

The balance of power.

How can UK manufacturers
control energy costs and
remain competitive?



A Deloitte Research Report

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Executive summary

This report looks at the thorny issue of energy costs facing UK manufacturers. It reviews some of the underlying causes and suggests ways for manufacturers to live with higher energy prices.

The June 2008 Producer Price statistics recorded the highest annual increase in producer input prices since records began in 1986.¹ Much of this increase is driven by the high cost of energy, fuel and the resulting impact on raw material prices and other parts of the supply chain. Fuel and raw materials account for one-third of the costs of manufacturers. While overall input prices have dipped since June thanks to a fall in crude prices,² energy continues to make the biggest contribution to UK manufacturing costs. According to estimates by the Energy Intensive Users Group, UK energy intensive industry groups like manufacturing currently spend around £2.4 billion on gas and £5.2 billion on electricity per year. Approximately 70 to 80 per cent of this cost is attributable to the wholesale cost of gas and electricity.³ By July 2008, UK manufacturers were paying 82 per cent more for gas, 74 per cent more for oil, 24 per cent more for electricity and 21 per cent more for raw materials than in July 2007.⁴

For the UK manufacturing sector to remain competitive, achieving much tighter control of energy consumption and expenditure is essential. Energy cost inflation is not a cyclical trend requiring a temporary response. Structural reform will be necessary, involving a step change in thinking, processes and actions with regard to energy usage. Living in a high-cost world requires changes to existing production processes, upfront investment in energy efficient devices, an ability to respond quickly to changing energy market conditions and possibly a redesign of end products that require less energy to produce. The efficient use of energy needs to be a core performance metric built into the reward structure of management.

- **Financial discipline** – The days of energy being regarded as another annual overhead to be paid are over. Given its impact on costs and production, energy is an increasingly important strategic issue for UK manufacturers. It needs to be treated with the same financial discipline as other critical business costs. Manufacturers should apply lean-thinking techniques and treat energy as a scarce resource. Making sure the lights are turned off each night and allowing energy contracts simply to roll over each year will not be enough.
- **Energy must be carefully managed** – The ability to manage energy well by producing more with less may be the difference between success and failure. Too often the only response to higher energy prices is to seek to lower them. This is a missed opportunity. Instead, manufacturers need to develop a policy of energy management, focusing as much on how energy is consumed as well as on price. Manufacturers need to factor in energy considerations when planning new products or changing manufacturing processes. Good energy management can generate business opportunities and improve the bottom line. Producing more with less generates competitive advantage.
- **Know your business** – Understanding how energy is used in the business is critical. This allows manufacturers to identify areas of wastage and quickly implement energy cost savings.
- **Sustainability is the panacea to rising energy costs** – Manufacturers need to adopt the principles of sustainable design when planning new production sites or upgrading plants. Forward-thinking manufacturers are already retrofitting existing plants and facilities to be more energy efficient. Upfront investment in high-efficiency electrical, ventilation, plumbing and lighting systems should pay dividends by reducing overall energy bills. With sustainability issues creeping into the public's attitude, firms risk damage to their reputations and the potential loss of customers if they do not embrace the green agenda.
- **Making energy from waste** – Companies can reduce energy consumption, cut emissions and achieve significant cost efficiencies by exploiting waste streams generated in the production process. The technology is already there. Waste heat recovery boilers can produce steam that can turn turbines and generate a clean form of electricity.
- **An integrated approach is needed** – Manufacturers can reduce energy costs via simple operational improvements and more complex changes to production processes and products. The real opportunity to drive down energy costs lies with improving efficiencies in the manufacturing process such as the use of recycled waste-heat and high-efficiency motors. An integrated package of measures combining demand management technologies (smart meters, collection devices and analytical software), flexible purchasing contracts, risk management tools, localised generation of energy and innovative transport solutions is most likely to succeed.

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- **Management must engage with its workforce** – Managers must empower staff to be energy efficient by giving them explicit responsibilities for energy management and rewarding those who deliver savings.
- **Clarity on costs** – Investing in energy-saving equipment delivers real savings, in terms of lower utility bills and lower carbon emissions. However, uncertainty may deter investment. For energy efficiency investment to be successful, manufacturers will need more clarity on the costs and benefits. Price signals alone are not enough. Initiatives designed to reduce energy consumption will need to be measurable in order to evaluate their effectiveness.
- **Less red tape, more support** – Smaller manufacturers lack resources for investing in energy-saving projects. There are grants for the installation of energy-saving equipment but these are sparse, involving several bureaucratic hurdles. Outside the Carbon Trust, few support mechanisms exist. Removing administrative red tape and introducing more financial support measures (that is, interest free loans, capital grants) that target smaller manufacturers will help to alleviate some of the pain of higher energy prices.
- **Build a risk management function** – Energy is an ongoing issue for manufacturers. With volatility an intrinsic characteristic of energy markets, both price and volume risks relating to energy need to be carefully managed. Introducing internal risk controls to manage these risks will help to reduce this exposure.
- **Bridging the competitiveness gap** – Analysis in July 2007 by the Energy Intensive Users Group (EIUG) showed that UK manufacturers are paying considerably more for gas than their continental neighbours and US competitors.⁵ UK energy prices paid by industrial energy users need to be on a par with prices charged in continental Europe. Additional gas storage capacity, greater access to liquefied natural gas (LNG) terminals, and the European Union delivering on its promise of a fully liberalised European energy market would help reduce price differentials.

With careful planning, along with some upfront investment, it should be possible for businesses to insulate themselves from high energy costs and safeguard margins. The rewards for responsible and forward-looking energy management are high. Manufacturers that successfully reduce their energy consumption by running more sustainable businesses are likely to have lower costs, better margins and be in a stronger market position. In such a competitive world, where low cost and lean production is king, manufacturers cannot afford to ignore this issue.

Introduction:

The balance of power – how can UK manufacturers control energy costs and remain competitive?

Energy is an issue that UK manufacturers can ill afford to ignore. After years of cheap energy, its cost to manufacturers has increased dramatically with input prices increasing by over 30 per cent in the year to June 2008.⁶ This is not just a UK issue. A 2007 study on climate change by IPCC estimated that by 2020, 50 per cent of US manufacturing costs will be energy related.⁷

Since the start of 2006 the UK manufacturing sector has showed remarkable resilience. UK manufacturers enjoyed the longest run of sustained demand for 12 years, with orders for capital goods approaching record heights, and seasonally-adjusted manufacturing production in the ascendancy since Q1 2006 (see Figure 1).^{8,9}

This performance is all the more remarkable given the cost inflation hitting the sector and strong overseas competition. Energy costs, the scourge of manufacturer operating margins in late 2005, also appeared to be under control. The Winter 2007-2008 Business Energy Survey by npower found that energy prices remained static in 2007 for most of their respondents, reflecting greater stability in wholesale energy markets and improvements in the United Kingdom's energy supply infrastructure.¹⁰

A lot can change in a few months. Since March 2008, business confidence in the manufacturing sector has declined following the sharp spike in wholesale energy prices, slowing demand outlook, falling output and fears of recession. Manufacturing output has fallen for the fourth consecutive month with output in June 2008 0.8 per cent below its level in June 2007.¹¹

The April 2008 CBI industrial survey made for dismal reading, reporting a sharp drop in new orders as the credit crunch, rising costs and economic downturn took its toll on manufacturers. Thirteen per cent more firms reported a fall rather than a rise in new

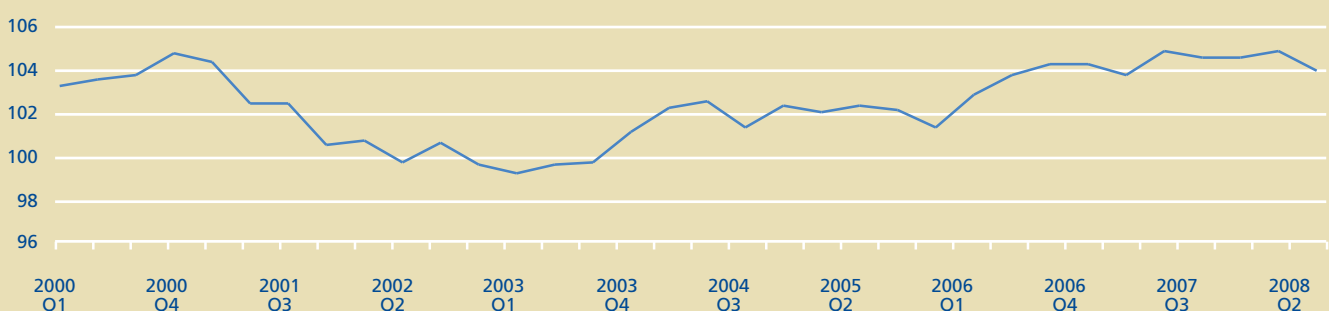
orders. This is the biggest reversal in orders since records began in 1977.¹² The CBI survey of August 2008 added further to the gloom, with British manufacturers experiencing the worst price pressure for 30 years.¹³ Average unit costs increased for 65 per cent of firms in the sample.¹⁴ Another measure of manufacturer business confidence, the CIPS Purchasing Managers' Index, recently fell to its lowest level since December 1998 as manufacturers battled with the destructive influence of falling demand and record cost inflation.¹⁵ While economic growth will eventually recover, it is difficult to foresee a sustained fall in energy prices in the near future.

High and volatile energy costs are beginning to have a serious impact on manufacturing performance, particularly for smaller producers. According to the CBI's July 2008 survey of Small and Medium Enterprises, over half (62 per cent) of the survey respondents reported a rise in average unit costs for the three months up to July 2008 due to much higher energy and raw material prices.¹⁶ Bigger manufacturers are not escaping either. The CBI/Experian August 2008 Regional Trends survey, covering the whole of manufacturing, reported the sharpest rise in unit costs across several key manufacturing regions since the survey began in 1988.¹⁷ Even sharper increases are expected ahead. Declining output, plant shut-downs, wholesale relocations of production sites, investment claw-backs, research and development (R&D) freezes and job losses are some of the adverse consequences of living with higher energy prices and unstable energy supplies.

Viewed in the current context of financial market turbulence, rising energy costs are an unwelcome headache for manufacturers. Manufacturer energy costs are increasing against a backdrop of tighter credit conditions, rising pension liabilities, slowing demand, strong competition from low-cost overseas producers and stricter environmental regulation. High energy prices combined with costly

Figure 1: UK manufacturing production

Production index (2003=100)



Source: Index of Production First Release, Office for National Statistics (ONS), July 2008.

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measures to reduce carbon footprints are putting pressure on wafer-thin margins. Passing on higher costs by raising prices makes it more difficult for UK manufacturers to compete with lower cost overseas producers. Higher prices may protect margins in the short term but they come with the risk of reduced sales and lower market share.

Environmental legislation is also applying pressure by raising the cost of electricity. The Carbon Reduction Commitment (CRC) is an auction-based emissions trading scheme designed to encourage organisations to reduce their CO₂ emissions. UK manufacturers not subject to existing emissions regulation (that is, Climate Change Agreements) will naturally fall under this scheme. According to the Fifth npower Business Energy Survey published in February 2008, 75 per cent of major energy users surveyed believe the combined pressures of the Climate Change Levy, European Union Emissions Trading Scheme and the CRC will place increased pressures on businesses.¹⁸

If unchecked, rising energy costs quickly translate into declining margins. Higher selling prices will eventually lead to a long-term loss of competitiveness. How can manufacturers minimise the impact of rising energy costs on their margins, and how can they protect market share? They need to embrace the guiding principles of lean production. Being a lean, low-cost manufacturer and being energy efficient are not mutually exclusive goals. Lean thinking is closely linked with sustainability policies, given the shared focus on waste reduction, optimising space, reducing energy costs and enhancing performance.

Controlling energy expenditure will be a key differentiator in the marketplace. The winners will be those companies that understand well how energy is used in their businesses and are able to economise on usage. Those manufacturers that confront the problem head-on by investing in the monitoring, control and eventual reduction of energy costs will find themselves operating at a significant cost advantage to their peers.

Finding 1:

Understanding the impact of energy costs on manufacturing

Manufacturing is an energy intensive process with energy making a significant contribution to production costs. According to analysis by the EIUG, energy contributes up to 25 per cent of production costs for steel and paper manufacturers and around 40 per cent of costs for aluminium smelters and certain chemical processes.¹⁹

Energy primarily impacts manufacturers via three channels. Firstly, energy costs have a direct impact on manufacturer bottom lines through their influence on profits and earnings. Secondly, the cost and availability of energy has an impact on how much a firm can produce, that is, its production volumes. Thirdly, energy plays an increasingly important role in influencing planning and investment decisions.

Impact 1 – The bottom line

Energy costs directly impact the bottom line with manufacturer margins being hit from several angles:

- **Direct impact on costs** – via the consumption of energy (mostly gas and electricity). Persistently high and volatile energy prices have pushed up the cost of goods sold and squeezed manufacturer margins.
- **Supply chain impact** – high fuel and energy prices have filtered through the supply chain as higher raw material prices.
- **Compliance costs** – the costs associated with complying with new environmental standards and energy market systems. Compliance with schemes, such as ISO 14001 and Integrated Pollution Prevention and Control (IPCC), and European regulations such as the Energy Savings Directive has imposed pressure on UK businesses to be more energy efficient. It has also increased costs.

These margin pressures have been compounded by manufacturers' reticence to pass these increased costs to customers for fear of losing market share to lower cost producers overseas. The evidence since the tail end of 2007 (that is, the quarterly CBI Industrial Trends surveys) indicates that UK manufacturers are more comfortable with passing on elevated input costs to their customers.

Impact 2 – Production

Manufacturing relies on having secure and dependable energy supplies. Without a secure supply of energy, production targets will be missed, resulting in an immediate loss of sales and potential loss of customers.

The gas shortage of the winter of 2005 was a sharp reminder of how vulnerable the United Kingdom's energy supply position is and how sensitive manufacturers are to disruptions in supply. As the United Kingdom found itself short on gas, several UK manufacturing and chemical companies scaled down production and some companies were forced to shut down altogether. A November 2005 survey by the Birmingham Chamber of Commerce, of manufacturers in the West Midlands, found 90 per cent of respondents were concerned that their businesses might be seriously affected by shortages and unprecedented energy costs.²⁰ Forty per cent thought that energy shortages could force their companies to stop production.

Despite investment in new gas import infrastructure, worries remain about the United Kingdom's future energy supply position. The United Kingdom has an ageing power station fleet and faces a shortage of power generation capacity by 2010-2015 as nuclear and coal-fired power stations retire from active service. At least 40 per cent of the existing power station fleet in the United Kingdom will need to be replaced.

Building more gas-fired power stations raises concerns about the security of supplies because with UK indigenous gas reserves in steep decline, a dash to gas increases dependency on overseas gas supplies. The United Kingdom needs a diversified portfolio of nuclear, gas-fired and clean-coal power stations combined with various renewable energy technologies. Building a new energy infrastructure presents significant engineering, investment and financing challenges:

- **Skills shortage** – There is a shortage of engineering skills in the United Kingdom necessary to build a new energy infrastructure. For example, the United Kingdom has not built a nuclear power station since the 1960s. The average age of UK engineers has been increasing gradually over the last 20 years, and is now over 55. Industry experts therefore doubt whether the United Kingdom has the specialist engineering skills base and capability to drive an ambitious new-build programme.

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- **Challenging economics** – Nuclear power has unique financing features that set it apart from other generation technologies. Firstly, nuclear new build has very high initial capital costs associated with long construction lead times. Secondly, building a nuclear plant is often subject to planning delays (Sizewell B took 12 years to build), leaving plants highly vulnerable to fluctuations in power prices.
- **Getting private sector buy-in** – It is difficult to attract private-sector investment given such challenging economics and uncertainties. Without a long-term price signal for carbon and stable price for electricity, it will be very difficult to get private sector buy-in.
- **Renewable generation** – A big problem with renewable energy is that it cannot be relied upon to meet the United Kingdom's baseload electricity demand. Critics point to the intermittent performance of renewable energy, its need for conventional fuel as back-up generation and, with nuclear back on the energy policy agenda, its long-term commercial future. Currently 2 per cent of the United Kingdom's energy is generated from renewable sources. Reaching the European Union's 15 per cent target by 2020 will require significant investment and a considerable leap of faith.
- **Clean-coal** – Greener coal alternatives such as Carbon Capture and Storage (CCS) or Advanced Combustion Technologies are currently extremely expensive and are seen as longer-term opportunities.

Impact 3 – Investment and planning

Large-scale investment is conditional on attaining some degree of stability, visibility and certainty on costs. Volatile energy costs interfere with investment planning decisions by making it difficult for manufacturers to plan ahead and set their capital expenditure programmes. High energy costs also crowd out investment capital. For example, as a result of high energy costs, manufacturing investment in the United Kingdom has been scaled back to focus on cost reduction and improving productivity rather than pursuing value-enhancing, organic growth initiatives.

The high cost of energy is one of the contributing factors to the slump in business confidence that has reduced the flow of investment funds. Manufacturer worries regarding high energy costs coupled with slowing demand, a deteriorating economic outlook and reduced earnings expectations have curbed the appetite for investment in manufacturing. This is reflected in the quarterly CBI Industrial Trends of July 2008 where confidence among manufacturers fell to its lowest level since October 2001, with reduced employment and investment intentions.²¹

Finding 2:

Manufacturer energy costs are back on an upward path

Energy takes up a big share of manufacturing costs. Between 2001 and 2006, average UK industrial gas and electricity prices increased by 121 per cent and 76 per cent respectively with severe price spikes in the winter of 2005 when the United Kingdom was short on gas.²² At the end of 2006, energy prices fell to manageable levels. This was due to significant improvements in the UK gas import infrastructure. New pipelines and inter-connectors with European gas-trading hubs, and increased gas-storage capacity and LNG-receiving terminals, increased the flow of gas into the United Kingdom. This helped to reduce wholesale gas prices and eased energy cost pressures for manufacturers.

Unfortunately this relief appears to have been temporary. Wholesale energy prices are on a steeply upward trend. UK natural gas prices have increased by over 114 per cent in the year to date.²³ Crude oil prices have increased by over 86 per cent in the year to June 2008.

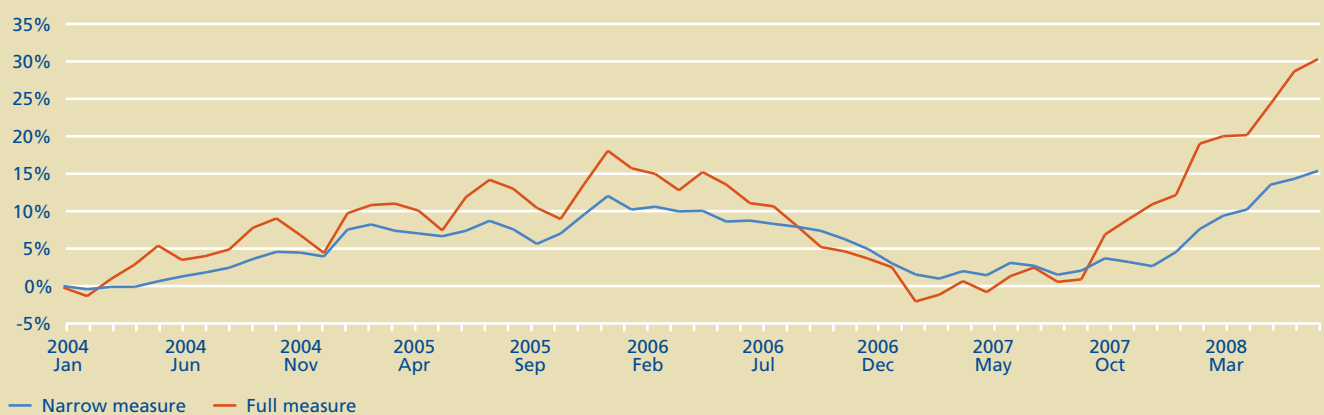
High oil and gas prices have quickly translated into high electricity and raw material prices, which feed into manufacturer costs. The overall UK manufacturer input price index increased by 30.3 per cent

in the year to June 2008.²⁴ This is the largest annual rate of increase since records began in 1986 with 54 per cent driven by crude and petroleum product prices alone. The narrow measure of the input price index increased by 15.4 per cent in the year to June 2008.²⁵ Tellingly, it represents the highest rate of annual increase since January 1980 (25 per cent) and is compelling evidence that after a period of relative calm, energy costs are a serious concern for manufacturers (see Figure 2).

The input – output price gap

More worrying than the increase in fuel and raw material prices is the growing gap between manufacturer input prices and output prices. Input price inflation has outpaced the rate of increase in manufacturer output prices by a factor of three. Since January 2005, UK manufacturing input prices, adjusted for the climate change levy, have increased by almost 50 per cent while output prices have managed to grow by just over 18 per cent.²⁶ The gap between input and output prices grew for the ten months up to June 2008, suggesting that UK manufacturers are finding it increasingly difficult to pass on the increase in costs to their customers.

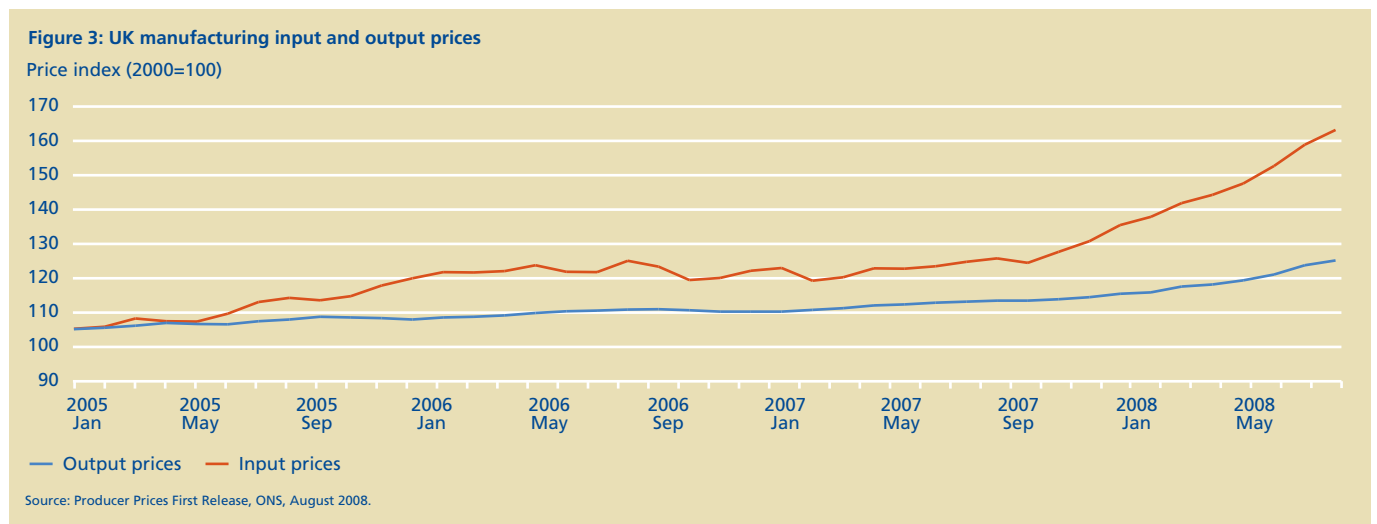
Figure 2: Annual change in manufacturer input prices



Source: Producer Prices First Release, ONS, June 2008.

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This is despite the highest annual increase in manufacturer output prices (10 per cent) since August 1991 (see Figure 3). With demand slowing since the onset of the credit crunch, UK manufacturers have limited scope to share their energy cost burden with customers.

Competitiveness gap

To make matters worse, there is evidence that UK manufacturers are paying significantly more for gas and power than their European and US counterparts. This is creating a competitiveness gap that UK firms will find hard to bridge. Recent analysis of energy forward

markets by the EIUG showed the differential between UK and US/European gas and electricity prices rising.²⁷ In July 2008, UK gas prices were approximately 16 per cent above those in continental Europe and in September, UK electricity prices were around 38 per cent higher than German power prices on a year-ahead basis.

Finding 3: Energy prices – the forces at work

Global energy prices are shaped by a complex interplay of supply and demand forces, geopolitical factors, exchange-rate differentials, emissions trading schemes, weather patterns and climate change policies. As well as influencing the direction of prices, all of these factors contribute to the volatility of energy prices. Energy prices are high and hard to predict. This makes it more difficult for internal energy managers to manage energy costs efficiently and plan ahead.

The spike in manufacturer input prices seen across 2008 is due largely to a steep rise in crude oil and fuel prices. The price of crude was up by 86.4 per cent in the year to June 2008, and the price of fuel, up by almost 32 per cent – the highest annual rate of increase since July 2006.²⁸ Crude prices contributed to over half of the total annual increase in manufacturer input prices.

Oil price movements in 2008 have been extraordinary. Brent crude, the UK benchmark price, reached \$145/bbl in July 2008, an all time high and almost 400 per cent higher than its price five years ago.²⁹ While crude prices have tapered off from the record highs of July 2008, few believe that the era of high oil prices is over given such a fragile supply dynamic and the continued reliance of the global economy on oil. A spot check of investment bank forecasts for Brent crude oil by Bloomberg in September 2008 produced a weighted average crude price of almost \$130/bbl in 2012 with some leading analysts predicting crude to reach \$155/bbl (see Figure 4).³⁰

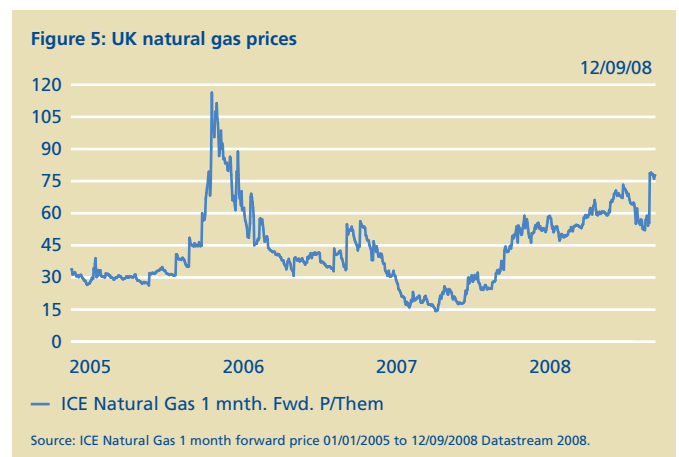
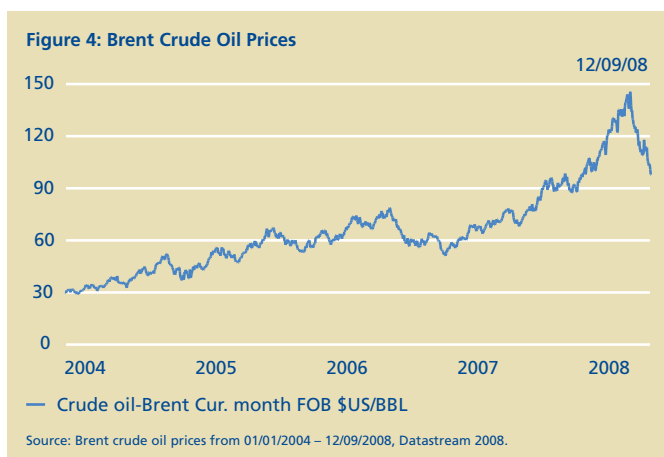
The factors driving oil prices to record heights are both economic and political. At the core of the inflationary spiral is a classic supply and demand imbalance. High demand for oil driven by strong economic growth from emerging economies (particularly the BRIC nations) has rapidly outpaced supply. A draw-down in global crude stocks and product inventories combined with tightness in refining capacity, increased production and oilfield service costs, and skilled labour shortages has blunted the supply response. Rising geopolitical unrest in oil-producing regions, such as Iran and Nigeria, is also increasing supply concerns and applying upward pressure on oil prices.

Supply has been constrained because of under-investment in production capacity. A recent report by the Chatham House think tank questioned the willingness of leading companies to invest in the oil industry.³¹ International Oil Companies (IOCs) are returning investment funds to shareholders rather than investing in production infrastructure.

This chronic supply shortage has prompted speculation of a new commodity super cycle. Goldman Sachs recently published a research note that mooted the possibility of \$200/bbl oil within the next six to 24 months.³² This is being priced in by the forward markets. Oil futures reached new heights in June 2008 with contracts as far out as December 2016 almost breaching \$140/bbl.³³

Gas prices for UK manufacturers also increased sharply with a 78.5 per cent annual increase in the year to June 2008.³⁴ This increase is largely due to the steep rise in oil prices. Many gas buyers, especially in continental Europe, buy gas on long-term contracts with its price index-linked to oil prices. Although the United Kingdom's gas price is partly driven by spot trading, greater interconnection between the United Kingdom and Europe (that is, the United Kingdom/Belgium Interconnector pipeline, the United Kingdom/Dutch BBL pipeline and the United Kingdom/Norway Langeled pipeline) has increased the exposure of UK gas prices to continental European energy markets. Tightness in gas supply has also increased volatility and pushed energy prices upwards. With indigenous supplies waning, the United Kingdom is increasingly dependent on imports. The United Kingdom also has limited gas storage capacity relative to European neighbours like Germany.

Movements in wholesale gas prices have been extraordinary. The United Kingdom's one-month natural gas forward price increased by 141 per cent from the start of 2007 to September 2008 (see Figure 5).³⁵ The European oil-indexed gas price could hit 110 pence per therm if oil settles at around \$200 per barrel. High gas prices tend to translate into high electricity prices.



Finding 4:

Learning to live with high energy prices

All indicators suggest that high energy prices will continue in the medium to long term. The forces driving a wedge between the demand and supply of energy commodities are so strong that it is difficult to imagine a future of low and stable energy prices.

A different way of thinking is needed

Companies react to high energy costs in a variety of ways. Some manufacturers are shifting production facilities overseas to lower cost countries where energy is cheaper and labour costs lower. For others, particularly smaller manufacturers, the energy cost burden is so large that production is being shut down permanently.

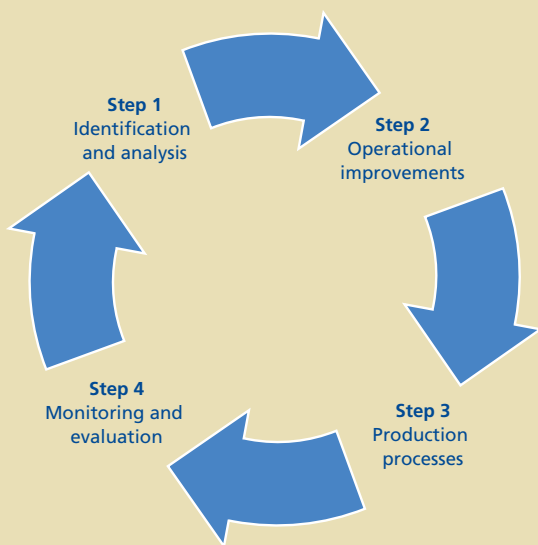
Plant relocations and closures are drastic measures. With careful planning and modest investment, energy savings can be made. For some manufacturers, it may require a rethink of existing business practices or a change in mindset. Energy needs to be treated as a cost of goods sold and managed with the same discipline as labour, capital, overheads, raw materials and inventories. Monitoring a company's energy productivity index (the amount of energy used to create a product or service) allows managers to see how efficiently energy is being used in the business.

Being prepared to modify buying policy as the market changes using flexible price contracts is one way of reducing the impact of volatile energy prices on the bottom line. Rethinking distribution channels and end markets is another – long distance trade only makes sense if transport costs are low. Using energy more efficiently throughout the business – from critical production processes to auxiliary operations – is another option. It requires manufacturers to be more aware of prevailing trends in energy markets and to have a clearer understanding of how energy is used in their businesses.

Identification, operations, processes and monitoring

Successful strategies may involve identification of energy saving opportunities, operational and process improvements, and monitoring/evaluation to ensure all benefits are captured (see Figure 6).

Figure 6: The virtuous cycle of improvement



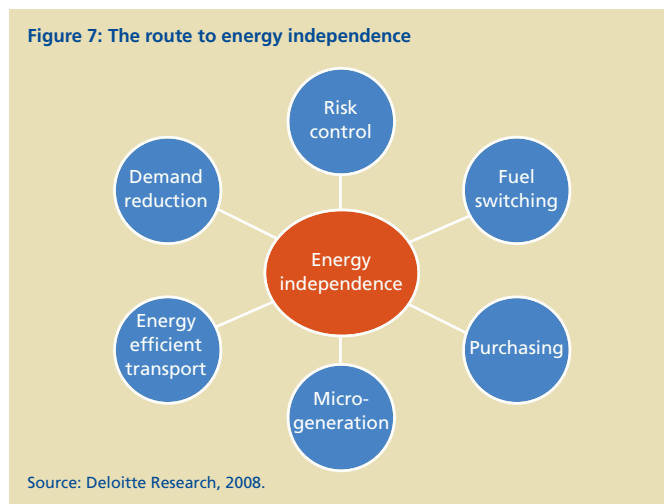
- Step 1: Identification and analysis – Quantify energy costs across the supply chain. Conduct an energy audit to understand how energy is used in the business, examine how it can be used more efficiently and identify potential cost savings. This is a data-intensive phase, so good quality data is essential. Firms need to make up-front investment in metering and data processing systems. Without data analysis tools it is difficult to determine the energy efficiency of a process and justify expenditure on energy reduction investments.
- Step 2: Operational improvements – Target the quick wins. Typically this will involve operational improvements such as installing building management systems to switch off lights and regulate heating, fitting energy-saving light bulbs, introducing switch-off audit for electric motors and sealing leaks.
- Step 3: Production processes – Adjust processes. This is a longer term goal that requires more investment but tends to have the biggest pay-off in terms of reducing energy costs. Options include the use of greener materials in products, redesigning engineering techniques, recycling waste streams, introducing high-efficiency motors and a redesign of products/services. Some sectors are sub-contracting parts of the manufacturing process. For example, in the automotive sector, paint companies are now spraying as well as supplying paint. Energy savings are also possible further up the supply chain (that is, raw materials and packaging).
- Step 4: Monitoring and evaluation – Energy performance monitoring tracks key performance indicators across the supply chain. This ensures that benefits identified in the energy audit and acted upon in steps two and three, are sustained in the long term. Manufacturers need constantly to gather, analyse and act on energy data to identify saving opportunities.

Source: Deloitte Research 2008.

Finding 5:

A route map to energy independence

It is vital that UK manufacturers develop effective strategies to control their consumption of energy and manage their energy costs. A range of options could be considered, from flexible purchasing contracts and risk sharing, to localised generation of energy and strategies designed to reduce energy consumption (see Figure 7).



Demand abatement strategies

The key to easing cost pressures is to reduce energy consumption. Virtually all energy intensive companies are engaging in some form of energy demand management. They are either reducing the absolute amount of energy consumed or consuming energy more efficiently across the production chain:

- **Internal energy audits** – Many companies, often working with outside specialists such as the Carbon Trust, have conducted energy audits to improve their understanding of energy costs and to identify potential cost savings. Audits are backed by the appointment of energy champions and sustainability councils giving staff specific responsibilities for energy management.
- **Energy management technologies** – In a modern energy management system there are three components: smart meters providing the data, specialist devices collecting the data, and software analysing the data:
 - **Smart meters** encourage the responsible consumption of energy resources. They reduce costs, offer improved data accuracy and generate better usage information. Smart meters are expected fundamentally to change the way customers and suppliers interact because information is exchanged rather than fed, one way, to customers. By making energy costs and usage more transparent, manufacturers can switch from using energy at peak rates and cut costs.

- **Data collection and analysis software** enable the information supplied by meters to be channelled effectively. Advances in Web-based software solutions allow customers to collect more detailed, accurate and timely data and then analyse it to make informed choices regarding energy use. For example, installing gas, steam and condensate meters with an automatic data collection facility is inexpensive and provides information on fuel to steam efficiency. This indicates the potential for energy savings.

- **Process efficiency** – Companies are reducing energy costs via product innovations and improving the efficiency of manufacturing processes (lighting, space heating, ventilation):
 - Capturing waste heat generated in the production process and recycling to produce power. This also reduces greenhouse gas emissions. Gas consumption can be cut by reducing steam wastage.
 - Simple changes to pressure valves and temperature settings on boilers.
 - Scheduling, for example running systems like air-conditioning units in sequence rather than all at once. By helping to smooth power usage, scheduling helps to reduce peak demand and cut energy bills.

Purchasing innovations

Manufacturers are typically energy intensive users and cannot afford to be locked into high energy prices. Sophisticated and flexible buying policies help to reduce exposure to volatile commodity markets and thereby protect costs:

- **Flexible contracts** – Companies are changing the way they buy energy from increased use of wholesale floating contracts (as opposed to the traditional one-year fixed contract) to more sophisticated mechanisms such as online tendering, e-procurement and auctions. Flexible contracts allow manufacturers to time purchases to avoid peaks in the market and to take advantage of energy price falls.
- **Buying on forward markets** – Some industrial users are responding to higher energy bills by shifting towards short-term contracts or using forward contracts to purchase a greater quantity of energy day-ahead or month-ahead. Smaller companies in particular, with day-to-day cash flow considerations, tend to favour shorter contracts. Larger manufacturers are entering into longer term power purchase agreements with utilities to lock into stable energy prices.

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- **Outsourcing** – A growing trend involves manufacturing companies outsourcing their energy needs to purchasing specialists such as Utilyx and Encore International. The resulting energy savings more than cover the cost of commission fees. Energywatch has estimated that around 60 per cent of all energy consumed by businesses is now bought by third-party intermediaries (TPIs).³⁶ TPIs provide a range of services such as procurement, market analysis and risk management.
- For smaller manufacturers, **energy consortiums** can reduce the energy cost burden. Smaller firms have significant energy costs but lack buying power. Joining forces with rival suppliers allows them to aggregate purchasing power.

Risk management

Closely aligned to buying strategies are risk management procedures that manage the different elements of energy risk. Manufacturers face two key energy specific risks:

- **Price risk** – exposure to volatility of energy prices and the cost of energy.
- **Volume risk** – the ability to secure a company's energy requirements.

Combining flexible purchasing with proven energy risk management allows for greater control of both energy purchases and energy consumption. Risk-sharing products are being offered by energy suppliers and brokers alike. Sophisticated hedging and financial derivative instruments (for example, options, swaps, price caps and collars) can protect manufacturers against swings in gas and power prices. Greater access to energy market information and the emergence of energy broking services has enabled manufacturers to manage their energy portfolio more effectively.

Fuel switching

Manufacturers can reign in high energy costs by switching fuels. In 2005, Pilkington, the UK glass maker, switched from using gas to oil to run its UK operations because its gas bill was too high.³⁷ Some energy intensive sectors, notably cement and glass, are increasingly sourcing their energy needs from waste products. Used tyres, recycled liquid fuels, plastic packaging waste and sewage sludge pellets have all been used. Use of waste-derived fuels had a secondary benefit in helping to reduce overall emissions from cement kilns.

Microgeneration

Microgeneration is the generation of zero- or low-carbon heat and power by individuals, businesses and communities to meet their own needs. Some manufacturers are generating their own electricity and heat via renewable energy sources (typically mature renewable technologies such as wind power) to reduce exposure to high wholesale energy prices. Schemes are now emerging for financially viable wind power generation projects independent of the grid:

- **Nissan's** factory in Sunderland has eight wind turbines to generate 6 per cent of the plant's energy requirement. Local power stations supplying the factory save 4,000 tonnes of CO₂ emissions per year.
- **Ford's** Dagenham diesel engine plant has mini wind-turbines to generate energy, saving 6,500 tonnes of CO₂ per year. **Ford's** engine production line in Dagenham won a Green award through innovative use of waste and recycled materials.³⁸

Combined Heat and Power (CHP) is also a popular option. This recycles waste heat from electricity generation to produce electricity as well as heat. Although installation and capital costs are relatively high, running costs are low. Localised generation projects have additional benefits beyond reducing energy costs – they can lead to exemption from the climate change levy for some manufacturers via the use of Levy Exemption Certificates (LECs).³⁹

Transport-based solutions

Road transport accounts for 22 per cent of the United Kingdom's total emissions and makes a big contribution to the annual energy bill of UK manufacturers.⁴⁰ Several initiatives are helping reduce this burden:

- **Fleet management** – Reducing the carbon footprint of corporate fleets helps to reduce emissions and lower energy costs. Low-cost emissions monitoring systems enable companies to identify and replace high-emissions vehicles. A recent study by the Energy Saving Trust revealed that the UK economy could save up to £3 billion per year if businesses switched to greener company cars.⁴¹
- **Improved fuel economy** – Innovations in fuel and engine design are helping to cut emissions while increased use of lighter materials is improving fuel economy. New technologies are reducing the energy consumption of cars. For example, Stop and Go technology cuts engines at traffic lights to save fuel. Brake Energy Regeneration saves on energy lost when brakes are applied and Switch Point Display informs drivers of the most economical gears to use. Automotive technology is focused on improving fuel economy and optimising engine performance.

Examples are:

- **General Motors** announced a new high-efficiency technology – Homogeneous Charge Compression Ignition (HCCI) – that promises to cut fuel consumption by up to 15 per cent.⁴² This advanced combustion technology burns fuel at lower temperatures and reduces heat energy lost during the combustion process.
- **BMW** launched EfficientDynamics in 2007, a package of technologies and energy management systems designed to improve vehicle effectiveness and increase fuel economy by 25 per cent.⁴³ The combination of fuel saving innovations, reduced weight and the right level of energy lubricants, fluids and tyre pressure could save motorists up to £520 per year.⁴⁴
- **Michelin** introduced a new tyre in early 2008, the Michelin Energy Saver, which reduces rolling resistance by 20 per cent. This green tyre improves fuel consumption and lowers emissions.
- **Low-emission engines** – Automotive manufacturers are leading the way in developing low-emission engines:
 - **Hybrid cars** combining electric and petrol engines. These hybrid models have superior performance both in terms of miles per gallon and level of emissions.
 - **Electric vehicles**. UK manufacturer Smith Electric Vehicles, a world leader in the manufacture of zero-emission electric vehicles launched its first vehicles for mainland Europe in August 2007.⁴⁵
 - **Diesel engines** are increasingly finding favour over traditional petrol-run engines. As well as generating superior performance and lower emissions, there is more scope for innovation in diesel engines because they can be combined with different fuels.
 - **Hydrogen and fuel-cell vehicles** are an exciting development but several years from commercialisation. Advanced hybrid vehicles with fuel cells are better positioned in the medium term.
- **Biofuels** – Biofuels such as biodiesel and ethanol are also making a difference. Flexible-fuel cars running on petrol or E85, a high ethanol blend have been shown to reduce emissions and fuel expenses. SCA Packaging switched its transport fleet over to biodiesel and reduced fuel costs by 55 per cent.⁴⁶ Despite the potential of biofuels, a limited UK biofuel supply infrastructure, questionable green credentials and warranty issues are limiting their impact as a serious alternative to fossil-fuel transport fuels. Following the report of the Gallagher Review, the Government is urging caution over the the introduction of biofuels in the United Kingdom. The report, commissioned by the Renewable Fuels Agency, recommended scaling back the growth of biofuels until adequate controls are introduced to reduce their adverse effects on the environment and the food industry.⁴⁷

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Conclusion

The health of the United Kingdom's manufacturing sector is conditional on securing a reliable supply of energy at affordable prices. With oil prices exceeding \$120 per barrel and talk of \$200 oil on the horizon, energy is proving to be the spoke in the manufacturers' wheel.⁴⁸ Manufacturers are searching for relief from today's high energy costs and price volatility. Also, with persistent geopolitical tensions in major oil and gas-producing regions, UK energy supply is far from secure.

With rising energy bills and emissions trading schemes penalising excessive consumption, UK manufacturers have powerful incentives to reduce their energy usage and carbon footprints. While new

sources of energy supply, such as the revival of the United Kingdom's nuclear programme, new LNG terminals and gas pipelines and the building of a renewable energy infrastructure, will improve the reliability of energy supplies, they are unlikely to result in cheaper energy for manufacturers. High energy prices will continue to put pressure on manufacturer margins for some time. If UK manufacturers are to be truly competitive on a world stage, running a tight ship on energy consumption and expenditure will be essential.

Notes

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