AI: A Game Changer for Carbon Reduction in Manufacturing

As digital infrastructure expands globally, localized smart solutions are emerging as key drivers in reducing industrial CO2 emissions. In 2020, DIGITALEUROPE projected that digital systems could help cut worldwide emissions by up to 20% by 2030, but is that still a realistic goal?

This projection remains plausible, as subsequent studies have reinforced the significant potential of digital solutions in mitigating emissions across various sectors.

For instance, a 2022 report by the World Economic Forum and Accenture found that digital technologies, if scaled appropriately, could deliver up to a 20% reduction in emissions by 2050 in high-emitting sectors such as energy, materials, and mobility.

Similarly, a 2024 study by Bitkom, Germany's digital association, indicated that accelerated digitalization in Germany could lead to a net reduction of approximately 73 million tons of CO_2 by 2030, accounting for nearly 24% of the country's climate targets.

While figures vary by source, it is widely believed the industrial sector is responsible for around 20-30% of global CO2 emissions and, as such, faces a dual challenge: meeting growing environmental requirements while maintaining competitiveness. According to Climate Watch 2024 data, manufacturing and construction remain the third-largest source of carbon dioxide emissions worldwide, following energy and transportation. The pressure to reduce the industrial carbon footprint continues to grow with new regulations - from the Kyoto Protocol through the Paris Agreement to the latest COP28 decisions.

Breaking Down Barriers

A 2024 study by CO2 AI and BCG, which covers companies responsible for 45% of global greenhouse gas emissions, identified three main barriers to using AI for decarbonization: high solution costs (34%), difficulties in staff training (30%), and the lack of AI integration with existing tools (23%).

However, these concerns seem to be largely outdated.

"Today's technologies enable rapid deployment and deliver measurable results without requiring extensive IT infrastructure upgrades or complex team training. This represents a fundamental shift in how we approach artificial intelligence for industrial decarbonization," explains **Piotr Siwek, Mitsubishi Electric Factory Automation Global MCoE Manager**.

Smart Solutions Driving Results

AI technology offers tangible solutions in the fight against CO2 emissions, delivering measurable results across three critical areas. For example, in the optimization of production processes and energy consumption, intelligent algorithms adjust machine parameters in real time to align with current operational needs. The second key area is predictive maintenance, where AI detects potential equipment failures before they occur, eliminating unplanned downtime and associated energy waste. Third, the technology can streamline logistics operations by optimizing delivery routes, scheduling, and warehouse space utilization. These combined initiatives translate into significant energy savings and a substantial reduction in the carbon footprint.

"Our experience shows that AI-enabled solutions like EcoAdvisor can help reduce energy consumption by 30-50%. These are concrete results that translate into both environmental and economic benefits. Another example is MaiLab, a software that analyzes production data in real time, identifying correlations and indicating potential areas of improvement. The system reduces maintenance costs and supports technical teams in decision-making without requiring specialized programming or data analysis knowledge," says Siwek.

Shaping Tomorrow's Industry

By 2030, edge AI, which involves processing data locally at the source, is expected to become standard in industrial facility energy efficiency management. The key to success will be balancing artificial intelligence's potential with minimizing its environmental impact. Companies investing in scalable, local AI solutions today are reducing their carbon footprint while also gaining a competitive advantage in an increasingly demanding regulatory environment.

"The implementation of AI in industrial operations isn't just another technological trend – it's a game-changer that's already transforming manufacturing facilities worldwide. Forward-thinking companies are leveraging these solutions today, proving that the future of sustainable manufacturing isn't a distant concept but a present reality. The message for industrial leaders is clear: embracing AI isn't just about staying competitive; it's about survival in an increasingly carbon-conscious market," concludes Siwek.

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Originally (initially) released in English.

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**U.S. dollar amounts are translated from yen at the rate of ¥151=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2024.*

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About e-F@ctory

e-F@ctory is Mitsubishi Electric's integrated concept to build reliable and flexible manufacturing systems that enable users to achieve many of their high speed, information driven manufacturing aspirations. Through its partner solution activity, the e-F@ctory Alliance, and its work with open network associations such as The CC-Link Partners Association (CLPA), users can build comprehensive solutions based on a wide ranging "best in class" principle.

In summary, e-F@ctory and the e-F@ctory Alliance enable customers to achieve integrated manufacturing but still retain the ability to choose the most optimal suppliers and solutions.