



Enhancing Infrastructure Resilience with Predictive Maintenance

A Guide for Water and Wastewater Facilities



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1. Introduction

The Critical Cost of Unplanned Downtime in Water and Wastewater

When critical equipment fails at a water or wastewater facility, the cost extends far beyond the cost of parts and labor. Unplanned downtime can add stress to already overstretched teams—forcing overtime, spikes in energy usage, and requiring additional chemical dosing as the systems work to recover.

Not only do efficiency and operating budgets take a hit, but compliance and community health are at stake. Continuous adherence to NPDES and Safe Drinking Water Act requirements depends on steady operations. A single incident can ripple across the plant, triggering fines, issuing boil-water advisories, or causing sanitary sewer overflows (SSOs) that affect thousands of customers—and result in long-lasting regulatory consequences and increased oversight. With aging infrastructure and 24/7 demand, utilities can't afford to operate reactively.

Costs & Risks When Water and Wastewater Assets Fail

\$7.6B

Annual loss from treated water leaking out of distribution systems¹

250K+

Water main breaks per year due to age-related failures—up 27% since 2012²

60%

Share of a wastewater plant's electricity used by blowers³

7.1M

Annual direct illnesses attributable to waterborne disease⁴



The Potential of Predictive Maintenance

When a predictive maintenance program works as intended, it enables teams to achieve and sustain optimal operations in water and wastewater facilities. Combining real-time vibration, temperature, and lubrication data, AI-driven analytics, and expert input to detect and address equipment issues in their earliest stages is key to mitigating the costs and risks of unplanned downtime, permit violations, and environmental incidents. It also provides other significant benefits: improved morale, lower energy consumption per million gallons treated, and longer asset life, to name a few.

What if the potential of predictive maintenance doesn't match the day-to-day reality for utility teams and operators?

This scenario is not uncommon. The good news is, it's entirely avoidable. You just need to be armed with the right information before you commit to a predictive maintenance program.

IN THIS GUIDE, we'll explain how you can shift to predictive maintenance with confidence and start protecting your critical water and wastewater assets.



2. Common Barriers to Avoid When Adopting a Predictive Maintenance Strategy

Given the strict regulatory standards and high stakes in water and wastewater operations, utilities are recognizing the need to innovate to keep treatment, collection, and distribution systems running reliably—and in compliance. But succeeding with predictive maintenance can be a challenge, particularly when the formula for success isn't clear.

Whether it's the perceived upfront investment, concerns about integrating with SCADA/CMMS and existing operator workflows, or questions about the measurable value the system will deliver, predictive maintenance programs can—and sometimes do—fail to take off. When that happens, plants miss out on financial relief, staffing capacity, resilience against permit excursions, and the broader business benefits they're targeting.



4 COMMON REASONS

Predictive Maintenance Solutions **Fail to Deliver**



Upfront & Ongoing Costs

Many predictive maintenance solutions require significant capital just to get started, plus additional costs for installation, ongoing service, and support. Utilities may also incur expenses for network segmentation, which can push the total cost higher than expected.



Resistance to Change

Implementing new technologies like AI requires cultural change, which can be difficult to achieve. Resistance often stems from concerns over disrupting SCADA alarm practices and workflows, skepticism about effectiveness, and uncertainty about impacts on staffing, safety, and compliance.



Lack of Expertise

Many facility teams lack the experience they need to interpret machine data and pinpoint issues that need addressing. If expert support is not available to help them identify and prioritize needs—and take the correct course of action—the value of the data plummets.



Frustration & Diminishing Returns

Big data can become a heavy burden. A constant flow of alerts from predictive maintenance software, including false positives, can make teams feel overwhelmed and fall back into a reactive mode, frantically dealing with issues while unsure of what to prioritize next.

Any one of these four drivers of negative ROI can undermine a predictive maintenance program on its own—or discourage water and wastewater utilities from pursuing it in the first place. **The problem isn't predictive maintenance as a strategy or technology; it's whether the solution aligns with treatment, collection, and distribution operations, integrates with SCADA/CMMS, and empowers maintenance and operations teams to act.**

NEXT, we'll explain how AssetWatch can successfully navigate the shift to predictive and empower your team to enhance operational resilience for good.





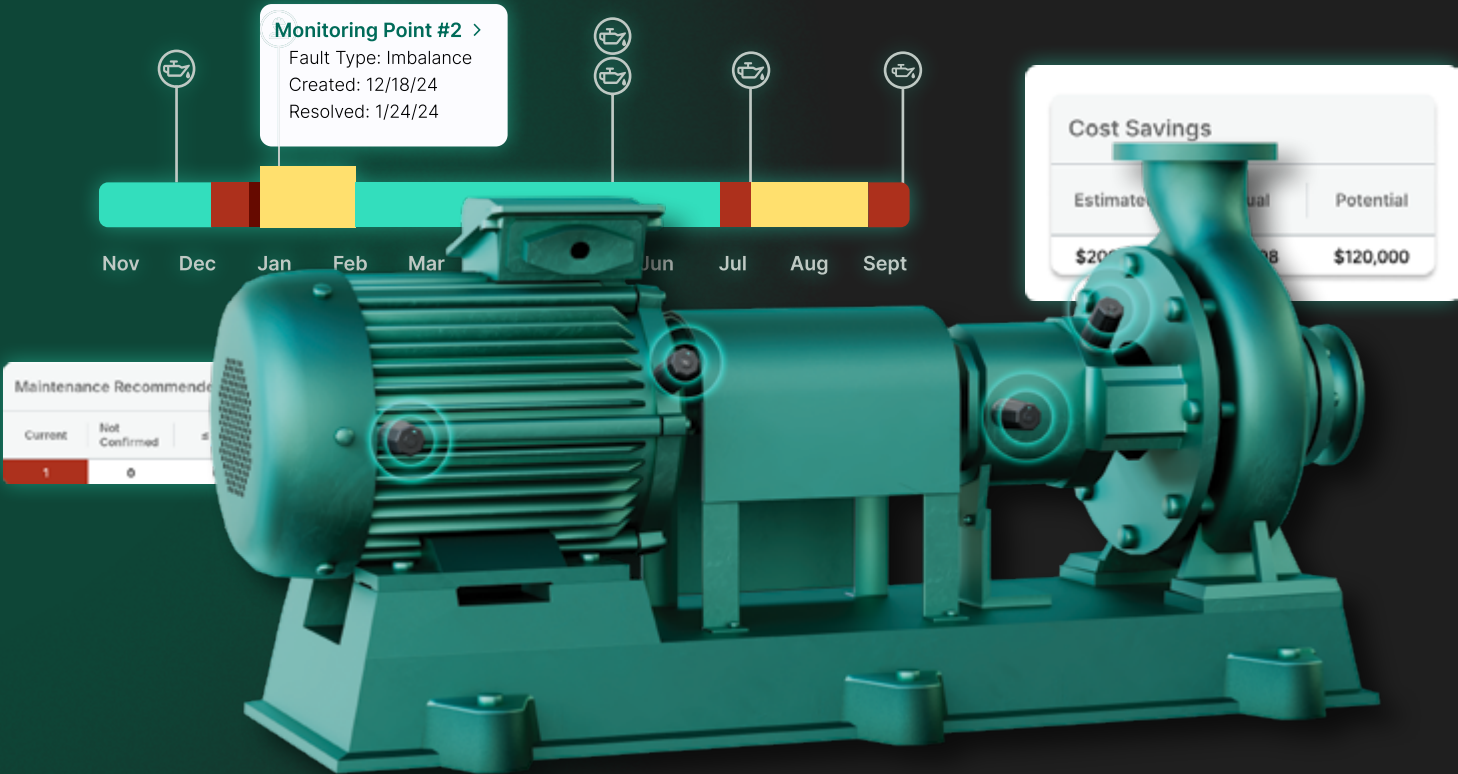
3. Your Manual for Reliable Operations with Predictive Maintenance

Having the power to predict and prevent equipment failures enables you to transform operations, reduce compliance risk, and drive continuous improvement. The question isn't whether predictive maintenance is necessary, but how to maximize its value. Here are four essentials to ensure long-term program success.

Test Before You Invest

In terms of cost, effort, and time-to-value, a turnkey subscription is the lowest barrier to entry and offers the most value for the money. With no CapEx—and no additional cost for hardware, software, criticality assessment, installation, ongoing monitoring, and dedicated CAT III+ support—your team can transition to predictive maintenance easily and have everything they need to increase uptime and strengthen operations fast.

Start with a low-cost, low-risk trial. You'll see how the system functions within your existing workflows, learn alongside the expert dedicated to your facility, and notch quick wins. A trial takes pressure off your team while selling them on the value of predictive maintenance and the benefits of a proactive culture from day one.



REAL WORLD SAVES

Municipal Wastewater Facility Secures Early Trial Save and Team Buy-In

A municipal wastewater organization began a six-month trial of AssetWatch across several sites. At one facility, a 1,000 hp aeration blower's drive end (DE) showed a sharp rise in vibration, and their dedicated AssetWatch Condition Monitoring Engineer (CME) suspected rotating looseness/bearing damage. They alerted the maintenance team, recommending that the blower be taken out of service until the bearings could be inspected.

Maintenance confirmed the bearing needed to be replaced. After the swap, vibration returned to baseline-keeping treatment on spec, avoiding permit risk, and averting a costly blower rebuild. That early save alone paid for the first two years of service and helped to secure organization-wide buy-in for predictive maintenance.



TOTAL SAVINGS:
\$45,000+

Empower Your Team with Advanced AI + Human Expertise

AI is invaluable for detecting early anomalies—but relying solely on AI can lead crews into reactive mode: chasing nuisance alerts, wasting hours on non-issues, and missing events that pose permit risks.

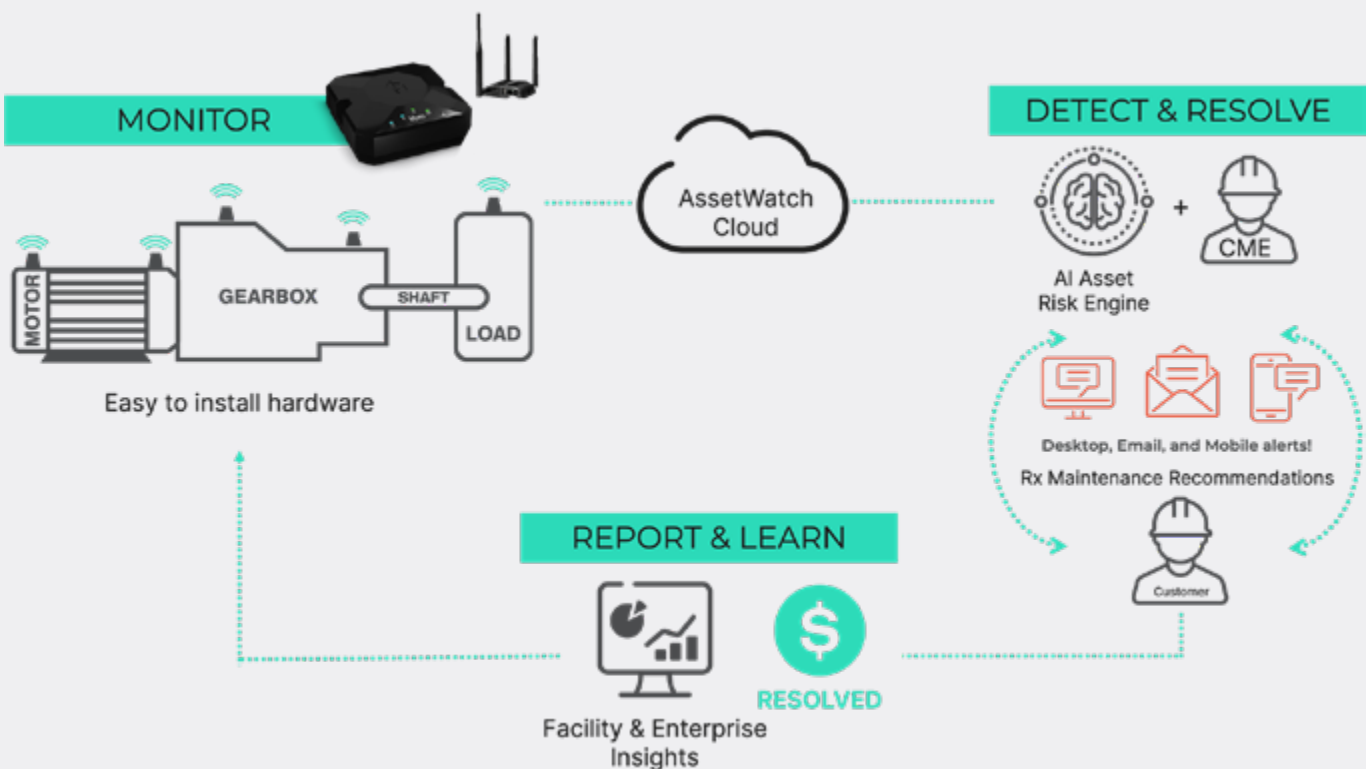
For long-term success, balancing predictive analytics with human insight is key.

Beyond training AI models (with 99% accuracy achieved), a dedicated expert who knows your facility can also validate signals, filter false positives, and prioritize work by process urgency.

Equally important, you gain a partner who proactively reaches out with prescriptive recommendations for the earliest, most practical resolution.

A FULL-SERVICE CONDITION MONITORING SOLUTION

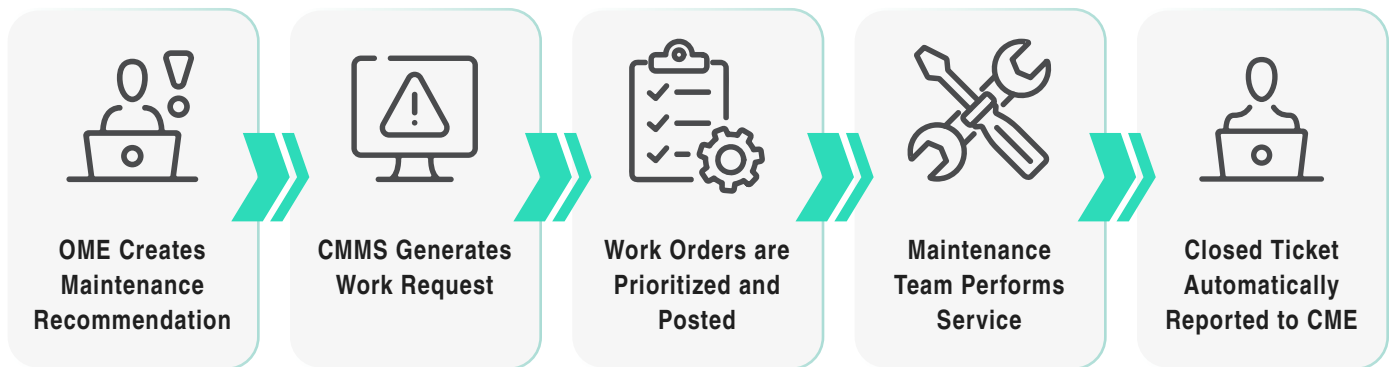
that combines the power of predictive analytics with human expertise empowers maintenance teams to proactively address failures and achieve more with less.



Streamline Workflows with Easy Integrations

The most effective predictive maintenance solutions seamlessly integrate with existing systems to simplify operator workflows, enhance collaboration, and improve decision-making. Choose a solution that not only empowers your team with dashboard views and two-way communication with a dedicated expert but also integrates easily with your SCADA and CMMS.

This setup eliminates time-consuming data entry and duplicate efforts, so crews are deployed where they can make the biggest impact. You'll be able to automate work order generation, prioritize maintenance actions, easily track work orders to closure, and obtain auditable records for permit compliance and reviews.



REAL WORLD SAVES

Water Utility Critical Save: Replaced Mixing Blade & Gearbox

At a municipal wastewater treatment facility, Vero® wireless vibration sensors on a contact basin mixer (motor and gearbox) triggered an elevated 1x and 2x gear-mesh alert in the AssetWatch platform.

The facility's dedicated AssetWatch CME notified maintenance and advised them to remove the bottom cover to inspect the shaft and blades, pull an oil sample of the gearbox, and shut the mixer down.

Upon inspection, the team confirmed a missing mixer blade on the 20-ft shaft, and oil analysis showed wear particles and high moisture. The blade and gearbox were replaced, and vibration returned to normal. In addition to avoiding costly equipment failures, this save also prevented up to 3 days of water treatment downtime.



TOTAL SAVINGS:
\$8,000+

Focus on the Right KPIs for Continuous Improvement

Setting measurable goals that align with utility goals and KPIs is essential for benchmarking your baseline, driving progress, and demonstrating overall value to the organization. The following KPIs help you gauge the full impact of your predictive maintenance program.

Calculating the Value of PdM Over Time: Key Metrics

Cost Savings & ROI	Return on Investment (ROI) - $(\text{Total Savings} - \text{Cost of Implementation}) / \text{Cost of Implementation}$ Total Cost of Maintenance (TCM) - Preventive + Corrective + Predictive Maintenance Costs Cost per Failure Event - $(\text{Downtime Cost} + \text{Repair Cost} + \text{Labor Cost}) / \text{Total Failures}$ Reduction in Emergency Maintenance Costs - Baseline vs. Post-Implementation Reduction in Overtime Labor Costs = Overtime Hours Saved x Hourly Rate
Equipment Performance & Reliability	Mean Time Between Failures (MTBF) - $\text{Total Operating Time} / \text{Number of Failures}$ Mean Time to Repair (MTTR) = $\text{Total Downtime} / \text{Number of Repairs}$ Asset Uptime (%) - $(\text{Total Operating Time} / \text{Total Available Time}) \times 100$ Failure Rate (%) - $(\text{Number of Failures} / \text{Total Assets}) \times 100$ Reduction in Unplanned Downtime - Downtime Before vs. After Predictive Maintenance
Production & Operational Efficiency	Overall Equipment Effectiveness (OEE) - $\text{Availability} \times \text{Performance} \times \text{Quality}$ Planned vs. Unplanned Maintenance Ratio - $\text{Planned Maintenance Hours} / \text{Total Maintenance Hours}$ Capacity Utilization (%) - $(\text{Actual Output} / \text{Maximum Possible Output}) \times 100$ Throughput Increase (%) - $(\text{New Throughput} - \text{Baseline Throughput}) / \text{Baseline} \times 100$ Reduction in Maintenance-Related Production Delays
Safety & Compliance Metrics	Reduction in Safety Incidents = Incident Count Before vs. After Implementation Reduction in Regulatory Non-Compliance Events Audit Pass Rate (%) = $\text{Number of Passed Audits} / \text{Total Audits} \times 100$
Inventory & Spare Parts Management	Reduction in Spare Parts Inventory Holding Cost Reduction in Urgent Spare Part Orders Inventory Turnover Rate - $\text{Cost of Goods Sold} / \text{Average Inventory Value}$
Environmental & Energy Efficiency Metrics	Reduction in Energy Consumption per Asset Reduction in Carbon Footprint (CO2 Emissions Saved) Waste Reduction from Equipment
Predictive Maintenance Effectiveness Metrics	Accuracy of Failure Predictions (%) = $\text{Correct Predictions} / \text{Total Predictions} \times 100$ Reduction in False Positives & False Negatives Reduction in Unnecessary Maintenance Interventions

Conclusion: Discover How Easy Predictive Maintenance Can Be

Some of the costliest challenges in water and wastewater operations are caused or compounded by sudden, unforeseen failures that destabilize treatment. Fortunately, a turnkey predictive maintenance program can make stable operations a daily reality and alleviate your biggest operational and compliance risks.

With the power of AI plus dedicated support from a seasoned analyst, you can overcome the usual barriers to adoption and progress—and empower your team to win the high-stakes battle against equipment failures.



Contact us today!
Take that first step.

AssetWatch makes getting started easy with a low-cost, no-risk 30-day trial—no CapEx, self-install, and no IT involvement required. We'll help you identify critical assets, get up and running in 1–2 days, and provide ongoing expert support tailored to your facility and workflows from day one.

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