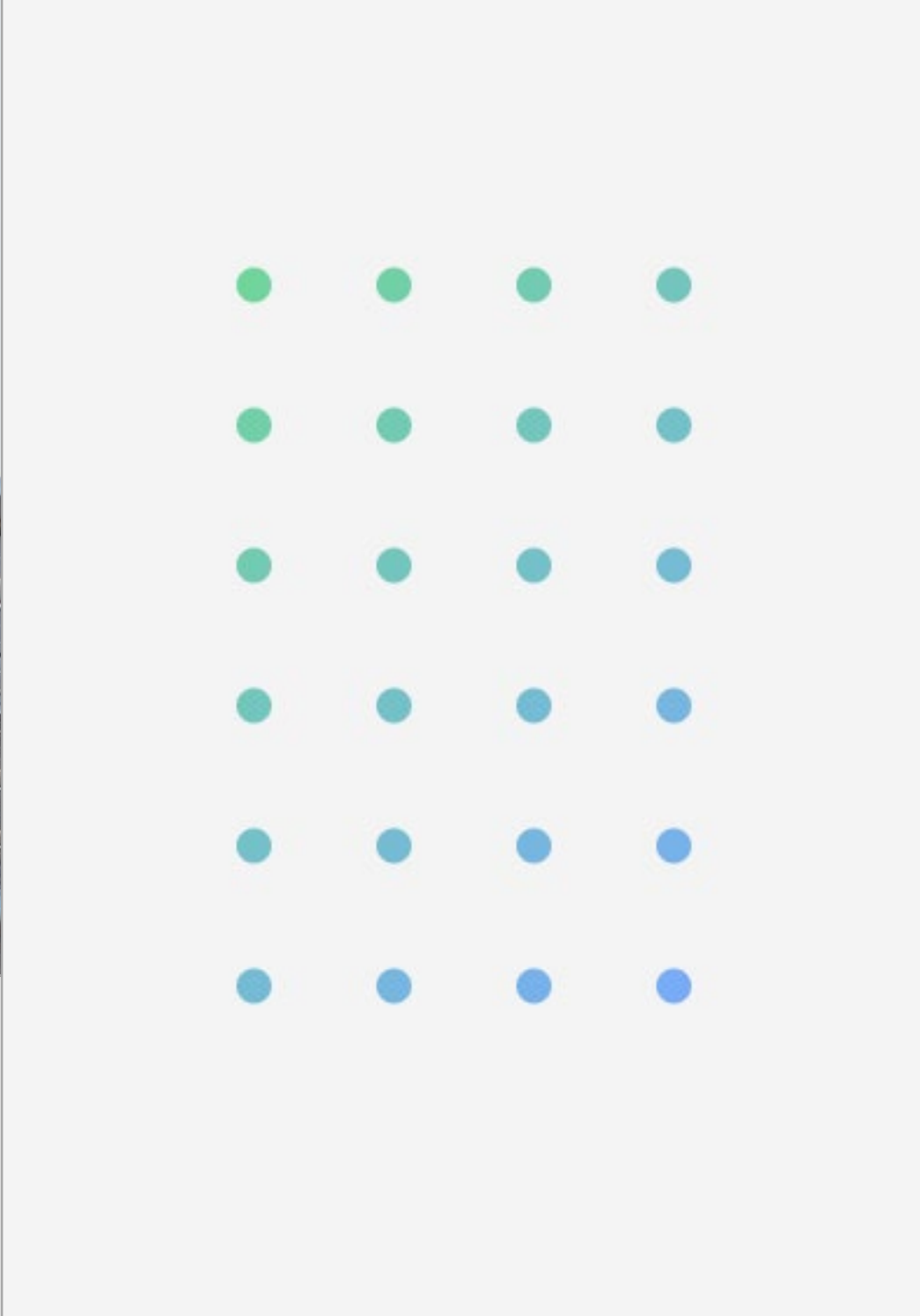
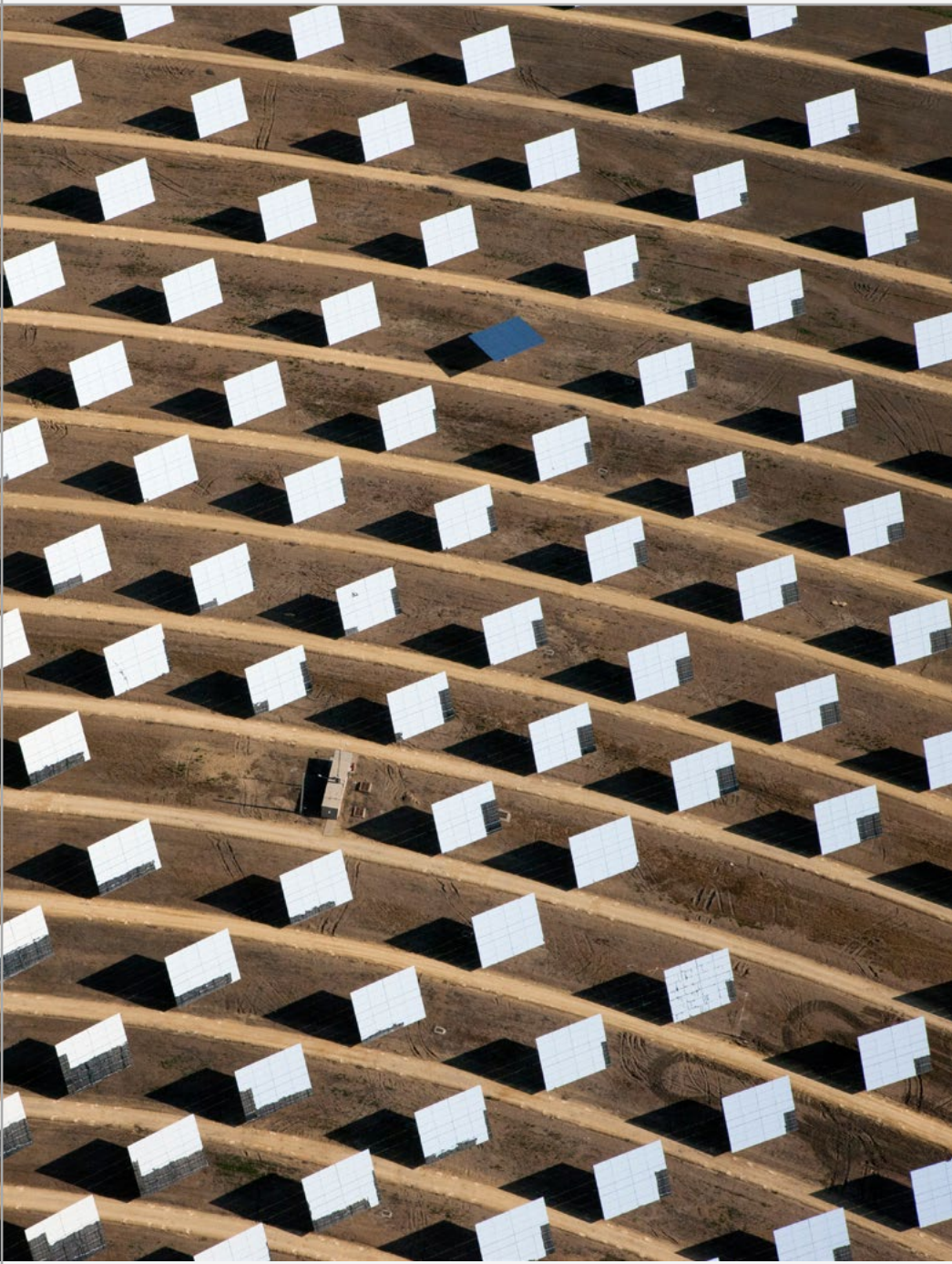
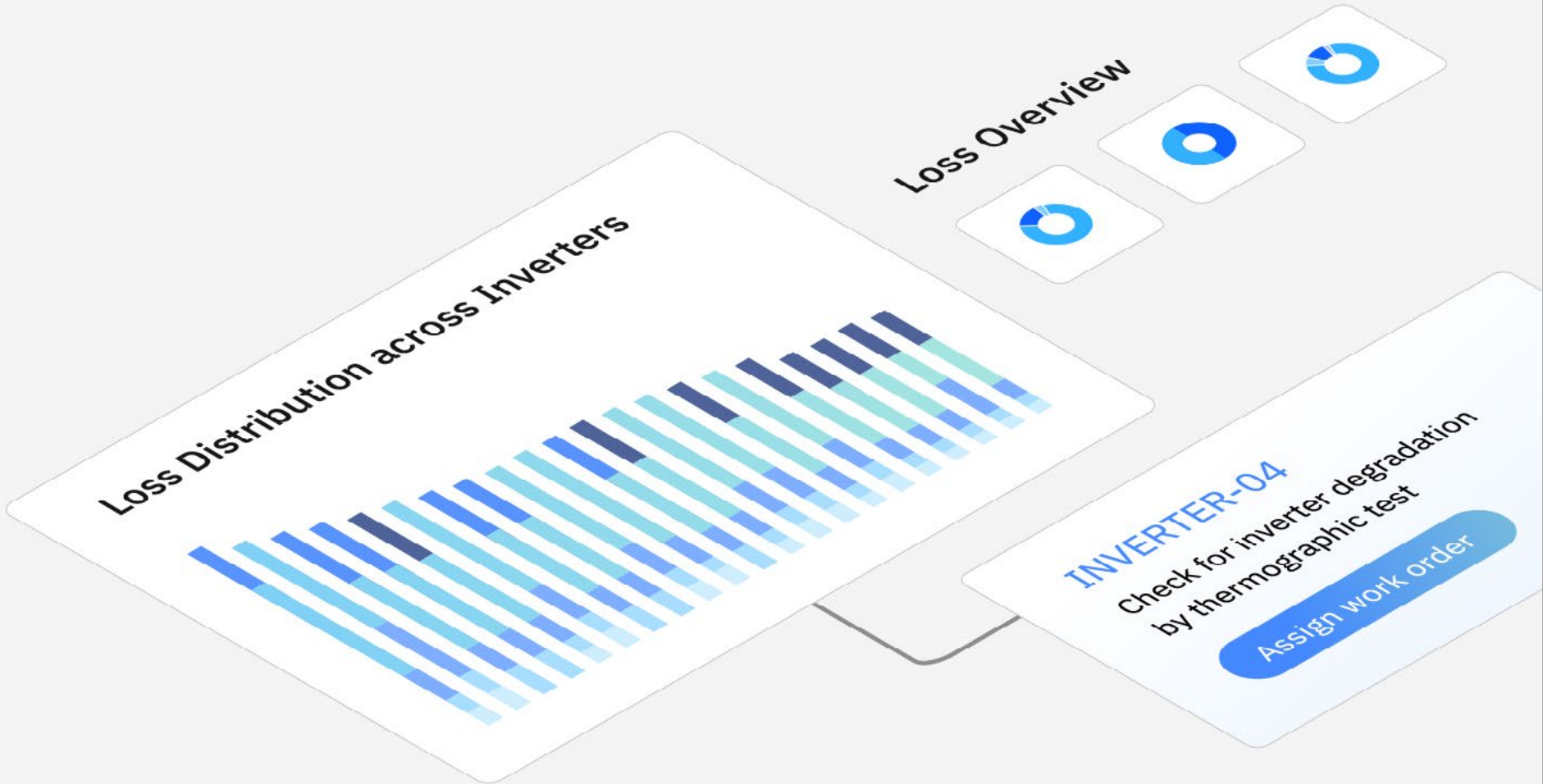


Buyer's guide

The Buyer's Guide to Renewable Asset Performance Management



Evaluate solutions, align capabilities with business outcomes and build a compelling investment case



Contents



[01 →](#)
Introduction

[02 →](#)
IBM Maximo Renewables
at a glance

[03 →](#)
Drivers for APM adoption
in renewables

[04 →](#)
What you should look for
in a modern APM solution

[05 →](#)
IBM Maximo Renewables:
The smart option for your assets

[06 →](#)
How IBM Maximo
Renewables stands out

[07 →](#)
Your real ROI with
IBM Maximo Renewables

[08 →](#)
Ready to choose smarter?
Your APM evaluation cheat sheet

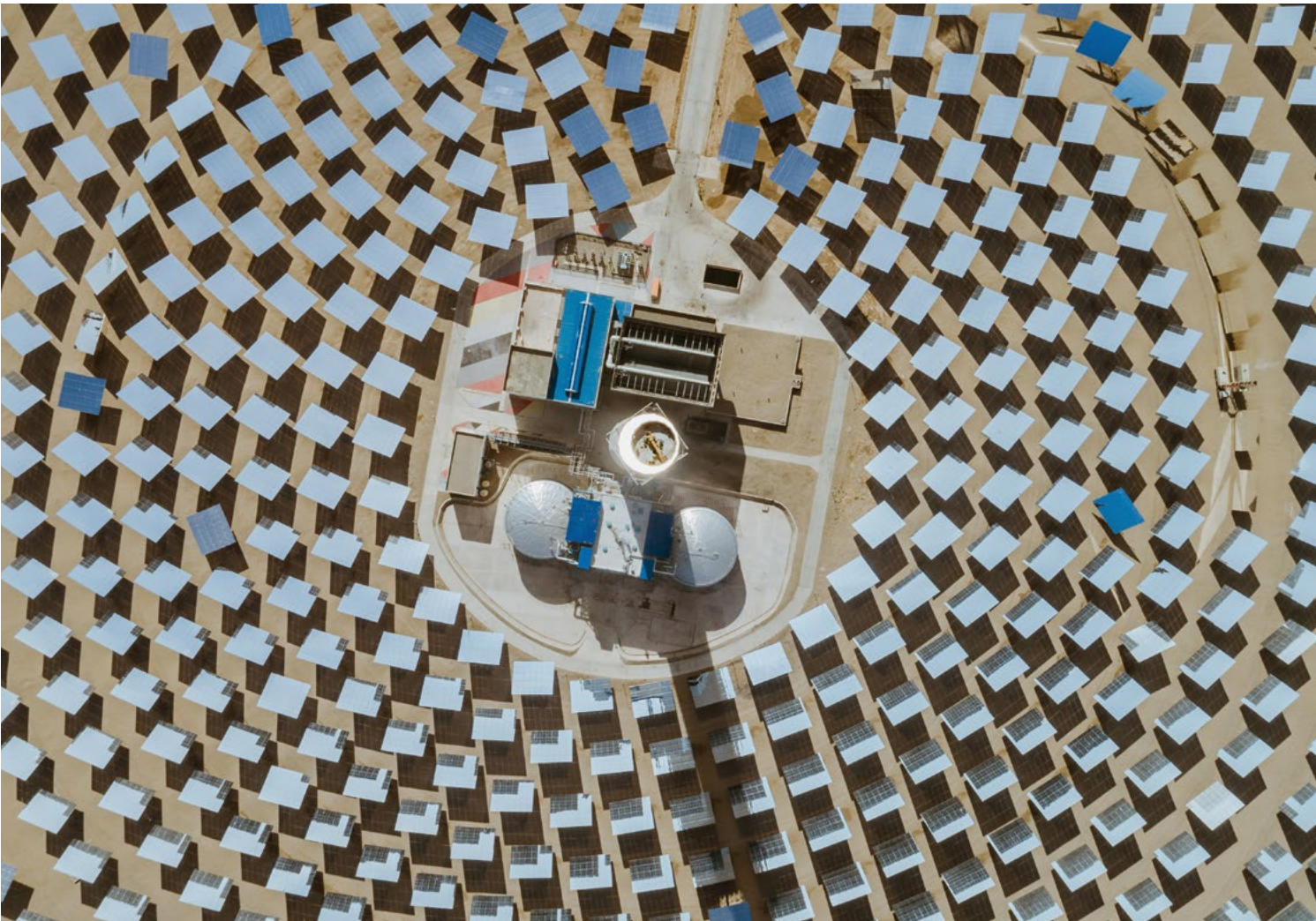
[09 →](#)
Why IBM

01

Introduction

Executive summary

Renewable energy is scaling rapidly. According to the International Energy Agency (IEA), global renewable power capacity will need to more than double by 2030, creating new opportunities—and new operational challenges—for asset-intensive organizations.



As renewable portfolios grow, operators must maximize asset performance, minimize downtime, ensure compliance and control operational costs across increasingly complex, multisite environments. As an operator of solar farms, wind parks and battery energy storage systems (BESS), your mission is clear:

- Maximize asset performance.
- Minimize downtime.
- Ensure compliance.
- Control operational costs.

But achieving these goals across diverse portfolios, fragmented data systems and evolving safety standards demands more than traditional tools. It requires a new operating model in the form of a modern, integrated asset performance management (APM) solution.

↪ This guide is for you if:

You're a decision-maker who shapes operational strategy and technology investments, including:

- Chief information officers (CIOs)
- VPs of asset management
- Operations & maintenance (O&M) leaders

You're either evaluating your first APM platform or upgrading an existing system and need clear frameworks to help you:

- Identify key capabilities to look for.
- Align APM features with business outcomes.
- Build a compelling case for investment.

↪ In this guide, you'll learn:

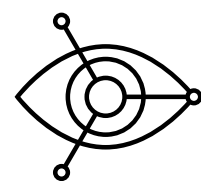
- Why renewable operators are investing in APM.
- What capabilities you should evaluate.
- How IBM Maximo Renewables compares.
- How to build your business case.



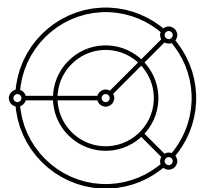
02

IBM Maximo Renewables at a glance

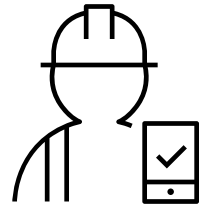
IBM Maximo Renewables use cases



Monitor: Unified asset visibility
Aggregate data from Supervisory Control and Data Acquisition (SCADA), the IoT and weather systems to monitor solar, wind and storage assets.



Analyze: AI-powered insights
Cover utility-scale and distributed energy portfolios, from inverters to strings.



Manage: Intelligent work execution
Translate analysis into automated work orders, intelligent scheduling and mobile-first field service execution.

The renewable energy industry is transforming rapidly as utilities, independent power producers (IPPs) and industrial operators expand solar, wind and battery energy storage portfolios. As portfolios grow, so do the challenges of managing performance, availability and compliance across geographically dispersed assets from diverse original equipment manufacturers (OEMs).

IBM® Maximo® Renewables delivers an AI-powered SaaS platform designed to unify renewable asset management—integrating monitoring, analytics, operations and reporting into a single pane of glass. The result: improved generation efficiency, reduced operations and maintenance (O&M) cost and greater operational resilience.

Built on the trusted IBM Maximo Application Suite, IBM Maximo Renewables combines advanced AI analytics, predictive maintenance and end-to-end asset lifecycle management (ALM). Within the first year of adoption, operators achieved the following results.

15%
generation improvement¹

20%
O&M cost reduction
and measurable ROI²

Key challenges in renewable operations

Renewable operators face increasing complexity as each site may integrate dozens of OEM systems and hundreds of data interfaces. Balancing uptime, performance and sustainability goals adds further operational pressure. Effective root-cause analysis demands asset-specific expertise and near real-time prioritization, while manual, fragmented reporting still consumes valuable engineer hours and slows decision-making.



03

Drivers for APM adoption in renewables

Why renewable operators are turning to APM—and you should, too.

A challenge-solution breakdown.



Undetected underperformance

Minor but persistent inefficiencies—such as inverter clipping, string outages, gearbox wear, blade misalignment or weak battery modules—often go unnoticed. Over time, these inefficiencies degrade yield significantly. Without AI-driven diagnostics and high-resolution monitoring, such hidden losses remain invisible.

These losses are silent—revenue bleeding out below the alarm threshold, with no fault code to trigger a response. Industry research consistently places average solar underperformance against P50 forecasts in the high single digits, and unlike a hard failure you can fix tomorrow, lost generation from last quarter is gone permanently. A few points of undetected underperformance isn’t a rounding error; it’s a material hit to investor cash flows.

Data overload, limited insights

Operators handle streams of data from SCADA systems, condition monitoring sensors, Modbus devices, weather stations and online weather services. In mixed fleets, each OEM often provides its own monitoring portal, forcing operators to toggle between multiple systems for only a partial view. This method is time-consuming, increases the risk of missing critical events and creates compounded challenges, such as data latency and poor data quality. In the absence of harmonization of these disparate data sources, creating a comprehensive portfolio-wide report becomes an additional challenge.

Engineering teams spend a large share of their week reconciling data instead of acting on it—the most expensive talent in the organization doing the lowest-value work. Worse, the events that matter most get lost in the noise, so problems are caught late, when they’re expensive to fix rather than cheap to prevent. At portfolio scale, these issues aren’t an inconvenience—they’re a structural ceiling on how many megawatts a team can actually manage well.

Multisite deployment and grid integration complexities

Managing geographically dispersed, multitechnology fleets adds layers of complexity. Integration across OEMs, regulatory jurisdictions and grid interconnections is difficult. Operators must also manage curtailment events and ensure compliance with power purchase agreement (PPA) performance guarantees, where even small deviations can trigger financial penalties.

When PPA performance guarantees are missed, the penalties hit the bottom line directly—and the burden of proof sits with the operator. Without a unified, defensible data trail across sites, disputes with offtakers and lenders become expensive to fight and easy to lose. Every new site, OEM or jurisdiction added to a fragmented operation compounds this exposure, meaning the risk grows faster than the portfolio does.

Cost and margin pressure

Failing tariffs and competitive bidding mean operators must extract maximum yield at the lower O&M costs. Even a 1%–2% gain can make or break internal rate return (IRR) on larger portfolios.

As merchant exposure rises and PPA prices compress, there’s no longer any slack in the model to absorb operational inefficiency. The operators who win the next round of bids will be the ones who can credibly run at lower O&M cost per MWh—and that capability is built years in advance, not at bid time. Margin discipline has shifted from a finance exercise to an operational one, and the tooling an operator runs today determines the cost base they can compete on tomorrow.

Compliance, risk and resilience

Growing obligations under ISO standards, PPA contracts and environmental, social and governance (ESG) mandates require automated reporting and noncompliance can trigger penalties, lost investor confidence or even PPA termination. At the same time, operators face rising risks from grid instability, cyberthreats or even climate-driven events.

Compliance has moved from a reporting task to an existential one—a missed obligation can mean penalties, a damaged lender relationship or, in the worst case, a terminated offtake agreement that strands an asset. Manual reporting can’t keep pace with the growing surface area of obligations, and every gap is a liability waiting to surface in an audit. Meanwhile, cyber and climate exposure mean resilience is now something lenders and insurers actively price—operators who can’t demonstrate it pay more for capital and coverage, if they can secure it at all.

04

What you should
look for in a modern
APM solution

A modern APM solution for renewable operations must provide:



Centralized, OEM-agnostic asset visibility

- Data integration from all OEMs, devices and protocols, delivering high-resolution, near real-time insights with minimal latency
- Data normalization and harmonization across disparate sources to ensure top-quality, actionable data



Enterprise-grade asset management backbone

- Bankable availability metrics that stand up to lender, offtaker and tax equity scrutiny
- Enterprise-grade security, governance and support built for regulated environments



Near real-time performance monitoring

- Renewable industry-specific KPIs and dashboards offering portfolio, plant and asset-level insights
- Unified view of alarms and intelligent alerting to prevent alarm fatigue



Performance intelligence

- AI-powered analytics trained on renewable energy specific assets that detect root causes of losses, such as inverter clipping, soiling, yaw misalignment
- Reliability strategies and preventative maintenance capabilities embedded to reduce the down time and extend asset life



Mobile-first field service management (FSM)

- Integrated work order management that converts performance insights into action
- Intelligent assignment of work orders to the right crew, with mobile-first tools, enabling technicians to execute tasks and provide near real-time updates—even offline



Multisite deployments and grid integrations

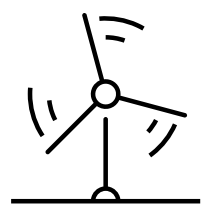
- Solutions that integrate seamlessly across OEMs, regulatory jurisdictions and grid interconnections
- Critical curtailment management and compliance with PPA performance guarantees, as even small deviations can trigger financial penalties



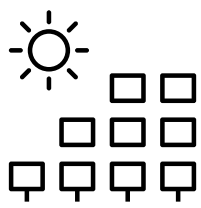
End-to-end asset lifecycle management (ALM)

- Asset investment planning, acquisition, operations, optimization and retirement
- Support for decision-making across all lifecycle stages

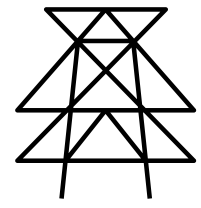
Where to focus



Wind
Supports all major OEMs with turbine analytics and availability management



Solar
Covers utility-scale and distributed energy portfolios, from inverters to strings



Energy storage
Optimizes performance across multiple chemistries and OEMs



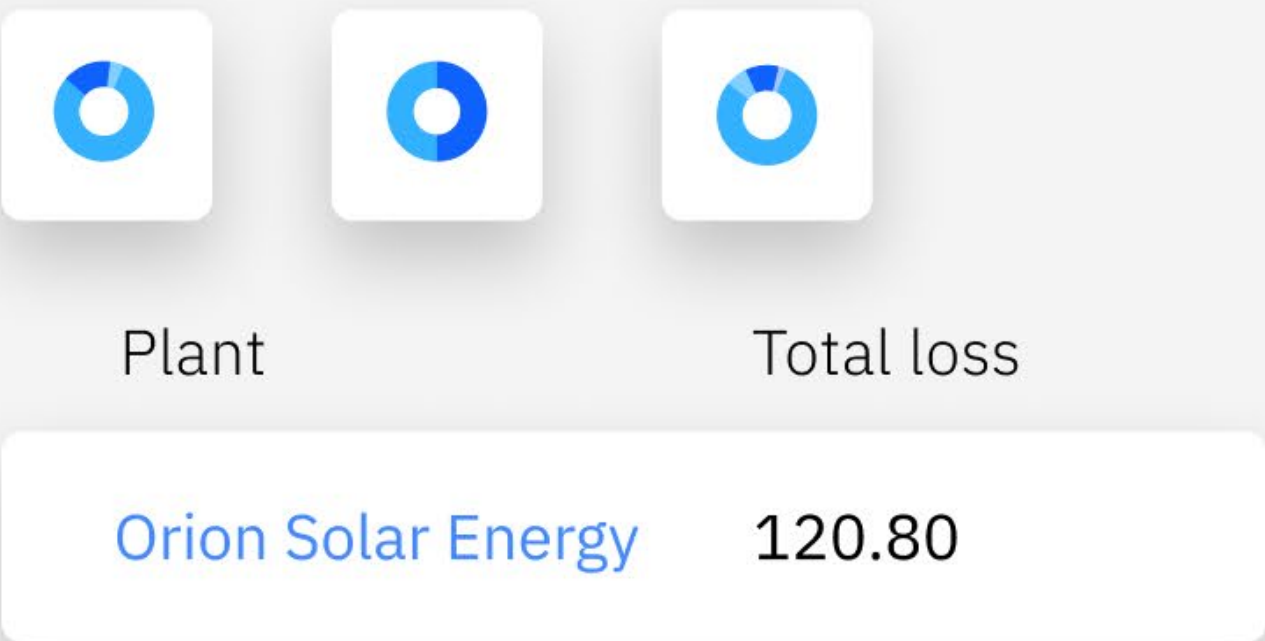
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IBM Maximo Renewables: The smart option for your assets

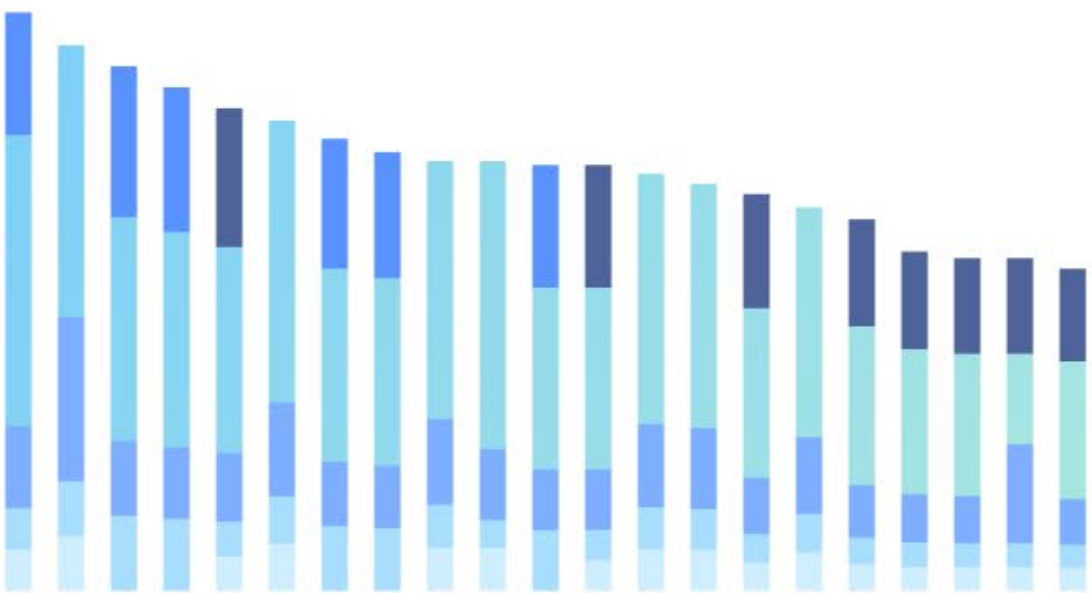
Asset health



Loss overview



Loss distribution across inverters



Recommendations

Inverter-04

Check for inverter degradation by thermographic test

Assign work order

Belting supply

Unit price	Lead time	Available
USD 156	42 days	204

Approve

IBM Maximo Renewables provides a comprehensive framework for end-to-end asset and performance management, addressing the unique needs of solar, wind and battery storage operators. Unlike siloed monitoring tools or point solutions, Maximo integrates the entire lifecycle into one unified platform.

The framework is built on three core capabilities.

1

Monitor:
Unified asset visibility

IBM Maximo Renewables enables near real-time tracking of asset health and performance across diverse renewable portfolios. The platform ingests data from SCADA, IoT devices, weather feeds and condition monitoring systems into a single, OEM-agnostic view.

2

Analyze:
AI-powered insights and reliability

Using prebuilt industry models, IBM Maximo Renewables applies AI-driven analytics to detect anomalies, classify losses and identify root causes of underperformance. Losses are categorized into actionable buckets, such as inverter inefficiency, yaw misalignment or soiling.

Value: Moves organizations from reactive maintenance to predictive and prescriptive operations—strengthening both reliability analysis and failure prediction

3

Manage:
Intelligent work execution

Insights don’t stop at dashboards. Maximo translates analysis into automated work orders, intelligent scheduling and mobile-first field service execution. Defects detected through drone scans or AI anomaly detection can trigger corrective maintenance directly in Maximo, helping ensure the right crew and parts are dispatched.

Value: Improves first-time fix rates, reduces downtime and helps ensure operational issues are addressed swiftly and efficiently

 IBM Maximo Renewables brings together monitoring, AI analytics, field service, inventory, lifecycle planning and reporting into one platform—delivering reliability, predictability and optimization at scale.

IBM Maximo Renewables: The smart option for your assets



How to get there:
Structured migration path

A phased rollout minimizes disruption
while delivering quick wins:

Pilot phase

Focused deployment at one site to
prove value and validate integrations

Multisite expansion

Templates, dashboards and processes
replicated across additional plants

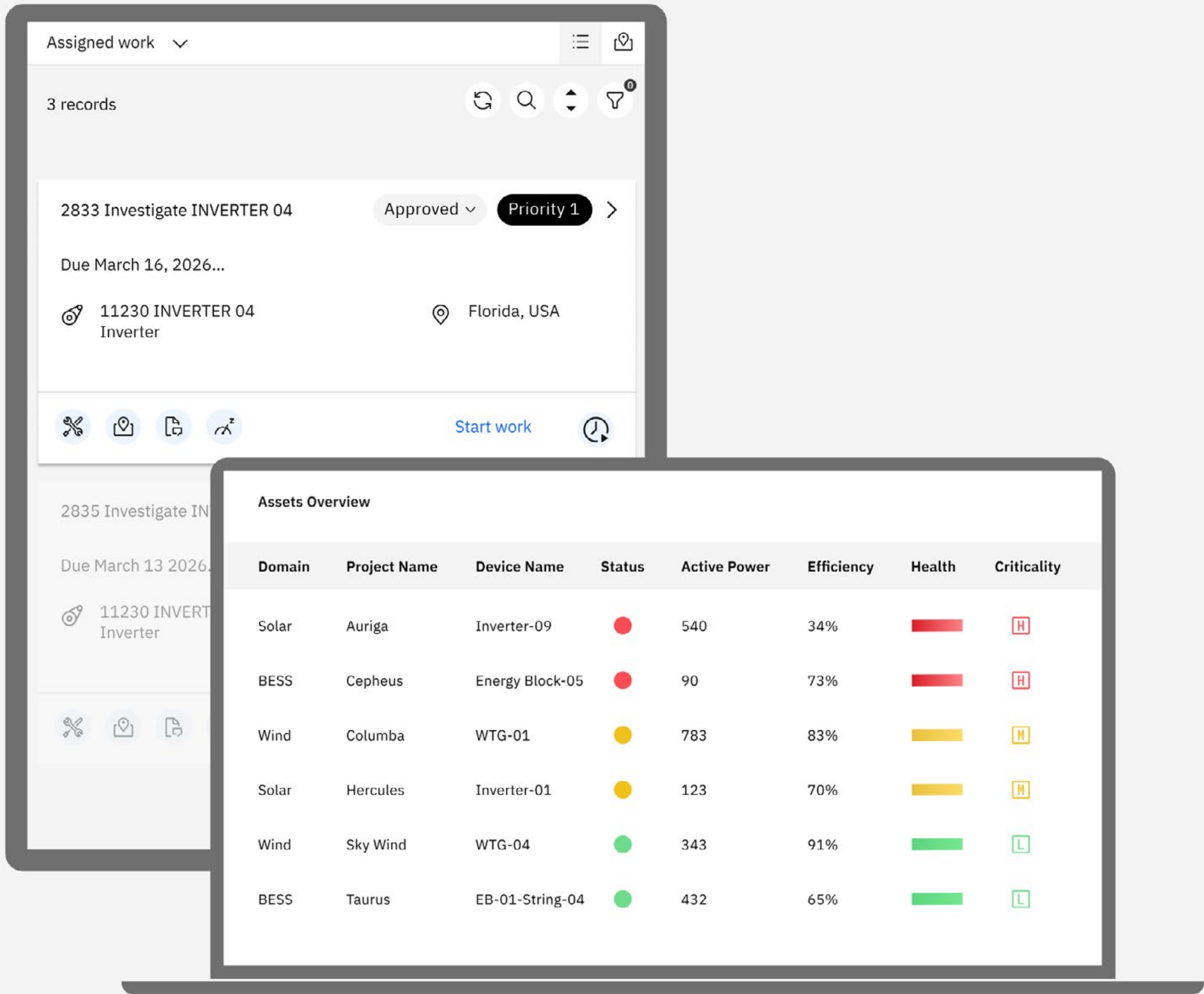
Portfolio-wide rollout

Centralized control, standardized
reporting and consolidated
analytics across all assets

↪ IBM and its global partner
ecosystem bring deep
expertise in renewables
integration, change
management and training,
helping ensure a smooth
adoption journey.

06

How IBM
Maximo Renewables
stands out



Multiasset, OEM-agnostic platform
Supports solar, wind and battery energy storage system (BESS) in one unified system—no vendor lock-in.

AI-driven operational insights
Prebuilt AI models from IBM Research® and the IBM watsonx® platform turn raw data into predictive insights.

Future-ready innovation
Mobile field service management (FSM), IBM Apptio® cost intelligence and MRO inventory management keep you ahead of the curve.

Trusted at scale
Manages more 18 GW across many countries for leaders leaders, such as Radiance, Matrix, Exus and KP Group.

“IBM Maximo Renewables has significantly transformed our operations. Our reporting now delivers real-time insights at both the organizational and investor levels, greatly enhancing visibility and decision-making.”

Dr. Faruk G. Patel
Chairman and Managing Director
KP Group

[Read the report →](#)

07

Your real ROI
with IBM Maximo
Renewables

How IBM Maximo Renewables
drives measurable ROI

Yield improvements (1%–5%)³	AI-driven analytics improve generation by detecting hidden underperformance at the module, inverter, turbine or BESS level. Even a 1% increase in yield for a 100 MW plant translates into USD 100,000 increase in the project IRR.
Revenue gains from early loss detection	Optimizing renewable O&M can unlock significant value per GW of capacity. McKinsey estimates potential annual value of approximately EUR 3.4 million per GW for solar PV plant operators and more than EUR 9 million per GW for onshore wind. ⁴
O&M cost reductions (up to 20%)²	Advanced APM reduces spare part usage, optimizes technician deployment and extends asset life. Automation of reporting, work tracking and analysis cuts overhead—saving up to USD 3 million annually per GW of managed capacity.
Workforce optimization	As AI automates repetitive work, 80% of executives expect employees to spend more time on innovation, while 34% foresee AI copilots improving efficiency through streamlined workflows. ⁵
Risk and compliance savings	Automated ESG and regulatory reporting avoids costly penalties tied to missed compliance obligations. Data-driven KPI monitoring also reduces liability in operator contracts, cutting contingency costs by 2%–3% of O&M budgets. ⁶
Rapid time to value	Designed to enable onboarding in less than 4 weeks, organizations begin realizing measurable ROI in the first month of deployment, with 8–10x returns within the first year—based on client benchmarks.

08

Ready to choose
smarter? Your
APM evaluation
cheat sheet

Before you commit to an APM solution, make sure it checks all the boxes.
Here’s a simplified checklist to guide your decision:

1. Multiasset Coverage

Does it support all asset types, such as solar, wind and storage, in one unified platform, independent of OEM?

2. AI-driven analytics

Does it provide AI-based analytics and actionable recommendations, including renewable-specific loss models?

3. Reliability and failure prediction

Does it offer advanced reliability analytics and predictive failure detection, for example: inverters, blades and batteries?

4. Enhanced monitoring

Does it integrate with drone thermography and the IoT and SCADA systems to detect anomalies early?

5. Field execution

Can field teams work offline in remote environments with mobile-first tools that improve first-time fix rates?

6. Integration complexity

Will it integrate seamlessly with enterprise resource planning (ERP), SCADA, geographic information system (GIS), OEM portals and inventory systems without disrupting OEM warranties?

Are prebuilt connectors and APIs available, or will custom development be required?

7. Compliance and reporting

Can it automate portfolio-wide generation reporting and fulfill PPA, ESG and regulatory requirements with audit-ready outputs?

8. Scalability

Will it scale smoothly from a 50 MW pilot to multi-GW, multicountry portfolios?

9. Total cost of ownership (TCO)

Are all costs transparent—licenses, hosting, integrations, upgrades and ongoing support?

Does the vendor provide clear comparisons of TCO against point solutions or OEM tools?

10. Change management & adoption

Does the solution include training, onboarding and role-based dashboards to ensure user adoption?

Is there a proven migration path: pilot → multisite → portfolio-wide rollout?

Does the vendor provide an ROI calculator to build a business case?

11. ROI proof

Is there a clear ROI path within 12 months, supported by benchmarks or case studies, such as yield improvement percentage, O&M cost reduction, downtime avoidance?

Does the vendor provide an ROI calculator to build a business case?

↪ If most answers are “yes,” IBM Maximo Renewables is a strong fit.



Make your APM choice count

As renewable portfolios grow in scale and complexity, operational excellence depends on unifying data, analytics and action. IBM Maximo Renewables brings these capabilities together in a single, AI-powered platform—helping operators move from reactive maintenance to predictive performance management.

Choosing the right APM platform isn’t just a tech decision—it’s a strategic one. From boosting yield and cutting O&M costs to ensuring compliance and scaling with confidence, the right solution should deliver measurable impact fast. Use this guide to evaluate with clarity, compare with confidence and invest in a platform that’s built for the complexity of renewable operations. IBM Maximo Renewables checks the boxes—now it’s your move.

09

Why IBM



Why IBM

The IBM Maximo Application Suite builds on IBM’s decades of leadership in the asset and operations management space, providing a closed loop model from capturing and analyzing data to enabling prescriptive maintenance actions. The suite uses IBM’s deep commitment to data science and AI at enterprise scale, as well as its recognized leadership in the IoT platform, hybrid cloud, security and now digital twin technology.

For more information

To learn more about IBM Maximo Application Suite, contact your IBM representative or IBM Business Partner, or [visit the site →](#)

Ready to see smarter asset management in action? Explore the self-guided demo to see how IBM Maximo Renewables uses AI, analytics and deep industry expertise.

Take the self-guided tour

→



1. Based on results reported by an IBM customer in the renewable power generation industry.
2. Digitalisation Journey for Wind Power Analysis and Asset Management, Leadvent, 2025.
3. 2026 Renewable Energy Industry Outlook, Deloitte, 2025.
4. Renewables O&M reimaged: Boosting performance with AI and conventional levers, McKinsey, 2026.
5. AI is reshaping utilities—from automation to autonomy, Accenture, 2025.
6. Operation and maintenance management for offshore wind farms integrating inventory control and health information,” Mingxin Li, Xiaoli Jiang, James Carroll, Rudy R. Negenborn, 2024.

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