

Adapting the manufacturing sector for a brighter future: new approaches to energy resilience among SMEs



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Summary

Introduction: The new turn towards ‘net zero realism’

For many businesses across the country, this current period spells the dawn of a new era, whereby energy risks becoming not only too expensive, but dependent upon an infrastructure over which they have little control. It is a particularly pressing threat to the UK’s manufacturing sector, much of which relies on large amounts of consistently supplied energy to power its processes, at an affordable rate. The solution advanced by respondents to this research report suggested a cooled, more adaptable approach: one of ‘net zero realism’ meaning we can still achieve environmental aims through boosting business and growth plans.

What did manufacturers tell us about energy costs and resilience?

In order to investigate SME manufacturer’s views on costs, energy supply, disruptions and resilience, researchers at Civitas undertook a range of primary research in Liverpool and London, through round tables (4 in-person and 2 virtual), semi-structured interviews, telephone interviews, and a 20-participant structured survey.

Energy Security: ‘Secure energy is slightly more important than green energy’ (not, vice versa)

- Plus, we found more respondents were either very or fairly concerned about potential energy blackouts than not concerned.

Energy Resilience: ‘The manufacturing sector is not sufficiently resilient to disruption in the security of supply’

- Plus, when asked whether they had contingency measures in place for when their usual source of energy power is disrupted, most responded they either had no contingency measures, or only some very informal measures.

Clean Supply: ‘SMEs are too busy doing their day job to think about cheap or sustainable energy’

- As one SME described, ‘If you don’t own the building and have a lease, you have to negotiate with a landlord and it can be difficult to make an agreement. ... Building ownership, landlords, the value of infrastructure and the issue that we don’t even own the panels is difficult.’ [SME on solar photovoltaics rollout across factory roof.]

Quality of supply: although by no means clear-cut, electricity supply can be ‘undermined by “micro” outages in which LED lights register a flicker’

- Another described, ‘We have talked about batteries but don’t see the payback for that kind of need and they [the firm] don’t want to go there with the batteries just yet.’

Energy Costs: ‘...our energy costs are less than one per cent of sales. This could increase to 6, 7, 8 per cent and would erode our bottom line’

- Plus, the greater number of our small-survey needed to know that there would be an overall cost benefit to their business when seeking to diversify their energy sourcing strategies.

Growth plans: ‘no tax to pay on breaking even’

- The greater number of respondents thought they would increase their business’s capital investment plans over the next 12 months or at least maintain the same level.
- When asked which range of policies might most help them in supporting business growth, most first supported ‘Financial support to boost capital investment projects’, followed closely by ‘Support for Research and Development (R&D)’.

Top 10 recommendations

1. To encourage No. 10 and wider government to adopt a pragmatism and policy of 'Net Zero Realism.'
2. Target Energy Bill Discount Relief to protect SME manufacturers in order to reflect reliefs at today's wholesale prices.
3. Extend the super-deduction capital allowance to let SMEs grasp a 50% effective tax relief on energy monitoring technology.
4. Develop DIY employee training and self-help tools on energy efficiency for smaller manufacturers.
5. To seek for a charitable energy educational trust to introduce a crib sheet on energy management for manufacturers.
6. Encourage government to coordinate UK universities in supplying low-cost postgraduate advisory teams for SMEs conducting energy management strategies.
7. Propose government and large manufacturers coordinate German-Swiss style networks for smaller manufacturers interacting with energy network providers in order to resolve renewables applications, grid balancing, outages and intermittency.
8. Encourage landlord incentivisation for energy efficiency improvements through tax reliefs and EPC-rating rewards for energy performance.
9. Introduce a simple, non-binding, minimalist, energy ISO Standard to apply across industry in order to resolve confusing carbon reporting and environmental compliance frameworks
10. The introduction of a refined UK-wide 'realist' Industrial Strategy.

Introduction: The new turn towards ‘net zero realism’

‘Our country is facing a profound economic crisis. The aftermath of Covid still lingers. Putin’s war Ukraine has destabilised energy markets and supply chains the world over. I will place economic stability and confidence at the heart of this government’s agenda. This will mean difficult decisions to come.’¹ Rishi Sunak’s candid comments, shortly after his accession as UK Prime Minister in October 2022 came as a frank and concerning assessment of the trajectory of UK industry. Of particular note are the Prime Minister’s comments regarding the disrupted energy supply, and the destabilisation of global supply chains, following Russia’s invasion of Ukraine earlier last year. For many businesses across the country, this may spell the dawn of a new era, whereby energy risks becoming not only expensive, but dependent upon an infrastructure over which they have little control. The solution advanced by respondents to this research report suggested a cooled, more adaptable approach: one of ‘net zero realism’ so we can achieve environmental aims through boosting business and growth plans.

Whilst this will be of concern to a range of different industries, it may be considered a particularly pressing threat to the UK’s manufacturing sector, much of which relies on large amounts of consistently supplied energy to power its processes, at an affordable rate. For the wider economy, this may cause considerable anxiety, given the pivotal role manufacturing holds in shaping the UK’s economy. Indeed, the manufacturing sector has been labelled the ‘cornerstone’ of the economy, and an industry in which the UK can be a global leader.² Indeed, as of 2022, the UK’s manufacturing sector has an annual output of £183 billion, making it the 9th largest manufacturing country in the world.³ Manufacturing accounts for 9.6% of UK output.⁴ (At the time of writing, manufacturing output declined by 4.4% in 2022. It is expected to decline by a further 3.2% in 2023.)⁵ It creates approximately 2.5 million jobs for the UK economy, or 7.5% of the UK workforce overall.⁶ The impact of manufacturing on British livelihoods goes further, however, with an estimated 18-27% of UK employment dependent on manufacturing as well as 15-22% of the economy.⁷

UK manufacturing also continues to exceed expectations relative to size of the country’s economy. The UK is the 10th biggest exporter of goods in the world. These strengths are highlighted by the high levels of productivity seen throughout the manufacturing sector. According to Office for National Statistics (ONS) figures, ten out of the thirteen most productive sectors were in manufacturing.⁸ In addition to being more productive, productivity growth has also tended to be faster in manufacturing than the UK average since the turn of the century. This has also been reflected in manufacturing wage levels, with the average wage in the sector standing at £35,277, 12% higher than the UK average of £31,447 for the whole economy.⁹ According to Make UK (formerly the Engineering Employers’ Federation, EEF), increasing manufacturing output as a share of UK GDP from its current 10% to 15% could feasibly result in an extra £142bn to the UK economy.¹⁰

1 ‘Rishi Sunak promises ‘economic stability’: Top quotes from first speech as UK PM’, <https://indianexpress.com/article/world/rishi-sunak-promises-economic-stability-top-quotes-from-uk-pms-first-speech-8229482/>

2 ‘Manufacturing can be cornerstone of UK economy’, <https://www.electronicweek.com/news/business/manufacturing/manufacturing-can-be-cornerstone-of-uk-economy-2010-03/>

3 Make UK, ‘UK Manufacturing The Facts: 2022’, <https://www.makeuk.org/insights/publications/uk-manufacturing-the-facts--2022/#/>

4 Make UK, ‘Regional Manufacturing Outlook 2022’, <https://www.makeuk.org/insights/reports/regional-manufacturing-outlook-2022>

5 David Milliken, ‘UK manufacturers expect output to fall 3.2% in 2023’, <https://www.reuters.com/world/uk/uk-manufacturers-expect-output-fall-32-2023-2022-12-12/>

6 Chris Rhodes, ‘Manufacturing: statistics and policy’, <https://researchbriefings.files.parliament.uk/documents/SN01942/SN01942.pdf>

7 Ibid.

8 David Bailey and Ivan Rajic, ‘Manufacturing matters for the UK economy — more than people commonly think’, <https://blogs.lse.ac.uk/businessreview/2020/06/29/manufacturing-matters-for-the-uk-economy-more-than-people-commonly-think/>

9 Ibid.

10 Make UK, ‘Levelling up: Bridging the gap between policy and progress’, <https://www.makeuk.org/insights/reports/levelling-up-bridging-the-gap-between-policy-and-progress>

The importance of SMEs within the manufacturing sector and across the UK economy should not be overlooked. There are 244,140 manufacturing businesses across the UK.¹¹ The sector provides for just over 2.5 million jobs (in 2022). It is known that some 99.5% of those businesses – just under 243,000 are SMEs (i.e. with less than 250 employees). While over 42% of the employment derives from the larger manufacturers, the significance of those employed by manufacturers with 1-49 employees (27.2%) and those with 50-249 employees (24%) represents a significant proportion of jobs in the sector. In 2022, manufacturers in the UK had a total turnover of £577.2 billion and as one might expect, while the highest share is generated by the larger firms (67%), the 13.3% generated by the smaller (1-49 employees) and the medium sized (18.1%, 50-249 employees) is remarkable. Nor should the importance of SMEs in manufacturing be understated as a total portion of each of the manufacturing sub-sectors. For example, of plastics producers, 98% (3,955 of the 4,035 total) are SMEs.¹² Of glass manufacturers, 98%, or 580 of the total 590, are SMEs. For structural metal product producers, 99%, or 3,530 of the 3,550 total, are SMEs. Even where we tend to think of major capital - and higher energy-intensive subsectors, the SME market is crucial. Amongst motor vehicle manufacturers, of the 490 firms collectively generating a £55.3 billion turnover, 96% (470) are SMEs – and in the air and spacecraft industry, 86% (260) of the total 300, all generating £30.6 billion turnover, are SMEs.

What is clear therefore, is that manufacturing continues to play a pivotal role in the UK's economic output, and is a fundamental part of the country's economic fabric. Despite this however, there remain several challenges to the manufacturing industry which may be regarded as causes for concern in the near future. Amongst these concerns is the observation that the UK's manufacturing share of GDP is internationally very low. Whilst the UK's manufacturing percentage of GDP was less than 10%,¹³ this figure was 23-4% in Germany,¹⁴ 14% in Italy,¹⁵ or 15% as an EU28 average and 25% in South Korea.¹⁶

Perhaps even more urgent, however, are concerns about energy costs and security for manufacturing firms. This is particularly the case for SMEs, without the depth of resource to adequately counter such problems. In European research at least, there has been little focus on how SMEs can improve their energy efficiency.¹⁷ According to the National Manufacturing Barometer report, 94% of manufacturers emphasised current energy costs as having a negative impact on their business by July 2022;¹⁸ remaining high at 84% by October 2022¹⁹ and 86% by January 2023.²⁰ By autumn 2022, Make UK found that 42% of manufacturers said their electricity bills had increased by 100% in recent months and 32% viewed gas prices as having increased by 100% during the same time period.²¹ Furthermore, almost 60% stated that energy costs were now causing a threat to their business, with 12% having already made job cuts and 13% reducing their hours of operation.²²

11 Latest BEIS data for 2022, Department for Business, Energy & Industrial Strategy, 'Business population estimates 2022', <https://www.gov.uk/government/statistics/business-population-estimates-2022>; An SME is any organisation that has fewer than 250 employees and a turnover of less than €50 million or a balance sheet total less than €43 million: Foreign Commonwealth and Development Office, 'Small to medium sized enterprise (SME) action plan', <https://www.gov.uk/government/publications/fcdo-small-to-medium-sized-enterprise-sme-action-plan/small-to-medium-sized-enterprise-sme-action-plan>

12 SME, based on employee size.

13 John Mills Institute for Prosperity, 'UK manufacturing must reach 15% of GDP by 2025 as it launches its 10-point plan for reviving British industry, says Institute for Prosperity', <https://instituteforprosperity.org.uk/news/post/2021-08-13-uk-manufacturing-must-reach-15-of-gdp-by-2025-as-it-launches-its-10-point-plan-for-reviving-british-industry-says-institute-for-prosperity>

14 Timo Klein, 'Germany's manufacturing sector – an unlikely saviour in the pandemic?', <https://www.spglobal.com/marketintelligence/en/mi/research-analysis/germanys-manufacturing-sector-unlikely-saviour-pandemic.html>; Federal Ministry for Economic Affairs and Climate Action, 'A modern industrial policy', <https://www.bmwk.de/Redaktion/EN/Dossier/modern-industry-policy.html>

15 World Bank, 'World Bank Open Data', <https://data.worldbank.org>

16 World Bank, 'Manufacturing, value added (% of GDP) - Korea, Rep.', <https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=KR>

17 Zarrin Fatima, Virpi Oksman and Risto Lahdelma, 'Enabling Small Medium Enterprises (SMEs) to Become Leaders in Energy Efficiency Using a Continuous Maturity Matrix', <https://www.mdpi.com/2071-1050/13/18/10108>

18 SWMAS, 'National Report for Q1 2022/23', <https://www.swmas.co.uk/sites/default/files/National%20Manufacturing%20Barometer%20Report%20-%20July%202022.pdf>

19 SWMAS, 'National Report for Q2 2022/23', <https://www.swmas.co.uk/sites/default/files/National%20Manufacturing%20Barometer%20report%20-%20October%202022.pdf>

20 SWMAS, 'National Report for Q3 2022/23', <https://www.swmas.co.uk/sites/default/files/National%20Manufacturing%20Barometer%20Report%20-%20January%202023.pdf>

21 Make UK, 'Out of control energy bills are now business threatening for 60% of manufacturers', <https://www.makeuk.org/news-and-events/news/out-of-control-energy-bills-are-now-business-threatening-for-60-of-manufacturers>

22 Ibid.

The government has to some degree made some essential interventions to alleviate pressure on businesses, including manufacturers. Perhaps most notably, the Energy Bill Relief Scheme (EBRS) (introduced in October 2022) offers discounts to businesses on gas and electricity unit prices.²³ Furthermore, since April 2022, government has been eager to bring forward a reformed energy security strategy, which has focused on reducing reliance on energy from abroad, and accelerating the transition to renewable sources, including developing up to eight new nuclear reactors.²⁴ However, despite such moves, the government acknowledges that switching to more renewable power sources can risk a more intermittent and lower quality supply of energy, with such sources being ‘challenging because they disrupt the grid conventional methods for planning the daily operation of the electric grid.’²⁵ Therefore, whilst government has intervened more tightly with the relief scheme, there are less direct interventions by government for the SME market which could guarantee a smooth, inexpensive, secure, stable and clean supply.

To grasp at the ‘realism’ some SMEs called for in this research, we wanted to understand the impact of energy insecurity, rising costs and unreliability are therefore having on UK manufacturers, and the wider manufacturing industry. Specifically, it examined a number of key areas that were of concern for SME manufacturers in guaranteeing a security of energy supply, how energy costs are acting as a barrier for growth, and in certain cases, the survival of businesses, and then, what key mechanisms they adopt to ensure energy is secure, clean and resilient.

The ambition is to develop a broader view in identifying potential future avenues to cleaner and more efficient supply in an increasingly fractious global economic climate. With the UK manufacturing industry so critical to the overall national economic landscape, but with manufacturers already feeling the effects of broader energy, inflationary and economic challenges, these questions are not simply there to be acknowledged, but fundamental to the strategic solutions for generating greater economic prosperity.

23 Department for Business, Energy & Industrial Strategy, ‘Energy Bill Relief Scheme: help for businesses and other non-domestic customers’, <https://www.gov.uk/guidance/energy-bill-relief-scheme-help-for-businesses-and-other-non-domestic-customers>

24 Ibid.

25 Department for Business, Energy and Industrial Strategy, ‘UK Energy in brief’, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1094025/UK_Energy_in_Brief_2022.pdf; Robert Fares, ‘Renewable Energy Intermittency Explained: Challenges, Solutions, and Opportunities’, <https://blogs.scientificamerican.com/plugged-in/renewable-energy-intermittency-explained-challenges-solutions-and-opportunities/>

What did manufacturers tell us about energy costs and resilience?

In order to investigate SME manufacturer's views on costs, energy supply, disruptions and resilience, researchers at Civitas undertook a range of primary research, through round tables (both in-person and virtual), semi-structured interviews, telephone interviews, and a structured survey. With regards to gathering data and analysing the positions of a vast range of manufacturers first-hand, researchers designed and distributed an in-depth survey to SME manufacturers. These questions focused on key areas of concern in the following categories: energy security, energy resilience, clean supply, quality of supply, energy costs, and growth plans. This has helped to more specifically identify where SME manufacturers are facing challenges in the current climate.

The following section outlines the results and data collected as part of the research into a selected cohort of senior managers and directors from 20 SME manufacturing companies. The objective of this section is not to scrutinise the results, but simply to classify them and report them objectively, so that they can be analysed with greater clarity in the conclusions of this report.

It is supported by responses provided to researchers attending the SME Growth Summit Conference in Liverpool, in November 2022.²⁶ Here, a few hour-long round tables with a variety of manufacturers were held in order to gain insight into some of the key themes surrounding energy supply for such firms. This was supplemented by a series of semi-structured interviews at the conference, and a broad range of sector engagement (virtual and by telephone) for a subsequent two-month period (December 2022 – January 2023), examining the effect the current energy challenges are having on manufacturers. The focus of each of these activities had been the impact the energy crisis is having on manufacturers, and potential areas for improvement.

The 20 participants for the in-depth survey

The majority of the manufacturing survey respondents are drawn from electrical (6), plastics and rubbers (5), as well as machinery (4), transport (4), basic metals (3) and electronic components (3) while others were distributed widely across the sector.

The majority were relatively high energy intensity (8), followed by medium intensity (5), followed closely by high intensity (4) and three from relatively low energy intensity firms.

We took a sample from across the SME sizes, namely 4 from 0-10 employees, 4 with 11-49 employees, 3 from 50-99 employees, 6 from 100 to 249 employees and 3 from 250+ employees. Although the latter is technically beyond SME definition, it provided a good understanding of issues impacting larger firms and also helps identify where size could be a factor among responses.

The general outlook

- Despite the multiple challenges, many firms thought of their current business outlook as generally positive (7), neutral (5), or very positive (4) than generally negative (3) – nobody thought of it as very negative.
- At least half felt they were in a position to trust external energy suppliers to provide them with a secure energy supply over the next 12 months.

26 As part of the SME Growth Summit 2022 – organised by The Manufacturer – and taking place during Digital Manufacturing Week in Liverpool, researchers at Civitas, supported by the ERA Foundation, investigated the energy landscape within manufacturing through a survey.

- When asked to identify potential challenges in terms of the ‘most significantly impacted’, they more likely ranked energy costs (8) as above supply chain disruption (6) and inflation (4) beyond a concern for the suitability of skilled staff (2).

Energy Security: ‘Secure energy is slightly more important than green energy’ (not, vice versa)

Energy security is defined as the uninterrupted availability of energy sources at an affordable price.²⁷ This itself can be divided into long-term and short-term energy security. Long-term energy security deals predominantly with investments to supply energy in line with economic developments and environmental needs.²⁸ Short-term energy security, however, focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance.²⁹ In contrast, long-term security often involves the incorporation of measures such as reducing dependence on any one source of energy supply, increasing supplier numbers, and reducing overall demand for energy through conservation measures. Indeed, irrespective of type of manufacturing, all processes require reliable power sources in order to run effectively without disruption.³⁰

What did the manufacturers say?

- Most saw their business as having an uninterrupted supply of electricity for their regular purposes (12 Yes; 6 No; 2 Don’t know).
- Of the six that reported that their business did not have an uninterrupted supply of electricity for their regular purposes, we wanted to know about their wider challenge. Most were very or fairly concerned about potential energy blackouts in their business. They mostly had only some or some very informal contingency measures in place for when their usual source of energy power is disrupted. That group would mostly (4) need to know that there would be an overall cost benefit to their business when seeking to diversify their energy sourcing strategies. Five were worried (very or moderately) about not being able to pay energy costs in the next year. Four thought that energy costs in the UK were unfair compared to those paid in France and Germany.
- Given the choice between a selection of statements, in general, more responded either that ‘secure energy is slightly more important than green energy’ (7) than vice versa, or it ‘is not possible to say whether secure energy is more or less important than green energy’ (7).

Which one of the following statements would you agree with?

In general, secure energy is much more important than green energy	3
In general, secure energy is slightly more important than green energy	7
It is not possible to say whether secure energy is more or less important than green energy	7
In general, green energy is slightly more important than secure energy	2
In general, green energy is much more important than secure energy	1
Number of respondents	20

27 IEA, ‘Energy security’, <https://www.iea.org/topics/energy-security>

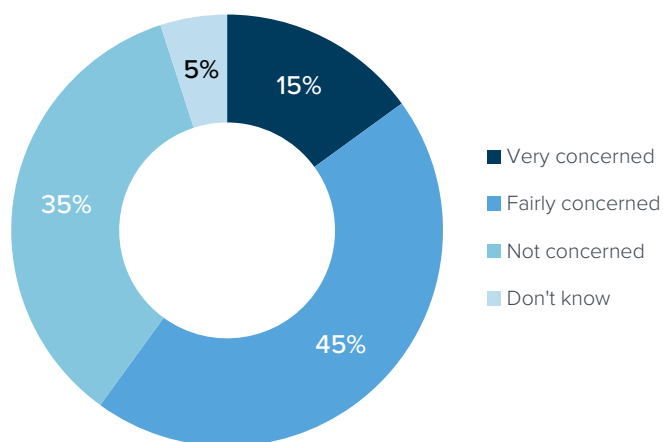
28 Ibid.

29 Ibid.

30 Powerstar, ‘Why UK manufacturers are turning to new tech to increase productivity’, <https://powerstar.com/why-uk-manufacturers-are-turning-to-new-energy-technologies-to-increase-productivity/>

- When asked which energy sources they considered to be most significant for generating a reliable and cost-effective energy supply, many more identified nuclear (14) as meeting that reliability, with very few identifying oil and gas, or fracking.
- When questioned on the potential for an uninterrupted supply, how likely they were to plan for future transition to onsite generation, the results were divided – with the greater number saying likely (8) but the second greatest number saying extremely unlikely (5).
- More respondents were either very or fairly concerned about potential energy blackouts (12) than not concerned (7).
- The vast majority have begun taking steps to reduce their regular energy consumption e.g. through introducing an improved heating system (17 Yes; 2 No; 1 Don't know).

How concerned are you about potential energy blackouts in your business?



Energy Resilience: ‘The manufacturing sector is not sufficiently resilient to disruption in the security of supply’

Energy resilience is about ensuring that a business has a reliable, regular supply of energy and puts contingency measures in place in the event of a power failure.³¹ Causes of resilience issues include power surges, weather disruption, natural disasters, accidents and equipment failure.³²

Resilience is critical to maintaining operations and reducing commercial risk for manufacturers, with power failures and outages having potential extreme negative repercussions for the businesses.³³ Energy resilience for business continuity is therefore an important aspect of risk management and includes a business’s ability to adapt to a changing environment.

What did the manufacturers say?

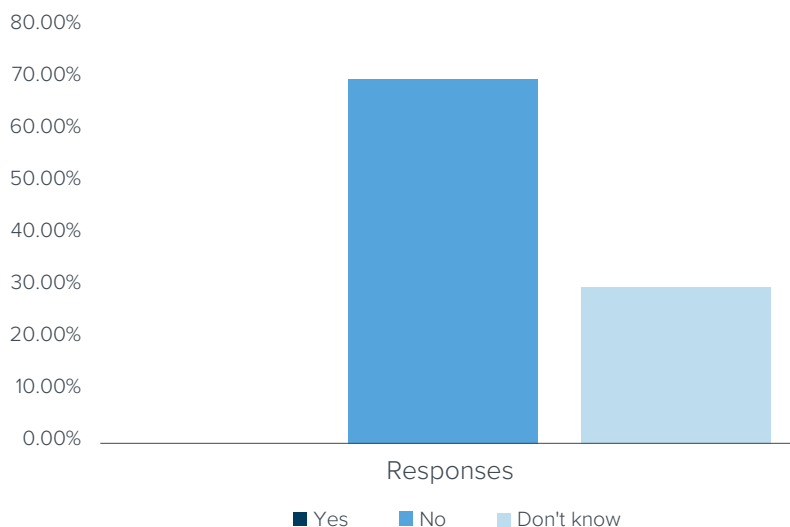
- Most thought the manufacturing sector was not sufficiently resilient to disruption in the security of supply (14 No; 0 Yes; 6 Don't know).

31 Legal Information Institute, ‘Energy resilience’, https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=10-USC-1624767337-428117824&term_occur=1&term_src=title:10:subtitle:A:part:I:chapter:1:section:101#:~:text=%E2%80%94The%20term%20%E2%80%9Cenergy%20resilience%E2%80%9D,including%20mission%20essential%20operations%20related

32 Ibid.

33 Enel X, ‘Why is energy resilience important in business?’, <https://corporate.enelx.com/en/question-and-answers/what-is-energy-resilience#:~:text=Why%20is%20energy%20resilience%20important,negative%20repercussions%20on%20the%20business.>

Do you think the manufacturing sector is sufficiently resilient to disruption in the security of supply?



- When asked whether Germany’s turning to more reliable coal-fired power plants to be restored or extended past their close dates should be replicated in Britain, again, there was an unclear division in responses (5 Yes; 8 No; 7 Don’t know).
- When asked whether they had contingency measures in place for when their usual source of energy power is disrupted, most responded they either had no contingency measures (7), or only some very informal measures (7), followed closely by some saying they have some measures (5).

Does your business have contingency measures in place for when your usual source of energy power is disrupted?

Yes, extensive contingency measures	1
Yes, some contingency measures	5
Only some very informal contingency measures	7
No contingency measures	7
Don’t know	0
Number of respondents	20

- Only three believed they had been ‘somewhat’ helped by the Energy Intensive Industries Compensation Scheme (14 said they had not).
- Most were not receiving government assistance for industrial fuel switching (18 No; 0 Yes; 2 Don’t know).
- The vast majority have not taken any steps to improve Carbon Capture, Utilisation and Storage (CCUS) in their regular processes (16).
- The vast majority have not selected alternative energy sources on the grounds of their ability to generate an improved quality supply of electricity (16).

Energy monitoring technology and basic, cost-free checks: In the round tables and interviews, monitoring is highlighted as one of the potential solutions to rising costs. As energy prices increase, companies aim to monitor the cost of energy in more detail, in order to keep a closer watch on how much they are spending in different areas, and where costs may be saved in the future.

'There is a large CapEx for energy monitoring but the savings make it worth doing.'

Energy monitoring systems allow firms to look across production more broadly, and thus gain a holistic view of the most expensive areas. In this context, the role of cost-free DIY pre-monitoring tasks as a means of reducing energy consumption should not be underestimated.

'...You have to do it for yourself. You can't really rely on government to have any strategy and even if you did, you would not have the certainty because government would change it. In order to do this, business needs confidence in its future so it can plan – so it does things for itself.' [On energy efficiency and solar panels planning.]

One SME, minimally reliant on refrigeration processes, explained to our investigators how the simple cleaning of freezers by chipping off over-developed ice blocks from the equipment resulted in a boost to their capacity. It then subsequently enabled the team to remove some refrigerators from the process, thereby reducing energy consumption.

In several cases, companies have invested in electrical monitoring infrastructure due to a lack of understanding across the firm as to processes which require high energy consumption, and areas where energy can be limited and costs cut. Firms sometimes use half-hourly energy monitoring systems, and several had considered started installing equipment within the last year. One fashion manufacturer stated they have incorporated a computer system which monitors excess heat and usage within the building and enables them to balance solar-generated excess power on the roof which they can convert energy into heat for their processes. This allows electricity taken from the solar panels to be turned into thermal energy via water for their systems, which helps reduce energy consumption.

Several firms have also been reducing energy output in areas such as heating and lighting systems – in the latter case, through LED and in some cases, motion-sensor or passive infrared sensors (PIR sensors). It was near unanimous among participants that they had undergone an extensive process of installing LED lighting; the uptake of which might be compared with a fairly accepted though not always implemented practice of energy monitoring; and again, the even more occasional process of introducing solar panels over a south-facing factory roof.

CapEx and investment risks: However, the main barrier to monitoring technology is the upfront capital expenditure costs and investment risks of installation. One medium-sized, energy intensive plastics manufacturer said the quote they had received for such an installation was £50,000, and even after this, they could not be guaranteed that it would be a fully efficient system. This has particularly been the case when companies were absorbing a huge rise in inflation simultaneously. When it came to energy monitoring, there was a strong sense that it was difficult to incorporate monitoring technology systems where older tech/equipment was employed – a problem that perhaps impacts SMEs more than their larger counterparts. One SME electronics industrial plant described how one-third of their machines were monitored well but 'in older rooms, it's quite tricky', albeit they were investing in energy management. As a result, there has been a stark difference between companies in the amount of energy monitoring implemented, despite many wanting to introduce it in principle.

That SME manufacturers had 'started to install monitoring systems' but were not in a position to be 'monitoring individual bits of equipment as such' was a common reply. Not a statement of ambivalence; a view on favouring the intention, but there were expensive and practical reservations to realising that goal. As several SMEs noted

however, more help is still needed with regards to energy monitoring. This can often go hand in hand with companies looking to deploy renewable energy in order to improve their quality of supply, such as – in one remarkable case of a sustainable transport manufacturer – building a lake in order to use as a type of heat sink. In such an example, the large heat capacity of water can make the lake a thermal energy source for heat pumps to warm buildings.

Student/graduate monitoring and analysis: To alleviate cost in an SME plant, it is worth considering what might be done to remedy the long-term issues. During the course of interviews, one manufacturer identified that a helpful graduate team of 30-40 university-level graduate students were investigating their energy monitoring as part of an evaluation of their full energy management system. It would be worthwhile government considering a shift in policy in the context of placing some of the many postgraduate energy engineers into regular SMEs – where the need is greatest and the buffer against substantial energy monitoring costs is less. It is of interest that teams of postgraduate or student placement engineers could be absorbed into a firm’s energy infrastructure personnel to recommend low-cost actions for adapting energy management and monitoring, to deliver cleaner, more resilient energy systems with short-term payback.

‘Net zero realism’: The focus should be framed specifically on what those changes can achieve for the SME in cost-reduction terms – and less on how it seeks to conform to cumbersome net zero target-setting. After all, respondents on one virtual round table urged a greater sense of ‘net zero realism’ while the survey expressed that the greater majority needed to know whether there would be an overall cost benefit to their business when seeking to diversify their energy-sourcing strategies.

The ‘Crib Sheet’: Helpfully, in line with the theme for energy monitoring, one company said that unless company management currently look to actively educate themselves on best practices for energy generation, the support is not existent from a wider energy body. One manufacturer of industrial digital imaging systems specifically suggested a kind of crib sheet that might help them go through potential energy-saving activities.

‘People need a crib sheet on energy – it took me two years to educate myself on what I’m [currently] doing’.

‘Self-sufficiency and guidance on best practice’ were needed. They were looking for additional guidance on self-generation and commented how helpful this would be. ‘People need a crib sheet on energy’, it was proposed. One manager in a manufacturer of plastics and composites suggested ‘we saved £40,000 a year onsite by educating people about caring for energy usage’, which meant a lot of discussion on how to achieve greater energy efficiency, particularly if staff have been pursuing a role in a specific way for the past 20-30 years.

‘Heating and monitors are our main energy expense and you can save a huge amount of energy by being mindful of energy use’.

Factory equivalent of the household offer: A repeated trend also emerged as to why ordinary households were receiving support for energy but not companies, which require much greater industrial-level energy consumption and yet potentially offer the greatest savings on energy usage.

‘Why are households getting guidance on energy but high energy intensive businesses not?’

One thermal technology manufacturer expressed interest in renting roof space across a 12-acre factory site for solar panels, should all other challenges be met – but compared the absence of help in industrial premises to the vast support given to residential premises. Government and local authorities target residents with written campaigns; similar campaigns seem unheard of among SMEs in industry, which as our interviewee pointed out, could help to ‘reduce all our emissions and costs.’

At least two respondents were interested in energy models for industry that mirrored their domestic use of Octopus Energy Intelligent Tariff in the course of discussions – simply because they could instruct, ‘I want my device charged by this point and in time’ and it then chose when it was best to do so. (At that time, Octopus Energy had recently introduced a new EV tariff called Intelligent Octopus, which provided users with energy at a much cheaper rate for six hours every night between 11:30pm and 5:30am, meaning homes could choose to run a dishwasher, washing machine, immersion heater, etc, at a cheap rate whilst also saving on charging their car.) Another respondent ‘wished meter readings in homes would have a factory equivalent’. Separately, another said, ‘why are households getting guidance on energy but high energy intensive businesses are not?’ Their general hope was that residential energy monitoring had a large-scale industrial equivalent.

‘One standard’ in energy management: There was a clear signal given of the vast range of reporting requirements to the extent that professional environmental consultancies had created an ever-increasing number of energy management actions. Many of the manufacturers – dependent on whether they were publicly-listed companies – published ESG investment frameworks, demonstrating a wide range of commitments and compliance with innumerable emissions and environmental targets, from the UN Sustainable Development Goals (SDGs) through to solar-specific reporting initiatives. There was an aspiration expressed, at the very least, to move towards a carbon neutral manufacturing process in carbon reporting, but often done by sometimes offsetting in other regulatory carbon impacts. One SME manager with a background in industrial print tech observed how they had worked on meeting industry-led as well as other science-based reporting goals, the UN and other initiatives – and it would be ideal, in their words, ‘if there was just one.’ It was noted how the increased number of conditions – derives from, or is linked to, the increasing demands framed by ESG investing. It is fair that investors perhaps look for some independent validation, but others complained the process had become ‘a money-making exercise’. ‘Nobody [is] stopping standards from being invented.’ Helpfully, one director proposed we ‘need some kind of ISO standard,’ giving a minimal level of requirement for environmental reporting.

Efficiency opportunities in product development: There are a huge range of product-related, non-site related opportunities which can be taken by SME manufacturers in their transition to more low-carbon manufacturing processes, beyond looking to energy usage reduction as well as taking up renewable energy sources as a means of delivering lower costs. The role of sustainability in product development and wider energy efficiency also puts into context past research into Italian primary metal manufacturing SMEs, which highlighted firm size, innovativeness of the market in which enterprises operate, as well as product and process innovation as factors affecting barriers to energy efficiency.³⁴

Even when our research set aside factory-specific searches for better energy efficiencies, it remained the case that both modern processes and product development tend to incorporate sustainability as a central objective, putting SMEs in a position of being able to reduce, re-use and recycle materials as part of their sustainability objectives. Energy resilience policies are considered to relate to dimensions of sustainability.³⁵ This can include manufacturers we spoke to looking to an innovative firm which had developed the practice of recycling fishing nets into engineering grade filament for 3D printing. That is to suggest, energy and environmental efficiencies can be carefully written into product and process innovation.

34 Andrea Trianni, Enrico Cagno and Ernst Worrell, ‘Innovation and adoption of energy efficient technologies: An exploratory analysis of Italian primary metal manufacturing SMEs’, <https://www.sciencedirect.com/science/article/abs/pii/S0301421513005193>

35 Andrea Gatto and Carlo Drago, ‘Measuring and modeling energy resilience’, <https://www.sciencedirect.com/science/article/abs/pii/S0921800919301570>

Clean Supply: ‘SMEs are too busy doing their day job to think about cheap or sustainable energy’

The manufacturing industry has become part of a growing trend of sectors shifting towards renewable, cleaner sources of fuel, which may prove a more sustainable option going forward.³⁶ Clean energy, in this case, can be defined as energy derived from renewable sources that do not pollute the atmosphere when used.³⁷ Given the recent geopolitical instability, it is not unusual for professional consultancies to recommend company investment in onsite generation such as solar, given the wholesale price levels significantly reducing the payback period for such investments.³⁸

The challenge or desire for incorporating renewables within an SME manufacturing market should by no means be taken as universally accepted. Indeed, the manufacturers’ organisation MakeUK have noted that the manufacturing sector has been leading Britain’s charge towards renewable energy,³⁹ although that trend is by no means confirmed by the SME market. Pre-pandemic, 30% of manufacturers were investing in energy efficiency measures, with 40% reporting an increase in profits as a result.⁴⁰ Furthermore, 90% of manufacturers said that they are aware of 2050 Net Zero targets and nearly half had committed to meeting these with concrete actions.⁴¹ Their research also reported however that less than half of all SMEs (47%) saw the net zero carbon targeting as an opportunity for their business – almost half the proportion of the large enterprises (90%).

Furthermore, manufacturers have been supported by the government in helping make the switch to renewable energy tariffs. The government currently offers a variation of tariffs to encourage firms to use renewable energy, such as the Smart Export Guarantee, which allows companies to feed back any excessive energy generated through solar sources into the grid, and be paid according to how much extra is generated.⁴² Similarly, the Non-Domestic Renewable Heat Incentive offers payment for heat generated through renewable sources for firms.⁴³ Furthermore, the Free Electricity Scheme aimed at start-up companies, offers no charge on electricity in exchange for the installation of solar panels.⁴⁴

What did the manufacturers say?

Renewables and solar uptake: In addition to monitoring, many companies agreed that the difficulties with their energy supply are leading to a greater potential for onsite generation going forward. It has been noted that this could be effective if achieved using renewable energy sources.

‘A green wave seems to be coming but from energy costs and chaos, not from environmental care.’

36 Keepitgreen, ‘How Manufacturers Are Developing and Using Renewable Energy’, <https://www.smartcitiesdive.com/ex/sustainablecitiescollective/how-manufacturers-are-developing-and-using-renewable-energy/1175001/>

37 TWI, ‘What is clean energy? How does it work? Why is it so important?’, <https://www.twi-global.com/technical-knowledge/faqs/clean-energy>

38 PWC, ‘Rising energy costs – 10 point plan for business’, <https://www.pwc.co.uk/industries/documents/rising-energy-bills-business-impact-briefing.pdf>

39 Make UK, ‘Manufacturers are leading the UK’s green recovery & building a sustainable future’, <https://www.makeuk.org/insights/reports/manufacturers-are-leading-the-uks-green-revolution-and-building-a-sustainable-future>; see page 5 of the report, identifying the discrepancy between SMEs and larger firms on plans for net zero.

40 Ibid.

41 Ibid.

42 Ibid.

43 Gov.uk, ‘Non-domestic Renewable Heat Incentive (RHI)’, <https://www.gov.uk/non-domestic-renewable-heat-incentive>

44 Gov.uk, ‘Help with your energy bills’, <https://www.gov.uk/guidance/getting-the-energy-bills-support-scheme-discount>

One SME manufacturer was currently working with a firm of energy consultants to attempt to source almost all their power from renewable sources for their company sites across the UK. Another company noted how they have found that the use of solar panels pays off financially, and in the past four years installed a 250,000 kWh's per year-generated solar installation, across three spaces. They have now expanded into creating a fourth space. Altogether, this generates one megawatt across two sites. This allowed the company to become net neutral on carbon, and has paid off the costs within one year. Overall, it was suggested the solar electricity generated by even north-facing solar panels were better than any battery. With regards to efficiency, the company experienced no problems with outages or constant supply of power, and could monitor the energy using an independent monitoring system.

'The return on investment in installations is like one year payback for a 25-year asset.'

This sentiment was shared by a clothing manufacturer, who responded that for the past twelve years they had installed solar panels with a good feed-in tariff scheme, which had been agreed at a lower rate in the past eight years. Such feed-in tariffs have been developed by the government in recent years, with the Feed-In Tariff scheme designed to promote uptake in renewable energy.

'Too busy doing their day job': However, the above conversations could easily be perceived as 'outliers' since even among those SMEs who were well-versed in renewables and onsite generation, the difference was well accepted: among larger industrial firms and sites, they can give energy considerations a huge amount of time and consideration but in the SME market, the smaller companies could not afford to give the subject a great deal of time, in terms of energy alternatives, understanding of new technology or the implementing of it. SMEs are, in the words of one otherwise highly energy-efficient SME outlier – who was successful in their energy management, monitoring, and renewables strategy – 'too busy doing their day job to think about cheap or sustainable energy'.

'Most of the huge industrial firms have given energy considerations serious thought, not many smaller ones have, they just don't have the time.'

Moreover, the small sample of survey respondents in this study were divided on plans for any future transition to onsite generation.

'SMEs are too busy doing their day job to think about cheap or sustainable energy.'

Investment risks in decision-making: The investment decision-making could generate a chicken-and-egg challenge. SMEs often did not feel like they had the resources for the decisions they were expected to make. 'You want to get the data but due to budget constraints, you want confirmation that if I invest, I will see the savings this year'. The respondent described energy consultancies he could 'go to, but you have to pay them before you get anything, buy information – and then it's a risk...'. Essentially, he felt, in order to save money, he needed to invest more to save it. But he would only know his savings on an investment after they had been made.

The leaseholder obstacle: However, despite government subsidy in this area, several firms were put off by the costs of this exercise, as well as SMEs on leasehold contracts facing difficult situations, with landlords concerned about whether they should permit the development.

'We have a quote in the price [for solar] but we are on a lease for this site, so it depends on the landlord.'

For those who sought solar panels for the site, SME leaseholders faced a particular struggle: they might look for deals in which (after their lease term ends) they would not lease or own the panels.

'If you don't own the building and have a lease, you have to negotiate with a landlord and it can be difficult to make an agreement. ...Building ownership, landlords, the value of infrastructure and the issue that we don't even own the panels is difficult.' [SME on solar photovoltaics rollout across factory roof.]

They were subject to extensive negotiations with the landlord, who might be agreeable on the need for environmentally friendly technology but had difficulties in foreseeing the final payback to their property. Another respondent described:

'Landlords often aren't working as individuals but work for organisations, meaning that they want the building back in the same condition as before they leased it... they don't want to make a big call on solar panels even if it's a good investment.'

'It would make them money but their side is complicated'. Another SME manager said, 'If you own your own buildings, it makes it much easier', in relation to their solar rollout programme.

'...some of the team have proposed solar panels on the roof. It would only generate eight to twelve per cent of the power. There are also complications then on the lease of the building...'

As a result, many firms have created plans for onsite generation, but have been unable to move forward with them. One SME manufacturer suggested that there needed to be an 'incentive from government to make it easier' to install panels, particularly when overcoming landlord, leasehold, network operator and Power Purchase Agreements (PPAs) obstacles in the process. One automotive engineering manufacturer suggested that although he was in the process of deciding what to do with solar panels he remained confident that solar 'would pay for everything' but there were obstacles. He was looking for the capital expenditure to do it and hopefully own the panels but was certain the landlord wanted him to take all the responsibility and pay all costs.

The financial services obstacle: In planning for renewables, again, SMEs of various sizes noted they were required to seek the permission of their banks for energy-saving investments. Approaching the bank in good faith, they then found they would be charged for this function. Why had government, in their view, not looked to streamline this process so that SMEs are not charged at every step they make towards cleaner resilience and growth? One respondent suggested there was a lack of pragmatism in banking – a 'computer says no' approach – in which applications for their investment needed to go to large, depersonalised and centralised teams. Those testimonies chimed with external evidence suggesting the share of bank finance going to renewable energy rather than fossil fuels had changed little over the past six years.⁴⁵ Respondents compared this approach more broadly with European continental approaches resting on an industrial strategy where monitoring and renewables strategies were already written into innovation, financial services support and buildings standards. A manufacturer from a different subsector intervened during this discussion to add that government policy should give some greater recognition to what an energy efficient manufacturing sector contributes to the economy as a whole.

The tangled logistics of wind power: Some firms are also considering using wind power as part of their onsite processes, but once again, the logistics of this are particularly difficult, and could depend on significant spare land availability and discussions with the local network and suppliers. Furthermore, firms that have successfully installed renewable onsite generation programmes have often conceded that they possess niche knowledge that not all companies do, and that their demand was low-energy intensive. They also note how more innovation is needed in this area for it to become widespread and successful.

45 Reuters, 'Bank funding for renewables stagnates vs oil and gas – report', <https://www.reuters.com/business/sustainable-business/bank-funding-renewables-stagnates-vs-oil-gas-report-2023-01-24/>

Poor interactions with Distribution Network Operators (DNOs): Another common theme to emerge from speaking to manufacturers cleaning up their energy supplies had been the role of DNOs. There is a ‘big DNO challenge from a policy point of view’ said one respondent. They are the regional companies that operate the network of towers, transformers, cables and meters that carry electricity from the national transmission system.⁴⁶ UK Power Networks, for example, are the UK’s largest Distribution Network Operator (DNO) in terms of customers, located in the south of England.⁴⁷ DNOs manage distribution networks from 240V to 400 kV through underground and overhead power lines. They distribute electricity from the transmission grid for a large region. There are also Independent Distribution Network Operators (IDNOs), which operate smaller, local electricity distribution systems within the DNO network.⁴⁸ Both are responsible for connection line faults and maintenance. Energy suppliers then sell the electricity that runs through the power lines and is delivered via substations.⁴⁹

Several companies have said that they would like to see DNOs better coordinate with them as well as government and other agencies. One manufacturer we spoke to had been eager to reduce the waiting time for DNO responses on a renewables application. (They are obliged to notify DNOs of small-scale renewable installations, so operators are aware of energy assets to enable efficient operation of the network). This was further emphasised by an SME stating that the capacity of DNOs to work with them and other companies was ‘non-existent’.

‘The capacity of DNOs to work with customers is non-existent’.

Quality of supply: electricity supply can be ‘undermined by “micro” outages in which LED lights register a flicker’

We wanted to find out from manufacturers whether they recorded any recent intermittency in supply, and what the potential causes of these may have been. At the centre of this enquiry are the challenges resulting from the objective to obtain 3 phase power in the electrical power supply for their industrial installations – for the purposes of plant and heavy machinery, heating systems, motors and pumps and potentially, Uninterruptible Power Supply (UPS) systems. Whereas domestic properties rely on electricity supplied with one live (phase) wire, delivering power at 230 volts, the 3 phase supply uses three live wires where the voltage between these live wires is 400 volts.⁵⁰ It is significant in industry because an unbalanced three-phase system results in intermittency and can cause three-phase motors and other three-phase loads to experience potential poor performance, increased vibration and mechanical stress, motor overheating or failure of equipment.⁵¹

Given the historic challenge of intermittency resulting from renewables, the research team also questioned the tendency for renewable energy technologies to create an intermittent availability of power when weather-dependent renewables, such as solar photovoltaics (PV) and wind turbines are deployed.

Can businesses guarantee uninterrupted on-site power supplies? For those businesses suffering power interruptions, an uninterruptible power supply solution can be attractive. It protects electricals from the adverse

46 Nationwide Utilities, ‘Technical Services Distribution Network Operators (DNOs and IDNOs)’, <https://www.nationwideutilities.com/service/dno-idno/#:~:text=What%20are%20DNOs%3F,and%20distribute%20it%20throughout%20Britain.>

47 UK Power Networks, ‘Media centre’, <https://www.ukpowernetworks.co.uk/news/media-centre>

48 Nationwide Utilities, ‘Technical Services

Distribution Network Operators (DNOs and IDNOs)’, <https://www.nationwideutilities.com/service/dno-idno/#:~:text=What%20are%20DNOs%3F,and%20distribute%20it%20throughout%20Britain.>

49 UK Power Networks, ‘Media centre’, <https://www.ukpowernetworks.co.uk/news/media-centre>

50 Brightlec Electrical, ‘What is 3 phase installation for industrial buildings?’, <https://brightlec.co.uk/what-is-3-phase-installation-for-industrial-buildings/>

51 Fluke, ‘Motors, drives, pumps, compressors’, <https://www.fluke.com/en-gb/learn/blog/motors-drives-pumps-compressors/voltage-unbalance#:~:text=An%20unbalanced%20three%2Dphase%20system,motors%20and%20three%2Dphase%20rectifiers>

effects of brownouts, spikes and power outages.⁵² A UPS (uninterruptible power supply) can provide protection from power surges, load shedding and unpredictable weather conditions. Backup power solutions are said to deliver resilience and reliability.⁵³

Although industry specialists will differ between UPS and traditional battery backup, the UPS can ensure an internal battery is constantly charged from the main electrical grid supply and delivers a steady, consistent electricity flow to any equipment or appliance plugged into it. The desire for battery backup in industry is clear: it helps prevent disruptions on site when firms get unprecedented cuts or surges. It can also help preserve the life of electrical equipment by stabilising electricity supply.⁵⁴ This mechanism can be important in manufacturing since the UPS provides the necessary power to prevent either a machine malfunctioning, a loss of production, wasted labour, wasted resources due to restarting the automated process, combined with costing the wastage.⁵⁵

As well as UPS and battery supply, industry also considers a role for generators to provide power via a motor that is fuelled from either petrol, diesel or liquid petroleum gas (LPG) stored within a tank within the generator or a storage tank nearby. For example, standby power generators provide temporary backup power during a mains power supply failure.⁵⁶

What did the manufacturers say?

- An almost equal amount of businesses measure whether their electrical supply is delivered at a stable voltage and frequency (8) than those who do not (9).
- The greater number of respondents either rejected the idea (7) or didn't know of any intermittency (8) in electricity supply which is generated by renewable sources.
- Although respondents found it difficult to answer, the largest portion found their regular industrial electricity supply to have been undermined by 'micro' outages in which LED lights register a flicker (6) compared with unplanned power outages (3) or momentary voltage spikes (3).
- Where a majority of six reported their regular industrial electricity supply to have been undermined by 'micro' outages in which LED lights register a flicker', we again wanted to find out more about the challenges facing that cohort. Five in six were very or fairly concerned about potential energy blackouts in their business. All had begun taking steps to reduce their regular energy consumption e.g. through introducing an improved heating system. None thought the manufacturing sector was sufficiently resilient to disruption in the security of supply. Nearly all (5) only had 'some contingency measures' in place for when their usual source of energy power had been disrupted. Most would be very unhappy with more expensive but low carbon energy. They were evenly split over whether they measured their electrical supply being delivered at a stable voltage and frequency. Most (4) suggested that installing batteries would not be affordable to their firms. Most were very or moderately worried about their business being able to pay energy costs in the next year. All thought that they would need to raise prices in order to be able to pay energy costs in the next 12 months. All but one (5) thought energy costs in the UK are unfair compared to those paid in France and Germany; and all but one (5) thought that the exposure to high energy costs was likely to threaten business survival.
- At least half the respondents (10) found that power management solutions, such as installing batteries, in response to any potential power outages or unstable voltages, unaffordable to their firm (while 4 agreed it was affordable and 5 didn't know).

52 Schneider Electric, 'Uninterruptible Power Supply (UPS)', <https://www.se.com/uk/en/product-category/8000-uninterruptible-power-supply-ups/>

53 PowerControl, 'Machinery & production', <https://www.powercontrol.co.uk/industries-applications/machinery-production/>

54 Schneider Electric, 'Uninterruptible Power Supply (UPS)', <https://www.se.com/uk/en/product-category/8000-uninterruptible-power-supply-ups/>

55 PowerControl, 'Machinery & production', <https://www.powercontrol.co.uk/industries-applications/machinery-production/>

56 Sever Room environments, 'The Key Differences Between UPS, Generators and Energy Storage', <https://www.severroomenvironments.co.uk/blog/the-key-differences-between-ups-generators-energy-storage-systems>

A resistance to battery back-up: The dialogues in round tables indicated only a handful of companies were in the process of considering using batteries as a form of back-up generation. This had involved either using batteries to provide back-up power for buildings, or using batteries to charge equipment at night.

'We have talked about batteries but don't see the payback for that kind of need and they [the firm] don't want to go there with the batteries just yet.'

As suggested previously, the cost and size of infrastructure had held some SMEs back from pursuing a strategy of using batteries for back-up supplies. Battery backups were sometimes considered to be inappropriate for high energy intensity firms. Again, amongst the 20-member cohort questioned about energy power disruption in the survey, most SMEs said they either had no contingency measures or some 'very informal' ones, followed closely by a smaller proportion who had some more robust buffers in place. Half the survey cohort also expressed that power management solutions, including batteries, were unaffordable to their firm. When a separate electronics industrial plant was asked why batteries would not work for interruptions in the power supply, they cited the substantive costs and that when they did experience disruption it could be 'a very seasonal issue,' along with the concern that they would not be required for nine months of the year. However, a number of businesses saw renewable energy sources such as solar power a more attractive alternative to batteries. This is because the cost of batteries can be high and many SME companies could not see a payback in a realistic timeframe.

Spurs, switches and costly remedial works: The evidence from the round table and interviews suggested problems relating to costs have been exacerbated by an increasingly poor and sometimes intermittent supply for some businesses. Intermittency or in the worst case, outages can be caused by various challenges, not all of which are energy-related obstacles.

'We do have some electrical intermittency which derives from problems in the network infrastructure.'

One thermal tech manufacturer identified how their site was on a spur which kept breaking. They reported that when it broke, it could lead to three breakdowns in a year. On one occasion, they relied on a generator and a tanker for one week to back up supply. Although this was a rare testimony, their supplier wanted costs of up to £50,000 to remedy the spur problem – an amount unaffordable to that firm and many SMEs. Although it should be further investigated as to how widespread intermittency is within SME supply, in our small sample survey cohort of 20, over half acknowledged either some form of micro-outages, with LED lights flickering, some unplanned power outages or momentary voltage spikes.

Intermittency and the need for monitoring: Outages were sometimes attributed to roadworks accidentally cutting through the mains; on other occasions, to being on an industrial site in close proximity to a housing estate which can cause 'imbalances, now and then'. On other occasions, outages can be more related to energy supplier concerns.

'The threat is that if we knock off power for even ten seconds, it would destabilise our melting process.'

One very energy-intensive electrical manufacturer plant reported power dips, some severe enough to cause industrial furnaces to crash. When domestic demand was high at 7.30am, it caused their power to dip. It had been 'ongoing for years' and happening 'every day this week' [in December 2022]. More specifically on intermittency of supply, this has led to several companies working towards a better understanding of the quality of their supply through energy monitoring.

Also of interest, another manufacturer who had gained experience from across the sector suggested intermittency could be less about the type of manufacturer but about the age of tools and equipment, which, in

turn, could be an issue facing the SME market more greatly than their larger counterparts. Older tools can often not handle any glitch in the power supply. Many newer tools can cope with flickers and minor interruptions.

In certain cases, however, manufacturers had been working constantly with professional energy monitoring companies to generate data on how much energy is being consumed by different pieces of equipment at the factory site. Those responses should be coupled with the startling revelation from our 20 cohort of the in-depth survey analysis which discovered that most were 'very' or 'fairly' concerned about blackouts.

Energy Costs: '...our energy costs are less than one per cent of sales. This could increase to 6, 7, 8 per cent and would erode our bottom line'

Prior to the government's implementation of the EBRS (running from October 2022 to March 2023), nearly six out of ten manufacturers saw spiralling energy costs as a threat to their existence.⁵⁷ This meant that 13% of manufacturing businesses reported cutting their operating hours or avoiding production during peak periods, while 12% reported making job cuts as a result of increasing energy costs.⁵⁸ Where businesses have not had to cut staff, many have seen a reduction in hiring due to a lack of operational income.⁵⁹

Make UK found 70% of manufacturers witnessing a profits drop as a result of bills, with 27% having already moved to on-site generation.⁶⁰ Ahead of the relief scheme, the nearly unanimous response to Make UK's surveys amongst manufacturers was that the government was not doing enough to support businesses.⁶¹ In response to this scenario, the government announced the EBRS in September 2022, which allowed suppliers to automatically apply reductions to the bills of all eligible non-domestic customers, on a pence per kilowatt hour level.⁶²

Despite this fact, there are a wide variety of monitoring and efficiency actions manufacturers can take on their own initiative. For example, while manufacturing sites will have main meters present at the point of entry, recording all of the energy and gas consumed by that building, sub-meters can be separately installed downstream of the main meters to measure the individual consumption of pieces of equipment.⁶³ They provide a more detailed picture of the total consumption figure for energy, or in half-hourly data that can be downloaded for analysis.⁶⁴ The principle is that if manufacturers have an accurate outlook of their typical energy usage, it is far more easier for them to manage energy usage and notably, identify any significant drains on energy supply.

Accordingly, professional services firm, PricewaterhouseCoopers (PwC), indicate that businesses already accessing 'the low hanging fruit' such as LED lighting, reducing out of hours lighting, may find value in investing in energy consumption, through use of sub-metering to identify additional efficiencies.⁶⁵

57 Drives&Controls, 'UK manufacturers see energy prices as threat to existence', https://drivescontrols.com/news/fullstory.php/aid/7118/UK_manufacturers_see_energy_prices_as_threat_to_existence.html#:~:text=UK%20manufacturers%20see%20energy%20prices,existence%20%2D%20Drives%20and%20Controls%20Magazine&text=Nearly%20six%20out%20of%20ten,UK%2C%20the%20manufacturers%20organisation

58 Ibid.

59 Richard Partington and Joanna Partridge, 'UK manufacturers fear blackouts and job losses after energy subsidy cut', <https://www.theguardian.com/business/2023/jan/09/uk-manufacturers-fear-blackouts-and-job-losses-after-energy-subsidy-cut>

60 Drives&Controls, 'UK manufacturers see energy prices as threat to existence', https://drivescontrols.com/news/fullstory.php/aid/7118/UK_manufacturers_see_energy_prices_as_threat_to_existence.html

61 Ibid.

62 Department for Business, Energy & Industrial Strategy, 'Energy Bill Relief Scheme: help for businesses and other non-domestic customers', <https://www.gov.uk/guidance/energy-bill-relief-scheme-help-for-businesses-and-other-non-domestic-customers>

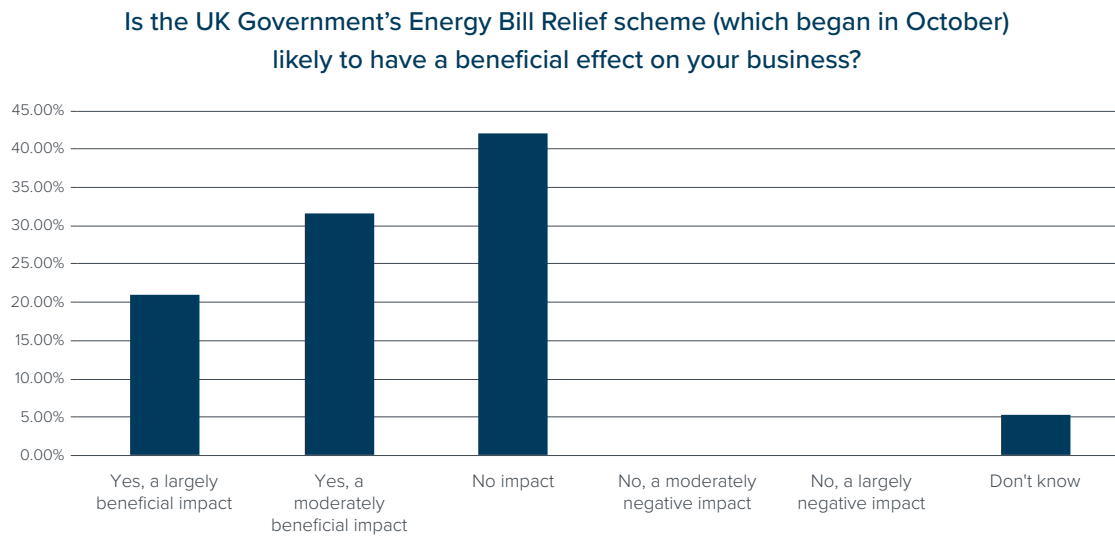
63 Concept Energy Solutions, 'Sub-metering: a guide for energy managers', <https://conceptenergy.org/sub-metering-a-guide-for-energy-managers/>

64 Concept Energy Solutions, 'Sub-metering: a guide for energy managers', <https://conceptenergy.org/sub-metering-a-guide-for-energy-managers/>

65 PWC, 'Rising energy costs – 10 point plan for business', <https://www.pwc.co.uk/industries/documents/rising-energy-bills-business-impact-briefing.pdf>

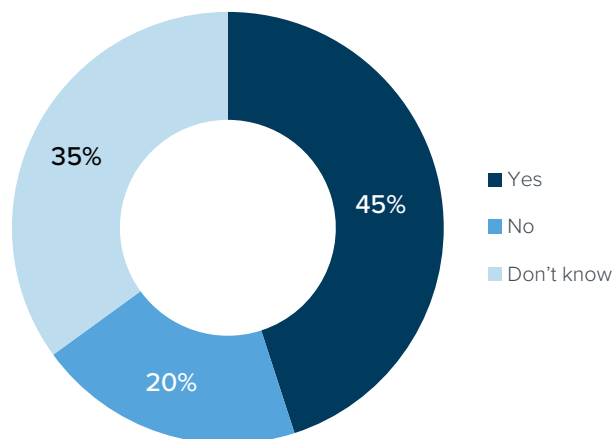
What did the manufacturers say?

- Although many respondents thought the UK Government’s EBRS was likely to have either a largely (4) or moderately (6) beneficial effect on their business, this is surprisingly closely matched by those saying it had ‘no impact’ (8).



- There was a strong sense of division over whether businesses believed they could survive a rise in energy bills persisting after March 2023 (when the current EBRS ends), between those who agreed (9), disagreed (4) or didn’t know (7).

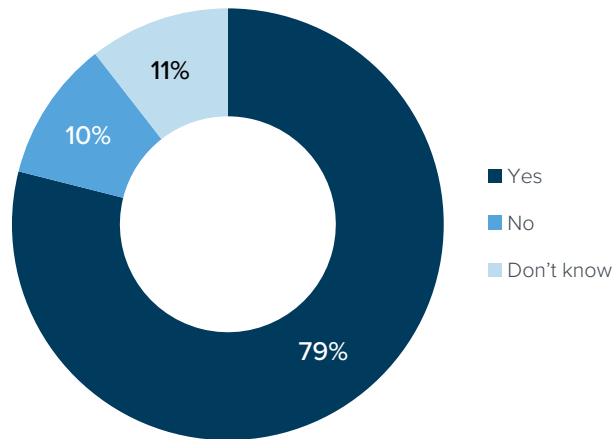
Do you believe your business could survive a rise in energy bills persisting after March 2023 (when the current Energy Bill Relief Scheme ends)?



- The greater number of respondents were moderately worried about their business being able to pay energy costs in the next year (9), although closely followed by those who were mostly not worried (7).
- The vast majority have concerns for energy costs relating more greatly to electricity than gas (13 to 1).
- The vast majority thought they will need to raise prices in order to be able to pay their energy costs in the next 12 months (15 Yes; 2 No; 2 Don't know). It is worth comparing reports towards the end of 2022, as EBRS had just begun in which manufacturers in our survey cohort were clearly expecting to have to pass on price increases but seemed reluctant to definitively commit in interviews and round table discussions; at a similar time, the large sample PwC/Make UK survey indicated that 53% of manufacturers were pricing increasing energy costs into their final product.⁶⁶

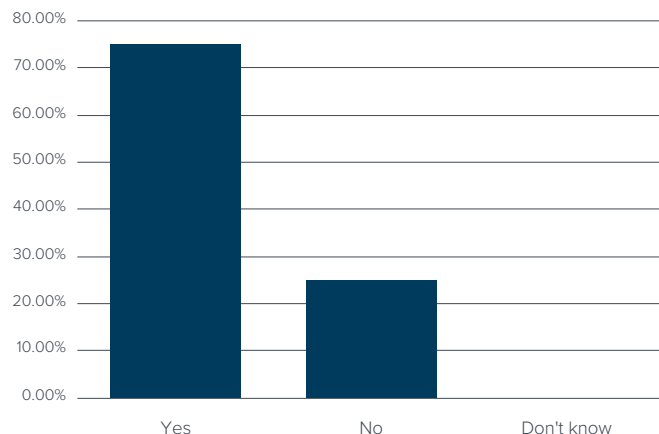
66 PwC, 'Make UK Executive Survey 2023'; <https://www.pwc.co.uk/industries/manufacturing/insights/make-uk-executive-survey.html>

Do you think you will need to raise prices in order to be able to pay your energy costs in the next 12 months?



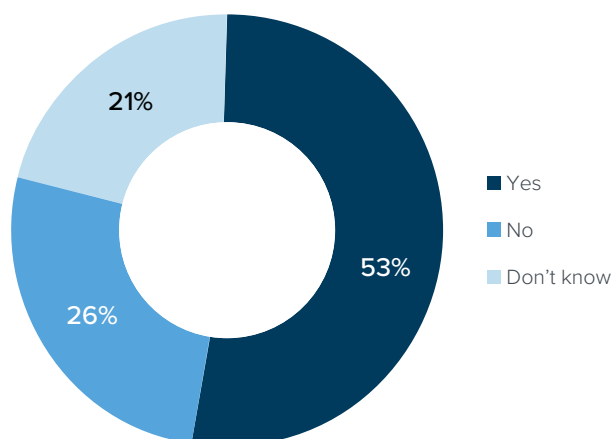
- By far, the majority (13) do not have plant and machinery used in onsite renewable energy generation and electricity storage that are exempt from business rates.
- The greater majority needed to know that there would be an overall cost benefit to their business when seeking to diversify their energy sourcing strategies (15 Yes; 5 No).

Would you need to know that there would be an overall cost benefit to your business when seeking to diversify your energy sourcing strategies?



- The vast majority (18) had not made any redundancies or sought to lower employment costs to compensate for high energy costs over the past 12 months
- The greater number of respondents did not know whether energy costs in the UK were unfair compared to those paid in France and Germany (9), although that is closely followed by those who thought they were unfair (7).
- The greater number of respondents thought the exposure to high energy costs was likely to threaten their business's survival (10 Yes; 5 No; 4 Don't know).
- Most felt that in the past 12 months they had never reduced or avoided the use of production equipment and machinery during peak energy periods (14).

Is the exposure to high energy costs likely to threaten your business's survival?



Energy costs a major concern: From the round table discussions, it was very clear that energy costs have severely impacted companies and have become a key concern.

'Energy costs are obviously a focal point for everyone.'

One medium-sized, energy intensive company noted they had lost £150,000 operational investment, and several have had to curb plans for growth going forward.

'£150,000 of our operational investment disappeared because of rising energy costs.'

It has been described as the most pressing issue surrounding SMEs currently, with costs from the mains supply going up to £100,000 in 2022 for one mid-sized plastics manufacturer. Yet, amongst manufacturers, there is an acceptance that 'the challenge ... is not just about how much energy we use' but 'where we source our energy from', '...how we can be sure of a secure energy supply' and 'reducing our reliance on the grid'.

'Currently, our energy costs are less than one per cent of sales. This could increase to 6, 7, 8 per cent and would erode our bottom line.'

Energy relief schemes preventing the erosion of the bottom line: To mitigate the high energy costs in the last quarter of 2022, the EBRS was designed to provide non-domestic energy users worst affected by high energy prices with help over the winter 2022/2023. That scheme was run from October 2022 to March 2023, and the government provided a discount on energy bills during this period.

However, given the scheme ends at the end of March, amongst several manufacturers in the round tables, there had been anxiety and confusion surrounding the scheme by the winter of 2022, particularly when trying to create forecasts for the upcoming year. Even more worryingly, several firms had not even heard of the scheme. The survey cohort also registered a number of respondents who felt the EBRS had made 'no impact'. However, this could be dependent on receipt of electricity from non-licensed providers, the nature and date of their fixed price contract or whether they were large-scale users protecting themselves from exposure to wholesale price changes hedging in the energy or financial markets.

'I don't know what that is.' [SME in answer to questions on the Energy Bill Relief Scheme.]

Whether it was the EBRS or a fixed price contract which might have helped them weather the storm of high energy prices, two of the main SME manufacturers responded that the scheme was helping them keep their energy costs at less than 1% of sales. They believed however, when their contract or EBRS came to an end, this could increase up to 6-8% and would 'erode our bottom line' for functioning as a profitable business.

Exemptions, what exemptions? Furthermore, from an exemption standpoint, some manufacturers had made use of the climate levy exemption and mineralogical transformation exemption for when a business is converting minerals. The latter was put in place so that the UK industry could more effectively compete internationally, but there is a feeling that this has not been widely publicised and overall awareness of the scheme is low.

Support for EVs: Given the role of government grants and relief programmes supporting electric vehicles (EVs) in recent years, some manufacturers openly discussed their ambitions to switch some of their UK cars to electric vehicles (EVs). This had been combined with offering employee charge-points, in some cases achieved through imaginative schemes such as through the salary sacrifice scheme for employees who express an interest.

Growth plans: 'no tax to pay on breaking even'

It is clear the manufacturing sector has suffered great losses as a result of the current energy climate. In November last year, as the relief scheme came into operation, all 13 manufacturing subsectors fell by an overall percentage of 2.3%, signalling the worst performance over a three-month period since the 1980s.⁶⁷ The purchase of new equipment and process to drive productivity is viewed as crucial for the sector's survival, yet business investment shrank by 0.5% over the third quarter of 2022.⁶⁸

This has been exacerbated by an increasing number of job cuts from manufacturing firms. Business shrank among manufacturers for a sixth month in a row in January, suggesting it will be a difficult 2023 as the UK economy may potentially fall into a recession.⁶⁹ More broadly, the UK economy was stagnant at the end of 2022, with a short recession expected in 2023.⁷⁰ A forecast was made in the Make UK/BDO final quarter 2022 survey indicating that manufacturing would be contracting by -3.2% in 2023.⁷¹

What did the manufacturers say?

- Almost as many thought their decisions on investment and the cost of energy were not offset by the Annual Investment Allowance or other tax reliefs (7), than those who simply didn't know (8).
- The greater number of respondents thought they would increase their business's capital investment plans over the next 12 months (8) or at least maintain the same level (6) than those would decrease (4) or didn't know (1).
- When asked which range of policies might most help them in supporting business growth, most supported 'Financial support to boost capital investment projects' (15), followed closely by 'Support for Research and Development (R&D)' (14), then 'A coordinated government campaign to revitalise British Manufacturing' (12), followed by 'Support for skills and apprenticeships' (11) and only then, the 'Continued offer of relief from government on non-domestic energy bills' (10).

67 Philip Inman, 'Decline of UK manufacturing accelerates as government 'abandons' sector', <https://www.theguardian.com/business/2022/nov/11/decline-of-uk-manufacturing-accelerates-as-government-abandons-sector-brexite>

68 Ibid.

69 Reuters, 'UK factory output shrinks again at start of tough 2023 – PMI', [https://www.reuters.com/world/uk/uk-factory-output-shrinks-again-start-tough-2023-pmi-2023-02-01/#:~:text=LONDON%2C%20Feb%20%20\(Reuters\),a%20survey%20published%20on%20Wednesday](https://www.reuters.com/world/uk/uk-factory-output-shrinks-again-start-tough-2023-pmi-2023-02-01/#:~:text=LONDON%2C%20Feb%20%20(Reuters),a%20survey%20published%20on%20Wednesday)

70 Ilze Jozepa, 'Economic update: Short recession looming and concern over US climate policies', <https://commonslibrary.parliament.uk/economic-update-short-recession-looming-and-concern-over-us-climate-policies/>

71 BDO, 'Industry to plunge into recession in 2023 – Make UK/BDO survey', <https://www.bdo.co.uk/en-gb/news/2022/industry-to-plunge-into-recession-in-2023-make-uk-bdo-survey>

Which of the following would most help you in supporting business growth? (Select all that apply)

Continued offer of relief from government on non-domestic energy bills	10
A coordinated government campaign to revitalise British Manufacturing	12
Greater commitment to Net Zero	10
Moving away from Net Zero commitments	1
Support for skills and apprenticeships	11
Support for Research and Development (R&D)	14
Financial support to boost capital investment projects	15
Number of respondents	19

No tax reliefs for ‘breaking even’: Some well-intended government reliefs seemed to miss the mark for SMEs. As one respondent put it, manufacturing doesn’t work on a three-to-six-month turnaround that other SMEs can work within; they work on five- to 10-year schedules. Policy discussions around the annual investment allowance can seem immaterial to them since there was ‘no tax to pay on breaking even.’

‘Well, every little helps, they still have to have profitability, the £1m tax deduction against corporation tax profits helps but it offers no help at all for energy costs – the help needs to be longer term, not short term.’

This judgement is again reflected in the survey. Amongst the small sample survey respondents, almost as many thought their decisions on investment and the cost of energy were not offset by a relief such as the annual investment allowance. But there were also many who simply didn’t know. Of equal concern is the impact that such costs might have: the majority of our small sample survey cohort expected they would need to raise prices in order to be able to pay their energy costs in the next 12 months.

Balance sheet burdens: It is worth government considering the ‘balance sheet burden’ confronted by firms, not only energy costs in isolation. As one finance director of an aerospace SME expressed it, they were being asked to repay their Coronavirus Business Interruption Loan Scheme (CBILS) over a five-year term at a cost of tens of thousands of pounds per month while paying costs of £2 million per year for energy. Given that overall picture, of which energy plays one important part, the government policy that the firm should be able to extend the payment term of their CBILS loan from six years up to a maximum of 10 years had not come to fruition for them and many others. Those Covid loan debt repayments and other elements higher up the balance sheet should be considered in tandem with relief for very high energy costs and which could often be overlooked in policy discussions. Another director from a food tech producer operating in competitive international markets put their energy costs into the context of balancing them off against poor support for exporting, unexplained or inaccessible support from UK Export Finance (UKEF) and an unreliable visa system for employees who could help export specific technologies.

Again, a separate automotive engineering manufacturer director put their energy costs into the context of shipping, transport and fuel, which were serious to him, outweighed any energy costs onsite and had a more gradual but negative impact on them. Even so, that view should be balanced with responses in our small survey sample, in which we asked SME directors to rank potential challenges in terms of the most significantly impacted – they mostly ranked energy costs higher and marginally above supply chain disruption, inflation in general, as well as suitability of skilled staff. A separate PwC/MakeUK survey during this time found that

64% of manufacturers rated increased cost of energy (including gas and electricity) as the biggest risk to competitiveness – higher than any other risk.⁷²

Energy level intensity: There could be a number of differences between those businesses with higher and lower levels of energy intensity. For example, of the eight who described their business practices as ‘relatively high energy intensity’, most (6) report that they are likely or extremely likely to plan for their business’s future transition to onsite generation. They were also very or fairly concerned (6) about potential energy blackouts in their business. All had begun to take steps to reduce regular energy consumption. They were evenly split on whether their business could survive a rise in energy bills persisting after March 2023 (while 4 didn’t know). Seven in eight of them thought the manufacturing sector was not sufficiently resilient to disruption in the security of supply. The same amount thought that there would need to be an overall cost benefit to their business when seeking to diversify their energy sourcing strategies. Six in eight thought the exposure to high energy costs were likely to threaten their business’s survival. Six in eight thought they would need to raise prices in order to be able to pay energy costs in the next 12 months – although, positively, all members in that cohort had also suggested that their business had not made any redundancies or sought to lower employment costs to compensate for high energy costs over the past 12 months. It is also important to recognise during the period surveyed that businesses who would not traditionally be defined as intensive energy users increasingly fell under this category, with energy costs consuming a higher proportion of total business expenditure than previously.⁷³

Methodological weakness: Of course, there can be methodological weaknesses in approaching the subject matter through adopting a small-scale, small-sample survey methodology. While the study aspired for a larger sample, many senior managers did not have the time or resources for research studies given their main, competing priorities. Company bosses and managers can also only share information in round tables and even in semi-structured interviews with the information they have available at that time. Depending upon their position in firms, some can be more focused on energy monitoring systems or supply issues; others, more focused on the financial costs relating to energy. This in turn, could be reflected in respondents to the survey indicating ‘Don’t know’ where they possibly were not involved in the decision-making or simply not able to provide those details for their companies.

72 PwC, ‘Make UK Executive Survey 2023’, <https://www.pwc.co.uk/industries/manufacturing/insights/make-uk-executive-survey.html>

73 Ibid.

Conclusion and recommendations

The scope of this research has been designed to discover the extent to which the current energy crisis has been affecting and continues to affect SME manufacturers, and the potential ramifications of this. In doing so, it also aims to make several recommendations on both how SME manufacturers may be better supported in the future by external parties, and steps that they can take to realistically innovate and adapt during these currently challenging times. Our findings correspond with other detailed research showing some 86% of respondents suggest that energy costs are negatively impacting their business, at least from the last quarter of 2022.⁷⁴

With several respondents seeking out the need for a cooler ‘net zero realism’, several areas have been identified for potential improvement, and recommendations have been devised across the main areas of concern. This may help serve as a guide for government and manufacturers looking to operate within a more healthy and energy efficient business framework.

1. To encourage No. 10 and wider government to adopt a pragmatism and policy of ‘Net Zero Realism’

One trend which emerged from the research conducted was the view from various manufacturers that the government’s policy frameworks have been in increasing danger of alienating the industry over a lack of ‘Net Zero Realism’. What recent years have seen is the importance of environmental objectives superseding the importance of business aims, with manufacturers having to choose to put aside business objectives in the name of compliance to environmental targets. There has also been a lack of political ambition to achieve environmental aims through bolstering business and their ambitions to grow. And while considerable time was spent discussing the current role of solar panels as the most relevant renewable during the round tables, policymakers might heed the responses of the SME survey which see nuclear as the most likely long-term, significant source for generating a reliable and cost-effective energy supply.

The survey conducted showed that manufacturers require a net cost benefit in order to be motivated to reach environmental objectives. The greater majority needed to know whether there would be an overall cost benefit to their business when seeking to diversify their energy-sourcing strategies. The SWMAS (South West Manufacturing Advisory Service) National Manufacturing Barometer similarly reflected a wave of concern here when looking into barriers currently preventing manufacturers from beginning, or progressing, their net zero journey, finding that 64% don’t think the benefits outweigh the cost of implementing low carbon improvements.⁷⁵

Several stated that they can make minor reforms to try and make their firms green, for example through changes in lighting, heating, insulation and refrigeration. They also noted how low-cost staff education programmes could be adopted to achieve basic energy-saving processes, such as turning off machines when they are not in use, and have often proved efficient. One medium-sized plastics producer noted that significant costs had been saved by educating staff on the best practices to utilise in order to save energy. However, it has also been widely stated that the government should act to remove top-down carbon reporting activism and focus on efficiencies increasing company performance.

Before government rushes in to mandatory, zero-carbon pathways for business which is fraught with dangers for SMEs and the wider economy, it should consider the role of voluntary, low-cost measures suited to the style of environment which tends to exist within smaller companies in the UK. As identified above, there are measures in which little or no upfront cost is needed to train employees to be more energy conscious, and to teach staff to switch off machines overnight or for other periods before progressing to anything more substantial.

74 SWMAS, ‘National report for Q3 2022/23’, <https://www.swmas.co.uk/sites/default/files/National%20Manufacturing%20Barometer%20Report%20-%20January%202023.pdf>

75 Ibid.

2. Target Energy Bill Discount Relief to protect all SME manufacturers in order to reflect reliefs at today's wholesale prices

The original EBRS provided a discount on wholesale gas and electricity prices for all non-domestic consumers. The scheme came into effect in October 2022 and was designed to run into the end of March this year. It was designed as a temporary six-month measure to protect non-domestic consumers from soaring energy costs, cutting the cost of power bills and providing them with some degree of certainty. In light of this strategy, the significant intervention was brought in to help the business community keep people in jobs, prevent unnecessary insolvencies and afford breathing space to identify measures or savings that may protect them from high energy costs. The government has been clear that such levels of support were time-limited and intended as a bridge to allow businesses to adapt. The latest data shows wholesale gas prices have now fallen to levels just before Putin's invasion of Ukraine and have almost halved since the current scheme was announced. This has meant that it had become appropriate to introduce a new scheme to replace the relief scheme after the end of March. In spite of this, approximately 70% of manufacturing leaders report in one PwC survey that energy costs are expected to increase significantly this year.⁷⁶

The Energy Bill Discount Scheme (to run from April 2023 to March 2024) will be similar to the old scheme in that suppliers will automatically apply reductions to the bills of all eligible non-domestic customers. The government will compensate suppliers for the reduction in wholesale gas and electricity unit prices that they are passing on to non-domestic customers. The discount applied will be in pence per kilowatt hour (p/kWh). The p/kWh government support for comparable contracts will be the same across suppliers, but the absolute level of individual bills will continue to vary across different contracts and tariffs. Eligible non-domestic consumers will now receive a per-unit discount to their energy bills during the 12-month period from April 2023 to March 2024, subject to a maximum discount. The relative discount will be applied if wholesale prices are above a certain price threshold. It would be premature at this stage to advance an alternative to the Discount Scheme but there are potential lessons to be learned.

Policymakers evaluating the EBRS and now the discount scheme, should benefit from the judgements of SME directors and managers in this survey: many respondents thought the relief scheme was likely to have a largely or moderately beneficial effect on their business, but were surprisingly matched by those who said it had 'no impact'. Other research has also found that almost 4 in 10 manufacturing leaders claim EBRS would not reduce their energy bills to a reasonable amount.⁷⁷ This, to a degree, reflected the anxieties of manufacturers over whether their business could indeed survive a rise in energy bills persisting after March 2023, when the EBRS ended – and the discount scheme had not (at that stage) been announced. It is also worth considering survey research showing that it would be popular among manufacturers to extend the current Energy Bill Relief Scheme beyond the initial six months to support manufacturers through the energy crisis (46%).⁷⁸ On a positive note, many of the respondents in the survey still suggested they would increase their capital investment plans over the next 12 months, or at least maintain the same level. Given the dual challenge that the discount may not extend to some manufacturing businesses and that SMEs are exposed to fluctuations that larger firms can ride out, the Discount Scheme must be fine-tuned. In doing so, the discount must be targeted to protect *all* SME manufacturers, to mirror the equivalent EBRS reliefs at today's wholesale prices.

It is well understood that some of the larger attempts at government assistance can often struggle to reach SMEs. For example, the Industrial Energy Transformation Fund (IETF) had been designed to help businesses with high energy use to invest in energy efficiency and low carbon technologies, which is available up until 2027.⁷⁹ Early evaluations of that fund reported it 'was unlikely to attract and support many SMEs which comprise

76 PwC, 'Make UK Executive Survey 2023', <https://www.pwc.co.uk/industries/manufacturing/insights/make-uk-executive-survey.html>

77 Ibid.

78 Ibid.

79 Department for Business, Energy & Industrial Strategy and Department for Energy Security and Net Zero, 'Industrial Energy Transformation Fund', <https://www.gov.uk/government/collections/industrial-energy-transformation-fund#ietf-phase-1>

the majority of the UK's business base',⁸⁰ that 'there had been no dedicated effort to engage SMEs, and it was judged unlikely that many eligible SMEs would have heard of the IETF.'⁸¹ The government may learn lessons from those evaluations in deciding how to proceed with the continued EBRs/EBDS reliefs.

3. Extend the super-deduction capital allowance to let SMEs grasp a 50% effective tax relief on energy monitoring technology

The research found that, in order to attempt to be as cost efficient as possible during the energy crisis, many manufacturing firms have turned to increased energy monitoring techniques (if they had not done so already), in order to identify areas of high usage and wastage and reduce consumption. We do know that more manufacturers are currently planning to increase investment in energy efficiency measures.⁸²

The cost-benefit of monitoring is well acknowledged, even where it has been difficult to implement. One medium-sized SME noted that since the pandemic, they have started monitoring energy in detail, with 98% of equipment now monitored internally, and hardware installed across several different locations. Such an advanced level of monitoring was also reported by another medium-sized SME, who said that whilst the cost of installation equipment is high, the savings made by monitoring had made expenditure worthwhile.

With regards to type of energy monitoring used, there has been a range of different solutions used by firms, dependent on the amount of upfront capital expenditure or attracted investment they have available to spend on equipment. One of the more advanced monitoring systems found was an independent monitoring suite, combining solar and site equipment monitoring through a modernised German-designed log system, which allowed the manufacturer to look at usage across production. On the other end of the scale, some firms are not monitoring individual equipment as such but the amount of energy usage more broadly across the site.

For firms which have not started monitoring usage, it is not out of lack of desirability or need but through aversion to the risks and costs of investment. One company reported that they did not wish to spend up to £50,000 on monitoring, to find out that minimum changes are potentially needed. There are subsequently several areas where support for SMEs can be improved with regards to energy monitoring. Firstly, the government should address anxieties for SMEs in using their capital expenditure on monitoring equipment and the likely payback models which will see their costs covered by savings in energy usage and consumption. In one US study reviewing the adoption of energy efficiency and renewable energy technologies into US residential buildings, it was observed that technologies with low adoption rates have, among other factors, higher payback periods.⁸³ The challenge starts with how government can assist SMEs in answering the 'payback' question.

For example, through a wider Industrial Strategy, there are further steps that can be taken to reward manufacturers who are taking significant steps through energy efficiencies and savings within the tax system. This would be a strategy to help SMEs answer the 'payback' challenge. The importance of boosting capital investment and supporting research and development should not be underestimated. When we asked survey respondents in this study to rank a range of measures which might help support their business growth, most supported the idea of providing further financial support to boost capital investment projects, followed closely by those who sought support for research and development, followed closely by a coordinated government campaign to revitalise British manufacturing. Given the absence of an Industrial Strategy (at least, a comprehensive text), the cutting of R&D tax credits (announced in November 2022) and the need for retuning

80 Department for Business, Energy & Industrial Strategy, 'Industrial Energy Transformation Fund (IETF) Phase 1: First-Stage Process Evaluation', https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019508/ietf-phase-1-evaluation-report.pdf (39)

81 Ibid.

82 PWC, 'Make UK Executive Survey 2023', <https://www.pwc.co.uk/industries/manufacturing/insights/make-uk-executive-survey.html>

83 Emily K. Schwartz and Moncef Krarti, 'Review of Adoption Status of Sustainable Energy Technologies in the US Residential Building Sector', <https://www.mdpi.com/1996-1073/15/6/2027>

the 'Made in the UK, Sold to the World' styled-initiatives of 2021, there is some advantage to government in focusing again on refining those policies.

In the German context, Fleiter *et al.* found that high investment costs can impede the adoption of energy-efficiency measures, even where those measures are deemed profitable. Again, a lack of capital slows the adoption of energy-efficiency measures, primarily for larger investments. One potential solution they identify is for soft loans for larger investments which may help accelerate the diffusion of energy-efficiency measures in SMEs.⁸⁴

Energy monitoring practices

What the research has shown is that manufacturers often need to adopt better energy monitoring practices, particularly in the current climate of rising energy costs. There are several easily digestible examples of how this can be done, provided by one industrial data service firm that enables maintenance management, RS Industria.⁸⁵ The first of these examples is a bakery tunnel oven.⁸⁶ A 1 tonne per hour oven will consume at least £400,000 of energy per year. By eliminating mechanical issues and improving insulation, it can improve efficiency by 10%, reducing energy costs by £40,000 per annum. Even where we consider a scenario in which it may avoid scrapping a batch of ingredients, often worth £4000 per tonne, the saving of just three batches would pay for the system set-up and monitoring costs. Preventing a catastrophic breakdown avoids spares cost and production downtime – of up to 48 hours, as the oven cools, is repaired and then brought back to temperature. At a cost of £1000 per hour, such a breakdown could cost could in any case be estimated to be £48,000.

A second example of these types of efficiency savings are centrifugal pumps,⁸⁷ where the data can quantify the energy cost per pump while showing up wasted energy. The monitoring data shows detailed run-times, enabling better balancing of the duty and standby assets, while revealing any operational issues. It can reduce the risk of unplanned failure and avoids secondary damage, while reducing spending on components.

Another example of this analysis generated by data derives from a focus on spiral freezers and chillers.⁸⁸ A 500KG/hour freezer, operating at -20C can consume about 250kW of cooling. It can represent about 80kW of electricity, costing over £100,000 per annum. By improving heat transfer by 10%, it will save around £10,000 per annum. In one worst-case scenario, a failure could take 24-48 hours to fix and shut down an entire line at an operating cost of £1000 per hour, not including the loss of product on the line.

In Britain's context, and to aid the recovery from the pandemic, a beneficial policy was introduced to last until 31 March 2023 so that companies investing in qualifying new plant and machinery assets would be able to claim a 130% super-deduction capital allowance on qualifying plant and machinery investments – and a 50% first-year allowance for qualifying special rate assets (a special rate first year capital allowance).⁸⁹ The super-deduction ensures the UK capital allowances regime remains attractive and competitive for manufacturers – although how far it has genuinely helped them should be reviewed in detail.⁹⁰ It covers machines such as computers, printers,

84 Tobias Fleiter, Joachim Schleich and Ployplearn Ravivanpong, 'Adoption of energy-efficiency measures in SMEs—An empirical analysis based on energy audit data from Germany', https://www.researchgate.net/publication/257126309_Adoption_of_energy-efficiency_measures_in_SMEs-An_empirical_analysis_based_on_energy_audit_data_from_Germany

85 RS Industria, <https://www.rs-industria.com/>

86 RS Industria, <https://www.rs-industria.com/use-cases/bakery-tunnel-oven>

87 RS Industria, <https://www.rs-industria.com/use-cases/centrifugal-pumps>

88 RS Industria, <https://www.rs-industria.com/use-cases/spiral-chillers-and-freezers>

89 Gov.uk, 'Claim capital allowances', <https://www.gov.uk/capital-allowances/temporary-first-year-allowances>

90 See: Gov.uk, 'Potential Reforms to UK's Capital Allowance Regime – Inviting views', <https://www.gov.uk/government/publications/potential-reforms-to-uks-capital-allowance-regime-inviting-views/potential-reforms-to-uks-capital-allowance-regime-inviting-views>

lathes and planers; office equipment such as desks and chairs; vehicles such as vans, lorries and tractors (but not cars); warehousing equipment such as forklift trucks, pallet trucks and stackers; tools such as ladders and drills; construction equipment such as excavators, compactors, and bulldozers and some fixtures such as a fire alarm system.⁹¹

From the standpoint of attempting to encourage firms to switcher to cleaner and greener sources of power, the tax may also be applied towards the installation of solar panels, and electric vehicle charge points.⁹² At present, it also extends to other forms of technology that have the potential to improve performance or reduce costs or maximise efficiencies for firms. This is a welcome policy that supports a core part of our findings, highlighting the utility and significance of monitoring in saving energy, and identifying where costs and usage are excessive. However, it was also stated that the cost of installing such equipment could be high or payback too long-term. This had discouraged a number of SMEs from widescale installation of equipment, as they were uncertain as to the payback rate.

There are consequently several areas where the super-deduction tax can be refined to benefit manufacturers more profoundly than at present. Firstly, super-deduction relief should be extended well beyond March 2023. After all, as other research has identified, the SME manufacturer need is unique and so the financial support must match those needs since manufacturers have long investment cycles in relation to investing in machinery.⁹³ This is something that is already proposed within the wider policy context, with bodies such as the Centre for Social Justice already calling for this to be implemented.⁹⁴ Moreover, it would be advisable to increase the relief of the super-deduction tax which covers the installation of energy monitoring equipment under the umbrella of the scheme, allowing businesses adequate incentives for investment in areas where they can save energy.

In order to inspire long-term energy savings, rather than just short-term superficial installation, the amount being able to be claimed by manufacturers should be put on a tiered system. The existing effective relief of approximately 25% might be further adapted and increased so that those manufacturers (and other firms) who have made energy-efficient machinery monitoring investments via the super-deduction scheme in Year One and have made onsite evidence-based energy savings of 10% as a result of introducing those technologies through Year One of operation should qualify for a second-tier, super-deduction to allow companies to cut their tax bill by a further 25p for every £1 they invest. A firm that had qualified therefore for both the tier one super-deduction allowance for the equipment itself could therefore go on to claim a second-tier based on proven energy efficiencies, which would lead to a manufacturer cutting their tax bill in half. An existing claim of 130% first-year relief on qualifying energy tech provides effective relief of 24.7%; an added second-tier claim of 130% for end-of-year relief on evidenced energy reduction would generate a further relief of 24.7%. This is potentially made more workable since it could be merged with – or at least developed alongside – an already existing ‘special rate first year allowance’ for plant and machinery qualifying for that rate when it includes thermal insulation added to existing buildings as well as solar panels. Such steps are vital, considering research has suggested no policy and regulatory initiative tends to be successful in improving energy efficiency issues unless the critical problems of finance, market, technology, attitude, information, etc., are prioritised.⁹⁵

Whilst it could be argued that this would be expensive for the government to implement, the long-term remuneration for the scheme would make it a worthwhile option. Currently, the projected cost to HM Treasury for the policy over two years is £24.9 billion.⁹⁶ This is broken down into £12.2 billion for Year One and £12.6

91 HM Revenue & Customs, ‘Check if you can claim super-deduction or special rate first year allowances’, <https://www.gov.uk/guidance/check-if-you-can-claim-super-deduction-or-special-rate-first-year-allowances>

92 Ibid.

93 Make UK, ‘Manufacturing sector net zero roadmap’, <https://www.makeuk.org/insights/reports/manufacturing-sector-net-zero-roadmap>

94 Centre for Social Justice, ‘Making the change: A plan to reboot British manufacturing and restore growth’, https://www.centreforsocialjustice.org.uk/wp-content/uploads/2023/01/CSJ-Making_the_Change.pdf

95 Zarrin Fatima, Virpi Oksman and Risto Lahdelma, ‘Enabling Small Medium Enterprises (SMEs) to Become Leaders in Energy Efficiency Using a Continuous Maturity Matrix’, <https://www.mdpi.com/2071-1050/13/18/10108>

96 HM Treasury, ‘Budget 2021: documents’, <https://www.gov.uk/government/publications/budget-2021-documents>

billion for Year Two.⁹⁷ However, it had been estimated that by bringing in the policy, UK investment will receive a boost of approximately £40 billion.⁹⁸ In its present form, therefore, the policy should bring a £27.5 billion net benefit to Britain. In the scenario, however, that relief is doubled for energy efficient monitoring technology, there may be a maximum annual cost to the Treasury of £24.9 billion. However, this could be offset by the potential doubling of likely investment, which would be at £80 billion. This would bring a potential net benefit of £55 billion. It is worth noting, however, this figure might be currently inflated since it only a relief on certain energy-tech equipment (not all items) but then equally, its benefits would also be reflected against costs, in line with the take-up of such a scheme.

4. Develop DIY employee training and self-help tools on energy efficiency for smaller manufacturers

Manufacturers almost unanimously reported that some considerable costs can be saved using simple measures, such as ensuring staff turn off machines at times when they are not in use or educating staff about basic energy-saving practices relevant to the user of the machine or equipment.

Before we reach the stage of requiring even greater government or Treasury-specific intervention, SME manufacturers should also look to carry out simple DIY self-monitoring through employee training. They should look for employees and users to amend behavior by adopting different approaches to equipment, from turning machines off during periods that they are not being used, night-time switch off, or identifying times in schedules to programming switches or shutdowns so equipment is not being left on, and energy consumption can therefore be reduced. For this reason, the self-training and education which should be simplistic, accessible and adaptable for a range of SMEs could be developed in the form of a crib sheet, as discussed below.

Accordingly, better staff training, cost-effective energy measurement, and data analysis/usage should start to form the basis of improved energy management. In recent years, Marcel Richert identified in one study how energy management enables SMEs to mitigate environmental impacts while generating financial savings.⁹⁹ It was developed using an action research approach in a German SME, in which some significant energy saving potentials were discovered.¹⁰⁰ Although published just over five years ago, the study itself found implementation rates remain low. The tendency is to explain this absence of helpful energy efficiency mechanisms in terms of SME resource constraints or an absence of managerial awareness on energy patterns. In order to address these constraints, the researcher presented a six-step energy management framework tailor-made for SMEs, which included (1) staff sensitisation, (2) energy measurement, (3) analyses, (4) optimisation, (5) reflection, and (6) strategy alignment. Its attractiveness for understanding SMEs is that the model maximises human capabilities and minimises any kind of resource-intensive management procedures to enable careful implementation.

97 Ibid.

98 CBI, 'A super deduction successor could trigger £40bn-a-year boost for UK business investment', <https://www.cbi.org.uk/media-centre/articles/a-super-deduction-successor-could-trigger-40bn-a-year-boost-for-uk-business-investment/#:~:text=Introducing%20a%20new%20permanent%20investment,to%20a%20new%20CBI%20survey>.

99 Marcel Richert, 'An energy management framework tailor-made for SMEs: Case study of a German car company', <https://www.sciencedirect.com/science/article/abs/pii/S0959652617313094>

100 Ibid.

5. To seek for a charitable energy educational trust to introduce a crib sheet on energy management for manufacturers

Several firms have called for quickly-accessible, impartial guidance on self-sufficiency and best practice with regards to their energy saving, monitoring and adoption of renewable technologies. Currently, it has been claimed that unless companies actively seek to educate themselves, there is no feasible method of understanding or monitoring energy consumption. Indeed, one such company stated that ‘before we do any saving we’ve got to know what we’re using, we’ve got to educate people and collect data.’ With regards to current levels of support on this, it has been claimed that ‘there are companies you can go to, but you have to pay them before you get anything, buy information – and then it’s a risk to get energy consultants.’ A typical chicken-and-egg scenario has been cited as a company in looking towards renewables: they need to be able to show the project would save the firm money, but then needed to invest in order to save it, and only knowing whether they may later see a return on their investment after the process is complete.

A number of companies remarked on the potential utility of an impartial intermediary organisation able to produce a document or paper providing readily digestible guidance to firms on the best ways to both save and monitor energy. One recommended that it would be useful if this came in the form of a ‘crib sheet’. In particular, there was clearly a reported discrepancy amongst manufacturers we talked to in the levels of support and education on energy saving that households are currently receiving and those received by businesses. This is even more alarming considering the levels of energy consumption by manufacturers in particular, the subsequent cost levels and indeed, the likely national savings, if simple advice were available. Indeed, many smaller businesses are currently unable to access the funding in order to install energy monitoring equipment.

The government does recognise the challenge of having a hub or crib sheet it can refer smaller manufacturers to. The UK government-endorsed Business Climate Hub is also a live website, a resource in which government sets out advice on how businesses can cut emissions through sector-specific tips in a number of pilot sectors, including in manufacturing.¹⁰¹ Although both the Business Climate Hub and accompanying SME Climate Hub appear unlikely to step up to meet SME requirements and appear campaign-based in relation to asking businesses to sign up to a climate pledge and thereby fill in their personal details, there is nonetheless some endeavour to provide a guide under the ‘Manufacture’ option, which looks at onsite renewable energy generation, improving manufacturing processes (by using data to analyse where efficiency-boosting improvements can be made), upgrading manufacturing equipment (such as the role of Computerised Numerical Control (CNC) to make equipment fully automated and programmable) and also with advice on how to ‘stop leaks and wastage’.¹⁰²

If the government could coordinate, for example, with the Energy Saving Trust (an independent organisation dedicated to promoting energy efficiency and sustainable energy use), then that organisation in partnership with government could produce a short accessible document in order to provide minimalist guidance to manufacturers on energy saving and monitoring in an industrial setting. There are however also various other helpful initiatives such as the previous Department of Business, Energy and Industrial Strategy (BEIS) hosting an Energy Technology List to help companies select equipment with a high standard of energy efficiency, thereby reducing operational costs.¹⁰³ The ideal crib sheet should serve as a means of education as the best way to save costs, and innovative potential measures on saving and monitoring. This should then be distributed to local manufacturers and become the main reference guide both for future cost-effective energy approaches and also for ‘actions to take’ during periods of energy shortages or high costs.

101 Department for Business, Energy and Industrial Strategy, ‘BEIS small and medium enterprises (SMEs) action plan: 2022 to 2025 (accessible webpage)’, <https://www.gov.uk/government/publications/beis-small-and-medium-enterprises-sme-action-plan-2022-to-2025/beis-small-and-medium-enterprises-smes-action-plan-2022-to-2025-accessible-webpage#definition-of-an-sme>

102 UK Business Climate Hub, <https://businessclimatehub.org/uk/>

103 Department for Business, Energy & Industrial Strategy, ‘Energy Technology List for energy saving products’, <https://www.gov.uk/government/publications/enhanced-capital-allowance-scheme-for-energy-saving-technologies>

6. Encourage government to coordinate UK universities in supplying low-cost postgraduate advisory teams for SMEs conducting energy management strategies

A major energy-intensive manufacturing SME, along with others, had referred to the positive role of incorporating ‘placement’ graduates into their firm as a way of providing advice and strategy on their energy management system. It is a step that may also help smaller manufacturers de-risk some of the decision-making and upfront capital expenditure costs for introducing expensive monitoring or renewables programmes. Inside companies, we found the relevant managers for implementing new technology innovations can often be rebuffed by financial controllers or directors since they cannot prove a year-on-year payback for an investment, so it is not possible to invest – but with a credible form of analysis, potentially they can overcome that obstacle.

Given the vast range of SME manufacturers, it would be appropriate that several of the major UK universities training students in engineering, energy systems and industrial innovation should provide a generation of postgraduate advisory teams to advise SMEs at a reduced or no cost basis on their best energy management system which can be set up and maintained at a reasonable price. The level of government intervention should be limited only to the Departments for Energy Security and Net Zero and for Education (DfE) ensuring this can be done on a cost-effective basis, even though the partnership is between SMEs and the universities.

For example, one Energy Management master’s degree at Robert Gordon University in Scotland provides students with the necessary knowledge and transferable management skills for the oil and gas, sustainable and renewable energy industries.¹⁰⁴ It is intended to equip students with the management training requirements for technical, business and early career managers within the sector. As such, it offers those students the opportunity to extend the graduate study by an extra year to complete a 48-week work placement. The University of Liverpool also runs an Energy and Power Systems with a Year in Industry MSc (Eng) course, providing students with immense knowledge of electrical power generation, transmission, distribution and networks, including the operating principles and control of modern power systems.¹⁰⁵ Again, De Montfort University in Leicester has an Energy Engineering MSc which provides students an in-depth understanding of contemporary issues in energy and sustainability as well as developing their knowledge of experimental and computer modelling techniques for the design of energy systems, such as electricity grids, thermal energy networks and transportation systems.¹⁰⁶ As such, they would all be well equipped to form an army of advisory teams who should, in turn, be well equipped to model, analyse and advise manufacturing plants in their likely efficiency savings and cost-effective developed energy strategies.

7. Propose government and large manufacturers coordinate German-Swiss style networks for smaller manufacturers interacting with energy network providers in order to resolve renewables applications, grid balancing, outages and intermittency

The results of the research highlighted several areas of importance regarding DNOs, and how they might do more to help manufacturers, both more generally and through the current energy crisis. Currently, it has been claimed that that the capacity of DNOs to work with customers is ‘non-existent’, with one SME interviewed as part of the round table stating that there is still a ‘big DNO challenge from a policy point of view’. Equally, another SME noted that ‘more support from DNOs’ is needed in the current climate, particularly given the potentially costly nature of outages.

104 Robert Gordon University, ‘Energy Management’, <https://www.rgu.ac.uk/study/courses/856-pgcert-pgdip-msc-energy-management>

105 University of Liverpool, ‘Energy and Power Systems with a Year in Industry MSc (Eng)’, <https://www.liverpool.ac.uk/study/postgraduate-taught/taught/energy-and-power-systems-msc-year-in-industry/overview/>

106 De Montfort University, ‘Energy Engineering MSc’, <https://www.dmu.ac.uk/study/courses/postgraduate-courses/energy-engineering-msc/energy-engineering-msc.aspx#:~:text=Energy%20Engineering%20MSc%20will%20give,energy%20networks%20and%20transportation%20systems.>

Whilst the UK-wide DNO network appears dislocated and unsupportive of smaller manufacturing businesses therefore, some of those networks in Europe seem far more cohesive and able to effectively offer help to firms. The German/Swiss organisational model for such networks, for example, facilitates dialogue on a number of energy efficient methods in order to help SMEs.¹⁰⁷ This stands in contrast to the cumbersome government-led bureaucratic goal-setting, brought forward through ongoing 'Net Zero' obligations seen in Britain currently. Instead therefore, any new model for helping SMEs should bring a calmer sense of pragmatism combined with peer-to-peer realism on clean, secure and affordable supplies. Britain needs a kind of 'net zero realism', as one machinery manufacturer interviewee explained to researchers.

While the country might look across to Sweden, Switzerland or Germany and their SME participation in industrial energy-efficiency networks (IEENs) as a means of introducing customised energy management practices into SMEs, the UK must find its own programme. The IEENs were founded as a network platforms that bring companies together (either regionally, by sector, by supply-chain) to exchange experiences and to follow steps together which may improve their energy efficiency.¹⁰⁸ The industrial network in these cases includes the attendance of the local network operator. They work on a voluntary basis, and they can exist with or without government intervention.¹⁰⁹ The idea should be for the Department for Energy Security and Net Zero and the large manufacturers to coordinate German-Swiss style networks for smaller manufacturers interacting with energy network providers in order to resolve renewables applications, grid balancing, outages and intermittency. The UK might also consider such a voluntary-based network; whilst the large manufacturers should provide the leadership to instigate, there are several organisations present in the manufacturing sector (and outside government) who could in principle take up the hosting of this form of collaboration in the format of voluntary peer-to-peer networking information-providers.

8. Encourage landlord incentivisation for energy efficiency improvements through tax reliefs and EPC-rating rewards for energy performance

The research also highlighted energy security and access to clean energy for a number of manufacturers had been made more challenging through an unbalanced relationship with their site landlords. This often arose out either a lack of landlord education or a lack of obligation upon landlords to facilitate an uninterrupted stream of energy.

Currently, the obligation upon commercial landlords is to supply tenants with electricity, gas and heating and through safe, working appliances.¹¹⁰ Where the SME is a leaseholder, a lease agreement will often set out what either party is responsible for. The majority of commercial landlords are also required to provide an Energy Performance Certificate (EPC) on which they must now (post-2018) have a rating of 'E' or above. The rating 'F' or 'G' means a landlord will need to take steps to improve energy efficiency. Electrical wiring, water and gas piping is 'almost always' the responsibility of the landlord.¹¹¹ However, there can be varying interpretations of what these terms mean, particularly with regards to a 'working' supply. A supply can be interpreted as 'working' even in cases where businesses experience some minor intermittency or outages. However, as several firms informed researchers, even a very short outage can have profound effects upon businesses, if not shut down a very costly production cycle.

107 Fredrik Backman, 'Local knowledge creation with the use of Industrial Energy Efficiency Networks (IEENs): A Swedish case study', <https://www.sciencedirect.com/science/article/abs/pii/S2214629618303128>

108 AGEEN, 'Energy Efficiency Networks: Towards good practices and guidelines for effective policies to stimulate energy efficiency', https://www.ageen.org/downloads/G7_Report_on_Energy_Efficiency_Networks_IPEEC-IEA%20_636.pdf

109 Ibid.

110 Laura Howard, 'Are You A Landlord? Here's All You Need To Know About Domestic Energy', <https://www.forbes.com/uk/advisor/energy/landlord-domestic-energy/>

111 Ibid; Money Supermarket, 'Commercial property landlord energy advice', <https://www.moneysupermarket.com/gas-and-electricity/business-energy/a/commercial-landlords/>

Furthermore, there has been a consensus amongst leaseholding SMEs firms that there is little incentive for landlords to find a pathway towards renewable resources for their tenants. This is often due to landlords not operating as individuals, or rather working for organisations, meaning their preference is to have the building occupied and returned in the same condition it was previously, and not innovate with renewable energy, even if the investment is beneficial. One SME manufacturer reported the lease on the building from the landlord was the biggest stumbling block to installing solar equipment which could save them (and the landlord) money.

The genesis of this problem has been identified as twofold. Firstly, the education of landlords in making mutually beneficial investments on a building occupied by tenants is currently poor, and discouraging small businesses from some kinds of energy saving innovation, which might otherwise result in a permanent structured improvement to energy performance. Furthermore, energy saving is hindered either by bureaucracy and the upfront capital expenditure costs associated with installing new items. Whereas many manufacturer SMEs are on a 5-10 year lease cycle, there can be a disconnect between businesses and landlords as to the changes that can be made for greater and lasting energy efficiency and which are of mutual benefit. The importance of developing landlord understanding and education was also highlighted as being of vital importance for companies looking to switch to onsite generation.

However, at present, if landlords are to be asked to make permanent changes to the structure of their buildings to improve energy efficiency levels, it should not only be a matter for their immediate energy gains and potential tax reliefs, but to redress the burdens placed on them by onerous regulation. Whereas the emphasis by government in this area is to respond by regulation, a more practical strategy should be on mutualism, thereby encouraging SMEs and landlords to cooperate. Landlords who pursue this route should therefore be given an option of either being elevated to the highest ranking or alternatively, opting out of the Energy Performance Certificate (EPC) rating system altogether. The EPC measures the energy efficiency of a building that is for sale or rent on a scale from A (most efficient) to G (least efficient). It also informs any recommended energy improvements and cost-effective ways to have a better rating. Yet existing research and industry analysts have shown that the EPC system no longer matches up to whether residences of commercial premises are energy efficient,¹¹² so could potentially be dropped for landlords whose infrastructure already has a high level of efficiency. Neither should the role of ongoing monitoring be excluded from dialogue and cooperation with the landlord. A past study from the US previously noted that building owners can be uncertain about the performance of new technologies and are risk adverse – the answer to which was real building performance information making them more likely to adopt.¹¹³

What is clear therefore, is that there needs to be additional forms of both education and incentivisation for landlords in order to move towards a healthier relationship between tenants and commercial landlords for cleaner growth. From an educational standpoint, this should focus around not simply educating individuals, but informing companies as to the financial and organisational benefits of making the switch to renewable energy sources. From an incentivisation perspective, it would seem advisable to grant commercial landholders an increased level of tax relief for implementing energy monitoring or renewable energy provisions on their sites. This could be achieved through an extension of the super-deduction and first-year allowances after March 2023, capital expenditure allowances on fixtures, or the Structures and Buildings Allowance already given to these parties and stipulate that upon a qualifying percentage of the site's energy demand being reduced, further tax relief would be granted. This should not necessarily be considered a new policy framework, since after the original super-deduction announcement, later amendments to the Finance Bill in 2021 exempted landlords from the definition of 'leasing' which meant that landlords are already able to claim up to 130% relief on new expenditure incurred in the two years up to 31 March 2023.¹¹⁴

112 Central Housing Group, 'EPC Ratings System Is Not Fit For Purpose', <https://centralhousinggroup.com/epc-ratings-system-is-not-fit-for-purpose/>; Jason Page, 'Are Energy Performance Certificates "misleading" tools for delivering zero carbon buildings?', <https://www.pbctoday.co.uk/news/energy-news/energy-performance-certificates/104123/>

113 Department of Energy, 'Accelerating the Adoption of Energy Efficient Technology', <https://www.energy.gov/sites/prod/files/2016/12/f34/High%20Impact%20Technology%20122016.pdf>

114 James Greenhalgh, 'Can Property Landlords Claim Any 'Super' Deduction?', <https://www.cowgills.co.uk/news/can-property-landlords-claim-any-super-deduction/>

9. Introduce a simple, non-binding, minimalist, energy ISO Standard to apply across industry in order to resolve confusing carbon reporting and environmental compliance frameworks

To achieve a greater degree of 'realism', if not stave off some of the excessive green requirements that are often made of SMEs through various consultancies, one such manufacturer advised that it should all be listed in one 'ISO Standard' for them. The International Organization for Standardization is a body of 167 national members who develop voluntary, consensus-based market relevant International Standards to support innovation. For example, in one such regulation, ISO 50001 on Energy Management Systems, provides a framework for organisations to develop a policy for more efficient use of energy, fix targets and objectives to meet the policy, use data to better understand and make decisions about energy use, measure the results, review how well the policy works, and continually improve energy management.

This standard is wide-ranging and provides benchmarks for organisations committed to addressing their impact, conserving resources and improving the bottom line through efficient energy management. Furthermore, it provides a model to follow when setting up and operating a management system. It is not obligatory but many organisations implement it for the benefits it provides. It then demonstrates to external parties, customers and suppliers, that they have implemented an energy-conscious system that is environmentally friendly. It helps them develop their own policy for efficient use of energy, whilst continually enabling them to improve energy management.

This type of standard should be revised, recommended and adopted for UK SME manufacturers, introduced in a non-binding fashion by the Departments for Business and Trade and also for Energy Security and Net Zero, so that consistent and minimal models of best practice in energy efficiency can be adopted across a variety of factory sites. This would prevent consultancies from 'inventing new goals' (as one interviewee told us) which are routinely subject to requests for compliance by SMEs, and which may not even be a reasonable or feasible standard for improving energy efficiency. It is far from coincidental that the Department for Business, Energy and Industrial Strategy (BEIS) sponsored the free giveaway of up to 100,000 copies of BS ISO 50005 to UK business and organisations during the intense energy crisis period¹¹⁵ which it claimed could start reducing energy costs immediately.

10. The introduction of a refined UK-wide Industrial Strategy

The need for an Industrial Strategy which encompasses simple steps (not necessarily mandatory) towards a 'net zero realist' approach and cost-effective energy efficiency on factory sites is becoming more and more transparent. The Centre for Social Justice (CSJ) think-tank recommended in recent weeks that the Government restore its Industrial Strategy, with a particular focus on manufacturing. The researchers highlighted how such a programme should be adverse to deadweight subsidy and that there remains a great deal government can do to 'facilitate, foster and stimulate the market through planning, convening power, provision of access to credit, fiscal relief and the provision of a skills base'.¹¹⁶ They place at the centre of their report a mission: that the government should set a target of increasing UK manufacturing as a percentage of national output from 9 per cent to 15 per cent over the medium term.

115 BSI, 'Reduce your energy costs', <https://www.bsigroup.com/en-GB/standards/bs-iso-500052021/>

116 Centre for Social Justice, 'Making the change: A plan to reboot British manufacturing and restore growth', https://www.centreforsocialjustice.org.uk/wp-content/uploads/2023/01/CSJ-Making_the_Change.pdf

The support and assistance to be given to SMEs in such a strategy should bear in mind the barriers to energy management and efficiencies those businesses seek to achieve. As one important research study by Meath et al. (2015) found in Australia, looking across the vast barriers and motivating factors to the adoption of energy savings measures among SMEs, any voluntary government energy efficiency programs should be flexibly designed and implemented to accommodate those many and various barriers.¹¹⁷

The aim of the Industrial Strategy should be to adopt a leading Net Zero realist perspective while looking to boost productivity by supporting businesses to create jobs and increase the earning power of people throughout the UK with investment in skills, industries and infrastructure.¹¹⁸ It should seek to identify the industries it considers of strategic value to our economy and work to develop partnerships between government and industry to nurture them, particularly in the fields of business and data, clean energy and self-driving vehicles. A key issue within the Industrial Strategy should be to continue to ensure the national electricity grid is remodelled so it can handle many different sources of clean energy and use new technologies to store energy and manage demand. The greater burdens and risks put upon SMEs should not be considered secondary to political legacy commitments in guaranteeing that ‘decarbonisation works’ and a greater emphasis should be put on making certain policy works for the energy and business demands of a majority of small to medium sized businesses in the UK.

The policy narrative should move away from the umbrella term of ‘the climate emergency’, another popular political party narrative in Westminster which does not always translate into real-term policy action for manufacturers. It might even consider providing policy consistency by placing an Industrial Strategy Council on a statutory footing. Such a strategy would provide ‘realism’ at home as well as national economic resilience in the face of future shocks, including to our energy and defence and security supply chains.

In 2023, there are nonetheless signals of a cross-party commitment to rebalancing the British economy and which favour boosting the conditions for enterprise to grow through a form of Industrial Strategy. Boosting manufacturing will be a central tool in allowing that to happen – and therefore regrowing the economy based on a policy for the over 99% of businesses which form that economy: SMEs.

117 Cristyn Meath, Martina Linnenluecke and Andrew Griffiths, ‘Barriers and motivators to the adoption of energy savings measures for small- and medium-sized enterprises (SMEs): the case of the ClimateSmart Business Cluster program’, <https://www.sciencedirect.com/science/article/abs/pii/S0959652615011762>

118 See, for example: Department for Business, Energy & Industrial Strategy, The Rt Hon Greg Clark MP, and The Rt Hon Theresa May MP, ‘Government unveils Industrial Strategy to boost productivity and earning power of people across the UK’, <https://www.gov.uk/government/news/government-unveils-industrial-strategy-to-boost-productivity-and-earning-power-of-people-across-the-uk>

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