



Industrial Energy Management Solution for Enhanced Monitoring and Reporting

The scalable, SaaS-based energy management platform for industrial clients, integrates edge devices and cloud services to enable real-time consumption monitoring, anomaly detection, and streamlined environmental reporting.

Overview

QBurst developed a comprehensive, SaaS-based Industrial Energy Management Solution for a Swedish tech company, addressing critical energy optimization and sustainability challenges across multiple industrial domains.

- Delivered a real-time monitoring platform that seamlessly integrates with diverse edge devices and sensors (Raspberry Pi, etc.) using the MQTT protocol for machine-level data collection.
- Enabled proactive decision-making by providing real-time dashboards (React/HighCharts) and a customizable alert system built on AWS serverless technologies.
- Supported sustainability goals by providing environmental ratings (CO2 tracking) and empowering clients with centralized reporting and PowerBI integration for versatile data analysis.



Client Profile

A Sweden-based start-up specializing in smart energy management systems that help the industrial sector reduce and optimize energy usage.

Challenges: Data Silos and Delayed Insights

Industrial clients faced several obstacles in achieving true energy efficiency:

- **Lack of Real-Time Visibility:** Inability to monitor energy consumption at the individual machine level for quick decision-making.
- **Fragmented Data Collection:** Difficulty integrating diverse sensor types and edge devices to pull consistent, real-time data streams.
- **Slow Anomaly Detection:** Inefficient processes for identifying and responding to critical events or cost-prohibitive pricing spikes.

- **Complex Reporting:** Lack of a centralized, easily digestible view for internal reporting and tracking sustainability KPIs (like CO2 emissions).

QBurst Solution: IoT-to-Cloud Monitoring System

We developed a scalable energy monitoring and management system designed to visualize, track, and predict energy needs across various industrial settings. The architecture seamlessly flows data from the sensor floor to the cloud intelligence layer.

- **Edge Integration:** Raspberry Pi edge devices were deployed to connect various sensors (energy, water flow, temperature, humidity) and collect raw, real-time data.
- **Data Transport:** The Pi modules securely transmit sensor readings to a gateway, which then sends the data to the AWS cloud using the efficient MQTT (Message Queuing Telemetry Transport) protocol, ensuring minimal data loss.
- **Cloud Processing & Analysis:** AWS serverless technologies (Lambda) were used to transform raw data logs (stored in S3) into actionable insights. Customizable thresholds allow companies to set proactive alerts for critical events and pricing changes.
- **Visualization & Reporting:** A user-friendly React-based frontend utilizes HighCharts to display real-time energy monitoring dashboards, time-series data, and summary insights. AWS API Gateway was configured to integrate seamlessly with external visualization tools like PowerBI.
- **Admin & Customization:** A comprehensive admin portal and KPI customization features were included to streamline administrative tasks and enable targeted insights and environmental rating tracking.

Technical Highlights

The solution is built on a robust, serverless-friendly AWS ecosystem for scalability and cost-efficiency:

- **Real-time Data Ingestion:** Utilized MQTT for lightweight, reliable transmission of sensor data from edge devices (Raspberry Pi).
- **Serverless Backend:** Heavily leveraged AWS Lambda and AWS API Gateway to power the alert system, data transformation, and external visualization integrations.
- **Dynamic Visualization:** Frontend built with React and HighCharts to deliver flexible and responsive real-time energy monitoring dashboards.
- **Data Integrity:** Designed the system to collect sensor data with minimal to zero loss, ensuring reliable historical lookups and reporting accuracy.
- **Technologies Used:** Python/Django (Backend API), Postgres (AWS RDS), AWS S3, AWS SQS, AWS MQ, AWS ECR, AWS EC2, and AWS Load Balancing/Auto Scaling Groups for resilience.

Impact: Driving Operational & Sustainability Improvements

The implementation of the energy management solution resulted in measurable operational and sustainability improvements for the client's subscribers.

- **Enhanced Operational Efficiency:** Clients gained real-time monitoring and predictive analysis capabilities, leading to informed decision-making and resource optimization.
- **Cost Optimization:** Energy pricing alerts enabled consumption planning during cost-effective periods.
- **Proactive Maintenance:** Prompt responses to automatically detected anomalies minimized equipment downtime and maintenance costs.
- **Sustainability & Reporting:** The system provided environmental ratings (CO2 tracking) and streamlined reporting via centralized data download and PowerBI integration, supporting corporate commitment to a greener future.
- **Flexibility:** Multisensor compatibility and KPI customization ensured the solution was tailored to diverse industrial needs and use cases.