THE ISSUE

Asset and Fleet Optimization

KEY TAKEAWAY

Intelligent asset and fleet optimization are essential to meet the demands of the future

The current situation

Power generation companies are at the center of mounting demands from governments, the private sector, and consumers to transition from reliance on fossil fuels towards a decarbonized world. Utilities and power generators are rapidly seeking greater levels of decarbonization and energy flexibility by investing in solar, wind, storage, hybrid and decentralized energy systems. The diversity of fleet assets is growing, too – renewables, storage and hybrids are creating a dramatic shift in status quo.

Yet, even as the cost of renewable energy comes down, utilities and independent power producers (IPPs) are under intensifying economic pressure to improve their balance sheet, increase revenue, and drive cost-out. They're being charged with managing operations to maintain reliability and improve profitability, while responding to dynamic, variable and uncertain market conditions through the transition.

Summary

It's a tough task: accelerate the energy transition without pushing risk out of bounds.

The key challenges

Power generators face multiple interrelated challenges as they strive for the ambitious goal of net-zero carbon emissions including responding to shifting market forces, labor forces and next-generation technology.

01

Addressing the unprecedented level of dynamic complexity associated with the energy transition. Power generation and operations has always been a complex and asset-intensive industry, but the energy transition creates a new, more intricate balancing act between:

- Growing use and diversity of variable/ renewable generation resources.
- Decarbonization of dispatchable thermal generation resources.
- Increase in decentralized and "behind the meter" generation.
- Pressure to lower generation costs, but without impact to reliability.
- Increase in extreme weather events impacting demand and challenging grid stability.

02

Reorganize operations and human resources to streamline and make better decisions, faster.

Utilities and power generators are taking steps to organize and execute for the future now, including consolidating and organizing their teams and functions centrally. Many companies were evaluating such changes prior to early 2020, but the COVID pandemic and resulting strain on the workforce sped up the acceptance of less-human intensive and more remote operations, such as:

- Centralizing and co-locating operations, monitoring and diagnostics, and commercial teams.
- Enabling plant operations remotely to minimize staff at sites.
- Investing in AI/ML and analytics to improve operational decisions.
- Reskilling and redeploying resources across asset types (e.g., thermal, renewable, etc.).

03

Leveraging a greater level of data availability, transparency and integration.

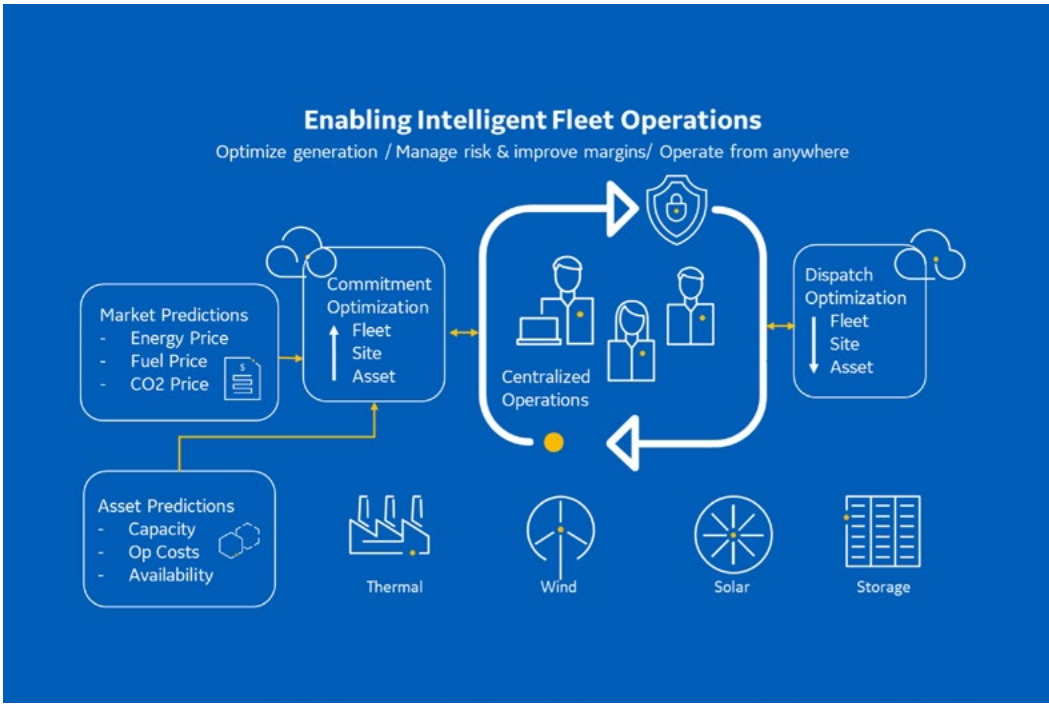
Utilities and power generators are not new to digital transformation – many have invested heavily in solutions to improve asset reliability and performance. But the complexity brought by the energy transition – and the speed at which we must adjust to that complexity – is extraordinary. Meeting ambitious decarbonization goals requires an even greater level of data availability, transparency and integration across functions, processes and systems.

The digital solution

Leaders in the energy sector are exploring how digital technology can create intelligent and autonomous fleet operations to optimize daily generation, manage risk, improve margins and operate from anywhere.

Integrate control room, commercial ops, commitment and dispatch optimization, with a focus on:

- Asset to fleet optimization
- Specialized analytics to handle market and operational uncertainty
- Technology to handle complexity and speed while enabling secure, autonomous operations edge-to-cloud and cloud-to-edge



The first step

Intelligent fleet operations start at the asset level, with a focus on advanced analytics for predicting week-ahead, day-ahead capacity and its cost. This seemingly straightforward task is complicated by weather forecast inaccuracies and new generation availability dynamics, so traditional methods for forecasting capacities and operating costs are insufficient.

In place of static curves and cost profiles, advanced AI/ML analytics are integrated with asset operational and availability data to more effectively predict capacity, its cost and uncertainty, and efficiently alert all users – from the site-level to central operations – to changes in predictions and uncertainty in real time. Similarly, market predictions down to the site level prevent inefficient resource allocation and ensure an optimal commitment at the fleet level.

Commitment optimization must manage the risk associated with both increasing capacity and market uncertainty to position the asset, site and fleet most economically and reliably. As solar and wind generators transition from being price-takers in real-time markets to committing in day-ahead markets – where opportunity is greater, but risk is higher – commitment optimization is even more paramount.

The long term

Once we move from commitment optimization to real-time dispatch optimization, we must be able to adjust fleet-to-asset operations quickly based on available capacity and market dynamics. To enable greater flexibility during the energy transition, investments in dispatchable generation are needed.

For example, take gas plants servicing vertically integrated utilities or regulated territories. During times of high demand or uncertainty due to variable energy resources such as wind and solar, they must manage the need for reserve capacity or emergency response on the system with a focus on minimizing maintenance and reducing energy imbalance costs. On the other hand, gas plants competing in an open or wholesale energy market need to capture revenue when energy prices are high, while avoiding penalties from missed targets and minimizing the impact of any operational changes on outage intervals.

In both scenarios, digital solutions that safely and reliably extend capacity and optimize energy production at times of highest demand can result in significant returns for the generator. And, by securely connecting IT to OT, edge-to-cloud and cloud-to-edge, the system can increasingly operate on its own, in real time, with supervisory oversight from a centralized team of cross-functional experts to maximize profitability in a deregulated market or minimize cost to meet demand in a regulated market.

Conclusion

As utilities and power generators strive toward net-zero carbon emissions, they can drive business growth by expanding intelligent and autonomous operations. Through centralized operations, specialized analytics to handle market and operational uncertainty, and software and user experiences that offer greater data availability, transparency, integration and security, make faster decisions that balance risk with the great opportunity presented by the energy transition.

Want to find out more?

For a more in-depth look at the current situation around decarbonization and how digital technologies will help enterprises achieve their goals, read our latest whitepaper: Sustainability & Profitability: How Digital Solutions Can Help Power Generators and Oil & Gas Producers to Find the Balance in the Energy Transition.

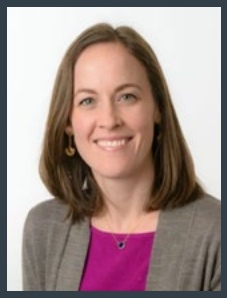
READ MORE →

Dig deeper into the Energy Transition with resources focused on:

Why energy operators should focus on Accelerating Decarbonization

How to leverage digital solutions to Decarbonize Heavy Industry

Unlocking value with Intelligent Asset and Fleet Optimization



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Rachel is a Sr Director of Product Management for GE Digital. She is responsible for delivering Operations Performance Management software solutions focused on enabling the power generation industry to lead through the Energy Transition with visibility, insights, decision support and advanced edge controls to manage risk, optimize performance and improve margins. With over 19 years of experience in Digital, Power and Aviation, she brings extensive knowledge in gas turbine and plant technologies, product and technology strategy and has been recognized throughout her career for bringing people and teams together to innovate and deliver value.

Rachel holds a B.S. and Masters in Materials Science and Engineering from the University of Pennsylvania and the Ohio State University, respectively.