AIRLAB
SOLUTIONS POUR NOTRE AIR

Microsensors CHALLENGE 2025

In partnership with:

Terms and Conditions, Regulations and Guidelines

This document constitutes a practical summary, in English, of the REGLEMENT DU CHALLENGE which is the original document in French covering the Terms and Conditions, Regulations and Guidelines of the Challenge. It is by no means a legal document under English law or under French law. Its sole purpose is to highlight the content of the 18 sections of the REGLEMENT DU CHALLENGE to English speakers.

Please seek independent legal advice to fully comprehend the Terms and Conditions, Regulations and Guidelines of the Challenge written in the REGLEMENT DU CHALLENGE as it constitutes a legal agreement under French law.

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1 Preamble

Air quality is a health, economic and societal issue. Air pollution, outdoor and indoor, is responsible for 7 million deaths expected each year worldwide, according to the latest WHO report published on May 2, 2018. In response to this strong challenge, the expectations of the population and public authorities are evolving towards a demand for personalized information that is increasingly precise in terms of air quality.

The development of connected devices has found applications in the measurement and monitoring of air quality. The market is now awash with sensors that are steadily becoming smaller and cheaper. Devices are found in cities, buildings, vehicles and even on people. However, understanding their performance and which product to choose for which use is not straightforward.

Since 2018, through AIRLAB[1], AIRPARIF and its partners have periodically organized the AIRLAB Microsensor Challenge to independently assess the performance of these new air quality measurement technologies. These sensors, constantly evolving, produce varying results depending on usage, environmental conditions, and duration of use.

The AIRLAB Microsensor Challenge thus serves a dual purpose. On one hand, it highlights innovation by showcasing the most effective technologies, and on the other, it helps guide users – local authorities, businesses, researchers, or citizens – in their choices, based on different parameters such as measurement reliability, ease of use, simplification of the provided information, and cost. For manufacturers, it offers a unique opportunity to receive objective feedback on their products, position themselves against the competition, and stimulate innovation.

The Microsensor Challenge only makes it possible to test and compare the products of the Participating manufacturers who have chosen to register and cannot be exhaustive.

Air quality measurements are crucial for protecting public health, especially in regions such as India and West Africa, where air pollution poses significant health risks. According to the WHO[2], in 2016, ambient air pollution in India was linked to approximately 1.8 million deaths due to conditions such as strokes, heart disease, lung cancer, and chronic respiratory diseases. Similarly, West African countries are experiencing rising levels of urban air pollution, leading to an increase in respiratory and cardiovascular diseases. However, these nations often lack comprehensive air quality monitoring systems, hindering the development of effective policies and public awareness. In this context, microsensors offer the promise of an affordable way to expand monitoring networks and improve data collection. However, ensuring the quality and reliability of the data is crucial to informing public policies and implementing effective actions to improve air quality in these regions.

[1] AIRLAB is AIRPARIF's accelerator for innovative air quality solutions.
[2] https://www.who.int/india/health-topics/air-pollution

For its fifth edition, and the second with an international scope following the one organized in 2023 in France and Thailand, the AIRLAB Microsensor Challenge will take place in three countries with diverse climatic conditions and emission sources: France (Paris), Ghana (Accra), and India (Bengaluru). This edition is made possible through a partnership between Airparif, Afri-SET, and Indi-SET—represented by the Center for Study of Science, Technology and Policy (CSTEP)—three initiatives specializing in microsensor evaluation and established in the host countries. Additionally, the 2025 edition will, for the first time, include evaluations in underground railway environments, in partnership with SNCF Gares & Connexions.

The project is financially supported by the Clean Air Fund, Open Philanthropy, the French Development Agency (AFD), Île-de-France Mobilités, and the French Agency for Ecological Transition (ADEME). It is carried out in partnership with the Asian Institute of Technology (AIT), the Federation of Air Quality Monitoring Associations (Atmo France), the Swiss Federal Laboratories for Materials Science and Technology (EMPA), the Environmental Protection Authority of Ghana (Ghana EPA), the Energy Policy Institute at the University of Chicago (EPIC), Imperial College London (Imperial), the Norwegian Institute for Air Research (NILU), the Observatory for Indoor Environmental Quality (OQEI), the World Meteorological Organization (WMO), and the South Coast AQMD.

2 Definitions

The following terms are used in the REGLEMENT DU CHALLENGE. Terms are capitalized and nouns may be used in the singular or plural formsf as needed.

- "**AIRPARIF**": association according to French law, created in 1979, accredited by the Ministry for the Environment (Ministère en charge de l'Environnement) for the monitoring of air quality and the communication thereof over the Ile-de-France region.

- "**AIRLAB®**" aka "AIRLAB® ecosystem": accelerator of solutions designed to improve air quality and fight against climate change, innovation-based, created and managed by AIRPARIF with the support of its partners.

- "**Categories**": Type of use or possible application of a Sensor. The categories in this Challenge are six (6); some of them are freely adapted from the World Meteorological Organization (WMO) technical report No. 1215 on microsensors[3]. The eight Categories can be grouped in 3 main classes depending on the application domain:
  - **Outdoor Air (OA):**
    - **Awareness (OA-A) –** Promote the information and the awareness of the public or users through outdoor air data. The requirements for this type of application are lower on the quality of the data. These sensors aim only at coherence to reference devices and not at equivalence. The panel of pollutants to be monitored may be reduced.
    - **Monitoring (OA-M)** Target the complementary integration into regulatory networks for monitoring of compliance to national or transnational standards of air quality for a given outdoor location. This implies very high requirements for the quality of data produced and their traceability to reference devices. The main regulated and problematic pollutants are to be measured.
  - **Indoor Air (IA):**
    - **Underground Railway Stations (IA-URS)** – Air quality measurement inside underground railway infrastructures, specifically on station platforms. As these data can complement existing air quality monitoring systems in underground

[3] https://www.wmo.int/pages/prog/arep/gaw/documents/Low_cost_sensors_post_review_final.pdf

railway stations, high-quality data, comparable to those produced by reference instruments, are expected, along with the monitoring of key pollutants in this environment—particulate matter.

- **Awareness (IA-A)** – Promote the information and the awareness of the public or users through indoor air data. The requirements for this type of application are lower on the quality of the data. These sensors aim only at coherence to reference devices and not at equivalence. The panel of pollutants to be monitored may be reduced.
- **Monitoring (IA-M)** – The support of the verification of compliance to national air quality standards in childcare establishments under 6 years old (nurseries, day-care centers, etc.), kindergartens and elementary schools. This implies a high quality of data by meeting the accreditation requirements LAB REF30[4] or the specifications of the INERIS on this subject[5]. The measurement process follows fully prescribed methods and best practices.
- **Piloting (IA-P)** – Controlling, managing, and regulating indoor air quality for building or installations with the help of a multi-parameter sensor[6]. The requirements for this type of application are lower on the quality of the data. These sensors aim only at coherence to reference devices and not at equivalence, while at the same time being continuously available and easily interoperable with the domotics system, including the managing or user interface.

- "**Sensor**" or "**Microsensor**": Device, or combination of devices (e.g., in conjunction with a mobile phone) capable to autonomously measure indoor and/or outdoor air quality indicators and to make this information available, and potentially also making use of algorithms, software or databases to enhance the quality of its results.

- **"Challenge"**: Subject of these Terms and Conditions, Regulations and Guidelines, the purpose of which is to test and compare the Sensors or Microsensors of the Participants.

- "**COPIL"**: Steering committee established as part of the Challenge, composed of representatives from AIRPARIF, Afri-SET, CSTEP, ADEME, AFD, the Clean Air Fund, Île-de-France Mobilités, AIT, EMPA, Ghana EPA, EPIC, Imperial, NILU, OQEI, WMO, SNCF Gares & Connexions, and South Coast AQMD. COPIL members are bound by confidentiality clauses (see Chapter 17). The committee plays a strategic and decision-making role in defining the operational framework of the Challenge. It discusses and approves documents outlining the governance of the Challenge process (the Terms and Conditions, Regulations and Guidelines and the Protocol) and ensures the Challenge runs smoothly.

- "**Cost**": Anticipated cost over 3 years combining the purchase price (or rental) and annual operational costs (e.g., access to data, maintenance, etc.) of the Sensor or Microsensor.

- "**Environmental Footprint**" evaluates the lifecycle impact of the sensor system by considering material efficiency, manufacturing location, maintenance requirements, expected lifetime, and Corporate Social Responsibility (CSR) initiatives.

- "**Utility**": the capacity of a system to provide the essential functionalities for accomplishing the targeted goal. The criteria taken into account to evaluate Utility vary based on the

[4] based on the NF EN ISO 16017-2 and NF EN ISO 16000-4 standards

[5] Evaluation of the conformity of kits for the realization of indicative measurements of formaldehyde, benzene and carbon dioxide in the indoor air of establishments receiving children – INERIS, 2017

[6] In this context, a multi-parameter sensor is a sensor that targets several air pollutants. Temperature, humidity or pressure are not considered as air pollutants.

category of use (detailed in the Challenge Protocol), with two criteria always present: Targeted pollutants and Data recovery.

- "**Usability**": the capacity of a system to provide the conditions for its users to perform the tasks safely, effectively, and efficiently while enjoying the experience. The criteria considered to evaluate Usability vary based on the category of use (detailed in the Challenge Protocol), with one criterion always present – the Ease of Use (Test of use).

- **"Evaluation Environment"**: it characterizes the environmental and mobility conditions for the deployment of the Sensors for evaluation. As part of the 2025 Challenge, the test environments are as follows:

	Evaluation Environment	Location of deployment	Categories
Outdoor Air	Temperate climate – Europe	Paris, France	OA-M, OA-A
	Tropical climate – West Africa	Accra, Ghana	OA-M, OA-A
	Tropical climate – South Asia	Bengaluru, India	OA-M, OA-A
Indoor Air	Underground Railway Stations	Paris, France	IA-URS
	Non-Specific Spaces	Paris, France	IA-M, IA-A, IA-P

- "**Accuracy**": the performance in terms of data quality is defined based on the Sensor Evaluation Toolkit (SET) index from Fishbain et al., 2017: "An evaluation toolkit of air quality micro-sensing units", enriched with additional criteria of trueness and precision. The SET Global Method Index includes seven evaluation criteria:
  - The *Root-Mean-Square Error* (RMSE) is a frequently used error metric for numerical deviations.
  - The *Pearson correlation coefficient* (ρ) characterizes the presence of a linear relationship between two signals (e.g., reference and candidate sensor).
  - The *Kendall correlation coefficient* (τ) and the *Spearman correlation coefficient* (S) are two different rank correlation coefficients which are used to test for the presence of a non-linear relationship between two variables.
  - The *Presence* metric represents the evaluation of the completeness of the data, highlighting sensor failures, operational or data transmission problems.
  - The *Source analysis* characterizes the capacity of the device to identify and localize a source (perception of the variations of pollutant level as a function of wind direction).
  - The *Match score* relates to the common use of air quality grading schemes (e.g., the Air Quality Index) in the context of applications that do not require precise absolute measurements such as citizen science projects or general risk estimations. It consists in the division of the reference and candidate sensor dynamic ranges into equal number of bins and quantifying the bin-classification agreement for reference-candidate measurement pairs.
  - The *Lower Frequencies Energy* metric characterizes the acquired sensor signal rather than a comparison with a reference instrument and reflects the sensor's ability to capture the temporal variability of the targeted pollutant.

  The additional criteria used in the Challenge are:
  - The *Slope* and *Intercept* of a linear regression model of the relationship between the reference measurements and the microsensor measurements. The values of these two parameters permit an evaluation of the trueness of the candidate solution.
  - The *Reproducibility* is an expression of the precision of the candidate solution and is calculated across the microsensor samples of a candidate solution, it includes both the variability due to causes intrinsic to one sensor unit (e.g., measurement noise) and inter-device variability (e.g., due to the manufacturing process).

  The final calculated index ranges between 0 and 1 (1 being equivalent to the reference).

- “**Confidential Information”**: any information, data, database within the meaning of Article 112-3 of the Intellectual Property Code, or document of any kind whatsoever, expressly identified as confidential and transmitted in writing, orally or by any other means , on the occasion of registration for the Challenge or during the Challenge, and including without limitation any technical, scientific, economic, financial, accounting, commercial, legal, strategic information, any sample, any specification, any drawing, any graphic representations or otherwise, any software, computer program, report, description, study or know-how.

- “**Jury**”: Committee responsible for validating registration files, selecting Sensors for evaluation, and confirming the results of this final evaluation of the Sensors based on the Categories chosen by the Selected Participants. The Jury is composed of representatives from AIRPARIF, Afri-SET, CSTEP, AIT, EMPA, Ghana EPA, EPIC, Imperial, NILU, OQEI, WMO, and South Coast AQMD. Jury members are bound by confidentiality clauses (see Chapter 17) and declare that they have no interest in the commercialization of any of the Sensors participating in the Challenge. If a conflict of interest, even indirect, is discovered after the formation of the Jury, the affected Jury member will be excluded from the discussion of the evaluation of the concerned Participant's Sensor.

- “**Partner**”: any member of the COPIL and/or Jury.

- “**Participant**”: any person registered as per Article 6 of this document.

- “**Selected Participant”**: Participants whose Sensor has been selected for metrological and use tests.

- “**Party**”: refers to AIRLAB, any Participant or Selected Participant or any Partner.

- **“AIRLAB® platform”**: open innovation platform, accessible at site www.airlab.solutions, through which candidates can register for the Challenge.

- **“Intellectual Property”**: all intellectual property rights, including all copyrights and industrial property rights, including patents, utility certificates, trademarks, designs, plant variety certificates, rights of producers of databases, rights to software, chips and semiconductors, and all other rights, including the rights attached to applications for any intellectual property rights.

3 Purpose of the REGLEMENT DU CHALLENGE

The REGLEMENT DU CHALLENGE establishes the Terms and Conditions, Regulations and Guidelines for the participation to the « Microsensor AIRLAB Challenge 2025 » organized by AIRPARIF and its partners (i.e. the members of the COPIL and/or the Jury).

The Participants acknowledge having been informed that the Challenge corresponds to a study and an objective comparison of the Participants' Sensors. The Challenge does not depend in any way, even partially, on chance and luck and cannot therefore be analyzed or be similar to a Lottery within the meaning of the French « Code de la consommation » (Retail law).

The Participants also acknowledge that AIRPARIF and its partners are independent organizations and that the study and comparison carried out within the framework of the Challenge does not constitute comparative advertising within the meaning of the Consumer Code. The Challenge and its results do not constitute an endorsement or disparagement of the Sensors and/or the Participants and Selected Participants.

4 Objectives of the Challenge

The Challenge aims at:

- Linking Sensors and their use, represented by the Categories
- Determining and providing information on the most relevant Sensors by Category of use
- Establishing a technological state of the art on the Sensors.
- Supporting innovation to improve Sensors.

Sensors will be rated according to the terms stated in Articles 8 and 9.

Participants to the Challenge are expected to be presenting devices that are already available on the market or that are being marketed for imminent commercialization (levels 8 or 9 on the Technology Readiness Level - TRL scale).

5 Participating in the Challenge: Terms and Conditions

5.1 Participants

Participants to the Challenge must be registered with the « Registre du Commerce et des Sociétés », or alternatively they must show evidence of an equivalent registration with a professional register.

The Challenge competition is not open to:

- AIRPARIF employees or their immediate families.
- Members of COPIL, members of the Jury or the members of the organizations they belong to.

AIRPARIF ensures its registration process is free from any form of discrimination or privilege.

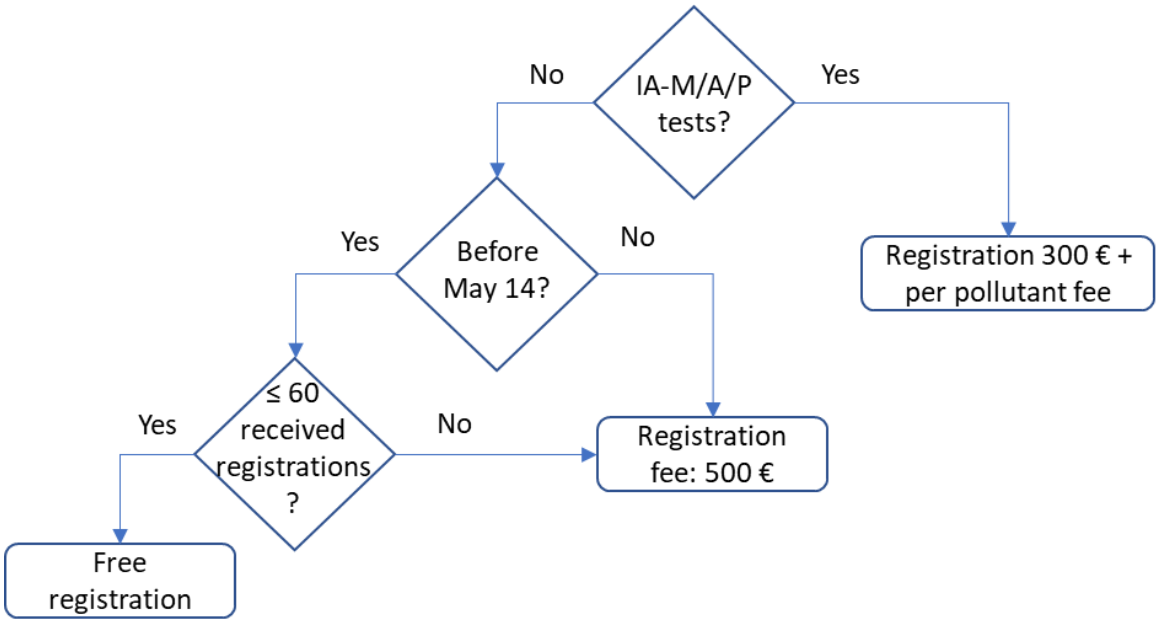
5.2 Commitment from Participants

Participants to the Challenge commit to:

- Compiling a registration file to the Challenge according to the provisions stated in Article 6, of this document.
- Respecting the process in place as per Article 7.
- Taking good note of the REGLEMENT DU CHALLENGE in its entirety and accepting the REGLEMENT (Terms and Conditions, Regulations and Guidelines) with no reservations.

5.3 Registration and associated costs

Registration for the Challenge, for evaluations outside the indoor air – general spaces environment (categories IA-M, IA-A, and IA-P), during the **early registration period** (defined in Article 7) is free for the first **60 applications**. A fee of **500 euros** is required **for each solution submitted** beyond the first 60 and for registrations received after the early registration deadline. These conditions are illustrated in the following figure:



Registrations for the IA-M, IA-A, and IA-P categories are subject to registration fees through a flexible fee structure. Specifically, this consists of:

- A processing fee of 300 EUR for each sensor system applying to at least one of these categories;
- Additional evaluation fees for each pollutant to be included in the evaluation (see the following table for the values of these fees).

PM	CO_2	NO_2	VOCs	CH_2O
100 EUR	100 EUR	100 EUR	200 EUR	200 EUR

For example, a sensor for which the participant would like to have an evaluation for one or more PM parameters (PM2.5, PM10, and/or count) would need to pay a total registration fee of 400 EUR. Another participant who would like an evaluation for PM, CO2, VOCs, and CH2O measurements would need to pay a fee of 900 EUR. At least one type of pollutant must be selected to validate the registration file.

The registration fees are non-refundable in the event of disqualification or withdrawal (see Article 18.2) and must be paid by bank transfer **before June 6, 2025**, to:

AIRPARIF
7 RUE CRILLON
75004 PARIS
IBAN: FR76 1027 8060 4100 0311 0354 130
BIC: CMCIFR2A

A paid registration will only be validated after receipt of payment.

The test environments are limited to a total number of distinct candidate solutions as outlined in the following table:

Environment	Limit of sensor solutions
Outdoor air temperate climate	25
Outdoor air tropical climate – Ghana	25
Outdoor air tropical climate – India	20
Indoor air – underground railway stations	10

The Participant is responsible for the delivery costs (including any customs fees) of the Sensors to the AIRPARIF headquarters (Paris, France), Afri-SET (Accra, Ghana), and/or CSTEP (Bengaluru, India), depending on the location of the deployment sites mentioned in their application file, the costs of making data available as well as the costs of repatriating the Sensors.

6 Registration to the Challenge

Registration is done online via the AIRLAB site: www.airlab.solutions by filling a form that can be found on: http://www.airlab.solutions/en/projects/microsensor-challenge.

Participants must provide the following information regarding the participating company or organization:

- Name
- Creation or incorporation date
- Mailing address
- Registration number (SIREN or equivalent certificate)
- Logo
- Website of the company or participating organization (optional)
- Social media presence (e.g., Linkedin, Twitter, etc.) of the company or participating organization (optional)
- Surname of the person representing the company or organization
- First name of the person representing the company or organization
- Their contact phone number
- A valid email address
- For each Sensor being assessed, the following information is required:
    - Name
    - Version
    - Development stage
    - Categories in which it is competing
    - Pollutants being measured
    - Other parameters being measured
    - Dimensions (in cm): length, width, height
    - Mass (in g)
    - Product lifespan (i.e. of the sensitive unit)
    - Recommended Retail Price (specify if real or projected)
    - Operating cost per annum (including rental if applicable)
    - If applicable, the instruction sheet to API or the ftp address to download the data from, along with keys and passwords
    - Manufacturing country of origin of the Sensor
    - Data collection and Ownership of data from the Sensor
    - Environmental responsibility policies (e.g., component recycling, e-waste management)
    - Sources for additional information about the devices being tested (test results, publications).

Participants must accept the REGLEMENT DU CHALLENGE (Terms and Conditions, Regulations and Guidelines) by ticking the appropriate box (« J'accepte le Règlement du Challenge »). It is the last question on the form. The registration form can be accessed at the following Web address: http://www.airlab.solutions/en/projects/microsensor-challenge. Pictures, technical documents and other files should be uploaded by accessing the dedicated link from the same Web page.

Participants accept to be contacted by AIRPARIF by phone or email in the context of the Challenge.

Participants may use the comment box to specify what information given in the form should be treated as Confidential Information.

Once the form has been verified, a confirmation email is sent to the Participant. Participants who insert misleading or erroneous information in the form will be denied access to the Challenge.

7 The Challenge Process

Registration for the Challenge is open from **April 2, 2025, to May 31, 2025, inclusive**. The **early registration** period runs from April 2, 2025, **to May 14, 2025**.

The selection results will be communicated by email to the Selected Participants before **June 16, 2025, at 5:00 PM (Paris time)**. If the number of registrations requires it, AIRPARIF reserves the right to modify the dates for communicating the selection results.

Selected Participants must deliver **three Sensors per test Environment** listed in their application and validated by the Jury by **July 18, 2025, at 5:00 PM** (local time of the corresponding test environment) at the following addresses:

- Afri-SET, Department of Physics, University of Ghana, Legon, Accra, Ghana – for Selected Sensors targeting the OA-M and OA-A Categories in the temperate tropical climate of Ghana
- Center for Study of Science, Technology & Policy (CSTEP), #18, 10th Cross, Mayura Street, Papanna Layout, Nagashettyhalli (RMV II Stage), Bengaluru – 560094, Karnataka, India – for Selected Sensors targeting the OA-M and OA-A Categories in the tropical climate of India
- AIRPARIF, 7 rue Crillon, 75004 Paris, France – for Sensors selected for all indoor air categories and the OA-M and OA-A Categories in temperate climates.

Preliminary functionality and communication tests will be conducted for each type of sensor upon receipt of the first sensors and until July 31, 2025. The tests necessary for the Ranking of the Sensors, provided by the Selected Participants, according to the various criteria (Article 9), will take place from **September 15, 2025, to January 15, 2026**.

For **outdoor evaluations**, by the end of the first third of the deployment duration, a **reference dataset** will be made available to participants who wish to perform a **colocated calibration** for the deployment site. This reference dataset will cover a period of **approximately one month**. Once this dataset is provided, both the **factory calibrated data** and the **colocation calibrated data** must be made available simultaneously and in the same format. These two datasets will be **processed separately** and will be differentiated in the final results deliverables to ensure transparency in the evaluation process.

The evaluation results and corresponding reference data will be communicated privately to each participant on **March 1, 2026**. From this date until **March 31, 2026**, participants will be able to provide their feedback on the results and submit any potential disputes. After this date, the results will be considered validated and final, and no further disputes will be processed. The final results will be made public during a dedicated ceremony. The date, format, and location of this event will be determined and communicated to participants at least 6 months prior to its occurrence.

Participants are responsible for retrieving their sensors **by March 1, 2026**, at the latest. If no justified request for an extension is received by this date, storage fees may be charged. Two months after this deadline, if the sensors have not been retrieved, participants will forfeit any ownership rights to their equipment, which may then be freely disposed of by the partner responsible for its deployment. Participants also have the option to donate their equipment instead of retrieving it.

However, only sensors that can operate without additional data access fees are eligible for this option. Any donation request must be submitted before the deadline of **March 1, 2026**.

In case of operational necessity, AIRPARIF reserves the right to modify the operational process of the Challenge after consulting the COPIL. AIRPARIF cannot be held liable for the changes. Participants will be informed of any modification of the process.

The dates and times indicated in this document and in the context of this Challenge are expressed, unless stated otherwise, in the Paris time zone.

8 Selection rules and process

The scope of the Challenge is limited to the Sensors associated to the Categories as defined by Article 2.

The selection of Sensors will be carried out by the Jury, which will analyze the registration file, specifically the technical elements and documents, the innovation compared to the state of the art, and the technological maturity. The Jury reserves the right to reject a sensor if it is considered too large or cumbersome in relation to the capacity of the evaluation site.

The Jury may exclude from the Challenge a malfunctioning sensor, meaning one whose evaluation is not possible due to lack of functionality or communication, following the preliminary tests conducted between June and July 2025. AIRPARIF reserves the right to contact Participants by email or phone during this selection phase, which extends until **July 18, 2025**. Participants agree to respond to requests for additional information within **2 business days**.

9 Performance Assessment and Ranking

The sensors provided by the Selected Participants will be tested in metrology labs and on-site. The Jury will give its opinion based on the following five criteria, as defined in Article 2:

1. Accuracy of measurements
2. Utility
3. Usability
4. Environmental Footprint
5. Cost

Each criterion and its composing sub-criteria, along with their calculations, are explained in detail in a separate document – the Challenge Protocol.

The following table indicates the weighting applied to each macro-criterion according to the Categories to obtain a final score on the overall performance of the candidate solution:

		Accuracy	Utility	Usability	Environmental Footprint	Cost	
						Paris	Accra/Bengaluru
OA	**OA-M**	5	5	3	2	3	4
	OA-A	3	4	4	3	5	
IA	**IA-M**	5	5	3	2	3	
	IA-A	3	4	4	3	5	
	IA-P	3	5	4	2	4	
	IA-URS	5	5	3	2	3	

9.1 Minimum Data Presence Requirement

To be considered for evaluation, each sensor unit must provide at least **50% of the expected data**. Additionally, the three sensor units together must collectively provide at least **two-thirds (2/3) of the expected data** across the evaluation period. Failure to meet these thresholds may result in exclusion from the final ranking.

9.2 Handling of Sensor Failures

Sensor failures refer to malfunctions or critical defects that prevent a sensor from operating as expected. These failures may arise from internal hardware or software issues and can lead to prolonged data loss or systematically erroneous measurements. A sensor failure is considered to have occurred when:

- The sensor ceases to transmit data for an extended period due to internal malfunction (excluding external infrastructure issues such as power or network failures).
- The recorded data exhibits persistent, unrealistic values (e.g., permanently stuck at a maximum or minimum reading, repeating a single value for an extended duration).
- The participant officially reports a critical defect affecting sensor operation.

Data recorded during confirmed sensor failures will be excluded from performance evaluation and will be handled as missing data.

Participants may replace a faulty sensor with a new device during the Challenge. In such cases, the three longest-operating devices will be considered for the final evaluation, provided they meet the minimum presence requirement. If a failure leads to the complete absence of usable data over the assessment period and no replacement is provided, the Sensor may be disqualified from evaluation.

9.3 Awarding of prizes

Based on the results of the sensor solutions, the Jury can decide to award prizes to the best performing candidates according to various criteria (e.g., best per category of use, best for a particular pollutant, etc.). The number of awards and the criteria for awarding these titles will be determined by the Jury's collective decision. The specific criteria will be made available to participants after the Jury's final meeting.

10 Presentation and Use of Challenge Results

The results of the Challenge are published on a dedicated interactive platform, providing access to individual performance reports. It also includes a search tool and a side-by-side comparison feature for the reports.

10.1 Integrity of Award Listings

The list of nominees and winners of the Microsensors Challenge awards, as determined by the Jury, shall be published by the organizers through official channels, including but not limited to the project webpage, the organizers' social media accounts, and the dedicated performance results website. Participants are not permitted to alter, modify, or selectively excerpt this information for reposting or redistribution in any form. Any reproduction of the results must be faithful to the official publication.

10.2 Proper Citation of Awards

Participants who receive an award in the Microsensors Challenge may reference their achievement in their own communications (e.g., marketing materials, websites, social media). However, they must accurately cite the full name of the award as designated by the organizers. Any truncation, modification, or ambiguous phrasing that may mislead third parties – such as presenting oneself as the overall "Challenge winner" when no such title exists or as being approved/certified/endorsed by Challenge organizers, their partners, or affiliated institutions – is strictly prohibited.

10.3 Restrictions on Modification of Challenge Deliverables

All deliverables of the Microsensors Challenge, including but not limited to official reports, evaluations, rankings, and any related materials, are provided as-is and may not be modified, edited, or repurposed for independent dissemination by participants. If participants wish to reference such materials, they must do so by directing audiences to the official sources provided by the organizers.

10.4 No Official Endorsement

The granting of an award in the Microsensors Challenge does not constitute an official endorsement, certification, or recommendation of any product, technology, or participant by the Challenge organizers, their partners, or affiliated institutions. Participants may not present or imply that their recognition in the Challenge equates to an official validation of their product's quality, reliability, or suitability for any specific use. Any misrepresentation in this regard may result in corrective action as outlined below.

10.5 Enforcement and Consequences

Any breach of the above provisions may result in corrective actions, including but not limited to formal retraction requests, disqualification from future editions of the Challenge, and/or legal recourse if the unauthorized use causes reputational damage to the Challenge or its stakeholders.

11 Provision of Sensors, Equipment and Data Access

The Selected Participants make available three identical Sensors free of charge for each Evaluation Environment in which they compete, with real-time access to the data generated by the Sensor.

Participants are required to provide all the necessary equipment for the proper functioning of their products. This includes, but is not limited to, communication routers or modems, SIM cards, communication or power cables, as well as electrical adapters for each evaluation site.

Selected Participants vow not to intervene on the Sensors or any Sensor data processing system beyond the scope defined in Section 7, which allows for colocated calibration for outdoor evaluations. No other modifications to data processing will be permitted.

12 Collection and retention of personal information

As part of this Challenge, AIRPARIF, publisher of the website www.airlab.solutions, implements a processing of personal data collected via the registration form of Participants, based on its legitimate interest in implementing operations favoring the emergence of innovations as part of its mission to monitor air quality and assess the health risks and environmental and building effects related to air pollution across the Ile-de-France region, and the implementation of pre-contractual and contractual measures taken at the request of the Participants.

The finalities pursued by this treatment are the organization of the Challenge, the management and monitoring of the registrations of the Participants, and the participation of the Selected Participants, as well as the dissemination of information on the activity of AIRPARIF.

AIRPARIF, an association under the law of 1901 located at 7, rue Crillon – 75004, is Responsible for Processing the personal data processed within the framework of the Challenge.

Personal data is, for the Participants, legal entities with legal capacity:
- The name of the representative of the Participant;
- The first name of the Participant's representative;
- The telephone number of the Participant's representative;
- Information about the company represented by the Participant;
- The valid email address of the Participant's representative.

These data, marked with an asterisk in the registration form, are required to validate the registration of each Participant. In their absence, their application cannot be considered.

The data is intended for AIRPARIF authorized persons and members of the Jury and the COPIL in charge of this Challenge, for the sole purpose of the organization of the Challenge, the management and the follow-up of the registrations of the Participants, the management and the monitoring of the participation of the Selected Participants and the dissemination of information on the activity of AIRPARIF and the other members of the Jury within the framework of the Challenge.

The registration data are kept for three (3) years from the registration of the Participants, for the sole purpose of communication on the role of AIRPARIF on the implementation of operations and activity development for the monitoring of air quality throughout the Ile-de-France region.

Registration and participation data of the Participants and Selected Participants shall be kept for the duration of the Challenge plus any applicable time limits. The contact details, name and surname may be used for three (3) years at the end of the operation for the purpose of communication and sending information on the role of AIRPARIF and the Jury on the implementation of animation operations and development of their activity for monitoring air quality throughout the Ile-de-France region.

As per the French law « Informatique et Libertés » and as per GDPR, Participants have, amongst other rights, the right to information, of access to their personal data for consultation, modification and limitation as well as the right to be forgotten.

Participants may also, at any time and for reasons of their own ask for their personal data not to be used even within the limitation of AIRPARIF's communication purpose as stated above. Participants can also ask their data not to be used for commercial and business development.

If you have any questions about AIRPARIF's privacy policy and practices regarding the protection of personal data or to exercise your rights, you can contact AIRPARIF:

- By e-mail at: demande@airparif.asso.fr
- By regular mail at: AIRPARIF – Surveillance de la qualité de l'air en Île-de-France, 7 rue Crillon 75004 PARIS.

Participants have the right to file a complaint with CNIL.

Participants also have the right to define general and specific provisions regarding the handling of their personal data after their death by email to challenge@airparif.fr or in writing to AIRPARIF, 7 rue Crillon, 75004 Paris.

13 Ownership of the data generated by the Sensors

The Sensors of Participants and Selected Participants will be tested, with their agreement, by AIRPARIF staff.

The data collected by the Sensors during these tests will be the exclusive property of AIRPARIF.

With regard to the OA-M (Outdoor Air-Monitoring) Category, and providing Participants give their consent, the detailed metrological output will be made available to members of LCSQA[7] for the purpose of nationwide and European-wide research on microsensors pertaining to European Directive 2008/50/CE.

14 Intellectual property

Participants and Selected Participants retain exclusive interest in and ownership of their Intellectual Property on the day of registration.

Each Participant and Selected Participant concedes, on a non-exclusive basis, to AIRPARIF, on its copyright:

  - The right of reproduction: the right to reproduce or have reproduced, and in particular to display, store, download, transmit, upload, in whole or in part, the Participant's works;
  - The right of representation of works: the right, for all or part of each work, to distribute or have distributed, communicated, in any way whatsoever, by any process whatsoever, known or unknown to this day
- For the following purposes:
  - The implementation and management of the Challenge,
  - The execution of the Challenge by AIRPARIF and its partners and in particular the tests and comparison of the Sensors.
- For the entire duration of the Challenge and for a period of five (5) years after the end of the Challenge,
- For the whole world.

Each Participant and Selected Participant grants AIRPARIF on its trademarks and other industrial property rights:

[7] LCSQA : « Laboratoire Central de Surveillance de la Qualité de l'Air » is the organisation in charge of the technical coordination of air quality monitoring systems in France. The LCSQA is the result of the collaboration between 3 organizations : the Institut National de l'Environnement Industriel et des Risques (INERIS), the Laboratoire National de métrologie et d'Essais (LNE) and the Ecole Nationale Supérieure Mines-Telecom Lille Douai (IMT Lille Douai).

- Exploitation rights, including the right of use and distribution,
- On all mediums, for the following purposes:
    - Setting up and managing the Challenge,
    - The execution of the Challenge by AIRPARIF and its partners and in particular the tests and comparison of the Sensors.
- For the entire duration of the Challenge and for a period of five (5) years after the end of the Challenge,
- For the whole world.

These concessions are granted in return for participation in the Challenge and to enable its proper execution.

15 Communication

AIRPARIF reserves the right to communicate about the Challenge by using the information provided by Participants, with the exclusion of Confidential Information, and in compliance with Articles 12 and 14.

Subject to the provisions of Article 12, the Participant authorizes AIRPARIF to use the content of the registration forms to communicate on the organization of this Challenge, the Participants, the Selected Participants, the Sensors tested and their description (name, measured pollutants, weight, size, photo, price, as well as associated services), and test results, in particular for communication activities and / or as communication support destined for the media.

As provided for in Article 14 of these Regulations, Participants give AIRPARIF authorization to use their name, logo, visual identity and registration to the « Challenge ».

The results from the Challenge will be displayed on the AIRLAB website (www.airlab.solutions) and disseminated by AIRPARIF via usual communications channels.

The present authorization applies to the whole world for the entire duration of the Challenge and for a subsequent 5 years.

The Participants are authorized to communicate on the Challenge by undertaking, however, to report on the Challenge as a whole and in all its conclusions.

16 Liability of AIRPARIF, Partners, and Affiliated Institutions

AIRPARIF, its partners, and their affiliated institutions cannot be held liable in case Sensors delivered by the Participants and Selected Participants fail to function properly or do not function at all. Selected Participants are entirely responsible for their Sensors.

The Participants and Selected Participants are also solely responsible for any damage caused to the Sensors during the delivery and repatriation of said Sensors.

AIRPARIF, its partners, and their affiliated institutions cannot be held liable for direct or indirect damage caused by a delivery failure or delay of a Sensor, in particular in the case where the Sensor is rejected because of a late arrival beyond the deadline stated in the REGLEMENT DU CHALLENGE.

AIRPARIF, its partners and their affiliated institutions cannot be held liable in case the Challenge is partially or totally modified, suspended, interrupted, postponed or altogether cancelled for reasons outside its control.

AIRPARIF, its partners and their affiliated institutions cannot be held liable in case a Participant is disqualified for violation of the REGLEMENT DU CHALLENGE.

It is recalled that AIRPARIF and the Participants have agreed that the nature of AIRPARIF's obligation within the framework of the edition of the Challenge is an obligation of means.

17 Confidentiality

Information shared between AIRPARIF, Jury members, members of the COPIL and the Participants are regarded as Confidential.

With regard to confidentiality, the interested parties shall respect the following principles:

- To treat Confidential Information with the same degree of care as they would with their own confidential information of equal importance
- To keep Confidential Information confidential, not to communicate it or make it vulnerable to disclosure to a third party
- To protect ownership of Confidential Information
- To ensure that Confidential Information is neither copied, duplicated, or reproduced partly or fully.

In the event of a breach of this confidentiality agreement, the defaulting Party will be liable for the breach with respect to the Party owning the Confidential Information.

All information, documents and data communicated by one Party to another Party shall be returned to it upon first request and without undue delay.

In case these cannot be returned, the other Party undertakes to provide the reasons and to certify that it no longer has such information, data or documents.

In the absence of destruction of the Confidential Information, the Parties undertake not to use them or solely use them for evidential purposes.

The Party receiving Confidential Information is free of all obligations or restriction if:

- The information entered the public domain before or after its disclosure, but in the absence of any fault attributable to it;
- The information is already known to the recipient Party, this can be demonstrated by the existence of appropriate documents in its files;
- The information has been lawfully received from a third party, without restriction or violation of its confidentiality obligations;
- The use or disclosure of the information has been authorized by the issuing Party;
- It has been demonstrated by written evidence or other hard evidence that the information was independently developed by the recipient Party.

During the Challenge and for 5 years after the end of the Challenge, Parties commit not to use Confidential Information for purposes other than the Challenge.

18 General Terms and Conditions

18.1 Cancellation or suspension of the Challenge

The Challenge may be partially (Categories) or totally suspended or cancelled by AIRPARIF in case of:

- Force majeure, as defined by the Civil Code and the case law of French Courts and Tribunals;
- Fraud;
- Low uptake, i.e. less than ten (10) Participants registered to the Challenge or less than five (5) Participants registered per Category.

AIRPARIF cannot be held liable in case the Challenge is partially or totally modified, suspended, interrupted, postponed or altogether cancelled for reasons outside its control. Participants are not entitled to compensation in such cases.

18.2 Withdrawal and financial compensation

Each Selected Participant may withdraw one or more Sensors in one or all of the Categories competed until **February 15, 2026**. This withdrawal does not result in financial penalties until **January 15, 2026**. From January 15, 2026 to February 15 2026, a financial compensation of 1,000 euros is requested in the event of the withdrawal of one or more Sensor(s) in one or all of the Categories to partially cover the costs incurred by AIRPARIF to process and evaluate the Sensors in the Challenge. These fees are payable by bank transfer to the same account as the registration fees (see article 5.3). The results of all candidate solutions that will not be withdrawn before February 15 will be published when the results are announced.

18.3 Insurance

Participants must make sure they are insured as appropriate for claims made against them by others in case of damage to persons or property during their participation to the Challenge.

18.4 Invalidity

Should a statement in the REGLEMENT DU CHALLENGE become invalid for legal reasons, other statements of the REGLEMENT DU CHALLENGE are not affected whatsoever.

18.5 Titles

Should there be a problem of interpretation between the title of a clause in the REGLEMENT DU CHALLENGE and the worded content of the clause, then the worded content will prevail and the titles considered void.

18.6 Independence

Parties are independent and act in their own name and responsibility. Therefore, Parties cannot act on behalf of anyone else and remain fully responsible for their staff, products and services.

18.7 Toleration

The fact that a Party tolerates a situation does not grant rights to the other Parties. Such toleration is not to be interpreted as renunciation of the right to enforce the terms of the contract.

18.8 Applicable Law

The REGLEMENT DU CHALLENGE is governed by the laws of France.

18.9 Language

The REGLEMENT DU CHALLENGE and all ensuing documents are or will be written in French. Wherever the documents are translated, French prevails. All communication pertaining to the REGLEMENT du CHALLENGE whether written or oral is done in French.

18.10 Dispute resolution

Any dispute arising out of or in connection with the REGLEMENT DU CHALLENGE, and which fails to resolve within three (3) months of being raised in due form, shall be referred to and finally resolved by a competent French court.