

Harnessing AI in asset-intensive industries

SUSTAINABILITY



Heiko Claussen at AspenTech explores how asset-intensive industries can harness artificial intelligence as a way of strengthening both efficiency and sustainability

In asset-intensive industries like refining, petrochemicals, and minerals, the integration of artificial intelligence (AI) promises significant efficiency gains and environmental benefits. Despite AI's longstanding presence, recent breakthroughs are unlocking new applications, leveraging its data analysis and process optimisation capabilities.

However, industrial emissions remain high, and the full potential of AI applications remains untapped. According to a report by **the Energy Institute**, fossil fuels still account for 82% of global energy consumption as of 2022, mirroring previous years' trends.

Pressure is mounting on businesses across these sectors to address environmental concerns and align with global net-zero objectives. In line with this, **Boston Consulting Group** states, "By scaling currently proven applications and technology, AI has the potential to unlock insights that could help mitigate 5 to 10% of GHG emissions by 2030 and significantly bolster climate-related adaptation and resilience initiatives."

Yet, despite AI's proven capabilities in managing vast data sets, predicting outcomes, and optimising operations, many organisations across asset-intensive sectors have yet to fully capitalise on the benefits. As industries that consume a significant portion of the world's energy strive to reduce emissions and improve efficiency, AI stands out as a key tool to meet these targets.

Strategic AI deployment for maximum value

One of the critical considerations for organisations looking to leverage AI is focusing on areas where it can deliver the greatest value. Each industry presents unique challenges and opportunities, and a targeted approach to AI deployment is essential.

For instance, in the manufacturing supply chain, AI can optimise operations by forecasting demand, managing inventory levels, and suggesting the best logistics routes. This optimisation reduces waste, lowers costs, and speeds up delivery times, benefiting both the company and its customers.

Another AI application used extensively across asset-intensive industries is predictive maintenance. A practical example from the upstream oil and gas sector might be an oil company using AI to enhance its drilling operations by predicting equipment failures weeks in advance, thus avoiding potential accidents and saving millions in repair costs and downtime.

The interface between human and machines

AI's ability to process and analyse large datasets can uncover insights that would be impossible for humans to discern manually. This capability is crucial for asset-intensive companies aiming to enhance their energy resilience by forecasting the availability of renewable power and adjusting operations accordingly.

While AI offers powerful tools for analysing data and optimising operations, and is used independently in a growing number of closed loop applications; human expertise still has a key role to play today. Experts in operations, sustainability, and IT must collaborate to implement AI solutions effectively. They can help ensure that AI applications align with the company's strategic goals and operational realities, bridging the gap with industry-specific knowledge.

Human oversight remains key in monitoring system performance, addressing unforeseen issues, and making strategic decisions based on AI outputs. For instance, in chemical engineering, AI enhances process optimisation and planning. Advanced process control solutions enable chemical plants to optimise production processes, resulting in increased yield, reduced energy consumption, and improved product quality. However, human experts are still needed to monitor system performance and make strategic decisions.

Bringing in external experts with experience in industrial AI implementations can significantly enhance a company's ability to deploy AI effectively. These experts can provide valuable insights into best practices, identify the most promising applications, and help develop strategies for scaling AI initiatives.

A notable example is the collaboration between industrial giants and AI tech firms, which often leads to groundbreaking innovations. For example, oil and gas companies have worked with AI firms to develop advanced models that predict and mitigate risks associated with drilling operations, enhancing safety, efficiency, and profitability.

Furthermore, human expertise is frequently important for interpreting AI-generated insights. While AI can crunch numbers and generate data-driven recommendations, it often requires human judgment to apply these insights effectively. This collaborative approach ensures that AI applications are not only technologically sound, but also practically viable within the specific context of the industry.

Towards a sustainable future

The integration of AI into asset-intensive industries presents a significant opportunity to enhance energy efficiency and advance sustainability goals. By focusing on areas where AI can deliver the greatest value, developing the necessary digital infrastructure, and leveraging both internal and external expertise, organisations can harness AI effectively.

AI can play a pivotal role in energy management by optimising energy use based on predictive models, reducing energy costs, and minimizing environmental impacts. This supports corporate sustainability goals and enhances the company's image among eco-conscious consumers and investors.

The journey towards integrating AI in asset-intensive industries for energy efficiency and sustainability is a multifaceted endeavour. It involves not only technological innovation but also strategic planning, investment in digital infrastructure, and a collaborative effort between AI experts and industry professionals.

The synergy between AI and human insight will be crucial in navigating challenges and unlocking the full potential of AI. By combining AI algorithms with specific domain knowledge, businesses can drive efficiency, sustainability, and innovation, thereby making a significant contribution to a more sustainable and energy-efficient future for all.

Heiko Claussen is Senior Vice President of Artificial Intelligence at **AspenTech**