

WHITE PAPER

Benefits of Incorporating Renewables Into an Integrated EAM

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With the rapid expansion of renewable energy resources, utilities are navigating an increasingly complex asset landscape. Traditionally, renewable energy resources have not been part of the enterprise asset management (EAM) system and follow a siloed approach for maintenance. An integrated EAM system can help companies optimize their renewable assets' life cycles, make strategic decisions on repair and replacement, and provide a comprehensive, real-time view of all their assets.



As renewable capacity continues to skyrocket, it's increasingly important that utilities commit to an integrated enterprise asset management (EAM) system. In 2023, the amount of renewable energy capacity added to energy systems around the world grew by 50% — to a record total capacity of 3,870 gigawatts (GW) globally. And, according to the International Renewable Energy Agency (IRENA), total renewable capacity is expected to double by 2028.

The utilities industry is navigating a complex landscape as it incorporates renewable resources into portfolios at an unprecedented pace. The accelerated push toward decarbonization stems from a range of variables, including unprecedented demand for power, healthy tax incentives

and sweeping clean-energy legislation. The Inflation Reduction Act (IRA) has poured billions of dollars into projects that generate clean energy, while the Infrastructure Investment and Jobs Act (IIJA) is doing the same for grid reliability, electric vehicle programs and systems that promote energy efficiency.

For utilities racing toward net zero, this new mix of energy sources presents unique challenges. Renewables require different maintenance protocols and practices; operators new to renewables may not know how to apply reliability and risk tolerances to those practices. Navigating peak demand issues by deploying energy storage devices brings a new set of challenges to maintaining batteries and integrating them to minimize downtime.

Yet, prioritizing those considerations is key for owners and operators who want to maximize their investment, maintain energy reliability, mitigate risks and meet regulatory requirements.

To navigate these fast-moving changes, some utility owners and operators are opting to manage renewable resources separately — even through outsourcing — rather than integrate renewables into their overall asset management strategy. That approach can work, but there could be complexities and unrealized potential benefits as scale increases. Any entity incorporating renewables into its portfolio needs to understand that an integrated EAM system is ideal for a host of reasons, including efficient performance, effective maintenance management and risk reduction. A unified, data-driven and AI-powered EAM system is a streamlined, cost-effective way for operators to deliver reliable, resilient and sustainable energy services.

Managing More, Managing Better

Utilities should take a proactive and holistic approach when integrating renewables into their portfolio. To increase efficiency and cost-effectiveness, they must assess their people, processes and technology. Key questions to consider include:

- Are we prioritizing short-term gains or long-term sustainability?
- How will our talent pool — maintenance technicians in particular — adapt to the changes?
- What approach will optimize our operations, mitigate risk and enable proactive maintenance management?
- How can we extend the life of our assets in the most cost-effective manner?
- What is the value of having a single, unified view of all our assets?

Rapid integration of renewables poses significant challenges, leading some utilities to partner with original equipment manufacturers (OEMs) or third-party vendors for maintenance. It's understandable, given the significant scale of renewables and the amount of work they present. For example, a 250-megawatt (MW) wind facility will have about 50 to 60 wind turbines and about 50 miles of collection lines. A typical 130-MW solar facility could have 350,000 modules and 30 inverters. However, this split approach can lead to disparate maintenance systems and software, creating silos and inefficiencies. To avoid this, providers should proactively integrate renewables into their existing infrastructure, establishing unified maintenance and monitoring practices. By doing so, they can leverage historical data to refine maintenance strategies and improve overall efficiency.

Integrating renewables into the overall EAM system gives operators a holistic line of sight into their assets, enabling utilities to optimize their people, processes and technologies. In fact, a significant benefit is the impact this has on an entity's team, whose members have the opportunity to broaden their skill sets and participate in significant organizational change.

Why an EAM System

An asset management system provides a comprehensive solution for managing assets, covering their entire life cycles and offering visibility across all assets, from solar panels to poles. Compared with siloed OEM solutions, an EAM system offers advantages including:

- A centralized database of assets, including work and configuration history.
- A single source for the maintenance life cycle of each asset, including scheduling, planning and work activities.
- Unified management and reporting for all renewable energy sources.
- Efficient procurement and inventory management.
- Improved decision-making abilities stemming from insights into asset performance, maintenance cost, downtime and more.
- Shared best practices for maintenance and asset management across geographically dispersed sites, avoiding siloed operations.

Because maintenance is a significant challenge and expense when integrating renewables, utilities can benefit from exploring how an EAM system enhances performance. The benefits are particularly vast when considering the entire life cycle of the asset.

Optimize Resources

Renewable energy assets need regular maintenance to maintain optimal performance and a long life span. Maintaining them is costly, time-consuming and can pose significant safety risks. Utilities that use an EAM system can schedule preventive maintenance based on asset condition. This proactive approach minimizes downtime, repair costs and risk.

For instance, wind farms are vast, and maintenance technicians spend considerable time in transit. By reducing "windshield time," utilities can maximize operational effectiveness. Also, since reaching turbines requires technicians to work about 150 feet above the ground, safety is a critical component to any maintenance plan.

Without an EAM system, utilities often rely on time-based maintenance schedules. By monitoring performance at scale using real-time asset data, utilities can reduce unnecessary maintenance and downtime while improving resource allocation. That's a formula for substantial savings over the long term.

Work From One Data Set

An EAM system allows operators to effectively manage and improve their assets' performance by using a centralized data repository for asset information, maintenance data, performance metrics and more. This centralized platform offers a single source of truth, giving operators a clear and comprehensive view of their assets.

Having consistent insights into assets, resources deployment and expenses in one platform allows operators to learn from historical practices and leverage that learning to create more efficient maintenance practices, driving continuous improvement and reliability.

When a utility has disparate systems for tracking maintenance, such as separate systems for renewables and conventional energy sources, it can lead to inefficiencies and subpar performance. In contrast, a single source enhances the ability to budget, manage workloads and prioritize maintenance.

Not only does the EAM system provide a single platform for operators to manage assets, but it also offers a comprehensive view of asset health to multiple stakeholders, including reliability engineers and CIOs, enabling informed decision-making across the organization.

Enhance Team Performance

When leveraging an EAM system to manage assets, technicians will have access to a powerful data-driven tool to help guide decisions and track learning opportunities. It also will empower them to understand their roles within the broader asset life cycle.

When utilities outsource maintenance to an OEM, they might be missing a valuable opportunity for growth and development. When maintenance is kept in-house, technicians gain hands-on experience and a deeper understanding of asset management, enabling them to develop and refine their skills. The integrated approach can lead to improved asset performance, reduced downtime and increased efficiency.

What Happens Without an EAM System

The risks of not having an integrated EAM system include:

- Reduced visibility and control, leading to inefficiencies in asset management, missed maintenance opportunities, and increased risk of equipment failures or unscheduled downtime.
- Ineffective maintenance practices that are more reactive than strategic, leading to higher costs, more downtime and a shorter asset life span.
- Reduced reliability, which could lead to outages. In general, renewables can be less reliable than traditional energy sources because they're impacted by weather and more. An EAM system enhances efficiencies in general, so without one, a utility increases its vulnerability.
- Siloed data, which leads to siloed decision-making. A holistic analysis of asset performance will optimize maintenance practices and inventory.
- Missed opportunities for innovation, because an EAM system allows the utility to tap into emerging technologies, from AI analytics to best practices in integrated management.
- Compliance risks, as the utility navigates multiple reporting deadlines and requirements on everything from environmental impact data to key performance indicators.

Best Practices for Integration

To maximize the benefits of incorporating renewables into an EAM system, utilities should establish a systematic approach from the outset. This initial investment will minimize challenges and deliver successful integration of renewables into the EAM.

Key best practices:

- **Establish a single naming convention.** Use a standardized naming system for assets, locations and hierarchy to prevent errors and facilitate maintenance bundling.
- **Bundle remote work.** Maintenance bundling is particularly important for high-altitude work on wind turbines, enabling technicians to complete multiple tasks in a single ascent.

- **Standard job instructions.** Record maintenance procedures and workflows in templated job instructions, including materials, tools and skills. The repetitive nature of renewable generation maintenance tasks makes templated job instructions crucial for enhancing efficiency and reducing errors.
- **Hierarchy and work management.** Determine the appropriate level of asset and location tracking for maintenance. For instance, it's not common to track individual panels within a solar installation because they are typically replaced, not maintained. Appropriate hierarchy will help estimate workloads and associated work assignments, subassemblies' maintenance tracking, and scheduling overhead.
- **Training and skills development.** Building a comprehensive training program focused on technical knowledge, software proficiency and best practices will increase the team's skill level. Additionally, any maintenance technician certifications (optional or required) for the job can be managed and enforced as needed.

- **Safety-first approach.** Maintaining industrial equipment, particularly isolated high-altitude wind turbines, comes with significant risk. Prioritizing safety is crucial. An EAM tool can play a vital role in facilitating and enforcing safe maintenance practices by automatically applying appropriate safety plans to maintenance tasks. To maximize efficiency, safety plans should be standardized and templated, taking advantage of the repetitiveness of these tasks, similar to templated job instructions.

Conclusion

As the push toward net zero intensifies, utilities won't have a choice on whether to introduce renewables into their portfolios. To maximize their investment and stay ahead in the transition, utilities must seamlessly integrate renewables into their EAM system.

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