

# Strengthening Port Sustainability using Polludrone's Data-Driven Monitoring: Bintulu Port, Malaysia



## INTRODUCTION

At a busy port, the air never sits still. Ships, cargo handling, and nearby industry all release emissions at the same time, and the coastal weather keeps moving them around.

For Bintulu Port in Sarawak, pollution was hard to pin down: easy to notice but difficult to measure or trace to a source. Oizom deployed a Custom-Configured Polludrone Air Quality Monitoring Station to address that, tracking both pollutants and weather in real time and sending the data directly to the Envizom platform for visualization.



**06** Polludrone Stations  
Deployed

**10+** Parameters  
Per Station

**24/7** Real-time Data  
To Envizom

## THE CHALLENGE

With periodic monitoring, Bintulu Port lacked data visibility, and when continuous monitoring was required, it didn't produce data reliable enough to withstand a compliance audit. The shifting weather that made measurement difficult also posed real operational risks, and unmonitored gaseous pollutants caused environmental corrosion at the port, affecting containers and vessels and gradually degrading metallic materials.

To deal with this, the port needed a system that could:

- Link pollution levels to port activity, so spikes during peak vessel movement and cargo handling could be spotted as they happened.
- Track wind speed and direction to follow the paths pollutants take across the port.
- Measure several pollutants and weather parameters at a single station, keeping the setup simple, and mitigate corrosion damage.
- Produce reliable, auditable data to back up environmental reporting and compliance.
- Combine live wind and rain data with predictive analytics to provide early warning and enable preventive action during severe conditions.

## WHY OIZOM POLLUDRONE

Monitoring at a coastal industrial site comes with specific demands: a setup matched to multiple emission sources, sensors that stay accurate in heat and humidity, hardware that survives a marine climate, and data that all lands in one trusted place. Oizom's Polludrone was chosen because it covers each of these in a single unit.

- **Multiple parameters measured in one station**, covering particulates, gases, and weather, without needing separate instruments.
- **Withstands a complex industrial setup**, with sensors chosen to handle the overlapping emission sources of a working port.
- **Accurate, reliable measurement**, holding data quality steady across pollutants and weather parameters.
- **Proven durability in coastal, humid conditions**, built to keep working through tropical weather and humid air.
- **Built-in Envizom integration**, giving live monitoring, clear visuals, and historical trends from one platform.

## THE DEPLOYMENT

Six Custom-Configured Polludrone stations were installed at Bintulu Port to study how pollution behaves across the port and how it varies with vessel activity and weather conditions. The station continuously samples the air around it and automatically sends the readings to Oizom's AI-powered platform, Envizom, for real-time collection, visualization, and analysis.

This moved the port from a patchy, occasional approach to a single, data-driven way of managing its environment.

The station measures a range of pollutants and weather parameters:

| CATEGORY           | PARAMETERS MEASURED                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Particulate matter | PM (particulate matter)                                                                                                                                                         |
| Gases              | SO <sub>2</sub> (sulfur dioxide), NO <sub>2</sub> (nitrogen dioxide), CO (carbon monoxide), NH <sub>3</sub> (ammonia), CO <sub>2</sub> (carbon dioxide), O <sub>3</sub> (ozone) |
| Meteorology        | THP (temperature, humidity, pressure), wind speed, direction, and rainfall                                                                                                      |



## RESULTS

The deployment changed how Bintulu Port understood, managed, and reported its environmental performance. With reliable, location-specific data on hand, the port could sharpen its operational planning while strengthening compliance and its wider commitment to responsible operations.

### KEY OUTCOMES

#### Better Regulatory Readiness

- Reliable, auditable data to support environmental reporting and compliance audits.
- A consistent record to demonstrate environmental responsibility.

#### Sharper Operational Insight

- Air quality and weather data used to adjust port operations and scheduling during high-risk pollution and extreme-weather periods.
- Clearer reading of complex air-quality data through Envizom's visuals.

#### Disaster Preparedness & Early Warning

- Live wind and rain data combined with predictive analytics to enable preventive action.
- Less disruption and better safety for workers and cargo in severe conditions.

#### Stronger ESG Performance

- Improved sustainability credentials and greater stakeholder confidence.
- A move from guesswork to measurable, data-backed environmental intelligence.

## IMPACT

With this system in place, Bintulu Port moved from limited visibility to air quality data it could act on. The deployment supports compliance and day-to-day efficiency while reinforcing the port's commitment to responsible, data-driven management, disaster preparedness, and early warning.

Beyond the immediate gains, it laid a foundation for long-term planning, linking port activity to weather conditions to assess cumulative impacts, plan mitigation measures, and keep daily operations aligned with broader sustainability goals.

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.