

EXPANDING APM WITH **ROBOTICS**

Autonomous inspection
and other robotics
use cases in energy
organizations



GE VERNOVA

INTRODUCTION

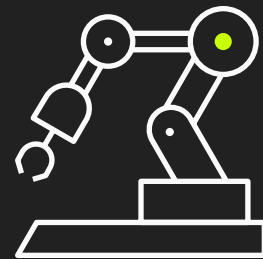
In the rapidly evolving energy sector, the growth of robotics is changing the way organizations think about maintenance, inspections, and operational efficiency. GE Vernova is at the forefront of integrating robotics to enhance data utilization, improve worker safety, and accelerate the energy transition.

Today, robotics are being deployed across various energy operations, from mobile robots navigating confined spaces in power plants to autonomous drones inspecting high-voltage substations. These technologies not only streamline labor-intensive processes but also enable continuous monitoring, predictive maintenance, and early fault detection. They contribute to significantly reducing downtime and operational costs.

By leveraging advanced sensors and continuous monitoring capabilities, robotics help detect leaks, emissions, and other environmental risks, improving compliance with regulatory standards and supporting sustainability goals.

As part of GE Vernova's commitment to the advancement of digitalization in the energy industry, this white paper explores:

- The potential benefit of robotics for energy organizations.
- How robotics can assist in gathering critical data that was once not possible—or safe.
- GE Vernova's vision for integrating robotics data into Asset Performance Management (APM) software for greater insights.
- The value of artificial intelligence (AI) in the form of computer vision for image analysis and other advanced monitoring techniques.



THE VALUE OF ROBOTICS FOR ENERGY ORGANIZATIONS

As a leader in the future of energy, GE Vernova provides energy organizations across the globe with the right solutions to help maximize production, increase availability and reliability, enhance worker safety and compliance, and ultimately accelerate the energy transition. With more technology available than ever before, experts at GE Vernova are actively developing robotics programs to support energy producers at scale. Through this program, GE Vernova has identified use cases in which the deployment of robotics can increase overall operational efficiency while allowing organizations to get more from their data.

Today, energy organizations are met with headwinds such as knowledge retention, employee attrition, volatile aging assets, and heightened economic expectations as everyone is being asked to get more out of O&M spend. As an OEM that helps produce more than 25% of the world's energy GE Vernova understands the need to offer technology so organizations can get the most out of their investment and continue to serve their markets effectively.

With robotics, energy organizations can enhance their maintenance and reliability practices and enable their employees to focus more on the critical problems their organization faces. By adding robotics to current operations, energy organizations can expect the following:

An Increase in Operational Efficiency

- Streamline labor-intensive processes and automate mundane tasks.
- Improve productivity as robots can operate without fatigue, therefore increasing the speed and frequency of things like inspections—leaving high-value work to humans.

An Increase in Safety

- Reduce human exposure in hazardous areas like confined spaces, high-voltage zones, platforms, or extreme temperatures.
- Help prevent incidents by collecting data that can lead to the early detection of catastrophic failures.

An Increase in Predictive and Proactive Maintenance

- Gain access to high-quality data better than before with advanced sensors and gathering techniques for things like thermography, gas leaks, and sonar.
- Integrate AI/ML on the data being collected by robots and use it in critical systems.

A Reduction in Cost

- Lower inspection costs by removing the need for items like scaffolding, climbing equipment, etc.
- Minimize downtime with faster inspections, leading to more productivity.

Improved Sustainability and Compliance

- Detect leaks, emissions, or spills.
- Automate inspections to be precise and adhere to regulations.



Current use cases are creating value for organizations and their employees, including:



Pipeline Inspections

Robots inspect oil and gas pipelines for corrosion and leaks using RGB camera sensors or vibrations through ultrasonic sound sensors, helping with overall integrity.



Wind Turbine and Solar Panel Maintenance

Drones and robots inspect blades and components for change detection, reducing the need for human technicians to climb to hazardous heights.



Plant Monitoring

Mobile robots navigate confined spaces like boilers, transformers, and turbines, identifying faults using and performing detailed visual or thermography infrared inspections.

GETTING THE MOST OUT OF ROBOTICS DATA WITH APM

GE Vernova's Software business plays a major role in the digitalization of the energy industry. As a leader in Asset Performance Management (APM) software, GE Vernova sees robotics as the next step in energy organizations' asset management journeys. GE Vernova's APM is built on a modern microservice foundation that focuses on connecting to an organization's other critical systems, ingesting data that is pertinent to asset performance, and transforming that data into actionable insights.

With GE Vernova's APM, organizations can set up digital strategies, build scalable condition-based maintenance programs, deploy predictive and prescriptive diagnostics, and also monitor fixed asset integrity and safety parameters—all in one place.

So, Where Does Robotics Data Come into Play?

With APM, organizations can rely on a single source of truth for time series data—inclusive of data created by any historian. This data is generated from sensors, edge devices, and other areas and then stored to derive insights.

In the energy space, robotics are in the field taking images, video, and even temperature readings from the assets an organization deems critical or too high risk for human monitoring. This image data today is often then reviewed by engineers on site, diagnosed, and then a decision is made on if any data viewed is actionable.

How Does This Work with Software Like APM?

As robots bring critical RGB images, videos, LiDAR 3D, and ultrasonic sound data back to engineers, it often takes time to review each image or video and identify any areas of risk.

Sometimes, the images provide a clear view of an emerging risk, but sometimes that risk is hidden. With GE Vernova APM, energy organizations can analyze robotics-captured images with AI in the form of computer vision. Simply put, computer vision can be used to convert images into a set of numerical values that can be ingested into Autonomous Inspection.

With Autonomous Inspection, users can take data from robots, written documents, infrared thermography, and gauge readings and convert it into time series data. This new data can be used in applications such as APM Health (condition-based maintenance), RoundsPro, SmartSignal (predictive and prescriptive analytics), Accelerators Health and Reliability workflow, Advanced Visualization, Policy, or APM Integrity (mechanical integrity).



CONCLUSION

The emergence of advanced robotics has been a boon for energy industrials and their employees. While the potential for this technology, paired with AI, is exciting, it's important to consider how this technology can enhance the effectiveness of internal experts—not replace them.

For energy organizations looking to automate inspections or repetitive tasks, keeping a human involved is critical to the effectiveness of a robotics program. Ultimately, robotics can provide more value to organizations and even more value to APM when used to gather data in risk-heavy areas.

Effective Inspections with Computer Vision

Autonomous Inspection from GE Vernova enables faster detection and response, improves worker productivity and safety, and helps get the most out of asset data.

[Learn more](#)

