for each expert working on the contract is not needed to be provided

## 6.3 Facilities to be provided by the contractor

No facilities by the contactor need to be provided.

## 6.4 Equipment

**No** equipment is to be purchased on behalf of the contracting authority / partner country as part of this service contract or transferred to the contracting authority / partner country at the end of this contract. Any equipment related to this contract which is to be acquired by the partner country must be purchased by means of a separate supply tender procedure.

# 7. REPORTS

## 7.1 Reporting requirements

The contractor will submit the following reports in English language in one original:

* **Draft final report** of maximum 2 pages (main text, excluding annexes) in the format given by Contracting authority. This report shall be submitted no later than one week after the end of the period of implementation of tasks.
* **Final report** with the same specifications as the draft final report, incorporating any comments received from the parties on the draft report. The deadline for sending the final report is 5 days after receipt of comments on the draft final report. The report shall contain a sufficiently detailed description of the different options to support an informed decision on final approval by the Contracting authority. The final report must be provided along with the corresponding invoice.

## 7.2 Submission and approval of reports

The report referred to above must be submitted to the project manager identified in the contract. The project manager is responsible for approving the reports.

# 8. MONITORING AND EVALUATION

## 8.1 Definition of indicators

|  |  |  |
| --- | --- | --- |
| **Activity, as per 4.2** | **Output/Indicator** | **Source** |
| Act 1. Conducting chemical analysis | Chemical analysis of the gathered samples for PAHs and HM performed | Collected data form chemical analysis summarized in excel document |
| Act 2. Development of Report | Report that contain data from chemical analysis, comparative analysis with standards and conclusion  | Written document/Report |

## 8.2 Special requirements

N/A