

TERMS OF REFERENCE (TOR)

PROCUREMENT OF A CONTINUOUS AMBIENT AIR QUALITY MONITORING STATION FOR QUEZON CITY

I. RATIONALE AND BRIEF BACKGROUND

Section 36 of Republic Act No. 8749 also known as the Philippine Clean Air Act of 1999 states that *“Local Government Units (LGUs) shall share the responsibility in the management and maintenance of air quality within their territorial jurisdiction.”* With this, air quality management has been integrated in the City’s development plans. Objective 4 of the City’s Comprehensive Development Plan 2021-2025 aims to promote sustainable urban development without compromising the future environmental condition and Strategy 2 under this Objective intends to enhance the quality of the City’s air to the levels meeting the standards of the Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB).

Aside from meeting the goals set out in the said plan, the City Government also made several commitments internationally with the signing of the C40 Clean Air Cities Declaration and the BreatheLife Campaign of the World Health Organization, the United Nations Environment Programme and the Climate and Clean Air Coalition.

Establishing a network of air quality monitoring equipment and sensors will enable the City to gather the necessary air quality data which can be used in developing effective interventions and formulating a comprehensive Air Quality Management Plan.

II. PROJECT DESCRIPTION, OBJECTIVES AND AREA OF COVERAGE

The Quezon City Local Government, through the Environmental Protection and Waste Management Department (EPWMD), intends to engage the services of a qualified Service Provider duly authorized and with the appropriate expertise, experience, and capacity to supply, deliver, install, calibrate and maintain a Continuous Ambient Air Quality Monitoring Equipment (CAAQME) for the purpose of providing the City with real-time raw and processed air quality monitoring data for particulate matter with diameter size of 10 and 2.5 micrometers (PM₁₀ and PM_{2.5}), Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂) and meteorological data (e.g. ambient temperature, relative humidity, wind speed, wind direction and rainfall) needed for the baselining and continuous monitoring of ambient air quality within the territorial jurisdiction of Quezon City.

The Project aims to establish, operate, and maintain a local air quality monitoring network and develop a monitoring information system to allow real-time sharing of air quality data with the public which are foundational data and information needed to craft the City’s Air Quality Management Plan in conformity with said commitments, the Philippine Clean Air Act of 1999 and its Implementing Rules and Regulations as well as the Integrated Air Quality Improvement Framework-Air Quality Control Action Plan (DAO 2000-82). This will also complement, expand, and build upon the ongoing activities conducted and implemented under the C40 Air Quality Technical Assistance Programme (C40 AQ TAP) which entails the conduct of a baseline air quality study through the deployment of non-reference AQM sensors and the development of an air quality monitoring network and management plan.

III. PROJECT SCOPE OF WORK

The following are the minimum activities to be undertaken for this Project:

1. Collaborate with the Quezon City EPWMD regarding the siting requirements and installation of the CAAQME as well as on the development of a Quality Assurance and Quality Check (QA/QC) protocol and calibration requirements;
2. Supply, deliver, install, calibrate and maintain the CAAQME in accordance with the specifications provided (Annex A – Technical Specifications of the CAAQME);
3. Conduct necessary capacity building activities for Quezon City personnel;
4. Provide the following for one (1) year:
 - a) An Air Quality Data Acquisition and Handling System (DAHS), inclusive of hardware and software subscription, to the Quezon City EPWMD preferably through fiber optic connection, wireless fidelity connection (WiFi) or analog adapters, as the case may be.
 - b) Submit air quality monitoring data for PM₁₀, PM_{2.5}, NO₂, SO₂ and meteorological data with at least 75% Data Capture Rate.
 - c) Monthly report disclosing the frequency of maintenance conducted, calibration undertaken, precision test, and corrective measures implemented, among others.
 - d) Provide real-time transmission of air quality data from the CAAQME to Quezon City EPWMD through an online dashboard and an Application Programming Interface (API) to the EPWMD servers or website and with daily/monthly data summary emails.
 - e) Payment for all operational expenses relative to the installation, operation, calibration and maintenance of the CAAQME, including but not limited to the following: electricity bills, internet/mobile data bills, consumables, filters, calibration and other maintenance costs, a monthly detailed list of which must be submitted to the EPWMD
 - f) Standby and emergency in-house personnel to immediately conduct service maintenance or troubleshoot the CAAQME to mitigate loss operation time;
 - g) Standby, ready-to-deploy CAAQME, of the same specification, at the expense of the Service Provider, in times of prolonged downtime of the CAAQME;
 - h) Minimum of one (1) year warranty period which shall cover removal, replacement, or repair of the CAAQME and accessories.

IV. EXPECTED OUTPUT

Given the above-mentioned Scope of Work, the Service Provider under this Project is expected to submit the following:

1. Project Inception Report
2. Siting and Installation Report
3. Calibration and Accuracy/Precision Report
4. Weekly submission of raw and processed air quality and meteorological data with at least 75% data capture rate, in digital copy format through a dashboard (with downloadable file feature), email or a repository server, that has undergone Quality Assurance and Quality Control (QA/QC) protocols

V. PROJECT STANDARDS & REQUIREMENTS

Minimum Qualifications and Requirements

Track Record

1. The Service Provider should have supplied, delivered, installed, calibrated and maintained at least one (1) CAAQME in the last three (3) years and have operated and maintained similar equipment in the country.
2. The Service Provider should have a single largest similar completed contract within the last three (3) years which must be at least fifty percent (50%) of the Approved Budget for the Contract.

The Service Provider must execute a statement of all its ongoing and completed government and private projects relative to this project as part of the Technical Requirements.

Organization

1. The Service Provider must have an in-house service engineer or highly qualified technician, IT systems software/maintenance personnel in the event of an immediate service-level maintenance to the instrument system, to ensure urgent response to mitigate loss operation time.
2. The Service Provider is preferred to have an office in Metro Manila, or an affiliate office or company that can facilitate coordination for the delivery and installation of instruments and can provide direct technical assistance or stand-by instruments/systems in case of malfunction. If based abroad, the Service Provider is required to provide information on mechanism for coordination and communication throughout the project; shipping logistics and associated costs, support available for coordination of shipment; and protocols involved in case of malfunction, difficulties in data access, and other issues.

The Service Provider shall submit the complete list of Key Personnel and Support Staff with their corresponding qualifications accompanied/supported with the following documentary requirements as part of the Technical Requirements:

- Original copy of Resume or Bio-data
- Photocopy of Diploma
- Photocopy of Professional License (if applicable)

Detailed Work Plan

A Detailed Work Plan shall be submitted by the Service Provider as part of the Technical Requirements. It should contain significant information, necessary resources, timelines, activities and strategies to be undertaken in accomplishing the Project objectives and scope of work.

Equipment

The Service Provider shall provide the components for the CAAQME as provided for under Annex A – Technical Specifications of the CAAQME of this Terms of Reference.

Acceptance Criteria of AQ data

Data Capture Rate must be at 75% or higher for the CAAQME, for purposes of interpretation, the measured data should have at least 18-hours of continuous valid data in a day and 23 days of recorded data for its monthly equivalent for particulate matter, nitrogen dioxide, sulfur dioxide

and meteorological data consistent with the prescribed averaging times under the National Air Quality Guideline Values of the Philippine Clean Air Act and the EMB MC 2021-07 on the 'Adoption of the Manual on Data Handling Protocols for Criteria Air Pollutants.'

Acceptable data shall not include irregular data such as negative data, among others. Data accuracy should be calibrated based on the standard instrument calibration procedure performed by the Service Provider. Missing data or exceedingly high or low data must be flagged to the EPWMD, with data flags that provide indication of reason for the flagged data (e.g., power interruption, pump problem, for confirmation of site manager, etc.)

VI. PROJECT IMPLEMENTATION AND DURATION

The delivery of the scope of work and expected output as stated in this TOR shall be for a period of one (1) year from the date the contract has been signed for the Project.

VII. APPROVED BUDGET FOR THE CONTRACT (ABC)

The Approved Budget for the Contract is **Fifteen Million Nine Hundred Sixty Thousand Pesos (PHP 15,960,000.00)** inclusive of all government taxes/fees. The Service provider shall be paid based on the following tranches:

| Tranches | Description |
|----------|--|
| 15% | Upon submission of Inception Report |
| 40% | Upon submission of Siting and Installation Report |
| 35% | Upon submission of Calibration and Accuracy/Precision Report |
| 10% | Upon submission of the reports (for 12 months) as stated in Item 4 – Project Scope of Work of this TOR |
| 100% | |

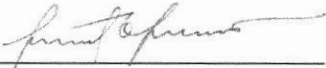
VIII. CANCELLATION OR TERMINATION OF CONTRACT

The City may, without prejudice to other remedies against the Service Provider, unilaterally cancel or terminate the Contract, in whole or in part, due to default, insolvency or for justifiable cause or on any ground which it deems inimical to the City's or public's interest, which includes but is not limited to the following:

1. Failure of the Service Provider to provide /meet the necessary requirements as stated in this TOR and in other bidding/contract documents;
2. Violation or non-performance of the other terms and conditions of the Contract; and
3. Other acts inimical to public interest.

The guidelines contained in RA 9184 and its revised IRR shall be followed in the termination of any contract. In the event the City terminated the Contract due to default insolvency, or for cause, it may enter into negotiated procurement pursuant to section 53 (d) of RA 9184 and its IRR.

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ANNEX A – TECHNICAL SPECIFICATIONS OF THE CAAOME

1. MONITORING EQUIPMENT

1. Equipment should have mitigation measures for vibration, anti-corrosion, electricity fluctuation/anti-lightning measures, anti-tilting, ease of access for maintenance works, and weather protection
2. Should have an Automated Weather Station for measuring temperature, relative humidity, wind speed, wind direction, and rainfall;
3. Provision of hardware and software for monitoring purposes (software application/database; File Transfer Protocol (FTP) data export at no subscription cost all throughout the duration of the contract;
4. Provision of user account credentials to remotely access the system and application;
5. Provision for the installation of a physical facility for the storage, with ready to connect power supply, uninterruptible power source, as well as an air conditioning system;
6. Inventory of spare parts and consumables expected, readily available upon equipment malfunction/maintenance;
7. Schedule of Periodic Service Maintenance and reliability for urgent, emergency repairs.

2. CONTINUOUS AMBIENT AIR ANALYZERS

General Specifications

PARTICULATE MATTER 10 ANALYZER (1 unit)

1. Analyzer should be able to read PM₁₀ levels
2. Range: 0 to 2,000µg /m³ (or higher)
3. Detection limit: 1µg /m³
4. Should have a built-in drier to address effects of humidity
5. With US EPA Federal Equivalent Method (FEM) or Reference method certifications
6. Should have internal and accept external zero and span calibration systems
7. Response time should be reliable

PARTICULATE MATTER 2.5 ANALYZER (1 unit)

1. Analyzer should be able to read PM_{2.5} levels
2. Range: 0 to 2,000µg /m³ (or higher)
3. Detection limit: 1µg /m³
4. Should have a built-in drier to address effects of humidity
5. With US EPA Federal Equivalent Method (FEM) or Reference method certifications
6. Should have internal and accept external zero and span calibration systems
7. Response time should be reliable

NITROGEN DIOXIDE ANALYZER (1 unit)

1. Analyzer should be able to read NO₂ levels
2. Range: 0 to 2,000µg /m³
3. Detection limit: 5 ppb
4. With US EPA Federal Equivalent Method (FEM) or Reference method certifications

5. Should have internal and accept external zero and span calibration systems
6. Response time should be reliable

SULFUR DIOXIDE ANALYZER (1 unit)

1. Analyzer should be able to read SO₂ levels
2. Range: 0 to 2,600µg /m³
3. Detection limit: 5 ppb
4. With US EPA Federal Equivalent Method (FEM) or Reference method certifications
5. Should have internal and accept external zero and span calibration systems
6. Response time should be reliable

AUTOMATED WEATHER STATION (1 unit or assembly)

1. Unit should be able to measure temperature, relative humidity, wind speed, wind direction, and rainfall and can be interfaced directly with the system
2. Temperature Range: -10°C to 50°C; Detection Limit: 0.1°C
3. Relative Humidity Range: 0% to 100%; Detection Limit: 1%
4. Wind Speed Range: 0 to 50 m/s; Detection Limit: 0.1 m/s
5. Wind Direction Range: 0° to 359°; Detection Limit: 0.5 °
6. Rainfall Detection Limit: 0.2mm
7. Unit should have a lightning protection in place and weather-proofed
8. All readings should be able to store and facilitate data transfer
9. Unit can be accessed on-site or remotely
10. Calibration devices/checks for the meteorological parameters should be provided
11. Response time should be reliable

CALIBRATION EQUIPMENT

Calibration equipment and consumables shall be National Institute of Standards and Technology (NIST) traceable.

DATA ACQUISITION, AND HANDLING SYSTEM

The Service Provider shall necessitate the delivery and set-up of the hardware needed for the Data Acquisition, Storage and Transmission System for the end-user. The system should be inclusive of software subscription.

The system must be capable of collecting, storing and transmitting continuous, automated, and real-time and averaged data over a given period, with minimum sampling average of 1 minute to 5 minutes. Particulate matter, Nitrogen Dioxide and Sulfur Dioxide parameters averaging period must be specified according to the Philippine Clean Air Act. If possible, varying averaging periods must also be available.

The system must be able to store the data in its internal memory of the system and/or transmitted to the data logger of the data transmission system. Each data reading must be with clear time stamps with preferred format of mm/dd/yyyy hh:mm in Philippine Standard Time (UTC+8), otherwise time stamp corrections must be explained and can be automatically processed in the data management/dashboard system.

Data accuracy should be calibrated based on the standard instrument calibration procedure performed by the Service Provider. Missing data or exceedingly high or low data must be flagged to the EPWMD, with data flags that provide indication of reason for the flagged data (e.g., power interruption, pump problem, for confirmation of site manager, etc.)

POWER REQUIREMENTS

Electricity requirements or power consumption of the stated instruments must be provided. The system must ideally handle 100 to 240 volts (autovolt). To avoid data losses in case of power interruptions, an Uninterruptible Power Supply or contingent

power supply must be identified and be able to have at least 8-hours of backup in full capacity. The system should comply with international and local safety standards.

EQUIPMENT SHELTER

The PM₁₀, PM_{2.5}, NO₂ and SO₂ analyzers and ancillary equipment are to be housed in an equipment shelter. The shelter should have measures against vibration, anti-corrosion, electricity fluctuation/anti-lightning measures, anti-tilting, ease of access for maintenance works, and weather protection, and have air conditioning system to ensure that the instruments are working within normal operating temperature.

NETWORK CONNECTIVITY

The system must be installed with internet connectivity whether fiber optic, wireless fidelity, to enable real-time transfer of data and remote access to the monitoring equipment.

In case of wired connection, the shelter must have adequate openings and housings for the internet cables and must be properly enclosed/protected to prevent leakages.

RELEVANT DOCUMENTS

All Operation Manuals, Service/Maintenance, Calibration Manuals for all instruments must be submitted in duplicate copies to the end-user. An Inventory of supplies (common replaceable/spare parts) and consumables of the operating instruments for maintenance purposes should also be submitted in duplicate copies to the end-user.

TRAINING PROGRAM

The Service Provider must provide at least three (3) days comprehensive training program, with provision for additional training as requested, for the end-user (10 personnel) to equip them with the skills and capacity needed to comprehend the nature of the project, undertake the daily operation, periodic maintenance of the station, data handling, etc.