



Powering on

Energy resilience in UK manufacturing



Contents

- 3 Executive summary
- 5 The energy challenge for UK manufacturing
- 8 How are UK manufacturers responding?
- 10 Overcoming the barriers to greater investment
- 13 Measuring the benefits of greater energy efficiency
- 15 Case studies
- 17 Key takeaways
- 18 About the author
- 19 About this research

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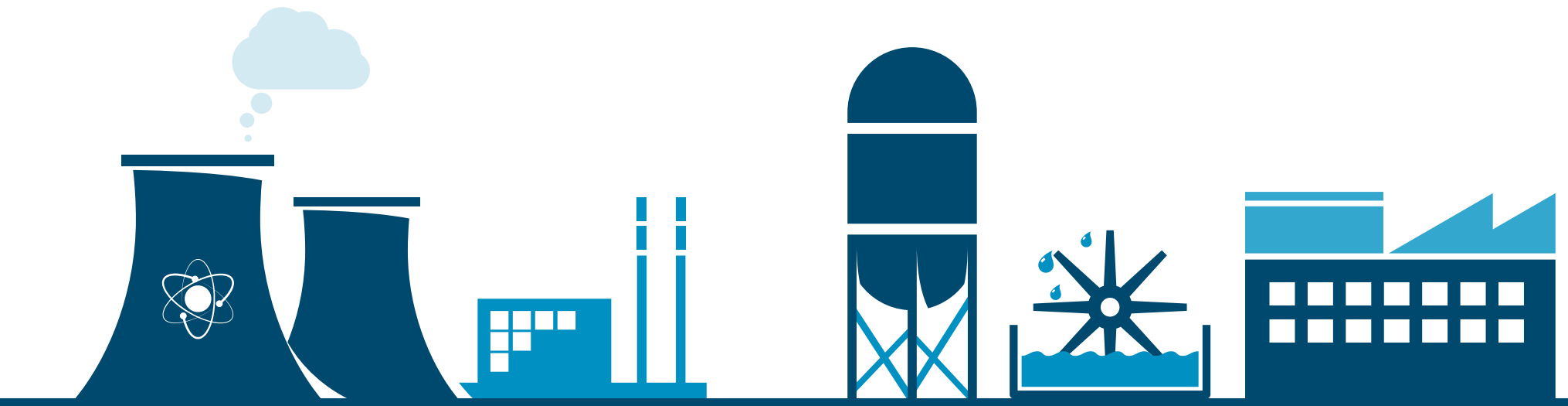
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Executive summary

This report examines the extent to which UK manufacturers are investing in technologies to increase their energy resilience and manage their energy use.

Addressing the energy challenge

Energy efficiency and resilience of supply are becoming increasingly critical issues to the UK manufacturing sector.

Energy prices and reliability of supply are manufacturers' key concerns and are rated as more pressing issues than environmental factors in addressing this 'energy trilemma'.

Disruptions in energy supply are increasing, with some manufacturers reportedly being forced to power down during peak periods. A total of 24% of businesses reported that they had plans in place and regarded their businesses with a healthy degree of resilience in the face of such an event. However, nearly two thirds of manufacturers said they are vulnerable to such events due to insufficient contingency planning.

These factors are encouraging UK manufacturers to make their energy use more efficient and some are considering alternatives such as renewables or self-generation, but take-up remains relatively limited. However, the growing importance of energy resilience is providing a strong commercial incentive for manufacturers to take control of their energy requirements.

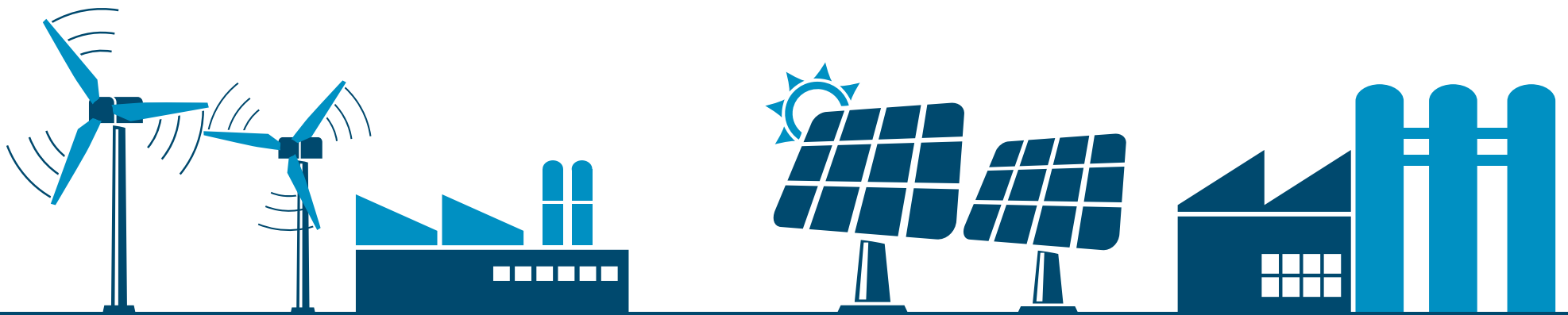
How are UK manufacturers responding?

Our research suggests that current levels of investment in energy efficiency are insufficient to overcome manufacturers' concerns. Just over one third of manufacturers (35%) say they are currently using or seeking to implement energy efficiency measures over the next 12 months. The planned investments are relatively small as well – less than £10,000 mainly.

While there is growing interest in renewables and new hybrid technologies that allow businesses to streamline their energy costs and plan for the future, the cost of these approaches can be prohibitive.

There is growing interest in renewables and new hybrid technologies that allow businesses to streamline their energy costs and plan for the future.

Buying economically, reducing power requirements and moving to the next stage in lean manufacturing and streamlined processes will be key to competitive success in a high-cost energy environment.



Energy resilience is firmly on manufacturers' agendas but relatively few are taking appropriate action to address it. Many companies would benefit from a greater management focus on this vital issue as a strategic priority, with potentially both commercial and reputational benefits.

Overcoming the barriers to greater investment

Our research highlights the need for manufacturing businesses to make investment decisions in light of their future energy requirements as much as other considerations, such as operational efficiency.

Lack of financial resources and uncertain return on investment can be major barriers. Other areas of investment are often seen as a higher priority. UK energy policy may need to adopt more stretching targets for reductions in energy use across manufacturing.

However, a fragmented long-term UK energy policy, combined with the possible repercussions of Brexit, mean that the manufacturing sector could face a significant threat to its competitive position in relation to EU and international peers. There is now both a more urgent need and a unique opportunity to develop an energy and industrial policy that meets the needs of UK manufacturing in the post-Brexit environment.

Measuring the benefits of greater energy efficiency

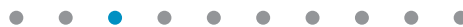
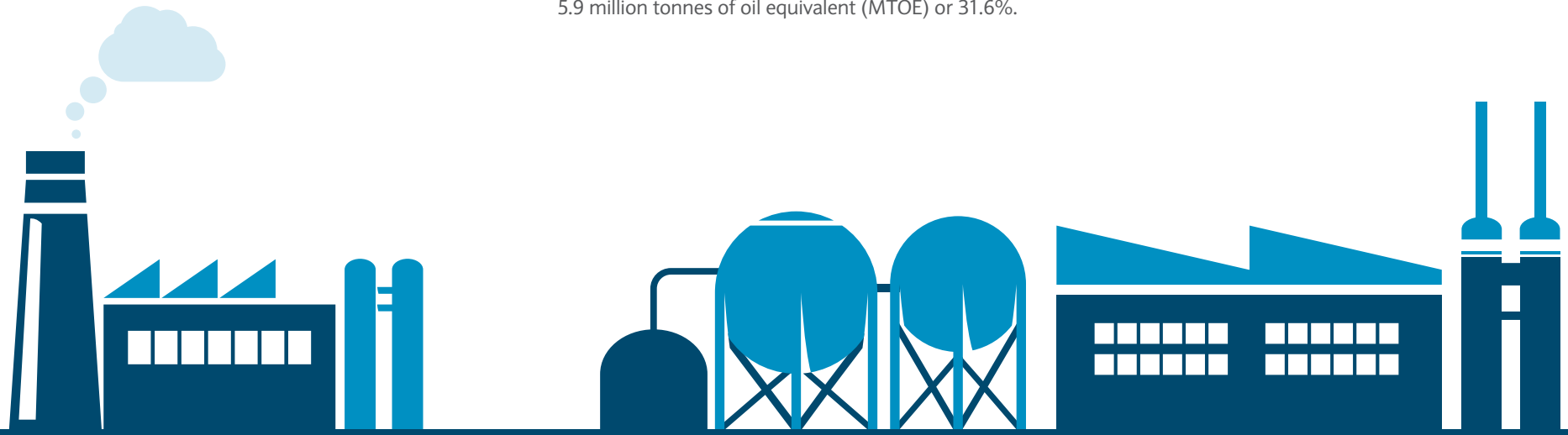
Our economic models show that the impact of greater investment in energy efficiency on energy intensity and materials costs could result in significantly higher levels of profitability and value added by the UK manufacturing sector over the medium and longer term.

More widespread and accelerated investments in energy management technologies compared to 'business as usual' investment levels could bring cumulative increase in economic output of £2.56bn by 2025. Overall energy usage under this alternative scenario would fall by 5.9 million tonnes of oil equivalent (MTOE) or 31.6%.

The increased investment in energy efficiency envisaged in this alternative economic scenario represents a significant opportunity for UK manufacturing to enhance its international competitiveness through better export performance and protection against low cost imports.

More widespread and accelerated investments in energy management technologies could bring cumulative increase in economic output of £2.56bn by 2025.

In a world of volatile energy prices and increasing uncertainty over supply, our research serves as a timely reminder of the critical importance of resilient energy strategies to our manufacturing sector's continued success.



The energy challenge for UK manufacturing

Our research underlines the growing importance of energy supply, efficiency and resilience on the boardroom agenda for UK manufacturers.

Higher energy prices, competition and pressure to reduce carbon emissions have led to significant changes in energy usage in UK manufacturing over the last few decades. Today, about half of all UK manufacturing energy use is in non-energy intensive sectors.

However, the burden of energy costs and resilience of supply are increasingly critical issues facing the UK manufacturing sector. Greater interest in both alternative sources of supply and more efficient use of raw materials could have a big impact on company buying behaviour and decision-making.

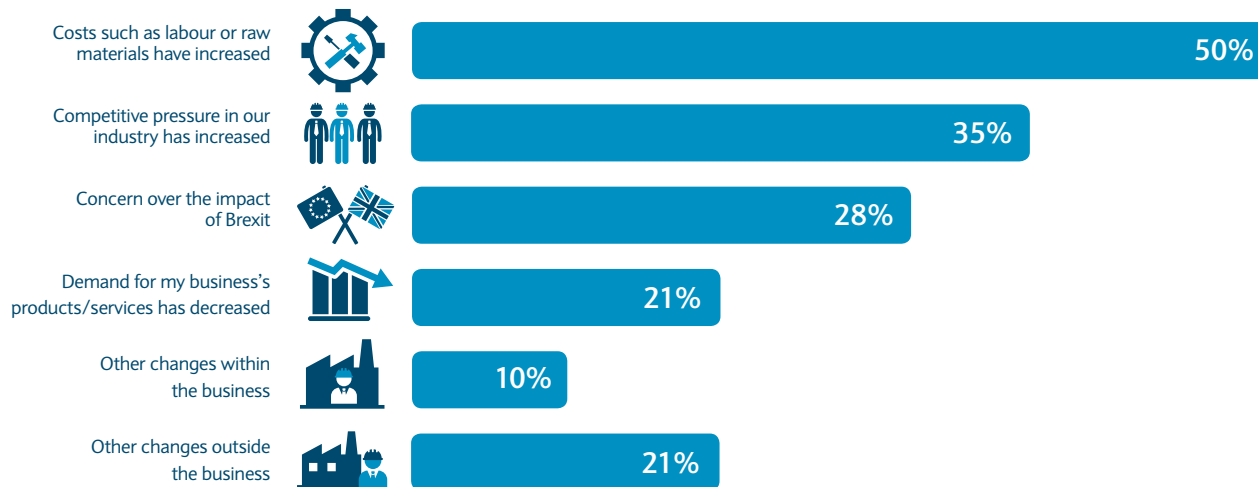
Over a quarter (27%) of the companies said that their concerns about energy supply were on the increase, compared to just 2% who said that energy supply was becoming less of a concern.

The burden of energy costs and resilience of supply are increasingly critical issues facing the UK manufacturing sector.

The energy trilemma

Our research highlights the energy 'trilemma' of price, supply and environmental concerns facing the sector. It shows that energy prices and reliability of supply are manufacturers' key concerns, ahead of factors such as sources of energy and environmental impact. Price (88%) and reliability (85%) are also the main factors that manufacturers take into account when choosing energy suppliers, ahead of other factors such as energy being flexible (69%), renewable (39%) or domestically produced (38%).

What are the reasons for energy being more of a concern now than at the start of this year?



To what extent would you say each of the following are energy concerns to your business?



Impact on competitiveness

Our research suggests that concerns over energy resilience have increased primarily as a result of higher costs and greater competitive pressure. Rising costs are clearly an important driver in making the case for investment in greater efficiency and resilience.

Over one third of the manufacturers (36%) are concerned that the availability and cost of energy in the UK could bring disadvantage in terms of the UK's international competitiveness.

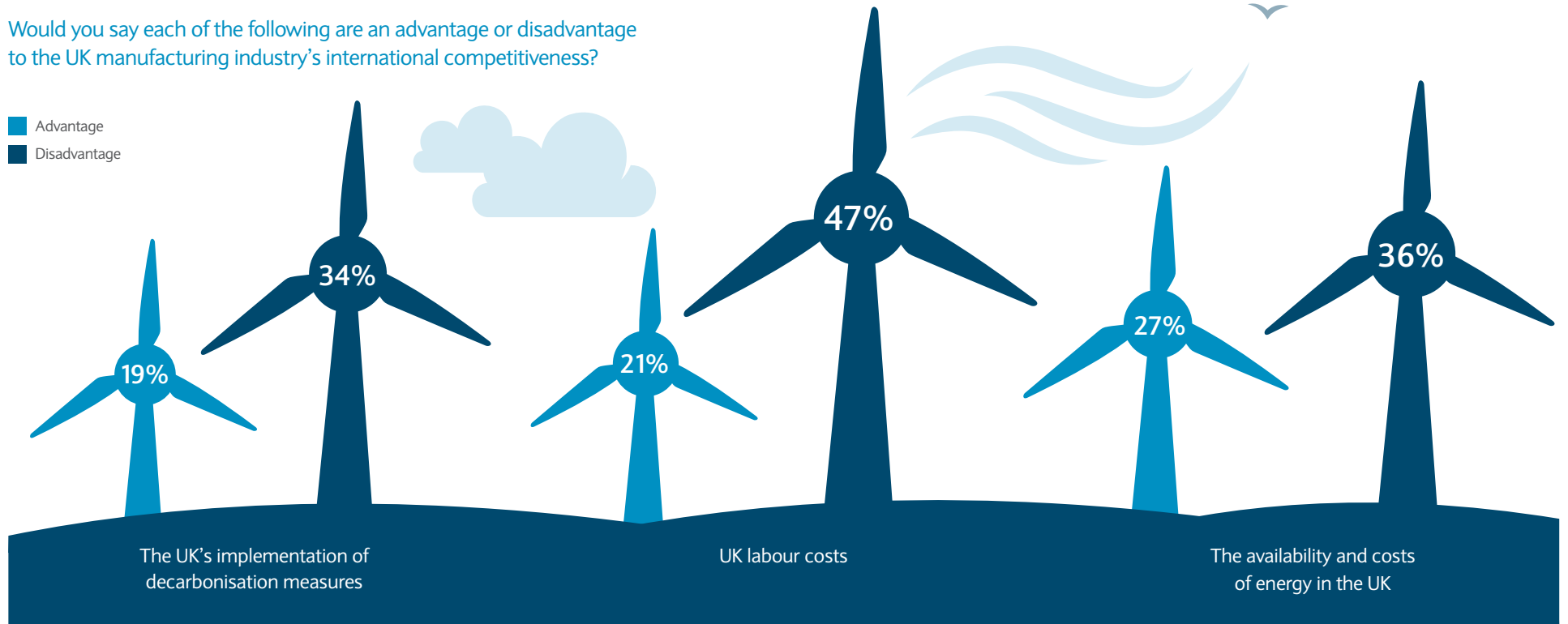
Vulnerability to energy disruptions

Our research provides clear evidence of increasing energy disruption for UK manufacturing, with 16% of manufacturers having had such an experience over the past 12 months. There were significant costs incurred as well: 15% had costs between £10,000 and £50,000, while nearly one in 10 (8%) saw costs of anything between £50,000 and £1m.

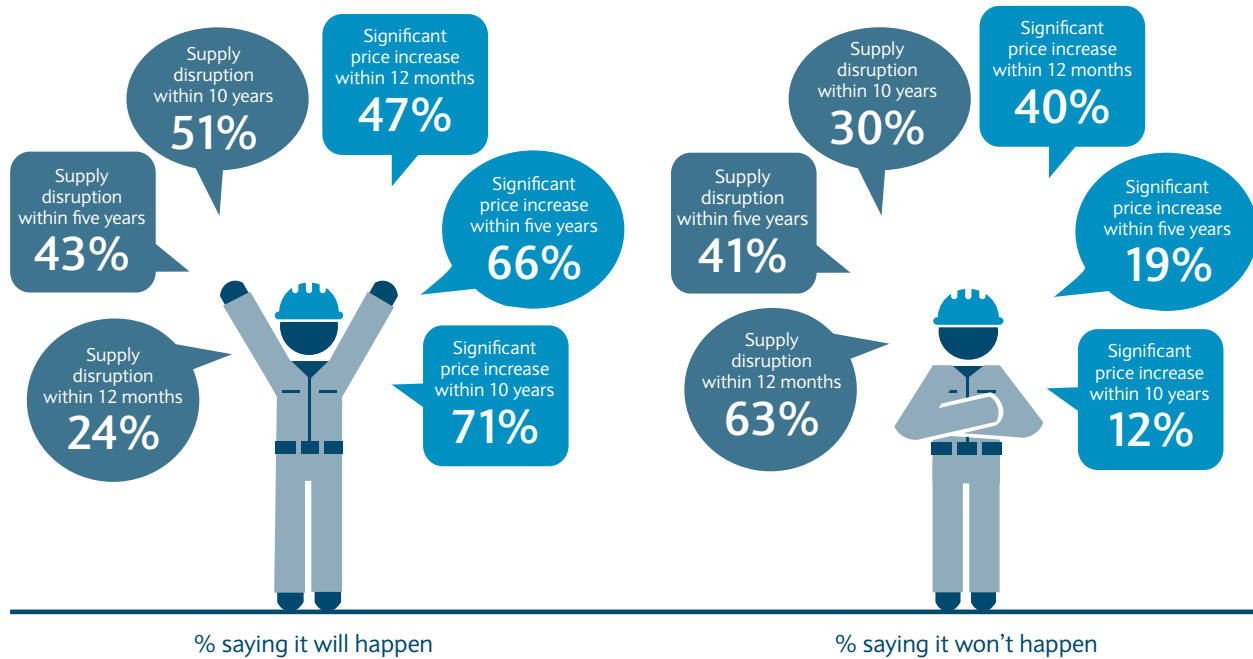
Manufacturers expect to see greater price increases over the longer term. For example, 71% expect a significant price increase within 10 years and 66% within the next five years.

Would you say each of the following are an advantage or disadvantage to the UK manufacturing industry's international competitiveness?

■ Advantage
■ Disadvantage



Likelihood of energy disruption



Current levels of resilience

Businesses were asked about their expected levels of resilience in the face of energy-related problems or events.

Nearly two thirds (63%) said that they would be vulnerable to an energy shortage in the UK because plans were either not in place or were likely to be inadequate.

In the event of a significant increase in the price of energy, 46% said they would be left vulnerable, while 42% described themselves as being resilient to such an event. In response to an energy supply disruption event, 63% of businesses said that they would be vulnerable, whereas 24% were confident that they had robust enough plans in place.

Despite these relatively low levels of preparation, many of our survey respondents reported that their resilience to such events has improved. For example, compared to 12 months earlier, 14% said they were more resilient to supply disruption and 18% said they would be more resilient to price increase disruption.

Motivations for more efficient use of energy

There are a number of factors motivating UK manufacturers to make their energy use more efficient, with the likelihood of future price increases and concerns about supply reliability being the main drivers.

Price volatility

Price volatility and increases provide a strong incentive for change. Electricity costs in the UK are among the highest in Europe and significantly greater than costs in Asia, Russia and the US. Prices are widely expected to continue to rise in real terms, with energy taxes accounting for an increasing proportion of bills. Fluctuations in energy prices make it difficult for manufacturers to plan ahead.

Uncertainty over supply

Uncertainty of supply is becoming an increasingly pressing issue, with some manufacturers reportedly being forced to power down during peak periods.

Uncertainty around new power generation is only likely to increase as the retirement of older electricity-generating plants cuts into UK production capacity. Around 20% of existing generating capacity is expected to shut down over the next decade and there is ongoing wrangling over the government's nuclear programme.

This has led some businesses to consider diversifying supply and to look at renewables or self-generation, but take-up remains relatively limited. The intended growth in renewable sources of fuel may in itself create greater uncertainty about supply due to the intermittent nature of energy sources such as wind and solar.

Addressing the trilemma

Our survey suggests that while social responsibility policies and environmental concerns will continue to have an impact, the growing importance of energy resilience is providing a strong commercial incentive for manufacturers to take control of their energy requirements. This is no longer the preserve of a small group of environmentally sensitive businesses, but a mainstream business challenge.



How are UK manufacturers responding?

Our survey suggests that current levels of investment in energy efficiency are insufficient to match manufacturers’ concerns.

What are the options?

Companies that have achieved substantial energy efficiency improvements have usually focused on one or more of the following broad strategies.

- **Quick wins** – such as monitoring energy usage, reducing wasted energy and encouraging staff to reduce energy use. These methods can be implemented quickly, require little or no capital expenditure and can lead to fast and tangible returns
- **Processes and systems** – such as introducing energy management programmes, changing operating procedures, improving maintenance or setting up energy use reporting systems. These solutions require some investment in capital, but can lead to significant savings in a reasonably short timescale
- **Structural change** – for example, through a step change in the business, new production equipment or process redesign. This generally requires more substantial capital expenditure as well as cultural change within the organisation.

Our research suggests that manufacturers would benefit from a greater management focus on energy efficiency as a business priority, with potential benefits from both a commercial and reputational perspective.

Scale of investment

Our survey shows fairly low levels of investment in energy efficiency by UK manufacturers over the last five years. Slightly more than a quarter (25%) of participants say they haven’t invested in energy efficiency at all, while the number grows for other investments, such as material efficiency (30%), self-generation (48%) and demand response services (50%).

Looking to the future, the planned investment in the energy technologies remains low. The amount of investment is largely below £10,000.

Planned investment in energy efficiency or production technologies

Event	Energy efficiency	Material efficiency	Self-generation	Location on resource recovery parks etc.	Demand response services
Up to £10k	22%	19%	8%	6%	7%
Between £10k–£100k	8%	8%	6%	4%	4%
Between £100k–£500k	6%	5%	3%	3%	3%
Between £500k–£1m	3%	3%	2%	2%	1%
More than £1m	2%	2%	3%	1%	1%
Nothing	24%	28%	42%	46%	45%

Anticipated levels of investment in material efficiency measures are broadly in line with those for energy efficiency, while planned investments in other types of intervention such as self-generation technologies are considerably lower.

These findings indicate an apparent discrepancy in manufacturers’ energy concerns – over a quarter said that their concerns are increasing – and these low levels of planned investment. This perhaps highlights the significant barriers to investment that exist (these are discussed in the next section).



Reasons for investment

We asked businesses that say they have invested in energy management or savings technology for their reasons why. Reducing operational costs was the top motivation, with 68% of the businesses responding so.

Concerns about future energy supply (20%) featured relatively low down the list of manufacturers' motivations. This perhaps suggests a lack of awareness of the ability of such measures to improve energy resilience.

Dealing with energy price increases

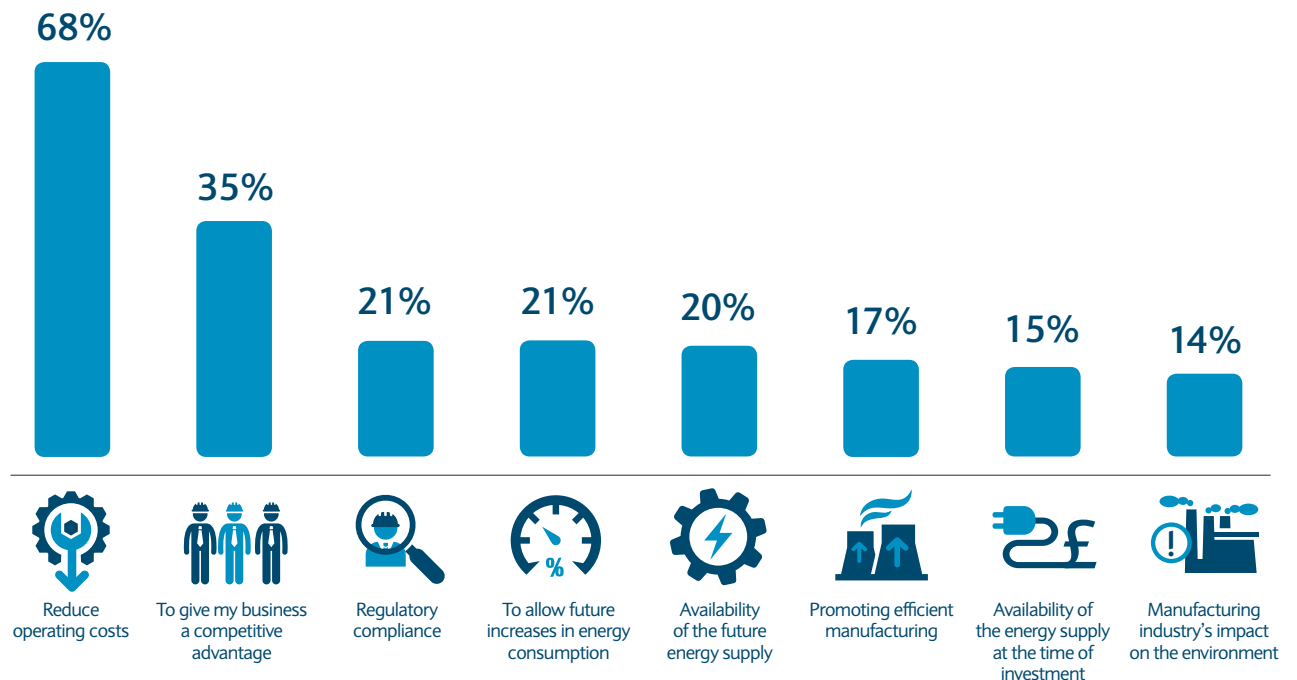
Looking at how manufacturers deal with the impact of energy price increases on their businesses, investment in energy efficiency appears to be a fairly low priority and self-generation even lower – 12% say they have invested in energy efficiency measures; 7% say they have introduced materials-usage efficiency measures more generally; and only 6% say they have undertaken some investment in energy self-generation technologies.

By contrast, around a quarter of respondents say they either pass cost increases on to customers (23%) or try to manage the situation by agreeing long-term fixed price contracts with suppliers. One in five (19%) say they have switched or rationalised energy suppliers as a result of higher prices.

Looking ahead

While there is growing interest in renewables and new hybrid technologies that allow businesses to streamline their energy costs and plan for the future, the cost of these approaches can be prohibitive. The attention of manufacturers may increasingly turn to energy input sources, along with the efficiency of manufacturing processes. Lower raw material costs with investment in automation can generate big cost and efficiency gains. Buying economically, reducing power requirements and moving to the next stage in lean manufacturing and streamlined processes will be key to competitive success for manufacturers in a high-cost energy environment.

Which of the following would you say were important factors for your business when deciding to invest in energy technologies?



Overcoming the barriers to greater investment

This research highlights the need for manufacturing businesses to make investment decisions in light of their future energy requirements as much as other considerations such as operational efficiency.

However, driving further change in production methods and energy usage represents a significant challenge and may require further government intervention or incentives. These may include purely financial incentives or others driven by reputation or social responsibility policies.

Barriers to investment

Despite the demonstrable benefits of investment in energy management indicated by our research, why are UK manufacturers not doing more? Our research highlights a number of significant barriers to investment.

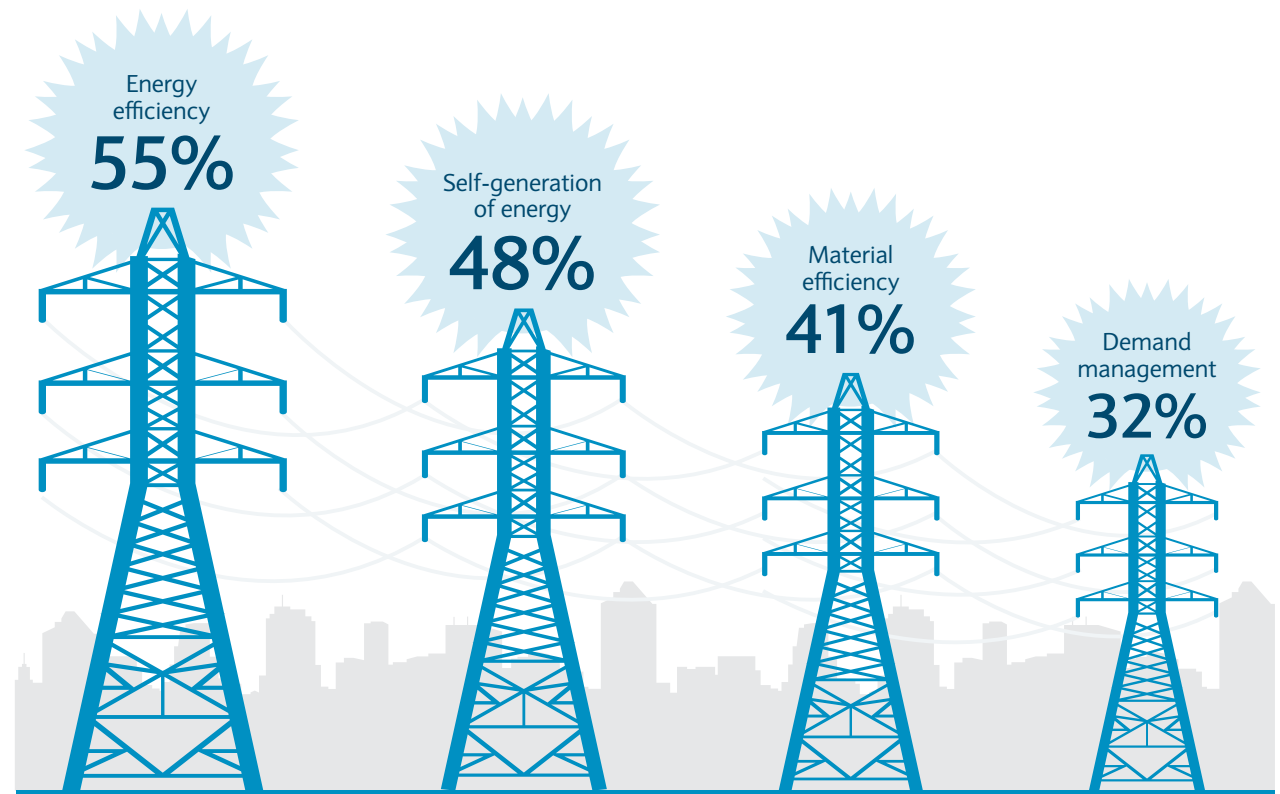
Information gap

SMEs often lag behind larger companies when it comes to investment and adopting best practice approaches to energy management because of a lack of information or awareness of energy efficient modes of operation.*

Skills shortage

Manufacturers often lack the necessary skills to implement energy efficiency measures effectively. These might include technical skills to identify appropriate solutions, commercial skills needed to make a fully rounded investment case and secure funding, or the expertise necessary to drive change and apply best practices within a business. This reflects the increasing importance and growing demand among UK manufacturers for a broader range of skills, such as languages and IT, among its management tier.

Which of the following would you like to be a key focus of the UK's industrial strategy, in the context of energy?



*Manufacturing Commission, Industrial Evolution: Making British Manufacturing Sustainable, 2015.



Financial resources

Lack of financial resources or inexperience in modelling return on investment can also be major barriers, particularly for SMEs, especially when it comes to taking on additional borrowing.

Leadership

Obtaining internal approval for energy efficiency projects can be difficult in the absence of board-level leadership and support or where other areas of investment simply take priority. There has perhaps been too much emphasis on cost reduction, compared to income generation and protection in evaluating energy resilience projects.

Overcoming the barriers

The barriers identified above are reflected in our survey respondents' views on what, if anything, would encourage them to invest in energy management or savings technology in the future. Commercial viability, rather than environmental concerns, appears to be the primary driver.

Access to external funding through grants or similar incentives is the most significant motivating factor, identified by 36% of survey respondents, followed by greater certainty on potential return on investment (30%), again highlighting the lack of information and skills available in order to assess this – 17% say they would like more access to information on best practice, while 9% said extra training would help.

A fifth (19%) of all businesses surveyed said there was nothing in particular that would encourage them to invest, although the proportion was considerably higher for small than for larger businesses.

Encouraging greater investment

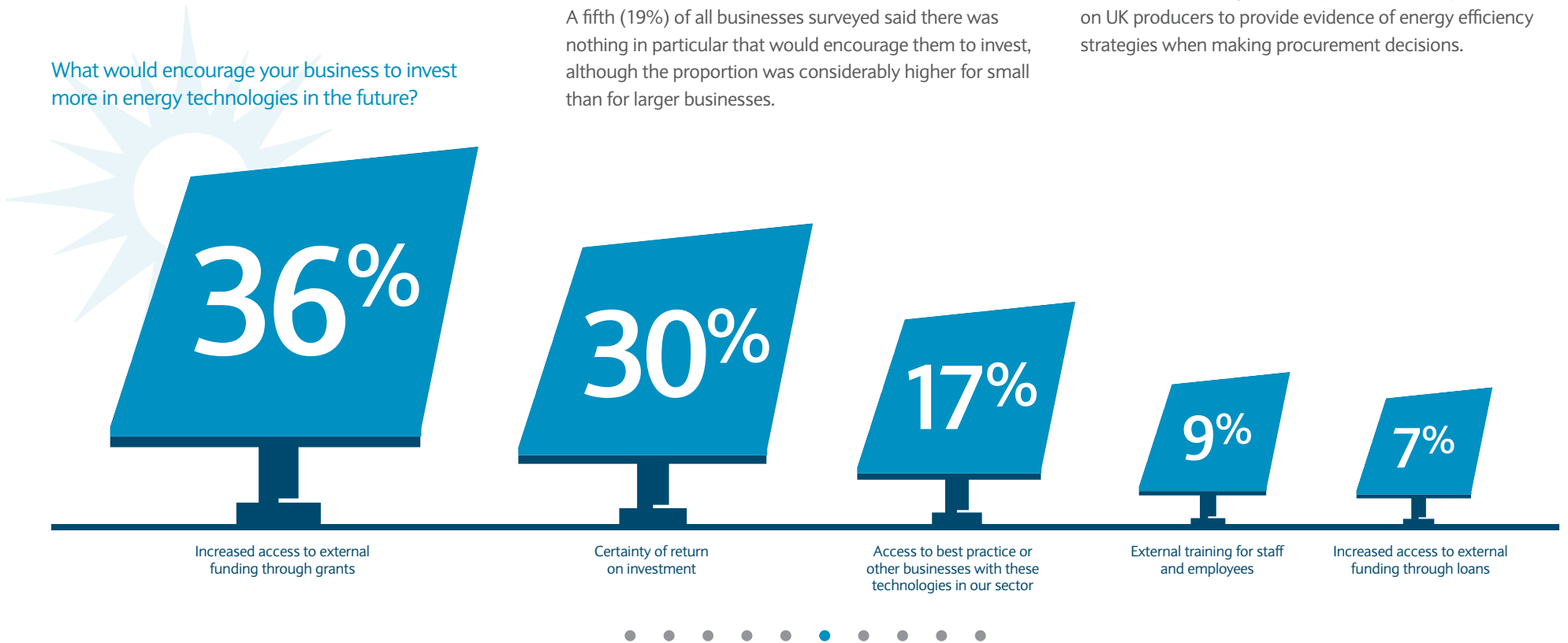
A number of factors could help facilitate faster and deeper investment by UK manufacturers in energy saving technology and production methods.

Government support

Manufacturing businesses would benefit from greater support in addressing information gaps on the benefits of energy efficiency and appropriate implementation strategies; for example, through business networks and mentoring programmes.

Policymakers may also need to adopt more stretching targets for reductions in energy use across manufacturing. This may include a greater emphasis from the public sector on UK producers to provide evidence of energy efficiency strategies when making procurement decisions.

What would encourage your business to invest more in energy technologies in the future?



Customer expectations

UK manufacturing is likely to come under further competitive pressure to demonstrate high standards of environmental responsibility, driven by changing consumer and retailer expectations.

Similarly, larger private sector businesses may become more demanding of their suppliers; for example, requiring certain thresholds of materials and energy efficiency in their production methods.

This may result in a greater tendency for SME manufacturers to emulate some of the advances in energy management made by larger businesses and smaller industry trailblazers.

Long-term strategy

A fragmented long-term UK energy policy, combined with the possible repercussions of Brexit, mean that the manufacturing sector could face a significant threat to its competitive position in relation to EU and international peers.

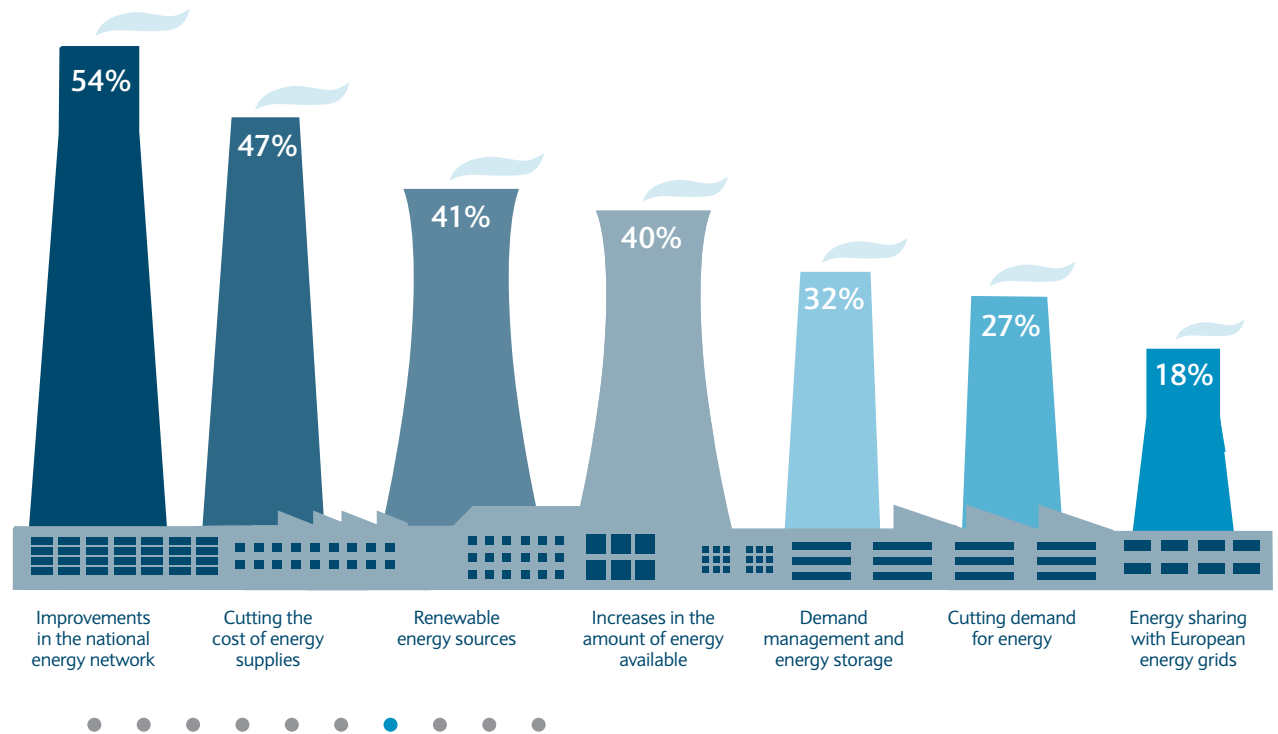
The government has entered into a number of binding international carbon emission commitments that will affect businesses across the sector, with tighter regulation and increased operational costs linked to energy consumption.

UK industrial and energy policy clearly has an important role to play in encouraging energy resilience – for example, through setting energy usage targets and providing greater certainty on tariff levels and strike price for future energy provision.

Brexit has the potential to significantly increase the UK's autonomy in energy policy. Whether any future involvement in the pan-European Internal Energy Market will lead to greater encouragement and enforcement of energy efficiency measures remains to be seen.

However, regardless of the UK's future energy relationship with the rest of Europe, there is both an ever more pressing need and a unique opportunity to develop an energy policy that meets the needs of UK manufacturing in the post-Brexit environment. We hope that this research informs the debate ahead.

Which of the following would you like to be key focuses of the UK government's energy strategy for the future?



Case study: Packexe

A Devon manufacturer's positive experience of investing in solar panels proves a winning formula.

Based in Exeter and founded in 1989, Packexe manufactures an innovative range of protective film products for the emergency services and the medical and construction industries, which it exports to multiple markets around the world.

Packexe has a strong track record of innovation and modernisation and a keen eye on improving its green credentials wherever possible. In May 2015, the company installed solar panels at a cost of around £78,000 to the roof of its 15,000 sq. ft factory and office space.

A financial no-brainer

CEO and founder Andrew Orchard explains that financial benefits were the primary reason for installing the solar panels. "We wanted to get a grip on our overheads as we could see our costs going up. As power gets more expensive, we want to get as close to off-grid as we can. And we knew we could also bring in an income stream from the solar panels."

Although the investment was considerable, the panels would ultimately pay for themselves. The government pay between 11p and 16p per kilowatt produced, in return for investing in solar. This works out at between £700 and £800 a month for Packexe.

"Over the first 15 months we sold £2,736 worth of surplus power to the National Grid, received government subsidies of £11,596, and made an own use saving of £6,966," says Andrew. "The returns have been incredible."

Packexe will take around five years to recoup the costs of the original investment, yet the panels will last 15 to 20 years. On some days there is a surplus which can be sold back, while on cloudy days, the business needs a mix of solar and power from the National Grid to run the factory.

Packexe also saw a real sense of pride from the staff from being an ethical business and having first-rate green credentials.

Feel-good factor

A television screen in the Packexe reception area clocks the amount of energy the panels are producing. Andrew says this has proved popular viewing for both staff and visitors.

Packexe also saw a real sense of pride from the staff from being an ethical business and having first-rate green credentials. "The happier your staff are, the better your company. We want people queuing up to work for us – so it needs to be an attractive proposition."

Packexe is now in the process of refurbishing all lights to LED, which will reduce lighting costs by 15%. In addition, Andrew is currently looking at the feasibility of wind power.

"If you're thinking about solar, it really helps to have a credible friend to guide you through the process," says Andrew. "It took about 12 months for the first payment to come through from our local power company, but I knew from his experience that I just needed to be patient. There was a lot of paperwork, so you need to be quite prepared for that, but looking back, it was such an obvious thing to do – I don't know why we didn't do it sooner."



Packexe[®]

Andrew Orchard
CEO, Packexe



Case study: Estover Energy

A viable and sustainable alternative in energy infrastructure for certain businesses to stabilise their supply.

Estover is a pioneer in developing sustainable power and infrastructure projects from inception through financing and construction to ongoing operation.

Growing energy concerns

Estover recognises that energy security has been developing into a serious concern for UK manufacturers. “There’s been a chronic lack of national-level investment for a generation. We’re a major economy and we have not been building enough new power stations,” says Max Aitken, Estover’s co-founder and CEO.

Estover offers a sustainable solution in the form of combined heat and power (CHP) biomass power stations fuelled by wood, built in partnership with manufacturers. Power and steam is delivered to the industrial use, and electricity sold to the National Grid.

Niche solution

With power plants built on location, Estover’s approach is only suitable for manufacturers meeting specific criteria. “The process is complicated and the sourcing of fuel is very specialised,” emphasises Aitken. “An industrial site need to work with a company who can source the right equipment, fuel and financing.”

The most important factor for Estover is location. Estover started in 2010 with a study of 153 sites around the UK, and 15 were eventually deemed suitable. “You need an industrial site that is going to be there for a long time, that is close to a sustainable supply of fuel, has 10–15 acres of land available, with a grid connection and the potential to getting planning permission. It’s not easy,” explains Aitken.

Suitable sectors

Another crucial factor is energy intensity – some types of manufacturing fit CHP better than others. Distilleries are an ideal fit due to their high energy requirements. Pharmaceuticals are another good match – Estover’s second project is to supply electricity and heat to pharmaceutical manufacturers in Cramlington, Northumberland.

“Many local councils are interested in creating big district heating projects, which are ideal for a CHP station,” comments Aitken. “Other industries such as papermaking and food production use a lot of steam and can be candidates.”

For manufacturers that fit the bill, CHP stations could offer a vital lifeline. Estover manages the entire process from conception to completion, explains co-founder and CEO Marcus Whately. “We design the power station project, get planning, put together the contractual package, raise the money, build and operate it. The manufacturer just wants a reliable supply – we do everything else.”

Raising awareness

While this type of energy supply clearly won’t suit everyone, Whately warns that there is still an awareness issue around energy resilience. “Manufacturers in general need to be more aware of the potential energy issues they will be facing in the future,” he says. “We can provide manufacturers with the energy resilience they need for both steam and electricity. They can also get discounts because of the government support schemes available to promote biomass and CHP.”

The result is energy supply that is highly efficient due to the combined heat and power; local, with short transport distances from forest to power plant; and supports biodiversity by encouraging forestry management.

With the growing importance of energy security and the scarcity of sustainable supplies, this type of innovative energy supply could well become a more prominent feature of the UK manufacturing landscape over the next few years.



Max Aitken

Co-founder and CEO, Estover

Marcus Whately

Co-founder and CEO, Estover



Key takeaways

- Energy efficiency and resilience of supply are increasingly pressing issues for UK manufacturers and are likely to continue to grow in importance
- Energy prices and reliability of supply are manufacturers' main concerns
- Disruptions to energy supply are becoming more frequent and manufacturers expect them to increase in the future – two thirds of companies surveyed say they are vulnerable to this
- There is a growing commercial incentive for manufacturers to take control of their energy requirements, but current levels of investment are insufficient to address their concerns
- Energy efficiency and material efficiency measures are the most common strategies adopted by UK manufacturers, ahead of innovative energy supply solutions such as self-generation
- Key barriers to increased investment in energy resilience include lack of information, a shortage of relevant skills, lack of financial resources or incentives, and uncertainty over return on investment
- Our economic models show that more widespread investment in energy efficiency would have a material impact on UK manufacturing output of as much as an additional £2.56bn by 2025, as well as having a significant impact on the UK's international competitiveness.

To find out more about how Barclays can support your business, please call 0800 015 4242* or visit [barclayscorporate.com](https://www.barclayscorporate.com)

*Calls to 0800 numbers are free from UK landlines and personal mobiles, otherwise call charges may apply.
To maintain a quality service we may monitor or record phone calls.

About the author

For further information and to find out how our sector specialist teams can support your business, please contact Mike Rigby, National Head of Manufacturing, Transport and Logistics.



Mike Rigby

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Mike is the National Head of Manufacturing, Transport and Logistics for Barclays. Since joining Barclays in 2008, Mike has always had a direct focus on the manufacturing sector, taking the lead for the wider manufacturing, transport and logistics sectors since 2012. Prior to joining Barclays, Mike was with HSBC for 14 years where he covered a number of roles across credit, retail and corporate banking.

Mike is passionate about the manufacturing, transport and logistics sectors and believes they are essential to the UK maintaining a balanced and resilient economy. His vision is to make Barclays the bank for companies in the manufacturing, transport and logistics sectors.

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About this research

Barclays' 'Powering on' report is based on a bespoke survey of 525 British manufacturing businesses on their attitudes towards energy resilience conducted on Barclays' behalf by YouGov.

The economic analysis used in this report is based on research by Development Economics that uses proprietary models to provide a perspective on the potential benefits to the UK manufacturing sector of increasing investments in energy efficiency above current predicted levels of investment. It is based on modelling of Gross Value Added (GVA), i.e. the economic contribution of the manufacturing sector to the wider economy.

The survey and economic analysis have been supplemented by a desk-based review of documents and data concerning trends in UK manufacturers' usage of energy.

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November 2016. BD04524.

