AOCEMS

AFRICA ONLINE CONTINUOUS EMISSION MONITORING SYSTEM

aocems
Ensuring ecofriendly communities

INTRODUCTION

OVERVIEW

Africa's rapid industrialization is essential for economic transformation, job creation, and urban development. However, this progress is increasingly challenged by escalating pollution levels across key sectors. In response, various countries are investing in emissions monitoring systems, including online continuous emission monitoring solutions, to align development goals with environmental sustainability.

As a background overview, industrial activity is responsible for approximately 23% of Africa's total greenhouse gas (GHG) emissions, according to the African Development Bank (AfDB, 2022). While Africa contributes less than 4% of global GHG emissions (UNEP, 2023), localized environmental impacts are severe. Urban centers like Lagos, Cairo, and Johannesburg report air pollution levels 5 to 7 times higher than WHO-recommended limits. Major polluters include the mining, oil and gas, cement, textile, and chemical industries, which release high levels of particulate matter (PM2.5), sulfur dioxide (SO_2), and nitrogen oxides (NOX).

OUR OBJECTIVES

The Africa Online Continuous Emission Monitoring System (AOCEMS) establishes an integrated framework for continuous industrial emission surveillance. The system enforces regulatory compliance with environmental statutes while driving measurable reductions in harmful outputs.

Through transparent data sharing, the initiative promotes accountability across all industrial sectors(inland & offshore) and supports Africa's transition toward cleaner production methods.

QUICK READ

Industrial pollution in Africa is rising fast.Industries like mining, cement, and oil & gas account for 23% of the continent's emissions (AfDB, 2022).

Major African cities face air pollution levels 5–7 times higher than WHO limits. As urbanization accelerates, emissions monitoring and greener practices are urgently needed.

AOCEMS provides real-time emission monitoring across all sectors, enforcing compliance and driving Africa's transition to cleaner industries.

In 2022, Africa emitted 1.42 billion metric tons of CO_2 . with significant emissions from ocean -going vessels

Manufacturing alone contributed 30-40%—about 440 million metric tons. Without action, this could rise to 830 million metric tons by 2050.

HOW EMISSIONS AFFECT US

Greenhouse Gas Emissions

CO2, NOx, and SOx emissions significantly contribute to global warming, necessitating urgent mitigation measures to align with international climate targets.

Air Quality Degradation

Emissions from industrial activities degrade air quality, leading to respiratory issues, environmental degradation, and adverse effects on marine and terrestrial ecosystems.

Excessive Heating

Heightened inudstrial emissions contribute to urban heat islands, exacerbating local temperatures, and impacting worker health and equipment efficiency.

Flooding

Rising sea levels and increased rainfall lead to frequent and severe flooding in coastal areas, disrupting port operations and local communities.

EMISSION SOURCES & TYPES

Industrial Clusters: Cement plants emit over 50,000 tons of CO_2 annually, while oil refineries release harmful SOx and NOx gases into the atmosphere.

Chemical Manufacturing: Pharmaceutical and chemical factories discharge toxic effluents containing heavy metals into waterways, contaminating vital water sources.

Port Operations: Cargo handling equipment and docked ships running auxiliary engines emit particulate matter (PM2.5/PM10) and greenhouse gases.

Ship Effluents: Vessels discharge oil-contaminated bilge water and sewage, introducing hydrocarbons and pathogens into marine ecosystems.

Construction Sector: Building sites and material production generate dangerous airborne dust particles (PM2.5/PM10) from cement and demolition activities.

Mining Operations: Mineral extraction releases silica dust and heavy metals like lead and mercury into both air and surrounding soil.

Hospitality Industry: Hotels and resorts contribute through energy-intensive operations emitting CO_2 and improper waste management releasing methane.

> ... countries' actual emissions have to be monitored and precise records have to be kept of the trades carried out.
>
> **KYOTO PROTOCOL**

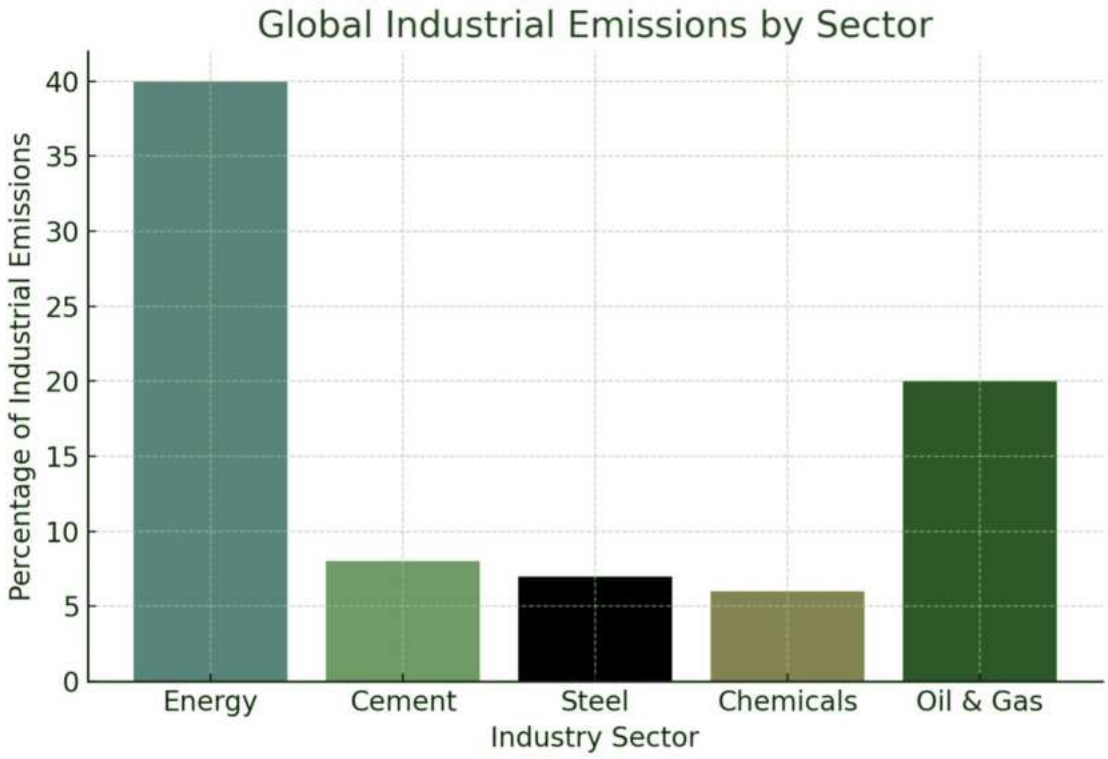
THE PRESSING NEED

Global emissions continue climbing – the first critical step to solving this crisis is implementing robust monitoring systems.

We cannot fix what we fail to measure.

GLOBAL INDUSTRIAL EMISSIONS BY SECTOR

Industrial emissions are released from energy production, manufacturing, chemical processes, and other industrial activities. Major pollutants include carbon dioxide (CO_2), methane (CH_4), sulfur dioxide (SO_2), and nitrogen oxides (NOx), which contribute to climate change and air pollution. To mitigate their impact there is a need for the development and implementation of a real-time emissions monitoring platform.



HOW OTHER COUNTRIES ARE MITIGATING THIS NEED

Nations are cutting emissions through real-time monitoring sensors, AI-driven analytics, and strict regulatory frameworks. Leading solutions include transparent public data sharing and predictive pollution controls. These model countries implement enforcement mechanisms and fines to sail these platforms. These are key models for an ideal emissions monitoring platform for Kenya. Below are descriptions of such implementations.

Country	National Monitoring System
China	Continuous Emissions Monitoring System (CEMS)
United States	EPA Air Quality System (AQS)
European Union	EU Emissions Trading System (ETS)
India	Central Pollution Control Board (CPCB)
South Korea	Smart Monitoring System for Industrial Emissions

Country	Monitoring Platform	Functionality	Fine for Excess Emissions
China	CEMS	Real-time industry tracking, government enforcement	$10 per ton CO_2 for non-compliance
United States	AQS	Industrial self-reporting with verification	$50 per excess ton CO_2
European Union	ETS	Cap-and-trade system for emissions control	$100 per excess ton CO_2
India	CPCB	Sensor-based real-time monitoring	$20 per excess ton CO_2
South Korea	Smart Monitoring System	AI-based compliance tracking	$30 per excess ton CO_2

The Call To Reduce Emissions

KYOTO PROTOCOL & PARIS AGREEMENT

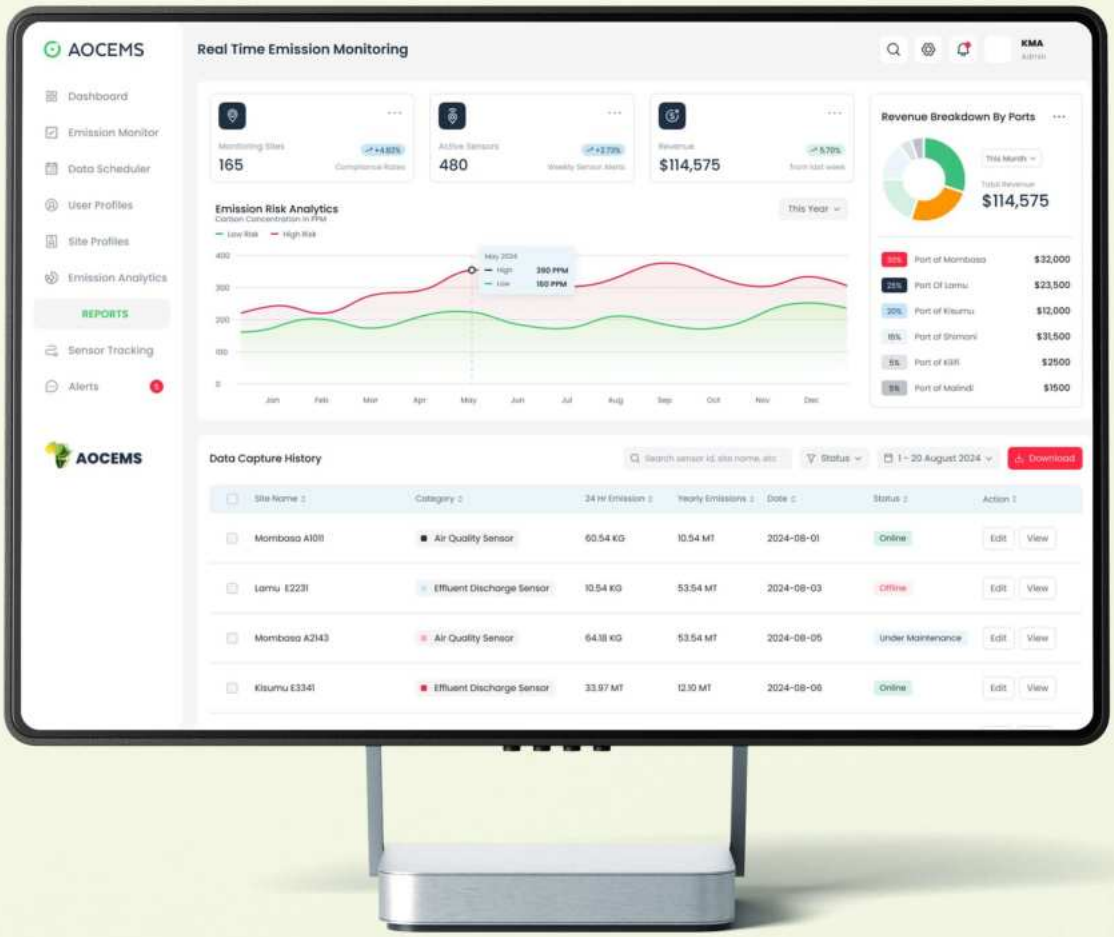
The Kyoto Protocol placed binding emission reduction targets on developed nations but encouraged African countries to adopt Clean Development Mechanisms (CDMs) to attract green investment and promote emission-reducing projects.

The Paris Agreement calls on all countries, including those in Africa, to submit Nationally Determined Contributions (NDCs), outlining plans to reduce emissions and build climate resilience. It emphasizes transparency and monitoring, urging the use of emission tracking systems to ensure accountability and progress.

Our Solution Analyzes Emission Parameters Based On Global Standards

WE HAVE
A SOLUTION
THAT IS ALIGNED TO

GLOBAL SDG AND LOCAL ENVIRONMENTAL GOALS



AOCEMS

AFRICA ONLINE CONTINUOUS EMISSION MONITORING SYSTEM

AOCEMS is a scalable solution dedicated to addressing the pressing issue of climate change through continuous real-time industrial emission monitoring across various African countries.

Our solution integrates advanced technologies (IOT & AI) to monitor and manage emissions from regulated industries covering inland and offshore facilities.

AOCEMS aligns with international climate change regulations and various national environmental policies to mitigate environmental impacts and promote sustainable industrial practices.

Our goal is to ensure African countries check compliance based on accurate emissions data from the various industries thereby staging a proactive step at climate protection while establishing an appropriate data threshhold for carbon registry and trading activities.

HOW AOCEMS WORKS

01 Sensor Installation Module

- Install approved and certified emission sensors at regulated industry sites. (These sensors will be made available by UPS)
- Monitor and maintain the sensors while ensuring that data is continuously transmitted to the National EPA Data Acquisition System at established control centres.

02 Data Aggregation Module

- Data from sensors is collected and processed using Artificial Intelligence(AI), IOT Technology and Environmental Data Analytics(EDA) in real-time with end-to-end encryption.

03 Application Module

- Processed data from the Data Aggregation Module is routed through AOCEMS and made accessible by the national regulators (Control centre dashboards) as well individual firms (where sensors are installed)
- Analytical forms, reports, and graphs are generated at this end in compliance with local policies and international emission regulations and protocol

AOOCEMS | SYSTEM DESIGN

DATA CAPTURE SITE

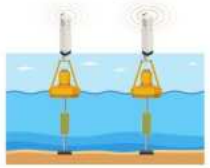
AOCEMS Captures data from air, water, noise sensors installed at various monitoring points at varying industry sites (Mining, manufacturing, chemical, hospitality, etc)

Data Acquisition Cloud Servers

Web App API, Database Servers

CONTROL ROOM

With analytical dashboards presenting **real-time views, reports on emission data and administration panels**

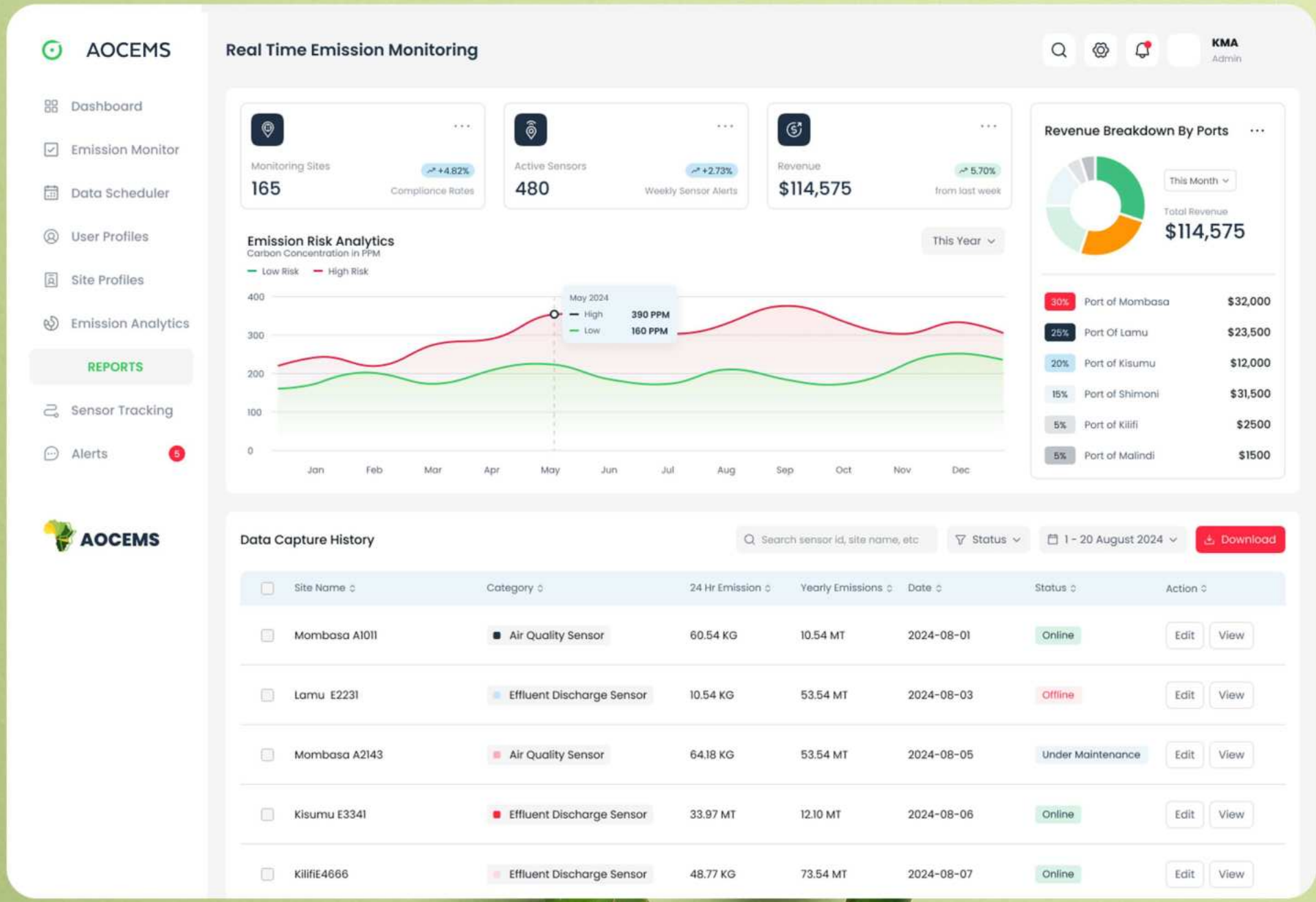


DATA CAPTURE SITE

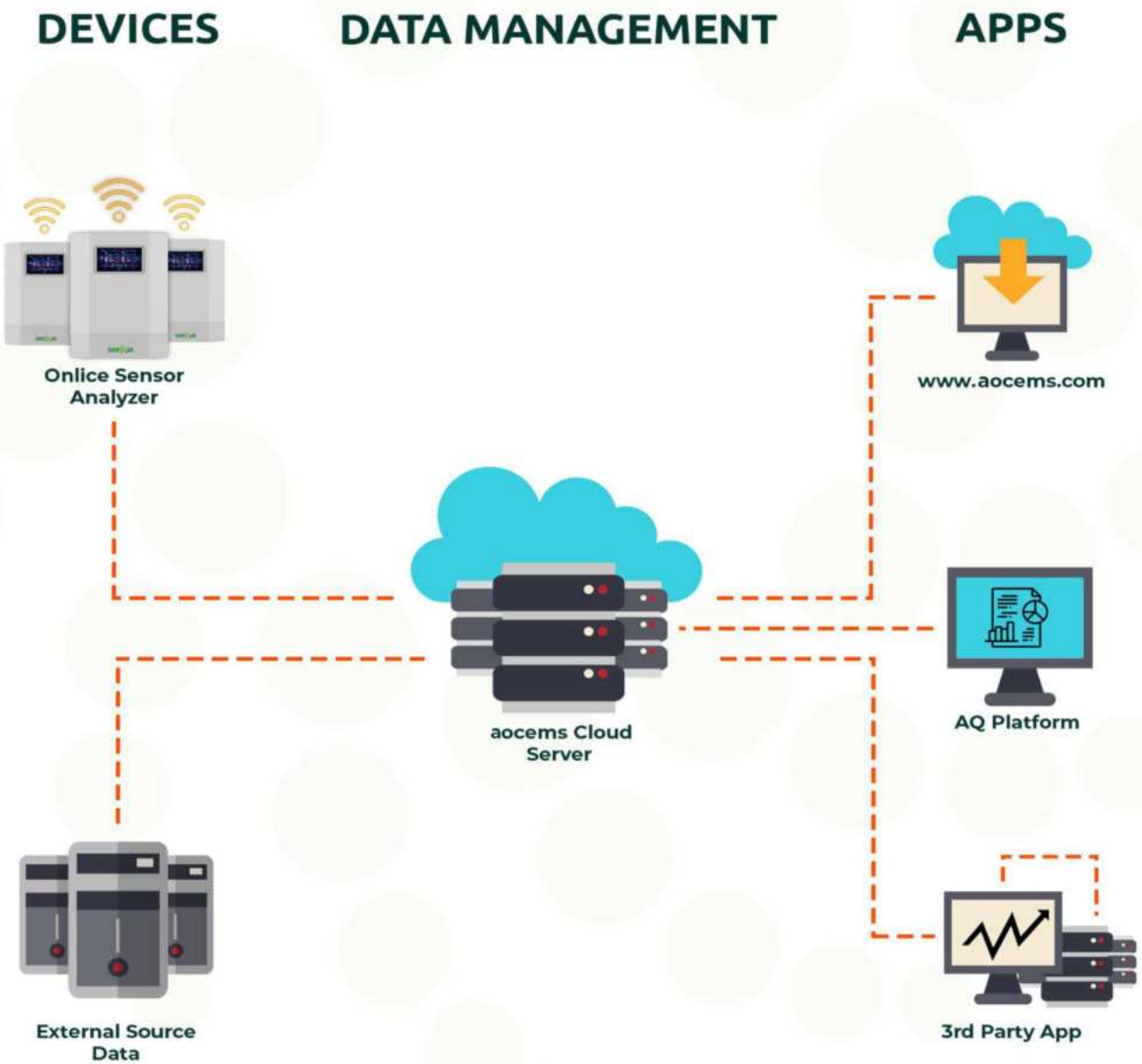
AOCEMS Captures data from ambient air quality sensors ,point source sensors and offshore ocean monitoring sensors installed at various points across the Nations' **PORTS (Onshore & offshore)**

APIs from other emission analyzers

AOCEMS - Dashboard



Data Architecture



USE CASES & PARAMETERS MONITORED BY AOCEMS

INDUSTRIAL USE CASES

AOCEMS is developed to apply to various entities involved in active emissions and hence required to perform emission monitoring. These include industrial brands such as **FMCG companies, chemical plants, pharmaceutical companies, manufacturers, factories, construction sites, mining sites, and waste management facilities**. Additionally, commercial entities like hotels, restaurants, commercial plazas and institutions.

AOCEOMS implementation in partner countries proposes to cover industrial activities within both ONSHORE and OFFSHORE facilities.

EMISSION TYPES AND PARAMETERS MONITORED

AIR EMISSIONS

For air emissions, parameters such as **SOX, NOX, PM2.5, PM10, VOCs, wind direction, methane, and odour** are monitored to evaluate air quality and atmospheric conditions.

EFFLUENT DISCHARGE/ WATER QUALITY

For water emissions, metrics include COD, BOD, TSS, pH, which help assess the chemical and physical health of water bodies.

NOISE LEVEL MONITORING

Noise emissions are primarily measured through parameters that capture sound and overall noise levels, ensuring adherence to permissible sound thresholds according to NEMA directives.

AOCEMS is designed to cover point source emissions, including emissions from industrial stacks, ensuring continuous and accurate monitoring of major pollution sources.

BENEFITS OF AOCEMS TO NATIONAL REGULATORS

01 Continuous Real Time Monitoring

02 Cost Efficient Emission Assessment and Analysis, ensuring accurate data for compliance checking

03 Avoid Emission related disasters and improve on climate sustainability

04 Accurate reporting, scalable metrics in case of updated regulations

05 Revenue Mobilization : From non-compliant firms through fines and defined penalties

BENEFITS OF AOCEMS TO INDUSTRIES

01 Real-Time Environmental Impact Assessment On Emissions Within Industries

02 Reduce exposure levels and improve worker/community health and safety.

03 General Improvement of Air, Water and Land Quality Standards.

04 Improve Reputation and Brand Value.

05 Improve Operational Efficiency and provide a platform for measuring sustainability efforts

Ensuring Ecofriendly Communities With IOT Based and AI-Driven Solutions For Efficient Emissions Monitoring

ROBUST & SCALABLE EMISSIONS MONITORING SOLUTION

Ambient Air Quality Monitoring Sensors

In-land Water Quality Monitoring Sensors

DELIVERABLES BY UPS FOR IMPLEMENTING AOCEMS

1. SENSOR INSTALLATION

Install sensors and devices across all regulated industries and Maritime infrastructure(both onshore and offshore); within the partner country for comprehensive emission monitoring

2. DRONES FOR ENHANCED EMISSION MONITORING DETECTION

Utilize drones at all seaports for real-time emission monitoring and data collection

3. ONSITE COMMAND CENTRES

Set up Command Centre at major ports and selected location within partner country (EPA regional headquarters prefered) to manage and process emission data.

4. NATIONAL CONTROL ROOM

Establish a centralized control room for the national regulator to monitor and manage emissions across all regulated sites and performance compliance checking and predictive analysis.

How UPS Seeks To Work With Partner Countries

A PUBLIC PRIVATE PARTNERSHIP AT ZERO COST TO THE PARTNERING COUNTRY

UPS will implement the Africa Online Continuous Emission Monitoring System (KOCEMS) through a PPP, covering all costs with zero government investment.

The PPP allows UPS to recover expenses through service fees while sharing revenue with partner countries at agreed percentages.

This model delivers advanced emissions monitoring at no upfront cost, generating shared revenue and supporting africa and global environmental/ climate protection goals.

UPS™
United Platform Solutions

ABOUT UPS

United Platform Solutions (UPS) is a company based out of Dubai, UAE it leads the way as a sustainable and green technology company through digital solutions and next-generation automation by following a corporate sustainability strategy with the goal of decarbonization at its core.

United Platform Solutions is an organization that has been firmly focused on executing climate sustainability initiatives across Africa.

Testament to this is the African Online Continuous Emission Monitoring System (AOCEMS). With a presence in Ghana and the Democratic Republic of Congo, AOCEMS has been instrumental in managing industrial emissions across Africa, contributing significantly to emission reduction efforts and sustainable development in the region.

GALLERY OF OPERATIONS

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