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Want to drive sustainability? Your data has the power

Track operational events, compare similar assets, and predict outcomes with a flexible and scalable data management platform

Executive summary:

Industrial companies know sustainability is critical to their success, but reaching sustainability goals often requires them to rethink their technology infrastructure. How can they become more efficient, operate safely, and reduce resource consumption while growing rapidly and remaining profitable?

As many as 65% of businesses say sustainability is a top priority,[1] but reducing energy usage, waste products, and total carbon footprint isn't simple—and it doesn't happen overnight. It requires deep visibility into operations, and that visibility starts with data.

Data is an incredible asset and a critical part of any successful sustainability strategy. Gaining a holistic view of operations allows companies to establish baselines and quantify progress.
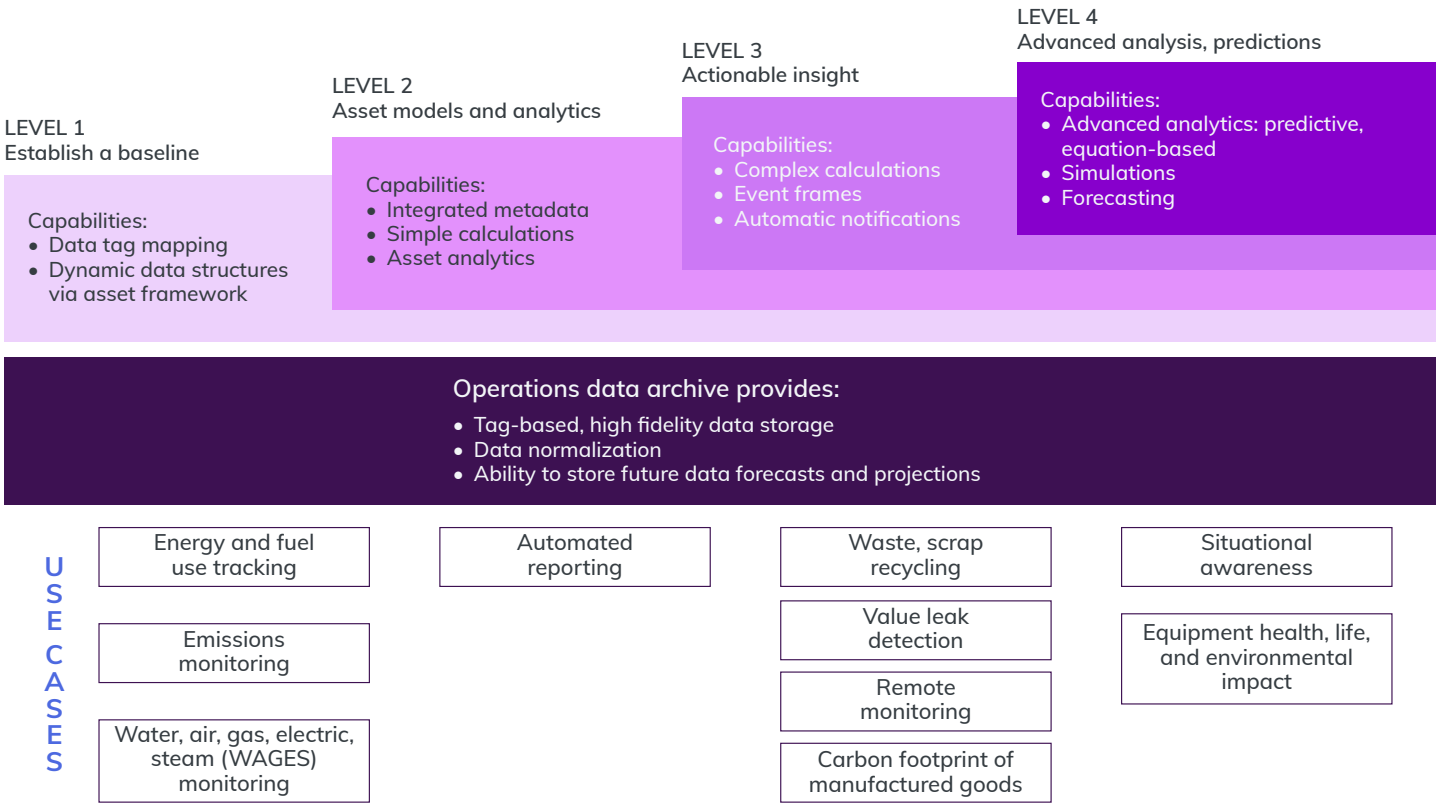
To move the sustainability needle and reduce emissions, companies are centralizing data into one location in an effort to overcome data silos and disparate systems that prevent them from gaining complete visibility into operations. When organizations collect, store, and contextualize operations data properly, users from across the organization can perform faster discovery and analysis, gaining relevant insights so they can make sustainable decisions.

The data management maturity framework

Every industrial company uses operations data to make decisions to varying degrees. Some companies are just now implementing an enterprise-wide data infrastructure, while others are layering in advanced tools that leverage artificial intelligence (AI) and machine learning (ML) to predict future outcomes. As their data management techniques become more advanced, companies will see greater benefits. Regardless of where a company is with its data management strategy, an operations data platform serves as the foundation for driving measurable sustainability outcomes that increase in complexity and scope.

A strong and flexible data management infrastructure will evolve and support you as you delve deeper into sustainability and pursue more complex use cases. Companies at every level of the maturity curve are driving measurable outcomes that deliver profitability. The framework below describes the typical benefits associated with each level of data management and illustrates the benefits of investing in a platform that can grow and mature along with your needs.

Sustainability use cases by data management level

LEVEL 1
Establish a baseline

Capabilities:
- Data tag mapping
- Dynamic data structures via asset framework

LEVEL 2
Asset models and analytics

Capabilities:
- Integrated metadata
- Simple calculations
- Asset analytics

LEVEL 3
Actionable insight

Capabilities:
- Complex calculations
- Event frames
- Automatic notifications

LEVEL 4
Advanced analysis, predictions

Capabilities:
- Advanced analytics: predictive, equation-based
- Simulations
- Forecasting

Operations data archive provides:
- Tag-based, high fidelity data storage
- Data normalization
- Ability to store future data forecasts and projections

USE CASES

Energy and fuel use tracking	Automated reporting	Waste, scrap recycling	Situational awareness
Emissions monitoring		Value leak detection	Equipment health, life, and environmental impact
Water, air, gas, electric, steam (WAGES) monitoring		Remote monitoring	
		Carbon footprint of manufactured goods	

As companies expand their use of operations data and apply new techniques, they can come closer to reaching their sustainability goals.

[1]Newman, Daniel. "The Future of Corporate Sustainability—Even in a Tough Economy." Forbes, 5 Dec. 2022, https://www.forbes.com/sites/danielnewman/2022/12/05/the-future-of-corporate-sustainability---even-in-a-tough-economy/?sh=3cd167a51ce5.

Level 1: Establish a baseline

At this level of data management, companies are collecting, storing, contextualizing, and accessing real-time operations data to make decisions that drive greater sustainability. You can think of the baseline as basic tracking and monitoring. Level 1 is not rudimentary. It delivers substantial benefits and is foundational to more advanced use cases.

Achievable outcomes: Once you have reliable, granular data, it is easier to identify the small changes that can add up to meaningful impact. You can track and manage the use of key resources such as water, air, gas, electricity, and steam (WAGES). With additional source information from energy providers, you can go a level deeper and track your specific use of renewable energy and fuel sources.

Companies across industries can document measurable progress in their sustainability transformation and improve overall profitability by reducing resource consumption.

Characteristic behaviors:

- Monitor critical assets and processes in real time
- Collect high-fidelity data streams outside the control network
- A centralized data archive provides a single source of truth

Focus on establishing a baseline if:

- The data you need is stored in multiple, diverse locations, making it difficult to see the bigger picture
- Decision makers spend too much time gathering, interpreting, and organizing data to assess progress

NASA Langley Research Center: Reducing energy usage through tracking

With lofty energy reduction goals of 2.5% per year, NASA's Langley Research Center needed reliable, real-time data from the facility's 400 metering devices to gain the visibility they needed to reduce energy consumption. The team implemented AVEVA™ PI System™ as part of its new baseline energy information system to improve meter-data quality, fill in data gaps, and easily run usage reports.

With streams of real-time data now aggregated in their AVEVA™ PI Server and easily visualized on a live dashboard built using AVEVA™ PI Vision™, NASA's energy analysts can now see immediate consumption levels. For example, by identifying that supplemental chillers weren't properly turned off during the fall, Langley **saved over 3000 kilowatts per year** in energy consumption.

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Level 2: Deploy asset models and analytics

As data management progresses, companies create customized ways of organizing and viewing data streams. They define data structures (or frameworks) that represent asset types or production processes and use them consistently across multiple plants or operating locations.

Achievable outcomes: Standard asset models increase the accuracy, speed, and consistency of reporting. Companies can digest larger volumes of data in a faster, simpler way. Accurate and reliable dashboards and reports are now available on demand, reducing the need for IT support. Users can more easily compare locations or similar assets and identify anomalies quickly. Teams can use asset analytics, calculations, and variance analysis to track outcomes within a specific period of time.

As a result, teams spend less time gathering and assembling data and can diagnose issues with less effort and more accuracy.

Characteristic behaviors:

- Assets visualized as a collection of data streams
- Use of asset analytics, calculations, and variances
- Dashboards and reports may include metadata and linked tables

Focus on building asset models if:

- Impactful operating decisions get delayed by lack of timely information
- Plants differ substantially in the way they monitor data and lack a standard data model
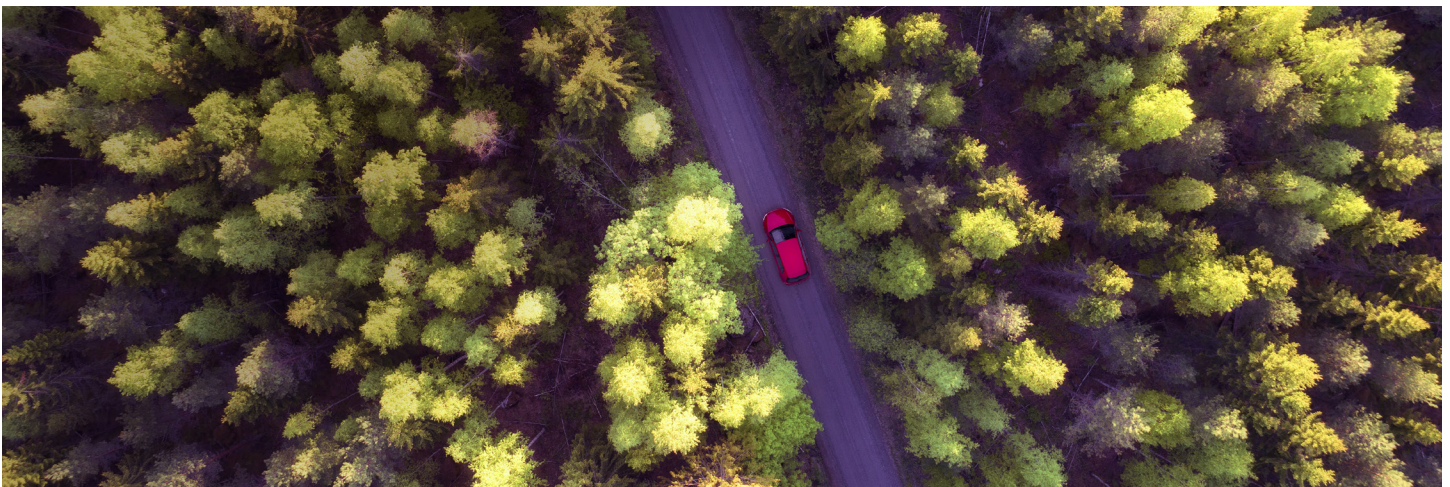
Toyota Motors, Europe: Reducing energy consumption and CO2 emissions

Before implementing AVEVA PI System, engineers at Toyota's European headquarters faced a time-consuming energy monitoring process. The European plants used different data platforms without a standard data model and had large discrepancies in monitoring capabilities, making it hard to compare data.

After transitioning their plants to a common data platform, headquarters began gathering data on each plant's water, air, gas, and electricity consumption and used AVEVA PI System's asset framework to build template-based data models to use in creating benchmarks and driving consistency. As a result, the company **reduced energy consumption by 35%, dropped CO_2 emissions by 28%, and cut data aggregation and validation time from hours to seconds.**

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Level 3: Develop actionable insight

When companies reach this level, they can develop deeper insight into their operations by transforming data in more complex ways. Users can leverage the results to make course corrections or to find and address root causes. Teams also can take advantage of data management features, like complex calculations using known relationships, event frames that capture data related to specific behaviors, and the ability to send automatic alerts or issue automatic work orders.

Achievable outcomes: A deeper analysis of causes and effects lets companies drive measurable improvements to resource consumption, CO_2 emissions, and waste generated. Comparisons between similar processes can detect value leakages. Automatic notifications can accelerate behaviors that improve sustainability and enable remote staff to respond to events in remote or hazardous locations.

Characteristic behaviors:

- Multi-step calculations that enable CBM, OEE, and rollups
- Event frames are used to identify data sets needed by other applications
- Automatic notifications, alerts, and work orders delivered to mobile devices

Focus on developing actionable insight if:

- Your company can benefit significantly from implementing a change with greater speed
- Deeper analysis is needed to identify further opportunities after initial sustainability projects

Kellogg's: Improving equipment effectiveness with proactive maintenance

Kellogg's has long relied on operations data to monitor operations and resource consumption. More recently they began using operations data to improve mean time between failures for critical production line equipment and deliver ROI through cost reductions and more effective plant maintenance.

The Valls plant wanted to meet the best-in-class standards of the consumer packaged goods industry for overall equipment effectiveness (OEE). Utilizing the richer, real-time analytics made possible by AVEVA PI System, the plant improved its root cause analysis to reduce disruptions and stops on the line. Using data to implement proactive maintenance helped the plant **reduce critical incidents by 64%, slash the number of cases scrapped due to equipment failure by 73%, and increase OEE to 80%—the CPG benchmark.**

Level 4: Leverage advanced analysis and AI

In advanced data management, companies use real-time operations data as the basis for running forecasting, simulations and predictive models, helping to anticipate outcomes before they occur. With so many AI- and ML-based solutions coming to market, companies need a vendor-neutral data platform that integrates seamlessly with third-party solutions and protects data in the cloud.

Achievable outcomes: Advanced analysis helps companies improve situational awareness and safety monitoring, prevent costly disruptions and maximize operational reliability. Real-time data is the key driver in predictive analytics, maintenance, and asset reliability solutions.

Whether you apply your own internally developed algorithms or rely on third-party service providers, an understanding of causes and effects helps you make changes in operations that will have a measurable impact on resource consumption, CO_2 emissions, and waste and scrap.

Characteristic behaviors:

- Integration of data with advanced analytics and AI to become more proactive
- Use of real-time data in forecasting, predictions, and simulations
- Evolving data models into working digital twins

Leverage advanced analysis and AI if

The cost of unexpected disruptions to production or impact on the environment could seriously damage your business	Reliable predictions would help you maximize your sustainability outcomes

A platform that expands as your sustainability efforts expand

As we've seen by exploring this framework, an enterprise-class operations data platform can support many use cases over time as companies and users grow more experienced with the features and capabilities it offers. Rather than thinking only about your most immediate need, consider how your data platform can support your needs over time, as your sustainability efforts become more rigorous and detailed.

In today's competitive market, companies should settle for nothing less than sustainable, optimized operations. By laying the data management foundation, companies can extract the right insights to make data-driven decisions that enable sustainable, profitable outcomes.