Whitepaper

Sustainability in milling

Turning responsibility into competitive advantage

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Agriculture and food production account for roughly a quarter of global greenhouse gas emissions. While livestock production represents the most carbon-intensive element of the food system, crop cultivation, dominated by grains and cereals, also plays a meaningful role. When land-use change is included, crops contribute roughly 8 percent of global emissions. These figures place every participant in the food value chain under increasing scrutiny. For milling companies, the challenge is particularly visible. Positioned between agricultural production and food manufacturing, millers influence both upstream sourcing and downstream product performance. As a result, sustainability in milling is no longer a peripheral topic. It is becoming a central strategic challenge. Three forces are accelerating this shift: evolving regulation, rising expectations from customers and partners, and the growing recognition that sustainability improvements often align with stronger business performance. For millers, the question is no longer whether sustainability matters. The question is how quickly and effectively they can translate ambition into measurable operational change.

Why sustainability is rising on the milling agenda

Across industries, sustainability reporting is becoming more structured and transparent. In Europe, for example, the Corporate Sustainability Reporting Directive requires large companies to measure and disclose the environmental impact of their operations. Organizations with more than 1,000 employees and annual turnover exceeding €450 million must comply with these requirements. Larger enterprises face additional obligations under the Corporate Sustainability Due Diligence Directive.

Although regulatory frameworks continue to evolve, the direction of travel is clear. Companies must quantify their environmental impact and demonstrate progress over time. For milling companies supplying major food manufacturers, this requirement increasingly flows through the supply chain.

Customers and partners are raising expectations

Demand for lower-emission food production is also being driven by industry coalitions and corporate commitments. In 2025, more than 70 European companies, including bakeries, cooperatives, and suppliers, launched the Sustainable Wheat Initiative Europe. The initiative aims to reduce emissions from European wheat and flour production by 30 percent by 2030, using 2022 as a baseline.

Such initiatives illustrate how sustainability expectations increasingly extend across the value chain. Food manufacturers, retailers, and consumer brands are seeking partners who can demonstrate measurable improvements in environmental performance.

rollDetect to refloot rolls at the perfect time for lower energy, lower footprint, higher grinding efficiency.

Sustainability increasingly supports business performance

For many millers, sustainability efforts also reflect a strategic business decision. More than ten thousand companies globally have committed to the Science Based Targets initiative, which requires rigorous measurement and reduction of greenhouse gas emissions.

Beyond formal commitments, however, the economic logic is compelling. Lower energy consumption, higher yields, and reduced waste simultaneously decrease operating costs and environmental impact. As customers and consumers increasingly prioritize sustainable sourcing, mills that demonstrate a smaller environmental footprint may gain competitive advantage, secure preferred supplier status, or command price premiums. In short, sustainability is becoming both a compliance requirement and a commercial opportunity.

Arrius, integrated grinding system uses less energy with higher grinding efficiency.

The role of technology providers

Equipment suppliers also have a significant role to play in improving the sustainability of the milling sector. For Bühler, sustainability is closely linked to the lifecycle impact of its equipment. The company's own operational emissions amount to approximately 58,000 tonnes of CO_2 equivalent annually, including both direct emissions and emissions associated with purchased energy. A pathway has been established to reduce these emissions by 60 percent by 2030 relative to a 2019 baseline.

However, the environmental footprint of Bühler equipment extends far beyond its manufacturing operations. Emissions associated with the upstream supply chain total roughly 718,000 tonnes of CO_2 equivalent. Even more significant are the emissions generated when equipment is used in customer facilities.

Over a typical ten-year equipment lifecycle, Bühler estimates that its products account for approximately 42 million tonnes of CO_2 equivalent emissions.

This disparity highlights an important insight: the greatest opportunity for impact lies not only in how equipment is produced, but in how efficiently it operates in mills around the world.

Bühler understands that the food industry needs to come together to reduce environmental impact across the value chain. The company has extended its network of partnerships and collaborations in recent years. It has also committed to developing and industrializing solutions capable of reducing energy waste and water consumption across customers' supply chains by up to 50 percent.

Measuring your environmental footprint

Effective sustainability programs begin with measurement. Without a clear understanding of environmental impact, companies cannot identify improvement opportunities or demonstrate progress. For milling operations, two widely used methodologies provide this foundation.

Greenhouse Gas Protocol assessments

A Greenhouse Gas Protocol assessment quantifies the annual carbon footprint of an organization by categorizing emissions into three scopes:

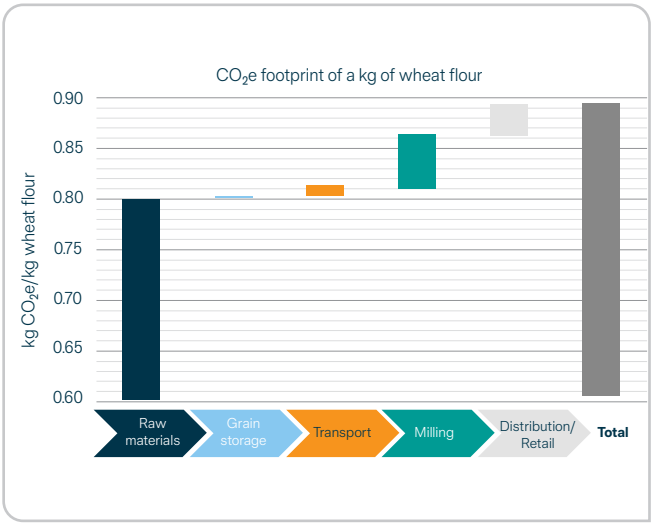
- **Scope 1:** Direct emissions from owned or controlled sources
- **Scope 2:** Emissions associated with purchased electricity or energy
- **Scope 3:** Indirect emissions across the value chain

This framework forms the basis for most regulatory reporting requirements and corporate climate commitments.

Life Cycle Assessment

Life Cycle Assessment (LCA) takes a complementary perspective. Instead of focusing solely on the organization, it evaluates the environmental impact of a product across its entire lifecycle. In milling, this approach typically measures the emissions associated with producing one kilogram of flour, considering upstream agriculture, processing, transportation, and downstream use.

Both methodologies provide valuable insights. The first helps companies manage organizational emissions, while the second enables comparison between products and production systems. Bühler milling specialists regularly help customers to evaluate their operations using either GHG protocol or LCA approaches and we have developed specialized software tools that millers can use for ongoing monitoring.



Environmental footprint of a wheat flour value chain.

Key levers for improving sustainability in milling

Although the environmental footprint of a milling operation depends on many variables, several improvement opportunities consistently emerge across facilities.

Strengthening grain sourcing strategies

In most flour supply chains, the largest share of emissions originates from the production and transportation of grain. This dynamic creates an opportunity for mills that maintain close relationships with local producers. Shorter supply chains, localized sourcing, and transparent agricultural practices can significantly reduce the embedded emissions of finished flour products.

Transitioning to lower-carbon energy sources

Energy sourcing also matters. Mills can lower Scope 1 and Scope 2 emissions by adopting renewable energy solutions, such as on-site solar generation, energy recovery from production waste streams or power purchase agreements with renewable energy providers. In addition to reducing emissions, such strategies can provide a hedge against volatile energy prices.

Reducing energy consumption in milling operations

The second major emissions driver is energy consumption within the mill itself. Bühler internal benchmarking suggests that roll stands represent the largest energy consumer in many mills, followed by pneumatic conveying systems.

Operational improvements can substantially reduce these energy demands. Installing variable-speed drives and in-line pressure measurement in pneumatic systems allows them adjust airflow dynamically according to mill load for example. Applying a similar approach to filter equipment allows motors speed to rise and fall depending on the accumulation of material on the filter, maintaining flow rates while using less energy. These measures reduce energy consumption while maintaining throughput and product quality.

Increasing yields and reducing waste

Improving process efficiency can also lower the lifecycle emissions of flour. Every kilogram of grain lost during processing carries the embedded carbon footprint of cultivation and transportation. Equipment upgrades, process optimization, and improved monitoring systems can increase extraction yields while minimizing waste.

Mill pneumatics and aspirations shall be adjusted via auto-control loops to meet exact pressure and air flow needs.

Unlocking value from side streams

Finally, sustainability improvements often emerge when companies reconsider how production side streams are used. Examples include producing whole-grain flours or converting bran into dietary fiber ingredients and snack products. By increasing the utilization of raw materials, mills can simultaneously reduce waste and create new revenue streams.

From obligation to opportunity

Sustainability in milling is rapidly moving from a niche concern to a strategic priority. Regulatory requirements, customer expectations, and market dynamics are converging to accelerate change across the sector.

For millers, the transition presents both challenges and opportunities. Companies that systematically measure their environmental impact, invest in efficient technologies, and collaborate across the value chain can achieve meaningful emissions reductions while strengthening their competitive position.

For Bühler, this drive for a collaborative, end-to-end approach is a core part of the organization's strategy. The company's milling specialists are always ready to work with customers and other partners in the pursuit of opportunities to improve sustainability and wider business performance.

In the years ahead, sustainability performance will increasingly shape how flour is sourced, processed, and marketed. Mills that act early and decisively will be best positioned to lead the transformation of the industry.

Hochwirksame Reinigung für weniger „guten" Abfall bzw. eine höhere Gesamtausbeute.

References

1. https://ourworldindata.org/food-ghg-emissions?
2. https://www.sustainablewheatinitiative.eu/manifesto/
3. https://sciencebasedtargets.org/news/sbti-celebrates-10000-company-validations

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BUZ MS Sustainability in milling Whitepaper EN 0626 Z&B 262004