



RELIABLE

Managing pump station assets for lowest TCO and maximum effectiveness

How digital technology is integrating real-time monitoring of pump energy usage, maintenance, and operations for maximum payback

www.se.com/pumpingperformance

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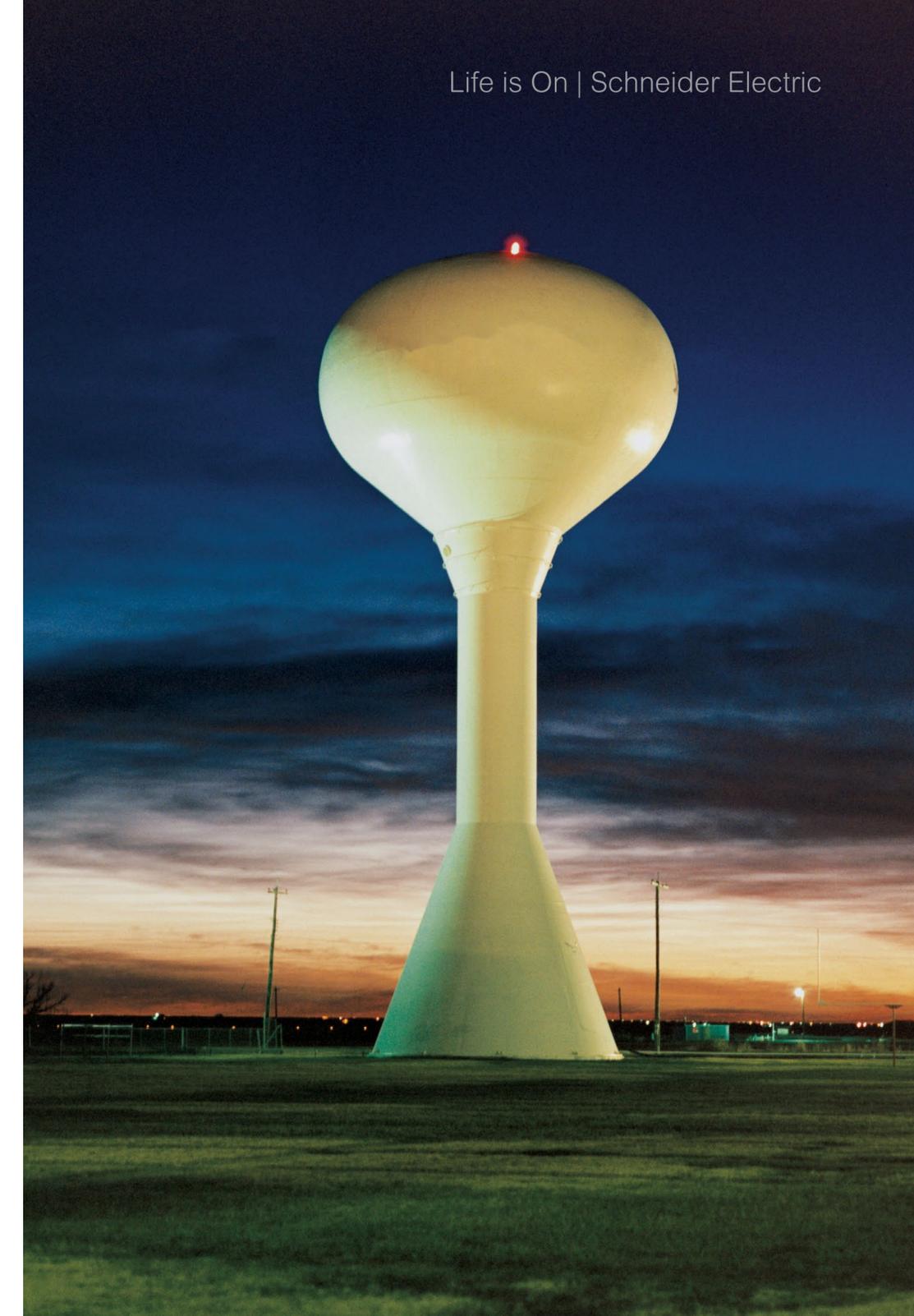
About this eGuide

Managing pump station assets for maximum effectiveness

This document is part of the Schneider Electric asset performance improvement series. The series is designed to help water and wastewater treatment plants and network operators extract maximum value from water and wastewater assets by digitizing operations. Applications described within can bring the following benefits:

- Reduce your operational expenditures by up to 15%
- Improve the management of your aging pumping infrastructure and extend the lifespan of your assets
- Manage synthesis of pump station performance
- Improve alarming with email notifications
- Improve continuous operations through KPI monitoring
- Select potential investments based on profitability

For more information visit: www.se.com/assetperformance-water





Modern challenges in a critical industry

Modern challenges in a critical industry

Water plants and networks around the world are under increasing pressure to achieve ambitious targets for service delivery, regulatory compliance, and resiliency in managing a large and ageing infrastructure.

With limited capital they must find ways to extend the lifetime of vital assets, prioritize renovation and fend off cyber security threats. For funding to meet these challenges, many are looking for new savings in their pump station energy maintenance and operating costs areas, which consume an estimated **75 percent** of a typical pump station budget (Figure 1).

Addressing such issues requires timely access to, and manipulation of, performance data, which is now readily affordable thanks in large part to applying to the water industry the digital transformation that is now taking place industry-wide.

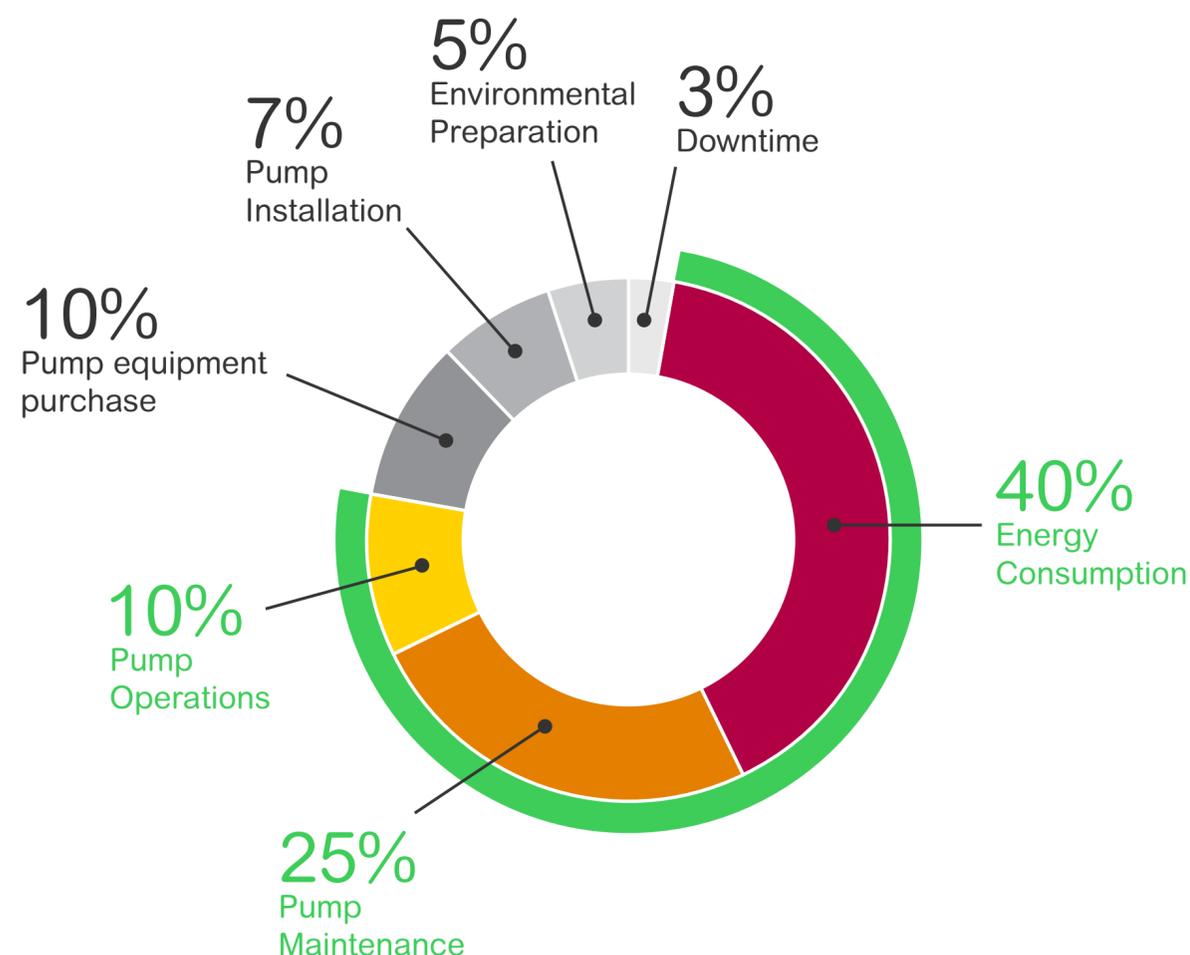


Figure 1: A typical pump station budget.

Modern challenges in a critical industry

Managing pump station performance improvement

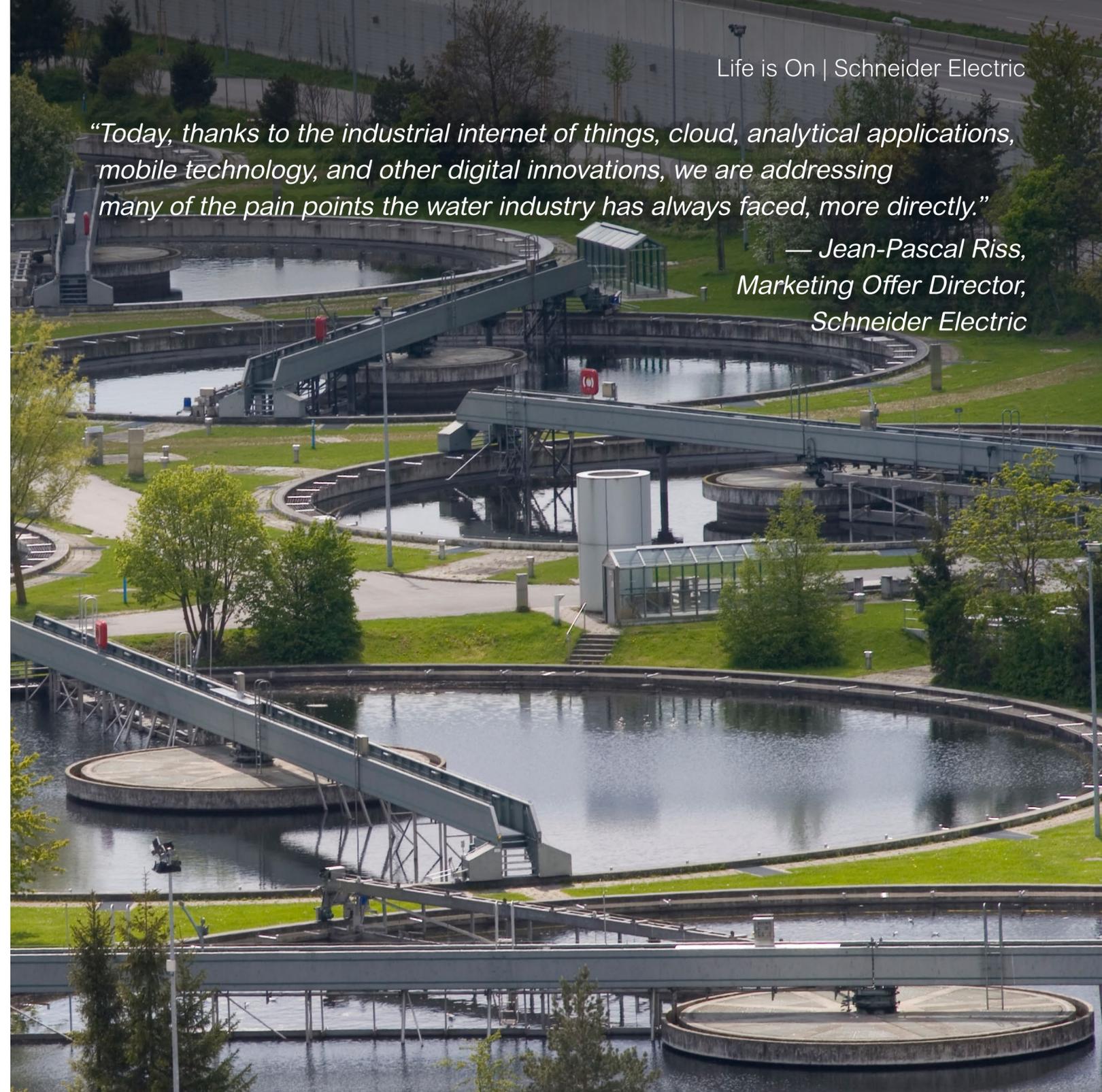
In the white paper titled *Realigning Water Industry Assets in Digitally-Enhanced Operations*, we discussed some of the broader trends that are impacting water asset performance improvement, including the maturing of asset maintenance and the digital transformation of technology.

Here we focus on management of pump station assets and how a program based on digital monitoring of energy usage, maintenance, and operations against targeted objectives can deliver maximum performance at the lowest total cost of ownership (TCO).

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“Today, thanks to the industrial internet of things, cloud, analytical applications, mobile technology, and other digital innovations, we are addressing many of the pain points the water industry has always faced, more directly.”

*— Jean-Pascal Riss,
Marketing Offer Director,
Schneider Electric*



A woman with long dark hair, wearing a light-colored blouse, is shown in profile, looking intently at a wall of computer monitors. The monitors display various data visualizations, including charts, graphs, and technical diagrams. The scene is dimly lit, with the primary light source being the screens themselves. The overall atmosphere is one of focused, high-tech work.

The digital promise

The digital promise

Digitizing operations for improved engineering, maintenance, and operational performance

Digital transformation promises to harness the volumes of information that are emerging in the wake of industrial operations and apply it to improving those operations. It does so by adding intelligence and connectivity to previously isolated assets, synchronizing control and communications among them, and sharing information with analytical applications.

Schneider Electric's EcoStruxure platform provides an architecture for organizing and integrating digitalized assets. At the base of the architecture are the pumps, motors, drives, and other assets that are becoming increasingly intelligent and connected. At the middle "edge" layer are controllers such as PLCs, or other edge control devices like internet boxes that coordinate exchange of data with analytical applications at the top layer.



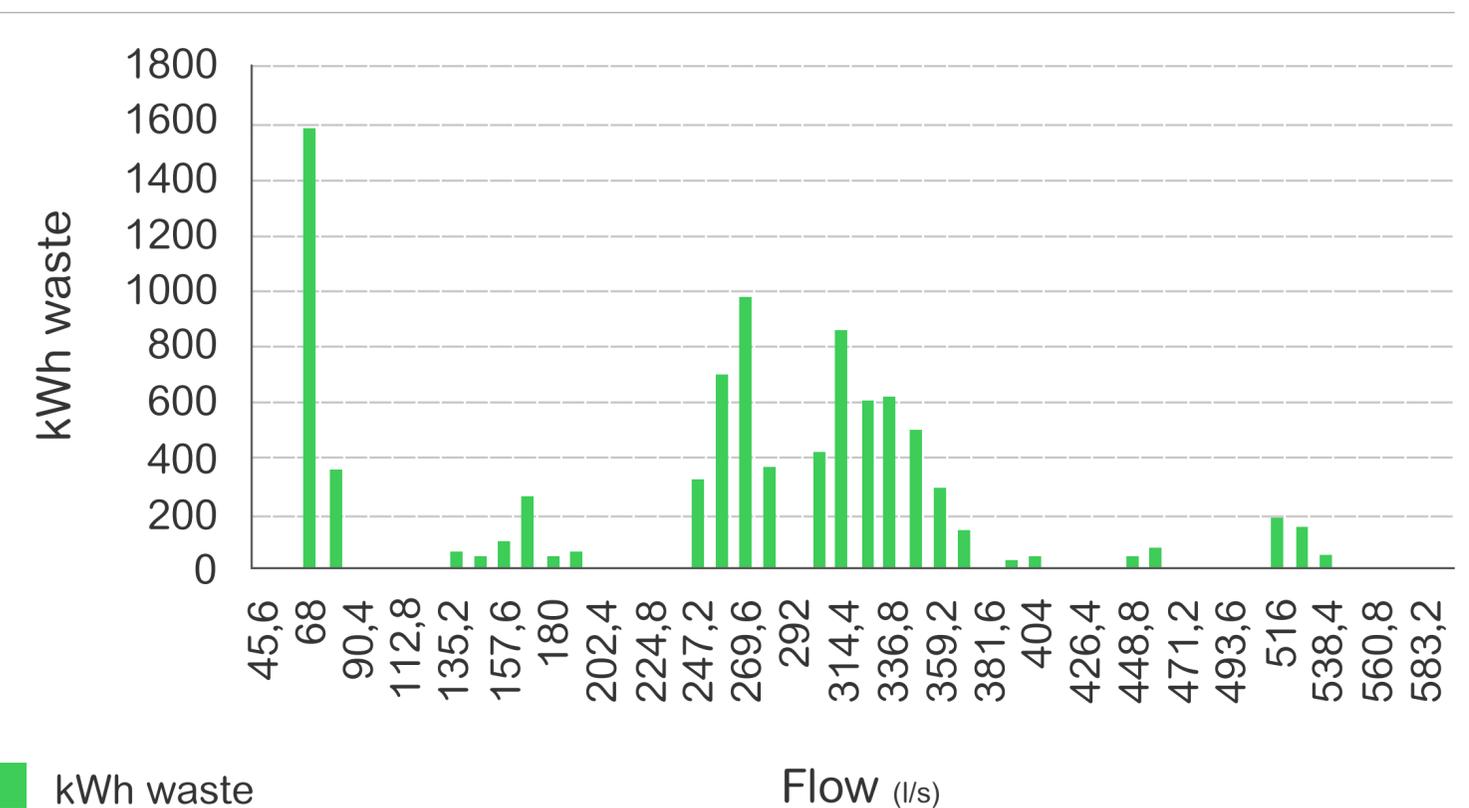
* The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

The digital promise

Managing pump station improvement

For water industry pump stations such a structured approach to digitalization means greater ability to contain energy, maintenance, and operational costs. It could reduce pump station energy costs by enabling operation closer to target curves; by leveraging most efficient equipment and lower cost periods while matching set points to; or by optimizing charges on energy bills to avoid demand charge and power factor penalties.

⚠ Energy waste lookup



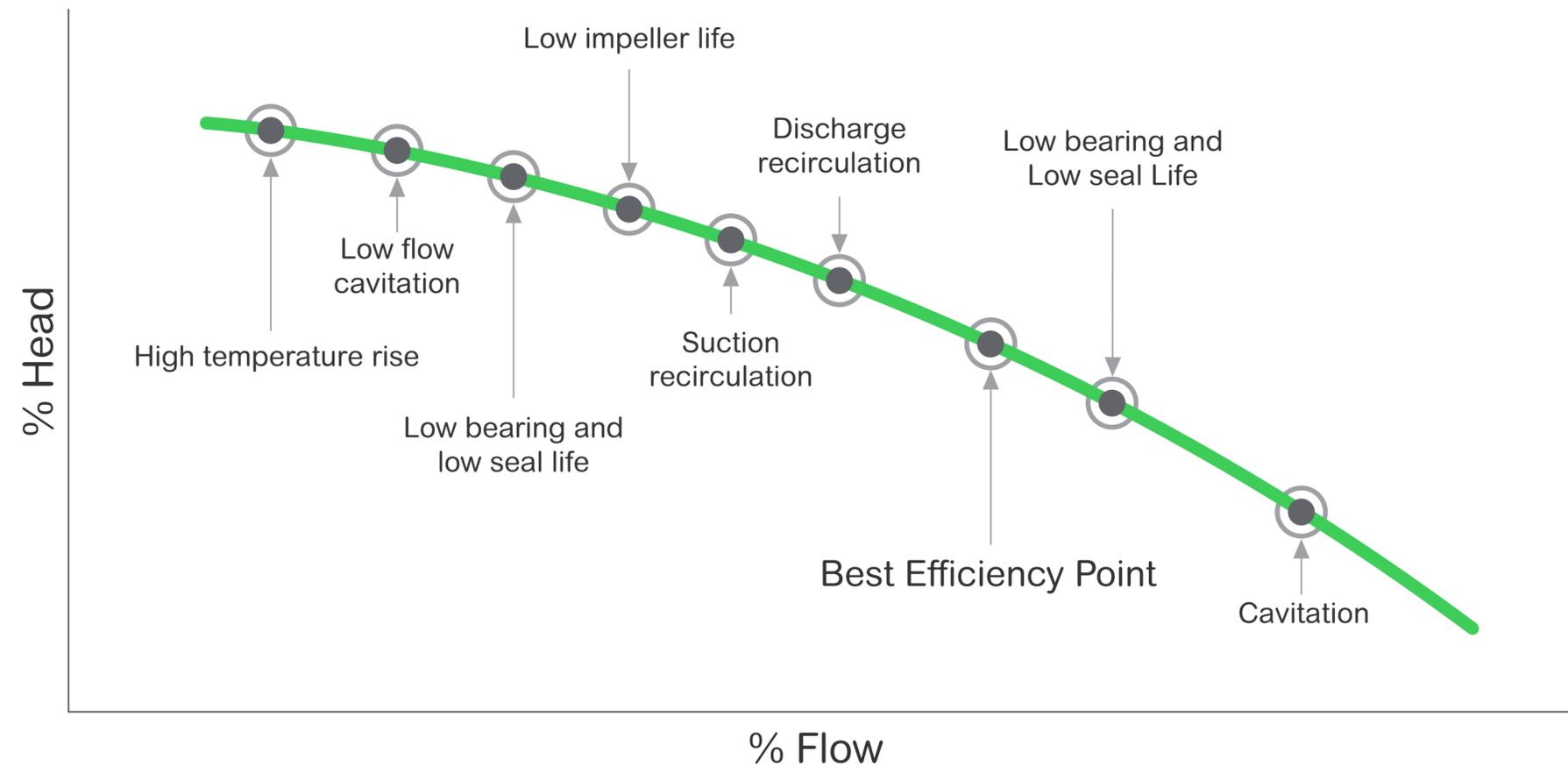
Dashboard from EcoStruxure Pumping Performance Advisor reveals points of energy waste.

The digital promise

Reducing maintenance costs

Digitalization could reduce *maintenance* costs by enabling pump operation closer to best efficiency points;

- Eliminating inspection through advanced monitoring;
- Augmenting routine maintenance with condition-monitoring to identify pending points of failure before they happen;
- Protecting assets by eliminating operation in low flow conditions.



Improved monitoring minimizes stress as pumps can operate closer to optimal efficiency levels.

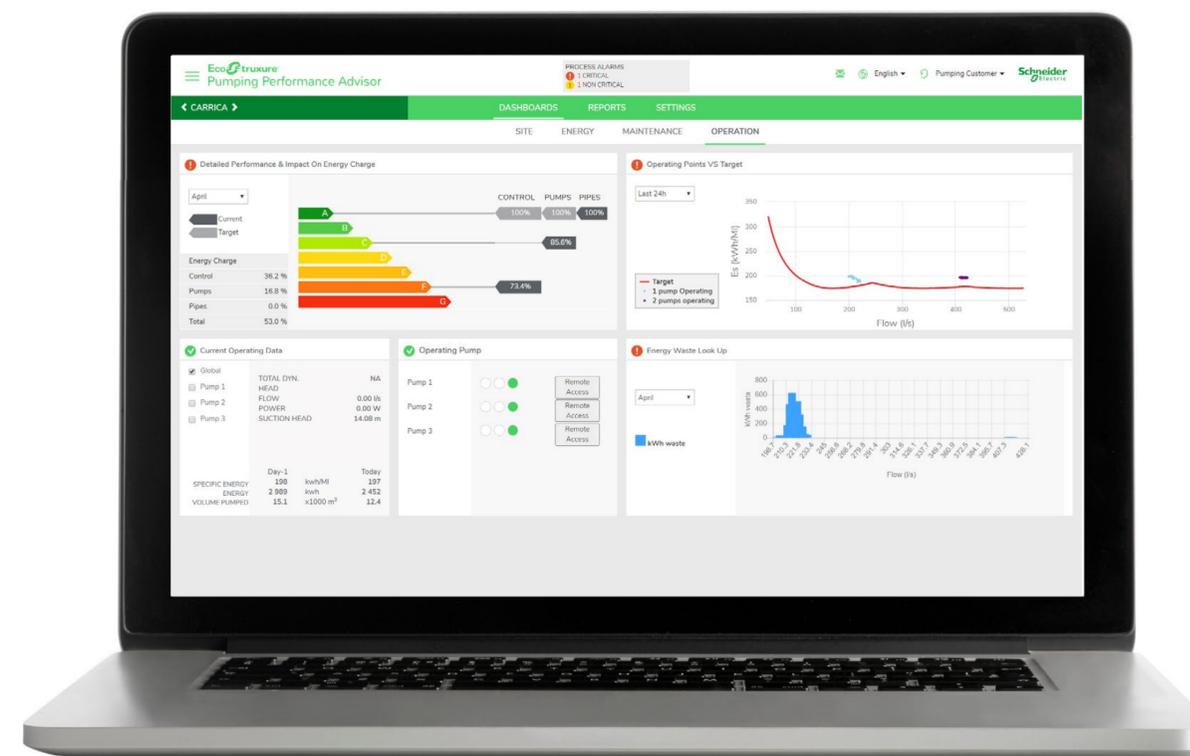
The digital promise

Reducing operating costs

Digitalization could contribute to overall *operational* cost reductions through enhanced, real-time monitoring against target performance points; varying motor speeds to achieve established targets; and synchronizing pump performance in the wider context of pumping installation. This context might involve hydraulic systems, pump control strategies, or auxiliary control functions like chlorination dosage.

What would you do with greater operational insight on your pumps?

Let's discuss how to get started



Ability to visualize pump operations in the context of other assets helps optimize operations

A photograph of a water treatment plant featuring several large blue vertical pumps on concrete bases. In the background, there is a large grey cylindrical tank with a blue top and a blue pipe labeled 'POTABLE WATER'. The sky is blue with some clouds. A green bar is at the bottom of the image.

Three maintenance improvement paths

Three maintenance improvement paths

Asset Reliability, Maintenance Excellence, Asset Optimization

Detailed, timely access to information enables performance to reach new levels. This includes:

- Cost-effective application of condition-based maintenance
- Improvements in overall operating conditions
- Reduction of frequency and therefore labor costs of inspections

1. Condition-based maintenance

Impellers are among the first pump parts to go and once erosion and corrosion begins, it accelerates. Analytics can provide insight into pump health index and capacity losses, which can correlate directly with energy usage as reported by energy meters. Monitoring pump suction with pressure transmitters can send alerts when pump suction dips below a certain level.



Three maintenance improvement paths

Asset Reliability, Maintenance Excellence, Asset Optimization

2. Improving operating conditions

In addition to monitoring pump conditions, the improvements of pumps' operating conditions improve the mean time between failures (MTBF) by reducing the axial forces that contribute to shorten gaskets and bearings lifetime.

3. Reducing inspection frequency

When information on pump operations is limited or unreliable, frequent manual inspection is necessary to identify need for maintenance intervention. Continuous digital monitoring of assets and key operating variables can reduce the frequency – and labor costs – associated with manual inspections. With modern digital tools, you can track electrical variables, mechanical variables, and hydraulic variables of motors and pumps and receive alerts when performance drifts from established thresholds.



Pump asset performance improvement in practice

Case study: Non intrusive, agnostic pumping performance solution

An asset performance improvement initiative begins with setting the objectives of the pump station management. In a water treatment plant in Northern Spain the plant manager wanted to reduce energy costs by improving plant-wide communications regarding operating actions and their results. In addition, he also needed to reduce operating expenses (OpEx). His technical and production managers shared the same objectives and were considering replacing aging pumps as a way to accomplish those goals.

We started this project by deploying the architecture shown in Figure 4, to gather

and analyze operating data. Utilizing instrumentation already installed on each of the station's three pumps, water industry specialists configured energy meters, intelligent drives on the motors, as well as pressure and flow sensors to monitor key process points.

SCADA software and PLCs at the edge control layer supervised the data exchange and production logic and in addition connected with an IIoT edge box across PROFINET and Modbus TCP networks. The IIoT Edge box was housed in the plant control room and delivered data to the [EcoStruxure Pumping Performance Advisor](#) hosted in the cloud.

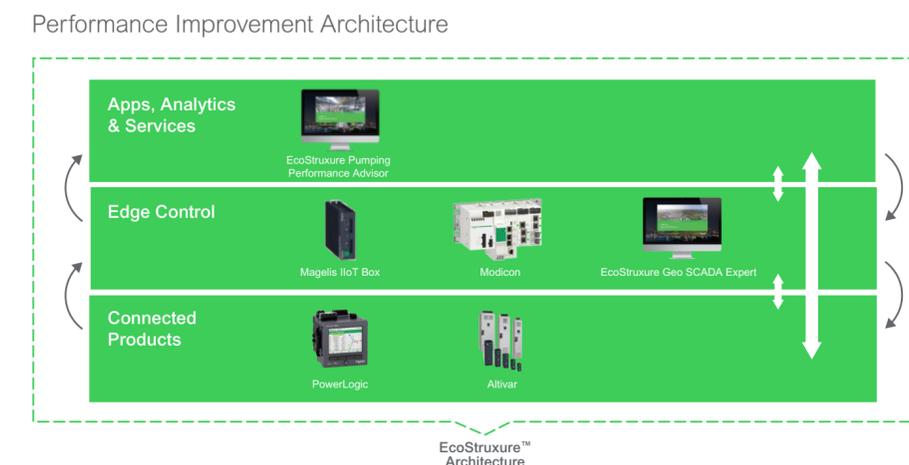


Figure 4: The performance improvement architecture that saved this water treatment plant €18,500 in the first year of implementation; with a return on investment in less than three months.

Performance improvement results

Return on investment in less than three months

After about three months of monitoring the Spanish plant, we reached the following conclusions:

- **There was no need to replace the old pumps.** Wear and corrosion impact could be managed through control loop tuning. We did, however, recommend refurbishing impellers and wear rings.
- **Changes in pumps' speed control improved performance and reduced the energy bill.** Controlling speed variation with the drives would be more effective than running the control loop in the PLC.
- **No longer a need to inspect every two weeks.**
- **Reduced operation costs.** Automating switching in the chlorination valve reduced operation costs by €4,500.

Implementing all recommendations except the impeller and repair ring refurbishment and the automated ozone system warnings saved €18,500 a year (See Figure 5 for a detailed breakdown).

Example of OpEx budget reduced by 12% of the Spanish plant:

€7,000

per year in reduced energy charges

€3,000

per year in maintenance costs by suspending the need to inspect every 2 weeks

€8,500

per year in operations savings, apps, insights and alerts and by automating the chlorination valve control (ON/OFF)

From reliable operation to continuous optimization

The fundamentals for asset performance improvement initiatives

Although the previous example related to potable water, the same basic architecture can be applied to pumps in almost any setting. For example, the same customer operates a wastewater treatment plant and water collection network and engaged Schneider Electric to accomplish similar objectives on their lifting station.

Similar variable speed adjustments based on monitoring increased pumping performance, reduced energy consumption, wear and tear,

and vibration. The monitoring also revealed the need for reducing the size of wastewater screens to keep out larger objects from increasing pump wear. Total additional savings here were over €18,000 (representing 14% of OpEx).

Whether you are pursuing the asset performance improvement initiatives with your in-house team, involving a third-party integrator, or working with Schneider Electric, the fundamentals are the same.

Asset Performance fundamentals:

1. Evaluate your current operations to assess the potential return and set targeted improvements

2. Implement the improvement and monitor progress against targets over a few months

3. Adjust performance accordingly

From reliable operation to continuous optimization

The fundamentals for asset performance improvement initiatives

You will eventually reach a point of consistently meeting targets and reaping the rewards of your investment, freeing up cash for other upgrade and modernization initiatives.

But the process should not end there. Water and wastewater operations are fluid by definition, plants and networks will always need to go beyond initial objectives to adapt to changing economic circumstances and physical realities. EcoStruxure as your optimization platform, gives you an architecture that will help you reach increasingly higher performance optimization plateaus.

Explore the possibilities with our water industry experts.

Schedule a call

For more visit [EcoStruxure Pumping Performance Advisor website](#)



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Discover EcoStruxure Pumping Performance Advisor – Predict failures before they happen.
To learn more visit:

www.schneider-electric.com/pumpingperformance

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