

Heathrow Airport: Redefining Sustainable Aviation Infrastructure through Oizom Air Quality Monitoring Solutions



INTRODUCTION

Heathrow Airport, one of the world's busiest international airports, handles continuous aircraft, ground support, and landside vehicle activity, all of which contribute to the local air quality footprint of the airport and its surroundings.

As part of its environmental and sustainability goals, the airport launched a long-term ambient air quality monitoring project covering particulate matter (PM), nitrogen dioxide (NO₂), and total volatile organic compounds (TVOCs).

A sudden spike in NO₂ concentration underscored the need for a dedicated monitoring network to trace pollutant sources and provide a continuous, long-term baseline.

To meet this need, two customized Oizom ambient air quality monitors were deployed across the airport, operating entirely on solar power and streaming data to the Envizom platform, where custom alert thresholds notify the team in real time when pollutant concentrations exceed predefined limits.



02 Monitoring Stations
Deployed

05 Parameters
Per Station

24/7 Real-time Data
To Envizom

THE CHALLENGE

Airports are among the most complex air quality environments to characterize. Pollutant concentrations can vary sharply between locations only a few hundred meters apart and can rise and fall within a single operational peak.

Heathrow's situation added two specific dimensions to this general challenge:

- Sudden NO₂ spike with no internal data to interpret it. Regional and reference data confirmed what is broadly known: NO₂ levels near major airports are high, but they could not explain a sudden, localized increase or identify which on-site source was driving it. Without its own monitoring network, the team had little to no knowledge to localize, time-stamp, or attribute the event.
- Expansion works underway. With construction activity in progress, the monitoring network was needed to assess air quality in the areas most likely to be affected, ensure ongoing compliance with applicable air quality limits, and enable early identification of potential exceedances before they became compliance issues.

The project therefore required a monitoring approach that could:

- Deliver long-term, continuous measurements of PM, NO₂, and TVOC at fixed locations to build a reliable multi-season baseline rather than relying on snapshot surveys.
- Provide source-relevant siting, with monitors positioned around key emission sources and sensitive receptors so that concentration changes could be traced back to likely origins.
- Operate autonomously and off-grid, without dependence on mains power or frequent site visits, across a large and operationally restricted site.
- Support real-time alerting, so that exceedances of predefined thresholds trigger immediate notifications rather than being discovered in retrospective reports.
- Remain maintainable in the field, since removing devices from an active airport environment for servicing or upgrades is logistically difficult.

WHY OIZOM DEVICES

Heathrow Airport deployed 2 Custom-Configured devices, selected because their configuration matched the airport's target parameters for particulate matter, NO₂, and TVOC, while providing the flexibility and autonomy the site demanded.

The decision was driven by:

- **Multi-parameter monitoring in a single station:** Each device measures particulate matter, NO₂, and TVOC together, avoiding the cost, footprint, and integration complexity of running separate instruments for each pollutant; a meaningful advantage on a site where every installation location requires operational clearance.
- **Field-serviceable, modular sensors:** The device's sensor modules can be replaced on-site quickly, without specialist intervention or weeks of downtime. For a long-term monitoring program, this maintains data continuity through routine sensor life-cycle replacements.
- **Expandability without removal:** Additional external sensors can be integrated into the deployed unit in the field without requiring the device to be shipped. As the airport's monitoring requirements evolve, the network can expand its capabilities at its existing locations.

- **100% solar-powered operation:** The monitors run entirely on solar energy, eliminating the need for trenching, mains connections, or generator support; a practical necessity on airside and construction-adjacent locations, and a direct fit with the sustainability objectives driving the project.
- **Envizom with custom alerting:** Data streams to the data visualization platform, Envizom, where custom alert thresholds were configured for key parameters. The team receives real-time notifications whenever pollutant concentrations exceed predefined limits, enabling a prompt response where required.

THE DEPLOYMENT

Monitoring locations were strategically selected based on key emission sources and the proximity of sensitive receptors. Because airport expansion works were underway at the time of deployment, the network was explicitly designed to assess air quality in the areas most likely to be affected by those works, ensuring compliance with applicable air quality limits and enabling early identification of potential exceedances.

Both customized devices operate entirely on solar power and continuously transmit data to Envizom, where the team monitors current and historical concentrations. Custom thresholds on key parameters generate real-time alerts, and the team conducts weekly checks of the data, alerts, and reports to verify that the network remains accurate and suitable for continuous air quality monitoring.

CATEGORY	PARAMETERS MEASURED
Particulate matter	PM ₁ , PM _{2.5} , PM ₁₀ , PM ₁₀₀
Gases	NO ₂
Volatile Organics	TVOC



INSTALLATION DETAILS
2 Units of Oizom Air Quality Monitors

RESULTS

The monitors have demonstrated reliable and consistent performance since deployment. Weekly data, alert, and report reviews have confirmed that measurements remain accurate and dependable for continuous, long-term air quality monitoring.

Beyond validating what was already suspected about NO₂ levels, the network has begun producing operationally actionable findings. The monitoring identified short-term increases in particulate matter and gaseous pollutants during peak operational periods, patterns that would not have been visible in averaged or off-site data, and these have since been addressed.

KEY OUTCOMES

A Continuous, Site-Specific Air Quality Baseline

- Long-term, uninterrupted measurement of PM, NO₂, and TVOC at locations chosen around actual emission sources.
- A growing historical record against which future changes, including those associated with expansion works, can be objectively assessed.

From Data to Mitigation

- Monitoring data have been used to identify areas requiring operational improvements and to support informed decision-making on reducing pollutant exposure, where necessary.
- Short-term increases in pollutants detected during peak operational periods were investigated and addressed.

Real-Time Exceedance Awareness

- Custom alert thresholds configured in Envizom deliver immediate notifications when concentrations exceed predefined limits.
- Early identification of potential exceedances supports continued compliance with the applicable air quality limits during expansion activity.

Autonomous, Sustainable Operation

- Fully solar-powered monitors operate unattended, with no dependence on mains power, consistent with the sustainability goals that motivated the project.
- Field-replaceable sensors and in-situ expandability keep the network maintainable and future-ready without removing devices from site.

IMPACT

For a team that previously had little direct visibility into its own air quality, the deployment has changed the fundamentals: unexplained emission spikes are no longer unanswerable events, but something the network can localize, time-stamp, and place in context alongside PM and TVOC behavior across the site.

By combining source-oriented siting, multi-parameter solar-powered monitors, and real-time alerting through Envizom, Heathrow Airport has established a long-term monitoring capability that supports compliance during expansion, informs targeted mitigation, and turns air quality from an external unknown into a continuously measured input for decision-making at one of the world's most important airports.

Oizom specializes in real-time environmental monitoring solutions designed to help organizations measure, manage, and improve environmental performance. Our comprehensive portfolio includes air quality, weather, noise, and emission monitoring systems, powered by advanced sensor technology and cloud-based analytics. Trusted across industries, governments, and smart city initiatives, Oizom's solutions enable continuous monitoring, regulatory compliance, and actionable environmental intelligence.