

## Localised Edge Processing in Remote Water Treatment – REN’s Potential Role in Optimising Plant Efficiency

### Scenario: Remote Water Treatment Facility

Imagine a remote water treatment plant serving a small, isolated community, managing tasks such as filtration, chemical dosing and wastewater processing. Operators might face challenges ensuring 24/7 efficiency and water quality with minimal human intervention, often in locations where internet connectivity is unreliable. Equipment must endure harsh environmental conditions and failures could cause disruptions requiring hours to resolve due to the site’s remoteness.

### A Hypothetical Solution: REN as a Local Edge Processor

The REN 19 could serve as a local edge processing unit for such facilities. It might process real-time data from sensors and systems, enabling more autonomous control of plant operations. This could help maintain consistent water quality and equipment performance without depending on cloud-based systems.

### Key Features and Use Cases

#### 1. Autonomous Monitoring and Control

The REN system could process data from sensors monitoring water quality, flow rates, chemical levels and equipment health. With suitable processing capabilities (e.g., Eagle Xeon E or Grizzly 16-core Xeon Atom), it might enable autonomous adjustments to treatment parameters, reducing the need for manual oversight.

- Example: If a sensor detects a drop in chlorine levels, the system could hypothetically adjust chemical dosing pumps to restore balance, ensuring safety without human intervention.

#### 2. Fault Detection and Predictive Maintenance

Through continuous monitoring, REN might identify early signs of equipment wear or malfunction, allowing for preventive actions.

- Example: If a pump shows indications of imminent failure, the system might reroute operations to a backup pump and notify the maintenance team to address the issue proactively.

### 3. Remote Accessibility and Data Logging

Operational data could be logged locally, offering a detailed record of plant performance for analysis. Maintenance teams might access this data remotely, even when off-site.

- Example: Operators could review historical water quality trends, potentially predicting when filters need replacement, streamlining maintenance schedules and reducing waste.

### 4. Real-Time Water Quality Management

The system might continuously monitor parameters such as pH, turbidity, and dissolved oxygen, adjusting processes autonomously to meet regulatory standards.

- Example: During heavy rainfall, if turbidity increases, the system could adjust filtration rates to maintain water clarity without manual input.

### 5. Energy and Resource Optimisation

By analysing data on energy and resource consumption, REN might optimise equipment operation to reduce waste and operational costs.

- Example: During off-peak demand, pumps could be throttled back to conserve energy, maintaining supply without excess expenditure.

### 6. Autonomous Operation During Connectivity Loss

In remote areas where internet access is unreliable, the system could function autonomously, storing data locally and executing pre-programmed protocols.

- Example: If connectivity is lost, the system could continue to operate, logging all data until reconnection occurs.

### 7. Integration with IoT Sensors

The REN Series might integrate with IoT sensors for monitoring water levels, chemical tanks, and environmental conditions, enabling real-time adjustments.

- Example: External weather sensors predicting heavy rainfall might prompt the system to prepare for increased inflow, minimising disruption.

### 8. Cybersecurity and Physical Security

With optional tamper-proof screws or custom security features, the REN system could help safeguard physical infrastructure and data from unauthorised access.

- Example: A remote water treatment facility might be a target for tampering or vandalism. The REN system's physical security measures prevent unauthorised access, ensuring that only designated personnel can modify or interact with the system.

## 9. Reliability in Harsh Conditions

The rugged design of the REN series might allow operation under extreme conditions such as high humidity, dust, or temperature variations.

- Example: At a coastal facility prone to corrosion, the sealed enclosure could protect sensitive electronics, maintaining reliability over time.

### Why REN Could Suit Remote Water Treatment

**Localised Processing:** REN might offer real-time, on-site control of water treatment systems without relying on cloud connectivity.

**Customisable and Scalable:** Its flexible configurations could support various processing elements to meet the needs of small or large facilities.

**Rugged Design:** Designed to endure challenging conditions, REN could reduce the risk of operational downtime.

**Tamper-Proof Security:** With optional tamper-proof screws and custom security features, the REN system protects sensitive water treatment infrastructure from unauthorised physical access.

**Autonomous Capability:** By enabling independent operation, the system might minimise the need for on-site staff in remote locations.

**Energy Efficiency:** Optimised resource usage could help lower costs and environmental impact.

### Make REN the Brain of Your Remote Water Treatment Plant.

With its potential edge processing capabilities, the REN Series could provide a platform for real-time monitoring, fault detection, and optimisation. While not a finished solution, REN offers a foundation for engineers to develop bespoke systems tailored to remote water treatment needs.



REN SERIES

## Disclaimer:

*The scenarios and applications described in this document are hypothetical in nature and intended solely for informational and illustrative purposes. Actual deployment, performance and results of the REN Series in water treatment applications may vary depending on specific configurations, environmental conditions and integration with other systems. The REN Series is provided as a customisable edge processing platform, not as a finished product; therefore, end users may need to modify, configure and integrate REN components to meet their specific requirements. All users should perform thorough testing and consult with qualified engineers to determine suitability for their intended use. Unitronix disclaims any liability for direct, indirect or consequential damages arising from the use or reliance on this document or the products described herein.*



## About Us

Unitronix are an innovative engineering-capable distributor and manufacturer of rugged, embedded computing solutions for military, aerospace and high-end industrial applications. Our own innovative Rugged Embedded Nodes - REN are reusable, reconfigurable, recyclable, cutting carbon footprint and saving cost.

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