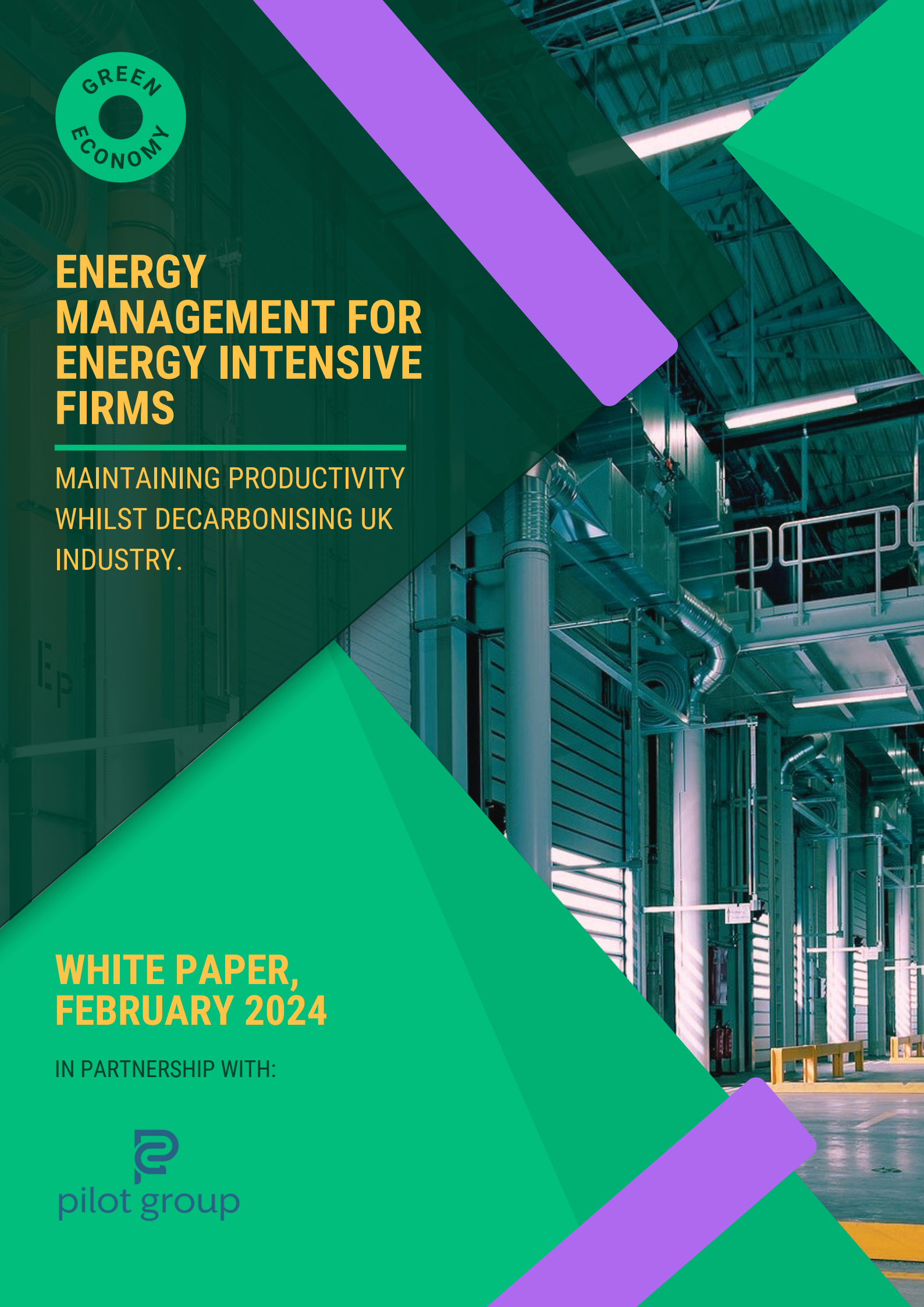

ENERGY MANAGEMENT FOR ENERGY INTENSIVE FIRMS

MAINTAINING PRODUCTIVITY WHILST DECARBONISING UK INDUSTRY.

WHITE PAPER, FEBRUARY 2024

IN PARTNERSHIP WITH:

pilot group

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MAINTAINTING PRODUCTIVITY WHILST DECARBONISING UK INDUSTRY

At Green Economy our purpose is to decarbonise the corporate sector and support the UK Government's commitment to achieve net zero greenhouse gas emissions by 2050, with regions across the UK setting their own targets as close as 2030.

In order to meet this target, businesses, which account for approximately 18 per cent of greenhouse gas emissions in 20200 (ONS, 2021) have a clear responsibility to take action. But with a complex market and extremely volatile economy,business leaders require clarity and support to navigate the right solutions and technologies that will drive change with their specific requirments.

There is no more challenging set of operations than those that are energy intensive, but the drivers to make change go beyond the altruistic. Increased energy costs mean businesses must act now, or risk potentially fatal consequences. Simultaneously, as we march closer to the 2050 target, larger firms will be assessing the environmental performance of their supply chains ever more closely to ensure Scope 3 targets are delivered – with businesses able to demonstrate a robust carbon reduction strategy with science-based targets winning the biggest slice of sales.

Within government, local authorities and city-regions face a ticking clock to achieve their local environmental plans, and with business accounting for around a fifth of emissions, they must engage them at pace if they are to influence leaders to develop and implement carbon reduction plans that will deliver impacts in the next five years.

There is a huge and often overwhelming task ahead, but I hope this report will present reasons for optimism, by demonstrating that many of the solutions are within reach and can ensure the UK meets its international responsibility.

I hope that the insights here can drive change within operations, but also present solutions that local leaders can apply to their regions in achieving their own environmental strategies, in partnership with enterprise.

Amy House, Director, Green Economy

ENERGY INTENSIVE BUSINESSES AND THE BARRIERS TO NET ZERO

This paper addresses energy challenges faced by energy intensive operations in England, focusing on firms that can unlock the most impactful carbon reduction towards local and national net zero targets. Energy Intensive Industries are defined by the UK Government as manufacturing and production operations (UK Government, 2022).

There are **220,360** energy intensive businesses operating in England at present and they are collectively responsible for **60.43** thousand tonnes of C02E emissions, whilst contributing **£970,488m** to GVA.

Manufacturing and industry tend to be the heaviest emitters, due to the size, scale and nature of operation which may be reliant on old, fossil fuel powered technologies. Industrial businesses usually operate at scale and are process heavy with a reliance on gas.

OTHER HIGH EMITTING SECTORS

- **Distribution and logistics**
  Similarly to manufacturing, these firms operate at scale and with multiple processes. Transport costs tend to be most significant in terms of cost and greenhouse gas emissions, but the carbon footprint can be impacted by poorly performing, less intensive equipment like refrigeration.
- **Hospitality, leisure and retail**
  This sector is big emitters because of scale and turnover within the business, with laundry services and heating, ventilation and air conditioning (HVAC) provision increasing the carbon footprint. Sectors that rely on lower skilled employees tend to have a high turnover of staff and will have a particularly challenging time implementing sustainability practices.
- **Social care**
  Whilst not reliant on intensive machinery, social care settings require high levels of HVAC for patients and residents which increase their carbon footprint. High staff turnover can also make the implementation of environmental policies particularly challenging.

WHY NOW?

Global insecurity due to the Covid-19 pandemic, conflict in the Middle East and Europe and the UK's exit from the European Union have all impacted how businesses operate, presenting a range of challenges across energy security, skills, costs and supply chains. This coupled with the effects of climate change such as flooding, droughts and wildfires, which have impacted transportation and the availability of raw materials, presents a particular challenge to smaller firms operating in

complex supply chains. These contracts appeal as commercially advantageous and lucrative, but volatility in the market and the cutthroat nature of the contract can be disastrous for businesses reliant on a small number, or in some cases, a sole client.

The UK has a legally binding agreement to achieve net zero by 2050, with a 30 per cent reduction set for 2030. With this first deadline in sight, the UK runs the risk of falling behind.

THE OPPORTUNITY

Challenges aside, net zero presents a real opportunity for businesses, to increase efficiency, enter new markets and build resilience.

Businesses that have armoured themselves against risks, such as those mentioned in the previous section, tend also to be the ones more likely to be climate and energy resilient. Insulating against rising energy unit costs by being more efficient makes greater business sense now than ever before.

Time is of essence as the green technologies sector is an increasingly demand led market. For example, solar installations have risen sharply over the past three years. The cost of panels has decreased significantly since the mid 2000s, but prices are creeping up for medium sized installations as demand has risen. Businesses that invest now are likely to see the best returns for the lifetime of the technology.

Figure 1 - Business opportunities of transitioning to net zero.

BUSINESS INSIGHTS

Green Economy hosted a roundtable with some of our business clients to address some of these points with business leaders directly to understand how high up the agenda energy efficiency is in decision making.

Phoebe Baker
EMS Account Manager
The Pilot Group

Jo Atkinson
Chief Operating Officer
Thomas Storey

Krzysztof Szlezyngier
Technical Manager
Laserline Dies

Jules Drake
ESG Lead
Ellard

Financing decarbonisation projects

The biggest driver for our panellists was unsurprisingly energy costs. Each were focused on bringing down the cost of production to ensure their pricing could remain competitive, whilst reducing overheads to improve cashflow.

Jo Atkinson, who is Chief Operating Officer for Thomas Story a steel fabrications firm operating in OEM supply chains, said: "We're a highly energy intensive business using around 150MWh per month. The market fluctuations in 2022 saw our energy bills increase from £30,000 per month to £130,000 per month. We know we have a moral obligation to reduce energy consumption, but prices going up focused us and we've made more savings in the last year than in the past 10 years put together."

When investing in carbon reduction projects, decision makers want to see a return on investment within 12 months to greenlight the spend.

> "We know we have a moral obligation to reduce energy consumption, but prices going up focused us and we've made more savings in the last year than in the past 10 years put together."
>
> **Jo Atkinson, Thomas Storey**

Krzysztof who is Technical Manager at Laserline Dies, a manufacturing firm of packaging tools with sites in Essex and Greater Manchester, said: "Cashflow is the main challenge. I have a pile of efficiency and carbon reduction projects on the table and ready to implement, but it comes back to finance every time."

The businesses agreed that there was a lack of transparency and consistency in green funding and finance opportunities and that a central database would remove this barrier to net zero. Krzysztof said: "We have sites across the UK and decarbonisation business support and finance is really accessible in Greater Manchester compared with other parts of the country – it comes down to local governance and funding."

Securing buy in

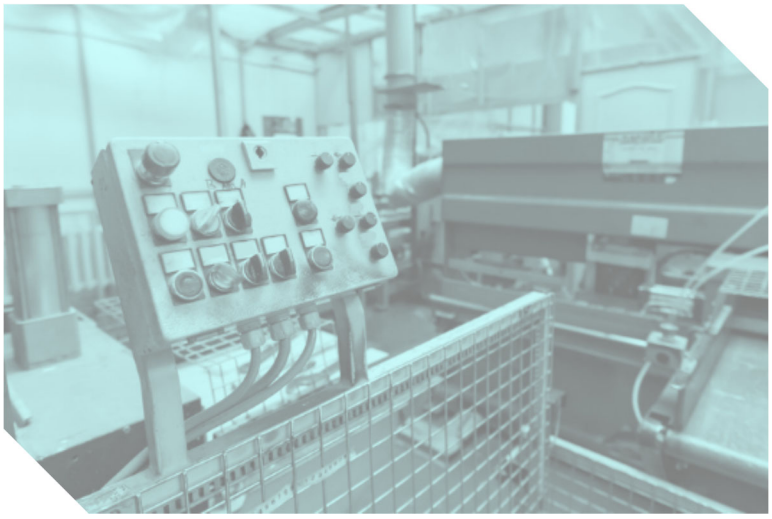
Phoebe Baker, is an EMS Account Manager at The Pilot Group who specialise in supplying energy management technologies and software to energy intensive firms. She said:
"When we're selling energy management technologies to a business, the financial savings we can demonstrate means that the Managing or Financial Directors often become the champion for the investment. Small-medium businesses can make relatively quick decisions around capital

expenditure, but in larger or multi-nationals it can take much longer. In one case I've been working with a business for six years looking for approval from the board. If the decision requires board buy in, it is often helpful to have an expert in the room to field their questions and provide reassurance that this is a good investment.

"It is frustrating as we know how quickly a business could be reducing demand and seeing return on investment. During autumn and winter months a business will likely see results from an energy management system from day one of installation."

Operational efficiency

For a manufacturing firm focused on marginal gains and lead processes, production equipment plays an important role in speeding up operations. However, old or complex equipment can be expensive to run. Krzysztof said: "Truthfully, standby time costs less than downtime in some cases. Equipment that is turned off overnight can take significant time to reset, and our team want to come in to do their job."



Whilst energy cost savings can be significant from process or production changes, the overall benefits of maximising productivity and reducing waste in operations may be several times greater from an environmental perspective than investing in green technologies.

Thomas Storey anticipated that solar would be a key solution for their business given their large roof space, but it transpired that updating their operations would have a much more significant impact. Jo said: "Solar would only account for 12% of our energy needs presently so the ROI just doesn't stack up. Instead, we're investing in a new laser which will cut the steel for our fabrications. The energy savings this will create moving from a CO_2 powered laser cutter to a fibre optic laser cutter will see us payback the investment within a year."

Uncertainty in how and where to invest was a common theme. Phoebe said: "As an example, many clients want to move from gas to electricity, but the capital investment is off-putting. There is a variety of solutions, compressors, variable speed, heat recovery, but businesses don't know where to start. Our advice is always to get the critical baseline starting point first and you can then demonstrate ROI."

Jo said: "When the energy prices increased we knew we had to act. Key decision makers got round the table to look at what changes we could make. We got our energy data and assessed what is most power hungry and how can we make these more efficient. We quickly got together a list of projects that could help us to drive down costs, which has the new laser cutter. We estimate that we'll have saved 171 tonnes of CO2e this year from these changes."

Engaging the workforce

This led the panel to consider how change is made in their operations and the crucial role of workforce engagement.

Krzysztof said: "Green Economy installed an energy monitoring system on one of our sites for three weeks. During this time the team could see the impact that turning machines and lights off made, particularly during the factory shutdown at the weekend. There is real value in having live data to increase efficiency through behaviour change."

Jules Drake, ESG Lead at Ellard, an automation firm said: "We set up a taskforce on Environment, Social and Governance (ESG) which meets each month with representatives from every team in the business including senior management. In that meeting we look at our carbon footprint and energy consumption, meaning the group can see the correlation between sustainability and cost savings, which enables us to influence change with our teams. It works because this is a top-down initiative, and our leaders are bought in to the purpose and value of the group's work."

"We set up a taskforce on Environment, Social and Governance (ESG). It works because this is a top-down initiative, and our leaders are bought in to the purpose and value of the groups work."
Jules Drake, Ellard

Long term plans

When looking at the future in all cases, the businesses were looking for reshoring opportunities to remove uncertainty around international supply chains and the panel agreed that interventions were going to have to come from government to drive change across the corporate sector.

Jo said: "In 2023 we saw a definite foot off the gas by the Prime Minister on the Net Zero agenda. This isn't going to impact our resolve or deter our investments into more efficient solutions for our business, but they must make financial sense."

CASE STUDY: LASERLINE DIES

Laserline Dies manufacture steel tooling for packaging firms and worked with Green Economy following a referral from their local Business Growth Hub. They met with a Sustainability Consultant who conducted a site audit to understand their carbon footprint and to identify where the biggest carbon and cost savings could be achieved.

Krzysztof Szlezyngier, Technical Manager at Laserline Dies, said: "Like every successful business we are constantly looking at improving our efficiencies, reducing our environmental impact and energy costs. There are a lot of ways these targets can be achieved, but very often the process, return on investments or administration can be long and painful. We were looking for ways to achieve this in the most convenient and least disruptive way.

"The Green Economy team visited our premises and installed voltage electricity loggers to monitor our usage for a few weeks. This data was vital in helping us to understand how we were using electricity, identifying some quick wins with our weekend and out of hours usage and helping us to understand where we could invest to make the most impactful improvements.

"We also joined Green Economy's Journey to Net Zero training programme. It brought together all relevant information about environmental impacts and ways of capturing correct and reliable data and has gone into possible improvements and different ways of achieving them."

Key impacts:

- LED lighting conversion programme saved 23512kWh, 5.43 tonnes of $CO2_E$ and around £15k in costs.
- Factory and office premisses are now equipped with energy saving light sources which have improved employees working conditions.

REDUCING DEMAND AND CUTTING COSTS

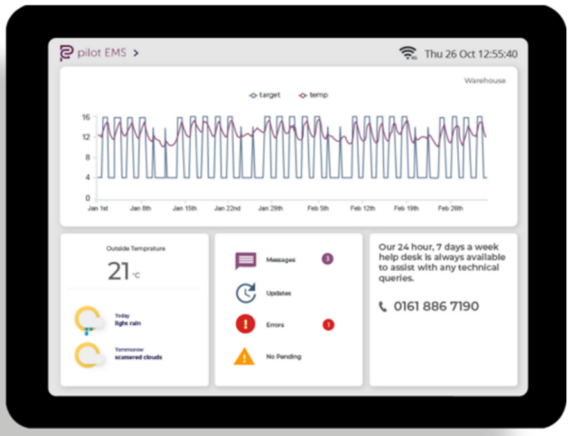
As these business insights demonstrate, cost cutting is the most significant driver for businesses. However, energy is just one element of a wider picture. Here, **Alasdair Dalzel-Job, Technical Lead at Green Economy,** shares his advice on reducing greenhouse gas consumption in energy intensive settings.

Understand where you are now

For heavy industry, energy will almost certainly be the main cost for your business; lighter use firms may find diesel or cold storage are most expensive. Measuring your carbon footprint by gathering your cost and consumption data to measure your CO_2 equivalent usage is the most effective way to ensure you focus on the best tactics to bring down costs within your operation.

Monitoring, measuring and correcting

A phase of monitoring these metrics will provide the granular detail on how, when and where you are using energy. You can request half hourly data from your energy supplier to assess the influencing factors on your usage, such as processes, production, shift patterns, downtime and changeovers, but Energy Management Software (EMS) simplifies this process for you by providing you with live data enabling you to spot those anomalies as they. Phoebe Baker from The Pilot Group explains how their EMS works.



"An EMS takes control of high energy consuming appliances and applies control strategies, to reduce the amount of energy they consume. At The Pilot Group, our EMS is tailored to industrial settings, connecting to equipment like warm air blowers, radiant tubes, lighting, roller shutter doors and air conditioning through an outstation that removes the localised control to create a centralised point. This can be accessed anywhere with an internet connection via an online portal to better schedule and control the high energy consuming items.

"In addition, the EMS has its own smart technology to further reduce consumption. The system can switch off heat burners when they get to within one degree of the target temperature but leave the fans going, utilising residual heat for that final degree. Similar strategies can be implemented to incrementally reduce heat at the end of shifts and switch off the heating system when roller shutter doors are open – leading to huge potentials savings."

Energy management guarantees 25 per cent savings

As energy management technology has progressed, average savings have increased. Pilot Group has installed systems at over 3,000 businesses across the UK and Europe during the past 30 years. Their installations have created an average saving of 43 per cent, with a guaranteed 25 per cent saving.

In some cases, consumption of gas has been reduced by just over 87%, this can happen when items in the environment are controlled along with the heating, such as roller shutter door integration.

Heating	Lighting	Equipment
•Well used thermostats which are correctly set up by room usage and with the correct date, times and shift pattens is a simple, no cost check that can be implemented immediately. •Maintaining heating systems and eliminating draughts, open shutters etc. •Insulating pipework, destratification fans and replacing non-condensing boilers. •Consider Heat pumps where applicable.	•On average lighting accounts for around 40 per cent of a building's electricity consumption and there are multiple ways to reduce this. •A simple lights off policy will empower your colleagues to reduce consumption, whereas opportunities to use natural light and modify lighting use are equally impactful. •Implement affordable technology such as timers, lighting controls and LED replacements.	•Switch off equipment when not in use. •Service and maintain air conditioning units. •Ensure refrigeration equipment are well maintained, replacing damaged seals, stored away from direct heat and consolidated into as few fridges as possible. •Compressed air leaks are a very low-cost way to eliminate energy waste. Ultrasonic leak detection equipment can spot leaks before the human ear can.

Figure 2 - Low and no cost energy saving opportunities.

Engaging the workforce

As Fig. 2 shows, there are a multitude of low cost or free solutions to reduce energy usage in your business, but if they are to be successful will require buy in from across the organisation. Here are some of the routes to engage with you colleagues to drive change:

- **Build momentum**
  Quick wins are a powerful way to build momentum and establish buy-in.
- **Colleague ownership**
  Your teams may be aware of issues but lack a forum to share this. Change is much more likely to be successful when teams have ownership of the task.
- **Incentivisation**
  Awareness of an issue will not create change alone; understand what motivates your staff for initiatives like team competitions, financial rewards or charity donations to succeed.
- **Internal communications**
  Make best use of existing communications channels but consider half hour toolbox talks, staff webinars, internal campaigns or specialist apps. Consider staff suggestion schemes.

Efficient equipment

We recommend that businesses have an up-to-date list of major energy using equipment by type, age, specification (with relevant IP or ATEX ratings) and efficiency if known. Then you would need a clear decision-making process when something fails. What we mean by this is if something breaks do you fix or replace it? As an example, a motor loses 4% efficiency every time it is re-wound. This is likely be necessary with larger motors with greater capital cost and inherently higher efficiencies but those smaller than 7kW can be replaced with a more efficient one.

It is important to do your research on new equipment and any marginal cost differences, to build the business case for replacement. This should then be ready for when a machine fails beyond repair, reducing time spent in researching the best available technology to replace it.

Go for the highest efficiency equipment that you can afford, bearing in mind that the increased marginal cost of a high efficiency motor or compressor will in most cases pay for itself within a few months.

When purchasing equipment, consider its lifetime value rather than just the capital expenditure. For example, motors can consume the equivalent cost of purchase in electricity within two weeks of installation.

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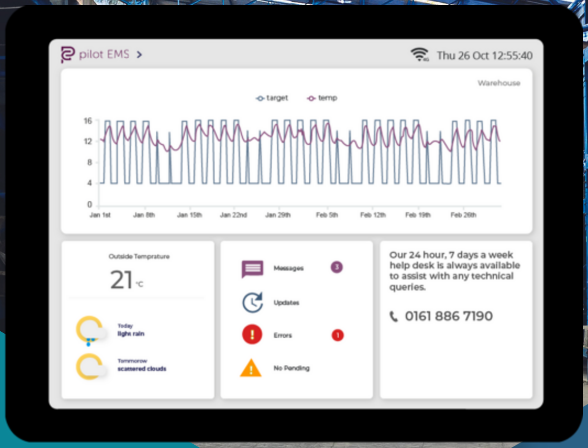


INTELLIGENT HEATING CONTROLS

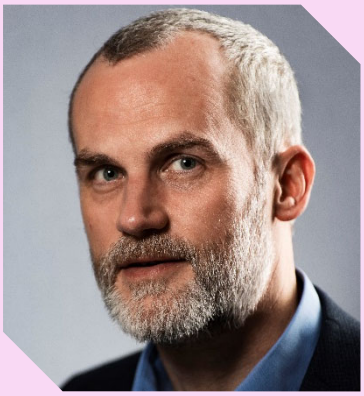
BENEFITS

- Average 43% kWh Reduction in Gas
- Remote Access Anywhere with Internet
- Sensors Accurate To **0.2** Degrees Celsius
- Retrofits to Existing Industrial Heaters

CONTACT:
SALES@THEPILOTGROUP.CO.UK

ENERGY-SAVING FEATURES:

- Roller Shutter Door Sensors
- Residual Heat Utilisation
- Heat Curve Learning
- Weather Compensation



ACCELERATING LOW CARBON TECHNOLOGY THROUGH INNOVATION

Despite significant advances in low carbon technology (electricity can now be generated by wind and solar for lower cost than fossil fuels), we still require widespread innovation to ensure homes, businesses and infrastructure are decarbonised at the pace and scale required to meet our legally binding carbon targets.

Though the UK ranks 4th in the Global Innovation Index, we have struggled to translate that research power into investment and adoption - UK business uptake in innovation lags considerably behind other developed nations. With an accelerating climate crisis and a narrowing window in which to take action, the perceived risk of adopting innovation needs to be weighed against the business risks of doing nothing.

Global energy supply and prices have seen elevated instability over the last two years, with forecasts suggesting UK prices will remain high until the late 2030s, further penalising businesses with high energy use. Increasingly, the corporate and public sectors are demanding suppliers have net zero strategies and emission reductions; and are willing to cut ties with suppliers that risk harming their supply chain decarbonisation.

Innovation should make energy use more efficient, greener and equitable, but developing new technologies doesn't traditionally occur on a timescale that matches the urgency of our current energy crisis. Connecting start-up and university innovators with industry guidance and commercialisation support accelerates product development, bringing forth solutions that address real-world challenges. We have seen these innovations open up new avenues for business decarbonisation that crucially make financial as well as environmental sense.

There are three broad strands of innovation we are helping to deliver:

- Incremental innovation – better versions of existing technology: flexible, lightweight solar panels, micro wind turbines for road & rail, industrial-scale heat pumps
- Novel innovations – brand new technologies (long duration flow battery storage to complement increased renewables)
- "Smart" innovation – using data & connectivity (AI 'brains' for buildings that can detect if HVAC is breaking down or machinery is running out of hours)

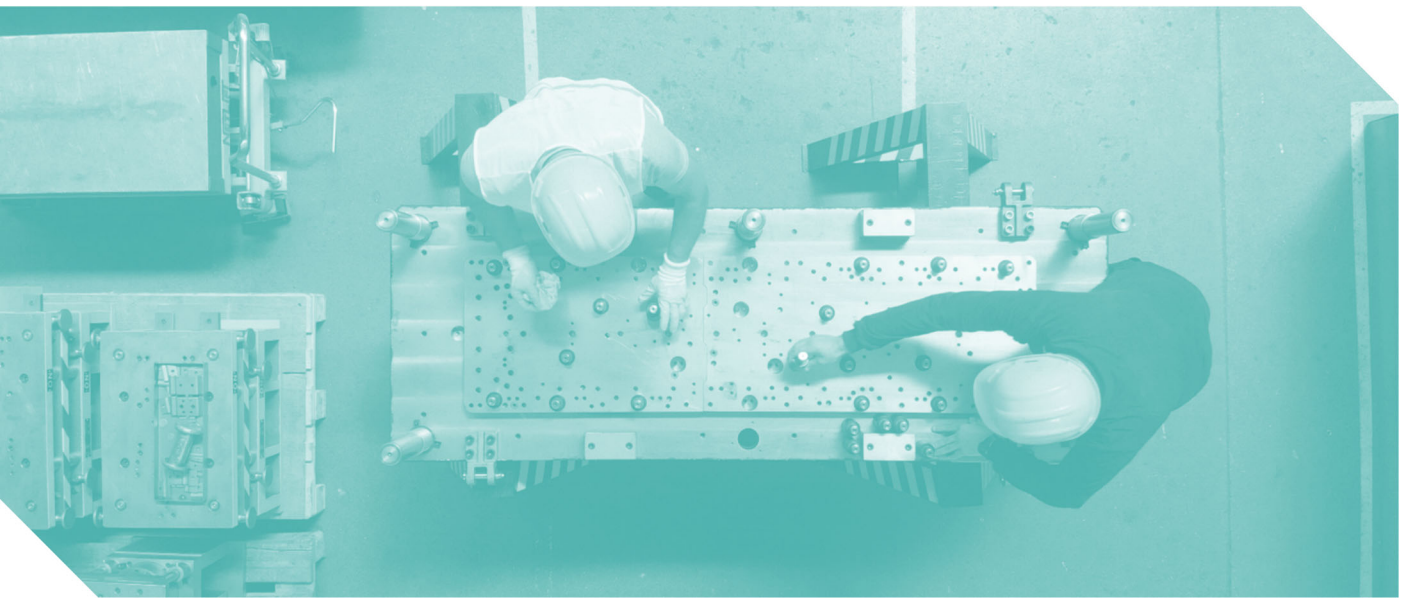
The Energy Innovation Agency's core purpose is to accelerate energy-related innovation and bridge the energy innovation gap by encouraging growth and investment in green, cleantech and low carbon companies, supporting innovators to improve their market accessibility. Through these innovative technologies we can revolutionise the way operations are powered in high energy intensive businesses, assisting them to achieve their potential to reach net zero emissions.

David Schiele, Director, Energy Innovation Agency

KEY FINDINGS

This paper has brought together industry insights and expert thought leaders to consider how high emitting businesses can transition to net zero whilst ensuring they can maintain productivity. The key findings include:

- Cost remains the single biggest driver for business taking steps towards decarbonisation, with the recent increase in energy bills motivating businesses to look at how they can increase efficiency and save money. What this has uncovered is that these changes can signal value add such as improved operational efficiency, greater competitiveness, better working conditions and colleague engagement.
- Investment and lack of access to funding remain a barrier to energy efficiency, along with knowledge and practical understanding of the technology. Historically businesses might see a return on capital expenditure projects within two to five years, but our participants suggest this can be as fast of one year. When considering new equipment purchases, it is vital to consider the whole lifetime cost of the investment, not just the initial outlay to secure buy in.
- A key starting point for businesses is to set a benchmark by understanding current energy usage. The good news is that there numerous low and no cost ways to save energy and reduce the cost of energy bills that can be implemented immediately.
- The ultimate prize here is that businesses who make the relevant changes and investments now are set to be more competitive, more economically resilient and more attractive to both clients and stakeholders for years to come.



SUSTAINABILITY AND NET ZERO SUPPORT

Our services to help you reduce carbon, increase competitiveness and save your business money.

CARBON FOOTPRINTING

Support to measure your carbon footprint and create an evidence based action plan to prioritise key actions that will deliver returns.

01

EXPERT BUSINESS ADVICE

Onsite energy and resource efficiency reviews from Sustainability and Net Zero Consultants to Implement techniques that dellver carbon and cost savings.

02

SKILLS AND TRAINING

Increase understanding of your net zero obligations, implement effective carbon reduction plans and upskill your teams through peer groups, workshops, resources and training.

03

GREEN FUNDING AND PROCUREMENT SUPPORT

Access to grants and finance to invest in energy efficiency and green technologies, with support from a network of trusted suppliers ensuring you can procure with confidence.

04

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