



Calcamite
SANITATION + WASTEWATER

CASE STUDY

4SIGHT AND CALCAMITE:
SCALING SUSTAINABILITY THROUGH
REMOTE EDGE-TO-CLOUD
DIGITISATION

Architecting a resilient, distributed wastewater management framework powered by Schneider Electric's EcoStruxure Automation Expert and the AVEVA Connect cloud platform.

EXECUTIVE SUMMARY

In a continent facing critical water shortages and widespread pollution from untreated wastewater, South African innovator **Calcamite** builds high-efficiency modular wastewater treatment plants. To scale their solution, they faced a critical challenge: how to remotely monitor, maintain, and prove the performance of hundreds of distributed assets.

4Sight, an Endorsed AVEVA Partner and Schneider Electric Alliance Partner, architected and delivered a robust Edge-to-Cloud solution. By standardising on Schneider Electric Edge controllers running **EcoStruxure Automation Expert (EAE)** and integrating them seamlessly with **AVEVA Connect** in the cloud, 4Sight gave Calcamite 100% visibility of its fleet.

By leveraging "Virtual Sensing" techniques, 4Sight has delivered high-end diagnostic capabilities, including flow estimation and performance control and monitoring, within a limited budget. This solution has differentiated Calcamite from its competitors, enabling a "Peace-of-Mind-as-a-Service" model, protecting public health, and creating a blueprint for a sustainable water economy across Africa.

The Partners

- **Calcamite:** The domain expert and innovator in modular, decentralized wastewater treatment plants.
- **4Sight:** The AVEVA Endorsed and Schneider Electric Alliance Partner who served as the solution architect, integrator, and project delivery expert.
- **Schneider Electric:** The technology provider for robust Edge hardware and the next-generation EcoStruxure Automation Expert (EAE) software platform.
- **AVEVA:** The technology provider for the open, scalable, and flexible cloud monitoring platform (AVEVA Connect).



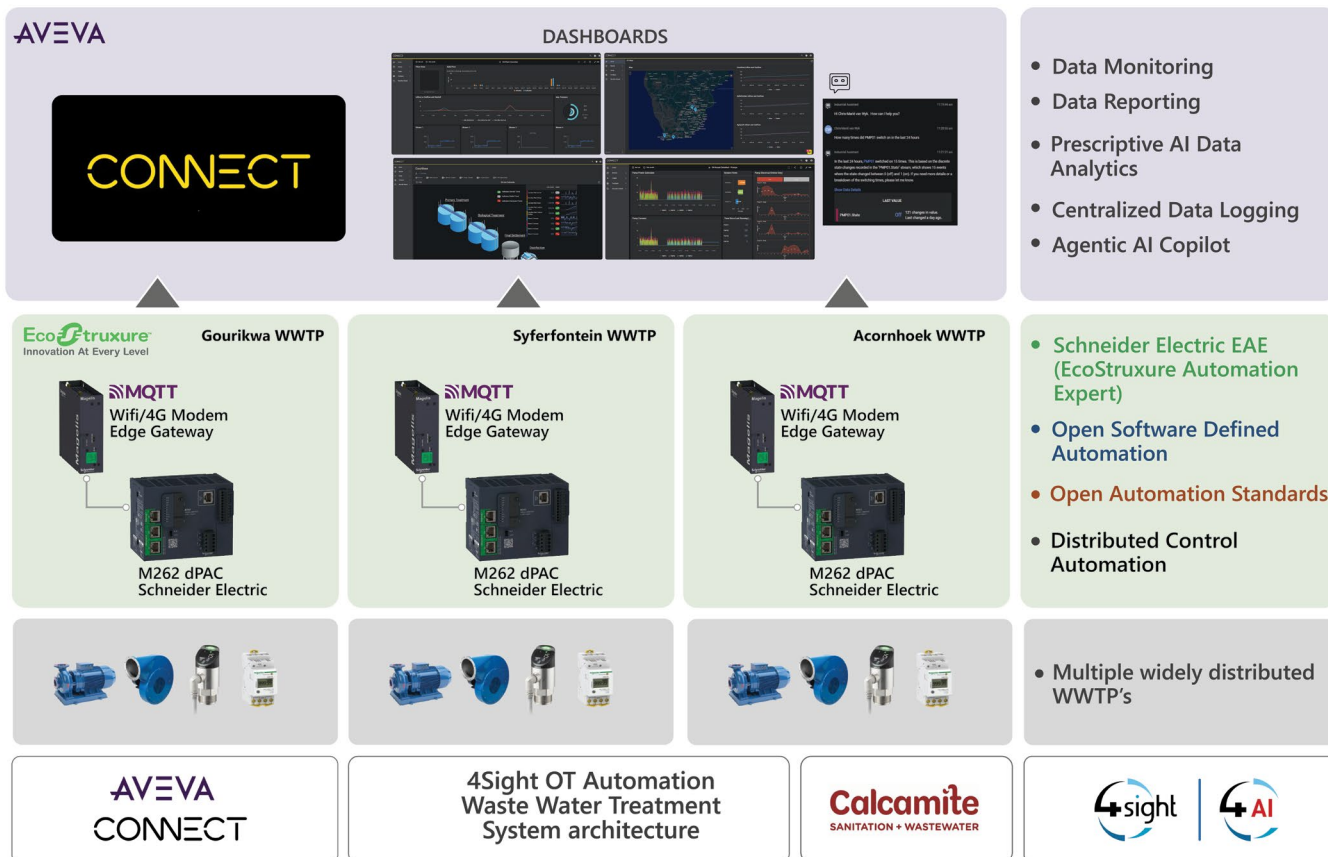
THE CHALLENGE: A TWO-FOLD WATER CRISIS

The case study addresses two core problems:

1. **An Environmental & Social Crisis:** In rural and developing areas, the lack of bulk wastewater infrastructure leads to raw sewage contaminating groundwater, spreading waterborne diseases.
2. **A Business & Operational Challenge:** Calcamite’s modular plants are the perfect solution, but they were “blind.” Operations were manual and reactive. They had no way to:
 - Confirm if remote plants were operational 24/7.
 - Monitor actual treatment flows to confirm if the plant is operated within nameplate capacity.
 - Confirm the operational status of critical electrical and mechanical components of the plant.
 - Move from costly, reactive maintenance (fixing breaks) to proactive, predictive maintenance (preventing them).
 - Offer a service-level agreement (SLA) to their clients.

THE SOLUTION: A SCALABLE EDGE-TO-CLOUD ARCHITECTURE

4Sight designed a standardized, secure, and scalable architecture to provide a single source of truth for Calcamite’s entire fleet.



The Edge (On-Site at each Plant)

- **Asset Management:** All equipment, sensors and actuators on the Calcamite plant are managed by logic controllers running EcoStruxure Automation Expert (EAE).
- **Software-Centric Control:** The IEC 61499-based EAE platform provides hardware decoupling, allowing 4Sight to create proven software “objects” that are rapidly instantiated across new sites.

The Integration (Designed by 4Sight)

- **Data Flow:** The EAE application securely publishes operational data via a dedicated Edge Gateway. Utilising the industry-standard MQTT protocol, this gateway ensures efficient communication to the AVEVA Connect cloud platform.
- **Unified Name Space (UNS) & Contextualisation:** 4Sight architected the data model using a Unified Name Space (UNS) approach. This standardised framework contextualises all operational data into a single source of truth, enabling seamless fleet-wide analysis.

The Cloud (Global Visibility & Scalable Intelligence)

- **AVEVA Connect:** This central, cloud-based platform acts as the global command centre, providing:
 - **Secure Storage:** A high-performance, long-term historian for all operational data, providing a robust audit trail for environmental compliance.
 - **Unified Visualisation:** Role-based dashboards, maps, and trend charts provide a “single pane of glass” view across the entire fleet.
 - **Proactive Alerting:** Real-time notifications for critical events allow for rapid response before environmental impact occurs.
 - **Advanced Analytics & Virtual Sensing:** 4Sight leverages the cloud computation to run mathematical models that act as Virtual Sensors. This allows for the estimation of hydraulic performance and biological health without expensive physical sewage flowmeters and inline sewage plant instrumentation.
 - **Scalability:** The platform allows 4Sight to on-board new plants with minimal engineering effort, supporting Calcamite’s expansion across the continent.

THE IMPACT: A NEW “PEACE OF MIND” SERVICE MODEL

This digital solution, delivered by 4Sight, fundamentally transformed Calcamite's business and its environmental impact.

Business & Operational Benefits

- **Strategic Roadmap to 100% Fleet Visibility:** Successful pilots of the initial sites has established the blueprint to move from “blind” to “all-seeing,” creating the infrastructure to monitor hundreds of distributed assets from a single dashboard as the rollout continues.
- **Proactive Maintenance:** Alerts now drive maintenance activities, reducing downtime and operational costs by shifting from reactive “fixing” to proactive prevention.
- **Performance Guarantees:** Calcamite can now prove its plants are meeting flow specifications through data-rich compliance reports provided directly to end-users and regulators.
- **The “As-a-Service” Opportunity:** This digital foundation enables Calcamite to transition from selling equipment to selling “Guaranteed Uptime and Compliance.” This fundamental shift in business model differentiates them from traditional competitors and builds deep, long-term client trust.

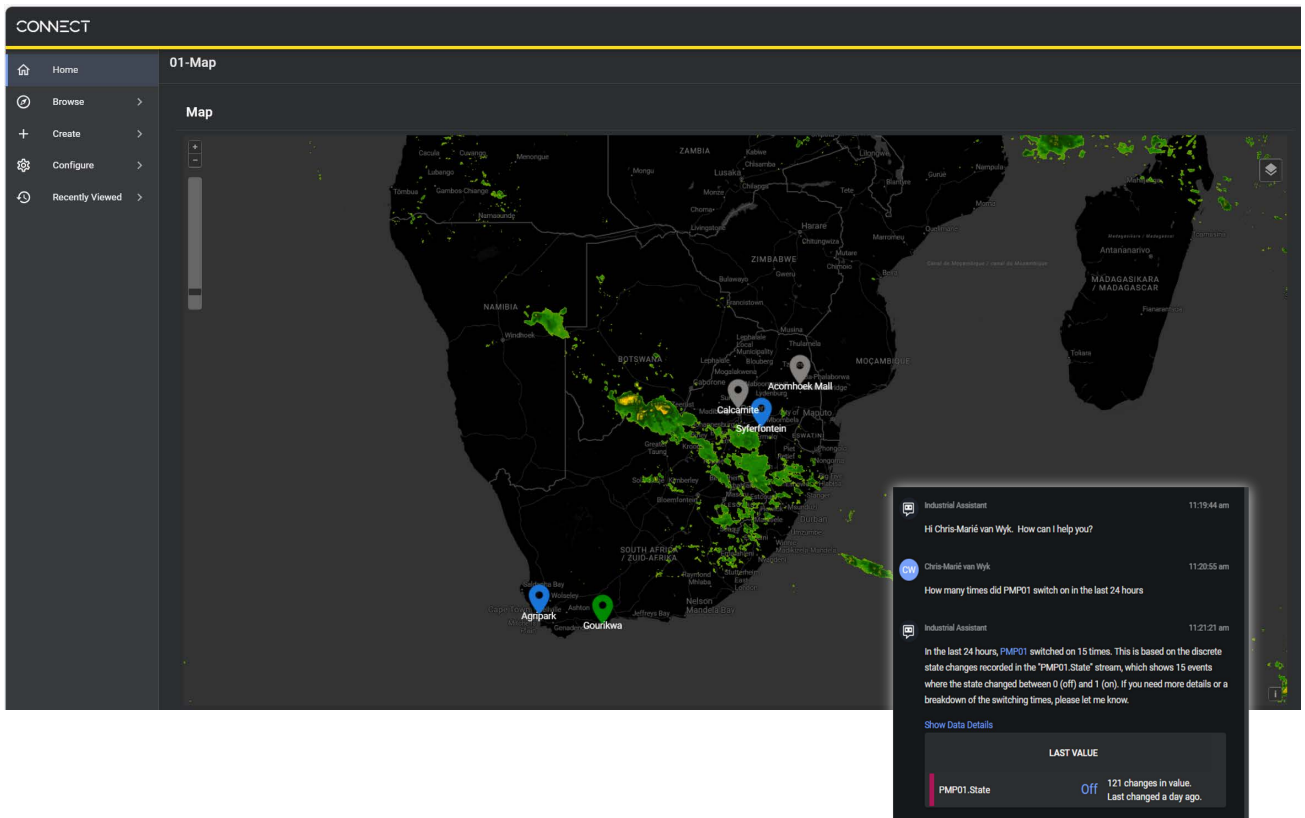
Sustainability & Environmental Benefits

- **Protects Public Health:** By ensuring plants run 24/7, the solution stops pathogens from contaminating groundwater, directly protecting local communities.
- **Enables a Circular Economy:** The system guarantees that treated water is safe for reuse in irrigation or industrial processes, turning “waste” into a valuable resource and reducing demand on scarce potable water.
- **Lowers Carbon Footprint:** Treating water at the source eliminates the massive energy consumption required for large-scale pumping to central plants.
- **Reduces Infrastructure Strain:** Decentralised treatment alleviates the load on failing municipal bulk plants and avoids the high-carbon civil works required for new bulk sewer lines.

THE FUTURE: AGENTIC INSIGHTS & PRESCRIPTIVE INTELLIGENCE

With a foundation of high-quality, contextualised data in the UNS, 4Sight is advancing the solution beyond descriptive monitoring into the realm of autonomous intelligence:

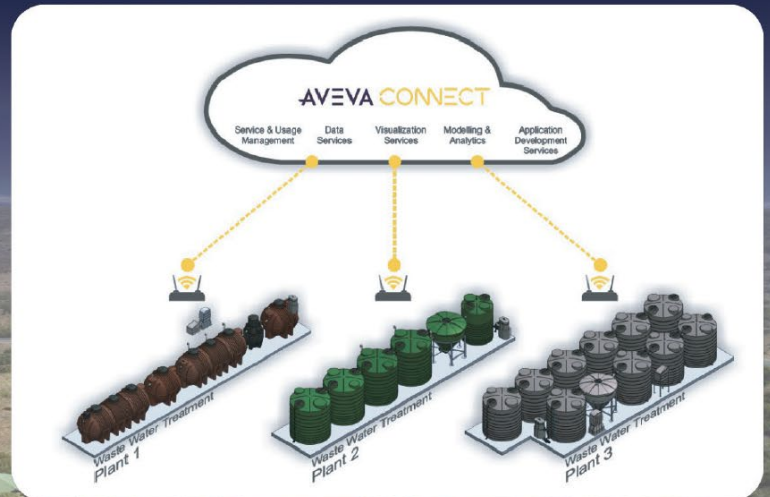
- **Predictive & Prescriptive Intelligence:** Using Machine Learning, the system moves from detecting current issues to predicting future failures and recommending specific operational adjustments to prevent biological upsets.
- **Agentic Insights with Microsoft Copilot:** By integrating Microsoft Copilot, operators can use natural language to query the fleet status and receive autonomous scans of the UNS for anomalies, bridging the gap between complex industrial data and rapid human decision-making.



CONCLUSION: A RESILIENT BLUEPRINT FOR THE FUTURE

The journey from manual, reactive operations to a data-driven "Wastewater Treatment-as-a-Service" model is more than just a technical upgrade; it is a commitment to the future of the African continent. By bridging the gap between cutting-edge automation and essential environmental stewardship, 4Sight, Calcamite, Schneider Electric, and AVEVA have created a solution that is as resilient as the communities it serves. As this blueprint scales from individual pilots to a continental network of smart, modular plants, it stands as a testament to the power of digital transformation to solve our most fundamental human challenges—ensuring that clean water and a healthy environment are no longer a luxury, but a guaranteed standard for all.

This diagram illustrates Calcamite's innovative use of AVEVA CONNECT to enable smart, cloud-based monitoring and management of decentralized wastewater treatment plants across multiple sites.



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