Introduction

*Connected Asset Lifecycle Management (CALM)* is the second in our series of papers that looks at how connected technology is beginning to transform the power and utilities sector.

Across all asset-intensive industries, including power and utilities, companies are under increasing pressure to do more with less, enhance customer service, improve asset uptime, and advance performance predictability.

Critical to performing well in this environment is having access to the right information at the right time. However, power and utilities companies historically have been frustrated by limited knowledge of an all-important component of their business: their assets.
On the back foot

The absence of a detailed, end-to-end view of an asset portfolio makes it hard to achieve value for money across the asset lifecycle.

Lack of information also prevents power and utilities companies from establishing a forward-looking view, making it difficult to predict when assets may fail and from adopting a risk-based approach to investment. This, in turn, creates an environment in which reactive maintenance—which affects customers and is costly and disruptive—is the norm, and scheduled work cannot be completed as planned.

Today, companies increasingly are realizing that a coordinated approach is needed to deliver the required change in asset performance and efficiency. Improved strategic planning should enable organizations to extract maximum value from their assets and build resilience to the potential business impact of issues such as climate or demographic changes.
Making the connection

At the heart of a coordinated approach is the concept of “connected assets.”

Having connected assets means integrating operational technology with information technology; cultivating a deep understanding of the organization’s physical assets; and possessing high-quality, reliable data that can be used to produce the insights needed to generate incremental, long-lasting business improvements.

The Internet of Things (IoT) creates new data streams that can aid decision making and connect assets with other sources of live intelligence. IoT and other novel tools can enable scenario planning and predictive asset performance, but if deployed in isolation, these tools may fail to deliver the required commercial benefits.
Culture shock

While opportunities are clear, challenges are significant.

Connecting assets will likely require that companies make changes to operations and culture—as well as adopt new ways of working across the organization. Field workers and operators will need to embrace registering data as a fundamental part of their job. Engineers and asset managers will have to learn to integrate results from advanced analytics into their decision making. And asset information managers will need to own and manage the data.

Figure 1. The digital water utility of the future

- **Customer experience is improved through digitalization** and integration of smartphones as sensors and data-streams
- **Robots** do physical tasks: humans can **avoid danger zones**, and pipes are installed faster and with **less variability**
- **Tiny insect-inspired robots** check pipes and **make repairs in situ** without causing damage to the network
- **Built-in IoT sensors** self-monitor assets and the network
- **Instead of humans searching for asset wear and tear visually, drones** inspect exterior

Potential benefits:

- Improved safety
- Insight-driven operations and maintenance
- Better defect detection and predictive failure
- Greater customer value delivered
- Improved sustainability
In addition, company policies likely will need to be based on sound data analysis, which is then fed back to the field. Operations, in turn, will be expected to provide feedback on policy decisions, creating a virtual circle of analysis and improvement.

Figure 1 illustrates some of these changes in a water company of the future.

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Advanced asset management (e.g., improved efficiency, predictive failure and environmental compliance)

Fewer technicians remain on the ground

Fully integrated catchment management:
- Water resources
- Sludge
- Bio-products
- Energy

Technicians increasingly control things remotely via real-time problem-solving and decision making.
The data challenge

Applying a connected asset approach is relatively new in the power and utilities sector, with a number of factors in play.

**Lack of data**

Most power and utilities companies have so many assets under management that it is not uncommon for the condition of some of them to be unknown—particularly when the assets are below ground. With a sewage infrastructure dating back to the Victorian age, for example, the first time a water company may acquire full information on an asset is when a leak has to be repaired. With accurate data on assets’ operational state, a prerequisite for their effective management, many companies are struggling to institute a fully integrated approach.

Lack of data also affects customers who, understandably, want to be kept informed of maintenance work (planned or otherwise), as well as the duration and severity of service interruption. Weak asset management increases the likelihood of asset failure, and customer satisfaction scores are more likely to be impaired by a major outage than planned replacement work.

**Silo mentality**

Until now, many asset managers have collected and stored data in silos. In some cases, the same data set exists in a variety of locations and in incompatible formats. Each silo may rely on and trust its own data but lack confidence in the quality and suitability of the limited data others provide. This prevents power and utilities companies from making effective use of the wide range of data they already collect—a problem compounded when data governance and field teams fail to update asset data after carrying out an intervention.

**Asset strategy**

Lack of data and a silo mentality have prevented some companies from truly understanding how their assets are performing; not to mention how critical those assets are. This knowledge gap may manifest itself in the number of times assets unexpectedly need to be repaired and rebuilt, along with the costs, delays, and customer satisfaction impacts this entails. It also may mean that decisions on whether to maintain, repair, or replace degrading assets will be made without an effective asset strategy in place.

In contrast, if companies can predict accurately when to replace an asset, our experience suggests they could save 10 to 15 percent of operational expenditure (OPEX) and 5 to 8 percent of capital expenditure (CAPEX). At a time when regulators and shareholders are looking to asset owners to provide better value for money across the asset lifecycle, these efficiencies simply cannot be ignored.

Further still, with regulators pushing water companies to look at total expenditure (TOTEX), organizations dependent on large-scale infrastructure now have little option but to more effectively manage the entirety of their assets over a project’s lifespan.
Spinning plates

Power and utilities companies also are being directed to be more customer-focused—with regulators using both carrot and stick to make sure it happens.

In a transforming power and utilities industry, companies increasingly should address supply continuity, affordability, and customer satisfaction while they concurrently focus on maintaining profits and meeting investor expectations.

To keep the company’s portfolio performing as necessary to help achieve these objectives, managers should consider all aspects of the asset management lifecycle—from investment planning and capital project delivery through operation and maintenance.

The good news is that there are tools to help asset managers at each lifecycle stage:

- Virtual models can help anticipate potential issues, reduce costs, and improve safety and reliability.
- Capturing physical data from the moment assets are installed can improve reliability and allow the assets to be monitored in real time to predict maintenance needs.
- Predictive analytics can improve maintenance cycles and prolong asset lifetimes.
- Analyzing asset information helps inform future upgrade and planning cycles.

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The digital twin

With data firmly established as being central to effective asset management, how can companies best acquire and maintain it?

Arguably, one of the most important asset management solutions today is the digital twin—a virtual representation of a physical asset. Enabled by the IoT, this pairing of the virtual and physical worlds allows power and utilities companies to analyze data and monitor systems to prevent downtime, develop new opportunities, and use simulations to plan for the future. By moving to a data-centric approach, companies can realize significant efficiencies over time.

The volume of data the water sector collects, for example, has increased dramatically in recent years to include flow, chemical concentration, and laboratory data; metering and customer usage data; engineering and construction data; and asset performance and maintenance data. This collection provides a rich vein of intelligence to monitor and control assets from procurement through retirement, giving companies the ability to diagnose and remedy issues before they cause a supply interruption. This ability to take preventative action, predict future asset performance, and reduce risk helps improve investment decisions.
A business imperative

Now is the time to decide who is responsible for the data analytics agenda within your organization and align the business and IT around the issue.

Connected Asset Lifecycle Management will require changing the way decisions are made, both centrally and on an operational level. Workers will need to be educated on the value of capturing and providing asset data in a way that, traditionally, they have not been required to. Operational efficiency should be viewed as a long-term strategy that uses data-driven insights to inform the analysis, design, and rollout of new business operating models. Personnel with technical and analytical skills will need to be deployed alongside those with business and commercial skills.

All this can present a significant challenge, as many companies will likely need to bring in additional capabilities and establish processes to industrialize analytics and ensure that insights are actionable and sustainable.

Done well, power and utilities companies will have valuable resources they can use for improved asset management and long-term strategic planning. Get it wrong and they risk being left behind.

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What does good look like?

The potential/sample benefits of more effective asset management include:

- Enhanced customer satisfaction from improved product or service performance and control
- Systematic and controlled processes that comply with legal, regulatory, and statutory standards, and align to ISO 55001
- Improved safety (e.g., water, employee, public)
- Improved risk management and corporate governance, and a clear audit trail for decision appropriateness
- Ability to demonstrate best value for money within a constrained funding regime
- Improved return on investment and growth through effective asset stewardship
- Enhanced corporate image, including improved product and service marketability, greater staff satisfaction, and more efficient and effective supply chain procurement
- Ability to demonstrate that sustainability is actively considered as part of asset utilization and selection
Deloitte’s Energy & Resources team has worked with most of the major energy and water companies in the United States. We understand the challenges you face and can help you address the strategic, operational, and cultural changes you may need to make.

We recognize that asset management is not just about fixing an immediate problem; it’s about driving longer-term value for customers, shareholders, and society. To that end, we also help our clients think about what they are investing in and what their strategic plan is, to ensure supply consistency to customers.

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