

Manufacturing: New Challenges, New Opportunities

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BERR | Department for Business
Enterprise & Regulatory Reform

Department for
**Innovation,
Universities &
Skills**

Manufacturing: New Challenges, New Opportunities

Foreword

"...for this government manufacturing not only has been, but remains and will always be, critical to the success of the British economy..."

Gordon Brown

Manufacturing matters. It creates wealth, sustains jobs and is central to our economic success. It has been the foundation of our strength as a trading nation in both the past and the present.

UK manufacturing has been succeeding in a fiercely competitive global environment, with particular challenges from emerging economies. Manufacturing has made the changes – many of them difficult – to emerge as a major success story of the economy. That is often not recognised – too many still think of manufacturing wrongly as fixed in an era of heavy engineering and in decline. Modern manufacturing is at the frontier of new technologies, products and ways of working. Our future lies in a mixed and balanced economy with manufacturing and services reinforcing each other.

Manufacturers are clearly affected by the current global economic slowdown, and rising fuel and materials prices. The Government recognises that these are demanding times and is committed to helping manufacturers to get through them.

For the medium term, we have identified trends in global manufacturing that provide new challenges and opportunities, not least in the transition to a low carbon economy. The Government has reviewed and refreshed its medium term strategy for the sector to reflect these new dynamics and to adjust the way we support companies for future success. We want manufacturing to emerge from this challenging time stronger and fitter than before. To achieve that we are committed to building the best framework of support, developing the right skills and creating an environment in which British manufacturing can seize new opportunities and remain a global success.



A handwritten signature in black ink that reads "John Hutton".

John Hutton
Secretary of State for Business,
Enterprise & Regulatory Reform



A handwritten signature in black ink that reads "John Denham".

John Denham
Secretary of State for Innovation,
Universities and Skills

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Part 1: Manufacturing Matters



INTRODUCTION

- 1.1** Manufacturing has been, and continues to be, critical to the success of the UK economy. Britain's strength as a prosperous trading nation over the past three centuries was built on manufacturing. Looking forward, a thriving modern manufacturing sector is central to the future success of the British economy.
- 1.2** Manufacturers face major challenges in the short-term – the global economic slowdown compounded by high input prices for energy and raw materials – and in the longer term, as the pace of globalisation continues to intensify. But at the same time, longer term changes in the global economy present tremendous opportunities in new and growing markets¹, which Britain is well placed to exploit.
- 1.3** The UK's global connections provide ready access to global markets, while our flexible labour force and light touch regulatory environment enable quicker responses to changing demand.
- 1.4** It is therefore vital that British manufacturing continues to have the right long-term framework of support to ensure it emerges from the global slowdown stronger and fitter than ever, and better placed to exploit the new opportunities of an increasingly interconnected economy.
- 1.5** Based on extensive consultation and working with the Ministerial Advisory Group on Manufacturing² and other stakeholders³ the Government is launching a new Manufacturing Strategy. This builds on the foundation of the present strategy, announced in 2002.
- 1.6** The Government is clear that the UK's future lies in a mixed and balanced economy, where manufacturing activities complement services to deliver the widest possible range of economic benefits across all regions, and create skilled jobs that span the entire value chain, from research through to fabrication, branding and sales.

1 BERR Economics Paper No.2: 'Five Dynamics of Change in Global Manufacturing' available at www.berr.gov.uk/files/file47663.pdf

2 www.berr.gov.uk/sectors/manufacturing/MAGonmanufacturing/page47668.html

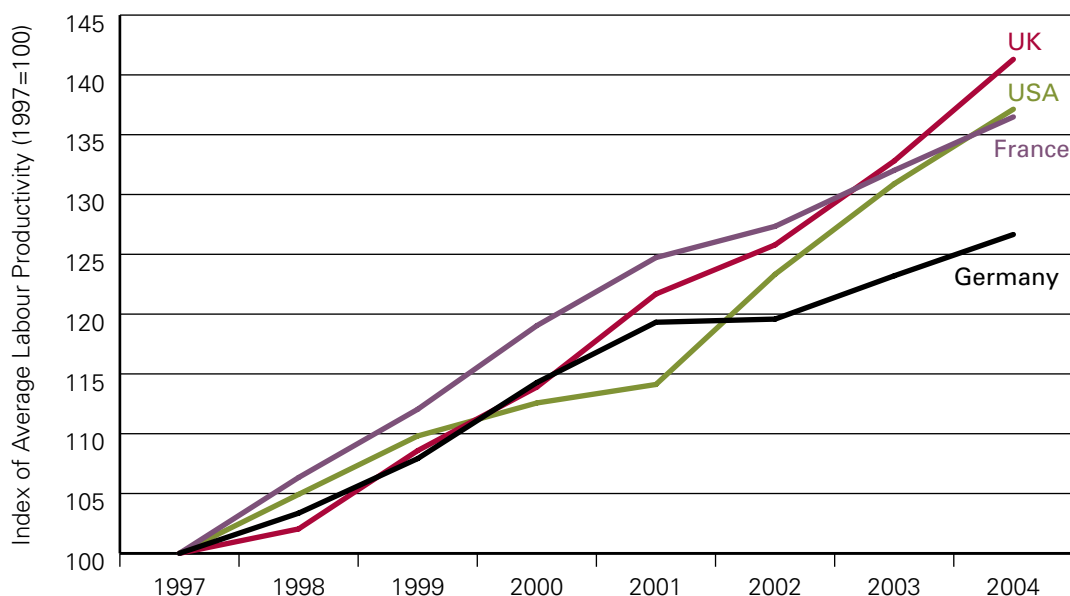
3 www.berr.gov.uk/sectors/manufacturing/regionalevents/page47671.html

- 1.7** In addition, growth and demand in manufacturing and in new services reinforce each other. Manufacturing adds over £150 billion a year to the economy and accounts for half of the UK's exports.
- 1.8** Our vision is for a globally competitive manufacturing sector that leads the world in capturing higher value components of the global value chain, while consolidating areas of existing comparative advantage, including activities within high technology manufacturing.
- 1.9** The UK can also be a world leader in manufacturing solutions for a low carbon economy and we want to see at least a million jobs in the green economy by 2030. To achieve these goals, we need to ensure that we have the right skills mix, from engineering to design to project management.
- 1.10** At the same time manufacturing must be seen as an attractive career option for the highest calibre individuals to ensure a multi-skilled, flexible workforce that underpins success in the global market place.

A MAJOR SUCCESS STORY

- 1.11** Manufacturing is a real, but not always recognised, success story. It accounts for 13% of UK GDP and has increased its productivity by 50% since 1997, outstripping the rest of the economy. This has narrowed the overall economy's historic productivity gap with major competitors: between 1997 and 2004, average labour productivity in the UK grew by 4% more than the USA, 5% more than France, and 15% more than in Germany:

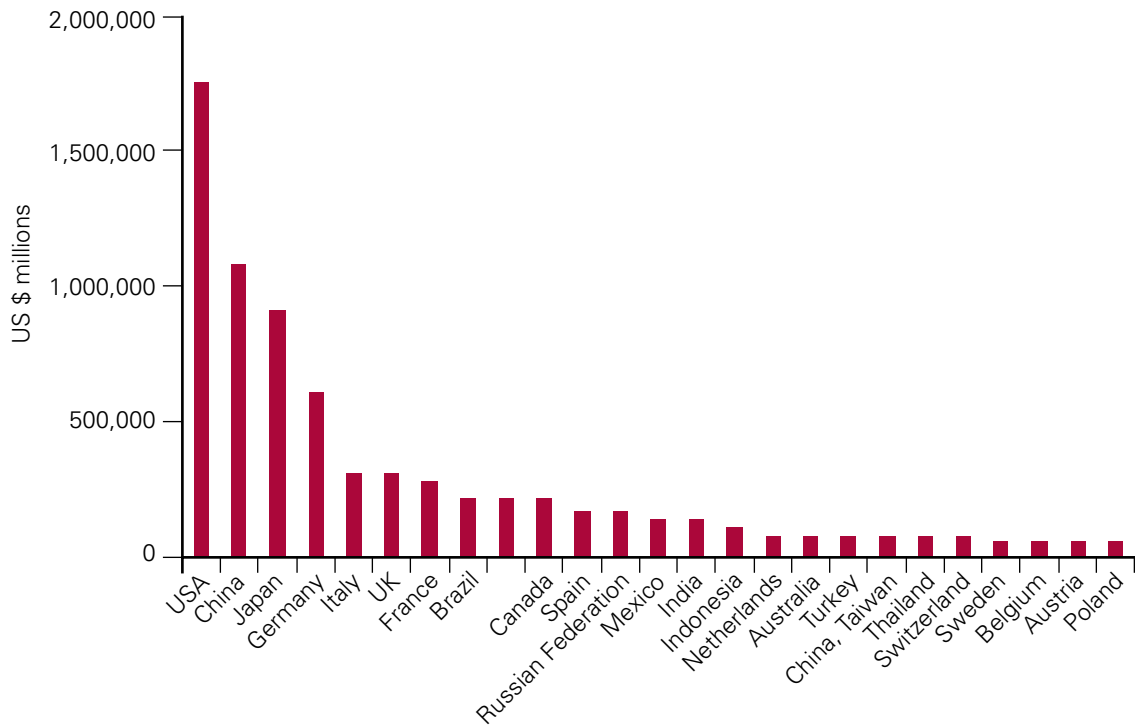
Growth in Average Labour Productivity in Manufacturing



Source: BERR – NIESR

1.12 The UK is also the world's sixth largest manufacturer by output⁴:

Manufacturing GVA in 2006 (top 25 countries)



1.13 And Britain is a world-leading exporter of high-tech goods. In 2006, 25% of UK goods exports were high-tech, compared to 22% in the USA, 15% in France and 11% in Germany, while the UK is consistently among those countries with the highest proportion of total goods exports coming from Research & Development intensive industries. Overall the sector contributes 75% of all business R&D in the economy.

1.14 The UK outperforms every country in Europe in terms of attracting inward Foreign Direct Investment to manufacturing, and is second globally only to the USA. In 2006, manufacturing FDI into the UK exceeded £26 billion, compared to £15 billion into France and £3 billion into Germany.

1.15 This reality is very different from the popular misconception that manufacturing is in decline and actual activity does not fit the traditional image of manufacturing. This is in part because many firms have developed in new or unfamiliar sectors, such as silicon design, Bluetooth technology, in-flight refuelling systems, fuel cells and plastic electronics, or they are developing frontier technologies, such as information and communications, biotechnology and nanotechnology.

4 UNCTAD, 2008, Handbook of Statistics

Cambridge Silicon Radio Ltd – high-tech success

CSR is the world's leading supplier of Bluetooth chips, with approximately 50% market share. Founded in 1998 as a spinout company from Cambridge Consultants, CSR's leading product is a 2.4GHz, single-chip Bluetooth® standard integrated circuit for radio-signal communication. This advanced technology is used in a wide variety of devices including many mobile telephones and communications systems.

Bluetooth connectivity has now become a tick-box item in smart phones and feature phones. A feature phone is one with functions such as a high quality screen, camera, memory, and applications beyond basic telephony. This category comprises the largest proportion of the cellular handset market and is set for the highest growth over the next few years. With its global relationships, intellectual property and technical expertise, CSR is well positioned to take advantage of this fast growing market.

CSR's strategy includes a global value chain with over 1000 employees based in the UK, the US, Sweden, Denmark, France, Korea, China, Taiwan and Japan.

- 1.16** Many new firms are part of a fragmented supply chain and do not produce final consumer products, while others have successfully combined manufacturing and service activities, with distinctions between the two increasingly blurred. Aerospace, automotive, pharmaceuticals, food and drink, defence, telecommunications and many more all have thriving manufacturing operations at their core, or are part of a global value chain with links to manufacturing elsewhere in the economy.
- 1.17** The manufacturing workforce is also more diverse today, with increasing numbers of jobs in R&D, design, sales, services, after-care and supporting packages, alongside those in more traditional jobs in production and engineering.
- 1.18** Inevitably, this success has meant significant restructuring in UK manufacturing, with job losses affecting many communities. However, it has also meant the manufacturing sector is well placed to meet the challenges of an increasingly competitive global economy.

UK Manufacturing Success

- £150 billion per annum to the economy
- Half of UK exports
- 50% productivity growth since 1997
- 75% of business R&D
- 6th largest manufacturing output in the world
- Consistently in top rankings of high tech exports
- More foreign direct investment than any country apart from the USA

SUPPORTING MANUFACTURING SUCCESS

- 1.19** In 2002 we published a strategy for UK manufacturing industry. This identified seven critical success factors:
- **Macroeconomic Stability** – allowing businesses to plan for the long-term
 - **Investment** – supporting investment in capital equipment and processes, leading edge technology, skills development, and Research and Development
 - **Science and Innovation** – helping manufacturers exploit the UK’s strong science base to create innovative, high value products
 - **Best Practice** – helping companies to raise productivity through continuous improvement and ‘lean manufacturing techniques’
 - **Skills and Education** – supporting the development of a skilled and flexible manufacturing workforce
 - **Modern Infrastructure** – providing effective transport and communications networks
 - **Right Market Framework** – providing the supportive business environment that manufacturing needs to compete globally
- 1.20** These factors remain as relevant today and the basis for Government support, regionally, nationally and internationally. In 2004 the Government expanded the role of the Manufacturing Advisory Service (MAS), which has helped thousands of businesses compete in existing and new markets, and is available across all regions of the UK. Businesses following MAS advice have saved over £500 million by using MAS’ free or subsidised advice, which has helped thousands of businesses across the UK to improve their efficiency and effectiveness through the introduction of lean manufacturing techniques.
- 1.21** The Government has also introduced National Skills Academies, including the National Skills Academy for Manufacturing, and established the Technology Strategy Board to invest in new technologies and innovations for the benefit of business, which is key to a sector which makes up 75 per cent of business R&D.

Government support for manufacturing:

- R&D Tax Credits brought £2.3 billion of support for business R&D by 2005-06, with a significant proportion taken up by the manufacturing sector
- Repayable Launch Investment for civil aerospace projects. Over the past decade BERR has invested almost £1 billion. For example, in Airbus from the very first A320 to the recently launched A380 aircraft
- Selective Finance for Investment grants of £191 million from 2004-2007, 75% (£143 million) of which is to the manufacturing sector
- Since 2004 the Technology Strategy Board has invested in a portfolio worth more than £1 billion in collaborative business-business and business-academia partnership projects, predominantly in manufacturing
- Since 2002 and the creation of the Manufacturing Advisory Service Government and RDAs have invested £90 million in the service, helping 24,000 firms
- Since 1997/98 the number of people starting an apprenticeship has more than doubled from 75,000 to 184,000. In 2006/07 23,000 apprentices started learning in the manufacturing and engineering technologies sector
- Government has committed to investing £140 million over the next three years to increase science, technology, engineering and mathematics education in schools and help recruit and train more science and maths teachers

- 1.22** The Government recognises that while some challenges are common to all UK manufacturers, others are highly sector specific. It will analyse these sectoral issues and develop evidence-based policies in response, as part of this framework.

Defence Industrial Strategy

The Defence Industrial Strategy was released in December 2005, and was widely welcomed by industry. It set out how government and industry could best work together to meet the needs of the armed forces. Industry now better understands future defence requirements and research priorities, and is working with Government to achieve better value for the taxpayer.

- 1.23** To achieve our goal of a globally competitive manufacturing sector, we need to ensure that we have the right skills mix. Most importantly, the sector must be seen as an attractive career option for the highest calibre individuals to ensure a multi-skilled, flexible workforce that underpins success in the global market place.

- 1.24** We want UK business to extend its success in high value added sectors and to put British manufacturing at the cutting edge, including maximising the potential for new 'green jobs' in a low carbon economy. As highlighted in the Innovation Nation White Paper, this means we need to enable businesses to be innovative by investing in people and knowledge, in research and the exploitation of knowledge, and also by using regulation and public procurement to shape the market for innovative solutions.

Innovation Nation

Innovation is essential to the UK's future economic prosperity and quality of life. To raise productivity, foster competitive businesses, meet the challenges of globalisation and to live within our environmental limits, the UK must excel at all types of innovation. The Innovation Nation White Paper, published earlier this year, set out policy proposals to make the UK the leading place in the world in which to be an innovative business. Key policy measures included:

- Using the purchasing power of the public sector, which spends £150 billion a year on goods and services, to drive innovation
- Reforming the Small Business Research Initiative to ensure that it effectively supports technological innovation by SMEs
- Reviewing the role of regulation in promoting innovation
- Strengthening our science base with record levels of funding – £6 billion a year going on science and research by 2010
- Increasing business focused support for technology innovation through the work of strategic organisations such as the Technology Strategy Board and the Energy Technologies Institute
- RDAs providing Innovation Vouchers to help small businesses access the UK's knowledge base
- Building the capacity of the Further Education sector to support businesses to raise their innovation potential, and
- Improved measurement through a new Innovation Index

Progress on implementing these measures will be reported on in the Annual Innovation Report, the first of which will be published in October 2008.

RESPONDING TO GLOBAL CHANGES IN MANUFACTURING

- 1.25** The environment facing manufacturers has undergone and continues to face significant change. To understand what is powering these shifts we have conducted consultations with the Ministerial Advisory Group on Manufacturing and other stakeholders, and drawn upon academic and survey evidence.
- 1.26** This work has revealed the importance of five inter-related dynamics that have been and continue to be instrumental in reshaping global manufacturing⁵:

Transforming global manufacturing – the five dynamics

- **The increasing prevalence and complexity of global value chains**, underpinned by developments in information and communication technology, and consequent fragmentation of processes, encouraging specialisation
- **The accelerated pace of technology exploitation** as the pace and demand for change implementation has increased
- **The growing importance of investment in intangibles** such as design, branding and R&D
- **The increased recognition that investment in People and Skills** is among the most important for companies to make
- **The move to a low carbon economy** as the response to climate change creates both new challenges and opportunities for manufacturing firms

- 1.27 Global value chains:** Advances in technology, trade liberalisation and the rise of emerging economies are enabling manufacturers increasingly to unbundle different stages of the production process across the globe, in what is called a 'global value chain'. Manufacturers are specialising, not only in the fabrication of physical components, but in accompanying knowledge intensive services, such as research and development, inventory management, quality control, and other professional and technical services. Evidence from the World Bank⁶ and UKTI⁷ shows that UK firms still face significant barriers in accessing global markets, so the Government has an important role in enabling companies to overcome these obstacles.

5 BERR Economics Paper No. 2: 'Five Dynamics of Change in Global Manufacturing' www.berr.gov.uk/files/file47663.pdf

6 World Bank, 2008, 'Doing Business 2008'. Washington DC.

7 OMB Research, 2006

- 1.28 Technology exploitation:** Developing new technologies and harnessing their power is essential in order for UK companies to drive their competitive advantage. New technologies critically underpin improvements to productivity and the efficiency of processes, and provide the capacity for firms to develop higher quality or better customised products that allow them to capture higher value components of the value chain. The Government has a key role in enabling markets to fulfil their potential as powerful drivers of technological innovation, supporting broad-based science and technology research and providing incentives to invest in technology.
- 1.29 Investment in intangibles:** Manufacturers in the UK, and other developed economies, are increasingly recognising the importance of investing in intangibles or knowledge assets to exploit existing areas of comparative advantage in other sectors. These include design and other aspects of product development; software; brand-building; training; and improvements to business processes. Such investment boosts firms' competitiveness and enables products to meet changing consumer needs. The Government's role is to ensure companies have the right incentives and information to invest in intangibles, including an effective international system of patent protection.
- 1.30 People and Skills:** The increasing prominence of low wage economies in the global labour market and developments in technology have increased the importance of developed economies raising skill levels in their manufacturing workforces. Companies require a workforce with both specialist high-level science, technology, engineering and mathematics skills, and a generic set of soft skills enabling people to work across disciplines. The Government is developing a higher level skills strategy⁸ that recognises the importance of high level skills for innovation. Strong management and leadership is also vital for the operation of global value chains and making the most effective use of the skills of the workforce to deliver high value added products and services.
- 1.31 The low carbon economy:** The need to tackle climate change demands the transformation of economies around the world and, with it, a technical revolution. It presents UK manufacturers with a substantial challenge in reducing their carbon emissions, and also a major opportunity as the need for greater environmental efficiency stimulates demand for low carbon goods and services. The low-carbon economy will also require a greater proportion of global energy to come from nuclear and renewables. The Government has an important role in putting in place the frameworks needed to capture for Britain a disproportionately large share of the 'green jobs' created in these new global markets.

8 DIUS, 2008, 'Higher Education at Work – High Skills: High Value'

In response, the Government has reviewed and strengthened its strategy to focus support on helping manufacturers meet these challenges and seize the new opportunities they are creating. The new strategy sets out a framework that will inform a dynamic process of developing and implementing current and future policies and programmes for manufacturing.

By developing the right skills, using technological know-how and successfully exploiting Britain's world class science base, we can create the conditions in which UK firms can build on their success in high value-added sectors and realise their potential.

- 1.32** Part 2 analyses the five dynamics and sets out how the Government will enable UK manufacturers to seize the opportunities they present.

Part 2: Responding to Global Changes in Manufacturing



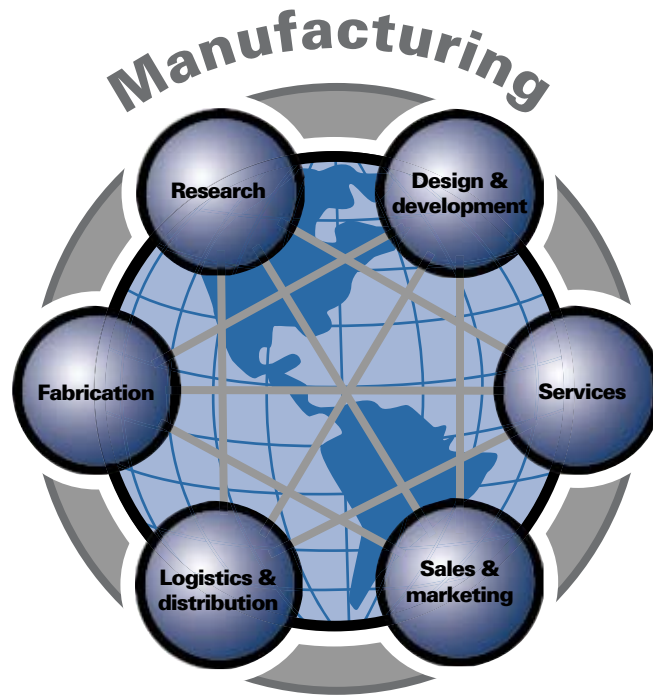
GLOBAL VALUE CHAINS: INTERNATIONAL FRAGMENTATION OF PRODUCTION

- 2.1** The UK has a strong history of free trade and openness, and we are arguably the most open major economy in the world. This has enabled UK manufacturers to take a significant role in new international structures of value creation, where traditional definitions of manufacturing, emphasising production of complete products in single locations, no longer apply.
- 2.2** What is new about the current phase of globalisation is the increasingly global location of the production of intermediate goods such as components and parts production. This separation has included not only the physical component parts of products, but the accompanying knowledge intensive services, such as R&D, inventory management, quality control, and other professional and technical services.
- 2.3** Global sourcing gives British manufacturers the opportunity to reduce costs and specialise in activities where they have a global comparative advantage. It also challenges British firms to become globally competitive in their specialised areas.
- 2.4** As more firms globalise, government may need to help businesses participate in global markets. SMEs in particular face barriers in accessing global value chains in high growth new emerging markets, for example in developing the skills and the collaborations needed to win access to global supply networks. This is an important policy issue because successful specialisation by British manufacturers in global markets will improve national productivity and lead to the development of new comparative advantages.
- 2.5** Integration into global value chains is also important to the economic performance of UK manufacturers: firstly, initial evidence⁹ suggests that it is having a positive effect on the productivity performance of UK manufacturers. Secondly, participation in global value chains can also help manufacturers engage with other international networks, for example in different product markets, or global innovation systems.

9 Harris, R and Li, Q Cher, 2006, Interim Report to UKTI

- 2.6** The changing role of UK manufacturers in global value chains is important to policy as it indicates where the UK economy is developing new comparative advantages, and how this is affecting national economic performance. Global value chains provide opportunities for UK firms to capture higher value activities and consolidate activity in high-tech, R&D intensive products and services.

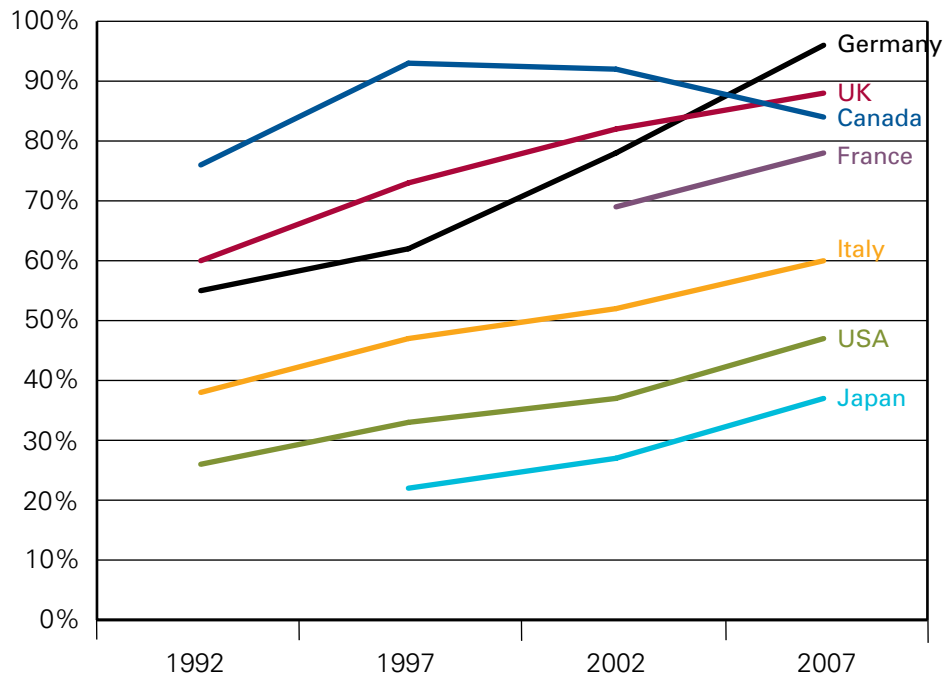
A Global Value Chain for Manufacturing Operations



UK Participation in Global Value Chains

- 2.7** There are several measures of the various ways manufacturing is increasingly integrating into global value chains. The following graph indicates the UK manufacturing sector has increased in openness to the global economy, with imports plus exports as a share of manufacturing output increasing at a similar rate to other developed economies. On this measure the UK is second only to Germany within the G7.

Manufacturing imports and exports as a percentage of manufacturing output



Source: UN Comtrade and OECD.stat databases and BERR estimates

- 2.8** Other evidence on how UK manufacturing is engaging with global supply chains is given by the extent to which firms are selling into overseas markets, and the extent to which their export customers are other businesses. Recent survey evidence from UKTI¹⁰ found that some 58 per cent of the exporters interviewed were selling to other businesses as opposed to supplying consumer markets directly.
- 2.9** The importance of technology in winning overseas customers is underlined by the Community Innovation Survey (CIS4) which indicates that exporters have markedly higher R&D intensity than non-exporters and born global companies in turn spend significantly more on R&D per employee than other exporters.
- 2.10** Contrary to popular perception, therefore, growth in manufacturing in emerging markets can create significant opportunities for UK manufacturers, both by direct sales and through winning access to specialised supply chains. As ever more firms internationalise, we will therefore seek to harness those benefits and spread success throughout the supply chain, maximising the further benefits of being a part of supply chains in high growth markets for companies of all sizes.

10 OMB Research, 2006

Exploiting Global Value Chains – Hozelock Ltd

Hozelock is a long-time leader in the domestic market for garden watering products and responding to market volatility is fundamental to its business. If there is a sudden hot spell, demand for some products can increase in days by 300 to 600 per cent. To respond quickly, the company utilises ICT to control its value chain and takes data from point-of-sale terminals to feed into its production schedules. The company has to work within three days from the receipt of an order to delivery to store, efficient logistics are therefore essential.

Previously Hozelock had a complex structure – five separate UK sites for manufacturing, administration and logistics, resulting in parts and finished product being shipped around the country. Hozelock has responded by creating a more integrated global value chain. The five production sites were consolidated into a single site at Sutton Coldfield, near Birmingham and within the plant itself there was a comprehensive reorganisation and integration of production lines.

Alongside UK consolidation of value adding activities, Hozelock has also embarked on a programme to outsource products that can be made securely offshore. Managing Director, Peter Rush says, “Although we have offshored the majority of our complex manufacturing processes, we still keep a considerable amount of manufacturing in the UK”, he says, “A detailed analysis was carried out across the entire product range to determine which items could be supplied on a long lead time basis and which had to be made locally in the UK to respond to the vagaries of volatile demand driven by unpredictable UK weather patterns.”

Supporting Firms’ International Networks and Capabilities

- 2.11** As with all customer/supplier relationships, global relationships bring fresh demands and require innovative solutions. If goods have to travel long distances to customers, manufacturers may have to meet sudden changes in demand from a customer without holding additional local stock. Companies also need to develop new skills to manage relationships across differing languages and cultures, as well as across different time zones. In a competitive trading environment international expertise is vital, and UK excellence in key exporting industries has to be marketed vigorously.
- 2.12** A survey for UKTI focused on the barriers that firms themselves face to exporting. Younger firms particularly highlighted the barriers related to the fixed costs of exporting, language differences and the difficulty in obtaining relevant contacts.
- 2.13** In order to overcome the specific barriers faced by smaller companies in gaining access to the growth offered by new emerging markets:

UKTI will allocate additional resource to target a package of new support for 600 UK companies of all sizes to identify manufacturing value chain opportunities in India and China, using newly recruited industry experts, and will promote UK manufacturing excellence internationally through a range of major marketing campaigns. This is likely to include building a supply chain element into the proposed 'Advanced Passport' scheme; a more active focus on specific supply/value chain opportunities (such as the Chinese sustainable cities initiative); and improvements to our Portal to enhance matching of SMEs to global supply/value chain opportunities.

- 2.14** Specifically, new UKTI marketing strategies will promote UK excellence in advanced engineering, the defence and security sectors and the creative industries.
- 2.15** In addition, to maintain the UK's attractiveness to inward investors and to nurture technological development, BERR will work with UKTI to strengthen 'aftercare support' for high value inward investors.
- 2.16** Participation in global value chains can also help manufacturers engage with other international networks, including through the transfer and exploitation of intellectual property. BERR Economics Paper No.2: 'Five Dynamics of Change in Global Manufacturing' identified the importance of the Government providing expert advice and guidance on matters that the private sector alone will not or cannot provide.

The Intellectual Property Office will take additional steps to publicise their newly produced guidance for UK companies on protecting and exploiting intellectual property in key emerging markets such as China, India and Brazil.

Nurturing Clusters

- 2.17** Success in global value chains is based on specialisation, which often involves the early application of research and technology. Specialised firms can benefit from sharing services, resources and knowledge with similar companies. Clustering – geographic concentrations of inter-connected companies, specialised suppliers and service providers and institutions such as universities – supports specialisation and creates critical mass to attract investors and purchasers.
- 2.18** Clusters not only bring customers and suppliers together, they can also help create the conditions for complementary activities to thrive, including producing high quality specialist support services and fostering close links with universities, resulting in industry relevant courses, research programmes and spin offs. Industrial concentration within regions can support comparative advantage through the development of linkages between specialised buyers

and suppliers, technological spillovers, and specialised knowledge infrastructure (links to university research, local knowledge and best practice transfer mechanisms) and specialised skillsets. Local clusters of SMEs can in some cases overcome some of the challenges faced by smaller firms, such as access to technology, finance and specialised external services.

Clustering for Success – Chemicals and Plastics

The chemicals and plastics industries are a significant British manufacturing success story, with a substantial net trade surplus and continued significant inward investment.

In recognition of the importance of the industry BERR has invested almost £50 million over the past five years in new plants in the basic chemical industry in the north-west of England and Teesside, to help ensure the future of these key clusters. Many other smaller companies have also benefited both directly and indirectly.

- 2.19** These factors, plus the development of a specialised labour force, can help raise competitiveness and increase the attractiveness of an area as a manufacturing location. The Government has set out as its priorities encouraging high value investment into the UK and supporting the development of incoming manufacturers and cutting edge technologies.

To highlight and celebrate the best cluster activity the Government will therefore develop a new “Cluster Mark” award, which will raise the profile of manufacturers involved in the best clusters and support international marketing of local strengths. Each region will be asked to run a competition to select the best cluster according to a set of agreed criteria. The overall winner will be chosen by a national panel from the regional nominees.

TECHNOLOGY EXPLOITATION: ACCELERATING THE SPREAD OF NEW TECHNOLOGIES

- 2.20** Technological change is reshaping manufacturing by creating the capacity to adopt more efficient processes and develop new or better products. In a fast changing global market the ability of firms of all sizes to exploit new technology has a fundamental role in maintaining a competitive advantage against lower wage economies.
- 2.21** Technology drives competitive advantage through improvements to manufacturing processes and through product development. It also has a key part to play in ensuring information is efficiently collected and rapidly exchanged, enhancing order fulfilment and stock management as well as supporting the sharing of ideas and designs.

- 2.22** The UK is taking the lead in adapting to increasingly globalised innovation platforms. It is also building on the success of its world class science and technology base, having made improvements in recent years in the levels of knowledge transfer from the UK research base to business. For example, the Higher Education Innovation Fund and the Public Sector Research Exploitation fund have invested in building capacity in universities and public laboratories to work with business and commercialise their research.
- 2.23** The Research Councils have also been encouraging greater collaborative research with business and the Technology Strategy Board supports companies to work with the research base through its Knowledge Transfer Partnerships and Knowledge Transfer Networks. The Government believes both the research base and manufacturing can benefit from developing these links still further.
- 2.24** Recent developments in technology fields such as information and communication, genetics and biotechnology, advanced materials and nanotechnology have helped create new opportunities for business and manufacturing. New ICT systems are now at the heart of global operations and product flows; ICT exploitation is cited as one of the main factors underpinning productivity growth.

Innovating for success: AESSEAL

AESSEAL specialises in the design and manufacture of mechanical seals and support systems for pumps and rotating equipment to prevent liquids and gases from escaping into the environment. Based in Rotherham, Yorkshire, AESSEAL has experienced growth in excess of 20% per year since it was founded in 1983 and has become the only major international new entrant, to the mechanical seals industry, in the last twenty years.

The company's differentiated position is based on customer service, people and innovation. "Everything we do must add value" said production director Richard Cook. The bespoke nature of the company's products puts a big emphasis on logistics and resource efficiency. The company has a policy of vertical integration and makes as much of its products in-house as possible.

AESSEAL is continually involved in product innovation and has developed 60 patents in recent years. The sales growth from patented products has gone up from £324,000 in 1999 to more than £30 million a year today and the company aims to become a technology leader in the seals and support systems market. The company is on target to turnover £100 million by the end of 2009 and by the time of its 50th anniversary in 2029 aims to be the biggest mechanical seals company in the world.

Impact of Technology on UK Manufacturers

- 2.25** Technology has become a key driver of specialisation and delivering commercial success for UK manufacturers. In line with other developed economies, the UK's high-tech sectors are increasing their share of the UK's Gross Value Added in manufacturing.

- 2.26** The UK has also become a significant net exporter of R&D services to the rest of the world and the positive balance has grown from below £1 billion in 1997 to £2.6 billion in 2004. Much of the generation of the associated technological knowledge is undertaken within manufacturing firms or affiliated laboratories. The UK has also been able to attract significantly more international investment for technological R&D than other key competitors – approximately 25 per cent of business R&D in the UK is funded from overseas, well above Germany on less than five per cent and France, around 10 per cent.
- 2.27** The Government continues to play a key enabling role in ensuring markets act as powerful drivers of technological innovation. It supports broad-based science and technology research, and provides incentives to invest in technology. Government has also set out policy commitments in its Innovation Nation White Paper to drive increased demand for innovative products through improved regulation and through procurement.
- 2.28** As a first step, each government department will produce an Innovation Procurement Plan, linked to its commercial strategy, setting out how it will drive innovation through procurement, where the Government is the UK's biggest customer, spending £150 billion per year. We are promoting the use of Forward Commitment Procurement techniques in the public sector, to encourage the development of innovative solutions in response to identified challenges and specified outcomes, rather than current capabilities. The Annual Innovation Report, to be published in October 2008, will showcase a wide range of departmental activities that promote innovation and describe each department's plans to do more.
- 2.29** The costs of demonstrating that a new technology or production process is viable can be a significant barrier to investment in the development of new products, especially for smaller manufacturers. To help overcome this, the UK has a number of leading technology bodies and Knowledge Transfer Networks. These enable manufacturers and their supply chains to work with academic institutions to prove concept, demonstrate and exploit new products, including the Advanced Manufacturing Park in Yorkshire, the Advanced Forming Research Centre near Glasgow, the National Composites Network and the Innovative Manufacturing Research centres.

In 2010 Advantage West Midlands and the East Midlands Development Agency will deliver a new addition to this network, the Manufacturing Technology Centre at Coventry, with an investment of £30 million. The Centre will focus on the development and application of high integrity joining and fabrication, expertise in tooling, automation and operational performance with industrial scale pre-production and demonstration facilities. Over 10 years the Centre could see investment of £130 million in business-led applied research and its exploitation. Government would welcome industry-led proposals that widen the regional network of centres to specialise in key technology areas.

Investing to Stimulate Technological Advance

- 2.30** The costs of development for many complex modern technologies mean that co-ordination of funding is essential to make the most from resources, and since 2004 the Technology Strategy Board has invested in a portfolio now worth over £1 billion in collaborative business-business and business-academia partnership projects.

To increase further the focus of and access to public funds for collaborative R&D projects the Technology Strategy Board will invest a further £24 million in research central to high value manufacturing focused on Products, Production Processes, Services and Value Systems. In addition it will work with Government, the RDAs and Research Councils to offer a streamlined and simpler process for assessing the technological and business case for public sector investment in major collaborative R&D Projects, starting with those seeking over £10 million in public sector funding.

- 2.31** To help innovative businesses in the UK become and remain successful in the global marketplace, the Technology Strategy Board will work in partnership across Government, including its agencies, Devolved Administrations and Regional Development Agencies, and the Research Councils. It will co-ordinate direct business support for technology and innovation, with Government action driving demand for innovative products through improved regulation and through procurement.

DIUS will work with the Technology Strategy Board to build on the already strong evidence of its impact to date and use this to leverage additional resources to support technology innovation.

To enable UK companies to increase their competitiveness and develop new capabilities, DIUS and the Technology Strategy Board will stimulate industry to increase its participation in the “Manufuture” European Technology Platform to ensure it reflects the needs of UK enterprises. DIUS and the Technology Strategy Board will also influence the direction of a new joint technology initiative on sustainable and competitive high value manufacturing.

INTANGIBLES: COMPETITIVE ADVANTAGE FROM NON-TRADITIONAL ELEMENTS OF MANUFACTURING

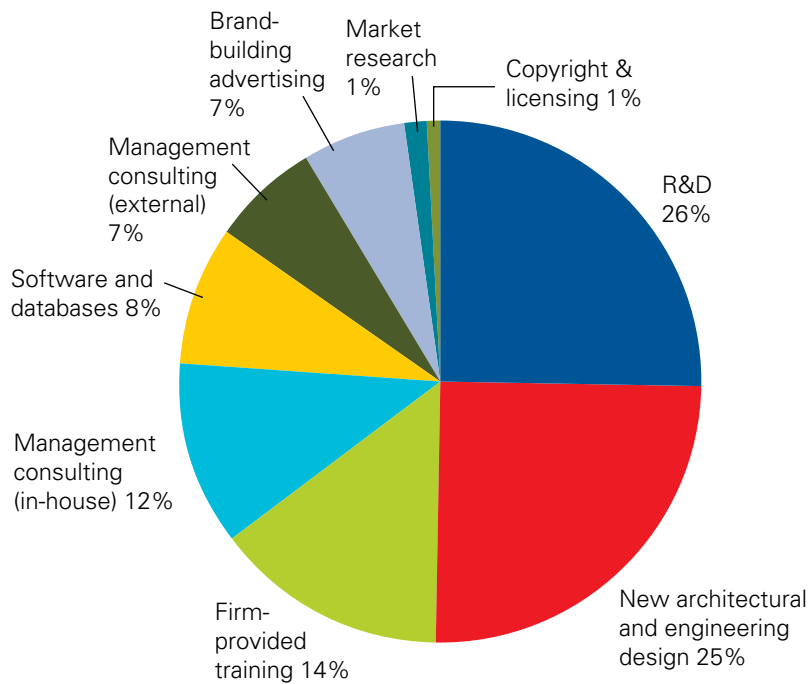
2.32 Firms in the UK and globally, including increasingly those in emerging economies, are growing their investment in intangible or knowledge assets, such as software, design and other aspects of product-development, brand-building, training and improvements to business processes, in order to improve their competitiveness and enable their product to meet the changing needs of consumers.

UK investment in intangibles

2.33 In addition to developing competitive advantages through specialisation, UK manufacturing firms are harnessing other areas of UK comparative strength, in particular the UK's creative and design expertise and world leading business services such as logistics, branding and consultancy. Combining the UK's strengths in the creative economy with those in manufacturing can help secure our long term competitiveness.

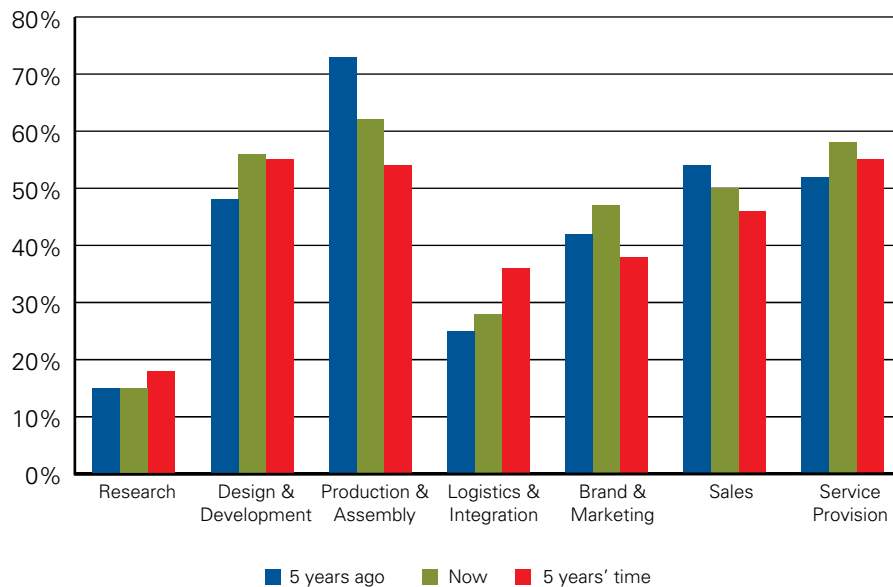
2.34 While a majority of UK manufacturing firms still consider production and assembly to be among their prime sources of competitive advantage, they recognise that other aspects of business, such as development, service provision as well as logistics and integration are becoming increasingly important. Success in these areas all depends on investment in intangibles. The following chart provides a breakdown of patterns of intangible investment in UK manufacturing.

Intangible Investment in UK Manufacturing 2004



2.35 Investment in intangibles by manufacturers increased to £32 billion in 2004, more than double the figure for traditional gross capital expenditures. This recent trend looks set to increase further: a recent CBI survey¹¹ showed 55% of firms see design and development as one of their most important source of competitive advantage in five years' time.

CBI asked: What are your top three sources of competitive advantage?



11 'Understanding Modern Manufacturing', CBI, 2007.

- 2.36** It is unsurprising to see manufacturers placing less emphasis on low-skilled activities such as assembly in view of the increasing importance in the world economy of states with abundant low-cost labour. The counterpart to this change is the advancing importance of Design and Development, Service-Provision and Logistics and Integration.

Investing in Intangibles: Taylors Eye Witness Limited

Taylors Eye Witness Limited (known as Harrison Fisher until 2007) was founded by John Taylor in Sheffield during the early 19th Century and has since become synonymous with fine cutlery. However, the increased competition from cheaper foreign imports meant that the company has had to rethink its product offering and focus on differentiating its products through added customer value and specifically the intangible value that can be captured through good design.

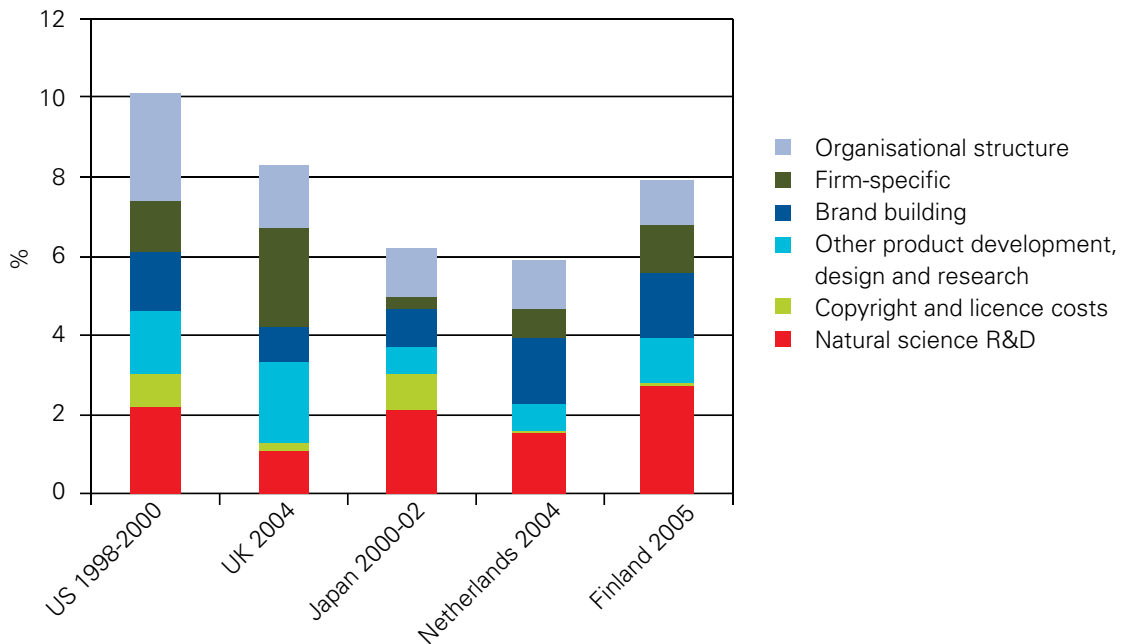
In 2002, Harrison Fisher joined the Design Council's Designing Demand programme which invited a design team led by Design Associate Jonathan Ball to examine every aspect of the business. At the heart of the rethink was the company's 'Taylors Eye Witness' consumer brand which faced stiff competition from cheap supermarket own-brand products. The design team's response was to redesign the brand to move towards being an independent consumer brand and develop a signature product range that reflected the core values of tradition and quality but in a more contemporary style.

Managing Director, Alastair Fisher believes the £80,000 invested in design was money very well spent: "We had been under a lot of pressure and were losing business. The Design Council Designing Demand programme helped us get ahead of the competition instead of playing catch-up." In addition, the company was also able to exploit the Government's R&D tax credit scheme to recoup half the development costs.

Instead of competing with low-cost competition from Eastern Europe and Asia, Taylor Eye Witness Ltd now confidently compete with upmarket, quality and design led German rivals and is differentiated through the intangible value that the design makeover has added.

- 2.37** Internationally, there is also emerging evidence that the UK's rate of market sector intangible investment to GDP is at least on a par with other countries.

Intangible Investment in five OECD Countries, Percentage of GDP



Harnessing Creative Talent to Manufacturing Success

2.38 As noted above, combining the UK's strengths in the more creative economy with our strength in manufacturing can help secure our long term competitiveness. The Government will therefore ensure the UK design sector continues to develop the skills required by manufacturers.

The Design Council and Regional Development Agencies will implement the findings of the current review of the Designing Demand programme to increase penetration of this successful programme across the regions as well as improve alignment with other relevant business support products such as the Manufacturing Advisory Service. The review is designed to ensure small and medium sized manufacturing companies continue to have access to support to develop their design capability. The review will synthesise data on business impact, forecast impact and service experience to assess existing roll-out, delivery and programme outcomes, as well as product brand awareness and programme flexibility.

2.39 Government will ensure the UK design sector continues to develop the skills required by manufacturers, and ensure small and medium sized manufacturing companies continue to have access to support to develop their design capability.

The sector skill council Creative and Cultural Skills Council and the Design Council will work to support the newly created UK Design Skills Alliance to ensure the UK design sector has the skills required by manufacturers to compete in global markets. The new Alliance will concentrate on professional development for designers, anticipating future skill needs and improving connections between practising designers and universities – to ensure our design sector can anticipate the shifting demands of the global economy.

Protecting Intellectual Assets

- 2.40** Many firms are aware of the importance of intellectual assets and intellectual property (IP) to their business. The number of UK businesses that use IP protection and regard it as important has increased since 2005 and, in a survey of 197 technology company executives, 85 per cent expected the importance of intellectual capital to their business to increase.
- 2.41** Government has an important role in ensuring that firms have the right incentives and information to continue investing in intangibles. A potential barrier to internationalisation for companies investing in intangible assets is the delay and backlog in processing international patent applications, which can cause uncertainty for innovators and investors.

The Government will lead the promotion of an international system of mutual recognition for the examination work of accredited patent offices.

- 2.42** Firms presently use a combination of formal intellectual property rights (IPR) and techniques such as speed to market and open innovation to capture value from intangible investments. Government has an important role in ensuring that firms have the right incentives and information to continue investing in intangibles. Manufacturers benefit from the UK's strong framework for the protection of IPR, together with valuable incentives for its creation. The Government is committed to maintaining a competitive tax environment that supports and encourages the creation or exploitation of IPR in the UK. Recent reforms have increased the level of the R&D tax credit and cut the UK's headline Corporation Tax (CT) rate to maintain its position as the lowest among the G7 nations.

The Government will continue to monitor and ensure the competitiveness of the UK's intellectual property tax structure and seek opportunities to lower the CT rate further.

PEOPLE: IMPROVING THE SKILLS BASE AND ATTRACTING TALENT INTO MANUFACTURING

- 2.43** A skilled workforce is essential for UK manufacturing to compete globally and for the UK to attract and retain high value added activities. Investment in skills is among the most important that manufacturers can make, and meeting the skills needs of companies and potential investors is central to the long term competitiveness of our economy. Evidence suggests that a transition in manufacturing is already taking place with an increasing proportion of employment being in more highly skilled occupations.
- 2.44** The growing strength of economies such as China and India has led to a rapid increase in the global supply of labour. The IMF estimates that the effective global labour supply quadrupled between 1980 and 2005, with East Asia accounting for half of the growth. Most of this global growth, however, has been in unskilled labour, while the economies of Europe have experienced an increase in skilled labour that is forecast to continue.
- 2.45** Most developed economies cannot compete with emerging economies on the basis of labour costs, increasing the importance of the availability of skilled labour for attracting mobile manufacturing investment. Meanwhile, rapid advances in technology are placing an increasing premium on skilled labour.
- 2.46** Manufacturing is projected to need an additional estimated 324,000 scientists and engineers by 2014. Employers need people who can combine qualifications in science, technology, engineering and mathematics (STEM) with a wider set of skills, such as team-working and communication abilities, which enable them to work flexibly across a range of activities within companies.
- 2.47** In addition, the growth and complexity of global value chains increases with firms potentially undertaking different activities in locations across the globe. This emphasises the need for strong leadership and management skills to allocate resources effectively and profit from the opportunities available.

AgustaWestland – broadening the skills base

AgustaWestland, based in Yeovil, Somerset, manufactures a range of rotorcraft and provides industry leading support solutions and services for commercial and military customers around the world. AgustaWestland employs approximately 3,500 people in Yeovil and offers some of the most prestigious staff training courses in the South West of England. In addition to engineering and technician apprenticeships AgustaWestland provide structured training programmes and undergraduate and graduate training programmes specifically aimed at meeting the business and administration requirements of modern global manufacturing companies.

The Business Support Programme places trainees in a number of business areas including procurement, project management and sales and marketing whilst simultaneously qualifying the trainees up to foundation degree and NVQ Level 3 in Business and Administration.

“Manufacturing is not purely about production – it offers a broad range of business opportunities to meet the needs of the global operation in driving the strategy forward” says Sarah Cook, Vice-President of Human Resources.

- 2.48** Management and leadership skills are difficult to define and measure in a consistent way across countries, but studies that have been undertaken for manufacturers support the perception that UK management capability is below that of the US, Germany and Japan.
- 2.49** Nevertheless, the UK’s labour force is responding to the changing skill sets demanded by the changes in the global economy, with the proportion of manufacturing workers in occupations such as R&D, normally considered to be more highly skilled, increasing.
- 2.50** Government needs to ensure the right mechanisms are in place to anticipate and meet the new strategic skills needs, and ensure that access to skills support is simple and easy for manufacturers, so that they are able to make the most of their opportunities to invest in talent. Between 1997 and 2008 Government investment in the Further Education and skills infrastructure increased by 53% in real terms, driving improvements in skills across the population.
- 2.51** Levels of educational attainment are also rising across manufacturing, shown in the following table. This reflects both the shift in employment to high value-added activities and a general increase in attainment across all occupational grades.

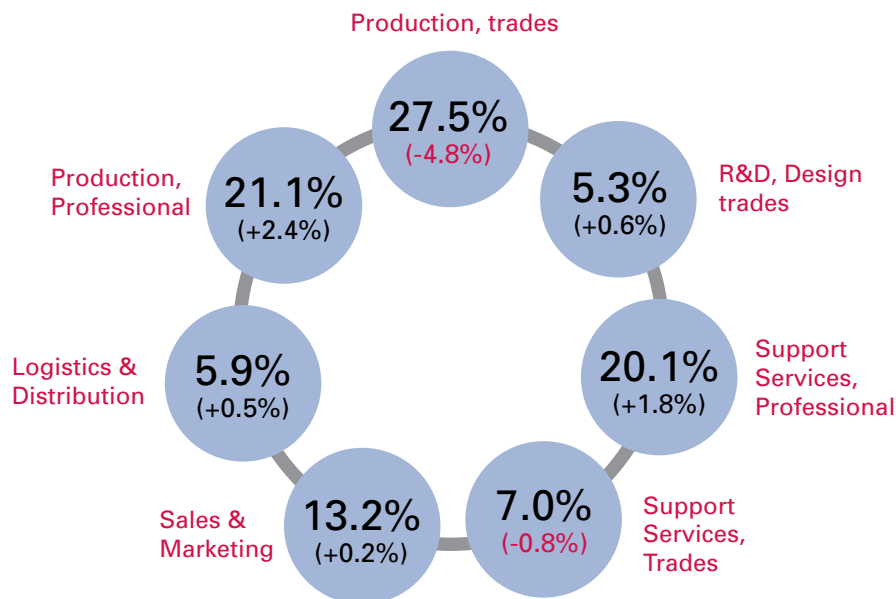
Educational attainment of UK manufacturing employees 1994, 2006

	Employment share (as a percentage of all manufacturing)		Percentage of people with NVQ level 3 and above		Percentage of people with degree or equivalent	
	1994	2006	1994	2006	1994	2006
Production, support services and trades, logistics and distributions	71.0	66.5	42.0	48.0	4.8	8.7
R&D, professional support services, sales and marketing	29.0	33.7	55.1	64.1	19.8	31.7
All manufacturing	100	100	45.5	53.4	8.9	16.4

Source: Labour Force Survey

2.52 As a result of both the general upskilling of the manufacturing workforce and the movement towards a greater share of employment in high value added activities, the contribution that occupational groups make to the value chain is also changing. This is illustrated by the following diagram showing the share of total earnings in manufacturing received by each occupational group in 2006 and the change in these shares between 2001 and 2006.

Share of UK Manufacturing Earnings across Value Chain 2006
(Percentage point change in share from 2001-6 shown in brackets)



Source: BERR analysis of LFS micro-data, ONS

- 2.53** In July 2007 the Government published *World Class Skills*, setting out a programme of reform to the skills system. It is vital we put in place a strong and flexible framework to meet the emerging strategic skills needs of major areas of the economy, including manufacturing. The government is reforming both the Further and Higher Education systems so they are responsive to business needs, support innovation in the economy and help UK manufacturers meet the challenges of the global market-place.
- 2.54** The reform programme includes moving to a more demand-led Further Education system, and developing a higher level skills strategy that recognises the importance of high-level skills for innovation and business. The Higher Education Funding Council for England is piloting approaches that encourage business-led demand to enhance the high-level skills of those already in work.
- 2.55** One critical reform to the system to ensure it is more demand-led and focused on business needs is a significant expansion of the Train to Gain service, which will provide over £1 billion of funding for employer-focused skills training by 2010-11. To reflect the more complex skill needs of the manufacturing sector, Government is taking steps to respond more flexibly to employer demand for skills, making available £127 million of the Train to Gain budget through compacts agreed with the SEMTA and Proskills Sector Skills Councils. These will deliver a more flexible support framework for the advanced manufacturing and process sectors respectively.
- 2.56** These compacts are expected to generate 40,000 qualification achievements at level 2; 18,000 at level 3; 3,900 leadership and management achievements; and the enrolment of 9,000 apprentices. They also include provision for extra training and support for skills brokers to ensure they understand the specialist needs of manufacturing employers.

Simplifying the skills system

- 2.57** The Government offers diverse support for specific manufacturing skills development, but employers, particularly SMEs, often report difficulties understanding and accessing the range of support available.
- 2.58** There are five employer-led Sector Skills Councils (SSCs) that have a central role in ensuring that the supply of skills and qualifications is driven by employers' needs, and for raising employer ambition and investment in skills. The Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTA) covers the advanced manufacturing sector; Cogent covers the chemicals, nuclear, and offshore oil and gas industries; Proskills covers the process industries; Skillfast covers the fashion and clothing industry; and Improve covers the food and drink sector.
- 2.59** A key aim of Train to Gain is to ensure that skills providers adapt their provision to meet the needs of employers by ensuring funding mirrors their market choices. To date around 10,000 manufacturing employers have used the service.

- 2.60** Train to Gain includes a brokerage service that provides employers with an individually customised package of training support, and information on the Government funding available to meet their needs. From April 2009, as part of the Government's Business Support Simplification Programme (BSSP), the brokerage service will be integrated with Business Link as part of a simpler, more coherent structure of support.
- 2.61** Business Link is the Government's primary access channel for business support. It is a front-facing service offering information, advice and brokerage to companies of all sizes, and can direct manufacturers to the most appropriate provider for their needs.
- 2.62** Train to Gain and the new compacts are a key element of the Government's aim to simplify the way it works with employers to develop the skills of their employees. We recognise that more needs to be done to make it easier for employers to access the skills and training support available. To make it easier for manufacturers to access the skills support they need, Government will strengthen the links and signposting between the range of services at national, regional and local level. We will regularly monitor the effectiveness of collaboration between the bodies delivering this service.

From April 2009, with Business Link acting as the primary access point for integrated business support, manufacturers will be able to experience a single seamless service for addressing their skills needs, whichever skills body they approach. The Memorandum of Understanding¹³ released with this strategy commits all those who interface with manufacturers to provide this immediate and seamless access to comprehensive and straightforward advice and support.

- 2.63** To drive performance across the Sector Skills Councils (SSC) network the Government is pursuing a programme of reforming and relicensing SSCs, overseen by the new, employer-led UK Commission for Employment and Skills (UKCES). The Commission also has broader responsibility for advising Government on the development of the skills strategy and monitoring whether we are on track to achieve the ambition of a world class skills base by 2020. A key early task will be to advise the Government on simplification of the skills system in England.

The UK Commission for Employment and Skills is developing proposals to simplify the skills system itself, building on recent reforms. The UKCES will report to Government in autumn 2008, and will target the Manufacturing sector as a first pilot for relevant proposals, including building Train to Gain as a more integrated service that offers a range of options for employers.

¹² Memorandum of Understanding: Education and Training Support in the Manufacturing Sector
www.berr.gov.uk/files/file47661.pdf

UKCES is also leading work to develop a Talent Map, providing employers with a single, clear visual representation of the education, employment and skills systems, and how employers can work with Government. We will look to involve manufacturing employers in further trials on the Map.

- 2.64** As we announced in 'Work Skills' in June this year, employers need access to the full range of skills and recruitment services. We are therefore bringing these services closer together to make them more coherent and simpler to access. The integrated employment and skills services, to be trialled from this autumn, will ensure the system is more responsive to the needs of individuals, for example through Skills Accounts and the adult advancement and careers service, which in turn will benefit employers through giving them a more highly informed and motivated workforce.

Work-based training

- 2.65** A further central element of the skills challenge for Britain is to increase opportunities for on-the-job learning for new entrants to the manufacturing sector. Since 1997 there has been a renaissance in apprenticeships. The number of people starting an apprenticeship has more than doubled from 75,000 to 184,000 in 2006/7, of which 23,000 apprentices started learning in the manufacturing and engineering technologies sector. The Government will build on the success of the Apprenticeships programme, and help smaller manufacturers in the supply chain that may find it difficult to employ and develop apprentices.
- 2.66** By offering additional support to larger companies to recruit and train more apprentices than they need, on behalf of smaller manufacturers, we can improve the quality of the supply chain in the sector at large and support smaller manufacturers in the supply chain.

Working with industry, the trade unions and the Apprenticeship Ambassadors' Network, we will extend and expand high quality apprenticeships by approximately 1,500 new places, inviting bids from larger manufacturers to train additional apprentices, including for their supply chains. This will be in addition to the Government-supported 9,000 new apprentice enrolments for manufacturers over the next three years, recently announced by the Sector Skills Councils.

- 2.67** To boost numbers further, the Government is creating a National Apprenticeships Service, to co-ordinate the Apprenticeships programme and simplify support for employers and would-be apprentices through a national matching service. Government is also exploring with key employers how to further reduce bureaucracy for firms wanting to access the apprenticeships programme. Government is working with the LSC and other partners to identify and tackle

unnecessary barriers and simplify the system. Steps are also being taken to streamline record-keeping requirements and remove excess paperwork.

Specialist support for manufacturing

- 2.68** The Government is also supporting the development of specialised, sector-specific skills. SEMTA is currently working with the Society of British Aerospace Companies to draw up an aerospace skills road map. This will identify the long-term skills needs of the aerospace manufacturing industry, a key area of British manufacturing strength, and outline how they will be met.
- 2.69** It is also working with employers to develop National Skills Academies (NSA), which enable employers to directly influence the content and delivery of training in their sectors. The National Skills Academy for Manufacturing (NSAM) was the first NSA to be set up in 2007. Three further NSAs relevant to manufacturing have been set up, for the Process, Nuclear and Food and Drink industries.
- 2.70** The pioneering development of the NSAM has been led by employers including Nissan, Toyota, Corus, Rolls-Royce, Caterpillar, Ford, GKN, Airbus, BAE systems and VT Group. The NSAM is working with the automotive sector to design an Automotive Supply Chain Development programme to boost skills in companies all along the supply chain.
- 2.71** The NSAM is launching pilot programmes in conjunction with the Society of Motor Manufacturers & Traders (SMMT) Industry Forum, and involving the three Japanese vehicle manufacturers, Honda, Nissan and Toyota, and their UK-based suppliers, to develop a strategic approach to improving the competitiveness of the UK supply chain. The pilots will provide focused support to raise leadership and management skills in supply chain companies, which are often SMEs; engage larger customer Original Equipment Manufacturers (OEMs) and Tier 1s in creating demand for support in supplier companies; and analyse supply chain efficiency and partnership relationships. They will also examine the strategic and operational performance of individual companies.
- 2.72** The Government is currently working to bring forward plans for a School of Design Innovation, as part of the National Skills Academy programme. The aim is to develop a national centre for excellence focused on boosting the number of design engineers in the UK.
- 2.73** The Government is also improving the specialist capacity of the network of Further Education Colleges, with a £5 billion programme of capital funding until 2010. This will enable colleges and training providers to build state-of-the-art facilities that provide the best possible training for the workplace. Our investment is supporting increased specialisation in the Further Education system, including through the continuing development of National Skills Academies and their specialist networks. Training providers and private companies will also be able to bid for capital funding to support facilities for training programmes such as apprenticeships, to ensure we are equipped to respond to identified skills needs in key sectors of the economy.

Changing manufacturing's image

- 2.74** We need to improve fundamentally the image of manufacturing for future generations, and demonstrate that choosing an engineering career will enable young people to tackle the key challenges facing the world and that matter to them, from climate change to water shortages in the developing world. To develop the evidence base and communication strategy to improve the perception of manufacturing:

Industry and representative bodies in partnership with Government will establish Manufacturing Insight, a body tasked with making the public perception of manufacturing reflect the reality of a successful, modern and broad sector and ensuring young people are aware of the exciting career opportunities available. It will develop the evidence base and communication strategy to improve the perception of manufacturing, liaise with the media, and work to improve careers guidance, strengthening links between schools and careers services and the manufacturing sector.

- 2.75** This will complement existing initiatives to ensure 14 to 19 year olds develop the skills they need to succeed in the manufacturing sector. GCSEs and A levels have been updated to ensure their relevance and rigour and the Extended Project to develop research, analysis and presentational skills will also be available from 2008. Diplomas will provide a new style of learning for young people of all abilities, combining knowledge and theory with practical work related learning. They will be introduced in four phases leading to a national entitlement in 2013 and a number will contribute directly to the development of a skilled and flexible manufacturing workforce, particularly Engineering, IT and Manufacturing and Product Design.
- 2.76** The Government has a major programme to invest £140 million to promote the uptake of Science, Technology, Engineering and Mathematics (STEM) subjects, and improve the quality of STEM teaching in schools. We are also increasing the number of STEMNET Science and Engineering Ambassadors from 20,000 to 27,000 by 2011. But many of those who go on to study STEM subjects do not go on to work in the manufacturing sector. Research by the Engineering and Technology Board shows that after completing their studies less than half of UK engineering graduates subsequently choose to enter the profession¹³. The largest proportion of engineering graduates can be seen working in the finance and business sector (30%), with the second largest group working in manufacturing (24%).
- 2.77** The propensity of graduates to enter professional engineering also differs across the engineering world. Civil engineering for instance has an extremely high rate of career progression with over 74% of civil engineering graduates working as professional engineers six months after graduation in 2007. In contrast, electronic and electrical engineering sees only around 30% of its graduates moving on to professional engineering careers. All engineering

disciplines experienced an increase of graduates moving into professional engineering in 2007 and there appears to be an upward trend emerging.

- 2.78** Government will ensure people in education are made aware of the opportunities on offer in manufacturing at different stages of their development.

We will launch a 'Manufacturing the Future' campaign in schools to promote manufacturing careers prospects for young people. This will use the Science and Engineering Ambassadors and work with Manufacturing Insight. This will build on the recently introduced engineering diploma for 14-19 year olds, the forthcoming manufacturing and product design diploma and the cross-Government project currently looking at labour market needs for STEM skills.

- 2.79** The Government will also encourage graduates to take up careers in manufacturing. It continues to promote University Enterprise Networks, and RDAs are currently working on manufacturing and high technology focused plans for the North West and South East regions, which will aim to increase engineering and technology graduates going into manufacturing.
- 2.80** It will also continue to foster closer links between manufacturers and universities, as part of broader efforts to ensure that the higher education system is responsive to employer needs. The strategy set out in *Higher Education at Work – High Skills: High Value*, published in April 2008, provides additional funding for Higher Education places co-funded with employers.
- 2.81** The Higher Education Funding Council for England (HEFCE) has agreed over 30 pilot projects to test out employer co-funding arrangements. HEFCE will also pilot joint approaches between Higher Education and Sector Skills Councils relevant to manufacturing to support high level skills. In addition we continue to expand Foundation Degrees, which are specifically designed to meet employer needs, across a range of sectors including manufacturing, to reach our ambition of 100,000 enrolments by 2010. HEFCE also identifies and supports subjects that are strategically important but vulnerable. Its consultation on a new 'University Challenge' should help to highlight areas where an HE presence could respond to employer demand in manufacturing.

LOW CARBON ECONOMY: OPPORTUNITIES FOR MANUFACTURING

“By 2050 the overall added value of the low carbon energy sector could be as high as \$3 trillion per year worldwide and it could employ more than 25 million people. So my goal is simple: I want Britain to achieve a disproportionately large share of these new global jobs.”

Gordon Brown, UK Low Carbon Economy Summit, 26 June 2008

- 2.82** The transition to a low carbon economy will require a significant transformation in products, processes and organisations.
- 2.83** As manufacturers respond to higher energy prices by improving their energy efficiency and innovate to reduce their carbon emissions in line with national, EU and international targets, they face challenges in revolutionising their production processes and technologies.
- 2.84** But this will also create opportunities for jobs and growth as manufacturers build competitive advantage and respond to demands from businesses and consumers for low carbon and energy efficient products and processes.

Seizing the Opportunities

- 2.85** The UK is already a net exporter of environmental goods and services, a sector that currently generates annual revenues of £25 billion in the economy. This could rise to over £45 billion by 2015 creating up to one million jobs by 2030. The UK also has the largest clean technology venture capital market in Europe with a cumulative investment of €186 million since 2001, accounting for 30% of the European total.
- 2.86** The UK Government is determined that UK manufacturing should be at the forefront of the low carbon revolution. Manufacturing has a significant role to play in lowering carbon and other greenhouse gas emissions through greater energy and resource efficiency and changing how resources are sourced and used across the supply chain. It is also well placed to take advantage of new markets.
- 2.87** Recent analysis¹⁴ suggests that there are significant opportunities for UK manufacturers to benefit from developments in clean technologies and products in areas such as software and electronics, pharmaceuticals and chemicals. This is also the case with developments in the machinery equipment sector, especially those linked to electricity generation technologies and in the aircraft sector, with change in many of these sectors, particularly among leading companies, already underway.

- 2.88** Ernst and Young identify the ability to attract capital including venture capital due to the existence of strong financial markets; the supply of high quality services to start and promote a new business (including strong software and business/management services); and the presence of a sophisticated and high tech manufacturing base as the key characteristics underpinning current advantage in these sectors.
- 2.89** EEF's analysis of modern manufacturing similarly looked at high performers in different sectors¹⁵. It concludes that the areas of UK manufacturing that have experienced higher rates of growth against the sector average in the last five years are those with high volumes of exports but also where a competitive edge has been developed, for example in responding to global environmental concerns, developing unique products and solutions or offering customers a 'whole life' service.
- 2.90** It also identifies UK sectors already benefiting from the increase in worldwide environmental concerns as manufacturers of industrial process control equipment (used by companies wanting to increase their resource efficiency), the motor vehicle industry and those in their supply chain developing more efficient engines, and specific chemicals manufacturers (from production of chemicals to improve fuel efficiency and reduce engine emissions to producing eco-friendly cleaning or paint products).
- 2.91** According to the CBI Climate Change Task Force report¹⁶ there are also considerable opportunities for SMEs in areas such as commercial buildings, renewable electricity and road transport fuels, domestic energy efficiency and housing. Low carbon business opportunities therefore exist across all sectors of the economy.

15 Delivering the Low Carbon Economy, EEF, 2008

16 Climate change – everyone's business, CBI Climate Change Task Force, 2007
<http://www.avtclient.co.uk/climatereport>

Driving Green Growth: ITI Energy Limited

ITI Energy Limited formed in 2003 is based at the Innovation Technology Centre in Rotherham. The company manufactures a compact and highly efficient thermal destruction technology based on a patented advanced gasification design. Combined with commercially available gas clean-up systems the technology generates a synthetic gas that is clean enough to fuel an internal combustion engine. The company's strategy is to provide gasification equipment that will treat all biomass and wastes at source eliminating transport costs and the adverse effects transport would have on the environment.

The system was developed in collaboration with the University of Newcastle and ultimately commercialised by ITI Energy Limited who in conjunction with sister company ITI Limited own all the rights, patents and IPR for the technology. Developed over ten years at Newcastle University, the ITI Energy Gasifier was specifically designed to handle a wide range of "difficult" or negative-value feedstocks and is particularly suited to the conversion of Refuse Derived Fuel (RDF) into energy. Gas from approximately 2.5 kg of biomass has the energy of one litre of petrol.

The use of biomass fuel, especially biomass wastes for distributed power production can be economically viable in many parts of the world. Biomass is a clean and renewable fuel. The potential applications for biomass gasification include: replacing current natural gas or diesel fuel use in industrial boilers or furnaces, providing distributed power generation where power demands are less than a few megawatts and displacing gasoline or diesel fuel in an internal combustion engine generator.

ITI is working with over 30 potential partners and clients to develop projects ranging from single unit sites to multiple unit 11 MW projects. Several of these partners already have multiple projects on identified sites in their pipelines.

- 2.92** Fossil fuels will continue to make a major contribution in meeting future energy needs – it is predicted that global coal demand is set to grow by over 70% in real terms between 2005 and 2030. Given this we need to find ways to reduce emissions from the use of fossil fuels through the development of Carbon Abatement Technologies (CATs) which will require the involvement of a large number of manufacturing and other sectors in which the UK has a strong presence.
- 2.93** Carbon Capture and Storage (CCS) is likely to be a major technology to help address climate change. Whilst CCS is not yet demonstrated at a commercial scale, the International Energy Agency (IEA) estimates that CCS will need to be installed on the equivalent of 630 coal-fired power plants by 2030 which is likely to represent around \$40 billion of investment globally per year.

- 2.94** The experience of the UK oil and gas industry and the companies that supply it places the UK in an ideal position to capitalise on the emerging opportunities from CCS. In November 2007 the Prime Minister launched a competition to support a commercial scale demonstration of CCS. This competition is now underway and in June 2008 the four bidders successful at the pre-qualification stage of this competition were announced – BP, EON, Peel Holdings/Dong Energy, Scottish Power. By being one of the first countries in the world to demonstrate CCS on a commercial scale, we will pave the way for this technology to be rolled out globally and put the UK in a strong position to take advantage of the significant market opportunities that will become available.
- 2.95** Greater resource efficiency is also vital if unnecessary carbon emissions are to be cut. At the same time it can deliver significant cost reductions and generate new commercial opportunities, for example, in waste treatment, recycling and remanufacturing. Waste disposal currently costs business 4% of their annual turnover – projected to rise to 6% with increases in landfill tax. A recent study for Defra estimates that potential resource efficiency gains amount to £6.4 billion per year for UK businesses, covering energy, waste and water savings.
- 2.96** The actions outlined in the Government’s Waste Strategy for England in 2007 are expected to lead to an annual reduction in carbon emissions of at least 9.3 million tonnes of CO₂ equivalent per year compared to 2006. The strategy sets ambitious targets to 2020 for the recycling of waste to reduce emissions from landfill sites, with the landfill tax escalator providing certainty of incentive into the future.

Achieving our vision

- 2.97** To achieve its vision of UK manufacturing at the forefront of the low carbon industrial revolution the Government is following the approach set out in its response to the Commission for Environmental Markets and Economic Performance (CEMEP)¹⁷. This set out a long-term regulatory and policy framework to provide industry with clear signals on carbon prices and emission reduction targets to help shape its future investment decisions.
- 2.98** The policy framework also seeks to remove barriers, including those resulting from failures in information provision and gaps in low carbon supply chains, to the investments in new technologies, innovations and skills needed to establish a leading low carbon economy.

¹⁷ Building a Low Carbon Economy: Unlocking Innovation and Skills, Defra/BERR, 2008.

Delivering Ambitious Carbon Goals

The Climate Change Bill will put into law the UK's targets to reduce CO₂ emissions by at least 60% by 2050 and by at least 26% by 2020, against a 1990 baseline. The Bill will make the UK the first country in the world to have a long term legal framework for driving the transition to a low-carbon economy. The Climate Change Bill will introduce, for the first time, a system of Carbon Budgets – capping emissions over five year periods, with budgets set 15 years ahead.

The UK framework is now established within a clear set of European goals. With strong UK support, the EU has agreed to reduce carbon emissions by at least 20% by 2020, or 30% if an international agreement is reached. The centrepiece of European policy is the Emissions Trading Scheme (EU ETS), which sets a price for carbon emissions. ETS will increasingly encourage industry to invest in carbon abatement technologies, thereby increasing the market for these products and services.

The Government has committed to meeting our share of the EU target that 20% of all energy should come from renewable sources by 2020. This will mean a very major increase in renewable electricity, heat and transport.

- 2.99** Communicating the benefits of a low carbon economy and providing advice and information to both businesses and households will play a key role in increasing the demand for low carbon products, services and jobs. In June 2008 the Government and Royal Bank of Scotland jointly hosted a Low Carbon Economy summit to highlight the business to business opportunities presented by the increasing demand for low carbon solutions and to explore what business and Government can do to make the most of new opportunities.
- 2.100** As a next step UKTI will launch an International Marketing Strategy to showcase UK excellence in delivering low carbon solutions for business and the economy and promote the UK as a global hub for low carbon solutions. The UKTI-led campaign will identify goods and services for overseas markets where the UK has an existing or potential competitive advantage and develop marketing materials and activities to help UK low carbon businesses exploit new opportunities.
- 2.101** The Government is also working with the CBI and others to develop a high-profile showcase for the UK's best low-carbon technologies – providing UK manufacturers the opportunity to exhibit new low-carbon technology to a global audience of potential investors.
- 2.102** Within the framework of the Climate Change Bill and EU climate and energy goals the Government has therefore set out a long term regulatory and policy framework to provide clear signals to industry to help shape its future investment decisions. The policy framework also seeks to support and remove barriers to investments in the new technologies, innovations and skills that are needed to establish a low carbon economy.

- 2.103** Developing the appropriate skills needed in a low carbon economy is vital to give the manufacturing workforce a competitive advantage as global markets for low carbon technologies expand. Following recommendations from CEMEP¹⁸, the Government will work with the Sustainable Development Commission, the UK Commission for Employment and Skills, the Sector Skills Alliance and Sector Skills Councils to develop a strategic skills solution for exploiting global opportunities.
- 2.104** Employers and sector skills organisations are already responding by establishing National Skills Academies for the Nuclear Industry and for the Process Industries. This is in addition to the National Skills Academy for Manufacturing and an independent academy for oil and gas. Building on this, the Government is also looking at an expression of interest from Energy and Utility Skills for the power sector in the current round.
- 2.105** This autumn, the Government will convene a high level forum on low carbon skills. The forum will establish a cross-sector employer-led Strategic Advisory Panel. The Panel will be tasked with aligning the skills system behind the challenges and opportunities of a low carbon, resource efficient economy, in line with the recommendations from the Windsor Consultation convened by DIUS and the New Engineering Foundation in June 2008¹⁹. The Panel's remit will be to find ways to draw best business practice into the skills system and deliver a rapid supply-side response without weakening existing employer leadership arrangements.
- 2.106** To help inform future debate the Government has also been working with stakeholders to review the current evidence base and understanding of the skill requirements for a successful transition to a Low Carbon and Resource Efficient Economy. This project will produce preliminary findings on areas of existing and future skills demand and provide recommendations on where future research should be directed²⁰.

18 <http://www.defra.gov.uk/environment/business/commission/index.htm>

19 Skills for a Sustainable Future – DIUS/NEF June 2008

20 <http://www.skills4lowcarboneyconomy.co.uk>

The Government will consult and produce next year an integrated Low Carbon Industrial Strategy to achieve its vision of placing UK manufacturing at the forefront of the new low carbon revolution. It will bring together all levers of Government activity, such as regulation, procurement, education, standardisation and investment, that will help manufacturers adapt to the low carbon economy and to identify and respond to the growing market opportunities it will create.

This strategy will build on the Government's response to the Commission for Environmental Markets and Economic Performance (CEMEP)²², which indicated five key elements:

- Long-Term Policy Framework – giving businesses the confidence to invest.
- Support for Low Carbon Supply Chains – identifying key constraints in the supply chain, and supporting businesses to overcome them.
- Creating the Conditions for Innovation – removing barriers to innovation through better regulation, public procurement, and support for research, development, demonstration and deployment.
- Developing the Necessary Skills – unlocking the talent and creativity of people in the UK.
- Information and Advice – increasing demand through improved business and consumer awareness.

2.107 The immediate focus of this new strategy is on three key areas of manufacturing activity: supply chains for nuclear and renewable energy equipment and Low Carbon Vehicles. To help deliver specific and targeted support to these areas the Government is establishing a network of cross-Whitehall Low Carbon Units.

Nuclear Energy

2.108 Facilitating new nuclear build is one of the key elements of the Government's energy strategy as it enables the UK to secure low carbon energy supplies. There is an opportunity for manufacturing to have a significant role in the construction, operation and decommissioning of new nuclear power stations in the UK. These include specialist equipment supply, the supply of forgings, and manufacture of large castings and reactor pressure vessels.

2.109 Simply replacing existing nuclear stations in the UK as they reach the end of their working lives will require 11 gigawatts of capacity, equivalent to seven large new reactors, at a cost of approximately £3 billion each. Worldwide, the prospects are even greater, with an anticipated global nuclear renaissance. The International Energy Agency anticipates at least 60 new plants in the next

15 years, making 430 GW in place in 2020 – 16% more than actually operating in 2006.

- 2.110** The Government's objective is to create a globally competitive supply chain in order to maximise the high value added captured by UK manufacturing from nuclear development in the UK and globally. Our strategy is modelled on the lessons learnt from the 1970s North Sea oil exploitation which, facilitated by the Offshore Supplies Office created in 1973, led to the birth of a globally competitive offshore supplies industry which is still a global leader and export earner for the UK.

The Government through the specially created Office of Nuclear Development (OND) will work with the supply chain and nuclear reactor vendors and operators to create and support a globally competitive supply chain, focusing on high value added. It will ensure that manufacturers in the supply chain have clarity and knowledge about the needs of the UK programme, anticipate and identify blockages. It will also assist manufacturers through existing and new programmes to develop capability where gaps are identified, assist manufacturers to work with the vendors, identify and help address skills and technology needs. It will also work with UKTI going forward to develop export strategies and develop targets and measures to measure the OND's progress against the goal of maximising value added to the economy. We are publishing today, as a start, a report by NAMTEC on the strengths and weaknesses of the supply chain²³.

- 2.111** The Government has also created the National Skills Academy for Nuclear to address the key skills and training challenges facing the nuclear industry. In addition, the Nuclear Industry Association, supported by the OND, the Regional Development Agencies, UKTI and other key partners will be delivering a programme of regional and sectoral initiatives aimed at improving the capability of the UK supply chain, through raising awareness of major opportunities at home and overseas. As an example the Special Metals Forum will organise an event to improve awareness of developing opportunities primarily among SMEs not currently in the nuclear supply chain.

Renewable Energy

- 2.112** There will be considerable commercial opportunities available to manufacturers as the UK builds the renewable infrastructure required to meet its 2020 energy and climate change targets. These opportunities will largely be around research, development and deployment of offshore wind technology, fabrication, assembly, installation, operation, maintenance and component supply for onshore and offshore wind, for example generators, castings, blades and cables. The investment required in the UK on renewables over the next twelve years will be in the order of £100 billion.

²² The Supply Chain for a UK Nuclear New Build Programme – NAMTEC report, September 2008
www.berr.gov.uk/files/file47664.pdf

The Renewable Energy Strategy will establish the Office for Renewable Energy Deployment (ORED) which will address barriers to deployment including supply chain, planning and grid issues. ORED, working with the Renewables Advisory Board, will help raise the domestic and global profile of manufacturing companies in the supply chain, identify and communicate the potential opportunities and, with the Manufacturing Advisory Service and UKTI, advise manufacturers on how they can most effectively exploit the growing renewables market. ORED will also provide the right level of information and advice to UK manufacturers to help them compete with international component suppliers to the global renewables industry.

- 2.113** ORED will build on the work of the Renewables Trade Promotion Service (RTPS)²³ which has, for example, assisted some manufacturers not connected with the renewables industry in promoting new products for the global wind market. The Carbon Trust estimates that the UK could earn annual revenues from marine renewables alone ranging from £300-900 million by 2020.

Low Carbon Vehicles

- 2.114** Low carbon vehicle technology is a key market opportunity for UK manufacturers. The King Review concluded that the average CO₂ emission of new cars could feasibly be cut to 100g/km by 2020 (from around 164g/km now). The Government is now pressing the European Union to adopt this ambitious long-term target. This will set a challenging target for car manufacturers, stimulating R&D and innovation in advanced low carbon technologies and creating substantial commercial opportunities.
- 2.115** The automotive sector is a pivotal part of UK manufacturing. It directly employs 194,000 people and contributes around £9.6 billion added value to the economy. Low carbon vehicle technology is a key market opportunity for UK manufacturers. The internal combustion engine will remain at the core of car manufacturers for at least the next two decades. However, these engines will have to become more efficient with emission savings of the order of 20-30% possible through technologies including downsizing, variable valve actuation, variable compression, direct injection, lighter weight materials and new efficient transmissions.
- 2.116** In the last six years the Engineering and Physical Sciences Research Council has allocated in excess of £250 million for research into basic technologies with potential applications in low carbon vehicles. The Technology Strategy Board's Low Carbon Vehicles Innovation Platform will provide an additional £70 million of funding for an integrated Delivery Programme seeking to integrate university and industry R&D to accelerate the exploitation of more radical approaches to decarbonising road vehicles. The Government set up in 2008 the industry-led Automotive Innovation and Growth Team (IGT), which in collaboration with the TSB and other relevant bodies is developing a collective industry view on

what the challenges and growth opportunities are for this sector. Advanced low carbon vehicles form a major strand of the IGT with an emphasis on how the UK can improve its global competitiveness. The findings should be available in spring 2009.

- 2.117** To build on the work of the Automotive IGT we will accelerate development of new technologies where there is potential for UK manufacturers to succeed in areas such as control systems, advanced internal combustion engines, electric motors, energy storage and scavenging devices, and recycling of complex components.

The Government is supporting a major new pilot programme for electric cars, including plug-in hybrids which can be fuelled by electricity from the grid or petrol. The Government will develop a programme, working with industry, the Energies Technologies Institute and the UK Centre of Excellence for low carbon and fuel cell technologies (CENEX), that it hopes will explore the role of electric cars in a sustainable transport system in a real-world demonstration.

- 2.118** As highlighted in the Innovation Nation White Paper, Government can also support innovation through the right regulatory design, through appropriate use of public procurement, and through specific policies for research, development and demonstration of new technologies.

We will also dedicate £20 million initially for the public procurement of innovative low carbon and zero emission vans.

- 2.119** The work does not stop here. The immediate steps we are taking, combined with those that are already in place, will help to ensure the UK delivers high value from low carbon markets, together with jobs and growth. Government will continue working in partnership with business to ensure that the UK is at the forefront of this technological revolution and reaps the rewards of moving to a low carbon and resource efficient economy.

Part 3: Manufacturing Action Plan and Supporting Information



This table sets out the Government's key new policy commitments, describes what is being delivered, and by when, as well as indicating who is responsible.

POLICY PROPOSALS ON GLOBAL VALUE CHAINS		
Policy Measure	By When?	Who is taking the policy measure forward?
UK Trade & Investment will allocate additional resource to target a package of new support for 600 UK companies of all sizes to identify manufacturing value chain opportunities in India and China, using newly recruited industry experts, and will promote UK manufacturing excellence internationally through a range of major marketing campaigns. This is likely to include building supply chain element into the proposed 'Advanced Passport' scheme; a more active focus on specific supply/value chain opportunities (such as the Chinese sustainable cities initiative); and improvements to our Portal to enhance matching of SMEs to global supply/value chain opportunities.	Q2 2009	UKTI
The Intellectual Property Office will take additional steps to publicise their newly produced guidance for UK companies on protecting and exploiting intellectual property in key emerging markets such as China, India and Brazil.	Q3 2008	Intellectual Property Office
To highlight and celebrate the best cluster activity the Government will therefore develop a new "Cluster Mark" award, which will raise the profile of manufacturers involved in the best clusters and support international marketing of local strengths. Each region will be asked to run a competition to select the best cluster according to a set of agreed criteria. The overall winner will be chosen by a national panel from the regional nominees.	End 2009	BERR, UKTI

POLICY PROPOSALS ON TECHNOLOGY EXPLOITATION		
Policy Measure	By When?	Who is taking the policy measure forward?
In 2010 Advantage West Midlands and the East Midlands Development Agency will deliver a new addition to this network, the Manufacturing Technology Centre at Coventry, with an investment of £30 million. The Centre will focus on the development and application of high integrity joining and fabrication, expertise in tooling, automation and operational performance with industrial scale pre-production and demonstration facilities. Over 10 years the Centre could see investment of £130 million in business-led applied research and its exploitation. Government would welcome proposals that widen the regional network of centres to specialise in key technology areas.	End 2010	BERR, DIUS, AWM and EMDA
To increase further the focus of and access to public funds for collaborative R&D, the Technology Strategy Board will invest a further £24 million in research central to high value manufacturing focused on Products, Production Processes and Services and Value Systems. In addition it will work with Government, the RDAs and Research Councils to offer a streamlined and simpler process for assessing the technological and business case for public sector investment in major collaborative R&D Projects, starting with those seeking over £10 million in public sector funding.	Q1 2009	TSB
DIUS will work with the Technology Strategy Board to build on the already strong evidence of its impact to date and use this to leverage additional funding to support technology innovation.	Q3 2008	DIUS, BERR, TSB
To enable UK companies to increase their competitiveness and develop new capabilities, DIUS and the Technology Strategy Board will stimulate industry to increase its participation in the "Manufuture" European Technology Platform to ensure it reflects the needs of UK enterprises. DIUS and the Technology Strategy Board will also influence the direction of a new joint technology initiative on sustainable and competitive high value manufacturing.	JTI structure and content – 2008/09	DIUS, TSB

POLICY PROPOSALS ON TECHNOLOGY EXPLOITATION		
Policy Measure	By When?	Who is taking the policy measure forward?
Innovation Vouchers will introduce a new stream of businesses to the UK's knowledge base institutions. This will help improve the environment for innovative businesses and expand the scale and range of knowledge exchange activities. Over the English regions, at least 500 businesses will be given an innovation voucher to work with a knowledge base institution of their choice, with the aspiration that this would increase to at least 1000 per year by 2011 as the vouchers were demonstrated to be effective for businesses. This is expected to mean an investment of at least £3 million to initiate collaborations between SMEs and the knowledge base.	Q1 2011	RDAs
The Small Business Research Initiative is being reformed to ensure that it effectively supports technological innovation by SMEs. The Technology Strategy Board is initially running an SBRI pilot involving the Ministry of Defence and the Department of Health, prior to rolling out the reformed programme to other Government Departments from April 2009.	Autumn 2008	DIUS, TSB

POLICY PROPOSALS ON INTANGIBLES

Policy Measure	By When?	Who is taking the policy measure forward?
<p>The Design Council and Regional Development Agencies will implement the findings of the current review of the Designing Demand programme to increase penetration of this successful programme across the regions as well as improve alignment with other relevant business support products such as the Manufacturing Advisory Service. The review is designed to ensure small and medium sized manufacturing companies continue to have access to support to develop their design capability. The review will synthesise data on business impact, forecast impact and service experience to assess existing roll-out, delivery and programme outcomes, as well as product brand awareness and programme flexibility.</p>	<p>Review due to complete September 2008</p>	<p>DIUS</p>
<p>The sector skill council Creative and Cultural Skills Council and the Design Council will work to support the newly created UK Design Skills Alliance to ensure the UK design sector has the skills required by manufacturers to compete in global markets. The new Alliance will concentrate on professional development for designers, anticipating future skill needs and improving connections between practising designers and universities – to ensure our design sector can anticipate the shifting demands of the global economy.</p>	<p>Programme starting in September 2008</p>	<p>BERR/DIUS/DCMS</p>
<p>The Government will lead the promotion of an international system of mutual recognition for the examination work of accredited patent offices.</p>	<p>TBD</p>	<p>UK IPO</p>
<p>The Government will continue to monitor and ensure the competitiveness of the UK's intellectual property tax structure and seek opportunities to lower the Corporation Tax rate further.</p>	<p>Ongoing</p>	<p>BERR/DIUS/HMT</p>

POLICY PROPOSALS ON PEOPLE AND SKILLS		
Policy Measure	By when?	Who is taking the policy measure forward?
From April 2009, with Business Link acting as the primary access point for integrated business support, manufacturers will be able to experience a single seamless service for addressing their skills needs, whichever skills body they approach. The Memorandum of Understanding released with this strategy commits all those who interface with manufacturers to provide this immediate and seamless access to comprehensive and straightforward advice and support.	Ongoing from September 2008	DIUS, BERR, UKCES, RDAs
The UK Commission for Employment and Skills (UKCES) is developing proposals to simplify the skills system itself, building on recent reforms. UKCES will report to Government in autumn 2008, and will target the manufacturing sector as a first pilot for relevant proposals; including building Train to Gain as a more integrated service that offers a range of options for employers.	Autumn 2008	DIUS, UKCES
UKCES is also leading work to develop a Talent Map, providing employers with a single, clear visual representation of the education, employment and skills systems and how employers can work with Government. We will look to involve manufacturing employers in further trials of the Map.	2009	UKCES, DIUS, DCSF, Talent Taskforce, National Council for Educational Excellence, BITC
Working with industry, the trade unions and the Apprenticeship Ambassadors' Network, we will extend and expand high quality apprenticeships by approximately 1,500 new places, inviting bids from larger manufacturers to train additional apprentices, including for their supply chains. This will be in addition to the Government-supported 9,000 new apprentice enrolments for manufacturers over the next three years, recently announced by the Sector Skills Councils.	2008-2011	DIUS, LSC

POLICY PROPOSALS ON PEOPLE AND SKILLS		
Policy Measure	By when?	Who is taking the policy measure forward?
Industry and representative bodies in partnership with Government will establish Manufacturing Insight, a body tasked with making the public perception of manufacturing reflect the reality of a successful, modern and broad sector and ensuring young people are aware of the exciting career opportunities available. It will develop the evidence base and communication strategies to inform public debate, liaise with the media, and work to improve careers guidance, strengthening links between schools and careers services and the manufacturing sector.	2009	BERR, DIUS, DCSF
We will launch a 'Manufacturing the Future' campaign in schools to promote manufacturing career prospects to young people. This will use the Science and Engineering Ambassadors and work with Manufacturing Insight. The campaign will build on the recently introduced engineering diploma for 14-19 year olds, the forthcoming manufacturing and product design diploma and the cross-government project currently looking at labour market need for STEM skills.	Q3 2009	DIUS/BERR/DCSF

POLICY PROPOSALS ON LOW CARBON		
Policy Measure	By when	Who is taking the policy measure forward?
The Government will consult and produce next year an integrated Low Carbon Industrial Strategy to achieve its vision of placing UK manufacturing at the forefront of the new low carbon revolution. It will bring together all levers of Government activity, such as regulation, procurement, education, standardisation and investment, that will help manufacturers adapt to the low carbon economy and to identify and respond to the growing market opportunities it will create.	2009	BERR
The Government through the specially created Office of Nuclear Development (OND) will work with the supply chain and nuclear reactor vendors and operators to create and support a globally competitive supply chain, focusing on high value added. It will ensure that manufacturers in the supply chain have clarity and knowledge about the needs of the UK programme, anticipate and identify blockages. It will also assist manufacturers through existing and new programmes to develop capability where gaps are identified, assist manufacturers to work with the vendors, identify and help address skills and technology needs, work with UKTI going forward to develop export strategies and develop targets and measures to measure the OND's progress against the goal of maximising value added to the economy. We are publishing today, as a start, a report by NAMTEC on the strengths and weaknesses of the supply chain.	2008	BERR

POLICY PROPOSALS ON LOW CARBON		
Policy Measure	By when	Who is taking the policy measure forward?
The Renewable Energy Strategy will establish the Office for Renewable Energy Deployment (ORED) which will address barriers to deployment including supply chain, planning and grid issues. ORED, working with the Renewables Advisory Board, will help raise the domestic and global profile of manufacturing companies in the supply chain, identify and communicate potential opportunities and, with the Manufacturing Advisory Service and UKTI, advise manufacturers on how they can most effectively exploit the growing renewables market. ORED will also provide the right level of information and advice to UK manufacturers to help them compete with international component suppliers to the global renewables industry.	Spring 2009	BERR
The Government is supporting a major new pilot programme for electric cars, including plug-in hybrids which can be fuelled by electricity from the grid or petrol. The Government will develop a programme, working with industry, the Energy Technologies Institute, and the UK Centre of Excellence for low carbon and fuel cell technologies (CENEX), that it hopes will explore the role of electric cars in a sustainable transport system in a real-world demonstration.	End 2008	BERR, TSB, ETI, Dft
We will also dedicate £20 million initially for the public procurement of innovative low carbon and zero emission vans.	End 2008	BERR, TSB, ETI, Dft

ENGAGEMENT WITH KEY STAKEHOLDERS DURING THE COURSE OF THE REVIEW

The Government's proposals have been developed with close and constructive engagement from a wide range of stakeholders, and there will be further more detailed consultation on the implementation of individual elements as appropriate.

Ministerial Advisory Group on Manufacturing

To help in this work, in November 2007 BERR established a Ministerial Advisory Group on Manufacturing to provide advice during the Review to Shriti Vadera, Parliamentary Under Secretary of State for Business and Competitiveness, BERR and Baroness Delyth Morgan, Parliamentary Under Secretary of State for Intellectual Property and Quality, DIUS.

Members:

Andrew Churchill, Managing Director, JJ Churchill Ltd

Allan Cook, Chief Executive, Cobham plc

Phil Davies, National Secretary, GMB

Stella Layton, European President, Cookson Precious Metals

Iain Gray, Chief Executive, Technology Strategy Board

Professor Mike Gregory, Head, Cambridge Institute for Manufacturing

Garry Hodges, General Manager, Eisai Ltd

Bryan Jackson, Chairman, East Midlands Development Agency

Professor Julia King, Vice-Chancellor of Aston University

Ian McCafferty, Chief Economic Adviser, CBI

Trevor Mann, Senior Vice President – Manufacturing, Nissan UK

Tim Page, Senior Policy Officer, TUC

Andy Reynolds-Smith, Executive Director, GKN plc (also Chair of CBI Manufacturing Council)

Ian Shott, Chairman, Excelsyn

Martin Temple, Chairman, EEF

Chris Tyas, UK Supply Chain Director, Nestle

John Wall, President, CSEU/Unite

Margaret Wall, SEMTA

Alan Wood, Chairman, Siemens UK

Regional Manufacturing Events

In addition, BERR arranged jointly with the Regional Development Agencies a series of three facilitated regional manufacturing workshops, covering the nine RDA regions, in the North, Midlands and South of England. These events, held in mid-2008, were designed to ensure that manufacturers contributed to the development of this document.

Events were held at:

- Pride Park in Derby for manufacturers in the AWM, EMDA and EEDA regions – co-hosted by Shriti Vadera, PUSS for Business and Competitiveness and Dr Bryan Jackson, Chair of East Midlands Development Agency and a member of the Ministerial Advisory Group on Manufacturing;
- Hewlett Packard Laboratories in Bristol for manufacturers in the SWRDA, SEEDA and LDA regions – co-hosted by Shriti Vadera and Juliet Williams, Chair of the South West of England Regional Development Agency;
- The Baltic Centre in Gateshead for manufacturers in the NWDA, ONE and YF regions – co-hosted by Malcolm Wicks, Minister of State for Energy and Margaret Fay, Chair of One NorthEast.

More than 300 people attended the events. The attendees for the events were:

- Regionally representative;
- Included small, medium and large enterprises;
- Covered R&D, design, production, logistics/marketing, services;
- Took account of gender and ethnicity balance.

Key themes to emerge from the workshops

The events were structured to facilitate discussion around the key dynamics changing the current landscape of manufacturing.

General feedback from participants included:

- Agreement that the Government needed a long-term, clearly communicated strategy for manufacturing;
- General consensus on the new dynamics identified;
- Strong emphasis on the importance of improving the image of manufacturing in order to attract the best talent from schools and universities;
- Support for further simplification of the skills system;
- Emphasis on the importance of Government support for R&D, innovation and best practice;

- Evidence that the Manufacturing Advisory Service was a popular support mechanism;
- Highlighting Designing Demand as a valuable source of support (by those who had experienced it).

MANUFACTURING IN DEVOLVED ADMINISTRATIONS

The UK Government recognises that support for manufacturing is a matter that is devolved to Wales, Scotland and Northern Ireland.

We will continue to work closely with the devolved administrations, and we hope this framework will help inform thinking as they develop or refresh their own approaches to manufacturing as their approaches have informed ours.

In Wales, manufacturing has gone through significant transformation in recent years and continues to be an important part of the Welsh economy, contributing significantly to the wealth creation process and providing well paid jobs for many thousands of people in Wales.

Following the 2004 publication of a Task & Finish Group report on 'Manufacturing in Wales' the Welsh Assembly Government facilitated the creation of a Welsh Manufacturing Forum, with a remit to:

- Develop, implement and keep under review a manufacturing strategy for Wales that addresses issues of generic concern to the sector;
- Assist in obtaining the best possible return upon public sector support investment in providing support to the manufacturing sector;
- Endorse the detailed sector strategies developed by those sector fora representing priority manufacturing sub-sectors in Wales and support, as appropriate, the implementation of those strategies.

A Steering Group was established which took early action to identify and focus upon a limited number of strategically significant issues affecting manufacturing in Wales. These key issues were identified as 'High Value Add Manufacturing', 'Skills', 'Marketing' (Image of Manufacturing) & 'Small Businesses'.

The Forum is currently engaged in producing a Manufacturing Strategy document, which focuses on these issues and which is due to be completed and presented to Ministers before the end of 2008.

In Northern Ireland, Invest NI encourages the manufacturing sector to enhance and strengthen activities in order to make local businesses, particularly those at SME and micro level, be more outward looking and trade externally. It works with a range of client companies and representative bodies on specific initiatives to promote and develop export potential by identifying new business opportunities and develop new markets for their members' products and services.

Invest NI also helps manufacturing businesses improve their competitiveness through programmes addressing capability, product, process, export and investment. Actions include: role models and case studies; Innovation Advisers; mentoring and coaching support; strategic collaborative networks of businesses and knowledge institutions; and Knowledge Transfer Partnerships.

Invest NI benchmarks its own activity in this area against other RDAs to ensure Northern Ireland companies receive optimum support.

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