Sustainability in the Food and Beverage Industry

Global, National, and Local Challenges and Opportunities

A look at some of the sustainability opportunities and environmental challenges facing the U.S. food and beverage sector.

The food and beverage sector is a significant presence in the nation's economy in measures of size, value, workers, and growth. A 2017 report by the Committee for Economic Development estimates that the U.S. food and beverage industry accounted for 1.46 million employees and an annual payroll of $54.7 billion in 2012.[1] These numbers amount to approximately 13 percent of all U.S. manufacturing employment in 2017, up from 9 percent in 2001.[2] Although a general decline in the number of large manufacturing facilities has been observed across the United States in recent years, the food processing industry has been an exception, with the number of food plants employing more than 1,000 workers growing in 2015 as compared to prior years.[2] With tens of thousands of food and beverage facilities, many of them very large, the food and beverage sector plays a major role in our nation's economy—so too in our nation's environment.

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The food and beverage sector consists of a diverse range of processes and products, including meat and poultry, grain and oilseed milling, bakeries, dairies, and breweries. These facilities face short- and long-term environmental challenges that are similar to those faced by heavier industries. As in other manufacturing sectors, food manufacturing and processing facilities rely on readily available energy, sufficient amounts of water, and quality sourcing materials. From a waste and emissions standpoint, these facilities manage waste generation and disposal, wastewater treatment, air emissions, and the risks associated with chemical usage.

The food and beverage sector, like other manufacturing sectors, is under increasing pressure to embrace sustainability across its supply chain, and to effectively manage the localized impacts and environmental risks associated with manufacturing operations. These demands are simultaneously global, national and local in scope—and while the sector has demonstrated a willingness to tackle sustainability on a global scale, plant-level environmental compliance challenges remain.

Measures for Sustainable Sourcing

Over the past several years, the food and beverage industry has embraced global opportunities to address sustainability in supply chains with cooperative programs and certifications seeking to reduce the industry's impact on climate change, and to address social issues within grower communities, such as poverty, child labor, and education. These efforts have demonstrated the industry's response to an increasing demand for corporate social sustainability measures, and the tremendous impact of those efforts.

Coffee and chocolate manufacturing industries have been leaders in using the expansive reach of their supply chains to enhance supply stability. This has resulted in a positive impact on the manner in which coffee and cocoa is grown in Central and South America, and in Africa. Coffee and chocolate manufacturers have partnered with organizations such as UTZ (https://utz.org), Fairtrade USA (http://fairtradeusa.org), and the Rainforest Alliance (https://www.rainforest-alliance.org) to provide support and training in sustainable farming techniques that address risks from deforestation, climate change, and crop disease. These efforts have been substantial.

For example, coffee giant Starbucks (https://www.starbucks.com/responsibility/global-report) has announced that 99 percent of its coffee is sustainably sourced, and Nestlé (http://www.nestle.com/csv/communities/coffee) has pledged to meet milestones for 2020 in terms of coffee plantlets distributed and tons of coffee sourced sustainably. Leading chocolate manufacturers (http://www.worldcocoafoundation.org/cocoa-forests-initiative/), including Hershey, Mars, Blommer, and Nestlé, have recently announced a cooperative, multi-stakeholder framework to address deforestation and forest degradation on the cocoa supply chain. Other products such as palm oil, soy, and wheat have also been the subject of sustainable sourcing initiatives.

Efforts to Reduce Energy Consumption and Waste Generation

According to an estimate by the U.S. Department of Agriculture, the food system accounts for approximately 16 percent of the nation's energy budget, with food processors showing the largest increase in energy usage between the years 1997 and 2002.[3] Although there is a wide variety of products and processes within the food manufacturing sector, heating and drying, refrigeration, and processing equipment are consistent energy drivers across the industry. With global climate

change as a focus, the food and beverage sector has been an active participant in efforts to develop and rely on renewable energy.

Clif Bar & Company, Diageo, and Kellogg's are among the many manufacturers participating with RE100 (http://there100.org/companies), a global collaborative of businesses committed to achieving 100-percent renewable energy. However, these goals may take years to achieve, even for the largest companies, and may not be as feasible for mid-size or small facilities. In the meantime, these facilities are faced with everyday decisions relating to energy demands and related emissions. Food processors may be required to report emissions of greenhouse gases under the U.S. Environmental Protection Agency's (EPA) Greenhouse Gas Reporting Rule, including emissions associated with stationary combustion and wastewater treatment. Many food and beverage facilities are also likely subject to EPA's major and area source boiler rules, which were recently amended to require energy assessments for facility operations.

Aggressive waste reduction goals have been established by many companies as a means of curbing the amount of landfilled waste that ultimately will contribute to the generation of landfill gas containing methane (a greenhouse gas). In 2015, the Obama administration set a first-ever food waste reduction goal of 50 percent by 2030, an effort focused on reducing the levels of food waste, which currently accounts for about 21 percent of total landfilled waste.[4] The good news appears to be that the food manufacturing industry has already effectively maximized its recycling and reduction efforts. A 2014 report by the Food Waste Reduction Alliance states that approximately 95 percent of food waste generated by manufacturing survey respondents in 2013 was donated or recycled. Use as animal feed provided the greatest opportunity for reuse.[5]

Chemical Usage and Risk Mitigation

While the food and beverage sector is not typically known for the use of highly dangerous chemicals in its production processes, the use of ammonia refrigeration systems has been a mainstay of the sector and has been an area of continuing focus as a result of EPA's recent enforcement efforts.

Ammonia is a regulated substance covered under the U.S. Clean Air Act Chemical Accident Prevention requirements, codified at 40 C.F.R. Part 68, also known as the Risk Management Program (RMP) requirements. The RMP program imposes requirements for proactively evaluating the potential offsite consequences of chemical releases, and development of hazard response plans for facilities that use more than a threshold quantity of 10,000 pounds of ammonia. According to the Right-to-Know database, ammonia is ranked third among the most used chemicals subject to EPA's RMP requirements, with food and beverage companies among the largest users of the chemical.[6]

EPA's enforcement of its RMP for facilities that use ammonia refrigeration systems has followed a consistent pattern. For facilities that have experienced releases of ammonia from refrigeration systems, enforcement actions may be taken for failure to immediately notify emergency response agencies of the release. In many of those cases, EPA has also examined,

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Current federal wastewater pre-treatment standards cover a large swath of the industry, including meat and poultry, canned and preserved fruits and vegetables, seafood processing, and dairy processing sectors.

and found deficient, facilities' compliance with RMP requirements, such as the scope of the hazard analysis, adequacy of response plans, effectiveness of training, and in many cases, the adequacy of facility alarms and notification systems. Even though RMP mandates a self-implemented evaluation and planning process rather than specific management practices or equipment, EPA's enforcement approach has often led to forced upgrades to facility equipment, with many facilities committing to significant capital expenditures in addition to civil penalty payments.

EPA has also analyzed the adequacy of risk planning efforts at facilities that utilize ammonia in amounts that fall below the 10,000-pound RMP applicability threshold, citing these facilities for failure to comply with the Clean Air Act's General Duty Clause, which requires owners and operators of stationary sources to minimize the risks associated with potential releases of ammonia and other hazardous substances. Revisions to the RMP requirements finalized in 2016 would further enhance evaluation and planning requirements, with new requirements for incident investigations and root cause analyses, third-party audits, and greater coordination with emergency responders. The RMP rule revision has been delayed pending reconsideration, but the RMP rule will undoubtedly continue to be a focus of the agency and for ammonia refrigeration system users.

Wastewater and Stormwater Management

As one the largest utility inputs in the food and beverage sector, water usage and subsequent treatment represents a significant burden on facilities in terms of cost, energy, and management resources. Sustainable approaches to water and wastewater management have gained traction in recent years as treatment infrastructure begins to age or production efficiencies result in the need to re-assess how water and wastewater are managed. While facilities may engage in better water usage strategies through front-end production efficiencies, impacts from those efficiencies may result in changes to back-end wastewater effluent characteristics.

Pre-treatment for wastewaters from food and beverage manufacturing has long been required pursuant to the U.S. Clean Water Act and implementing regulations for treatment of wastewaters prior to discharge to a local sanitary treatment authority or nearby receiving stream under National Pollution Discharge Elimination System authorizations. For example, current federal pre-treatment standards cover a large swath of the industry, including meat and poultry, canned and preserved fruits and vegetables, seafood processing, and dairy processing sectors. While there are no one-size-fits-all solutions, rapid technological development and demonstration of wastewater treatment technologies, such as moving bed biofilm reactor, dissolved air flotation, and reverse osmosis systems, have gained favor among industry professionals for their removal of soluble and insoluble organics, as well as fats, oils, and greases (FOG) found in variable strength wastewaters typically generated from the food and beverage sector.

In addition to enforcing federal pre-treatment requirements, delegated local sewer authorities also have a responsibility to protect their own infrastructure and maintain local ordinance-based pre-treatment requirements. These local agencies are charged with enforcing standards to prevent buildup-up of FOG, as well as regulating discharges to prevent corrosion of infrastructure and to prevent pass-through or interference at a local treatment plant. Non-routine wastewater generation must also be considered, such as boiler and cooling tower blow-down, ammonia refrigeration purge-water, and vehicle/truck washing. As evidenced in several multi-million-dollar enforcement initiatives targeting the food and beverage industry over the past few years, understanding local and state pretreatment requirements is yet another important consideration when evaluating sustainable strategies for wastewater management.

Proper management of stormwater has gained recent traction through EPA's 2015 revision to the Multi-Sector General Permit (MSGP) for Stormwater Associated with Industrial Activity.[7] EPA's MSGP, and the more recently issued state-

equivalent general permits for stormwater, establish best management practices (BMPs), monitoring requirements, and good housekeeping standards with the intent of reducing FOG, organic materials, metals, and related pollutants from reaching or impairing nearby receiving waters. Most common application of the MSGP to the food and beverage industry typically involves stormwater generated from manufacturing operational areas, as well as stormwater generated from distribution and warehousing operational areas. While simple on their face, BMPs and good housekeeping practices may become enforceable conditions when not properly implemented or poorly documented.

Conclusion

While the U.S. food and beverage sector continues to take great strides in global sustainability initiatives, industry efforts at the plant level will also enhance the sector's credibility and public recognition. Ensuring that federal, state, and local requirements are fully understood, fully implemented, and continue to be managed as appropriate should only add to the value of the industry sector's sustainability efforts going forward. **em**

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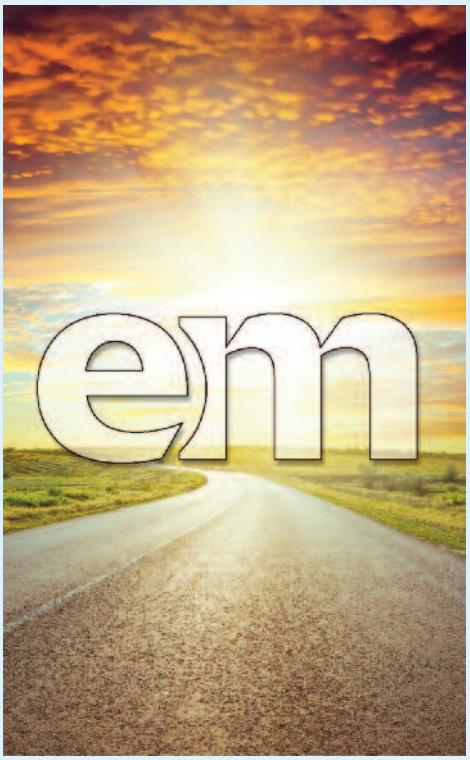

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