

The background image shows several people in a manufacturing or industrial setting. They are wearing high-visibility yellow safety vests and white hard hats. They are gathered around a large, horizontal digital display that shows various data visualizations, including line graphs, bar charts, and circular progress indicators. The display is illuminated with a blue light, and the people's hands are visible as they interact with the screen. A white, curved line graphic separates the text area from the image below.

Manufacturing insight: Using data to meet Scope 1 goals

How manufacturers can make better data-driven decisions to optimize processes and minimize Scope 1 emissions across the value chain

Manufacturers have a significant opportunity to minimize emissions for their own businesses – and the businesses for which they serve as inputs – but many don't know how to act on their data to make measurable improvements.

Most companies today are accelerating their sustainability journeys to do better for people and the planet. According to the Capgemini Research Institute's 2023 *A world in balance* sustainability trends report, 63 percent of executives say that the business case for sustainability is clear.

And while there are several reasons to adopt a greener agenda, 64 percent of executives said a motivating factor was to comply with current regulations, up from 51 percent in 2022.

Scope 1 emissions are among the most important compliance measurements, especially for industries with inherently high direct emissions. Scope 1 covers direct emissions from owned or controlled sources. For example, these include greenhouse gas (GHG) emissions from fuel combustion in boilers, furnaces, and vehicles. That means manufacturing is an industry with ample opportunity to address Scope 1.

These companies are also Scope 3 inputs for other businesses. For instance, the way a chemicals company manages its supply chain is quantifiable and contributes to the Scope 3 emissions of a company using those chemicals.

The opportunities to make green improvements are vast, but not all manufacturers are executing at speed. Data is key to staying on top of Scope 1 emissions and finding where improvements can be made. The challenge is that manufacturers don't have the visibility they need because data is disparate,

disconnected, and not available to facilitate actions in near real time to reduce emissions. Businesses must address this to support a greener future.

Finding hidden benefits

Energy use is the largest source of pollution for most manufacturers, so Scope 1 emissions can be reduced by determining how to produce products with a minimum amount of energy. There are typically two ways to do this. The first is investing in improvements that are more energy efficient. The second is identifying the minimum amount of energy required given the existing plant configuration. Companies can achieve this by identifying and eliminating leaks, energy waste, and inefficient operating conditions.

The foundation for understanding these issues and making informed decisions is data. The tens of thousands of sensors that plants use to monitor and control operations create a rich data trail. With the power of analytics and AI, those sensors become "emissions monitors" that allow an engineer or operator to act to lower emissions while maintaining other operating parameters like safety, reliability, and schedules.

This abundance of data can help shape emissions-reduction strategies, but manufacturers must first build the ability to capture and decipher the information. Companies must integrate vast amounts of data coming from diverse sources, ensure its accuracy, and translate that into actionable insights. This requires robust systems and expertise.

Manufacturers can have an impact across the three scopes that categorize greenhouse gas emissions created by a company, its suppliers, and its customers.

SCOPE 1

Covers direct emissions from owned or controlled sources, such as company vehicles.



SCOPE 2

Involves indirect impact emissions from the purchase and use of electricity, steam, heating, and cooling.



SCOPE 3

Includes all other indirect emissions from the upstream and downstream activities of an organization's value chain.





For example, tracking fuel usage in vehicles and aggregating data from operating conditions including flow rates, temperatures, and pressures, and calculating the ideal minimum energy use, actual energy use, and significant deviations can lead to efficiencies without sacrificing other variables like safety. Ideally, companies then build a library of optimal operations to learn the most efficient scenarios. Over time, operators will learn to operate with less energy, reducing Scope 1 emissions.

Data collection and aggregation will also help companies move from reporting emissions monthly, or sometimes even yearly, to doing so weekly or daily. This allows a business to adjust its operations to reduce emissions as well as avoid permit violations.

Toward more sustainable manufacturing

Gaining the speed to quickly identify problem areas enables companies to take swift action to reduce emissions. With data, companies can establish robust models to not only identify opportunities to reduce emissions, but also look for long-term opportunities for change. This is where the real impact happens.

Capgemini works with manufacturers to make a measurable impact on their Scope 1 emissions.

Sustainable manufacturing. We help companies to embed sustainable manufacturing practices across the manufacturing operations value chain. This includes the sustainable design of systems and technologies for enabling and achieving sustainable goals, changing procedures and technology to minimize or reach zero landfill usage, and identifying ways to minimize energy and water usage.

Engineering capability. We bring deep experience in manufacturing and process engineering, industrial operations engineering, compliance, quality, and regulatory engineering. Capgemini works closely with cross-functional teams to design, develop, and implement effective manufacturing processes, ensuring that they meet regulatory requirements and quality standards.

Data analysis. Along with our data analytics partner Seeq, we develop advanced analytics tools to help manufacturers manage the large data sets necessary for in-depth analysis. Data insights can not only help companies reduce Scope 1 emissions, but also find ways to cut costs and increase revenue through optimized operations.

Innovation. Using design thinking workshops and tools, we collaborate with clients to identify and implement innovative solutions to emissions reductions problems. Historically, reducing emissions was a lower priority for companies but today they must add this dimension to legacy manufacturing while still retaining a focus on safety, reliability, and production.

Sustainability will continue to be a top priority for manufacturers – and all industries – for years to come. Now is the time to lay the foundation for ongoing optimization and reduction of Scope 1 emissions.

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For more information, please visit our [sustainability initiatives page](#).

About Capgemini

Capgemini is a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end-to-end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2023 global revenues of €22.5 billion.

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