#### **Food & Beverage:** Sustainable manufacturing boosts bottom line

In food and beverage manufacturing, the real payoffs of implementing sustainable water, energy and waste practices are higher efficiency, lower costs, and a more competitive business model.



A **FOOD DIVE** PLAYBOOK

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ere's a challenge: Find a colleague and play a word-association game ... what's the first word that pops into their head when you say "sustainability?" In many cases, the response that "sustainability" elicits is something like "green" or "conservation" or "recycling." Maybe it's "organic" or "eco-friendly" or "environmental." Perhaps it's even a word like "altruism" or "humanitarianism." It could even be something derogatory, like "greenwashing."

The reality is that a single, universal understanding of the concept of sustainability does not exist. While many professionals across different industries have highly sophisticated views of what sustainability is and what it means to their businesses, they still may define, and implement sustainability strategies very differently both within and across industry categories.

Sustainability is viewed with increasing urgency in food and beverage manufacturing, packaging, and distribution. Food production represents 10 percent of global gross domestic product and is an extremely resource-intensive operation. Companies in this sector are driven to constantly modernize and automate to improve efficiency in water and energy consumption.

With that imperative in mind, sustainable practices are table stakes to survival. Companies pursue sustainability to be competitive, to be modern and up to date, to be more efficient, to reduce costs, and to remain viable and competitive. They do it to boost energy efficiency, reduce costs, and keep production



running. This in turn supports viability, competitiveness, and modernization. In some cases, sustainable practices are an issue of compliance with government and utility regulations for water and energy. Regardless of the driver, the longevity of businesses often depends on running manufacturing environments using sustainable methods.

"I haven't been into a food and beverage plant yet that doesn't want to produce more product, faster and fresher, using cleaner energy and more sustainable practices," says Cliff D. Cole, ABB's U.S. lead in the food and beverage sector.

In food manufacturing, sustainable practices are core to increased profitability, resource savings and operational efficiency. In an evaluation of 56 academic studies on the topic of sustainability, Deutsche Bank found that organizations with high ratings for environmental, social, and governance (ESG) factors have a lower cost of debt and equity. Nearly 90 percent of the studies reviewed showed that companies with high ESG ratings outperform the market in the medium- (three to five years) and long- (five to ten years) term.

The mission of this Playbook is to demonstrate how food and beverage manufacturers can more strategically use and manage power to produce their products more efficiently and more competitively. Research on corporate sustainability from McKinsey & Company found that, whether the trigger for commitment to sustainability was risk management or growth, most companies started by improving natural-resource management. In fact, 97 percent of research participants were compelled to sustainable action on energy efficiency, 91 percent on waste, and 85 percent on water.

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This Playbook focuses on why sustainable practices matter in three key areas: energy efficiency, water usage reduction, and waste reduction. The Playbook outlines actionable, practical, affordable, and in many cases immediate changes that companies can make to achieve their sustainability goals. Our goal is to demonstrate that sustainability is not a lofty, expensive, out-of-reach goal for food and beverage manufacturers. On the contrary, it can be achieved in many small, attainable ways that move the needle on goals toward more sustainable manufacturing methods and practices.



## The Sustainability Imperative for Businesses

anufacturers that are wasteful with energy and water do so at their peril—and the likely result is both short- and long-term market penalties in the form of financial loss, and even failure. Manufacturers that waste energy and water miss key opportunities to increase efficiency and reduce operating costs, and could face penalties for regulatory non-compliance.

The risk of brand damage is also possible. Sustainability gives customers the confidence that the products they offer—and the way they're sourced—aren't destroying the environment, says Keith Fox, strategic account manager for ABB. Candy giant Mars, for example, implemented an initiative to guarantee the ongoing supply of cocoa—an essential ingredient of chocolate—by helping boost the sustainable practices of its suppliers. The candy maker did so by providing small cocoa farmers in the West African nation of Cote d'Ivoire with access to better planting materials, fertilizers, and training. Mars also conducts ongoing research into improved quality and performance of cocoa plants.

Mars's chocolate competitor Hershey's, meanwhile, dispatches experts to help farmers hone their best practices. Both Mars and Hershey's aim to have their entire cocoa supply sustainably sourced by 2020. While practices like this may not boost efficiency or reduce costs, they can be valuable in the grand scheme of sustainability. Other initiatives are even more direct: Purina's effort to transform itself as a sustainable pet food manufacturer have measurably reduced operating costs, improve brand perception, and—perhaps most important—driven up the company's stock price, says ABB's Fox. There also are ever-evolving requirements to meet changing regulatory and compliance standards for food safety. This has prompted the modernization of plants using technology that will inherently help their environments to operate more sustainably. Some companies even require their vendors to complete a sustainability audit, to ensure that their sustainability requirements are matched or exceeded by the vendors and suppliers.

"We have large food and beverage manufacturers that are augmenting their traditional power supplies—say a gas-powered plant or a nuclear plant—with renewable energy sources like wind and solar energy as part of their programs," says Cole. "These companies are working with us to set up renewable energy programs—basically mini-microgrids—to help support their food and beverage manufacturing process." Sustainability initiatives can also lead to a boost in a brand's reputation. Companies that repurpose public buildings by turning them into manufacturing facilities are participating in regional redevelopment efforts, says Aaron Strupp, control technologies sales manager for ABB. Efforts like that can help bolster brand reputation by demonstrating a commitment to the communities in which the companies operate, he says.

"They're really trying to improve trust," Strupp says. "There's been a perception over the years that these plants didn't have a concern about sustainability—that they used what they wanted to use, including land and waste. Now they're trying to show that they're here to be sustainable for the community in measurable ways, beyond just energy and water usage. They want to make sure they're using their resources—energy, water, people, buildings—in the most efficient ways possible, and to give value back to their communities."

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#### Energy Efficiency

mproving the electric energy efficiency is critical to successful sustainability practices. Nearly half of the electricity powering continuous flow in food processing facilities is consumed by three-phase induction motors operating at full speed. Unfortunately, many processes require only about half of the power these motors generate. Reducing wasteful motor power output is the low-hanging fruit for manufacturers strategically looking for a competitive edge by curtailing operating costs.

There are short- and long-term alternatives to address motor efficiency. Both options can demonstrate a fairly quick pay-back, but short-term fixes can leave some significant cost savings on the table. A better long-term solution for controlling motor output is to switch to variable speed drives which can reduce energy consumption by 30 to 50 percent. As an example, a 50 kW pump that runs 48 weeks per year typically consumes 400,000 kW hours of electricity per year. The addition of a variable-speed drive that saves 40 percent in power consumption would drop power consumption for that same 50 kW pump to 240,000 kW per year. These simple steps to improve the efficiency of motors serve as critical examples that sustainability isn't a pie-in-the-sky notion that is beyond the reach of every manufacturer. At reasonable investment levels, the addition of variable-speed drives can make a big impact in the short term on both efficiency and cost-reduction. Implementing more energy-efficient pumps further leverages sustainable practices to deliver attainable energy savings.

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#### The Energy/ Water Nexus

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nergy and water are inextricably combined in manufacturing environments. Achieving more efficient energy consumption and water usage is a concrete measurement of successful sustainability initiatives. For example, German company Bayer expects a resource-efficiency monitoring system it developed to improve operations by reducing water consumption, saving more than \$10 million per year.

"The energy/water nexus is the correlation—the unique symphony between the amount of water that's consumed in energy production and management and distribution, and the amount of energy that's necessary for water processing, distribution and cleaning," says Howard "H.J." Dewes, ABB's director of sales and marketing for water and wastewater. "Water and energy are uniquely tied together in that they have completely dependent relationships with one another."



According to Dewes, if manufacturers establish processes and programs to reduce energy consumption, they will use less water by association; if they figure out a way to reduce water usage, they will use less energy as well. Both efforts contribute to sustainability initiatives.

Steps like proper pressurization, leakage reduction, energy used in over-pressurization, drive systems and variable motors that right-flow or right-pressurize, smart meters that function as feedback loops—overall right-sizing of water usage by controlling flow rates—all contribute to the proper balance of the energy/ water nexus.

"Manufacturers that have right-sized their water distribution networks are using the right amount of energy to produce, distribute and use that water," said Dewes. "The energy/water nexus is the correlation the unique symphony—between the amount of water that's consumed in energy production and management and distribution, and the amount of energy that's necessary for water processing, distribution and cleaning. Water and energy are uniquely tied together in that they have completely dependent relationships with one another."

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## **Power Quality and Reliability**

roduct quality is a focus for all manufacturers. For companies that produce food, the product quality bar is significantly higher, which is why the food industry is heavily regulated. Anything that unexpectedly impacts food processing—from power dips to outages can dramatically affect product quality, often with devastating and costly results. In short, a manufacturer's energy sources matter—a lot. At issue is not only improved energy efficiency that reduces operational expense and improves reliability, but also the reduction of the waste that is generated when power quality is compromised.

"Continuous and high volume of production and also energy savings are very important for food and beverage manufacturers," said Kathleen Ryan, ABB's business development leader for capacitors and filters. "A production outage caused by poor power quality can cost anywhere from \$100,000 and upwards to \$1 million, depending on the duration and scrapping work-in-process."

Power quality is a measure of the availability, quality and efficiency of the power being utilized and supplied. When power quality is high, there is an efficient supply of electricity that is reliable and available. When power quality drops, the electrical distribution system of the plant is inefficient—which can wreak havoc. Poor power quality can result in damage to variable frequency drives and other sensitive equipment, as well as interfere with production and cause waste. This multiplier effect significantly underscores the critical role that reliable, available power plays in food production.

The good news is that forward-thinking manufacturers are successfully applying sustainable practices and technologies to achieve greater energy efficiency without compromising power availability or quality. Food and beverage manufacturers are increasingly aware of the need to address and improve power quality and the importance of power quality to improving energy efficiency.

"On a corporate basis and on a worldwide basis, we've seen sustainability programs require good power quality," said Ryan. "Electrical utilities have minimal power factor levels that they require their end customers to meet. Good power quality is a key driver of energy efficiency."

## The Long-Term Vision of Sustainability

ore efficient, sustainable practices that reduce energy consumption, make more efficient use of water, and automate processes will directly correlate with improved product quality, enhanced reliability, streamlined and more energy-efficient and cost reduction.

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In manufacturing environments like food processing, sustainable practices are table stakes.

"Businesses want to create long-range sustainability strategies for their organizations that demonstrate how they can be successful for the next 200 years," Cole said. "Key to that goal is demonstrating to the people in their communities and all their stakeholders—all the way down to the end consumer—that they're in





it for the long haul, and that they're willing to adjust and adapt to their environments."

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The fact is that these companies can indeed be successful in their mission to achieve energy efficiency, reduce water usage, and reduce waste--among other sustainable practices. The sooner sustainability is viewed not as a lofty concept related to saving the world, and instead as an attainable concept related to making incremental, immediate changes and improvements to improve efficiency and reduce consumption and waste, the better off the manufacturing world--and the world overall--will be.

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