



Accelerate sustainable manufacturing operations with the cloud

Elevate your competitive advantage by reducing carbon emissions, improving efficiency, eliminating waste, and advancing product innovation



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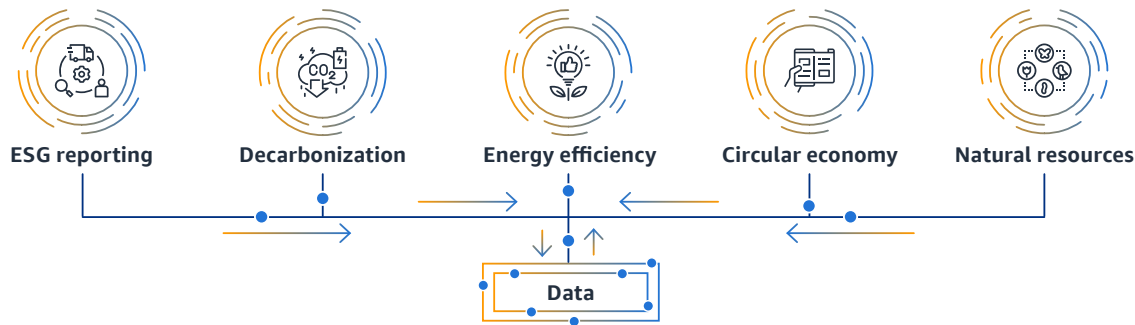


AWS enables sustainability solutions

For many manufacturers, sustainable business practices are no longer an ethical choice—they're a top priority.

Focusing on sustainable business operations not only benefits the environment, it also leads to better business outcomes. Between changing regulations and increased consumer demand for sustainable practices, it's clear sustainability will play a large role in the next evolution of manufacturing.

According to the [United States Environmental Protection Agency \(EPA\)](#), embracing sustainable business practices in your day-to-day operations opens the door to potential short-term cost savings while setting the stage for achieving long-term financial advantages. By proactively integrating sustainable business practices and tools, manufacturers are better equipped to meet their respective industry's environmental standards and attain their personal sustainability goals.



As the manufacturing industry as a whole aims to reduce carbon emissions, adopt more efficient operations, and eliminate waste, individual manufacturers, such as [Coca Cola Icecek \(CCI\)](#), are working to minimize environmental impact by leveraging data to enhance transparency, comply with regulations, drive innovation, and more. Cloud solutions that harness data are key to discovering new ways to increase efficiency and reduce consumption. Technology is playing a vital role in uncovering new breakthroughs in sustainable production, resulting in increased profitability.

This ebook offers examples of how manufacturers have achieved their sustainability goals using [Amazon Web Services \(AWS\)](#) to unite their data, produce valuable analytics, and adapt their operations. Read on to learn how other companies have transformed their industrial operations with the power of the cloud.

¹ [IDC FutureScape: Worldwide Future of Operations 2022 Predictions](#), IDC, October 2021

² [Gartner CEO and Senior Business Executive Survey](#), Gartner, May 18, 2022



+400M

METRIC TONS OF CO2

will be saved by using data and analytics to reduce emissions.¹

Sustainability is a top 10 business priority

In 2022, CEOs placed sustainability as a top strategic priority and see it as a transformational change catalyst.²

AWS drives industrial sustainability

In response to the impacts caused by climate change and stricter regulations, many of today's leading companies are stepping up to help build a more inclusive, equitable, and sustainable world.

As part of its mission to be Earth's most customer-centric company, Amazon is committed to building a sustainable business for its employees, customers, and communities. In 2019, Amazon co-founded [The Climate Pledge](#), which is a commitment to reach net-zero carbon emissions by 2040—10 years ahead of the Paris Agreement.

AWS focuses on efficiency across all aspects of our infrastructure, from the design of our data centers and hardware, to modeling the performance of our operations for continuous, enhanced efficiency. By continuously improving our efficiency, we can reduce the amount of energy needed to operate our data centers. Research studies found that moving on-premises workloads to AWS can lower the workload carbon footprint by at least 80 percent and up to 96 percent once AWS is powered with 100 percent renewable energy, a target it is on path to meet by 2025.³

For a number of reasons, manufacturers are prioritizing sustainability strategies that are **incremental** and **transformational** for their organization, and in many cases, the industry at large.

From optimizing processes to reducing carbon emissions to integrating data across the value chain to enable a circular economy, the following pages outline how AWS services and tools enable sustainability.



Cloud customers reduce their carbon emissions by up to 88% when they use AWS.^{3 4}

³ [The Carbon Reduction Opportunity of Moving to Amazon Web Services](#), 451 Research, October 2019

⁴ When they use AWS versus the typical on-premise data center



AWS drives industrial sustainability



Carbon Accounting & ESG

Track carbon emissions across the value chain and unify ESG data to support regulatory compliance



Sustainable Operations

Improve energy efficiency, optimize productivity, and reduce waste



Sustainable Logistics

Plan and execute your transition to an electric vehicle fleet to reduce costs and emissions



Incremental



Transformational



Sustainable Products

Plan for environmentally sustainable offerings



Sustainable Manufacturing

Environmentally sustainable production processes and cradle to grave emissions tracking



Sustainable Supply Chain

Collaboration and visibility throughout the supply chain to enhance circularity





Incremental activities lay the groundwork for change

Steps taken toward industrial sustainability can be broken down into two groups: incremental and transformational. The incremental steps are the initial wins that manufacturers can take to make progress. They are foundational as industrial operations continue to make strides in sustainability.



ESG and reporting requirements

Manufacturers must be responsive and work to meet emerging environmental, social, and governance (ESG) requirements. These emerging ESG requirements, including those at the international level, such as the EU's Corporate Sustainability Reporting Directive, currently, or may soon require manufacturers to report aspects of their sustainability practices and environmental impact.

AWS offers the tools and solutions to help with:

- **ESG reporting and disclosures:** Develop a single system of record for ESG data to allow auditable and finance-grade data that can be shared with internal and external stakeholders.



Sustainable operations and WAGES reduction

Equipment that's not running at peak performance wastes energy. Therefore, to create a more sustainable business operation, manufacturers should aim to improve the energy efficiency of manufacturing equipment.

AWS offers the tools and solutions to help with:

- **WAGES reduction:** Discover ways to better understand and reduce water, air, gas, electricity, and steam (WAGES) consumption and improve sustainability. Store, access, and analyze Internet of Things (IoT) data in an AWS data lake and use machine learning capabilities to analyze and visualize plant floor data to pinpoint areas for improving energy efficiency.
- **Remote asset monitoring:** Prevent, detect, and resolve equipment issues and act on opportunities for improved energy efficiency.



Sustainable logistics and route analysis

In the United States, there are more than 13.5 million medium and heavy duty trucks moving raw materials and finished goods.⁵ By moving to electric fleet vehicles and using an efficient route planner, manufacturers may be able to reduce their costs and work to meet their carbon emissions reduction goals.

AWS offers the tools and solutions to help with:

- **Route analysis:** Analyze routes and distances to optimize logistics operations and develop a more efficient system for shipping products.

⁵ [Trucking Industry Trends, Statistics, & Forecast—2023 Edition](#), TruckInfo.net, July 25, 2023



Transformational strategies enable industrial innovation

Transformational strategies are bigger, bolder, and lead to new revenue streams. These actions have a direct impact on end customers and often involve industrial innovation.



Sustainable products and accelerated design

Designing for sustainability requires a holistic approach to both hardware and software. There are several constraints when designing sustainable products, such as cost and quality, and there are lifecycle requirements to meet, including energy consumption, packaging, and water use.

AWS offers the tools and solutions to help with:

- **Cloud-native design:** Accelerate design and development with a cloud-native approach that creates expansive and complex simulations at scale using an AWS managed infrastructure.
- **AWS innovation experts:** Define a new product, service, or experience that meets your customers' needs—then rapidly bring that solution to life with AWS technologies.



Sustainable manufacturing and PCF tracking

Manufacturers need to be able to track their product carbon footprint (PCF), which is the total greenhouse gas emissions that a product generates from raw material extraction to final sales.

AWS offers the tools and solutions to help with:

- **Product Carbon Footprint:** Using the PCF solution on AWS, companies can automate granular emissions tracking to generate insights on product sustainability performance, identify improvement opportunities, and increase transparency.



Sustainable supply chain

Studies show that supply chains account for more than 90 percent of an organization's greenhouse gas emissions, but also 50–70 percent of their operating costs.⁶ As a result, the importance of the circular economy is growing. As an economic system, the circular economy aims to keep products, components, and materials at their highest value and in use for as long as possible, reducing waste and decreasing the use of raw materials and carbon emissions across the supply chain.

AWS offers the tools and solutions to help with:

- **Value chain transparency:** Gain access to reliable supplier data from across the value chain, avoid greenwashing—which gives customers a false impression about how sustainable your processes are— and comply with emerging regulations.
- **Circular supply chain:** Gather product information about sourcing and development and build a common platform for data sharing and traceability.

⁶[How sustainable supply chains are driving business transformation](#), EY, September 20, 2022

Industrial sustainability in action

Using AWS solutions to ingest, analyze, and manage sustainability data, you can build cloud-based solutions ranging from carbon tracking to energy conservation to waste reduction. Learn how manufacturers are already taking advantage of AWS offerings to execute their sustainability goals.



Bayer centralizes and standardizes data from its Carbon Program using AWS

To help Brazilian farmers adopt climate-smart agricultural practices and reduce their carbon emissions, Bayer created the Carbon Program. This initiative aims to build carbon-neutral agriculture practices by measuring and increasing carbon sequestration in the soil. Farmers involved in the project use AWS to centralize and standardize the soil data they collect. The data is captured in a serverless data lake on AWS, which provides the scalability and agility the project needs. The initial Carbon Program included more than 400 farmers across 144 cities in 15 Brazilian states—and generated more than 80,000 soil samples.

[Read more >](#)



Mueller Water Products improves leak-detection performance

Mueller Water Products wanted to tap into the full potential of its data to provide performance insights to customers. The company built a data lake on AWS and is using [Amazon SageMaker](#), a fully managed machine learning service, to increase leak-detection performance. By building a scalable software and data solution on AWS, Mueller was able to give its customers a more accurate view of critical water data, enabling them to manage their infrastructures more efficiently. As a result, Mueller has automated the daily collection of more than five GB of data and expects one customer will save \$8 million over five years.

[Read more >](#)



“Using AWS helped us complete this data integration, understand what methodology to use to look at soil carbon sequestration, prove these methodologies together with partners, and exchange this information with partners who all have different knowledge within the entire chain.”

Vanessa Ginez
Digital Transformation Manager, Bayer





Coca-Cola İçecek saves 20 percent on energy annually

Coca-Cola bottler Coca Cola İçecek wanted to improve its sanitation process to maintain clean equipment, but also avoid overusing energy and water. The company needed a way to collect and process enormous amounts of industrial data as well as build digital models of assets. CCI worked with AWS Professional Services to build a robust digital analytics system in just two months. Using [AWS IoT SiteWise](#), CCI collected, stored, organized, and consumed data from industrial equipment at scale. CCI also developed a digital twin that uses AWS IoT SiteWise to optimize production processes through near-real-time asset monitoring. As a result, CCI saved 20 percent on energy and nine percent on water for two process systems annually.

[Read more >](#)



Carrier and AWS collaborate to reduce food spoilage

Carrier, a leading provider of cold chain solutions, wanted to reduce food spoilage and improve food sustainability for suppliers, manufacturers, logistics, consumers, and everyone in between. Working with AWS, Carrier developed Lynx, a digital platform that unifies cold chain data to reduce food spoilage, support end-to-end visibility, and increase efficiency throughout the various stages of refrigerated storage and transportation. Powered by AWS IoT services, machine learning, and analytics, Lynx improved efficiency by optimizing distribution routes and tracking ambient temperature along the entire cold chain journey. Carrier reduced food spoilage and limited methane emissions—a byproduct of decomposing, wasted food—through AWS services like [AWS IoT Greengrass](#), [Amazon SageMaker](#), [Amazon Athena](#), [Amazon EMR](#), and [Amazon QuickSight](#).

[Read more >](#)



“We wanted to improve process efficiency by avoiding errors in time measurement, which could lead to CCI plants overusing energy and water.”

Burcu Hacıoglu
Product Owner, CCI



The time to step up sustainability is now

Building a more sustainable world benefits billions of people globally every day, from companies and their customers, employees and investors, to government agencies and regulatory bodies.

The impacts of climate change and other environmental issues are driving industrial companies to play a central role in helping to build a more inclusive, equitable, and sustainable world. At every step of the way, AWS can provide manufacturers with the tools they need to implement more sustainable business practices.

AWS is at the forefront of the data revolution, providing products that enable industrial and manufacturing companies to tackle sustainability challenges head on. The AWS infrastructure is 3.6 times more energy efficient than the median of surveyed U.S. enterprise data centers and [up to five times more energy efficient than the average European enterprise data center](#). AWS also offers a wide range of ways to collect, analyze, and manage sustainability data to build transparency and accelerate progress. AWS provides knowledge and tools for manufacturers of all sizes to build and implement solutions that meet their sustainability goals.

[Learn more about industrial sustainability solutions from AWS ›](#)

[Contact us to get started ›](#)

