

Six Strategies to Improve Energy Efficiency at Food & Beverage Facilities

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Details:

Home > Articles > Six Strategies to Improve Energy Efficiency at Food & Beverage Facilities

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The six strategies are: (1) Review compressed air distribution system and compressed air use, (2) Review steam system, (3) Consider implementing heat pumps, (4) Reduce cooling requirements, (5) Enable pump systems to match demand, and (6) Maximise capacity. Each strategy addresses a specific energy-intensive function in food and beverage operations. Together, they form a systematic approach to identifying and implementing improvements across heating, cooling, pressurised air and fluid movement systems. Implementing multiple strategies can significantly reduce operational costs, since most food and beverage organisations attribute over 15% of their operational costs to energy consumption.

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As high-energy users, food and beverage facilities can strengthen their business performance through energy efficiency measures that conserve energy, reduce costs, and boost productivity.

Food & beverage manufacturers play a vital role in the economy's supply chain. These facilities involve energy-intensive processes to transfer ingredients as well as blend, heat, cool, store, pack and deliver their products. With most organisations attributing over 15% of their operational costs to energy consumption, there is an immense opportunity for improved energy efficiency to lower their organisational operating costs and contribute toward corporate emission reduction targets.

Read on to discover the six energy efficiency strategies that food and beverage organisations should consider for their facilities.

Strategy 1 - Review Compressed Air Distribution System and Compressed Air Use

Optimising a manufacturing plant's compressed air distribution system is an effective way for the plant to reduce its carbon footprint and save a considerable amount on operational expenses. For food and beverage plants, it is common for 10-40% of total energy costs to go toward the generation and distribution of compressed air. Considering that energy costs make up 80% of an air compressor's total cost of ownership, it is clear how efficient equipment and system maintenance can lead to significant savings.

To optimise the compressed air system, it is important to eliminate the amount of compressed air lost through leakage. It is not uncommon for a facility to lose up to half of the energy expended to generate compressed air on leakages. Identifying leaks and repairing these enables facilities to improve their energy efficiency and reduce consumption. Although identification of major air leaks can be detected by listening for the leaks in non-production periods, a more robust and detailed analysis typically requires specialised equipment and an experienced technician.

Another issue is that a plant may use compressed air inappropriately. For instance, some operators may use compressed air to clean equipment, which is wasteful and can potentially give rise to Occupational Health and Safety (OHS) issues. Instead, vacuuming or sweeping away debris is a safer and more energy-efficient means of cleaning.

Strategy 2 - Review Steam System

Due to the integrated role steam has throughout a facility, it is critical to have a comprehensive understanding of the plant's heat flow and temperature requirements to make effective improvements to the plant's thermal energy processes.

Like compressed air distribution systems, steam piping and valves are subject to leakage and subsequent wasted energy. Repairing leaks is a sensible start to reducing a facility's steam requirement. Insulating steam piping and valving to prevent heat loss will also reduce demand on the boiler, which lowers fuel consumption and creates a safer work environment.

Beyond insulation and leak repair, there are several other energy-efficiency best practices that can be used to optimise steam generation systems:

- install an economiser on the boiler to utilise untapped energy from the boiler waste heat stream

- install an oxygen trim on the boiler to monitor and adjust combustion air to maximise combustion efficiency through the minimisation of excess air. Not only does this enhance overall boiler efficiency, but it can assist with stack emissions compliance.

- install variable speed drives (VSDs) on the induced draft and force draft fans to adjust the fan speed in accordance with demand

- optimise boiler sequencing in multi-boiler installations through a boiler management system

- maximise condensate return

Industrial heat exchange, or heat recovery, provides a source of clean, reliable thermal energy. Capturing and utilising the energy potential of a return heating stream is an effective way to reduce boiler demand, save on fuel costs, and reduce emissions. Because it is more energy-efficient to create hot water than it is to generate steam, it is also worth assessing heating requirements to determine if hot water can replace steam.

Strategy 3 - Consider Implementing Heat Pumps

A heat pump can potentially provide for many of a facility's hot and chilled water needs. For hot water needs up to 90 degrees C, an industrial heat pump is extremely efficient, requiring only a third of the energy needed to power a traditional hot water heater. For more domestic needs, such as hot water for staff amenities, a commercial heat pump set at 60 - 65 o C can be used.

Commercial heat pumps can also chill water, some creating temperatures as low as -9 degrees C. Using CO₂ as a natural refrigerant instead of a chemical alternative, commercially available heat pumps also help improve a facility's carbon footprint. In many cases, the operational efficiency of heat pumps make them a viable alternative to be considered when determining how to reduce carbon intensity and cut energy costs.

To further reduce heating and cooling demand, the required temperatures for various applications should be assessed. It may be that cooler temperatures will suffice for various hot water applications, such as using 60 o C water in place of 70 o C water for cleaning purposes. In some cases, warmer temperatures - or even ambient temperature water - may suitably serve a plant's cooling water requirements. Changing the temperature of a heating or cooling medium may result in larger heat transfer areas being required, longer heating and cooling times, and proof of cleanliness being compromised. Therefore, several factors need to be considered before making these temperature

adjustments to ensure the continuation of quality operations.

If deemed viable, adjusting the water temperature profile across the processes and maximising heat regeneration across the plant will help reduce heating and cooling energy requirements, aiding energy conservation, emissions reductions, and cost savings.

Strategy 4 - Reduce Cooling Requirements

To reduce the cooling requirements for refrigerated rooms, it is imperative to minimise cold air escape. Firstly, it is important to limit the time that the refrigerated room is directly exposed to ambient air, which occurs whenever the door to a refrigerated room opens to an ambient space. When this happens, cool air migrates to the warmer environment, leaving a void to be filled by fresh air that needs to be chilled through the refrigeration system. One way to limit this exposure to the outside environment is to install roll fast doors that are activated using push buttons or vehicle sensors in the floor. Another strategy is to incorporate an airlock between the refrigerated room and the warmer external space.

Additionally, it is important to ensure proper insulation around doors and other penetrations to prevent cold air from escaping through holes and cracks. An infrared gun can be used to identify cold spots resulting from a leak.

Lastly, a facility should assess if it keeps its refrigerated space at an appropriate temperature. If the temperature can be slightly raised - from 1 degrees C to 3 degrees C, for instance - then the facility will require less energy to maintain suitable conditions.

Strategy 5 - Enable Pump Systems to Match Demand

Prioritising energy efficiency is important when considering a pump, fan, or other pieces of motor-driven equipment. Pumps are used for transporting ingredients, products, utilities, and effluent, making them one of the most frequently installed pieces of equipment in food and beverage plants. It is common for pumps to account for 25-50% of a facility's total electrical usage. Reviewing and optimising the operating conditions of pumps and similar equipment can therefore have a significant impact on a plant's energy efficiency and operational expenses.

Significant opportunities exist to reduce pumping system energy consumption through smart design, retrofitting, and operating practices. In particular, pumping applications with variable-duty requirements offer great energy and cost savings potential. Pump systems are often oversized, many by more than 20%. If a pump demand varies, retrofitting oversized systems with VSDs can better match pump output to system requirements. This retrofit can save considerable amounts of energy, as well as enhance performance, improve reliability, and reduce life cycle costs. If a process' flow requirement is constant, then a properly-sized replacement pump may be a consideration, or alternatively, the existing pump could be throttled through flow rate control to conserve energy.

Similar to pumps, fan motors can benefit from the installation of VSDs. Whether the fans are on boilers, refrigeration units, or other equipment, a VSD enables the fan motor to conserve energy while more accurately meeting demand.

Strategy 6 - Maximise Capacity

Processes are generally most efficient when equipment is operating at maximum capacity. For instance, it is more efficient for a two-boiler system to have one boiler running at maximum capacity rating (MCR) with the other on standby than to have both boilers operating simultaneously at 50% MCR. Similarly, organisations that produce the same product at different sites, such as sprayed dried whole milk powder, should consider conducting long runs at one site while the other location temporarily shuts down. This has the potential to be more efficient than doing short runs across both sites as frequent equipment startups and shutdowns lead to an increased amount of non-productive energy and resource consumption, resulting in less energy-efficient operations.

For industrial food and beverage facilities, there is often a significant opportunity to improve energy efficiency with existing infrastructure. By exploring ways to improve thermal energy retention and optimise systems to meet energy demand, facilities can identify strategies that result in considerable cost savings and improved energy efficiency.

Northmore Gordon helps industrial food and beverage facilities realise these savings. Our team of energy experts can help to identify and implement energy-saving strategies as well as to measure their impact. We are committed to finding energy solutions that meet industrial facilities' corporate needs. Contact our team to enhance your facility's energy efficiency strategy.

Scheme and certificate context

Before using a certificate or grant figure, confirm the current scheme method, eligible activity, effective date, evidence requirements, price date and registration or application process.

Related guidance

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Read the original article for the source publication and its full context.

What are the six energy efficiency strategies for food and beverage facilities described in the Northmore Gordon article?

The six strategies are: (1) Review compressed air distribution system and compressed air use, (2) Review steam system, (3) Consider implementing heat pumps, (4) Reduce cooling requirements, (5) Enable pump systems to match demand, and (6) Maximise capacity. Each strategy addresses a specific energy-intensive function in food and beverage operations. Together, they form a systematic approach to identifying and implementing improvements across heating, cooling, pressurised air and fluid movement systems. Implementing multiple strategies can significantly reduce operational costs, since most food and beverage organisations attribute over 15% of their operational costs to energy consumption.

Why should food and beverage facilities prioritise reviewing their compressed air systems?

Compressed air represents a major energy cost in food and beverage plants, with 10–40% of total energy costs commonly going toward its generation and distribution. Energy costs account for 80% of an air compressor's total cost of ownership, making efficiency improvements particularly valuable. The Northmore Gordon knowledge library identifies compressed air as a key investigation area in food and beverage manufacturing, recommending assessment of unnecessary uses, leaks, idling, pressure settings and compressor sequencing. A practical starting point is to distinguish compressed air tasks that genuinely require pressure from those that could be performed more efficiently through vacuuming or sweeping, eliminating waste while improving workplace safety.

What optimisations can improve steam generation system efficiency beyond basic maintenance?

Beyond insulation and leak repair, best practices include installing an economiser to utilise boiler waste heat, installing an oxygen trim to maximise combustion efficiency and assist stack emissions compliance, installing variable speed drives (VSDs) on induced draft and force draft fans, optimising boiler sequencing via a boiler management system in multi-boiler installations, and maximising condensate return. These measures require technical assessment appropriate to the site's steam profile and equipment configuration. Our process heat assessment can help identify which improvements match your facility's operating requirements, duty cycles and replacement planning. A phased approach allows capital investment to be sequenced with maintenance windows and

production schedules.

How efficient are industrial heat pumps for hot water production compared to traditional heaters?

For hot water needs up to 90°C, industrial heat pumps are extremely efficient, requiring only a third of the energy needed by traditional hot water heaters. Some commercial heat pumps also provide chilled water, with certain models reaching temperatures as low as –9°C, and some use CO₂ as a natural refrigerant to reduce environmental impact. Heat pump feasibility requires assessment of available heat sources, required temperature profile, electrical supply constraints and installation scope. Our renewable heat assessment and feasibility studies help determine whether heat pump technology is technically and economically viable for your facility's specific duties and operating schedule.

What practical measures reduce energy consumption in refrigerated storage areas?

Key strategies include limiting ambient air exposure through roll-fast doors activated by sensors or push buttons, installing airlocks between refrigerated rooms and warmer spaces, ensuring proper insulation around doors and penetrations (using infrared detection to identify leaks), and carefully evaluating temperature setpoints—for example, raising refrigerated space temperature from 1°C to 3°C reduces energy while maintaining product safety if operationally feasible. The Northmore Gordon knowledge library emphasises starting with production requirements and operational constraints before selecting cooling improvements. A targeted assessment can quantify the energy effect of each measure and identify the most cost-effective combination for your facility's product mix and facility design.

Why is retrofitting oversized pump systems with variable speed drives a significant efficiency opportunity?

Pumps commonly account for 25–50% of a facility's total electrical usage, and many pump systems are oversized by more than 20%. When pump demand varies across operating conditions, retrofitting with variable speed drives (VSDs) allows pump output to match system requirements, delivering simultaneous benefits: reduced energy consumption, enhanced equipment performance, improved reliability and lower lifecycle costs. This is a practical example of how matching equipment output to actual operating conditions improves efficiency. Our energy assessment and optimisation services can help identify oversized systems, model the effect of VSDs under your facility's actual operating profile, and structure the investment case to compare options on a consistent basis.

How does the 'Maximise Capacity' strategy apply to multi-boiler and multi-site operations?

For multi-boiler systems, running one boiler at maximum capacity rating (MCR) with the other on standby is more efficient than operating both simultaneously at 50% MCR. Similarly, organisations producing the same product across multiple sites should consider concentrating longer production runs at one site while the other temporarily shuts down, rather than conducting short runs at both locations. Frequent startups and shutdowns cause increased non-productive energy and resource consumption. This strategy requires coordination with production planning and maintenance schedules. Our delivery approach includes sequencing technical improvements with operational changes; the energy management and forecasting stages can help identify the efficiency gains available from modified production and equipment operating patterns.

What does Northmore Gordon's engagement process look like for food and beverage facilities seeking energy improvements?

We follow a six-stage delivery approach: Assess (energy audits, benchmarking, data collection), Build the Case (feasibility, investment case development), Capture Value (funding and certificate pathways), Deliver (implementation and measurement and verification), Procure (energy and environmental attribute purchasing), and Perform (ongoing management and monitoring). The knowledge library emphasises beginning with production requirements and operational constraints rather than assuming

every opportunity is investment-ready. A practical first step is to submit a project brief describing your facility's energy problem, current equipment, available data and decision timeline. We can then establish an appropriate starting scope and deliverables aligned with your priorities.

How should food and beverage facilities prepare evidence before implementing energy efficiency projects?

The Northmore Gordon knowledge library recommends documenting the site state and recording available energy data before selecting upgrade options. For a food and beverage facility, this includes shift calendars, production volumes, equipment lists, existing studies and at least one year of energy bills. If certificates or funding are being considered, prepare a dated project chronology showing feasibility approval, final investment decision, equipment purchases and any prior nominations. Before implementation, establish measurement responsibilities and record baseline conditions; after completion, verify outcomes against baseline under comparable operating conditions. Our measurement and verification services help establish these boundaries and track actual results, distinguishing genuine efficiency improvements from changes in production or operating patterns.