

The UK plastics industry: A strategic vision for growth

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The UK plastics industry: A strategic vision for growth

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British Plastics Federation
BPF House, 6 Bath Place
London, EC2A 3JE

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Industry foreword

David Hall

President
British Plastics Federation



The plastics industry is one of the major strengths of the UK manufacturing sector. It all began here in the mid-19th century and, when it comes to making plastics materials and products, the UK remains a centre of excellence to this day.

The plastics industry in the UK directly employs 170,000 people. This is more than those employed in the pharmaceutical, glass, paper, nuclear and steel industries combined. It makes a huge contribution to UK manufacturing in all sectors, yet as an industry it lacks visibility and is not immediately recognisable as a distinct industry sector.

Whilst sectors such as aerospace, automotive and construction are often cited as our most important industries, rarely is it mentioned that without the use of plastics none would be possible in their current form or indeed be profitable. In order to secure higher recognition of the importance of the UK plastics industry this strategy, with the support of UK Government, sets out to realise the true potential of plastics and gain the recognition it deserves.

Based on its first-rate resource efficiency and carbon saving initiatives, the characteristics of the UK plastics industry act as an important attraction

for inward investment.

The UK is a global leader in many aspects of plastics technology and has an innovation record that is second to none. However, our industry is held back from realising its potential due to a number of key reasons, including:

- **A Chronic shortage of skilled staff. A skilled and educated workforce is essential in order to maximise and create opportunities for business development.**
- **The UK has come to rely, to an uncomfortable extent, on imported raw materials and recent shortages highlight our vulnerability. The future sustainability of the industry in the UK is questionable if the availability of materials cannot be guaranteed at the volumes required.**
- **There is a perception that negative views about the littering of plastic products could adversely affect the acceptance by the general public as well as influencing decisions about careers in the sector.**

With these factors in mind, the British Plastics Federation, working alongside key sector organisations, has developed this roadmap for the wider UK plastics industry to help develop its position at the forefront of global manufacturing.

A handwritten signature in dark ink, reading 'David Hall'.

Executive Summary

The use of plastics globally has increased 20-fold in the last 50 years and it is expected to double again in the next 20 years¹. Indeed by 2020 it is expected that the global plastics industry will be worth in excess of \$650 billion². This document sets out the key actions we need to take collaboratively to ensure the UK continues to maintain a pivotal role in

the future of the plastics industry.

This document was developed with the expert input of over 40 organisations across the plastics industry supply chain, as well as a number of key stakeholders from outside the industry.

The report has identified actions to support future industry growth. These are:

- Promoting the reputation of plastics and the plastics industry
- Improving the industry's skills base and its educational support
- Securing consistent and competitive supplies of feedstock
- Accelerating the sustainability of the plastics industry and its alignment with the circular economy
- Focusing on overseas market development and the encouragement of reshoring
- Focus on overseas market development and encouragement of reshoring
- Enhanced industry collaboration

¹ Page 24 The New Plastics Economy , Ellen Macarthur Foudation (2016)
http://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_TheNewPlasticsEconomy_19012016.pdf

² <http://www.prnewswire.com/news-releases/plastics-market-worth-65438-billion-by-2020-grand-view-research-inc-511720541.html> / <http://www.grandviewresearch.com/industry-analysis/global-plastics-market>

The UK Plastics industry 2015

6,200



Companies in the
plastics industry

1.7 m

Tonnes of material
produced



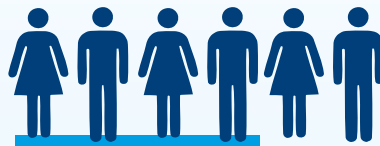
3.3 m

Tonnes of plastics
materials processed



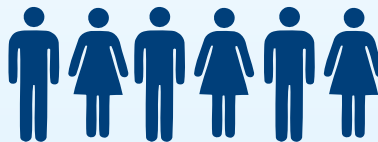
£23.5 bn

Plastics industry
turnover



170,000

People employed



27

Employees per
firm (average)



£7.5 bn

Value of exports



5,200

Manufacturers of
plastics products



30+%

Plastics and plastic
products exported

Sources: www.bpf.co.uk/sources/strategy.aspx

Points for action

T The following points to action are developed in more detail in the relevant sections found within this report and are to be driven forward by the BPF with the support of industry and government.

Promoting the reputation of plastics and the plastics industry

Establish a BPF Central Committee for sustainability to act as a central authoritative voice and to promote positive messages about plastics and its role in sustainability

The BPF to create a series of infographics and presentations (promoting positive messages about plastics and the plastics industry) for use by the industry and to be shared on social media

Make greater use of third parties (brand owners, retailers etc) to endorse the use of plastics materials and products

Work more closely with organisations who encourage the use of 'sound science' in public policy such as Sense About Science and the Science Media Centre

Improving the industry's skills base and its support for educational & vocational training

Conduct research to better understand current skill levels and likely future demand across the sector

Develop online educational resources for use in schools

Ensure plastics/polymers continue to appear in the national curriculum and that further investment is made in educating young citizens in the necessary technical skills to meet the current labour skills gap

Establish a BPF Central Committee for skills, training and education

The BPF to create an online hub for information on the currently available short courses and graduate/post graduate courses on plastics

Increase online promotion of the career opportunities available in the plastics industry

Encourage plastics firms to offer student placements/work experience and provide a way to promote this online

Encourage the creation of 'Micro Regional Training Academies' (see the case study on the RPC academy on page 28)

Securing consistent and competitive supplies of feedstock

The BPF to sponsor an academic study into the relative efficiency of the polymer market

Increase awareness in the political community about the opportunities for the plastics industry arising from shale gas discoveries in the UK

Ask government to include plastics in any considerations of strategic materials of national importance (alongside, for example, rare earth metals)

Ask the government to periodically review the appropriateness of tariffs applied to polymers sourced from outside of the EU

Accelerating the sustainability of the plastics industry and its alignment with the circular economy

The BPF to encourage government to use green public procurement policy to incentivise the use of recycled materials in relevant product applications

The BPF to maintain pressure on banning the landfilling of all recyclable and recoverable waste

The BPF and its partners to fund further development and implementation the Plastics industry Recycling Action Plan (see case study page 43)

The BPF to encourage relevant parallel organisations and funding bodies to support further research and development in plastics recycling

The BPF to work with Department for Business Energy and Industrial Strategy (BEIS) and other industry stakeholders e.g. WRAP, Recoup etc) to gather more market intelligence in order to aid a detailed analysis and discussion about the economics of plastics recycling

The BPF to encourage government to review the PRN (Packaging Recovery Note) system to create a level playing field between domestic recyclers and exporters of used plastics for recycling

The BPF to encourage regulatory bodies to help facilitate the recycling of plastics containing legacy additives and thus ensure that their huge potential as a secondary raw material resource is realised

Spotlighting future markets for plastics products

The BPF to engage with the Manufacturing Technology Centre on the implementation of the Additive Manufacturing National Strategy

The BPF to explore the creation of an Additive Manufacturing Group made up of machinery manufacturers and resellers, printing bureaus, software suppliers, consultants, designers, material suppliers and universities

The The BPF to run a series of seminars on additive manufacturing in order to raise awareness, educate the industry and stimulate dialogue on how it will affect the UK plastics industry

Focus on overseas market development and encouragement of reshoring

BPF to elaborate the specific advantages of the plastics supply chain in the UK in an overarching "UK Plastics Industry Guide"

Continue the support of UKTI for the sector and to specifically award grants to encourage UK SMEs to develop overseas markets and to participate in foreign trade shows

Lobby government to examine the incentivisation of reshoring via tax breaks or other incentives

Work with UKTI and their 'GREAT' campaign to better link in with their existing 'Innovation is GREAT' campaign

The BPF to promote to the industry opportunities in specific growth markets such as South America, Middle East, Africa and Asian countries

The BPF to look to government for financial support for a detailed analysis of what is currently being exported from the UK and what could be successfully exported in the future

The BPF, with government financial backing, to prepare a gap analysis study on the UK plastics industry supply chains to better understand where future efforts should be focussed

The BPF to organise a 'plastics round table' discussion forum in order to enable better dialogue between the plastics community and the design community

Enhanced industry collaboration

The BPF to create a stakeholder map for the plastics industry

Explore ways in which the plastics industry could engage better with the design community

Create an online portal allowing designers to access information on plastics

Encourage participation of the plastics industry in more design-focused events such as the 100% Design Show

The BPF to be arrange 'Meet the Buyer' event in order to connect UK-based plastics firms with the design community. This will provide a platform for discussing new projects and sourcing technical advice to ensure the design is 'fit for manufacture and use'

Engage with the Automotive Council to develop relations between automotive manufacturers and the suppliers in the plastics industry

Engage directly with the Catapults around the UK, specifically the High Value Manufacturing Catapult

Section 1

The UK plastics industry today

The plastics industry is a major component of the UK manufacturing sector and currently employs approximately 170,000 people (representing around 6.5% of all those employed in manufacturing in the UK) in over 6,200 companies with a combined turnover of approximately £23.5bn. Plastics products are used in practically every industrial and distributive sector and provide unique properties not offered by any other single material.

Contemporary manufacturing and distribution would be impossible without plastic and the design flexibility, resource efficiency and energy savings it brings.

The UK plastics industry occupies a strategically crucial position and is a critical factor in the supply chains of a vast array of UK manufacturing and service sectors, for example:



Aerospace Composite fuselage, nose cones, tail planes and wings



Furniture Bedding, upholstery and household furniture



Automotive Bumpers, dashboards, engine parts, seating and doors



Marine Boat hulls and sails



Construction Insulation, window frames, doors, pipe systems, flooring, roofing and cladding



Medical / Healthcare Syringes, blood bags, tubing, dialysis machines, heart valves, artificial limbs and wound dressings



Electrical Television, computer housings and white goods



Military Helmets, body armour, tanks, warships, aircraft and communications equipment

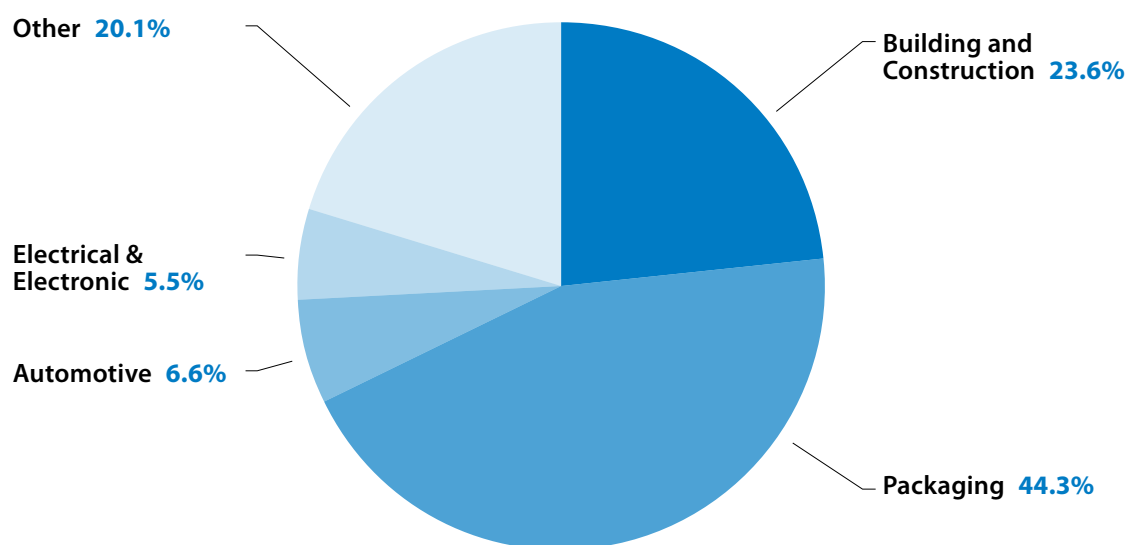


Energy Generation Wind turbines, solar panels and wave booms



Packaging Bottles, crates, pallets, food containers, trays, drums and films

Plastics consumption by application markets (%) in the UK



Plastics consumption by application - Source: PlasticsEurope Market Research Group (PEMRG) / Consultic Marketing und Industrieberatung GmbH

The UK Plastics industry – Estimated Key Numbers/Size/Tonnages (2015)

Plastics Firms in the UK

Manufacture of plastics raw materials	400
Manufacture of plastic products	5,200
Plastics recyclers and traders	200
Manufacturers and distributors of machinery and ancillary equipment	400
Total number of firms	6,200
Employees	
	170,000
Average employees per firm	
	27
Plastics material processed p.a.	
	3.3 million tonnes
Plastics material produced p.a.	
	1.7 million tonnes
Turnover	
	£23.5bn
Percentage of plastics and plastic products exported	
	35%

Manufacture of plastics raw materials – Source: Annual Business Survey (ABS) SIC Code 20.16

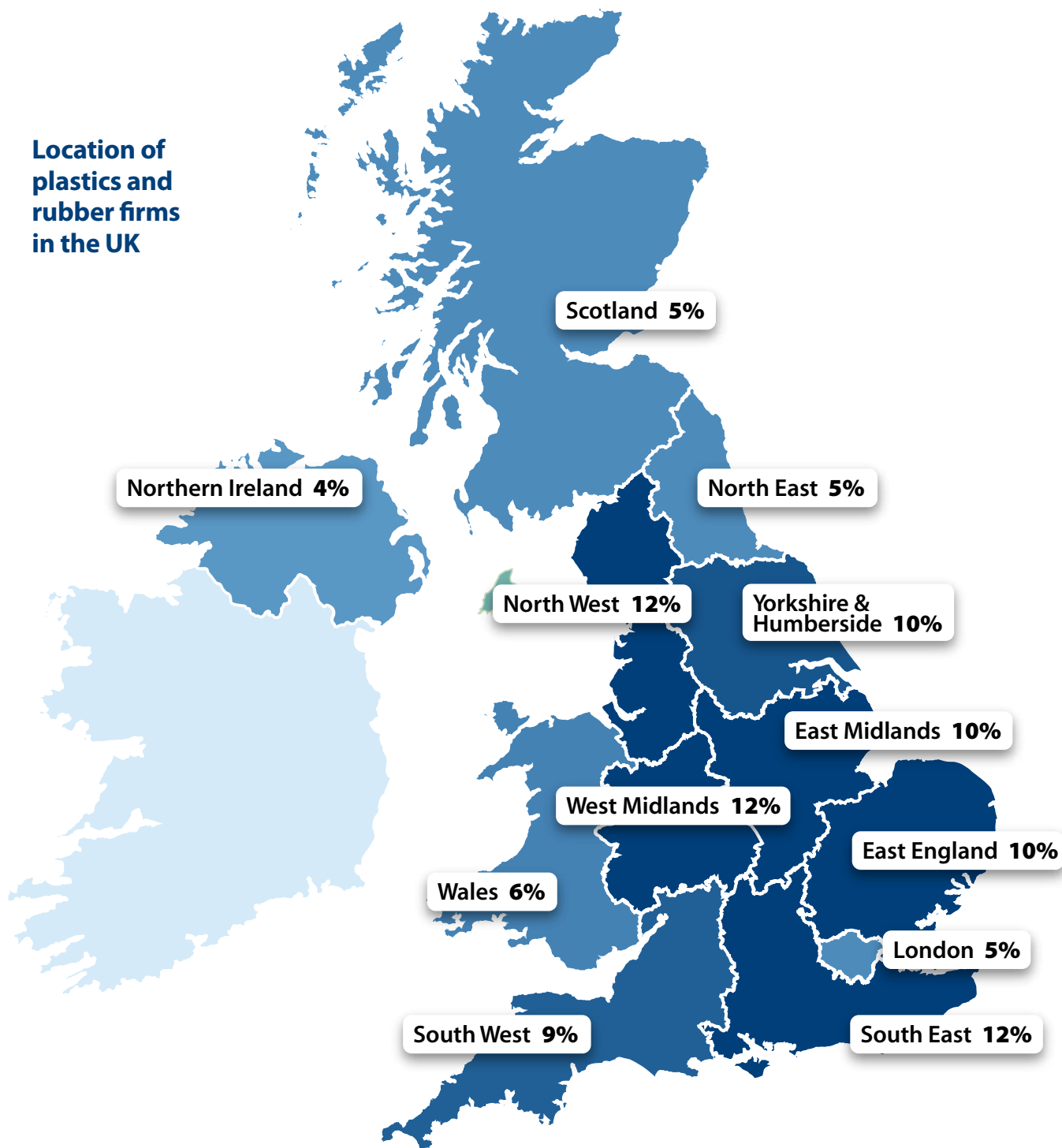
Manufactures of plastic products – Source: Annual Business Survey (ABS). Relevant SIC Codes: 20.16 (Manufacture of plastics in primary forms) and 22.2 (Manufacture of plastic products). In addition other relevant but not wholly incorporated 28.96 (Manufacture of plastics and rubber machinery), 27.33 (Manufacture of wiring devices), 33.20 (Installation of industrial machinery and equipment), 38.92 (Recovery of sorted materials) and 29320 (Manufacture of other parts and accessories for motor vehicles)

Plastics recyclers and traders – Source: BPF Recycling Group

Manufacturers of machinery and ancillary equipment – Source: Annual Business Survey (ABS). 28.96 supplemented with industry estimate

Percentage of Plastics and Plastic Products Exported – Source: UN Commodity Trade Statistics Database (UN Comtrade)

**Location of
plastics and
rubber firms
in the UK**



Source: Cogent

Key strengths of the UK Plastics industry

The UK holds a **formidable position in the global plastics industry**. It is the 15th biggest consumer of plastics in the world and the **4th largest in Europe**

The UK's **rich and varied geography** provides the building blocks for a wide range of polymers, additives, specialist materials, compounds and masterbatch

A strong indigenous chemicals industry that is closely interlinked with the plastics industry and represents a supply chain which is a national strength. The plastics sector accounts for approximately 7.5% of UK chemical demand

The UK is renowned for **innovation in product design and process development**. In addition to native creativity the sector is supported by **first-rate academic institutions** and a sophisticated network of government-supported bodies such as Innovate UK, KTN and the Catapult centres

The UK has a **highly flexible and innovative** culture meaning companies are **quick to move and adapt** to customers' needs

A vibrant and cutting edge plastics processing community with some of the **world's most skilled engineers and product designers** enabling the UK to be at the cutting-edge in the production of **technical mouldings** and **ancillary equipment**

**PLASTIC
FACT**



The world's first man-made plastic was invented by Birmingham inventor Alexander Parkes who patented the material in 1862.

World-leading automotive sector with the requisite supply chain to match. A focus on innovation and efficiency has led to some of the **world's most efficient and innovative plants** being based in the UK

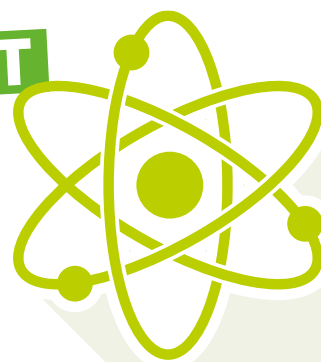
The UK is the home to one of the **most sophisticated retail environments in the world** which has been a driving force behind **an extremely advanced and innovative plastics packaging sector** capable of offering consumers a broad range of purchasing options

The UK is regarded as one of the best in the world in terms of meeting employee needs and in **driving improvements in Health & Safety**. Contributing to its enviable position for **demonstrable Corporate Social Responsibility** seen as an increasingly important factor for attracting inward investment from the **world's biggest blue chip companies**

An **extremely accessible supply chain** driven by the British Plastics Federation, a globally unique association that represents all sections of the UK plastics industry

The UK is home to one of the **most highly productive plastics industries in Europe**. In terms of 'Value Added' (see page 22) the UK is second only to Germany when compared to the top five consumers of plastics in Europe

**PLASTIC
FACT**



Polyethylene (now the most widely used family of plastics in the world) was discovered in 1933 by Eric Fawcett and Reginald Gibson at the Imperial Chemical Industries (ICI) works in Northwich, England.

Plastics: the key enabling industry

Despite its size and massive contribution as an 'enabling industry', the plastics sector is, in the minds of many, an invisible industry. Its contribution as a huge employment creator and economic generator for the UK is not widely appreciated.

Any downturn in the future prospects of the plastics industry will have a huge effect on the UK's overall economic performance as many key manufacturing sectors are almost wholly reliant on the plastics supply chain including construction,

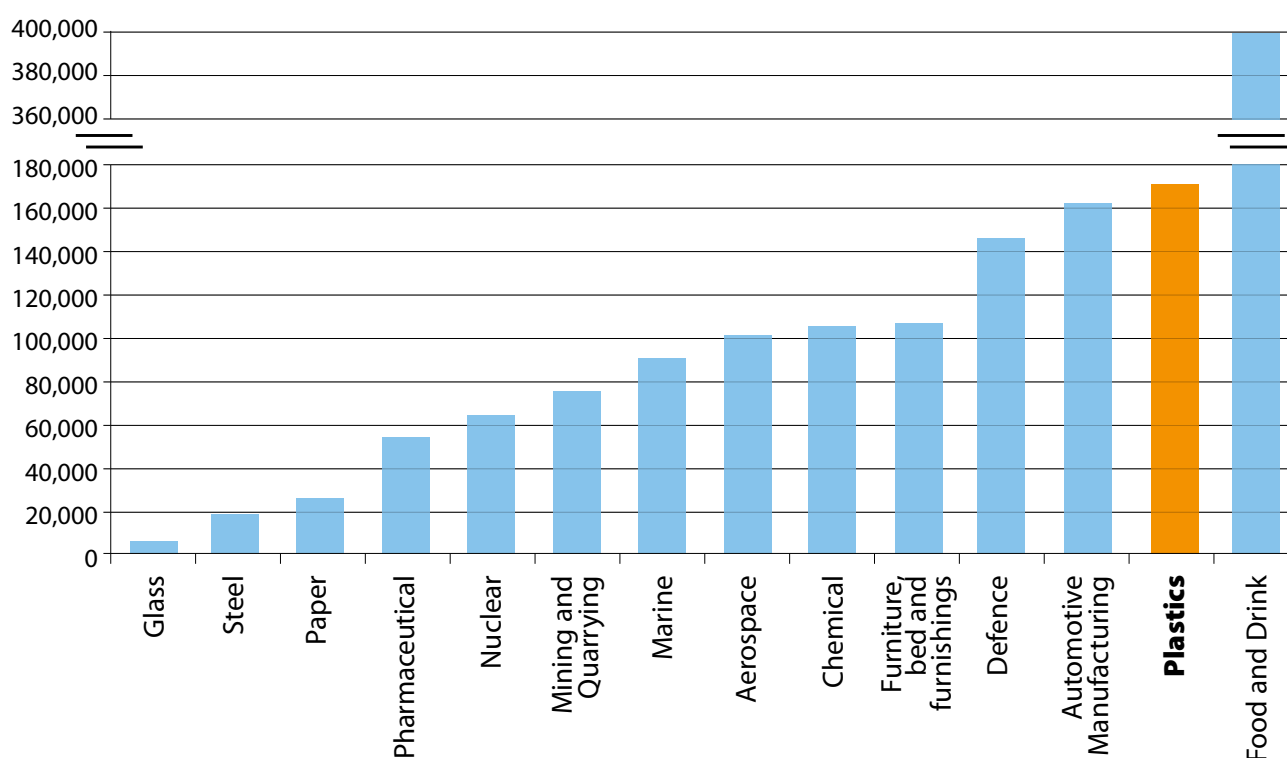
automotive, aerospace, oil and gas, water, energy, agriculture, healthcare and food delivery.

The UK plastics industry is a global leader operating at the cutting edge of technology. It remains one of the top five processors of plastics in Europe (it is 13th globally) with some 3.3 million tonnes of materials processed in the UK annually. Around 1.7 million tonnes of plastics raw materials are manufactured here each year, approximately 50% of the plastics processed in the UK (see section 2.3 for more information).



Plastics: the employment generator

Approximate Direct Employment in Various Manufacturing Sectors



Sources: ³

Due to the unique role the industry plays in the manufacturing supply chain, for every job created in the plastics industry a total of 2.74 are created in the wider economy.³

An example highlighting how plastics generate employment is the PVC window supply chain. As of 2015 there were only 13 large scale PVC windows 'systems' manufacturers (those who extrude PVC into the required lengths) yet there are around 1,600 companies fabricating PVC windows

and 10,800 installing finished PVC window and door products.⁴ The plastics industry is one of the largest employers in the UK with 170,000 people directly employed in the sector

³ Source: A full list of sources is available at www.bpf.co.uk/sources/strategy.aspx. Note: Numbers are approximate and are based on the most recently available numbers (2013-2016)

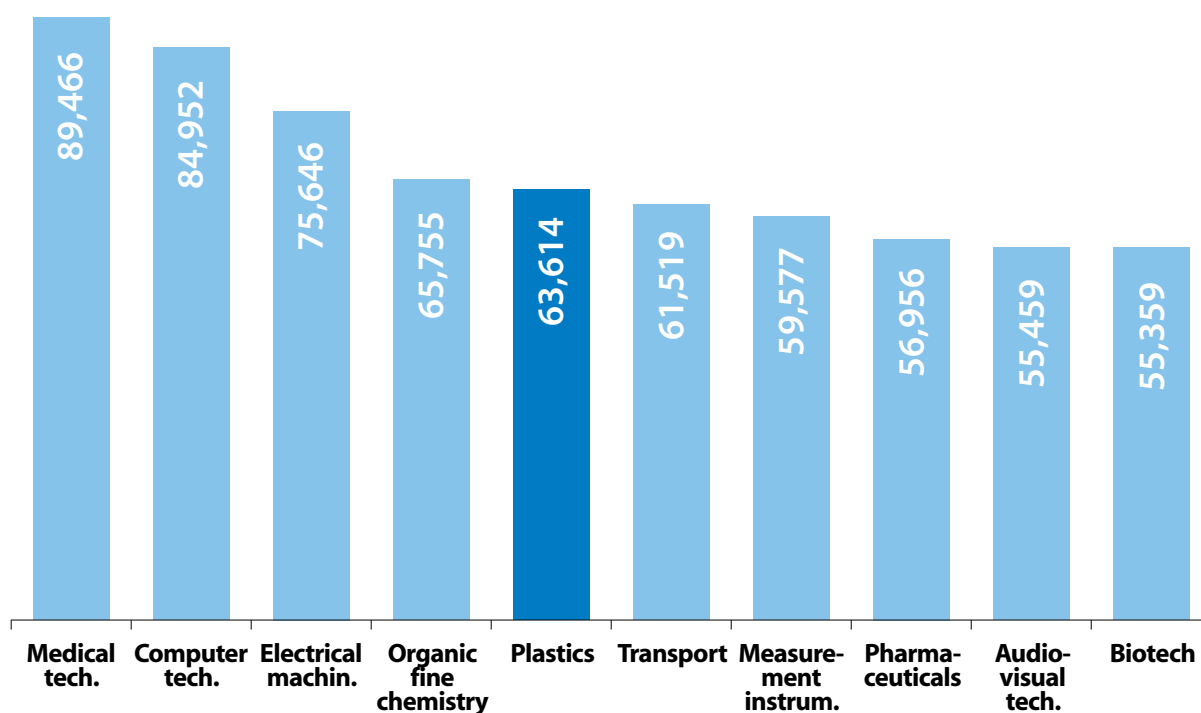
⁴ Source: Rehau

Plastics: the great innovator

The plastics industry continues to be one of the most innovative industries in the world. The graph below shows that across Europe between 2003-2012, plastics

was the fifth most innovative sector with 63,614 patents filed by plastics companies, accounting for 1 in 25 patents filed in Europe in that period.⁵

Patents in Europe 2003-2012



⁵ Page 5 http://www.plasticseurope.org/documents/document/20150227150049-final_plastics_the_facts_2014_2015_260215.pdf

Plastics: a rising star for UK productivity

Over the past five years, the plastics industry, like most industrial sectors, has seen a level of consolidation. Between 2009 and 2014 (see Table 1) the overall number of plastics processors in the UK decreased by nearly

13.5% and the number of employees by 8.6% yet overall turnover has actually increased by 7.51%.⁶ This is due to many factors including consolidation with resulting economies of scale, automation and investment in more efficient machinery.

Table 1: Manufacturers of Plastics Products in the UK

	2009	2010	2011	2012	2013	2014
Turnover (£000s)	16,888	16,198	18,394	18,091	18,047	19,329
Number of companies	5,614	5,383	5,216	5,119	5,129	5,152
Number of employees	141,000	N/A	134,000	133,000	140,000	152,000

Source: Annual Business Survey (2014 Provisional Results)

Typically one measure of productivity of an industry would be to calculate the material processed and compare this against the number of people employed. But, as the plastics industry continues to lightweight its products and create better products with less material, this measure is not appropriate.

We believe that 'value added' is a more relevant measure and have chosen to use this concept by assessing the volume of material consumed per

annum, calculating the cost paid for this material and then comparing the resultant figure to the overall turnover of the processing industry.

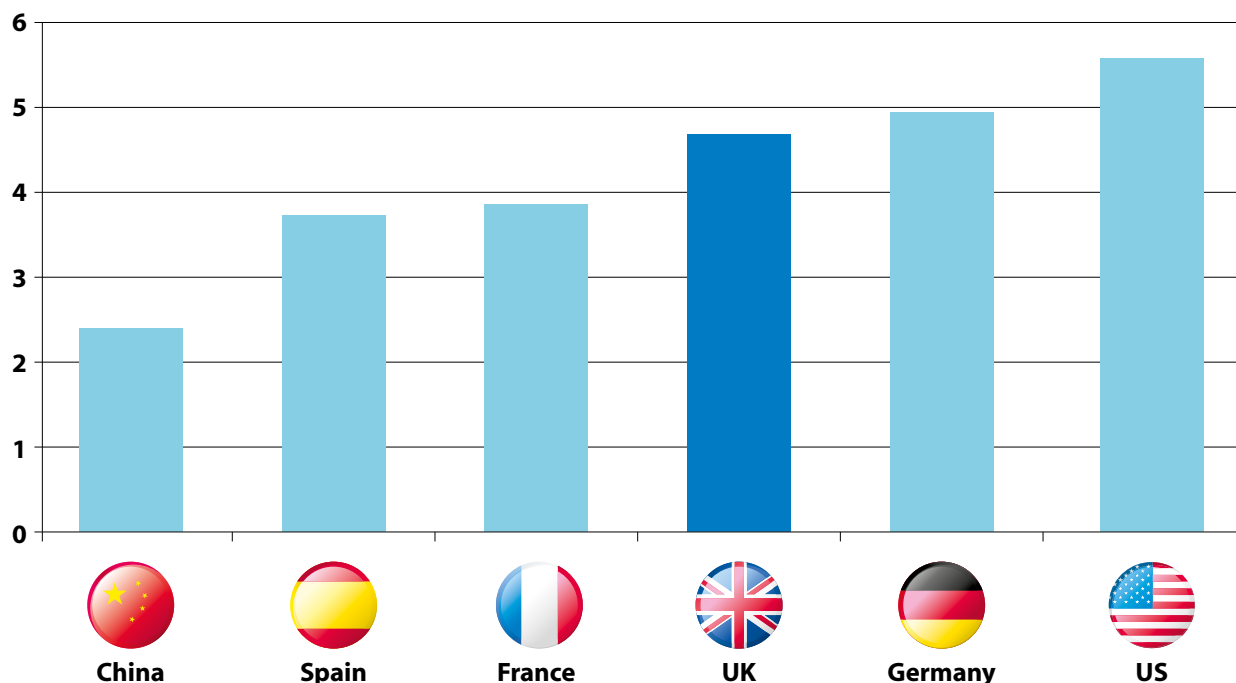
When this exercise is carried out it shows that the UK compares favourably when benchmarked against other leading plastics consuming countries and when compared against the top consumers in Europe, the UK comes in at number two, just behind Germany (see Graph 1).⁷

⁶ Source Office of National Statistics (SIC Codes used 22.2)

⁷ Raw material prices source: BPF Polymer Price Profile, Currency Exchange Rate Source: UK Forex, Polymer Consumption Data (by material) and industry turnover source: Reed Business Information (ICIS), International Monetary Fund (IMF), VDMA

Fachverband Kunststoff- und Gummimaschinen, Federation de la Plasturgie, SYMACAP, SNCP, CIPAD report, IRSG (International Rubber Study Group), GTA, EUROMAP, BPF, CIPAD report, IRSG (International Rubber Study Group), TRADEMAP, Annual Business Survey

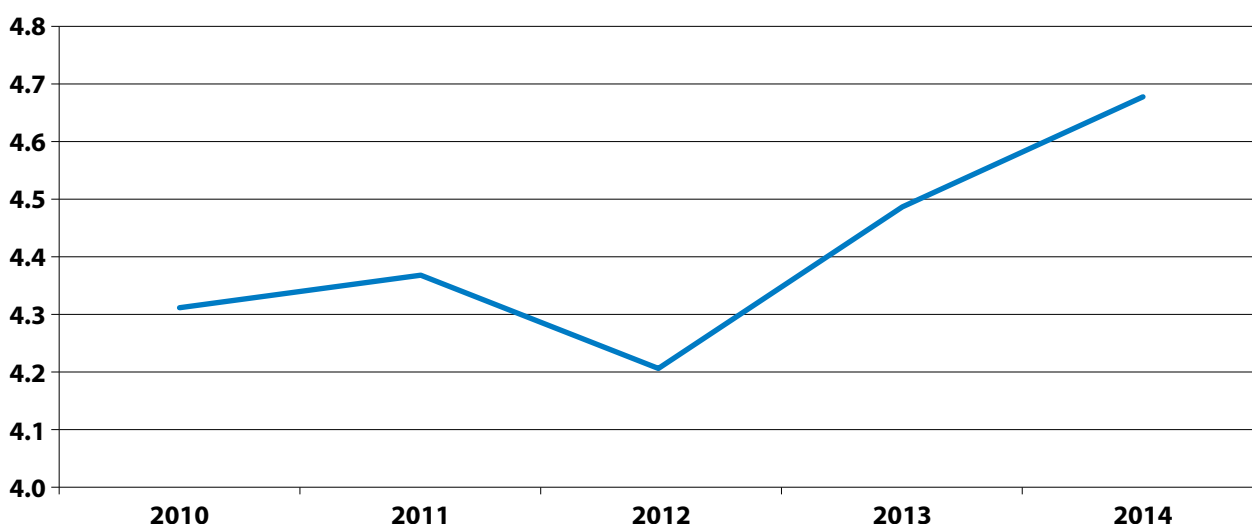
Graph 1: Plastics processing industry value added: National industries compared (2014)
Turnover of Plastic Processing Industry as a Multiple of Price Paid For Material Consumed



Graph 2 shows that, over time, the UK has continued to create more value added each year and has increased over 11% in the past two years.

This is a sign that the industry is more efficient than ever before and is adding more value to the UK economy overall.

Graph 2: Value added in the UK Plastics industry (2010–2014)
Turnover of Plastic Processing Industry as a Multiple of Price Paid For Material Consumed



Source: Raw material prices source: BPF Polymer Price Profile, Currency Exchange Rate Source: UK Forex, Polymer Consumption Data (by material) and industry turnover source: Reed Business Information (ICIS), International Monetary Fund (IMF), VDMA Fachverband Kunststoff- und Gummimaschinen,

Federation de la Plasturgie, SYMACAP, SNCP, CIPAD report, IRSG (International Rubber Study Group), GTA, EUROMAP, BPF, CIPAD report, IRSG (International Rubber Study Group), TRADEMAP, Annual Business Survey

Section 2

The plastics industry of the future: points for action

Promoting the reputation of plastics and the plastics industry

Plastics and plastic products suffer a public perception problem, particularly when it comes to sustainability, which is largely a result of the way plastics are portrayed in the media.

The value of plastics in the public eye needs to be improved and it is important that the industry works together to address this and ensure that plastics are given a more balanced hearing.

Plastics is an essential and varied industry, and a fundamental part of high-value manufacturing (HVM) in the UK. The plastics industry will play a key role in the future in so many positive ways and it is important that, as an industry, this story is told.

As a widely variegated industry comprised largely of SMEs and with many discrete sectors, historically it has proved difficult to promote a united message.

To tackle the image problem, a common front will have to be presented, the level of industry communications increased and government support will be needed.

Promote the product not the material

Consumers tend to relate more to products than materials and it can be very difficult therefore for people to identify 'plastics' with the direct improvements in their lives offered by products manufactured from the material.

Linking 'plastics' with 'products' will almost certainly require the support of the large household recognised brand owners.

**PLASTIC
FACT**



Over the lifetime of the average car, lightweight plastic parts save around 3,000 litres of fuel

Source: SPI <http://bit.ly/29Oy1xK>

Action plan



Life without plastics

There are often stories in the media about attempts to limit plastic usage, or indeed to live without plastic. These are often portrayed from a very one-sided point of view, typically focusing on single-use packaging items.

There is a need for parties across the plastics industry to work together, across supply chains, to highlight the essential role that plastics play in the modern world and to ensure that positive messages about the benefits that plastics bring to society should be given a fair hearing.

Life as we know it would be very different without plastics and when it comes to sustainability plastics constitute a key part of the solution and not the problem.

Establish a BPF Central Committee for Sustainability to act as a central authoritative voice and to promote positive messages about plastics and its role in sustainability

The BPF to create a series of infographics and presentations (promoting positive messages about plastics and the plastics industry) for use by the industry and to be shared on social media

Make greater use of third parties (brand owners, retailers etc) to endorse the use of plastics materials and products

Work more closely with organisations who encourage the use of 'sound science' in public policy such as Sense About Science and the Science Media Centre

Improving the industry's skills base and its support for educational & vocational training

The UK plastics industry is facing a skills crisis with two urgent needs:

- To upskill the current workforce
- To attract more people into the industry

The BPF's Business Conditions Survey (January 2016) found that whilst record numbers (52%) of plastics firms are actively recruiting staff, over half

(51%) are having difficulties recruiting individuals with the relevant level of skills. This number is increasing significantly year on year. In 2012, for example, only 22% of firms were having difficulty recruiting.

The lack of skilled staff entering the plastics industry is compounded by an ageing workforce. Over the next decade we expect that a large number of very knowledgeable industry professionals will retire from the industry.

Age of Workforce	Plastics industry
16-24	9%
23-34	23%
35-44	31%
45-54	24%
55+	13%

If this situation is not addressed as a matter of urgency, it could hold us back from reaping the full rewards of the economic recovery. Particular shortages are witnessed at the technician level, in technical management and among technically literate sales people.

Without the required skills within the plastics industry, the sector will not be in a position to continuously innovate and the UK will be in danger of losing its global position. A successful plastics industry will enable the UK to underline its position as the design capital of the world and a leader in

high value manufacturing.

The UK has a good skills base, but young people need to be attracted into the plastics industry and existing skills need to be passed on. In addition, technology will continue to evolve and will require new skills and changes to existing skills.

At present, it is clear that the plastics industry, and indeed the wider manufacturing sector, is simply not seen as an attractive or viable career choice. The number of people enrolling on polymer courses in the UK has been in decline for many years and the only Higher Apprenticeship

programme for polymers, run by London Metropolitan University, is in grave danger of being disbanded unless demand picks up.

Whilst engineering disciplines do provide a positive career choice, STEM subjects are often perceived as 'difficult' and 'complex' thus dissuading potential students from choosing them as their education develops.

King's College's "Aspires" study showed that whilst many children enjoy science at primary school, they have often decided by the age of 12 that they 'do not want to be scientists'. It is



People with a qualification in science or related subjects on average earn 10% more than those with other qualifications and those with engineering and technology qualifications can earn up to one third more [14-34% more]

Source: Science Opens Doors



**PLASTIC
FACT**



A survey by the BPF showed that in 52% of firms their board consists of at least one person who initially trained as an apprentice

suggested that one reason for this may be a lack of knowledge of science and engineering amongst teachers, family and friends.⁸

The UK will need 820,000⁹ more people with qualifications in science in the next 10 years, from apprentices to highly qualified research scientists. It is anticipated that **within a decade, seven million jobs in the UK will depend upon science.**

Our industry must appeal to young people if they are to be encouraged to go to university, college or to undertake an apprenticeship.

Moving forwards, we will need to focus on improved co-ordination of training and providing help to secure the specific dedicated training that companies in the plastics sector need to grow their businesses. It is imperative to upskill the current workforce whilst also showing the plastics industry to be an attractive career proposition for young people.

¹⁰ <http://www.kcl.ac.uk/sspp/departments/education/research/aspires/aspires-final-report-december-2013.pdf>

¹¹ Science Opens Doors

CASE STUDY

RPC Apprentice Hub



Three years ago the RPC Oakham site set up an industry award winning Apprentice Academy founded on sound fundamental principles of training and development of employees.

It is a state-of-the-art facility, fitted with all of the engineering equipment and teaching space needed to support training courses and qualifications to Level 3 and above.

Partnerships were entered into with stakeholders such as SEMTA, with agreements in

place for the Skills Funding Agency contract for delivery of the apprenticeship. Suppliers such as Ferromatik and Motan Colortronic provided their specialist processing equipment technology and support within the centre.

Five candidates were taken into the centre to begin a Level 2 Apprenticeship in Improving Operational Performance. At the heart of this sits a qualification now confidently referred to in the centre as 'PEO' (Performing Engineering

Operations). This qualification focuses on fundamental and practical skills including bench fitting, manual turning and manual milling.

The initial five apprentices worked regular day shift hours three days a week and for the remaining two days each was placed in department rotations at their home plant.

The group were set the task of delivering presentations at regular intervals culminating in a technical presentation on the specific polymer processes at their sites.

The next stage in the development of a Polymer Engineering Apprentice was uniquely funded with Cogent Skills under Science Industrial Partnerships. The programme design incorporated Level 3 engineering (NVQ and Technical qualification) but adds a second Technical Certificate in Polymer Manufacturing Technologies.

As an approved centre with the Polymer awarding body PAAVQSET it was decided that this element of the Apprenticeship should be delivered within the training centre at Oakham. The other engineering qualifications are delivered with a local college as a partner.

In addition to staff from RPC the second intake consisted of learners from local Plastics processing companies, Linecross Thermoplastics and Rutland Plastics Ltd, who had recently completed their first year at the Oakham Centre.

Action plan



Conduct research to better understand current skill levels and likely future demand across the sector

Develop online educational resources for use in schools

Ensure plastics/polymers continue to appear in the national curriculum and that further investment is made in educating young citizens in the necessary technical skills to meet the current labour skills gap

Establish a BPF Central Committee for Skills, Training and Education

The BPF to create an online hub for information on the currently available short courses and graduate/post graduate courses on plastics

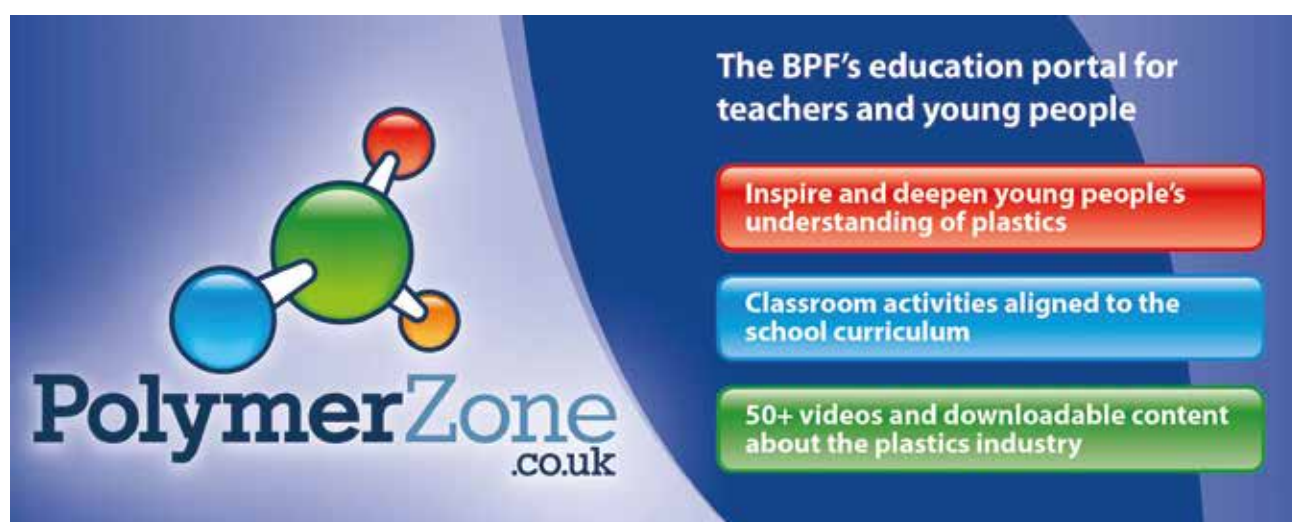
Increase online promotion of the career opportunities available in the plastics industry

Encourage plastics firms to offer student placements/work experience and provide a way to promote this online

Encourage the creation of 'Micro Regional Training Academies' (see the case study on the RPC academy on page 28)

STRATEGY IN ACTION

Creation of PolymerZone.co.uk



Changing the perceptions of educators and parents is key to the success of promoting the plastics industry to school children. The Polymer Zone website provides a 'one stop shop' resource for information about the plastics industry.

The website (www.polymerzone.co.uk) will be a leading educational resource in the UK for plastics-related information, suitable for 11-18 year olds, their teachers and career advisors.

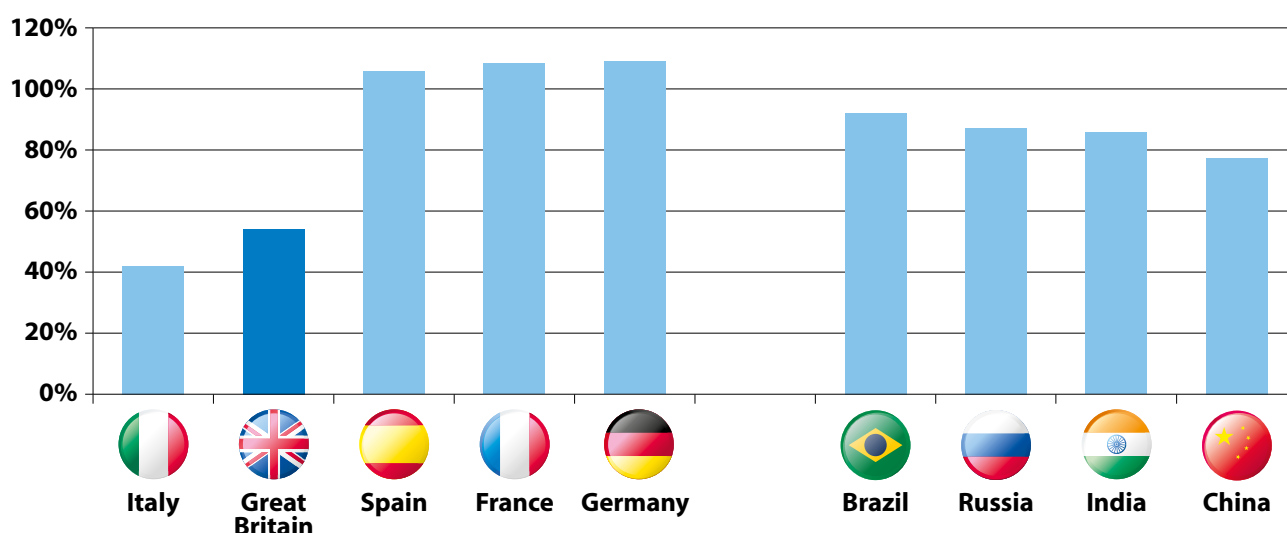
- The website includes videos, infographics, downloadable lesson plans and information on the positive aspects of plastics as an industry and as a career
- The BPF will examine the possibility of government funding and schemes to help develop this programme
- The BPF will explore the creation of a 'polymer ambassador' campaign to empower individuals from the plastics industry to attend schools and deliver presentations
- A 'Kickstarter'/crowd funding campaign may be initiated in order to raise funds from the industry to support this programme
- The BPF is creating a series of fact sheets and infographics to get the message across to stakeholders and the general public about the positive contributions plastics make in everyday lives

Securing Consistent and Competitive Supplies of Feedstock

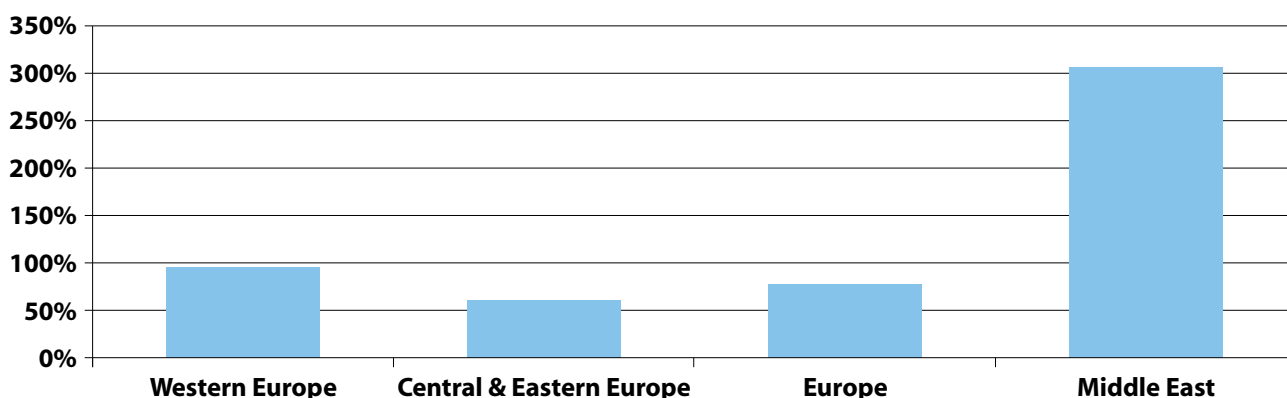
The UK currently produces around half as much polymer as it consumes – during 2015 it is estimated 1.7 million tonnes of plastics would be produced yet 3.3 million tonnes would be consumed. Current trends

indicate that in the future, the majority of the world's plastics raw material will not be sourced from Europe and that companies will have to search further afield to secure the material they require.

Country by country plastics production vs. consumption

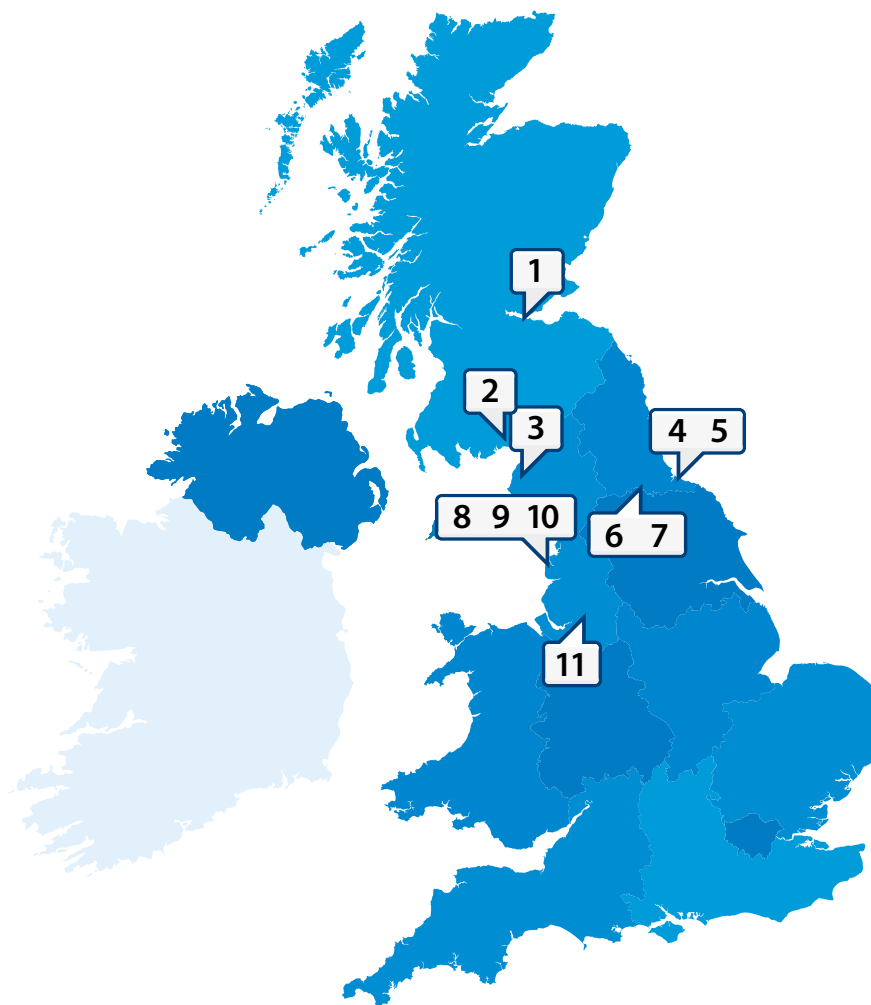


Global regions



Source: EUROMAP

Plastics production in the UK (2015)



1

INEOS
Olefins & Polymers Europe

Ineos Olefins & Polymers

HD / LLDPE swing
(Polyethylene High Density /
Linear Low Density)
Grangemouth
Capacity: 330,000 tonnes p.a.

PP (Polypropylene)
Capacity: 285,000 tonnes p.a.

2



PET Processors (UK) LLC

PET (Polyethylene
Terephthalate)
Dumfries
Capacity: 20,000 tonnes p.a.

3



Indorama Polymers

PET (Polyethylene
Terephthalate)
Workington
Capacity: 168,000 tonnes p.a.

4



Sabic UK Petrochemicals

LDPE (Low Density
Polyethylene)
Wilton (Teesside)
Capacity: 400,000 tonnes p.a.

5



Lotte Chemical UK

PET (Polyethylene
Terephthalate)
Wilton (Teesside)
Capacity: 350,000 tonnes p.a.

6



Inovyn
PVC (Polyvinylchloride)
Newton Aycliffe
Capacity: 300,000 tonnes p.a.

7



Lucite International
PMMA (Polymethyl Methacrylate)
Newton Aycliffe
Capacity: 3,000 tonnes p.a.

8



Victrex Plc
PEEK (Polyetheretherketone)
Thornton Cleveleys
Capacity: 7,000 tonnes p.a.

9



Vinnolit GmbH
PVC (Polyvinylchloride)
Hillhouse
Capacity: 45,000 tonnes p.a.

10



Asahi Glass Fluoropolymers UK Ltd
PTFE (Polytetrafluoroethylene)
Hillhouse
Capacity: 3,000 tonnes p.a.

111



Basell Polyolefins UK
PP (Polypropylene)
Carrington
Capacity: 230,000 tonnes p.a.

Source: Polyglobe, www.polyglobe.net

In the future polymer producers are likely to invest in the faster growing markets of Asia and the Americas and consequently there are few signs

of significant investment forthcoming to support the European marketplace.

The threat

It could be argued that without the security of supply for plastics raw materials and sources of energy, there is not a truly sustainable plastics industry in the UK.

Any short term supply issues could have a devastating effect on the industry. The industry could lose credibility with its customers who could start to look towards alternative materials to satisfy their needs.

Ongoing investment in polymer production facilities in the UK, and indeed the wider EU, is paramount. The industry could lose credibility, with its customers who could, starting to look towards alternative materials to satisfy their needs. Likewise a clear energy policy providing appropriate infrastructure requires vigorous implementation.

'Fit for purpose' legislation

Whilst there is a clear need for the UK to attract investment in plants and facilities the fact is that the UK, at the current time, is an unattractive market for investment. This is in part a result of overly burdensome legislation, often no longer fit for purpose, driving up costs and slowing progress.

This is not necessarily the result of one

individual measure but it is the cumulative effect of many, for example, chemicals regulations (REACH, Food Contact etc.), environmental legislation and planning laws. Arguably the UK has more significant legislative burden than many other competitors. The complexity of energy taxes, as we have recently seen in the UK, should be avoided.

Tariffs and competitiveness

A tariff of 6.5% is currently applied to plastics raw material imported into the UK from outside the EU.

This can undermine the competitiveness of

users of such materials and restricts choice. This can be problematic in times of material shortages within the EU and can make it hard for UK-based companies to compete globally.

INFORMATION

3D printing in schools: creating a generation of plastics processors



3D printing could play a big role in making plastics come alive to a new generation. For the first time, school children could be provided with the opportunity to create 3D plastics artifacts in the same way as they have been able to do in metal and woodwork for decades.

Within a generation we could have tens of thousands of plastics processors in schools across

the country generating ideas and understanding more about the potential of plastics as a 'wonder material'.

As of January 2012, there were 8.2 million pupils in all schools in England (4.2 million pupils in primary, 3.2 million pupils in secondary and 577,400 pupils in independent schools).

Future feedstocks

Making plastics requires the use of a small range of molecules, largely carbon and hydrogen which are today most conveniently derived from oil and gas. In the longer

term, if supply and demand of oil and gas tightens, there are opportunities for accessing the carbon and hydrogen required from other sources, such as biomass or shale gas.

Shale gas as a source of hydrocarbon feedstock for manufacturing

Shale gas has provided an enormous competitive advantage to the US plastics industry. It is not only used as a source of energy but as a source of feedstock for the manufacture of plastics raw materials. Historically, polymer crackers in the US were based on 70% ethane (derived from natural gas) and 30% naphtha (derived from crude oil), whereas today it is now 87% ethane and only 13% naphtha.¹²

The availability of ethane has led to huge investments from polymer producers with nearly every major polyethylene producer planning some level of expansion to either upgrade existing plants or to establish new ones.

Companies such as Sasol, OxyChem/MexiChem, ExxonMobil Chemical, Dow Chemical, Shell and Formosa¹³ are building new ethane crackers whilst Williams, INEOS, Westlake Chemical, LyondellBasell and BASF Fine Petrochemicals are all expanding production capacity.¹⁴ South Africa's Sasol, for

example, will be investing \$21bn into at least nine plants that turn gas into plastics and diesel.¹⁵

Europe's gas prices are now nearly three times that of the United States which, according to the Boston Consulting Group, gives the US an export cost advantage of between 5% and 25% over the UK in a range of industries including plastics and rubber.¹⁶

Thanks to the availability of cheap natural gas attracting large scale investment from chemical companies the American Chemical Council predicts that the trade surplus in chemicals in the US will increase from \$800m in 2012 to \$46bn by 2020.¹⁷

It has been demonstrated that the UK has enormous reserves of shale gas with estimates varying between 150-170 trillion cubic feet.¹⁸ As the UK's annual gas consumption is currently about 3 trillion cubic feet,¹⁹ shale gas could be a viable source of energy for between 50 and 70 years.

12 Slide 17 <http://www.archivo.ipa.org.ar/images/24.07.2014.pdf>

13 <http://www.slideshare.net/almajrsn/shale-gas-impact-on-petrochemical>

14 <http://www.slideshare.net/almajrsn/shale-gas-impact-on-petrochemical>

15 <http://www.bloomberg.com/bw/articles/2013-07-25/chemical-companies-rush-to-the-u-dot-s-dot-thanks-to-cheap-natural-gas>

16 <http://www.bbc.co.uk/news/business-23151813>

17 <http://www.bloomberg.com/bw/articles/2013-07-25/chemical-companies-rush-to-the-u-dot-s-dot-thanks-to-cheap-natural-gas>

18 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/367287/Shalegas_uk.pdf and <http://www.bbc.co.uk/news/business-22748915>

19 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/367287/Shalegas_uk.pdf and <http://www.bbc.co.uk/news/business-22748915>

CASE STUDY

Shale gas is an opportunity that the UK cannot afford to overlook – the vision of INEOS

INEOS is one of the UK's largest manufacturing businesses employing 4,000 people across seven sites. It produces intermediates for plastics manufacture and some of the main plastics types. It can use shale gas both as a feedstock or energy source.

INEOS's vision for shale gas derives from the United States where it saw first hand how shale gas had transformed the competitiveness of US manufacturing.

Shale gas is a natural gas, the same as North Sea gas. It is formed in shale formations 1-5 km underground. As North Sea gas is running out the UK now imports half of its gas, which is used to generate electricity and to heat our homes.

Hydraulic fracturing (otherwise known as 'fracking') has been widely used in the oil and gas industry for more than 50 years. Fracking has been carried out more than a million times in the US. The process involves drilling a narrow well between 1 and 5 kilometres deep. Fluid is injected into the rock deep underground and creates tiny fractures between 1-5 mm wide. Gas that was trapped in the rock can flow through these fractures, into the steel-lined well and up to the surface.

Extracting shale gas is an opportunity for the UK to reduce its dependence on imported gas (from volatile regions such as Russia and the Middle East) while creating potentially tens of thousands of jobs and generating significant tax revenue and growth. A Department of Energy and Climate Change report estimates that 16,000-32,000 full-time jobs would be created in

the gas industry and wider supply chain, while studies from Ernst and Young and the Institute of Directors estimate that the figure could be over twice this.

Respected authorities such as the Royal Society and the Committee on Climate Change recognise that extraction can be managed safely while meeting our carbon reduction commitments. The UK is committed to using gas over the next few decades, because it is the most environmentally responsible way of meeting our energy needs as we phase out coal and move to low-carbon alternatives. The Intergovernmental Panel on Climate Change has recognised that gas has half the emissions of coal when burned as a fuel for electricity generation.

It is important to note that gas is not just a fuel that we burn for energy – it is also a raw material used for the manufacture of chemicals and plastics that have application in a wide range of beneficial, high-value products (including products used to save energy and to enable renewable energy technologies). We will still need gas to make these essential items once we have made the transition to low-carbon energy. It is therefore vital that the UK has a secure and competitive long-term supply of gas to underpin the future of the manufacturing sector, and this is the main reason that INEOS is interested in shale gas extraction.

Biomass

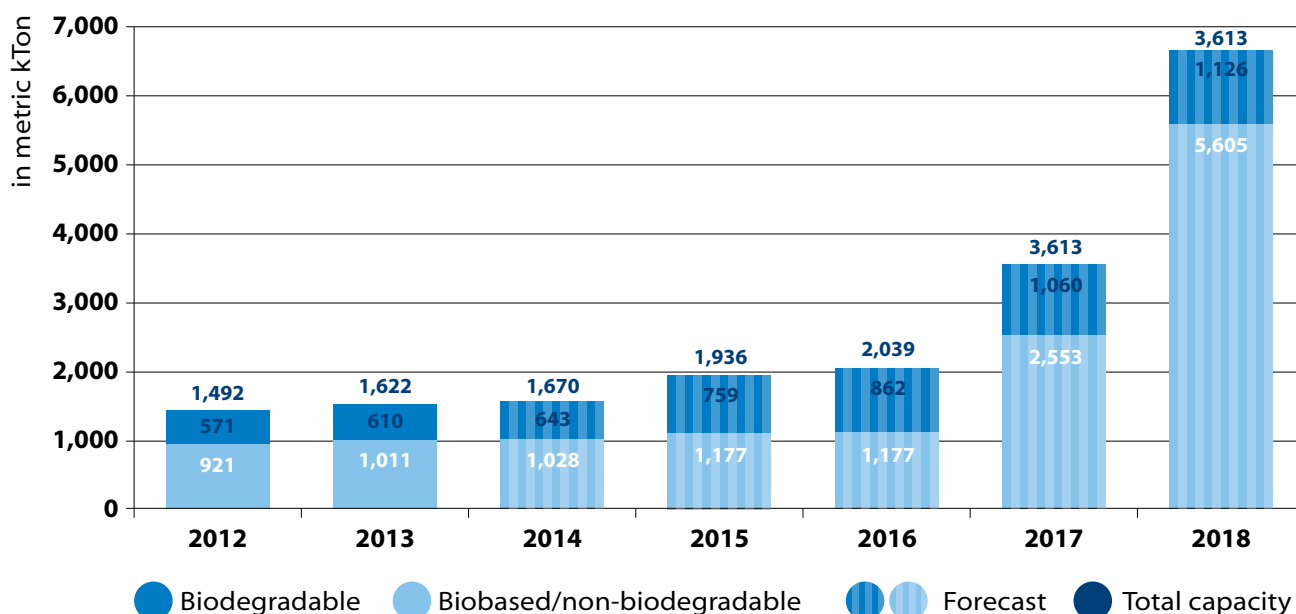
Due to concerns about fossil resources depletion, efforts have been made to replace conventional oil-and-gas-based plastics with others based on hydrocarbons derived from renewable resources such as biomass.

Besides crude oil, natural gas and coal, plastics can be derived from natural and renewable sources such as cellulose, vegetable oils, sugar and starch.

Many conventional polymers can, in principle,

be synthesised from renewable feedstock. For example, corn starch can be hydrolysed and used as the fermentation feedstock for bio-conversion into lactic acid from which poly(lactic acid), PLA, can be produced through chemical processing.

Whilst bioplastics have established themselves in some niche markets such as for caddy liners in food waste collection, they currently represent less than 1% of plastics produced annually. However, this quantity is increasing and it is estimated that global bioplastics production could grow by 250% between 2015-2018.²⁰



Source: European Bioplastics, Institute for Bioplastics and Biocomposites, nova-Institute (2014)
 More information: www.bio-based.eu/markets and www.downloads.ifbb-hannover.de/ (bit.ly/1J0oPWs)

²⁰ http://www.corbion.com/media/203221/eubp_factsfigures_bioplastics_2013.pdf

Action plan



Plastics waste as a source of feedstock

In some cases plastics waste consists of too many polymers or has not been separated sufficiently from other materials to be recycled by traditional mechanical recycling technology.

Whilst it is possible to chemically break down plastics waste into feedstock raw materials there are, currently, economic impediments and various factors would need to change in order to make a plastics-waste-to-feedstock facility an economically viable option.

The BPF to sponsor an academic study into the relative efficiency of the polymer market

Increase awareness in the political community about the opportunities for the plastics industry arising from shale gas discoveries in the UK

Ask government to include plastics in any considerations of strategic materials of national importance (alongside, for example, rare earth metals)

Ask government to periodically review the appropriateness of tariffs applied to polymers sourced from outside of the EU

Accelerating the sustainability of the plastics industry and its alignment with the circular economy

Plastics materials and products have an impressive record of sustainability. Consistent progress has been made in reducing the quantities of material used to manufacture particular plastics products. Their light weighting saves energy in use, whether in the packaging and transportation of goods or in the weight savings achievable by their use in vehicles and aircraft as well as the materials reduction itself to produce a finished article. Their low thermal conductivity improves the energy efficiency of buildings, whether used in PVC windows or EPS insulation.

With impressive lifespans some plastics products can be reused. They are being recycled to an increasing extent, noticeably bottles and PVC building products. For products which cannot be recycled the high energy content of the material means that they can be utilised in Energy From Waste (EfW) schemes and as Solid Recovered Fuels (SRF) in, for example, the cement industry, thereby displacing virgin fossil fuels.

However one defines a 'circular economy', plastics are very well positioned to contribute strongly to it. There are some issues which need to be addressed to allow the plastics industry to reach its potential within a circular economy. For example, at the present time, recycled plastics are often seen as 'inferior' to virgin material, demeaning their value and leading to a reticence to use recycled products. The expectation that recycled materials will always be cheaper than virgin has to be overcome. Government should be seen to 'lead from the front' and look to utilise its own public procurement guidelines to specify the use of recycled materials where suitable.

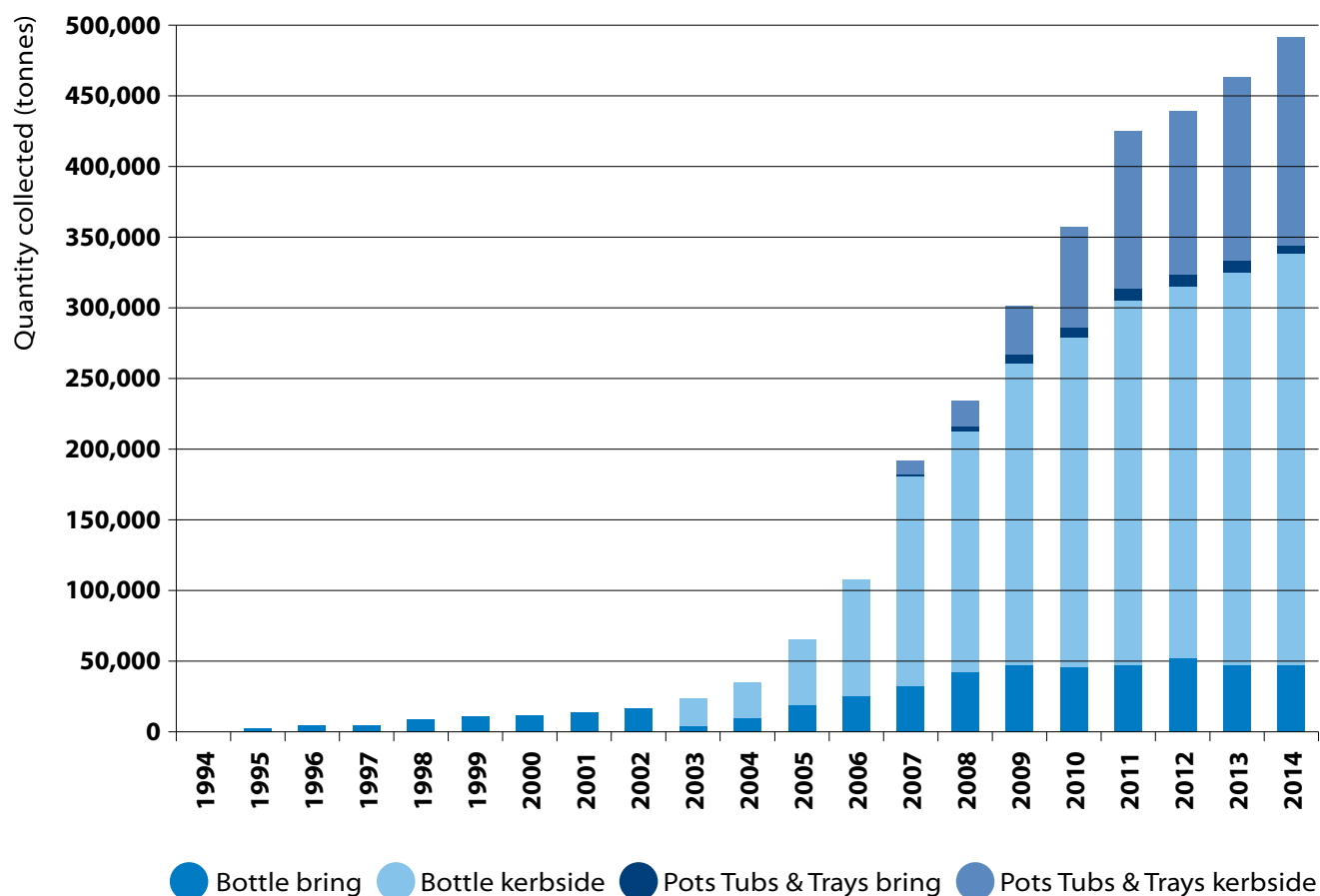
Many in the plastics industry are keen to increase recycled content in their products but they are constrained by either the availability of materials or by standards and / or legislation. There is a need for consideration of the end of life phase of the product as part of the design process.

**PLASTIC
FACT**



In the UK nearly 50 billion bottles and trays have been saved from landfill in the past 20 years

Source: Recoup Household Plastics Collection Survey



Source: Recoup

Due to the lack of standardisation in the UK, local authorities have different collections systems in place which is often confusing for the homeowner and prevents effective economies of scale being implemented in the recycling stream.

Additionally, despite the introduction of quality standards surrounding the output from Materials Recovery Facilities (MRFs), there remains a significant issue around the quality of output. Too often the speed of throughput seems to outweigh the quality of output and this, in part, leads to the export of raw material to markets where sorting is cheaper (both within and outside Europe). A focus on quality rather than quantity and more support for the domestic recycling infrastructure needs to be considered to level the playing field for UK-based recyclers.

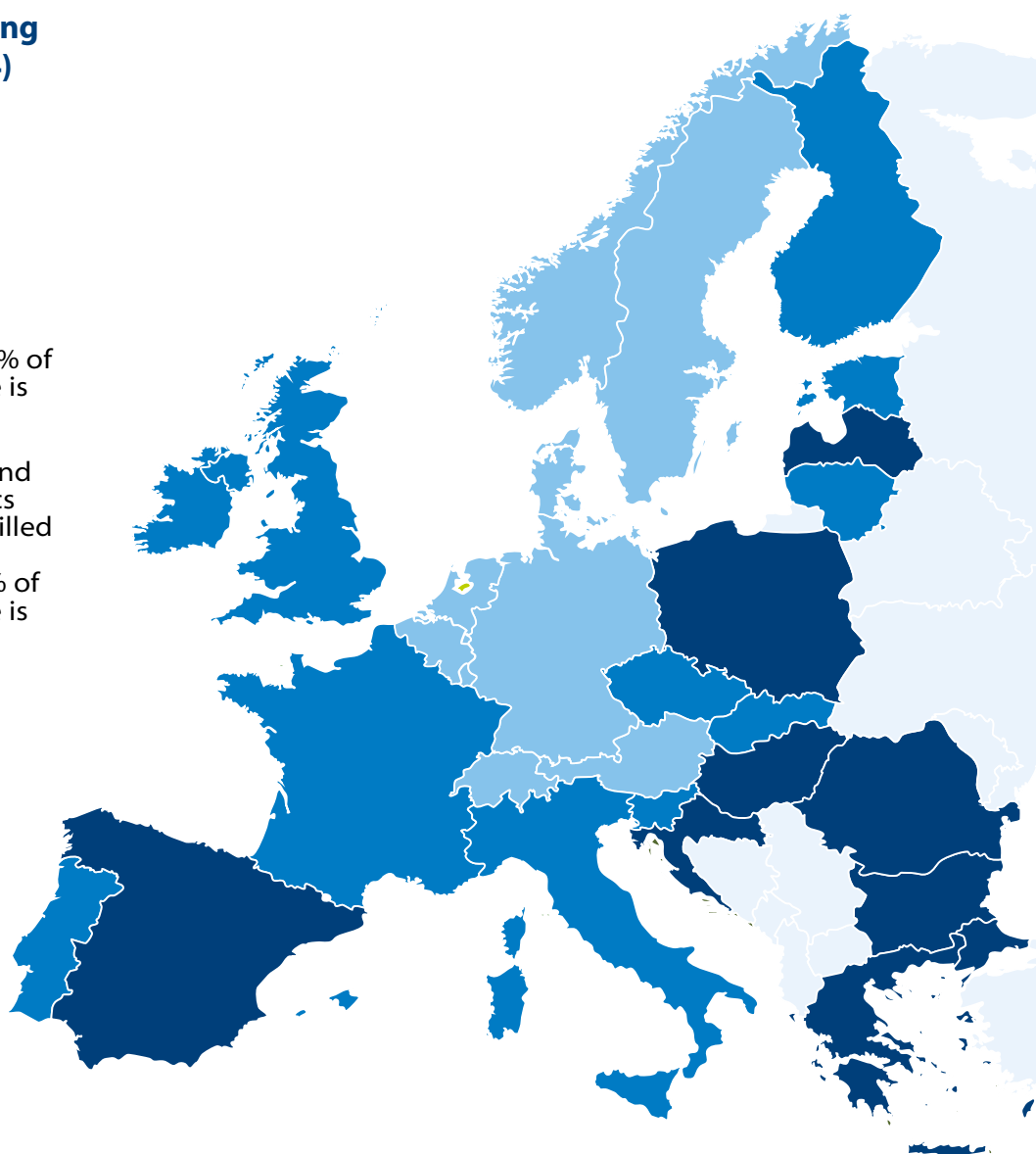
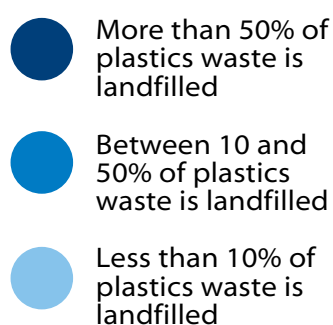
The BPF is committed to ending the landfilling of all recyclable or recoverable waste. A clear

precedent has been set by other EU Member States, which have already been successful in diverting waste from landfill. Predominantly this has, however, required legislative drivers to trigger the required investment in recycling and increases in the energy recovery of valuable resources, such as some used plastic products streams.

Between 2012 and 2014 the UK went from one of the highest landfill rates in Europe to one of the lowest, decreasing from a 69% rate of plastics to landfill in 2012 to 41% in 2014.²¹ This trend is expected to continue fuelled by the landfill tax and the legacy costs associated in managing landfills long after their useful life has come to an end, driving waste management companies to see the landfilling of waste as a last resort.

21 Source: Consultic/PlasticsEurope "Plastics the Facts 2013" & "Plastics the Facts 2015"

Plastics waste going into landfill (2014)



Source: Consultic

New and emerging technologies could also play a significant role in underpinning the industry's sustainability credentials. For example, work is being undertaken to look at the potential for depolymerisation to provide feedstock for virgin polymer production as a viable alternative to traditional mechanical recycling and for chemically recycling plastics that cannot be recycled by conventional means, e.g. laminated films, plastics containing legacy additives, contaminated plastics and thermosets.

Additionally, the industry has seen an

increase in the use of alternative feedstocks for commodity plastics including using hydrocarbons derived from renewable resources such as sugar cane and maize to replace conventional oil-and-gas-based plastics. Such biobased, non-biodegradable commodity plastics can be easily recycled along with their conventional counterparts. It is important to stress, however, the need to differentiate these types of plastics from the biobased biodegradable/compostable which cannot be recycled with conventional plastics.

CASE STUDY

Plastics industry Recycling Action Plan (PIRAP)

The Plastics industry Recycling Action Plan (PIRAP) was launched in June 2015. The plan provides a co-operative strategy for the plastic packaging supply chain to take action and contribute towards achieving the UK government's plastic packaging targets by developing a resilient and sustainable plastics recycling sector in the UK. The BPF and Plastics Europe are together implementing PIRAP with the support of WRAP.

PIRAP brings together for the first time the whole plastics packaging value chain to highlight best practice where improvements may be made to enhance collection rates, adopt best-in-class collection methods, optimise sorting infrastructure and develop end markets for recycled plastic. This project shows how legislators, local authorities, retailers, waste management companies, recyclers, converters and other key stakeholders of the supply chain can work in partnership to bring about positive outcomes.

Whilst PIRAP is primarily an industry plan, it acknowledges the requirement of active support from both government and its agencies. No individual stakeholder or sector can or should be expected to carry the burden alone and the interests and actions of all within the supply chain must be aligned in order to meet the government targets, and ultimately achieve ongoing profitable sector growth.

PIRAP has started a bi-monthly newsletter to keep signatories and the wider industry up to date with the actions which are being taken through PIRAP. This includes case studies from PIRAP signatories. This sharing of best practice will help inspire others in the supply chain.

PIRAP continues to engage directly with the main trade bodies representing stakeholders, and other relevant stakeholders, in order to establish a number of joint actions that can be taken to ensure the year-on-year profitable growth in recycled plastics.



CASE STUDY

MBA Polymers and Electrolux: Vac for the future

Electrolux's vacuum cleaner's parts are made from MBA Polymers products. By teaming up with global post-consumer plastics specialist MBA Polymers, Electrolux was able to source sustainable supplies of recycled plastics for the vacuum's components. The result is a vacuum whose green credentials cannot be questioned.

Electrolux's Ultra Silencer vacuum is made from 55% recycled PP, saving over two litres of

crude oil and 80 litres of water per unit, as well as reducing manufacturing energy consumption by 90%. Yet environmental credentials do not come at the expense of durability, and all products are developed to withstand ten years of normal usage.

If all of the 20 million vacuum cleaners that are sold annually in Europe were built in the same way, some 1.6 million cubic meters of water and 251,000 barrels of oils could be saved.



Action plan



The BPF to encourage government to use green public procurement policy to incentivise the use of recycled materials in relevant product applications

The BPF to maintain pressure on banning the landfilling of all recyclable and recoverable waste

The BPF and its partners to fund further development and implementation the Plastics industry Recycling Action Plan (see case study page 43)

The BPF to encourage relevant parallel organisations and funding bodies to support further research and development in plastics recycling

The BPF to work with Department for Business Energy and Industrial Strategy (BEIS) and other industry stakeholders (e.g. WRAP, Recoup etc) to gather more market intelligence in order to aid a detailed analysis and discussion about the economics of plastics recycling

BPF to encourage government to review the PRN (Packaging Recovery Note) system to create a level playing field between domestic recyclers and exporters of used plastics for recycling

The BPF to encourage regulatory bodies to help facilitate the recycling of plastics containing legacy additives and thus ensure that their huge potential as a secondary raw material resource is realised

Spotlighting future markets for plastics products

The UK plastics industry continues to evolve and innovate in order to keep pace with customers' demands and

developments in technology. Below are a selection of some of the likely upcoming trends in the UK plastics market.

Standardisation vs Customisation

Plastics lend themselves to mass manufacture and for this reason plastic products are affordable to buy and offer benefits in a wide range of economic and social uses.

In the future, mass customisation defined as 'producing goods and services to meet individual customer's needs with near mass production efficiency'²² will play a significant role in business and will affect the way both manufacturing and service industries operate.

Over time, it is felt that mass production will gradually give way to mass customisation and this is an area that the plastics industry can excel within.

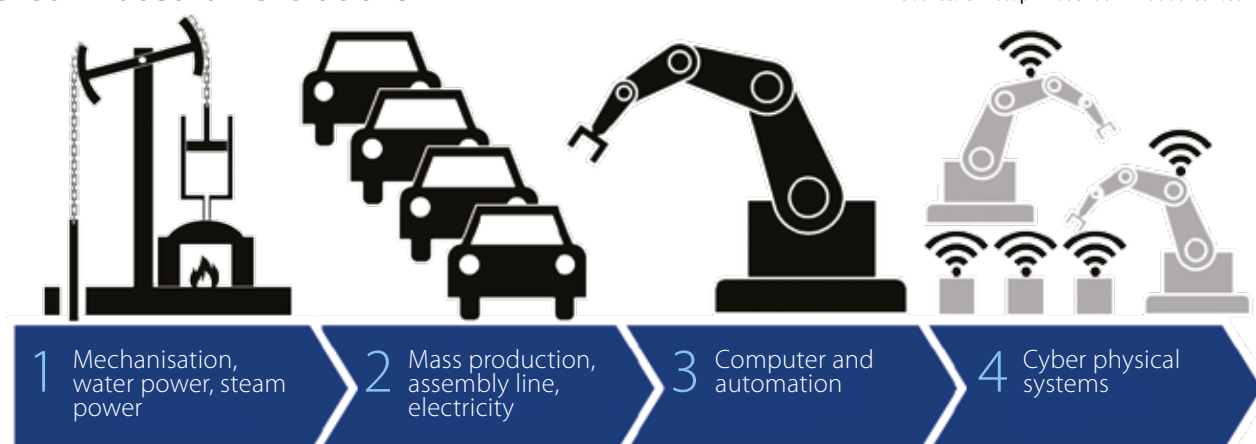
Innovative technology, pointing the way

towards Industry 4.0 (or the 'fourth industrial revolution', a collective term embracing a number of contemporary automation, data exchange and manufacturing technologies²³) is increasingly enabling this to happen.

Plastics manufacturing is at the forefront of this movement and well placed to provide people with a better choice of personalised products. Trunki, the manufacturer of a ride-on suitcase for children (see Case Study, page 54), for example, launched their 'Made For Me' service in 2014 allowing children to specify from nine different add-on parts and ten different colours, providing the ability to choose from over one billion potential colour combinations.

The four industrial revolutions

Source: Christoph Roser at AllAboutLean.com



²² Kaplan, A.M; Haenlein, M (2006). "Toward a parsimonious definition of traditional and electronic mass customization". Journal of product innovation management

²³ https://en.wikipedia.org/wiki/Industry_4.0

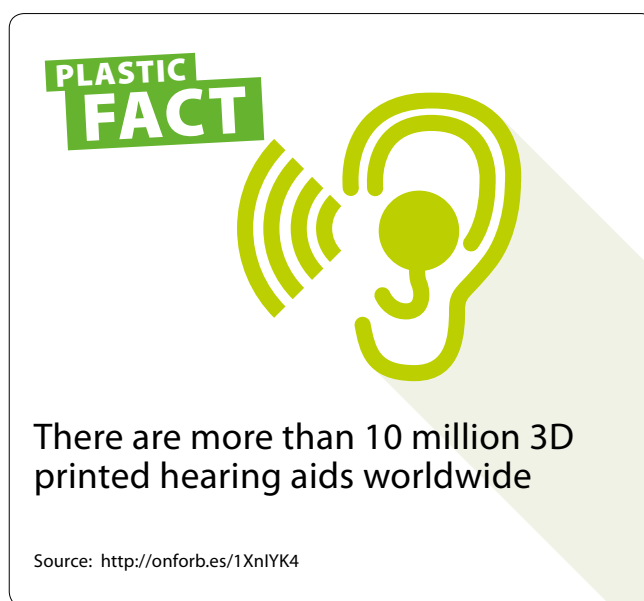
New products to support energy efficiency

Plastics can provide solutions to address the effects of climate change and to reduce energy consumption in a wide range of applications, including buildings, automotive and aerospace. The use of plastics materials and products across their life cycles from production to their end of life can assist in significantly reducing carbon emissions.

Within industry, modern plastics processing machinery is becoming increasingly energy efficient and uses between 20%-50% less energy than ten years ago. In addition, the BPF's Climate Change Energy Reduction Agreement²⁴ is one of the largest in the UK with nearly 350 sites registered. As a result of the scheme, 91,490 tonnes of CO₂ have been saved within the plastics industry as of the first Target Period (TP1) 2013/2014.

Plastics materials and products are also enablers of renewable energy production. As an example they are used in the production of rotor blades for wind turbines and key components in solar panels.

We also anticipate that material developments will bring about the further lightweighting of products such as cars and aircraft resulting in improved fuel efficiency and subsequent reductions in carbon emissions.



²⁴ www.bpfenergy.co.uk

Action plan



Additive manufacturing: a game changer?

The UK is a global leader (specifically in research and knowledge) in additive manufacturing (also known as 3D printing), alongside the US and Germany.

Whilst the market for additive manufacturing is growing rapidly (from a \$4.5bn global industry in 2014 to \$17.2bn by 2020²⁵), it is not yet known what impact this will have on the traditional plastics industry.

One example of where additive manufacturing may have an impact is in tooling. One of the biggest factors affecting the production of injection moulded parts is in the initial cost and lead times of tools. The work of Stratasys and others on 3D printed tools (either from plastic or metal) for injection moulding machines will impact on products with low runs.

A further impact could be for firms stocking large amounts of injection moulded parts (e.g. pipes companies who supply thousands of different fittings) who could make the digital files available (at a cost) for individuals or DIY stores to print on demand which could change relationships and responsibilities along the supply chain. Whilst this brings with it various issues about IP, lessons can be learned from the music and movie industries.

The growth of 3D printing machine ownership also brings with it opportunities for raw material suppliers who have new markets in which to sell their products.

The BPF to engage with The Manufacturing Technology Centre on the implementation of the Additive Manufacturing National Strategy

The BPF to explore the creation of an Additive Manufacturing Group made up of machinery manufacturers and resellers, printing bureaus, software suppliers, consultants, designers, material suppliers and universities

The BPF to run a series of seminars on additive manufacturing in order to raise awareness, educate the industry and stimulate dialogue on how it will affect the UK plastics industry

²⁵ A.T Kearney, Wohlers Report, Credit Suisse and Smart Tech Markets
<http://bit.ly/1RDops3>

Focus on overseas market development and encouragement of reshoring

The UK Plastic Industry has numerous strengths (highlighted on page 16-17), which elevate it to one of the strongest and most innovative in the world both in terms of exporting and investment.

Currently the UK exports around one third of plastics and plastic products produced in the UK but whilst exports of plastics raw materials and products grew a healthy 9.7% between 2012-2014, imports have grown by 16.8%. In order to maintain a healthy balance of trade it is paramount that the UK plastics industry continues to grow as an exporter.



Source: IMF (bit.ly/2a08voN)

Export of plastics raw materials and products

Country	Flows in USD			Evolution
	Year 2012	Year 2013	Year 2014	2014/2012
Italy	19,437,367,486	20,374,028,194	21,066,041,221	8.40%
Germany	56,446,095,572	59,470,190,405	61,823,023,676	9.50%
France	19,415,409,138	20,615,044,878	21,434,707,419	10.40%
Spain	10,556,124,246	11,494,461,965	12,449,814,895	17.90%
United Kingdom	11,834,515,586	12,105,167,211	12,983,512,863	9.7%
United States	59,340,137,198	61,336,004,476	63,426,758,266	6.90%
China	55,453,833,380	62,070,798,591	67,099,837,657	21.00%

Imports

Country	Flows in USD			Evolution
	Year 2012	Year 2013	Year 2014	
Italy	18,990,998,553	20,007,528,755	20,570,037,874	8.30%
Germany	37,772,371,103	40,046,516,390	42,011,995,428	11.20%
France	24,170,327,502	25,132,569,198	25,306,749,229	4.70%
Spain	9,601,741,064	10,534,829,726	11,478,155,773	19.50%
United Kingdom	17,406,835,135	18,946,956,596	20,327,806,742	16.80%
United States	42,322,308,004	44,491,404,114	48,165,308,131	13.80%
China	69,520,640,589	72,509,835,530	75,316,786,491	8.30%

Source: Source: United Nations Commodity Trade Statistics Database (UN Comtrade), December 2015, 39 : Chapter 39 – Plastics and articles thereof

Reshoring and inward investment

The UK has one of the world's most advanced plastics supply chains. This has been one of the driving forces behind the strong trend towards the reshoring of plastics manufacturing back to the UK as well as increased inward investment.

Reshoring has happened due to problems

of quality, delivery and loss of flexibility which companies have experienced when outsourcing manufacturing to lower cost economies such as China and this trend is likely to continue over the course of the next 5-10 years.

Support of foreign trade shows

In 1937, the British Plastics Federation organised its first British Pavilion at the International Exhibition of Industrial Art in Paris¹⁰ and it continues to organise British Pavilions around the world to this day. In the last five years, the BPF has organised 21 British Pavilions at the world's largest plastics shows, helping hundreds of firms to target markets that they otherwise would not have reached. All this is made possible by the BPF accessing, on companies' behalf, grants provided by UK Trade & Investment.

These grants, made available through the Tradeshow Access Programme (TAP), play a crucial role in encouraging companies to export. Indeed in years when the BPF has not been able to access grants for specific shows, and therefore not been able to organise a British Pavilion, UK participation dropped to zero. Whilst these grants are for relatively modest sums (around £2,000 depending on the market), they often provide the extra encouragement needed for companies to "go for it" and explore the market directly.

Through the BPF's overseas business development initiatives, the Federation is dedicated to helping the UK Government meet its target of getting 100,000 more companies exporting by 2020 and double current UK exports to reach £1 trillion a year by 2020.

The UK has the makings of being a global hub for the plastics industry. The biggest global PVC conference takes place in Brighton every three

PLASTIC FACT



A 2014 survey showed for every £1 of grant support given by UKTI, £35 of business was won

Source: Sponsors Alliance

years and the world's largest Rotational Moulding Conference has been held in the UK for two out of the last three editions (each time organised by the BPF). The BPF has the second most viewed website in the world for plastics information and it holds the general secretariat of CIPAD (the Council of Plastics Association Directors).

¹⁰ The Moulding of an Industry; A History of the British Plastics Federation by Geoffrey Stanley

CASE STUDY

The benefits of developing a business footprint in China



In 2006 Colloids developed a strategy based on growing with key accounts, globalising the business and building an export platform. This has seen the UK business turnover grow from £15M to £36M in a 9 year period and the company being classed as a quality partner to many of the petrochemical giants and international plastic processors.

As part of this programme Colloids entered the Asian export market selling to a known client base and appointed an agent in Hong Kong

to help in business development. This growth has been steady with export sales to Asia now reaching £2.5M.

As a result of growth in the region some difficult decisions needed to be made with particular reference to overseas investment. It was decided that the first phase of having a physical manufacturing business overseas would be China.

The decision to invest in China

- **Defensive** – Customers want a global/local supplier providing ‘western quality’
- All of Colloids’ **Top Ten** customers have manufacturing businesses in China
- The market is **growing, double digit percentage each year in China**
- Mega trends suggest that the requirement for cars in China will more than double in the next ten years, the high end car market uses a considerable amount of engineering plastic
- China has entered a new phase in its development and is moving towards a **high tech, high quality** focused economy
- There is a **growing middle class** in China that likes western brands and our products are used in many of these

Key questions asked

- Is there clarity on what the unique selling points and potential competitive advantages might be for Colloids in China?
- Who will be the customers and where are they located in China?
- Has the Intellectual Property been identified and what will be the strategy to mitigate them?
- Is there clarity on who the main local and foreign competitors are in China?
- Are there any grants or other forms of support that can be accessed?
- Is it possible to grow profitably in a short period e.g. three years after investment and be cash positive in five years?
- Are the risks of not becoming a global partner with customers understood?

Why Changshu in the jurisdiction of Suzhou?

- Suzhou is located in the Jiangsu Province which is the main province in China for engineering polymers
- It is the centre of foreign owned enterprises and joint ventures for automotive compounds, especially using polyamide (the ideal polymer for metal replacement as it reduces weight and therefore improves fuel efficiency)
- Around half of China’s automotive parts industry is located there
- The region provides access to a well-educated, technical workforce who are locally based and have a strong command of English

As a result of careful research, the fact that China is changing emphasis and becoming a quality driven consuming country and pressure from customers to globalise, Colloids embarked on a programme to build a plant in China in order to service the Asian market. Subsequently Colloids invested £4m in a new 40,000 sq ft manufacturing plant in Changshu Hi Tech Industrial Park.

This location was chosen as it provided a purpose built facility, a well-developed industrial zone, infrastructure and transport links as well as a

location close to customers.

As a result of the investment Colloids have been awarded significant contracts by major customers and have been recognised as a level one global partner rather than a level two regional partner. Subsequently they have also enjoyed additional contracts being awarded to the UK business for European supply because they are now seen as a international growing business that is prepared to position the company to meet the expectations of its blue chip client base.

CASE STUDY

Made in Britain: entrepreneur rides Trunki back home from China

The iconic children's ride-on suitcase Trunki brought home its production in May 2012. This had been a long term dream for designer and creator Rob Law MBE ever since the launch of Trunki in 2006. Fittingly the first British-made Trunki that rolled off the production line was the licenced Team GB and London 2012 Trunki.

Rob is keen to spread the word about UK manufacturing. Despite it being more expensive than China, there are many tangible business benefits which outweigh the current trend of just focusing on lowest prices

10 benefits of UK manufacturing

- 1 Lower lead times, reduced from 120 days to 30 days, allowing the sales team to react to market demands, and a promise 'NOOS' (never out of stock)
- 2 Better controlled costs; prices in China are constantly rising due to inflation, labour and currency appreciation. The cost of plastic is broadly the same the world over so UK pricing is only exposed to one major pricing fluctuation.





- 3 Reduce risk. External factors effecting importing products include: ocean freight (which can double over the year), import duty rates which are subject to change and GBP exchange rate variations.
- 4 Free up cash flow, by slashing UK stock holding and reducing the need for trade financing.
- 5 Cut carbon footprint. by reducing Trunki sea and road miles, using a factory which is much more environmentally friendly, than coal-powered factories in China
- 6 Cradle to grave – End of life product (that can't be reused) can be sent back to factory, melted down and made into new a Trunki.
- 7 Design innovation, with no language barrier and time differences, this means we can really push the boundaries with materials, creating limitless desirable products.
- 8 Wider product range, shorter production runs allow more exclusives to support retailers
- 9 Maintain market position, as leading children's travel brand with buy British angle, raising the barrier for potential competitors.
- 10 Rebalancing the economy and help move away from the reliance on the finance sector

“

This is where the UK can really stand head and shoulders above China, creating really innovative and well-engineered products that are more sustainable, drive better business performance and build stronger brand value. I'm thrilled that I was able to bring manufacturing back home.

Rob Law MBE

”

The current MK5 Trunki was redesigned specifically for UK manufacturing.

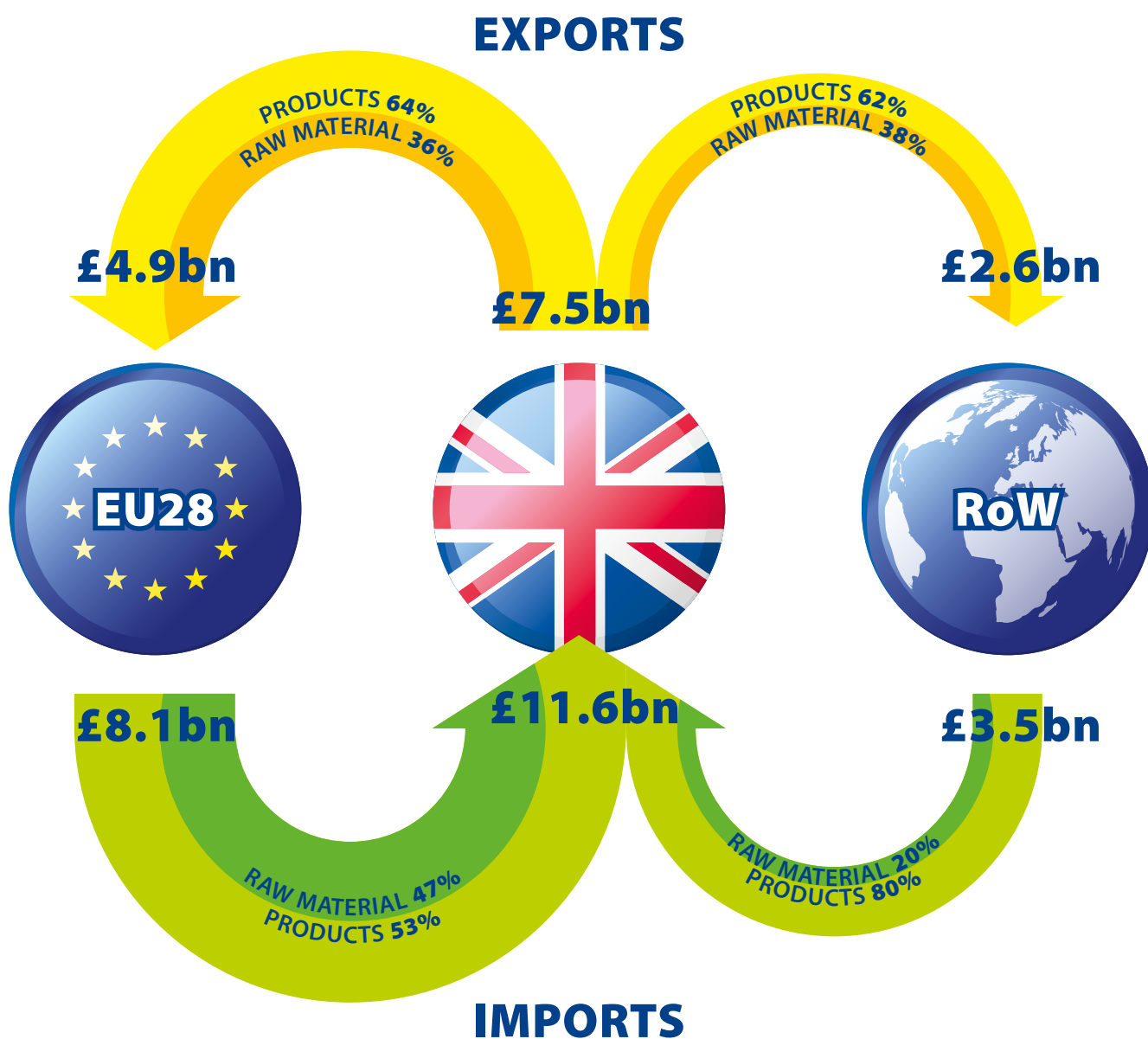
Weighing up the costs involved

Setting up production required significant investment. Although British made tooling costs six times more in China there is vastly improved efficiency. Further investment was required to completely re-engineer the parts for cost effective Western assembly. All this enabled Trunki to make a much simpler product by eliminating the 25 metal components and all adhesives, leaving just 2 types of plastic to recycle at end of its life.

Lack of Government support

Trunki was disappointed that there was little government support to help with the move back to UK and believe the government should do more to offer tax breaks for projects like this.

Trade flows of Plastics (products and raw material) from the UK to the EU28 and RoW (2015)



Sources: ITC calculations based on UN COMTRADE statistics/www.trademap.org, Product Code: 39, "Plastics and Articles Thereof" (3901-3915 raw material codes, 3916-3926 plastic products)

Action plan



The BPF to elaborate the specific advantages of the plastics supply chain in the UK in an overarching 'UK Plastics industry Guide'

Continue the support of UKTI for the sector and to specifically award grants to encourage UK SMEs to develop overseas markets and to participate in foreign trade shows

Lobby Government to examine the incentivisation of reshoring via tax breaks or other incentives

Work with UKTI and their 'GREAT' campaign to better link in with their existing 'Innovation is GREAT' campaign

The BPF to promote to the industry opportunities in specific growth markets such as South America, Middle East, Africa and Asian countries

The BPF to look to Government for financial support for a detailed analysis of what is currently being exported from the UK and what could be successfully exported in the future

The BPF, with Government financial backing, to prepare a gap analysis study on the UK plastics industry supply chains to better understand where future efforts should be focussed

The BPF to organise a 'plastics round table' discussion forum in order to enable better dialogue between the plastics community and the design community

Enhanced industry collaboration

Almost everything the UK Plastics industry seeks to achieve will require working with other organisations. There is not only a need for collaboration within the Plastics industry (and with related stakeholders) but also with other sectors.

Below is a list of just some of the key stakeholders:

UK Government & Parliament

All-Party Parliamentary Groups (APPGs)
Department for Business Energy and Industrial Strategy (BEIS)
Department for Communities and Local Government
Department for Environment, Food & Rural Affairs
Home Office
Members of Parliament

Devolved Governments

National Assembly for Wales
Northern Ireland Assembly
Scottish Parliament

Local Governments

Councillors
Local Authorities
Local Authority Recycling Advisory Committee (LARAC)
Local Government Association

EU: Commission & Parliament

Constituency and single issue MEPs
Directorate-Generals (DGs): Environment and Business
Various European Parliamentary committees

National Sector Specific Trade Associations

Automation, Instrumentation & Control Laboratory Technology (Gambica)
BEAMA (British Electrotechnical and Allied Manufacturers' Association)
The British Automation & Robot Association (BARA)
British Coatings Federation (BCF)
British Retail Consortium (BRC)
British Soft Drinks Association (BSDA)
Chemical Industries Association (CIA)
Construction Products Association (CPA)
Engineering and Machinery Alliance (EAMA)
Food and Drink Federation (FDF)
Foodservice Packaging Association (FSA)
Gauge and Toolmakers Association (GTMA)
The Glass and Glazing Federation (GGF)
The Manufacturing Technologies Association (MTA)
The Packaging Federation
Polymer Machinery Manufacturers and Distributors Association (PMMDA)
Processing & Packaging Machinery Association (PPMA)
The Society of Motor Manufacturers & Traders (SMMT)

EU-Level Plastics Related Trade Associations

European EPS Products Manufacturers (EUMEPS)
The European Organization for Packaging and the Environment (EUROPEN)
European Plastics Converters (EuPC)
European Plastics & Rubber Machinery (EUROMAP)
European Pipes and Fittings (TEPPFA)
European Windows Profile (EPPA)
PlasticsEurope
Plastics Recyclers Europe (PRE)

Regulation & Certification Bodies

The British Board of Agrément (BBA)
Environment Agency
Food Standards Agency
Health & Safety Executive

Business/Manufacturing Organisations

British Chamber of Commerce
Confederation of British Industry (CBI)
EEF
Environmental Services Association
Federation of Small Businesses (FSB)

Charities & NGOs

Fauna & Flora International
Forum for the Future
Friends of the Earth
Greenpeace
Keep Britain Tidy
Marine Conservation Society
Surfers Against Sewage
WRAP

Innovation

Catapult Centres
Innovate UK
KTN Ltd

Institutions and Professional Bodies

Chartered Institute of Waste Management
The Institute of Materials, Minerals and Mining
(IOM3)
Royal Institute of British Architects (RIBA)
Society of Plastics Engineers
The Worshipful Company of Horners

Skills & Education

Academia (for new technologies as well as for skills)
Cogent Skills
Sector Skills Council for Science, Engineering and

Product Design

British Industrial Design Association
Chartered Society of Designers
The Design Council
Museum of Design in Plastics (MoDiP)

Research & Testing

Pera Technology
RAPRA Ltd
Smither PIRA and Smithers RAPRA

Stronger engagement with the UK design community

The earliest plastics products were consumer driven and from the outset the Industry has been in strong collaboration with the UK's cutting edge designers. The UK Design Industry is held in the highest regard around the globe.

The design freedom created by plastics provides enormous opportunities for product designers and specifiers. Plastics are lightweight and durable and with their versatility in colour, touch and shape, they provide tremendous marketing advantages to users in addition to their functional performance.

There is a growing trend for UK designed products to be manufactured in the UK either through reshoring or in the first production phase.

The UK Design Industry has global recognition but finds it hard to communicate without support. Additionally, there are some key issues around the availability of easy to access information about plastics and the plastics industry for designers to exploit.

It is often said that the plastics industry and designers 'speak a different language.' Therefore there is a distinct need for better integration of the supply chain between plastics designers, moulders and toolmakers. If done properly this will enable more products designed in the UK to be manufactured here.

UK based designers have a vested interest in ensuring that work remains in the UK, as it speeds up production and gives them greater control of their products. The required skills (tool making and plastics processing) are here in the UK. They just need to be easier to access by designers.

With this in mind, there is a trend for designers to work locally (i.e. getting advice and input from UK based material suppliers, processors and toolmakers) and yet still outsourcing the production to China. The industry needs to work on educational resources for designers to explain the benefits of keeping production in the UK. With the increased wages in China, emerging labour shortages, frequent lack of adequate quality control and long shipping times combined with the increased automation in the UK, there is a very strong argument for keeping the production here, it just needs to be articulated better by industry supported by a government that creates a climate for inward investment.

Together, the UK plastics industry and the UK's world class design industry have the potential to be a powerful creative force. Exploiting this potential could provide a unique platform for changing societal perceptions of plastics for the better.

The Plastics industry must engage with the designers of the future by working in collaboration with the education sector including top design schools.

CASE STUDY

Recomed: the BPF and Axion Consulting working with the NHS to recycle PVC medical devices

PVC is widely used in medical devices from IV solution bags to tubes and masks. There are approximately 1,500 hospitals in the UK and it is estimated that around 2,250 tonnes of PVC could be recycled by collecting oxygen masks, oxygen tubing and anaesthetic masks alone.

Against this background, Vinyl Plus, the voluntary sustainable development programme of the European PVC industry, commissioned resource efficiency specialists Axion Consulting and the BPF to develop a collection scheme for medical PVC items from hospitals in the UK.

Two NHS Trust hospitals have pioneered the recycling scheme:

- **Queen Victoria Hospital NHS Foundation Trust, East Grinstead**
- **Frimley Park Hospital, Surrey**

Both hospitals were already successfully recycling domestic waste including paper, card and plastic bottles. They were keen to build on their existing recycling activities by working with RecoMed to reduce the amount of recyclable PVC in their clinical waste streams.



Pilot collection scheme

When developing the recycling scheme RecoMed worked closely with members of staff at both hospitals from a number of departments including clinical teams, hotel services, environmental services and infection control.

With the help of the two hospitals RecoMed identified that PVC anaesthetic masks, oxygen masks and tubing were the most frequently used PVC devices in the hospitals and that the recovery ward was the most appropriate location for a RecoMed container. Infection Control teams at each hospital undertook independent risk reviews concluding that the PVC oxygen masks and tubing were a non-hazardous waste with a low infection risk.

CASE STUDY

Amtek Plastics UK on design

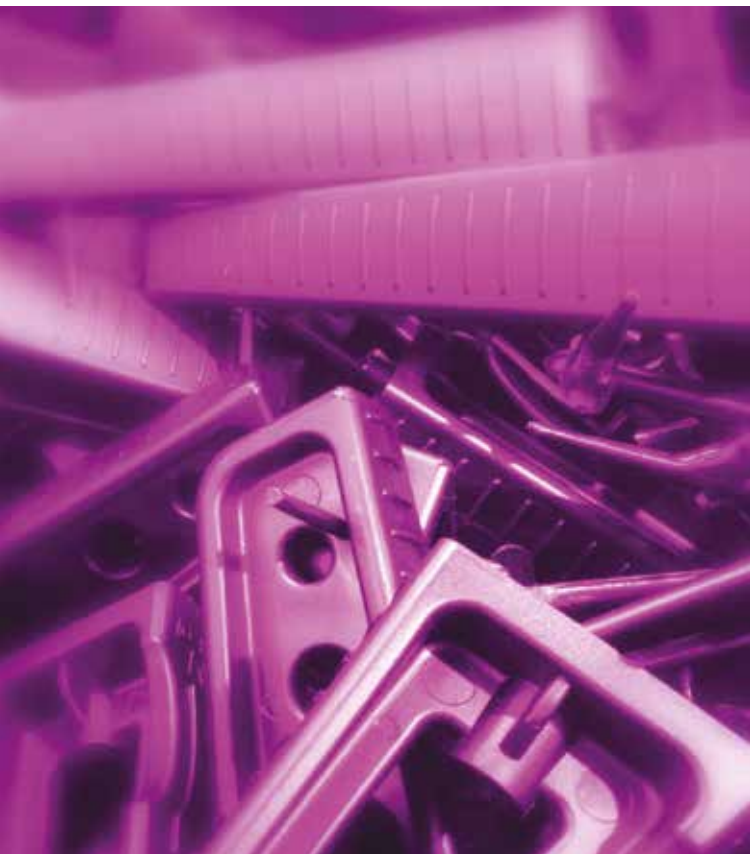


One of the most critical stages of bringing any product to market is 'design for manufacturability'. Anyone can make something look pretty, however, not everyone can design an item that can be manufactured and assembled, all for the right price.

Amtek Plastics had been working with a company which had engaged with a local Design Team to design and develop a brand new concept. When they received the original drawings, the bill of materials was in excess of

120 items, and the design was nowhere near what they required to manufacture the tooling. The concept needed to be manufactured and assembled for a budget of less than £10.00 per unit, with a tooling budget of less than £80,000. However these original drawings came in at a tooling cost of over £150,000 and a price per unit including assembly of £25–£30, therefore the project could clearly not go ahead.

Through consulting with Amtek, they were able to manage the re-design of the concept



which gave an enhanced appearance and provided the same functionality. It also reduced the bill of materials down to 14 components from 120 and an assembly time of less than 30 seconds rather than 7 minutes.

This shows how important the collaboration between design and manufacture at the earliest possible stage is and how collaboration is essential to save both time and money.

This project is now designed and made in the UK.

Action plan

BPF to create a stakeholder map for the plastics industry

Explore ways in which the plastics industry could engage better with the design community

Create an online portal allowing designers to access information on plastics

Encourage participation of the plastics industry in more design-focused events such as the 100% Design Show

BPF to be arrange 'Meet the Buyer' event in order to connect UK based plastics firms with the design community. This will provide a platform for discussing new projects and sourcing technical advice to ensure the design is 'fit for manufacture and use'

Engage with the Automotive Council to develop relations between automotive manufacturers and the suppliers in the plastics industry

Engage directly with the Catapults around the UK, specifically the High Value Manufacturing Catapult

BPF to organise a 'plastics round table' discussion forum in order to enable better dialogue between the plastics community and the design community



BPF House
5-6 Bath Place
Rivington Street
London
EC2A 3JE

TEL

+44 (0)20 7457 5000

WEB

www.bpf.co.uk

EMAIL

bpf@bpf.co.uk