EXECUTIVE BRIEF

Green evolution: Achieving sustainability in manufacturing

The manufacturing industry faces growing pressure to play a part in reducing global warming. The **three primary sources** of greenhouse gas emissions are transportation (27%), electricity production (25%), and industry (24%). There is an urgency for companies to adopt sustainable manufacturing practices, which the Environmental Protection Agency (EPA) **defines** as "the creation of manufactured products through economically sound processes that minimize negative environmental impacts while conserving energy and natural resources."

Manufacturers may have more questions than answers as they evaluate their options to produce environmentally considerate products while being mindful of the "environmental cost" of powering these innovations. Manufacturers are turning to newer, composable ERP solutions to analyze risks and monitor data so they can make knowledgeable business decisions while including a focus on the environment.

Pressure for change mounts

The increasing pressure for change in both attitude and action among manufacturers is bringing a sense of urgency to the goal of sustainability. Deloitte's recent report, **The Journey Towards Sustainable Manufacturing**, summed up the changing attitudes: "Whether prompted by stakeholder demands, regulatory mandates, a concern for the environment, or pure financial motives, one thing is clear: the sustainability imperative appears to be growing. Manufacturers can no longer confine sustainability to a reporting activity by simply publishing aspirational targets in their annual reports. To make the progress necessary to shift the dial, they will instead need to commit to clear action."

Measuring environmental impact of each facility

As manufacturers analyze options, they can begin by looking at their own carbon footprints and identifying areas for improvement. This often starts with measuring electricity and water usage, analyzing ways to reduce waste in the manufacturing processes and adopting material recycling practices before expanding into other areas.

There are many regulatory compliance requirements that require the manufacturing industry's attention. Current regulatory attention is focused on **per and polyfluoroalkyl substances (PFAS)** which are a group of manufactured "forever chemicals" that break down very slowly over time. There are thousands of PFAS chemicals that are found in different industrial, consumer, and commercial products. Manufacturing companies need to diligently evaluate their liability risks and develop programs to reduce and/or eliminate future uses. Businesses with operations or supply chains outside the U.S. face even wider PFAS regulations.

One federal program in the U.S. to help manufacturers is the **Green Suppliers Network** launched by the EPA as part of its Economy, Energy, and Environment (E3) framework. For each manufacturing facility, the Green Suppliers Network team conducts a **customized technical assessment** of production processes to help the manufacturer reduce waste and operate more efficiently. Data from several sources is reviewed, including:

- Electricity usage
- Water data
- Air, water, liquid, or hazardous waste permits and environmental reports that are submitted to environmental regulatory agencies
- Annual cost of hazardous waste disposal services
- Annual cost of solid waste disposal services
- Purchasing records for major raw material inputs
- Listing of any liquids that require special handling
- Listing of all materials recycled, as well as the monthly volume and revenue generated because of recycling

Manufacturers and their supply chains who utilize this network gain access to resources that further support their organizations, including a follow-up confidential survey with the National Institute of Standards and Technology (NIST) that measures progress in implementing recommended improvements.

The lithium battery debate

The pressure to achieve quick change can lead to missteps, setbacks, and the need to re-think hasty strategies. **Many believe** the adoption of lithium batteries for electric vehicles (EV) is that kind of faulty strategy. As car companies and governments pledge to ramp up reduced-emission vehicles, experts predict that 145 million electric vehicles will be on the roads by 2030. But while electric vehicles can play an important role in reducing emissions, they also cause environmental hazards—from the mining of raw materials to disposal/recycling of batteries. More than 12 million tons of lithium-ion batteries are expected to retire between now and 2030.

"Not only do these batteries require large amounts of raw materials, including lithium, nickel and cobalt – mining for which has climate, environmental and human rights impacts – they also threaten to leave a mountain of electronic waste as they reach the end of their lives," the Guardian reports.

Recycling matters

Hundreds of millions of dollars are flowing into recycling startups and research centers to figure out how to disassemble dead batteries and extract valuable metals at scale. While the U.S. has yet to implement federal policies mandating lithium-ion battery recycling, the EU and China already require battery manufacturers to pay for collection and recycling systems that address disposal issues. These funds could help subsidize formal recyclers to make them more competitive.

In late 2021, the EU proposed sweeping changes to its battery regulations, most of which target lithium-ion batteries. These include target rates of 70% for battery collection; recovery rates of 95% for cobalt, copper, lead, and nickel; 70% for lithium; and mandatory minimum levels of recycled content in new batteries by 2030 to ensure there are markets for recyclers and buffer them from volatile commodity prices or changing battery chemistries.

Safety concerns

The safety of lithium batteries is also a consideration. In February 2022, a **cargo ship left Germany** headed for the US with about 4,000 Porsches, Bentleys, and other luxury cars aboard, and some of those were electric vehicles. A raging fire erupted, causing the crew to abandon ship and leave the burning ship adrift. It's not clear if the batteries caused or contributed to the fire, but they made it harder to put out, limiting fire extinguishing options to the use of dry chemicals to smother the flames.

There have been more than **35 large lithium-ion battery fires since 2018**. While electric vehicle fires are considered rare **(.03% compared to 1.5% for internal combustion engine vehicles)**, they do pose a unique flammability risk especially when transported together by cargo ship, where one flaming battery could ignite a chain reaction of adjacent batteries. EV and battery manufacturers are considering switching to different formulations of lithium batteries as they quickly determine how to manage the new realities of working with different materials in new ways.

Complex decisions needed ahead

As the complications associated with EV and lithium batteries shows, there are no easy answers to achieving sustainable manufacturing. Regulatory constraints, a lack of government incentives for alternative energy sources, and uncertainty around larger industry advancements raise concerns for manufacturers who are looking for solid answers. During times of uncertainty, it is important to develop trusted ecosystems of manufacturers, industry associations, regulators, and third-party providers to advance sustainable outcomes.

To achieve an internationally shared goal of reducing global warming, consumers, businesses, and countries need to cooperate and to do their part. The stakes are higher than ever to increase sustainable business practices and to operate with higher standards and transparency.

Moving forward with trusted technology solutions

Managing the checks and balances of innovation requires a controlled, thoughtful, and strategic approach to changing the way new vehicles, machinery, and consumer products are powered. There are concerns that investments in manufacturing green products can be costly. These concerns can be addressed by taking the time to analyze facts and business data, rather than jumping to assumptions.

Manufacturers engaged in sustainability efforts will find more success by addressing sustainability in a measured, data-driven manner, rather than on an ad hoc basis. To do this, manufacturers looking to meet environmental responsibilities while capturing growth will need to embrace digital capabilities throughout their entire organization.

Digitalization supports holistic process improvement, starting with the operational shop floor. Greater efficiencies, including the smarter use of resources, can be achieved through the use of data-driven decision-making and machine-to-machine connectivity. In fact, **45% of manufacturing executives surveyed** expect increases in operational efficiencies through connecting machines and automating processes. Such savings add up, creating momentum and fueling a paradigm shift where "conscientious use of resources" becomes the standard, not the experimental effort.

The manufacturing industry can turn to modern cloud-based solutions to help manage innovation and sustainability initiatives, leading to better outcomes for the planet. Careful tracking and monitoring also help organizations fund large scale strategies. End-to-end solutions built around a modern ERP platform provide data insights, complete visibility, and a single source of truth for reliable, well-informed decision-making.

Modern cloud-based solutions support collaboration with stakeholders that can foster positive trusted relationships between internal and external partners. This collaboration, along with AI-driven forecasting and strategic analysis, can help organizations respond to customer expectations, increase competitiveness, and drive growth opportunities while improving environmental impacts. Technology helps to make the future look green—and sustainable.

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