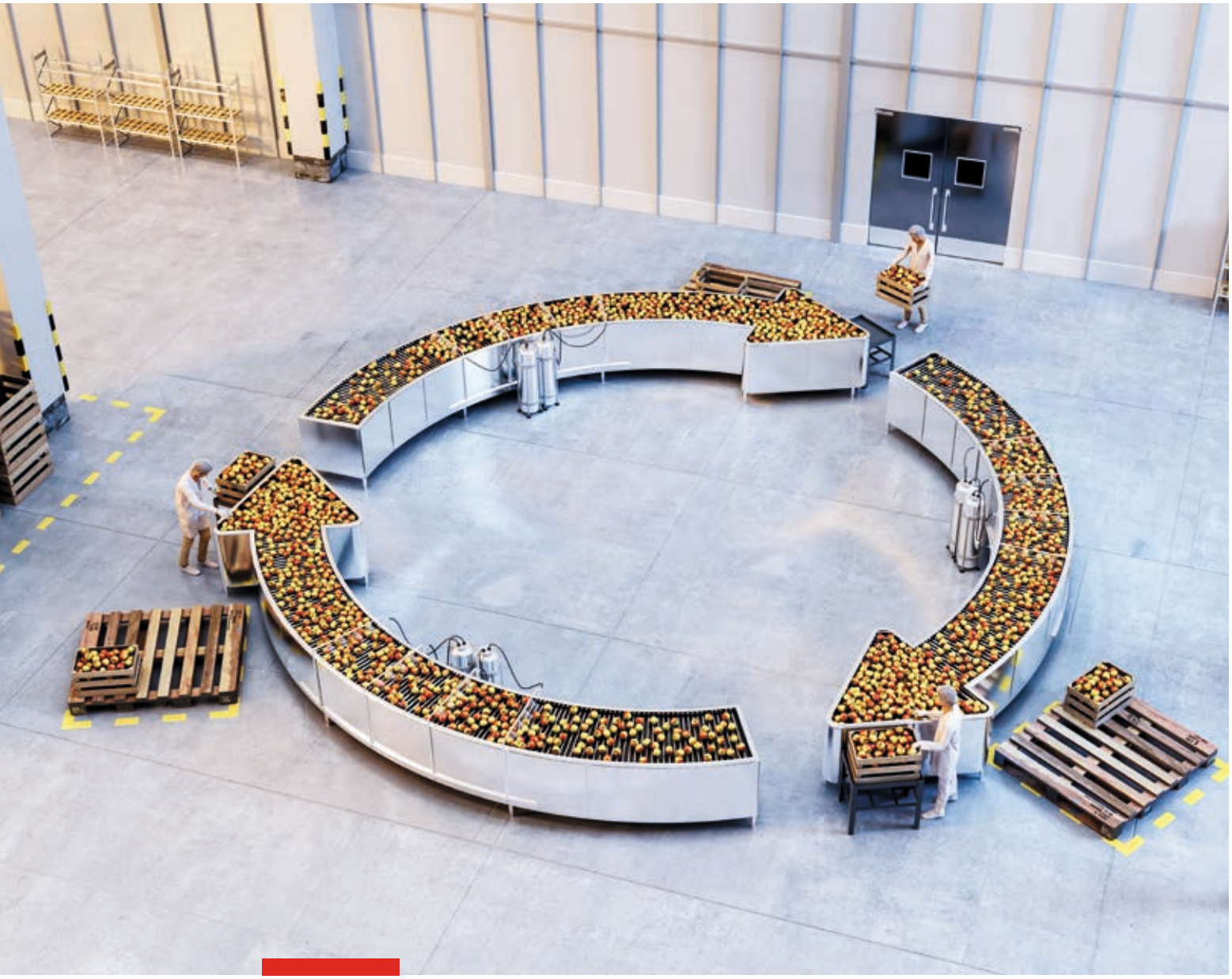

Sustainability on the menu for F&B

Understanding how sustainability is becoming a key driver for profitable growth.

It's a good time to be in the food and beverage business. The United Nations predicts food production must increase by as much as 70% between 2010 and 2050 in order to meet the needs of a growing global population. The industry is expected to see 4.8% CAGR in the US over the five years from 2017 to 2022, according to PMMI, the association for packaging and processing technologies.[1] But this rosy future is not without its challenges.

Demand from consumers for new products and more information about ingredients is driving market fragmentation, which means shorter product development cycles and faster changeovers. At the same time, stricter regulation is driving new labeling requirements and more robust food safety practices. The scope of "sustainability" is broadening, and F&B players are moving to demonstrate more than simple compliance.

Risky business

Like other high-visibility industries, F&B is exposed to a wide range of risk, from food andworker safety to energy and supply chain disruptions, even weather. According to Ceres, an environmental consulting firm, the industry employs over 1 billion people worldwide, consumes 70% of the fresh water used each year, and contributes nearly a fifth of global carbon emissions.[2]

In addition, a third of food produced globally for human consumption is wasted, but that figure hides an important distinction: much of the risk F&B faces lies outside of the industry's control, for example with consumers who throw away food before consuming it. The issue of waste is just one of a growing number of sustainability concerns about the food supply on the part of consumers, governments, activists and the industry itself.

The F&B industry employs

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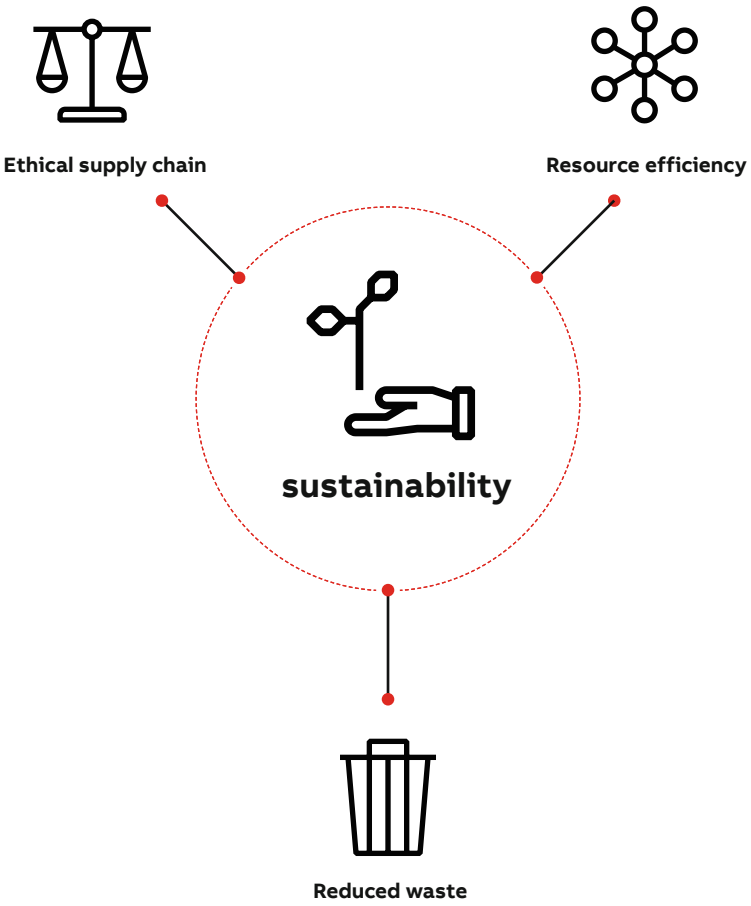
What “sustainability” means for consumers, retailers and manufacturers



The idea of sustainability is often associated with environmental stewardship, but the term isn’t fixed, and it depends on who is defining it. Resource efficiency, an ethical supply chain, reduced waste, and openness about ingredients are all potentially part of “sustainability.”

A recent Deloitte report[3] examining consumer trends in F&B found that consumers are becoming savvier—and more demanding—about how their food is produced. Taste, price and convenience are being joined by health, social impact and transparency as influences on consumers’ purchase decisions. These attributes affect not only product choices but which retailers people frequent:
23% of consumers said they choose their grocery stores based on social impact factors.

Suppliers and retailers should both take note. The Deloitte survey also found consumers are 3.4 times more likely to harbor negative sentiments about food companies compared to a multi-industry average.

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A 2015 Nielsen study reported that about two-thirds (66%) of consumers would pay more for products from companies that are committed to positive social and environmental impact.[4]

There are more concrete risks as well. Coca-Cola was forced to shut down one of its plants in India in 2004 due to a water shortage, for example, and drought similarly caused Bunge to report a $56 million loss in its sugar and bioenergy segments in 2010.[5]

An industry survey conducted by Grant Thornton in 2017 would seem to indicate F&B companies are focused on sustainability, with 68% of respondents indicating they see it as critical to growth.[6]

The importance of sustainability for F&B companies:

68% **say its critical to growth**

68% **say its profitable in long-run**

67% **say its expected by their customers**

Among manufacturers, these figures climb to 75% or higher. The Grant Thornton survey also found that half of all respondents (and 44% of manufacturers) said sustainability was hard to implement.

McKinsey puts the value at stake from sustainability concerns as high as 70% of EBITDA[5], but companies can also find value in sustainable business practice. Dow, for example, has saved nearly $10 billion on an investment of $2 billion focused on improving energy and wastewater efficiency.[5]

Having a robust sustainability program signifies other advantages as well. An Arabesque/Oxford University literature review of 200 sustainability studies found that most of them (90%) indicated lower cost of capital and showed better operational performance (88%) for companies demonstrating good ESG (environmental, social, governance) practices. Another 80% of the studies showed stock price performance to be positively correlated with good sustainability practices. [5] One study showed companies with robust sustainability programs even enjoy higher levels of employee retention (38%) and morale (55%) compared to firms with poor ones.

How to do sustainability

Given the enormous variation between different kinds of facilities, F&B manufacturers are well advised to start any sustainability initiative with a site assessment to identify safety issues, establish baselines for resource use, and uncover opportunities for process improvement. A recent assessment ABB conducted on behalf of a US poultry supplier found numerous items:

- Outdated single-line diagram (safety issue)
- Oil containment barriers damaged or missing
- Poor power quality across the plant
- Opportunity to boost efficiency of motors on compressors, cooling towers and ammonia system with variable frequency drives (VFDs)
- Boiler control system needed to maximize efficiency of the two boilers.
- Siloed PLC systems—potential for SCADA to realize improved control and data collection

Many of the applications that produce an immediate impact in F&B plants have to do with reducing energy consumption, as this example shows, but manufacturers can also affect waste, uptime and safety with the right sustainability approach. Following are a few examples of specific pieces of equipment that can have a substantial impact on plant sustainability.

Transformers are the gatekeepers of electrical systems, situated at the point of interconnection with the grid. As such, all of the plant's power flows through one or two of these critical devices, which experience losses even when the plant isn't using much power. In fact no-load losses account for 80% of a transformer's losses, which in turn account for up to 3% of all energy used in the facility.

Higher-efficiency transformers reduce those losses, sending savings directly to the bottom line. They also help address power quality problems like harmonics that can damage downstream equipment. More efficient units even reduce cooling load because less of the energy passing through them is lost as heat.

Transformers themselves vary in their level of environmental friendliness, too. Many firms are choosing dry-type units that eliminate the environmental and safety risks associated with transformers use mineral oil as an insulating material.

Power quality has a direct impact on electrical equipment. Harmonics, for example, can degrade sensitive components, shortening their lifespan and increasing the risk of failure. Utilities and industrial firms alike use power electronics devices to correct power quality issues and increase the usable capacity of existing power networks. Canada-based McCain Foods, for example, installed eight capacitor banks in one of its plants in the UK that improved power factor on the power distribution system so that a new line could be added without the need to install a new substation.

The avoided cost was estimated at £250,000. Similarly, PepsiCo used a STATCON to address power quality issues at one of its plants. The system yielded energy savings of 5-10% while improving the reliability of the plant's power distribution network, which also reduced downtime.

Motors and drives have perhaps the most compelling business case when it comes to saving energy, in part due to the fact that motors typically consume half the energy used in F&B facilities. But food processing operations are hard on equipment. High-pressure washdown, caustic cleaning agents and the presence of heat and dust all shorten the life of electric motors, so choosing the right motor is essential. Stainless housing and designs to avoid water ingress, as well as dust explosion-proof units are all available.

The first step in realizing the energy-saving potential of motor-driven systems is to size the motors properly. Many firms choose a few sizes to serve all the plant's needs but this is not recommended as in most applications the motor will be either over- or undersized.

For highly variable loads like pumps and fans, variable frequency drives (VFD) allow motors to ramp up and down as needed, drastically reducing the energy they consume. It's not uncommon for VFD applications to deliver payback in a matter of months. One sausage maker realized a 50% reduction in energy use when it installed VFDs on the motors driving the smokehouse fans. The savings paid for the investment in less than a year.

Drives also offer a number of operational benefits like minimizing cavitation, detecting pressure loss and providing required torque or torque limitation. These factors are particularly important with regard to water, which the F&B industry consumes voraciously. Heating, cooling, transportation, purification, pressurization and injection require significant amounts of energy, which illustrates the "water-energy nexus."

To reduce water (and energy) use, F&B manufacturers should look to re-use water by optimizing clean-in-place practices. "Cold CIP" methods like electrochemical activation (ECA) or ozonation, for example, use less water, detergents and chemicals as well as less energy since the water does not need to be heated. This approach also reduces the time required for cleaning.

VFDs can improve water management, too, with pressure and flow optimization, the ability to detect pressure loss (e.g., from ruptures), and efficient heat removal.

Level measurement is a specific application and not often considered as a sustainability opportunity, but even here F&B plants can leverage investments in technology to cut waste and downtime. Laser level sensors are generally a better alternative for F&B applications as they sense the level of materials of varying density as well as any low dielectric material. For example, liquid in a supply tank might be topped by a layer of foam that would not be detected using conventional devices. Laser level sensors "see" the foam and thus can prevent overfilling and spills, eliminating waste and keeping production running smoothly. With their narrow beam, laser level sensors can even work in tanks with mixers where traditional technologies struggle.

Worker safety is the ultimate sustainability issue. Almost a quarter of all reported industrial dust explosions occur in the food and beverage industry. This is largely due to the presence of dust-creating ingredients like flour, but also to the use of equipment that is not rated for the harsh environments found in F&B plants. Equipment that is certified dust ignition proof will not provide an ignition source. In other words, it will not cause a dust explosion even if all the other factors (dust, confinement, oxygen) are present.

Upgrading to dust explosion proof motors may also improve efficiency, which delivers faster payback on the motor investment. Just be sure not to confuse dust explosion proof with flame-proof motors. The latter are designed mostly for use in the oil and gas industry and are not dust explosion proof certified.

Packaging is one area where F&B manufacturers have invested in automation, with almost all plants (94%) using robotics for packaging. [1] This takes humans out of one of the most injury-prone areas of the plant, and reduces waste from breakage. Packaging design also plays a role. Reducing the material used cuts costs and reduces exposure to commodity prices Control systems offer a variety of tools to impact sustainability. Perhaps the most important is measurement—many F&B companies don't have a good grasp of their resource use, but you can't address what you don't measure. Control systems, whether SCADA or a full-blown DCS, create a platform from which to gather the data needed to establish baselines and track progress.

One example from the poultry business focused on dissolved air floatation (DAF) systems in a chicken processing facility. The plant owner didn't think that recovering oil from the waste stream would be economical, but a combination of real-time monitoring with smart instruments, trending and analytics in the control system made it possible to demonstrate cost savings. The company reduced disposal costs by 60% - 70% by collecting and re-using oil with the investment fully recovered within 18 months. Implementation challenges and best practices The availability of data remains a challenge for the food and beverage industry, particularly with regard to sustainability. As the Grant Thornton study notes, "Companies often struggle in determining which topics and specific measures are material to their organization and what meets their stakeholder expectations." The report also points out that the large number of potential metrics can make it difficult to benchmark a plant's performance against industry norms.

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Investment in automation, equipment set to increase. According to PMMI survey findings, nearly half of companies interviewed will be spending MORE on capital equipment in the next 12 to 24 months. Half are focused on increasing the level of automation in the next three to five years, and a large majority (75%) measure overall equipment effectiveness.

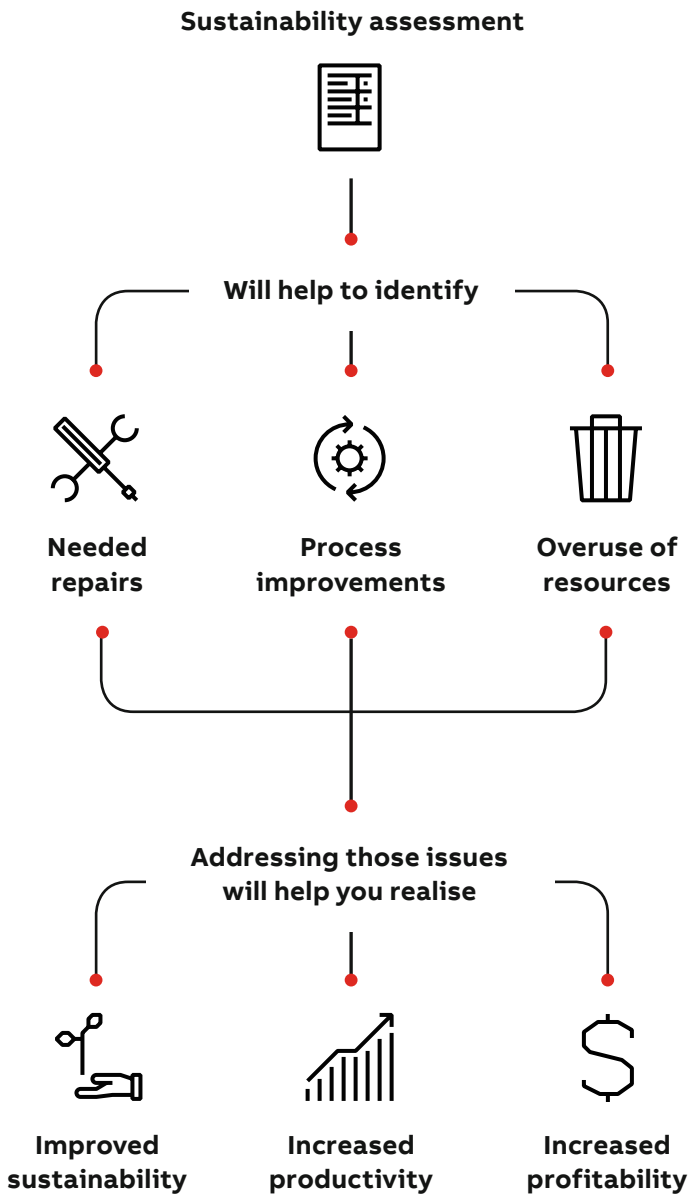
Asked to offer recommendations to suppliers, these end users suggested better cleanability, flexibility in changeovers, faster read time for vision equipment, improved operator safety and self-diagnostics for preventive maintenance. Buyers also want all new equipment to be connectivity-ready.

Moving to a sustainable future

F&B manufacturers must also navigate the interrelatedness of the different parts of their operations, again with an eye toward capturing useful data to make informed decisions. This can be a challenge when it involves numerous suppliers and potential interoperability or data sharing issues. Many are niche players focused on specific vertical markets within F&B (e.g., poultry processing) and may lack the needed perspective.

As noted earlier, one best practice is to start with a sustainability assessment with a multidisciplinary team to identify needed repairs, process improvements and opportunities to reduce resource use. Often larger suppliers can bring their experience to bear from across multiple sectors. They are more likely to have a holistic view of the plant, which helps to uncover actions that improve sustainability, productivity and profitability.

Finally, just as it's important to begin with a site assessment to establish baselines and identify KPI's, it's also important to measure them going forward. It is essential, then, to have the tools in place to gather the required data and have the analytic capability to derive actionable information from it. With those mechanisms in place, F&B manufacturers will be well equipped to increase the sustainability of their operations and ensure their long-term success.



Ready to talk?

when it comes to sustainability,
we can find the solution, together.

Endnotes

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