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DRIVING INDUSTRIAL ENERGY EFFICIENCIES: **A BEST PRACTICE GUIDE**



CONTENTS

Introduction	3
Part 1: Industrial Energy Efficiency	4
What is industrial energy efficiency?	4
What is driving energy efficiency among UK manufacturers?	4
The benefits of investing in energy efficiency projects for UK manufacturers	6
Part 2: How manufacturers can drive energy efficiency in their business	7
Step 1: Undertaking low cost, low-effort measures	8
Step 2: Implementing more complex measures that require investment	12
Part 3: Facing and overcoming barriers	15
Barrier 1: Information, advice, and guidance	15
Barrier 2: Access to technical skills	15
Barrier 3: Leadership and management skills	16
Barrier 4: Access to finance	16
Conclusion	19
Viewpoint	21
Appendix: The support available to manufacturers	22

INTRODUCTION

It's been a challenging few years for industry in keeping the lights on. The soaring prices of gas and electricity, exacerbated by the Russia-Ukraine war, have prompted the UK government, industry, and consumers alike to adopt drastic measures to reduce energy bills and energy dependency on Russian gas.

Operating sustainably and reducing energy consumption is not just about costs, but also about business resilience to face future crises. The Government has recognised this in its ambition to reduce total UK energy demand by 15% from 2021 levels by 2030¹.

While energy prices have reduced from their peak in autumn 2022, they are set to remain much higher than in the past decade, with gas three times and electricity five times higher compared to a decade ago.

As a result, businesses are starting to see investment in energy efficiency projects as more financially appealing, with significant savings on energy bills and the added benefit of being environmentally friendly. This is only made better by the rise of digitalisation across manufacturing businesses, making undertaking successful energy efficiency projects much easier.

Yet the power of Industrial Digital Technologies (IDTs) is only just beginning to be harnessed. AI and the Internet of Things, for example, now allow manufacturers to harvest more granular data and connect the once individual parts of a manufacturing operation. This allows them to run such processes as a single coherent system, in the most efficient way possible, leading to even further energy efficiency improvements.

The pitfall that businesses often end up in is expecting these to be one-off projects. Energy efficiency is a continual improvement exercise, and all businesses would see benefits if they considered such projects as an ongoing part of their routine operations.

But we know this is not easy, which is why Make UK, in partnership with Inspired, have come together to look at best practice in driving industrial energy efficiency and showcase the potential of energy and carbon management to UK manufacturers.

We conducted interviews with manufacturing businesses that have implemented measures to improve their industrial energy efficiency. They shared their best practices with us, to help the wider industry reduce energy demand, increase efficiency, and work towards transitioning to a net zero economy.

¹Powering Great Britain- Energy Security, March 2023

PART 1: INDUSTRIAL ENERGY EFFICIENCY

WHAT IS INDUSTRIAL ENERGY EFFICIENCY?

Industrial energy efficiency is defined as the amount of energy used in either the operation of a process or the manufacture of a product. It is measured in kilowatt hour (kWh)/operation, kWh/series of operations or kWh/unit produced. The aim of energy efficiency improvement is to reduce the amount of energy required for the same process or unit production.

Manufacturing equipment is designed to minimise energy waste, but friction between moving parts, electrical resistance, unwanted sound energy and from exothermic or endothermic processes requiring cooling or heating inevitably cause some energy waste. As technology advances, machines and devices become more energy efficient.

WHAT IS DRIVING ENERGY EFFICIENCY AMONG UK MANUFACTURERS?



The UK has an ambitious target to be net zero by 2050, and manufacturing is a crucial part of the jigsaw to reach net zero. However, as things stand, the manufacturing sector has limited tools to decarbonise to achieve this target: electrification, alternative fuels (e.g., biomass, hydrogen, small/modular nuclear), carbon removal technologies (e.g., CCUS and Direct Air Capture) and energy efficiency.

We are still some way off from using alternative fuels and carbon removal technologies. Many of these tools have yet to mature and the others will not be deployed before the early-mid 2030s at the earliest. This leaves electrification and energy efficiency as the only real tools available to help manufacturers to start their decarbonisation journey between now and the end of this decade.

ENERGY EFFICIENCY IS ONE OF THE ONLY TOOLS AT HAND IN THE 2020s TO DECARBONISE

Renewable energy:

Renewable energy is either supplied to the manufacturing site from clean sources of energy (wind, solar, nuclear) or generated at the manufacturing site itself. The UK has already phased out coal in favour of gas as its main fossil fuel source, and is also able to rely on an increasing proportion (just under half in 2022) of its power from renewable energy sources, in particular offshore wind, nuclear power, and solar PV. Energy storage is also part of the equation, playing a crucial role by storing the excess energy generated from abundant (but less predictable) wind and solar renewable power. It is still in its infancy, but, in time, it will prevent the national grid from building excessive infrastructure for energy production and build up the much-needed energy resilience.

Electrification:

Electrification is readily available technology, but remains unattractive and the uptake can be painfully slow. Just 9% of businesses have focused on fuel switching for electrified production. It is hindered by the lack of access to grid connectivity but mostly by the cost of electricity.

Even before the energy crisis struck, manufacturers were reporting that the price of electricity was unaffordable, so electrification, by running operations on all electrical equipment, is regrettably not economically viable. This is also the case for Energy Intensive Industries (EIIs) despite them benefitting from specific support schemes e.g., the EII Exemption or EII Compensation schemes, Climate Change Agreements (CCAs) or the Energy Bills Discount Scheme (EBDS). Electrification will only become truly attractive when electricity prices get down to parity with gas prices and/or the suitable incentives to switch are introduced.

Alternative fuels:

As for alternative fuels, they are not yet mature or easily accessible/affordable technologies, with only 10% of manufacturers having focused efforts on onsite combined heat and power (CHP), and 8% on fuel switching to hydrogen. Small Modular nuclear Reactors (SMRs) or the even smaller already proven 'Advanced Modular Reactors' (AMRs) are exciting prospects but also still not there yet in terms of economies of scale.

In previous years, energy efficiency projects have not been intrinsically very attractive as, with a decade-long of stable and relatively low cost of gas, their return on investment was not favourable compared to the much more rewarding investments to increase productivity.

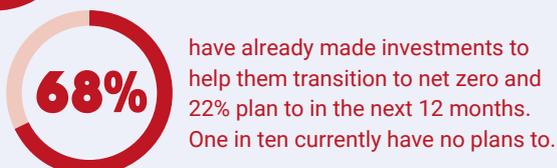
The UK became the first country to set its legally binding net zero by 2050 target and manufacturers realised that they must begin the process needed to start decarbonising in earnest. COP26 created a certain buzz around net zero – the challenge that lies ahead but, importantly, also the opportunities. Since then, huge strides have been made, with net zero becoming a mainstream

element of business strategy, and it remains a key priority today.

However, the real catalyst for change has been the bite manufacturers have felt as a result of volatile prices. With energy prices rocketing and industrial support for energy costs diminishing, focusing on energy efficiency has reduced costs for businesses. Essentially, it has become a hedge and risk management tool in conjunction with procurement. Previous concerns around return on investments have subsided, with payback periods now dramatically reduced.

This momentum has been building up. Make UK's research from last⁴ year revealed that nearly half (46%) of manufacturing companies are already implementing their decarbonisation plans, while a further quarter will start decarbonising within the next 12 months. An additional 17% aim to begin the process in the next 24 months. This demonstrates an ever-greater focus on energy efficiency.

Energy efficiency is seen as the main pathway to emission reduction. The focus on energy efficiency is a trend we have continued to see across Make UK's research. Make UK's Manufacturing Monitor⁵ found that almost half (47%) of businesses had adjusted their business practices to reduce energy consumption and become more energy efficient in response to heightened energy prices in 2022.



²Make UK, Decarbonising Manufacturing: Opportunities and Challenges (2023)

³Make UK, snap poll on net zero (September 2023)

⁴Decarbonising Manufacturing, Make UK, July 2022

⁵Make UK Manufacturing Monitor, 2022

When it comes to other operations across the business, improving energy efficiency of buildings through insulation, more efficient cooling and heating systems or buildings

management systems, ranked the highest, with 45% of companies citing this as the focus of their plans over the past year.

THE BENEFITS OF INVESTING IN ENERGY EFFICIENCY PROJECTS FOR UK MANUFACTURERS

The potential benefits of energy efficiency are numerous: from cost savings, better performance, longer equipment life, reduced environmental impact, and even creating time and jobs.

Reduced energy costs:

Energy efficiency measures directly lead to cost savings on businesses energy bills as less energy is consumed. Energy bills not only take into account the cost to produce the gas, electricity, or LPG, but also include carbon taxes (e.g., the climate change levy (CCL)), which most businesses pay (unless they have a discount through a Climate Change Agreement). How much a business can expect on the return from their investment depends on the extent of the investment, alongside the cost of the technology and the energy to run it. As we have seen, the RoI is much more favourable in today's context of high energy prices.

Less energy waste:

Energy that shouldn't be consumed in the first place, heat loss, and inefficient technology from equipment and machinery powered with fossil fuels, lead to carbon emissions and ultimately cost businesses money. The more efficient a device is, the less energy it wastes and the more useful work it produces per unit of energy input. This can save money and resources, as well as reduce environmental impact.

Less cooling is required:

More efficient devices dissipate less energy as heat, which can reduce the thermal stress and damage on the components. A lower temperature also means that less cooling (which is very expensive) is required, which can further improve the efficiency, saving more costs, and reduce the noise, another environmental impact in the workplace to consider.

A longer lifespan:

The devices and systems used to transfer energy will have a longer lifespan, increased stability, and require less maintenance. This will result in significant savings over their lifetime.

A more stable power supply:

A more efficient power supply can also provide a more stable and cleaner output voltage and current, which can improve the performance and durability of the connected devices.

Increased labour productivity:

Improved energy efficiency of a machine often comes with an increase in performance, which can mean the number of shifts (or production runs) for the same production output can be reduced. This frees up human resource for other tasks, which is especially valuable in these times of skilled labour shortage.

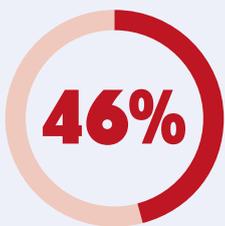
Improvement of Significant Energy Consumption (SEC):

Specifically, for those in Climate Change Agreements, to support them achieving their energy intensity reduction targets which reduces or avoids carbon buy outs.

Reduction of carbon:

By reducing energy demand by either generating on site or purchasing green REGO electricity, businesses will reduce Scope 1 and 2 emissions. Reporting more granular data energy (e.g., location-based on-site or locally produced) for the Streamlined Energy and Carbon Report (SECR) will also improve on the use of standard grid averages.

PART 2: HOW MANUFACTURERS CAN DRIVE ENERGY EFFICIENCY IN THEIR BUSINESS



of manufacturers have focused on optimising their energy efficiency via energy management systems⁶

Industrial energy efficiency is defined as the amount of energy used in either the operation of a process or the manufacture of a product. It is measured in kilowatt hour (kWh)/operation, kWh/series of operations or kWh/unit produced. The aim of energy efficiency improvement is to reduce the amount of energy required for the same process or unit production.

Manufacturing equipment is designed to minimise energy waste, but friction between moving parts, electrical resistance, unwanted sound energy and from exothermic or endothermic processes requiring cooling or heating inevitably cause some energy waste. As technology advances, machines and devices become more energy efficient.

⁶Make UK, Decarbonising Manufacturing: Challenges and Opportunities (2022)

STEP 1:

UNDERTAKING LOW-COST, LOW-EFFORT MEASURES THROUGH:

- better control e.g., understanding your costs and energy usage where better control measures can be implemented
- better practices e.g., understanding current practices and determining so better practices can be introduced
- culture change e.g., understanding the current organisational culture and where change is needed

STEP 2:

IMPLEMENTING MORE COMPLEX MEASURES THAT REQUIRE MORE INVESTMENT e.g.,

- building and electrical infrastructure improvements
- equipment upgrade/change
- process upgrade/change
- adoption of Industrial Digital Technologies (IDTs)



STEP 1: UNDERTAKING LOW COST, LOW-EFFORT MEASURES

1. Better control of costs and of energy usage

Energy procurement: one of the most important things for a business to have in place is a suitable energy procurement strategy. In a market where energy prices can swing dramatically, having the right supply contract and the right strategy is vital. The ability to forecast usage is important. Not planning for this can create exposure to volume tolerance clauses, which suppliers are increasingly enforcing on consumers due to the impact of increased energy wholesale prices.

a. Cost control: a simple way for businesses to immediately control costs is by reviewing their energy contract to ensure that that energy tariffs and chargeable rates are correct, and any exemptions are being claimed. There may be schemes available for businesses to join that entitle them to relief from some charges. Unduly high non-commodity costs which have recently soared can be identified and influenced by efficiency measures.

A trusted energy consultant can be used to help businesses understand the contract and the bill, and, in some cases, to conduct an energy cost audit to recoup refunds for up to 6 years previous and unlock ongoing savings. For those with on-site generation, operation and maintenance of on-site generation assets will ensure that return on investment is kept at optimal levels and in cases where there is surplus generation, it is possible to achieve additional revenue from exported energy.

b. Conduct a site audit: It is recommended to conduct an audit to measure energy (and this can also be done for air, water, and temperature) usage before making any significant investment. Energy audits or surveys provide a fresh pair of eyes to assess site process and consumption, and to make recommendations. What might appear to be the most energy consuming piece of equipment may, in fact, be less of a problem than another one. The audit is the key to creating the baseline at site and/or company level which will then allow the measuring of the impact of actions subsequently taken to reduce the consumption. Inspired has supported over 500 manufacturers, including Make UK members, to get a clear picture of how their sites are operating and where they could make the most efficient improvements, often starting with an energy site audit.

c. Monitor and visualise energy use through smart meters and sub-metering: Only what is measured can be controlled. Smart meters provide real time information on energy consumption, while sub-metering provides more granularity.

- Smart meters: Smart meters provide real time information on energy consumption in pounds and pence or in KWh for gas and electricity. They provide a good visual cue which may motivate users to improve their energy use. They can be obtained for free from the energy supplier in areas where they are being rolled out. One Make UK member said that every MD should have such a smart meter on their desk to know what is going on. However, smart meters are only linked to the incoming meter. Half-hourly (HH) meters (which are mandatory for larger business using over 100MWh) offer more granularity of usage. Profile alerts can be set, which allow businesses to understand if they are over consuming at certain times of day in comparison with previous trends. However, this does not indicate what area of the facility is over consuming, as it is only based on the incoming meter. This is where submetering provides much more granularity and allows more targeted action.
- Sub-metering: Sub-metering gives complete visibility of energy and water consumption, and carbon emissions, in far more detail than is available from a billed meter. As the name suggests, this type of ‘non-invasive’ metering goes behind the fiscal meter and allows users to monitor specific assets within their site(s). Connecting energy and water profile alerts helps to warn you when unusual patterns of excess consumption occur. The data gathered can be viewed on an online energy management platform, empowering a site’s workforce to understand exactly what equipment and operations are wasteful. However, even where data is available for meters, businesses often lack the time and expertise to interpret readings and take action.

Having data on annual energy consumption at hand allows manufacturers obtain better energy contracts with hedging (buying cheaper energy well in advance of its supply). Marrying up energy consumption with growth parameters can also motivate businesses to improve their energy efficiency so that energy consumption does not grow at the same rate as the business.

CASE STUDY: CLWYD COMPOUNDERS – THE POWER OF MONITORING

Background:

Clwyd Compounders are a manufacturer of custom rubber compounds based in North Wales. Their business is energy intensive, and as such, any increase in energy costs has a huge impact on their production. After their supplier withdrew from the market, they looked to mitigate the impact of energy price rises and increase their efficiency measures, and they engaged Inspired to help them achieve their goals.

The challenge:

Clwyd were keen to get the best deal on procurement when they renewed their energy contracts, as well as optimise their production efficiency. They also needed to respond to both government targets and client expectations regarding net zero and sustainability. They had little insight into how they consumed energy on site and wanted to understand how they could become more resilient and self-sufficient with their energy supply.

The solution:

Clwyd partnered with Inspired and used their EMaaS* solution to address their challenges.

Energy costs: The Inspired team moved Clwyd onto a new energy supplier to manage future costs flexibly and protect them from future cost increases whilst still being able to take advantage of falling prices. In addition, Inspired's Bill Validation service gave Clwyd peace of mind that they were being charged correctly and only paying for the exact energy they consumed, which supported their internal budgeting process. Inspired then went on to assess Clwyd's potential for on-site generation.

Energy consumption: Inspired deployed Circuit Level Monitoring (CLM) and water monitoring equipment on site so that Clwyd could better understand their energy usage "behind the meter", giving them granular visibility of individual assets and circuits.

Results: The implementation of Circuit-level Monitoring quickly identified opportunities to reduce consumption and increase efficiency, resulting in a saving of over £48,000, and 22 tons of CO₂, meaning that Clwyd achieved an ROI and profit within the first quarter of service delivery.

The water system findings also amounted to an additional £16,500 and 10 tonnes of CO₂ savings.

By providing Clwyd with access to risk-managed strategies for energy procurement, Inspired have managed to secure savings of £62,734 for this year's energy contract. In line with current trading, Clwyd can expect to see a further reduction of £53,679 for next year.

Inspired's on-site feasibility study found that Clwyd's Wrexham site was suitable for solar PV generation which, following install from our specialist team, generates over 290,000kWh of renewable energy per year. Clwyd now generate their own renewable energy, reducing their exposure to the volatile wholesale market. The client's payback on the current installation, which is on a 25-year warranty, is less than 2.5 years.

*Energy Management as a Solution

d. Buildings: Consider insulation, lighting, space heating/air conditioning. The measures available depend on the nature of the building – for example, it may not be useful to heat the entire factory, or some buildings are listed – so the options are limited. Improvements thus range from replacing older bulbs with LED lighting and using light sensors and thermostats, to implementing draft reduction measures (e.g., through installing faster doors and monitoring door closures) and fitting extra insulation to re-using of industrial waste heat, or installing the more energy efficient and clean air or ground source heat pumps (these even work for high temperature processes). For those with car parks, there are streetlamps with solar panels which can provide the car park lighting.

e. Heating and cooling systems: The efficiency of systems that are designed to transfer thermal energy (e.g., heating/cooling) can be improved by reducing the wasteful dissipation of thermal energy to the surroundings. For example, by using insulation, or isolating the cooler, warmer (including server rooms, drying rooms) or shopfloor spaces from the outdoors, with PVC sheets/panels. There are also vertical (destratification) heating systems that are more efficient for big spaces with high ceilings, like factory floors.

f. Building and Energy Management Systems: (BMS and EMS) are computer-based systems that control the building or facility's mechanical and electrical equipment, including ventilation, lighting, power systems, fire systems, security systems, and any other machines used in the production lines. The proportion of energy consumed by buildings (e.g., heating, lighting, and office equipment) is relatively low e.g., about 17% of the total energy consumed in the typical/average small manufacturing plant, and even

less (10%) for the energy intensive sectors. However, as industrial sites are not well insulated, it can still be rewarding to install a building (energy) management system. In fact, this was the most popular measure selected by manufacturers in 2022 as a way to control their energy bills. With modern technology, the mechanical improvement of efficiency is reaching its peak, but thanks to digital technology, a lot more energy efficiency can be squeezed out of the overall production system.

The advantage is that while local controllers may be useful, the machines still run independently, with additive effects, and end up creating a much larger wastage of energy (or air band in the case of compressed air systems). In contrast, a system controller will run the system as a single coherent system in the most efficient possible way, allowing the whole system to run on a lower energy (or air pressure) band. It will also select the most efficient machine to deal with the real-time energy (or air flow) demand. The equipment can be connected to a centralised digital system, which can collect and visualise the data harvested centrally, allowing businesses to spot what and where the issues and trends are, and to fix/control them.

g. Embrace the principle of the ISO 50001 standard for energy management system: This provides a framework for organisations to manage their energy performance and improve the energy efficiency across their operations. It is based on a principle system of continual improvement and can result in significant savings just with improved energy efficiency.



CASE STUDY: WEDGE GALV' – REDUCING GAS USAGE WITH DIGITAL CONTROLS

Wedge Galv' is a family-owned business, born in the West Midlands Black Country in 1869, which specialises in hot-dip galvanizing of plant and equipment. It is one of the largest galvanizers in the UK, owning 14 plants and has other leading businesses in Europe and the USA.

Galvanising is an energy intensive activity and Wedge Galv's gas bill is higher than their electricity bill, so were looking for opportunities for savings. Furnacing was identified as one hotspot which had the potential to reduce the gas usage by 30-40% on one of their sites and 10-15% across the group sites. Different options were considered and the digital control option was preferred to upgrading the flue, which can be very costly and would have involved shutting down the plant. Using smart technology has allowed the firm to monitor the furnacing and improve it.

The furnaces need to be fired to keep the galvanisation baths at the temperature of 450°C for most of the time. The way that the galvanising bath furnaces are now fired has had a major impact. Previously, the burners were either on 'high' or 'low', but digitally controlled firing now allows them to have variable on-demand firing.

A trial on one site showed a cost saving of £400,000 on the energy bill and a reduction of 1000 tonnes of carbon (7-15% of overall emissions). The payback time was less than 2 years. The overall savings for the Wedge Galv' group is £1m annually on their gas bill.

The company has also been closely checking its compressors and pumps for leaks every week for a number of years. All the production sites have a plant maintenance system with task lists and checks scheduled weekly, which has paid for itself.

The company is now exploring further options. Heat recovery from two tanks is one of them but there are technical barriers as a back-up boiler is needed.

Best practices and culture change:

a. Switching lights and equipment off when not in use or fitting motion sensors for lighting. Similarly, only switching on the machines that will be used on the day, and not switching them on unnecessarily in advance. One Make UK member reported that their ovens were switched on first thing in the morning, which was two hours before they were really being used. Once this corrected, the oven time decreased by a full day per week, amounting to considerable savings.

b. Adjusting thermostat settings for heating and to avoid overcooling. For heating or air, suitable room temperatures are 19°C - 21°C where people are idle, 16°C - 19°C where people are active, and 16°C in any room when nobody is on site.⁷ Air conditioning settings should be at the highest possible temperature (noting that productivity starts to decrease above 24°C). In unoccupied buildings, indoor temperature can be left as high as 29°C, the maximum to

avoid heat and humidity damage to premises. Factories may not be heated at all or may benefit from their high temperature processes which provide warmth. In the case of energy intensive activities in foundation industries (forging, casting, metal smelting, or glass making etc), energy usage in offices accounts for only a small proportion (~10%) of total energy usage, so extra spending to upgrade the building fabric has marginal gains. Factories built in more recent years are to higher standards and will have building controls on boilers.

c. Isolating warmer (e.g., dryers) or cooler spaces from the outdoors or other parts of the building with partitions, airlocks, air curtains, or PVC sheets will prevent heat or cool air losses, and therefore save energy.

d. Performing regular maintenance: Regular maintenance (at least once a year for compressors or more, depending on the type of machine) can go a very long way to create savings. A basic but regular walkaround with trained staff

⁷The UK Government's (DESNZ and SME Climate Hub) [UK Business Climate Hub](#)

members or hired consultants can help test equipment and identify issues. This includes checking pipework for poor insulation, liquid/air leaks and faulty control valves, inspecting pumps and compressors for holes, worn parts and dirty filters, and checking for wear and damage to condensers, fans and any other parts (e.g., cooling tower for refrigerators). It is estimated that regular maintenance can save up to 25% of what is currently spent on cooling⁸, compressed air⁹, or water. Lubricating mechanical devices like conveyor belts to reduce the friction between moving parts will make them more efficient by increasing the amount of useful energy transferred.

e. Organisational behaviour training: Adopting better practices means a culture change, with the acquisition of new levels of awareness and adoption of new habits. This

usually requires some behavioural training for all the staff to understand why this is necessary, what the objective is, and the importance of their role and contribution to the overall picture.

f. Forming a sustainability taskforce/working group at management level and creating energy champion role(s):

Leadership is key, and the management team will be responsible for ensuring overall accountability. Assigning a job role (e.g., champion) or a sustainability working group rather than just one or several persons to perform specific energy efficiency tasks or programmes (e.g., behavioural training, monitoring energy usage and efficiency, or ensuring maintenance rounds are performed) will provide a clear line of responsibility and ensure energy savings are a business priority and remain so for the long-term.

STEP 2: IMPLEMENTING MORE COMPLEX MEASURES THAT REQUIRE INVESTMENT

Building improvements:

a. Insulation, lighting, space heating and air conditioning:

The measures available can often depend on the nature of the building. For example, it may not be useful to heat the entire factory, or some buildings may be listed and therefore not all options are available.

Where it is possible, the measures available range from replacing older bulbs with LED lighting, using light sensors and thermostats, implementing draft reduction measures (e.g., through installing faster doors and monitoring door closures) and installing extra insulation (under the roof or on the walls, including painting), to rolling out to much more energy efficient and clear air or ground source heat pumps (these even work for high temperature processes).

Isolating cooler or warmer spaces (including server rooms, drying rooms, refrigerators) from other spaces or from the outdoors with PVC sheets/panels, and/or installing automatic door closures or floor to ceiling partitioning, can also be very effective in saving energy.

In addition, facilities with car parks may have streetlamps with solar panels which can provide the car park lighting.

Manufacturing equipment upgrade or replacement:

The energy efficiency of machines and devices have hugely improved over the years. For example, a new cooling unit will consume 40% less energy than one from the early 2000s, or a new laser 50% less than its older version, whilst a new compressed air system can yield up to 30% savings.

However tempting it may be to replace equipment, whether for energy, compressed air or carbon, the principle remains the same. Before investing into new equipment, it is always wise to conduct an audit (air/energy/carbon) to understand the energy (or compressed air) usage. Once the most significant energy consuming machine or system has been identified, the right solution becomes clear with a business case for investment.

Manufacturers have told us that the cost to replace or upgrade their equipment is the greatest barrier to implementing their plans to decarbonise. However, for more modest but still key equipment, the costs of energy to run the machinery can far outweigh the initial outlay. For compressed air systems, the energy costs constitute 76% of the Total Cost of Ownership (or TCO, comprised of the initial capital investment, maintenance and energy running costs).

⁸Carbon trust – UK Business Climate Hub

⁹Atlas Copco, 'How to Reduce your Carbon Footprint and Reduce the Cost of Running your Factory's Compressed Air System webinar', September 2023

Once the high energy users in the facility are identified, and the solution is to replace or upgrade equipment, the initial audit can then be complemented by a more specialised engineering audit to determine exactly which kind/brand of machine/system is right for the job.

Some quite common measures are to fit lids on ovens or furnaces, or line them with insulating bricks. This will reduce the escape of heat from the furnace and therefore reduce the use of gas.

Adopting Industrial Digital Technologies (IDTs)

Adopting industrial Digital Technologies can help drive energy efficiency. For example, the Internet of Things (IoT), in equipping machines with meter reading tools or sensors, can offer real time data access by connecting it to the cloud, enabling the monitoring of equipment from anywhere in the world. This means that faults can be spotted immediately, and the equipment repaired in good time and maintained at its optimal performance.

According to the Green Alliance, 'digitally enabled energy efficiency could save UK businesses £6 billion a year by 2030'.

However, digitalisation is at a relatively low adoption stage, although significant steps have been made in the last few years. It is all too often the case that, even though the existing IT equipment does take the measurements automatically, nothing is actually done with the data. It is important to realise that you need to know which data you

want to collect and make it 'visible' in order to be able turn it into a meaningful 'virtual reality' and maximise the potential for efficiency improvements of the system.

Electrical infrastructure:

a. Voltage Optimisation is a technology which optimises the incoming supply from the national grid to match the voltage required by equipment within a factory or other business. In doing so, it can reduce energy consumption and therefore costs. There are also wider benefits to be had, such as enhanced power quality, meaning less wear and tear on equipment, therefore increasing its shelf life.

b. Power Factor Correction focuses on improving efficiency known as "Power Factor" when operating equipment such as machines and motors. Power Factor is used to determine how much more energy will be required to power the load. The lower the power factor of a piece of equipment, the less efficient it is to run. Power Factor correction systems can be put in place to drive better efficiency by reducing the amount of power a device has to consume to generate its rated amount of power.

c. Variable Speed Drives (VSDs) control the speed of motors, fans, and pumps, all of which are typically found in manufacturing businesses. VSDs can be used to slow down motors, fans and pumps and therefore reduce the energy used.

d. Compressed air: Compressors are found in every single manufacturing facility, not just for pumps but for cleaning air. Compressed air generation accounts for 10% of the total industrial electricity consumption in the UK, i.e. 3.1% of the total national electricity consumption. In 2022, compressors consumed 8500GWh of electricity (almost the equivalent of the UK's Sizewell B nuclear power station).



The potential savings to be had are monumental¹⁰. For most installations, only 50% of compressed air is used for real production, the other half being wasted in air leaks, non-insulated equipment or over demand (e.g., too much change of air).

For a typical SME installation using a compressor power of 110kW for 4000 hours/year, assuming a 20% improvement on energy saving, total savings of £220,000 over 10 years (or £20,000 per year) can be achieved with a Return on Investment of 24 months.

Just like electricity and gas consumption, it is important to understand compressed air usage. Analysing air purity requirements is also useful as, if the air is cleaned too much, this will waste energy and costs on filters. It is advisable to look to isolate the areas which need cleaner air leaving a lesser air quality level for the less sensitive equipment, thus saving on energy and cutting the number of filters needed.

Process upgrade or replacement:

Upgrading or changing a manufacturing process is often restricted by the requirement of the manufacturer to produce in line with their client's specification.

Having to remanufacture bespoke parts for production, as well as retest and verify the product, is very complex, resource intensive and slow.

Instead, there may be more merit in recovering energy efficiency through adjusted shift patterns, or reduced downtime to maximise production versus consumption. Work can be planned and scheduled to avoid using the use of high-energy consuming machines during peak hours.

Heat recovery

Heat recovery may have the biggest potential to improve energy efficiency, but as yet is almost untapped. It uses the steam or waste heat from machinery (e.g., compressors, ovens/furnaces, galvanisation baths) or high temperature processes, to heat up other parts of the process (at lower temperatures), hot water, or for the space heating of the building. It can also be used to produce electricity via the Organic Rankine Cycle, a type of thermodynamic process which can use low temperature industrial waste heat (including from small/medium sized biomass plants, flue- and vehicle exhaust gases).

¹⁰How to reduce your carbon footprint and reduce the cost of running your factory's compressed air system, Atlas Copco webinar, 26 September 2023 available on request



PART 3: FACING AND OVERCOMING BARRIERS

Making energy efficiency improvements in a business is no mean feat and won't be without its challenges. It's important for manufacturers to understand the potential issues they may face and ways in which these can be overcome.

BARRIER 1: INFORMATION, ADVICE, AND GUIDANCE

Manufacturers, and SMEs and mid-market ones in particular, are not able to take action, mainly because they don't know where to get the right information and how to start. Although one can start on their own, it is likely to take more time. The best option for time-poor organisations is therefore to ask for expert advice, as this will provide them with the best solutions to reap the benefits in the shortest timeframe. However, there is a plethora of consultants to choose from and it is difficult to know whom to trust. Industry associations often work with trusted partners, and it is a good idea to ask them for a reference.

Innovate UK, Catapults (e.g., the HVMC, for high value manufacturing) and universities are good places to ask as they often have units specializing on industry needs around energy and carbon, and can provide advice and sometimes practical help. Larger organisations, for whom the Energy Savings Opportunity Scheme (ESOS) is mandatory, can use their ESOS report recommendations to get started.

BARRIER 2: ACCESS TO TECHNICAL SKILLS

The shortage of skilled workers in manufacturing has been a long-standing issue and now the need for new 'green' skills to become more sustainable is accelerating.

In the next five years, manufacturers expect to see demand for skills changing and have identified the top five skills to be able to operate more sustainably as: designing and engineering (75%), Research and Development (74%), production and manufacturing (73%), IT (57%), distribution and logistics (56%)¹¹.

Digital skills are just as essential to measure energy consumption and track down the waste. It starts with collecting data at a sufficiently granular level to make the invisible visible,

followed by the storage of this data, its analysis, interpretation and communication to decision makers. Data analysis skills are predicted to be the fastest growing digital skills cluster over the next five years, following the exponential growth in demand for advanced data science and machine learning applications across all sectors of the economy.

While government programmes, such as T Levels and the Lifelong Learning Entitlement, are welcome developments for investing in future talent, manufacturers need access to skilled workers now. By increasing support for apprenticeships and creating more flexible learning options, businesses are better placed to upskill and retrain their employees. This will inevitably lead to immediate improvements in digital adoption and innovation for energy efficiency.

¹¹Unlocking the Skills For a Green Future, Make UK report October 2021

BARRIER 3: LEADERSHIP AND MANAGEMENT SKILLS

Effective leadership and management skills are key to creating the innovative vision for the transition to a sustainable, energy efficient, low-carbon manufacturing business. However, 2/3 manufacturers believe that there is a shortage of management skills in the sector.

We know that leaders drive change. In fact, 8 in 10 manufacturers agreed with the statement that “effective leaders are critical to adopting new technologies or green practices”. Therefore, it is clear that accountability and prioritisation must come from the top and cascade to management, who will be in charge of ensuring action is taken at all levels of the organisation.

Nonetheless, there are not enough sustainability skills in the boardroom, which hinders the process. One member said that they recommended every CEO/MD to have a smart meter on their desk as this maintains the level of awareness high of the need for energy efficiency.

We have already called for changes to the apprenticeship levy to enable greater flexibility in training, and this need for support is felt just as keenly in leadership development as elsewhere in the sector. In the Maker’s Manifesto, we advocated for a manufacturing mentor programme, aiming to encourage older/retired workers back and into educational roles. This would support the younger generation and promises to create networks of manufacturing and management knowledge across the sector.

If we want to become more energy efficient, we require managers who can deliver the net zero vision for 2050 and keep their business profitable. This can only happen by investing in our skills sector and supporting businesses who want to further develop leaders for the future.

BARRIER 4: ACCESS TO FINANCE

Grants and match-funding are the preferred route for financing investment projects.

Most grant schemes are generally for SMEs (< 250 employees) so are not accessible to the typical mid-market manufacturing business, although the EITF is open to enterprises of all sizes. However, due to its competitive nature and the very long and complex application form, most SMEs need to spend money on consultants to participate, and even large companies find it too burdensome. Make UK have already provided extensive comments to DESNZ on the EITF.

Other schemes for energy intensive industries (EII) e.g., the Emissions Trading Scheme (ETS), Climate Change Agreements (CCAs) and Mineralogical and Metallurgical Processes Exemptions.

Min-Met also exemptions, which provide tax reliefs on energy and encourage energy consumption reduction, are based on too narrow eligibility criteria for energy intensity. They leave a majority of the manufacturing businesses behind, despite them routinely conducting energy intensive activities.

Business rates reliefs for green machinery and plant equipment for the purpose of improving energy efficiency and buildings improvements (e.g., insulation) have been welcome, but unfortunately only apply for the first 12 months. This is not a sufficient incentive as the payback time for machinery and equipment is longer, and many businesses are having difficulties finding money upfront to get started.

Information of where to find funds and grants is available in Appendix 1.



HYMID CASE STUDY – HOW A TYPICAL MANUFACTURING SME CAN SUCCESSFULLY EMBARK ON AN ENERGY EFFICIENCY JOURNEY

Who are Hymid?

Hymid Multi-Shot Ltd (Hymid) are a well established manufacturing SME based in Torquay, Devon, employing 48 staff. They are one of the UK's leading product development and manufacturing supply partners of technical single and two-shot plastic injection moulding components to the medical device, instrumentation, consumer and electronics industries.

The challenge

They mould components on energy intensive injection moulding machines under strict production protocols, but their production processes also involves other energy intensive activities, including the drying of raw materials (plastic pellets) to remove moisture and prevent microbial contamination during the moulding process, the need to constantly cool water to control the temperature of the mould tools, the use of compressed air for moulding equipment, and for lighting and air conditioning to provide a suitable work environment. All these demands make Hymid a relatively energy-hungry business!

Given the need to respond to soaring energy costs and better manage their environmental footprint, Hymid decided to embark on a major energy efficiency journey with Inspired, starting with an energy consumption and carbon emissions audit to help them identify how much energy was being consumed and where.

Monitoring energy usage

This initial audit revealed the production facility consumed 90% of its annual electricity in support of operations, of which just over half was processing. Gas use comprised just under 10% of total energy consumption and was used for heating the building. Other significant energy consuming (SEC) equipment were the dryers (9%), cooling (7%), compressed air (6%), air conditioning and lighting (5% each).

Outcomes

From this, Hymid was then able to identify which energy saving opportunities would provide the largest or fastest return on their investment, providing a matrix of options from which Hymid have already implemented:

- With the co-operation of their Landlord, Hymid have **re-roofed the production facility**, increasing the amount of natural light available, increasing the levels of insulation and making the roof capable of holding Solar PV. This will reduce the use of artificial light sources, ensure better heat retention and therefore reduce energy bills, and allow the installation of Solar PV when required.
- Within the production facility, the **replacement of fluorescent tube lights with LED lighting** has saved 80% on their running costs, whilst the **replacement of industrial gas heaters with new ultra-efficient ones** in the toolroom has saved 30% on their running costs.
- Older, **less energy efficient injection moulding machines are being prioritised for replacement** with new, more energy efficient machines. **Existing material driers are also being replaced by more energy efficient driers**. In the interim, existing production orders are being fulfilled on the more energy efficient machines whenever possible.
- The monitoring and collecting of energy, temperature and airflow data has enabled Hymid to reduce energy demands further by **determining the best production patterns to operate**. Work is now being scheduled to avoid using the use of high-energy consuming machines during peak hours.

The future

Amongst the other options identified by the audit, Hymid are also actively considering:

- An **automatic Monitoring & Targeting (aM&T) sub-metering system** would enable Hymid to automatically measure, record and digitally visualise their metered energy data, allowing them to both target improvements and to calculate accurate emissions data 'per product' in order to provide clients with a carbon footprint per unit to support their Scope 3 calculations, rather than having to estimate it. For a £20,000 investment (including technical support), Hymid would save over £8,500/year, or 7.5% of the site's total energy consumption, with a payback of just over 2 years.
- The **installation of solar PV** on their roof. Whilst this comes at a cost of over £100,000, it would save Hymid £27,000/year, or 20% of their total energy bill, with a pay-back time of just over 4 years (assuming Hymid can obtain a connection to the grid in good time).
- Other **low-cost measures**, which needed with no technical support, would enable Hymid to save between 10% and 50% on energy running costs; most having quick pay-back times of less than two years.
- The collection of annual data will also permit the **negotiation of a better energy contract** as Hymid will be able to purchase ahead of time with more certainty.

Hymid's experience to date has proven that whilst taking the first step may be daunting, **the benefits of actively engaging with subject matter experts, and investing time and energy to understand where and why your business actually consumes energy, are essential pre-requisites to becoming more energy efficient.** Even the simple step of routinely collecting data on a spreadsheet is better than nothing, so Hymid would encourage every manufacturing SME to start this journey!



CONCLUSION

For the majority of companies, energy efficiency is driven by cost, immediate savings, and net zero as a longer-term priority. Energy efficiency is one of the only tools that manufacturers have to decarbonise until at least the end of this decade.

There is a vast range of measures to improve energy efficiency. On one hand, better control, better practices, and organisational culture change provide low-cost low-effort measures. On the other hand, equipment upgrade/replacement, and process upgrade or change (including heat recovery and voltage optimisation) are more complex measures that require substantial investment.

Replacing or upgrading plant equipment and machinery, while attractive, is often hindered by access to finance. Skills are in short supply and present one of the major barriers to progressing with energy efficiency investments. However, where these barriers can be overcome, there are major rewards and gains to be made.

As this report has shown, companies can benefit from cost savings, longer equipment lifespan, less waste and carbon emissions, and increased labour productivity when energy efficiency projects are undertaken successfully.

But manufacturers cannot always do these things alone, and a policy environment which helps and not hampers commitments to drive energy efficiency is needed and needed now. The Energy Efficiency Taskforce that was initially set up in April 2023 has now been disbanded, but it is vital that the core work of the Taskforce is not lost or forgotten and is taken forward. We see the following as key to creating a policy environment to drive energy efficiency:

1. Introduce a national advisory energy service: In a similar model to Made Smarter, this should have specifics for the manufacturing or industrial sector. The scheme would provide smaller funding (e.g., £20k) to more companies and include energy audit, sub-metering, an implementation plan, an engineering audit if needed, and help with accessing the right finance, allowing them to take their first implementation steps.

The current IETF does not reach manufacturers of all sizes, despite it being open to all businesses, with the criteria pushing some companies out of being able to access the funds. In addition, the complexity of accessing the fund means small businesses need to access external advice if they want to attempt to use it. Large companies (e.g., steel sector) like it, but the application is too time-consuming for them.

2. Conduct a gap analysis of which tax incentives and funding are available on energy efficiency to the different business populations, so that no category falls through the cracks and is left behind. This should consider SMEs, mid-market companies, EIs (electro-intensive) and gas intensive industries (e.g., paper & pulp, or ceramics & glass who currently have no other alternative than to use a gas for heat, and are very exposed to high gas prices).

3. Extend the 12 months 100% business rate reliefs on green plant machinery and equipment, and on building improvements introduced in April 2023. Manufacturers are making green investments and we welcome current 12 months reliefs. However, green investments should have a minimum of a 3-year relief to reflect business' payback period for their investments, as opposed to the current 12 months. The three-year relief could be available for a limited time between now and 2035 to spur on immediate investment or bring forward investment plans, and then move back to the original 12 months relief.

THREE SIMPLE STEPS FOR BUSINESSES TO UNDERTAKE

Meanwhile, manufacturers can help themselves. This report includes some best practice case studies in a bid to support manufacturers to adopt similar approaches in their organisation. **Three simple steps that we recommend to all businesses to undertake in the first instance are:**

- **Conduct an energy audit and set your baseline consumption** as soon as possible before investing in any equipment. Get help from a consultant. Implement within the first 12 months the no/low-cost, no effort measures to control energy costs and usage identified in the audit, adopting best practices, and introducing organisational culture change.
- On the basis of the implementation plan resulting from the audit, **consider which of the more advanced investment stack up to a business case** e.g., whether to upgrade/change equipment (or process if necessary/possible), including heat recovery and voltage optimisation.
- **Embrace the principles of the ISO51000 for Energy Management** (or gain accreditation if they wish). Take Make UK's dedicated 'ISO5001 awareness' course for manufacturers.

HOW MAKE UK AND INSPIRED CAN HELP



Inspired has supported over 500 manufacturers, including Make UK members, to get a clear picture of how their sites are operating and where they could make the most efficient improvements.

Energy Management as a Service by Inspired® (EMaaS) can help you understand how energy is being used and reveal opportunities to improve efficiency, supporting your wider energy and carbon strategy needs and making investment decisions clear.

EMaaS puts hardware, software and services at the centre of managing the four key energy and sustainability challenges – helping you tackle your cost, consumption, carbon and compliance needs – now and in the future.



We provide training designed to equip all levels of the workforce with the knowledge and skills to help achieve your organisation's environment and sustainability goals. Our [IEMA accredited courses](#) are designed for a single delegate through to company-wide programmes.

Make UK provides ISO50001 courses and a series of net zero courses and sustainability leadership management for boardroom directors, management, and shopfloor staff.

Our half-day ISO 50001 Awareness training workshop for senior leaders and environmental specialists provides a general overview of the concepts and key requirements of the ISO 50001 standard.

VIEWPOINT



In an era where environmental sustainability is paramount, energy efficiency plays a central role in reducing carbon emissions and contributing to the fight against climate change. Whether organisations are ready to acknowledge this or not, the UK has a net zero target to meet.

As a dedicated consultant, supporting the manufacturing sector, Inspired wholeheartedly endorses Make UK's comprehensive report on energy efficiency in manufacturing.

It is evident that energy costs constitute a significant share of operational expenses for manufacturers and is a key concern. Over the last twenty-four months, price volatility and market movements have been highly turbulent. This has been further exacerbated by an increase in operational costs, leaving manufacturers forced to operate with a significantly reduced margin. Make UK's Driving Industrial Energy Efficiencies report delves into how energy-efficient practices and technologies can support cost reduction.

Reduced energy consumption: The adoption of energy-efficient technologies and processes yields a significant reduction in energy consumption and waste, translating into lower utility bills and substantial cuts in production costs. The main, and very desirable outcomes of reduced energy consumption are lower operational costs and lower greenhouse gas emissions.

Emissions reduction: Manufacturers can minimise their environmental impact by adopting cleaner energy sources, optimising production processes, and investing in renewable energy solutions. Reducing your reliance on the grid and on fossil fuels means you can be more in control of your costs, as well as supporting your carbon reduction targets.

Energy-efficient equipment: Well-maintained energy-efficient equipment operates with increased reliability and reduced downtime. This increased productivity aligns with Inspired PLC's quest for operational excellence, as less downtime means more efficiency and cost savings.

Enhanced Corporate Social Responsibility (CSR): Demonstrating a commitment to sustainability and

emissions reduction fosters a positive image and credibility within the market, which not only supports winning new business contracts, but also sets you apart from your competitors.

Seeking advice and financial support: As an independent consultant, Inspired recognises the importance of access to practical advice. Working alongside Make UK, members get access to a wealth of knowledge and expertise. There are numerous financial incentives, tax benefits, and grants available for manufacturers to embrace energy-efficient practices; a quality energy and sustainability partner can support you in obtaining these funds.

One of the key takeaways from this report and the information that is available is that sustainability makes good business sense. By implementing sound practises and applying continuous improvement processes around energy efficiency, manufacturers can remain competitive with their peers and favourable in purchasing decisions made by the evolving number of conscious consumers.

Inspired commends Make UK for its invaluable role, advocating for and supporting energy efficiency initiatives within the manufacturing sector. Make UK serves as the collective voice of the industry, promoting sustainable practices and offering invaluable resources and guidance to its members alongside lobbying Government for continued and additional means of support. This comprehensive report underscores the importance of collaboration between the industry and associations like Make UK to pave the way for a prosperous, cleaner and environmentally responsible future.



Andrew Stubbs
Director: Optimisation Performance, Inspired PLC

Energy Management as a Service by Inspired® (EMaaS) can help you understand how energy is being used and reveal opportunities to improve efficiency, supporting your wider energy and carbon strategy needs and making investment decisions clear. EMaaS puts hardware, software and services at the centre of managing the four key energy and sustainability challenges – helping you tackle your cost, consumption, carbon and compliance needs – now and in the future.

APPENDIX

THE SUPPORT AVAILABLE TO MANUFACTURERS

SCHEME	TARGET	PRIMARY PURPOSE	ELIGIBILITY CRITERIA
SUPPORT REDUCING ELECTRICITY COSTS for ENERGY INTENSIVE INDUSTRIES or ACTIVITIES			
Carbon Price Support (CPS) compensation scheme and UK-ETS free allowances	The UK ETS and CPS mechanism are designed to reduce emissions.	To compensate those EIs deemed to be exposed to a significant risk of carbon leakage due to the indirect emission costs of the UK ETS and CPS.	<p>There are 2 steps to assessing whether a business is eligible to claim compensation for the indirect costs of the UK ETS/CPS:</p> <ul style="list-style-type: none"> - The business must manufacture a product in the UK within an eligible sector (determined by reference to the 4-digit SIC code). - The business must pass a 5% filter test - The legal entity manufacturing a product in GB, and this will typically be a business registered at Companies House.
Climate Change Agreements (CCAs)	CCAs are available for a wide range of industry sectors, but generally those that are EIs.	Climate change agreements are voluntary agreements made between UK industry and the Environment Agency to reduce energy use and carbon dioxide (CO ₂) emissions. In return, operators receive a discount on the CCL, a tax added to electricity and fuel bills.	<p>Exact criteria for eligibility can be found here¹², but in general:</p> <ul style="list-style-type: none"> - An operator that has a CCA must measure and report its energy use and carbon emissions against agreed targets over 2-year target periods up to the end of 2022. - If an operator has more than one eligible facility in the same sector it can hold an individual CCA for each facility or choose to group them together under one CCA. Where facilities are grouped under one CCA the target is then shared across the grouped facilities. - Once a facility, or group of facilities, is included in a CCA, it is referred to as a target unit. - If the operator's target unit meets its targets at the end of each reporting period, the facilities continue to be eligible for the discount on the CCL.

¹²<https://www.gov.uk/guidance/climate-change-agreements--2>

SCHEME	TARGET	PRIMARY PURPOSE	ELIGIBILITY CRITERIA
Mineralogical and metallurgical processes exemptions ('Min-Met exemption')	Businesses carrying out metallurgical and mineralogical processes. processes	Taxable commodities used in mineralogical or metallurgical processes are exempt from the main rates of climate change levy. The exemptions ensure the UK tax treatment of highly energy intensive processes is in line with tax treatments elsewhere in the EU, thereby reducing any distortion of competition.	<ul style="list-style-type: none"> – Applies to those with energy used in metallurgical and mineralogical products, and their eligible processes is therefore 100% exempt from the Climate Change Levy. – Under the scheme, in return for meeting energy efficiency or carbon reduction targets energy intensive industries conducting eligible processes could claim reduced rates of CCL. The reduced rates are currently 10 per cent of the full rate for electricity and 35 per cent of the full rates for other taxable commodities.
The Energy-Intensive Industries (EIs) exemption scheme	EIs ¹³ compensation package aims to help big energy users stay competitive in a global market.	Exemption from the indirect costs of funding renewable energy generation, including Contracts for Difference (CfD), the Renewables Obligation (RO) and the small scale Feed-in Tariff (FiT) to help EIs stay competitive as our economy transitions to zero carbon	<p>The scheme's relief is up to 85% of the indirect costs, depending on the eligibility. The government has announced that the relief will be increased to 100% from April 2024. Eligibility criteria are based on:</p> <ul style="list-style-type: none"> – The business must manufacture a product in the UK within an eligible sector – the "sector level test". – The business must pass a 20% electricity intensity test – the "business level test". – The business must not be an Undertaking in Difficulty (UID) – the UID guidelines explain that "an undertaking is considered to be in difficulty when, without intervention by the State, it will almost certainly be condemned to going out of business in the short or medium term." – The business must have at least two quarters of financial data. – The application must contain evidence of the proportion of electricity used to manufacture the product for a period of at least three months.

¹³Sectors count as energy intensive if they carry out certain specified activities. The list of eligible activities specified in the government guidance is extensive and includes aluminium production, leather tanning and glass manufacturing. It also includes the manufacture of things as diverse as wallpaper, tyres, and electronic components. See [CFD – RO- FiT Exemption Guidance Government guidance](#)

SCHEME	TARGET	PRIMARY PURPOSE	ELIGIBILITY CRITERIA
FUNDS AND RELIEFS FOR ENERGY EFFICIENCY (AND LOW-CARBON) TECHNOLOGIES			
Industrial Energy Transformation Fund (IETF) (£500m for 2020 – 2028)	Open to all businesses	The Industrial Energy Transformation Fund (IETF) is designed to help businesses with high energy use to cut their energy bills and carbon emissions through investing in energy efficiency and low carbon technologies. The Government announced £315 million of funding in the 2018 Budget, available up until 2025.	<ul style="list-style-type: none"> – There is a minimum grant of 100K per application available, and the project must start by 1/2/24 and complete by 31/3/25. – Match funding up to 70% (or more in some cases especially for SMEs) – However, there are exclusions, including projects that upgrade systems in buildings that are not integral to the industrial process itself, as well as the cost of installation, operation, or maintenance of equipment.
Energy Savings Opportunity Scheme (ESOS)	Mandatory for large undertakings in the UK	ESOS is a mandatory energy assessment and energy saving scheme established by 2014 ESOS Regulations.	The scheme applies to large undertakings and groups containing large undertakings in the UK. It requires disclosure in annual reports of energy, emissions and energy efficiency action taken. The report contains recommendations and is a good indication of where to start taking action on energy efficiency.
The Heat Network Efficiency Scheme (HNES) (£30m for 2023 – 2025)		The Heat Network Efficiency Scheme (HNES) provides grant funding to support performance improvements to existing / operational district heating and communal heating projects.	HNES Round 5 launched on 23 September 2023, closing to applications on 10 November 2023. See guidance here .
Business rate relief – Green Technology (April 2023 to April 2035)	Businesses in England only.	<p>This supports the decarbonisation of non-domestic buildings¹⁴. Eligible plant and machinery will be exempt from business rates for the first 12 months.</p> <p>A 100% relief for eligible low-carbon heat networks which have their own rates bill will also be available.</p>	Plant and machinery used in onsite renewable energy generation and electricity storage, such as rooftop solar panels, wind turbines, and battery storage, plus electricity storage from any source where it is being used for electric vehicle charging points (EVCPs)
Business rate relief (100%) for building improvements (2023-2028)	Businesses in England only	<p>The relief is intended to encourage businesses to invest in their premises and support the decarbonisation of buildings.</p> <p>It is part of a wider package of reforms to the business rates system, which also includes a 50% discount for a lower multiplier for small businesses, and a targeted exemption for heat networks, amongst others.</p>	<p>Some examples of improvements that may be eligible for the relief are:</p> <ul style="list-style-type: none"> – Upgrading the insulation, heating, ventilation, or lighting systems of the property to improve its energy efficiency – Adding or extending the floor space, windows, doors, or other features of the property to enhance its functionality or appearance <p>To find out if you are eligible for the relief and how to apply, you should contact your local council.</p>

¹⁴<https://www.gov.uk/government/publications/spring-statement-2022-business-support-factsheet/spring-statement-2022-business-support-factsheet>

SCHEME	TARGET	PRIMARY PURPOSE	ELIGIBILITY CRITERIA
NON-SPECIFIC RELIEF SCHEMES			
Enhanced Capital Allowances Plus	Companies, individuals, and partnerships within Freeport.	The ECA scheme lets your business claim 100 per cent first-year tax relief on investments in qualifying technologies and products. This means you can write off (deduct) the whole cost, or up to the published claim value, of buying the energy-saving product against your taxable profits in the year of purchase.	<ul style="list-style-type: none"> You can only make claims for tax allowances under the Enhanced Capital Allowance (ECA) energy scheme for certain technologies. Qualifying products within these technologies must meet certain eligibility criteria specified on the Energy Technology List (ETL).
Annual Investment Allowance (AIA)	For all UK businesses.	A 100% relief on eligible plant and machinery used by businesses – The amount is currently £1m and has been made permanent.	<p>Eligible plant and machinery include:</p> <ul style="list-style-type: none"> alterations to a building to install other plant and machinery - this does not include repairs costs of demolishing plant and machinery items that you keep using in your business, including cars parts of a building considered integral, known as 'integral features' some fixtures, for example fitted kitchens or bathroom suites
R&D Tax credits	Large companies and SMEs.	To support companies that spend money developing new products, processes, or services; or enhancing existing ones.	<p>To be eligible the business must:</p> <ul style="list-style-type: none"> Be a limited company in the UK that is subject to Corporation Tax. Have carried out qualifying research and development activities. Have spent money on these projects. <p>If you are classed as an SME for R&D tax credit purposes, your next step will be to make a claim via the SME R&D tax incentive. And if you are a large company, via the Research and Development Expenditure Credit (RDEC).</p>
The UK Business Climate Hub	SMEs	The Hub is a shared endeavor, developed with the Department for Energy Security and Net Zero (DESNZ), the SME Climate Hub ¹⁵ and the UK's main business organisations, energy networks, high street banks and professional bodies to provide general advice to SMEs.	n/a

¹⁵Businesses that commit to reducing emissions through the SME Climate Hub will be counted in the United Nations' Race to Zero.



Make UK is backing manufacturing – helping our sector to engineer a digital, global and green future. From the First Industrial Revolution to the emergence of the Fourth, the manufacturing sector has been the UK's economic engine and the world's workshop. The 20,000 manufacturers we represent have created the new technologies of today and are designing the innovations of tomorrow. By investing in their people, they continue to compete on a global stage, providing the solutions to the world's biggest challenges. Together, manufacturing is changing, adapting and transforming to meet the future needs of the UK economy. A forward-thinking, bold and versatile sector, manufacturers are engineering their own future.

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Inspired PLC (AIM:INSE) is a leading B2B technology-based service provider supporting corporate businesses to control energy costs and enable their journey to net zero.

To enable our clients to respond to the climate emergency, we focus on solving their toughest sustainability challenges. By managing data comprehensively, offering expert insight and providing advisory services to reduce carbon efficiently, we enable our clients to control costs effectively, make authentic environmental, social and governance (ESG) disclosures and achieve their net zero targets.

Our solutions create clear and actionable long-term plans, making investment easier to obtain and carbon reductions quicker to realise.

We currently serve over 3,400 UK and Irish organisations across the public, private and third sectors and what sets us aside from other energy and sustainability advisory partners is our expertise in data management. Our solutions are evidence-based and enable us to provide our clients with practical steps to make a real difference.

In November 2020, we were delighted to receive the London Stock Exchange Green Economy Mark, recognising the Group's environmental and strategic advice, service and support to clients and the impact the business has on the green economy

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