

The logo consists of a large, stylized lowercase 'f' in orange and a large, stylized lowercase 'p' in white. The 'f' and 'p' are connected at the top.

FOOD PROCESSING

Adding energy flexibility into the mix

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Adding energy flexibility into the mix

Wayne Davies explains the steps the food industry can take to reduce greenhouse gas emissions, support Net Zero and generate additional revenue.

Food and beverage manufacturers are facing huge pressure from retailers, consumers and politicians to minimise or even avoid food price increases, while at the same time we are seeing prices rising for virtually every aspect of food and drink production – from the supply chain to raw materials and equipment costs. In response the sector is looking for ways to minimise costs and maximise revenue and many are finding a solution in a key element of their overall operational costs – energy consumption.

Refrigeration, heating and processing account for most of the sector's energy usage, with energy typically accounting for 15% of total operational expenses.

Addressing a trilemma

The three pillars that make up the energy trilemma are energy affordability, energy security and sustainability. Essentially, reducing energy costs, ensuring operational resilience and decreasing carbon emissions. This goal is recognised by the Food and Drink Federation (FDF) which has set a Net Zero by 2040 Ambition – 10 years ahead of the UK's legislated target date.

Despite there being a concerted rise in the importance of corporate ESG (environment, social and governance) strategies across the sector, a recent survey showed that 41% of food and drink companies believe they are

falling short of fulfilling their promise of sustainable product delivery.

The National Energy System Operator (NESO) has multiple energy market mechanisms that address the challenges of the trilemma, and the UK's food and drink producers are well placed to take advantage of participation in these markets.

One way they can actively make a difference is by participating in energy flexibility programmes. Participation can help accelerate the integration of renewable energy sources onto the national grid, while generating additional revenue from existing assets.

Energy flexibility mechanisms are designed to protect electricity grid stability. They offer an incentive to make existing infrastructure and equipment available to provide additional layer of resilience to the grid. By participating in energy flexibility markets, even at a basic level, it is possible to lower energy costs, without impacting operational performance.



How it works

Although largely predictable, renewable energy sources are intermittent. To balance fluctuating generation with demand, grid operators need to collaborate with their largest energy users to maintain grid stability. The heavy equipment in processes such as refrigeration and cold storage, for example, has a high energy demand. The natural inertia in the refrigeration process makes these assets prime candidates for flexibility as power consumption can be reduced temporarily with a negligible change in temperature. When these seemingly small actions are taken simultaneously across multiple large-energy users, demand on the grid decreases which allows it to stabilise and normal service can resume.

On-site power generation and energy storage assets like Battery Energy Storage Systems (BESS), which are used to provide backup in case of a power outage, can also be dispatched to meet increases in demand. This turns an idle asset into

an active facilitator of electricity grid stability and a new source of income.

The alternative to energy flexibility programmes for grid balancing is to ramp up production at a fossil-fuel power station. Instead, energy flexibility programmes act as a virtual power plant.

The Capacity Market is a good starting point for organisations looking to advance their ESG strategies and generate revenue to offset energy costs or invest in other environmental programmes.

At times of peak electricity demand, or reduced levels of production from renewable sources, an energy intensive facility that can temporarily adjust its overall electricity consumption can receive significant payments without impacting operations. Think of the Capacity Market as the last line of defence that NESO has against major issues on the network – it's an insurance policy used only after other demand response measures are exhausted.

Participating is easy, low risk and it can be set up at virtually no cost. Any business with the ability to turn down or switch on one MW or more of electricity capacity across a single site or a combination of sites can participate in the Capacity Market. In our experience, businesses tend to have more flexible capacity than they may realise. If treated as an additional resource, it can provide significant returns to the business.

Ensuring capacity

The Capacity Market represents a simple, lucrative and low-effort opportunity for organisations with high energy consumption to get paid for electricity that they do not use while helping to decarbonise the grid.

For example, in the event of a grid stress event, batch processing operations such as bottling, canning, baking, brewing and fermentation may be strategically rescheduled without affecting production or quality. This makes capacity available to the grid and doesn't impact operations or standards. Likewise, many mixers, grinders and pumps have adjustable speeds or may be re-scheduled around peak times. Cold storage and refrigeration can temporarily reduce power consumption, as can thermal processing with thermal storage capacity. Alternatively, some sites may prefer to switch from continuous

processes to batch processes, and instead temporarily store liquids in holding tanks while a grid stress occurs.

There is no one-size-fits-all approach. But a general rule of thumb is that processes that use large amounts of electricity for heating and cooling are ideal candidates for the Capacity Market, and so too are processes that can be adjusted up or down. This makes assets like ovens, proofing chambers and brewing and fermentation tanks well suited because they are energy intense and have adjustable cycles. Many of the critical assets used in food and drink manufacturing remain in near-constant or regular use, and as such they are continuously checked and maintained. This regular checking also makes them ideal candidates for participating in the Capacity Market, where payments are made for always being on standby to respond to a system stress event.

In a relatively recent change, energy flexibility opportunities for the food and drink sector have been further extended. Previously, food and drink manufacturers couldn't obtain value from flexibility within the wholesale market unless they entered into specific arrangements with their existing energy supplier. However, since November 2024 a modification to Ofgem's Balancing and Settlement Codes (BSC), P415, has allowed commercial energy consumers to access the wholesale electricity market, through aggregators such as Enel X. In particular, P415 allows businesses with their own energy generation facilities to trade their flexible electricity capacity in the wholesale market.

Participating in the flexibility market and responding to events can prevent an actual outage of the national or regional grid system that would result in more downtime, longer periods on backup generators and potential disruption to production or spoiled raw materials. This becomes all the more important as demand for renewable energy grows, increasing the challenge to maintain grid stability in the process.

Through energy market participation and distributed energy systems, food and drink producers can reduce the cost of powering their business while answering the call of customers, employees and shareholders to take meaningful action in the fight against climate change. ■

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