

# MONITOR, INFORM, UNDERSTAND, INNOVATE: the role of Airparif, a non-profit organization accredited by France's Ministry of the Environment to monitor air quality

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Head of Airparif



Installation of microsensors as part of the AIRLAB Micro-Capteurs 2019 Challenge ©MTES (Ministry for the Ecological and Inclusive Transition)

Karine Léger is an environmental engineer who joined Airparif, a non-profit accredited by France's Ministry of the Environment to monitor air quality in the Paris region, in 2001. She started as a project engineer before being appointed deputy head of communication and international policy. She was then appointed operational manager for communication, partnerships and digital, a role in which she helped to develop new specialist practices and extend Airparif's activities into the international field. She was coordinator for the Citeair II project that enabled the emergence of a pan-European real-time index for assessing air quality.<sup>1</sup> Karine Léger was appointed head of Airparif in 2018.

In France, ambient air quality monitoring is conducted by independent non-profit bodies accredited by government authorities. Airparif's main role is to track and analyze atmospheric phenomena (both over the long term and for episodic pollution events), help policymakers formulate action plans, foster innovation and inform various stakeholders.

The challenges of air quality are of particular importance in cities. Indoor air pollution is an often-forgotten issue in the field of air quality, since the general public is far more aware of atmospheric pollution than of pollution inside buildings. However, due to the accumulation of different pollutants and the fact that indoor air quality depends on outdoor air quality, indoor air quality actually tends to be worse than outside. This issue is especially important given that we spend around 80% of our time in closed spaces.

To meet these challenges, Airparif supports innovation via AIRLAB, a platform through which economic actors, research bodies and representatives from public organizations seek to test and assess innovative pollution measurement and treatment approaches. For example, one AIRLAB project relating to indoor air quality involves testing different categories of microsensors used indoors to give users unbiased information about the product's suitability for its intended application. Airparif also provides ad hoc assistance to public bodies, at their request, to carry out measurements and provide consultancy services used to validate and interpret indoor air quality data obtained from sensitive locations, such as buildings used by particularly vulnerable members of the public. Lastly, its work also seeks to characterize the air pollution that people living in the Paris region are exposed to, incorporating existing work and data on indoor air quality.

<sup>1</sup> The project website at [www.airqualitynow.eu](http://www.airqualitynow.eu) offers online air quality forecasts, is available in over 10 languages and accessible via social media and mobile apps.

## Tell us a little about Airparif

Karine Léger: Airparif was founded in 1979. It is an independent non-profit organization whose mission is to monitor and provide information about ambient air quality in the Paris region. It is accredited by the Ministry of the Environment. Representatives from various sectors involved in the problem of air pollution sit on its executive board and are divided into four equal groups: state representatives (prefect of the Île-de-France region, Paris police prefect, Ministry of the Environment, etc.); representatives from various layers of local government (regional council, Paris city council, regional transport authority, etc.); economic actors (industries liable for the GTPA pollution tax<sup>2</sup> that are members of the AIRASIF collective: Air Liquide, Faurecia, EDF, Engie, Icade, Veolia, Enedis, etc.); and, lastly, accredited environmental protection non-profits (France Nature Environnement, Friends of the Earth, WWF France, Respire) and consumer protection non-profits along with well-known figures and non-profits with relevant expertise, such as representatives from the medical or research world.

The greater Paris region is home to over 10 million people, highly built up and with heavy road traffic, such that it is deeply affected by air pollution issues. Airparif acts in a variety of ways to ensure that “everybody has the right to breathe air that does not harm health,” as enshrined in the Law on Air and Rational Energy Use (LAREU).<sup>3</sup> First of all, Airparif monitors pollution across the metropolitan area on a daily basis. With a full suite of technical tools (71 monitoring stations, modeling tools, measurement campaigns and an emissions inventory), 65 staff members and an annual budget of €8.5 million in 2016, Airparif records and maps 6 million locations across the region every hour. Our modeling work plays a determining role.

Modeling is used:

- as a decision-support tool for forecasters;
- to assess the impact of measures taken or planned by regional authorities;
- to provide content for daily updates;
- each year to calculate the size of the territory and the number of people exposed to levels above legal thresholds;
- for apps such as Itiner'air<sup>4</sup> used by walkers and cyclists to choose routes less exposed to pollution.

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## How is Airparif involved with indoor air quality?

K. L.: In terms of indoor air quality, actions run by Airparif tend to be *ad hoc* and specific, complementary to actions run by other stakeholders such as consultancies and specialist observatories such as the Observatory for Indoor Air Quality. This might also take the form of working with a region, administrative department or public body that has collected air quality data within a certain context and is looking for the expertise needed to validate and interpret the data it has gathered. Airparif analyzes different contexts, takes additional air quality measurements and uses them to provide an objective framework for the data presented initially. In order to warrant accuracy of the measurements made and to respond to demands from residents and local authorities, Airparif is engaged in a quality management process that led to an ISO 9001 certification and an ISO/IEC 17025 Laboratory Accreditation. Its role as a trusted third party is part of its DNA.

Airparif also works with the Ministry of the Environment to help draft standardized national protocols for air quality inspections and data analysis, to be adopted by all France's accredited air quality monitoring non-profits.

## Have you seen a change in people's attitudes towards air quality?

K. L.: Climate change has been on center stage for many years. More recently, air pollution has emerged as the biggest environmental concern among the general public

due to its impacts on health, the economy and the environment. Atmospheric pollution and the climate crisis are two sides of the same problem, leading to especially severe consequences in cities such as Beijing, Buenos Aires, Hanoi and Teheran. Airparif has entered into cooperation agreements with these cities, whose attractiveness is majorly impacted by poor air quality. The cardiovascular, respiratory and cerebral health impacts of this form of pollution have been well documented for years and can no longer be ignored. All these elements converge, leading many actors to adopt a position on this issue: improving air quality has become a major concern for international institutions such as the WHO, OECD and UNICEF. Major NGOs like Greenpeace are also raising public awareness of the issue. The same applies to national governments: the USA, for instance, has fitted sensors to monitor air quality in its embassies and consulates in a number of countries, the idea being that they can then inform their expatriates. Even space agencies are getting involved by measuring atmospheric pollution and supplying satellite data.

<sup>2</sup> General tax on polluting activities.

<sup>3</sup> This framework law enacted on December 30, 1996 aims to rationalize energy use and define a public policy incorporating air quality into urban development. Everybody has the right to breathe air that does not harm health. It is codified in the French Environmental Code.

<sup>4</sup> <https://www.airparif.asso.fr/actualite/detail/id/175> (in French)



Air quality training workshops for high school students

Despite this, much progress remains to be made. If we look at the French situation, the Report on Public Policies for the Prevention of Air Pollution<sup>5</sup> published in January 2016 by the Cour des Comptes [National Audit Court] noted the lack of a coherent national policy, with layers of uncoordinated actions accompanying the application of various EU directives. The report identifies inconsistencies between budgets, available actions, visibility, strategies, and so on. For instance, the government encourages the use of diesel fuel and wood-fired heating despite the known harm they cause. The situation is the same at the local level: air quality in the Paris region is getting better but too many people are still regularly exposed to levels of pollution that exceed WHO recommendations.

Indoor air pollution is an often-forgotten issue in the field of air quality: the public continues to believe that we are protected from pollution if we stay inside buildings, despite the fact that indoor air can be even more polluted than outside air. It's a matter of simple logic: on top of outdoor pollution, we add the pollution emitted by maintenance products, construction materials, different coverings and coatings, as well as that emitted by heating systems and lifestyles. This same sense of secondary importance is clear in public policies: budgets for monitoring indoor air quality are decreasing, both locally and nationally.

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## What are the impacts and issues raised by new technologies, particularly microsensors?

K. L.: Air is an emerging market with a worldwide scope, which is attracting a lot of investment from a number of economic actors. This trend is underpinned by the fact that the growth of environmental technologies, digital convergence, the rise of connected objects and the number of French actors highly engaged in these fields are generating new opportunities for monitoring and improving air. The biggest challenge with new technologies and microsensors is that data quality remains very uneven and that these solutions are not suitable for all types of uses.

Airparif has responded by creating a Lab<sup>6</sup> of which Veolia is one of the founding partners. AIRLAB is a platform that promotes open and collaborative innovation among an ecosystem of businesses, research institutes, and local and national authorities<sup>7</sup>. AIRLAB seeks to foster innovation and assess the impact of new solutions that may be rolled out in the near future on air quality. The platform adopts a highly original approach, centering on project assessments, which are required to demonstrate that they reduce pollution and protect the climate. To achieve this, Airparif provides its technical expertise and its monitoring tools. AIRLAB fosters the development, experimentation and evaluation of air quality solutions in the Paris region. Its mission also involves encouraging the diffusion of expertise nationally and internationally in the fields of city logistics, air quality in buildings, street furniture, heating, public information, mobility and citizen engagement with the issue of air quality. For indoor air quality, AIRLAB is host to a project developed by Veolia and Icade, exploring the use of microsensors to measure air quality and promote good practices and new solutions: ventilation, indoor air recycling, relative humidity management, measures of CO<sub>2</sub>, particulates and volatile organic compounds.

Airparif has also recently launched its second microsensors Challenge, "AIRLAB Micro-Capteurs 2019"<sup>8</sup> an event run in partnership with a number of French and international partners including the French Development Agency (AFD), the French development aid agency, the Swiss Federal Materials Testing and Research Laboratory and the World Meteorological Organization. The Challenge serves a twofold purpose because it makes it possible to:

- 1/ compare different air quality sensors in order to give potential users independent information about whether the product

<sup>6</sup> <http://www.airlab.solutions/en/discover>

<sup>7</sup> Ile-de-France Mobilités, Paris city council, Grand Paris Métropole, the regional prefecture, Ile-de-France Mobilités, SNCF Logistics, Air Liquide, Icade, Citelum (EDF Group), Engie France networks and Veolia.

<sup>8</sup> <https://www.airparif.fr/actualite/detail/id/261> (in French)

<sup>5</sup> <https://www.ccomptes.fr/en/publications/public-policies-prevention-air-pollution>



Experiments with microsensors as part of the AIRLAB microsensors 2018 Challenge

is suitable for their intended use (outdoor air, indoor air, transportation, etc.);

2/ highlight the qualities of these devices and suggest areas for improvement in order to stimulate innovation as well as disruptive technologies in this field and help grow the market.

The Challenge also gives project developers and companies a chance to position themselves against the competition. Airparif tries to assess the efficiency of microsensors in a number of ways that relate to how the device operates and to its data acquisition modes: all in all, sensors are assessed according to 46 separate parameters.

Microsensors offer real advantages and opportunities – they are tools that can be used to raise public awareness and trigger behavioral change. In 2018, over 800 high school students from 23 schools in the Paris region worked on air quality as part of a program called “Taking Hold of Our Air”,<sup>9</sup> during the course of which they were provided with sensors and an educational pack.

For outdoor air, especially when on the move, questions remain regarding the extent to which these microsensors can be used to supplement official measurement systems. This is due to the fluctuating reliability of measurements from device to device and over time, as well as the way in which they react to different pollutants depending on the components being measured and variations in temperature and humidity. Other important challenges include data processing, sensor calibration and the development of data correction algorithms to allow for margins of error in measurement. Other unknowns and things to watch out for are sensor lifespan (12 to 18 months on average, sometimes less depending on the conditions they are used in) and the energy needed to process and store the data gathered (which has to be evaluated in light of the sensor’s environmental performance). Reliability, accuracy, ease of use, cost, etc., are all parameters that Airparif aims to evaluate so we can provide information that is as accurate as possible and make recommendations tailored to the user’s specific requirements, uses, resources and characteristics.

<sup>9</sup> <http://www.drie.ile-de-france.developpement-durable.gouv.fr/lyceens-collegiens-prenons-notre-air-en-main-r1538.html> (in French)