Race To Zero:

How food and drink manufacturers can keep decarbonisation on track

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INTRODUCTION:

A critical moment for decarbonisation

If we don't get serious about climate change today, it will be too late for our children to do so tomorrow. That was the message of the then prime minister Boris Johnson two years ago at the COP26 climate summit in Glasgow, when he urged delegates to make the event "the moment when we get real" about the climate emergency.

With COP28 in the UAE imminent, global attention will return to the progress governments and industries are making in decarbonising their economies and business models. It follows a year of extreme weather events – from devastating floods in Libya to destructive wildfires in Southern Europe – that have reminded us how a warming climate is destroying people's lives.

It's a crisis in which the food industry is both contributor and casualty.

The sector is responsible for up to a third of global greenhouse gas emissions, according to a 2021 study published in the Nature Food journal, but it's also vulnerable to increased risk of crop failures and reduced yields.
That makes it vital that food businesses contribute to the climate agenda.

British food and drink manufacturers have already started decarbonising, a 2021 report from the charity Wrap noted that the sector decreased its greenhouse gas emissions by 16% between 2015 and 2019, due mainly to decarbonisation of the UK's electricity grid.

The ambition is to go much further. Led by the Food & Drink Federation, manufacturers are collectively aiming to reach net zero emissions by 2040 – a decade earlier than the UK government's legally binding target.

Collaboration with suppliers, customers and other partners will be key to cutting emissions. Nonetheless, for many manufacturers, the easiest and most immediate gains will be found in decarbonising the operations over which they have direct control, namely the production and distribution sites that power their own food and drink manufacturing.

Based on expert insight and featuring real life business case studies, this whitepaper explores how food and drink manufacturers can deliver on their net zero ambitions by investing in the low-carbon technologies and manufacturing processes of the present – and of the future.

> **Manufacturers are collectively aiming to reach net zero emissions by 2040 – a decade earlier than the UK government's legally binding target.**

CHAPTER ONE:

Start with a strategy

Many food and drink manufacturers are already some way towards decarbonising. Some are innovating of their own accord, while for others the stimulus has been pressure from consumers, campaigners and policymakers, or a desire to keep up with their industry peers. However, the sector faces unique challenges in reducing emissions.

Modern food and drink processing is highly energy intensive. Everything from refrigeration, lighting, motors and fans to pumps, drying and water heating requires energy, while critical safety processes such as sterilisation, pasteurisation and chlorination require sustained high temperatures, in many cases above 90°C.

"If you're a large, energy-intensive manufacturer, as most food and beverage companies are, then it's even more important to have a long-term strategy for decarbonisation that is well thought out and planned," says Stuart Beasley, head of sales operations for B2B Solutions at E.ON.

A clear strategy with targets and timescales requires commitment from leadership teams, as well as the finances and manpower to deliver. "This is typically where we see some organisations come unstuck," says Beasley.

"If you don't have people focused on decarbonisation, how can you deliver that strategy?"

INVESTMENT PRIORITIES

That strategy should start with a firm focus on operational realities. Plant managers will be looking for as little disruption as possible to the manufacturing process when green infrastructure and energy efficiency measures are being retrofitted into existing facilities.

"It's fundamental that companies are able to keep their production processes running, so you need to incorporate that into your long-term strategy and ensure you plan for the installation of this infrastructure for a time that is appropriate or when the factory can be shut down," explains Beasley.

Businesses with diverse manufacturing operations must also consider where to prioritise investment in green infrastructure, both at a site level and across national and international portfolios. The practicality of rolling out the same green technology – be it solar arrays or heat pumps – across a wide range of sites will depend on variables such as space, cost, planning policy and grid capacity.

Alongside practical considerations, different manufacturers will have different emissions hotspots depending on the nature of the process and product. A one size fits all approach is therefore rarely appropriate.

With the priorities mapped, the focus should be on optimising the energy sources responsible

for every business's overall carbon footprint. In practice this means reducing reliance on fossil fuels and moving towards greener sources of energy.

It need not be tricky. Beasley suggests those still using kerosene oil burners or heavily reliant on burning gas "immediately have a huge opportunity to cut carbon emissions substantially" by moving to greener alternatives.

MAKING THE CASE

Instability in wholesale energy markets linked to the volatile price of oil and gas has created huge cost pressures for businesses operating in energy intensive sectors like food and drink.

Investment in renewable energy self-generation can be part of the solution by reducing exposure to price volatility. "What renewable energy technologies allow is stability of pricing on a long term basis, which also gives you a level of resilience through less reliance on the grid," says Beasley.

The savings linked to lower energy usage can be significant and long-lasting.

Businesses who lack the capital to invest upfront can also access a range of flexible funding options.

While recent moves by the UK government to push back commitments to phase out diesel and petrol vehicles and gas boilers may have dampened enthusiasm to invest among some businesses, the fundamentals of a decarbonisation agenda have not changed – cost and sustainability are increasingly two sides of the same coin.

And despite government policy, food and drink manufacturers appear ready to seize the benefits a green transition can bring. Writing in The Scotsman in March, Iain Clunie, net zero programme director for the Food and Drink Federation Scotland, stated: "We need to make sure everyone is brought along on this journey, that net zero is at the heart of all businesses, new and old, and that we share information and examples of best practice. Co-ordinated action must be taken, and now."

> **We need to make sure everyone is brought along on this journey, that net zero is at the heart of all businesses, new and old.**
> *Iain Clunie, net zero programme director, Food and Drink Federation Scotland*

How to finance the net-zero transition

Both commercially and reputationally, the long-term business case for investing in green technologies is clear. But once you've decided on your investment priorities, food and drink businesses need to work out how to finance the transition to low-carbon manufacturing.

The starting point should be to decide what budget you can allocate to a decarbonisation strategy and whether you intend to deploy that capital upfront. "For things like lighting where the paybacks are really quick it might make sense for companies to find the capex as part of their annual budgeting cycle and deploy it immediately because that will give them instant benefits," says Beasley.

Companies wanting to minimise the upfront cost should explore the various funding options available from governments. These might include grants for purchasing electric vehicles or switching to lower-carbon heating systems.

For energy intensive sectors like food and drink manufacturing, the UK government's Industrial Energy Transformation Fund (IETF) is designed to help businesses cut their energy bills and carbon emissions through investing in low-carbon technologies. "Having a partner with the relevant skills and know-how can be a quick way for companies to take advantage of these kind of funding cycles," says Beasley.

Where business leaders don't have enough upfront capital or are unable to allocate large amounts of it to infrastructure projects, partners such as E.ON offer flexible financing options; one example is where E.ON provides the upfront cost to purchase and install technologies and then is paid-back via an energy contract over the long-term.

CHAPTER TWO:

Invest in energy efficiency

Food and drink manufacturers face two key elements in decarbonising. Firstly, optimising the current building by taking control of the energy use through efficiency measures and, secondly, phasing out the use of fossil fuels by replacing large generation plants and equipment with greener forms of energy generation.

Beasley suggests an effective net zero strategy has three distinct stages: "visualise, optimise and decarbonise".

Gaining visibility over your current energy usage and being in an informed position by using data driven software to build intelligence, has to be the first critical step to any decarbonisation journey.

VISUALISE

"The visualise element means working with a partner or a software provider to make sure that you are metering and sourcing the energy data from the right places and then putting it into an intelligent system that allows you to understand how that energy is being used, when it is being used, and where. Then you can start to understand who's using it and why they are using it in that way," he says.

Modern energy management systems like E.ON's Optimum platform provide that intelligent view of how much energy the business is using in key areas such as lighting and heating, ventilation and air conditioning (HVAC) systems, allowing site managers to more effectively target the key areas and take action to increase energy efficiency.

Sub-metering to monitor individual pieces of equipment is also key to gaining a more granular view of energy usage. "The more data that you can feed into the system, the more intelligence you're going to get out of it," says Beasley.

OPTIMISE

With visualisation achieved, often the interventions food and drink manufacturers can make to reduce energy will be straightforward, no regret actions such as switching off machines and other equipment when they are not in use. "One of the first things we'll look at is the operating hours; you should be able to see quite easily if there are key pieces of machinery or equipment left switched on when your operating procedures are not running," says Beasley.

Other energy efficiency benefits can be achieved with a change in kit. Some manufacturing businesses are still reliant on incandescent lighting, such as halogen bulbs. This is vastly less efficient and more expensive to run than LED lighting, as well as having a shorter lifespan and higher maintenance costs. By going further and installing motion sensing capability, companies can remove the energy wasted during production downtimes or when rooms are unoccupied.

Another option is the installation of Solatube Daylighting Systems, which capture sunlight from a building's roof and efficiently distribute it throughout the building, minimising the need for artificial light.

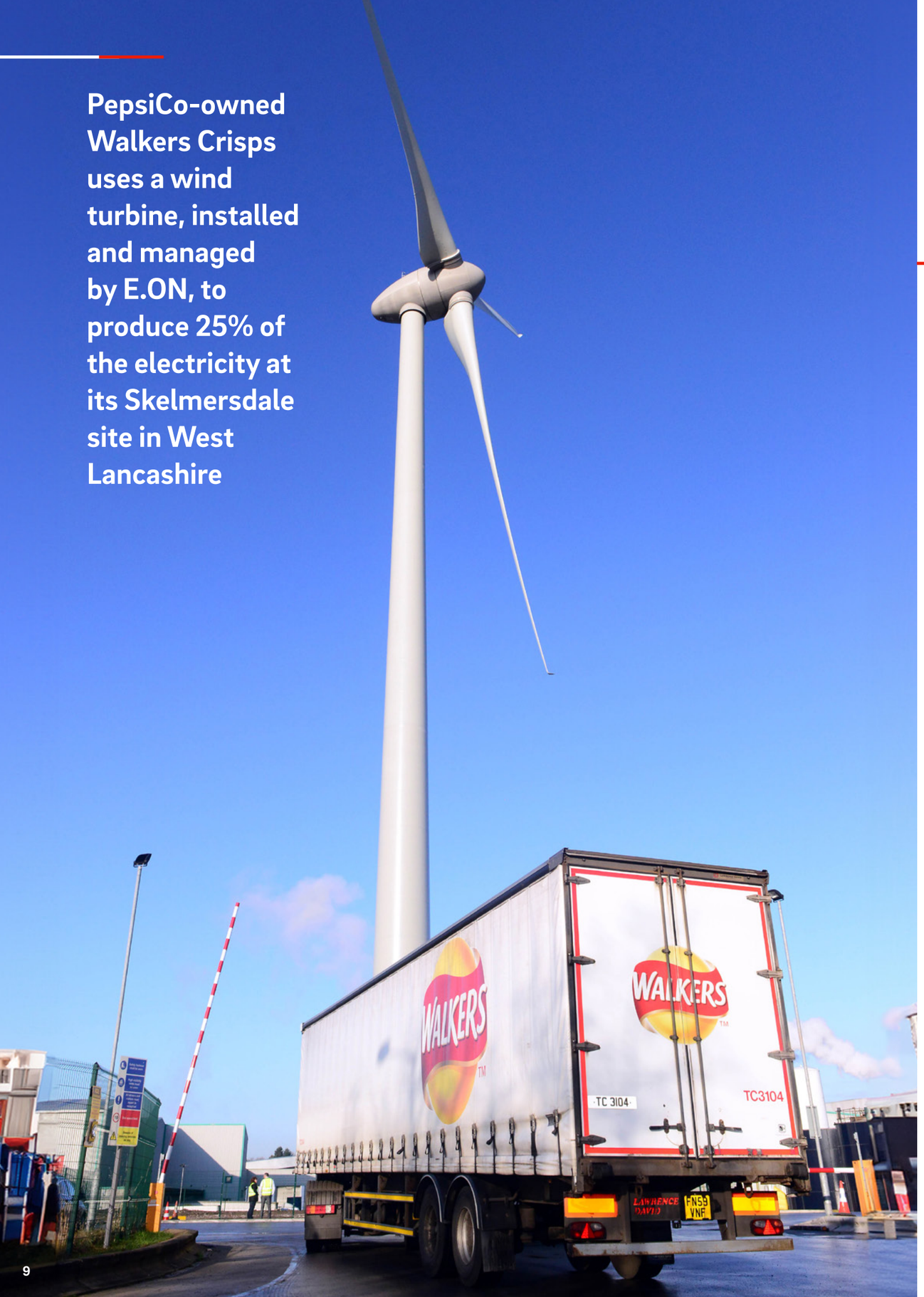
HVAC systems should also be an area of focus for manufacturers. "We still see a lot of old and inefficient kit that can be replaced with much newer kit that will provide further energy efficiencies," says Beasley, adding that the financial savings achieved by reducing energy usage will typically be favourable for companies as well.

More straightforwardly, windows can be another significant source of energy loss where buildings are old or in a state of disrepair. Replacing single-glazed windows with double-glazed alternatives will instantly drive energy efficiency, cutting costs and carbon.

Companies will need to decide which energy efficiency measures are most relevant to their specific context based on variables such as site specifications, budget and payback periods

Energy experts such as E.ON can help identify the right investments by carrying out a full site survey and bringing recommendations and cost options to the table.

> **The more data that you can feed into the system, the more intelligence you're going to get out of it.**
> *Stuart Beasley, head of sales operations for B2B Solutions, E.ON*



PepsiCo-owned Walkers Crisps uses a wind turbine, installed and managed by E.ON, to produce 25% of the electricity at its Skelmersdale site in West Lancashire

CHAPTER THREE:

Unleash the power of self-generation

Energy efficiency measures are an important first step in decarbonising. But the race to net zero can be turbocharged by investing in renewable self-generation technologies for energy production.

Over the past decade some food and drink manufacturers have installed combined heat and power (CHP) units to get the commercial benefits and efficiencies of burning gas to create electricity and using the waste heat for their processes. The challenge now is to move away from gas to renewable energy sources in a commercially attractive way that also provides the heat at temperatures required to sustain high energy manufacturing processes.

Businesses have a wide range of renewable energy sources available to them with the challenge being to find the appropriate solution for the site's commercial and operational context.

Commercial heat pumps, for example, extract heat from natural sources like the ground, air or water and as a by-product of cooling equipment. The pumps then store the heat or distribute it as central heating or hot water. The use of natural energy sources mean businesses can reduce their emissions, while the low ongoing running costs compared with fossil-fuel based alternatives will save money. For those businesses looking at heat pumps for self-generation it's important to first understand where you are going to put the energy centre for the pumps and how that integrates into existing processes on site. Beasley adds that the capacity of the grid is another important consideration. "You have to engage with the grid to understand what availability there is when it comes to deploying your own assets," he says.

CONTEXT IS KEY

In addition to heat pumps, wind and solar installations can offer a strong business case. "Typically our strategy is to work with the customer to deploy the renewable assets that are suitable for their site and commercially attractive with the right level of payback," says Beasley.

Availability of land is one key consideration when installing ground-mounted solar panels. Similarly, for businesses exploring the potential for rooftop rather than ground-mounted solar, it's important to ensure the structure of the roof can support the weight of a solar array.

Space is equally vital when wind power is being considered as a self-generation option. The topple distance needs to be sufficiently wide to ensure the turbine would not fall onto any overhead power lines or roads or cause damage to nearby residential areas or structures in the event it comes down.

Despite the constraints, there have already been success stories. PepsiCo-owned Walkers Crisps uses a wind turbine, installed and managed by E.ON, to produce 25% of the electricity at its Skelmersdale site in West Lancashire as part of PepsiCo's commitment to achieve net zero by 2040.

"We're continuing to work towards being fossil-fuel free in manufacturing and distribution by increasingly using alternative electricity sources," explains Simon Devaney, sustainability director for PepsiCo UK & Ireland. "We've invested more than £120 million in our UK manufacturing operations and supply chain since 2020 and continue to invest in low-carbon infrastructure and technologies, such as renewable energy sources."

Diageo builds the case for solar power

Global premium drinks producer Diageo has partnered with E.ON and Emtec energy to install 7,700 solar panels on an area of land the size of eight football pitches adjacent to its packaging plant in Leven, Fife.

The solar farm – Diageo's first such installation – became operational in April 2023 and has the potential to generate around 22% of the site's annual electricity needs in the winter months, rising to 60% during the summer months. It also enables the Leven plant to reduce its reliance on purchased energy, providing an economic, as well as environmental return to the company.

Diageo has set a target to fully decarbonise its primary operations globally by 2030. The company is taking a localised approach to decarbonisation based on what is best suited to the landscape and manufacturing needs of each site. At Leven, it agreed on a solar option due to Fife's location on the east coast of Scotland which provides strong and reliable sunlight for generation of solar power.

"The size, location and orientation meant that we could create a solar field that was big enough for the amount of solar energy that we wanted to generate as part of a diverse mix," explains Gavin Brogan, the operations director involved in the solar panel installation at Diageo, Leven.

The success of the project was demonstrated during a particularly hot spell of weather in May, when the solar panels produced enough energy to meet all of the plant's energy needs during daylight hours.

Following this, the team at Leven recently commissioned a second, smaller solar farm above an engineering workshop. This means that one of the plant's bottling facilities producing luxury brands for global export is now fully powered by solar energy.

Diageo says it will continue to analyse and evaluate how the solar panels are performing, and may look to roll the technology out more widely across its operational sites.

EV OPPORTUNITY

The drive to net zero may also include investment in infrastructure to support a shift to electric vehicles.

Forward-thinking companies are investing in electric charging points for fleet and employee vehicles, which can help contribute to reduced scope 1 emissions for company-owned vehicles and scope 3 emissions for employee travel.

Diageo has gone further still at its Leven site and switched its 100-strong fleet of forklift

trucks from liquefied petroleum gas (LPG) to electric, supported by the installation of three charging points.

Most businesses will begin by installing a small proportion of charging points in car parks and continuing to add new points as EV adoption increases among employees. Beasley notes that companies installing EV infrastructure need to consider the additional onsite energy demand being created and include in their strategy sufficient grid capacity.

That fits into the attitude of the most progressive businesses who see these technologies working across the whole building.

It starts outside with EV charging points and continues through investment in energy efficiency measures and renewable self-generation, right through to demand side response (DSR), where businesses can earn revenue by reducing electricity consumption at peak demand times for the grid, by pausing or reducing usage when supply from renewable assets is high, for example.

> **We're continuing to work towards being fossil-fuel free in manufacturing and distribution by increasingly using alternative electricity sources.**
> *Simon Devaney, sustainability director, PepsiCo UK & Ireland*

CHAPTER FOUR:

Explore the smart solutions of the future

The green technologies discussed in Chapter Three are all ready to be deployed immediately by food and drink manufacturers. But what are the future technologies that have the potential to turbocharge efforts to decarbonise an energy-intensive sector?

Diageo says that when in 2020 it set a 10-year goal to fully decarbonise its primary operations it did so with an "innovation gap" that would need to be filled with new technologies that would benefit both the business and the wider drinks industry.

"It's an exciting challenge to fill that innovation gap," says Kate Yauk, supply sustainability director for Diageo. "Transparency is key so we can all learn through this together. No one has the answers and it's by testing and learning that we'll be able to make a difference."

Several new green technologies are capturing the attention of food and drink manufacturers and their partners. One is green hydrogen, a cutting edge technology produced by splitting water into oxygen and hydrogen using renewable energy. Hopes are particularly high for green hydrogen as a cleaner alternative to natural gas. It is expected to play a significant role in our energy future, powering energy-intensive industries and long-distance transport.

A recent government-funded study led by a consortium of partners including E.ON, Chesterfield Special Cylinders and the University of Sheffield's Energy Institute found that Sheffield's steelmakers could save up to 3,500 tonnes of carbon emissions each year by switching from natural gas to locally-produced green hydrogen.

The fuel is especially exciting for food and drink manufacturers since it can support the sustained high temperatures required in processes such as sterilisation, pasteurisation and chlorination.

Elsewhere, the next generation of low-carbon heating and cooling systems similarly promise to support energy intensive processes by using geothermal systems to draw and store energy from deep in the earth. E.ON will soon be building a new energy centre at the Queen's Medical Centre (QMC) site in Nottingham that sees 64 boreholes descend up to 250 metres under the ground to provide the hospital with a sustainable low-carbon energy source.

More broadly, advances in battery storage technology will allow businesses generating their own electricity to store more of it for longer during peak periods of generation, boosting self-sufficiency and reducing exposure to peak charges.

CIRCULAR SOLUTIONS

There are also opportunities to build greater circularity into future manufacturing models by capturing waste products and resources and reusing them in the production process. Some brewers like BrewDog are experimenting with recovering the CO_2 emitted during the fermentation process and using it downstream to carbonate drinks.

Biomass and biogas has meanwhile emerged as another greener alternative to gas. At Unilever's production facility in Burton, a by-product from the Marmite manufacturing process is converted into biogas to help power the factory's boilers. At PepsiCo's Walkers Crisps factory in Leicester, 25% of the electricity demand is generated from biogas produced by the site's anaerobic digester powered by crisp and potato waste, at a site which has sent zero waste to landfill since 2011. Diageo, meanwhile, is reusing the co-products of the distillation process in biomass boilers to help power some of its Scottish distilleries.

Similarly, Beasley believes efficient use of excess heat should be a fundamental part of a decarbonisation strategy for food and drink businesses. "You're getting value out of energy that would otherwise have gone down the pipe," he says.

This includes exploring the opportunity for district heating. In the east of London, E.ON is innovating in the use of recycled heat by working with a sugar manufacturer to capture excess heat generated in the refining process and use it in a nearby residential development. Combining this with E.ON's ectogrid™ 5th generation low-temperature district heating and cooling technology, they will share thermal energy, both heat and cool, across the site for use in residents' homes.

By using energy that already exists and would previously have gone to waste, the project significantly reduces the need for primary energy generation.

As always, businesses will have to assess how new technologies align with their specific business needs and fit within their local context. But Beasley urges food and drink manufacturers to start exploring the range of green technologies available to them as early as possible as they develop roadmaps to achieving their decarbonisation and net zero ambitions.

"When I'm talking to companies, the point I make is: why wait?" he says. "The benefits of investing in low-carbon technologies are clear. You're better off acting now and getting ahead of the game."

By partnering with an energy provider such as E.ON, food and drink manufacturers can start taking advantage of the opportunity for collaborative projects that will deliver significant decarbonisation wins and help keep their net zero ambitions on track.

No one has the answers and it's by testing and learning that we'll be able to make a difference.

Kate Yauk, supply sustainability director, Diageo

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