

Made today, gone tomorrow?

Symposium series on future trends in resource use and management



November 2010



MERSEYSIDE WASTE DISPOSAL AUTHORITY



INVESTING IN
englandsnorthwest

EUROPEAN REGIONAL DEVELOPMENT FUND

Supported by



Project Title Made today, gone tomorrow?

Project Reference n/a

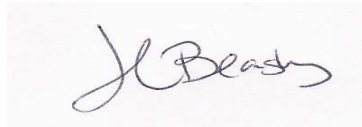
Report status FINAL

Client MWDA/EnviroLink Northwest

Date December 2010

Project Team	Dr Jane Beasley	Project Manager
	Ray Georgeson	Principle
	Vicky Duff	Research Manager

**Project Manager
(Final Sign-off)** Dr Jane Beasley



Contractor Contact Details

Beasley Associates Ltd
46 Stonefall Avenue
Harrogate
HG2 7NP
(T) 07946 217275
(E) jane@beasleyassociates.com
(W) www.beasleyassociates.com

RGR Ltd
2 Garnett Villas, North Avenue
Otley
LS21 1AJ
(T) 07711 069433
(E) ray@raygeorgesonresources.co.uk
(W) www.raygeorgesonresources.co.uk

Disclaimer:

Beasley Associates Ltd and RGR Ltd have taken all reasonable care and diligence in the preparation of this report to ensure that all facts and analysis presented are as accurate as possible within the scope of the project. However no guarantee is provided in respect of the information presented, and Beasley Associates Ltd and RGR Ltd are not responsible for decisions or actions taken on the basis of the content of this report.

Contents

1.	Introduction	4
1.1	Setting the Scene	4
1.2	Project Context	5
1.3	Resource Efficiency in Context	6
2.	Influencing Factors	8
2.1	Materials	8
2.2	Products	15
2.3	People	22
2.4	Policy and Strategy	30
3.	Summary	34
Appendix 1:	Further Information on the Symposia Events	41

1. Introduction

1.1 Setting the Scene

Prediction is very difficult, especially if it's about the future.

*Niels Bohr (attributed to Bohr by Arthur K. Ellis (1970))
Teaching and Learning Elementary Social Studies.*

It seems almost too simplistic to start by saying that one of the biggest challenges that waste and resource managers face is that of trying to predict the future; specifically, what may happen to waste volumes and composition in a rapidly changing world and economy. This is however what is required; major decisions need to be made about the long term management of municipal waste and material resources, which require some degree of judgement as to what the future may look like. When looking back at the rate of technological change and consumer behaviour in the last twenty years, to try and look ahead into the next twenty years may seem an impossible task, but it is a timeframe within which contracts for waste treatment and resource management are let, and so it can be argued that there is a duty to look ahead and plan for change.

What is clear is that as waste is increasingly regarded as a resource in the wrong place, and as the minimisation and then efficient utilisation of resources becomes a priority focus, the systems used for the collection, sorting, processing and treatment of material resources from households may change. Many factors along the resource chain may affect the viability and appropriateness of options and systems selected for long term material resource management, including: consumer trends; product design and marketing; manufacturing industries and the balance between exported and imported materials and products; the likely scarcity of valuable resources (especially precious metals); economic factors in the era of 'new austerity'; environmental drivers including the low carbon agenda; and developments in logistics and sophistication of collection systems.

On a global level with around 6.7 billion people on the planet the drive for development and increased consumption poses even greater issues for resource use and management. It is unclear how the supply chain will provide personal choice and Western-style living for those who aspire to it whilst at the same time accommodating a need for more sustainable living. What is clear is that the choices being made now have long term and far reaching consequences for material resource use and management.

As a contribution to thinking on these challenges, Merseyside Waste Disposal Authority (MWDA) and Envirolink Northwest commissioned a research project, **Made today, gone tomorrow?**, to examine future trends in resource use and management. The partners had complementary objectives for the project, with MWDA seeking to utilise the research and evidence obtained as a platform for thinking on the development of their new Waste Strategy and Envirolink Northwest using the research to identify business opportunities and

feed into future guidance, best practice and decision making exercises across the North West and beyond.

Made today, gone tomorrow? examined a complexity of issues where seemingly unrelated supply chain decisions are having direct consequences on waste and resource management; a good example is the Military's ongoing demand for scarce metals and the implications this may have on the recovery of household electronics. Equally in terms of global political stability and food and water scarcity, the question of whether local or regional behaviour can remain the same and whether for example Merseyside and the North West can continue to be so profligate with resources is one that needs to be considered. Governments and the supply chain are beginning to respond to the challenge but there is a scramble for resources with developed economies now moving rapidly into digital media, lightweight packaging and miniaturisation of products. The pace of change and the direct and indirect consequences of these changes should not be underestimated. The **Made today, gone tomorrow?** symposia series explored these issues from the perspective of UK waste management's preparedness for the future and the impacts that this backdrop will have on the quantity and composition of waste that the infrastructure being secured today will have to manage in the future.

1.2 Project Context

Four symposia were held in series, designed to build a base of knowledge and insight into future trends and challenges for waste and resource managers. The themes of each symposia were:

- **Future strategic direction for resource management** - this was an opening broad discussion of the potential direction of waste and resource management at a strategic level over the coming two decades, focusing on resources and society, economic influences and the movement towards a carbon based policy system and the implications this may have on waste related targets, indicators and monitoring systems.
- **Future Waste Composition** - this focused on how changes to product design, consumer behaviour in terms of demand for products, and a move towards a low carbon economy will impact upon the direction of travel for managing waste streams, from collection, to reprocessing, to treatment and finally disposal.
- **Future Manufacturing Industries** - this focused on the resource aspect of manufacturing and changes in technology and product design and the impact that they have on raw materials supply and demand, and the impact this has on resource flows and the resource management landscape.
- **Future Waste Infrastructure** - this looked at the challenge of ensuring that waste and resource management infrastructure remains fit for purpose in the long term, focusing on how systems and contracts can be future proofed.

The purpose of the symposia was to provide the opportunity to engage with experts and stakeholders, exploring issues that would potentially influence future resource

management. This report highlights the key findings and insights gained from the symposia¹ and suggests some potential implications for the resource chain including a horizon scanning approach to identify specific implications for waste management decision makers.

Further information in relation to the symposia can be found in Appendix 1.

1.3 Resource Efficiency in Context

It is increasingly evident that resource efficiency – that is, the systematic reduction in the quantity of resource employed to produce goods and services in the economy – will be one of the key determinants of economic success and human well-being in the 21st century.

Aldersgate Group (2010), Beyond Carbon

When undertaking a project looking at future trends in resource use and management (specifically from a UK waste management perspective), a key focus of the discussion is resource efficiency. It is therefore important to be clear what is meant by resource efficiency in this context.

Current developments in material use, product innovation, manufacturing processes and consumer preference are all influencing the nature of waste management. In a society where over consumption is the norm, alongside a public acceptance that more environmentally positive behaviour should be aimed for waste management services need to be delivered which meet the increasing demands of the householder in a difficult economic climate. It is clear that those involved in decision making are facing the ever growing challenge of trying to understand where waste now fits into a society more inclined to talk about resources and resource efficiency.

So what is meant by resource efficiency? Is it a focus on primary material use, intensity of material use, or specific materials, products or supply chains? Is the focus more on the energy and environmental impact, or actual wastage? In fact all these issues need to be considered in the context of resource efficiency. Two centuries of unprecedented material resource consumption and globalisation of the markets combined with the challenge of meeting the demands of a rapidly growing global population has led to the recognition that current resource use, whether this is materials, energy or water, cannot be sustained. Focusing on sustainable management of materials and ensuring their efficient and effective use throughout their life cycle is fundamental to economic growth, environmental quality and sustainable development. This requires a shift from end of life closed loop thinking to a

¹ Rather than summarise the proceedings of each event, we have used the record of each event, supplemented by our own research, to create a narrative around the key influencing factors recognising that they in effect become cross-cutting in terms of the implications for composition, manufacturing and infrastructure (which characterised the way we focused the workshops). Further information in relation to the agendas and presentations can be found at <http://www.beasleyassociates.com/madetoday.html>

more integrated life cycle approach and the embracing of 'cradle to cradle' thinking² throughout global supply chains.

When considering waste management within a resource context the key is to identify and understand the many factors which have an effect (positive or negative) on resource flows and resource use and which therefore have a bearing on the effectiveness or appropriateness of management systems for materials post consumer use. These factors are generally not discrete entities but are complex and intertwined and are affected by:

- consumer trends;
- product design and marketing;
- the role of manufacturing industries and the balance between exported and imported materials and products;
- the likely scarcity of valuable resources (especially precious metals);
- economic factors in the era of 'new austerity' and potential future prosperity;
- environmental drivers including the low carbon agenda; and,
- developments in logistics and sophistication of collection systems.

All have an impact to some degree on material resource management in terms of the long term viability and appropriateness of options selected for reuse, recovery, recycling, treatment and disposal of material resources post consumer use.

The key influencing factors identified in the course of the research are all considered in detail in Section 2.

² McDonough W and Braungart M (2002), *Cradle to Cradle- remaking the way we make things*, New York: North Point Press

2. Influencing Factors

From the significant amount of information and analysis generated during this research four key influencing factors were identified which cut across the symposia themes, namely:

- materials;
- products;
- people; and,
- policy and strategy.

It is these key factors which form the focus of the discussion below.

2.1 Materials

China produces as much as 97% of the world's supply of rare earth elements, but has slashed their export quota for the second half of 2010 by 72% year-on-year.

Tania Branigan, *Elemental struggle over rare earths*, Guardian 26 Oct 2010

The ways in which materials are used and processed are likely to continue to change as a result of global economic forces as much as through changes in consumption patterns. Already shifts in **material substitution** are being seen as a consequence of such changes; recent examples of the preference for **electronic** media such as the rapid rise in sales of e-books replacing paper look set to be a continuing phenomenon, with sales of e-books in the US in the first two quarters of 2010 at \$180m being already more than the whole year sales for 2009 of \$170m³. Music sales tell a similar story, with rapid increases in downloads and reductions in CD sales, with 16 million digital albums sold in the UK in 2009; this is a 56% increase on the previous year representing 12.5% of total music sales⁴ and expected to continue to rise. Downward trends in the consumption of newsprint as use of digital news media continues to rise are well documented, as is the trend for material substitution in areas such as food packaging where metal packaging is increasingly being replaced by plastics (discussed in further detail in Section 2.2).

Shifts in materials usage through substitution and consumption pattern changes may prove to be relatively easy to manage, especially if material recycling collection systems prove to be flexible enough to cope with the shifts⁵. It is possible that the prospect of **materials scarcity**, particularly in precious metals and rare earth elements (REEs) may prove to be

³ http://www.idpf.org/doc_library/industrystats.htm

⁴ <http://www.bpi.co.uk/music-business/article/the-market.aspx>

⁵ That is, ensuring systems have the flexibility to accommodate the addition or subtraction of materials in a straightforward way in response to industry changes in materials use.

more challenging⁶. As noted in the boxed headline, the prospects of Chinese control⁷ of access to key REEs, vital for products in the greentech sector (hybrid cars, solar panels etc), may prove to be a significant global economic factor even in the next few years. The challenge of securing access to supplies of REEs may even lead to serious attempts to develop seabed resources⁸, especially in the Far East as Japan seeks to maintain access to secure supplies of materials for its digital and greentech industries. Clearly, this type of seabed mineral extraction would come with environmental and health and safety risks, as well as potentially high costs and may be perhaps seen as a last resort. However, security of supply in a tightening global market may become a salient issue and subject to global political volatility⁹ and so the prospect of seabed mining may well increase.

In the shorter term and more realistically, models for **disassembly** of electronic products¹⁰ (such as Fujitsu's approach which collects and disassembles all redundant Fujitsu products in Japan for recycling) could start to prove viable in the European market as demand for precious metals fails to be met from virgin extraction. The EU may start to act on the realisation that it needs to do more to capture these resources from 'waste' products on our doorsteps in much greater volume than even the present WEEE Directive envisages¹¹. There almost certainly will be a drive to do more to ensure environmentally safe recapture of materials from electronic goods, wherever in the world they are ultimately dismantled and reprocessed.

Aside from the challenges facing and posed by **electronics** other key material streams identified in the project for attention were **food** and **plastics**. In recent years, public attention has been drawn to the volume and particularly the value of **food** that is wasted in the home, through factors such as over-purchasing, confusion from use-by and sell-by dates on products and haphazard portion control during food preparation¹². Recent progress has been made on reducing food waste, both at the household level and in the food supply chain, and there appears to be strong public support for initiatives to reduce food waste. For example, the Future Foundation notes that an overwhelming majority – 88% of us – agree that “people are generally far too wasteful when it comes to food”¹³. Building on the pioneering work of WRAP¹⁴ with their *Love food, hate waste* campaign, various retailers have followed suit in their own style, including Waitrose's *Forgotten Cuts* and Sainsbury's

⁶ <http://www.newscientist.com/blogs/shortsharpscience/2010/09/is-this-the-start-of-the-eleme.html>

⁷ <http://www.newscientist.com/blogs/shortsharpscience/2010/10/china-sparks-concern-over-rare.html>

⁸ Kawamoto H (2008), Japan's Policies to be adopted on Rare Metal Resources, in *Science and Technology Trends Quarterly Review*, No27, April 2008, pp57-76 - at

<http://www.nistep.go.jp/achiev/ftx/eng/stfc/stt027e/qr27pdf/STTqr27es.pdf>

⁹ Bradsher K (2010), *China Restarts Rare Earth Shipments to Japan*, New York Times, Nov 19 2010. Following a dispute over an accident between a Chinese trawler and two Japanese coastguard vessels in September 2010, the Chinese stopped exports of certain REEs to Japan – this has just been restarted following negotiations.

http://www.nytimes.com/2010/11/20/business/global/20rare.html?_r=1&partner=rss&emc=rss

¹⁰ Joy Boyce, Fujitsu, paper presented at **Made today, gone tomorrow?** 23 Sept 2010

¹¹ Michael Radermaker and Jaakko Kooroshy (2010), *The Global Challenge of Mineral Scarcity*, essay for Enriching the Planet – Empowering Europe conference, April 2020 – The Hague Centre for Strategic Studies www.clingendael.nl/resource scarcity

¹² Waste and Resources Action Programme (2008), *The food we waste*, Banbury: WRAP www.wrap.org.uk

¹³ Michael Tully, Future Foundation, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

¹⁴ www.lovefoodhatewaste.org.uk

Love your Leftovers campaigns. The recession has energised this trend, as did high inflation in food commodity prices in 2007 and 2008. In 2009 a survey for nVision Research¹⁵ claimed that 27% of the population were wasting less food as a direct result of the recession. More recently, WRAP released data¹⁶ indicating that 670,000 tonnes of food waste had been prevented from entering the waste stream between 2005 and 2009 which would indicate that this trend is indeed visible. Whether it is purely a response by consumers to recessionary pressures, food waste prevention campaigns, an effect of increased portion control packaging reducing kitchen waste or indeed a mixture of all three – it is a quantifiable positive improvement in resource efficiency.

Further promotion of home composting as part of a shift towards more personally sustainable, lower-carbon lifestyles as well as increased levels of food waste collection by councils should also feature strongly in maintaining a positive improvement in resource efficiency in terms of food waste.

It should also be noted that future **global food security**¹⁷ has been identified as an issue likely to impact upon the way food and the generation of food waste is viewed. Recent developments such as the impact of the Russian drought and consequent wheat shortage on wheat prices point to a trend towards uncertainty in food supply. This may be the start of a much bigger phenomenon¹⁸ - real concern about UK food security as a strategic issue¹⁹ within which the growth of local sustainability, food production at home and in local communities, and a heightened awareness of the fragility of global food supplies in a world where climate change impacts and control of resources play an even bigger part in geopolitical events. Connected to these concerns are issues of water management and the growth of GM crops to meet global food demand rising to even more prominence than they have already.

Plastics pose a different but similar set of challenges, with continued global increases in the consumption of plastics alongside future concerns about the price and availability of oil supplies. This points towards even more attention being paid to capturing the value from plastics back through closed-loop recycling systems and energy recovery. Whether the potentially competing demands of closed-loop product manufacturers and operators of energy recovery facilities for material prove to be a problem remains as a challenge for policy makers and resource managers alike. However, in the relative short term, there are public demands for more plastics recycling, industry innovation in the use of mixed plastics in products and the recognised carbon emissions reduction benefits of plastics recycling. This suggests that collection systems should evolve further to accommodate the capture of this resource stream. Plastic products and packaging are often regarded by the committed recycler as an irritant in the dustbin²⁰ but this material has the potential to be effectively

¹⁵ nVision Research (2009) for Future Foundation, cited by Michael Tully, Future Foundation – paper presented at **Made today, gone tomorrow?** 16 Sept 2010

¹⁶ http://www.wrap.org.uk/media_centre/press_releases/one_million_tonnes.html

¹⁷ Dr Julian Parfitt, Resource Futures, paper presented at **Made today, gone tomorrow?** 7 Sept 2010

¹⁸ Michael Tully, Future Foundation, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

¹⁹ House of Commons Library Briefing Note on UK Food Security (Oct 2010),

<http://www.parliament.uk/briefingpapers/commons/lib/research/briefings/snsc-04985.pdf>

²⁰ Dr Paul Davidson, WRAP, paper presented at **Made today, gone tomorrow?** 23 Sept 2010

utilised through establishing an optimal balance between resource and energy recovery. A further consideration here is the trend towards lightweighting of plastic packaging and the increased prominence of plastic films as a consequence of this. Whilst this is likely to present challenges for all recovery options, the continued switch to plastics taking place in various packaging systems (generally as a result of the strong 'product to packaging' ratios, embedded carbon and cube utilisation and associated logistics benefits) mean that the expected continued prominence of plastics in the resource stream is likely to accelerate rather than reduce, making recovery and recycling all the more imperative.

In all the discussions about materials and potential changes and influences, one further key theme emerged, that of the need to acknowledge the influence of **commodity markets**, particularly in relation to exports of recyclables and the quality of materials. This set of issues rarely commands consensus, as it tends to rapidly narrow down to choices of collection systems, a discussion of which is best, and how to optimise quality of materials collected alongside quantity and accessibility for the consumer.

Much growth in the collection of dry recyclables in recent years has resulted in increased export of that material, mainly paper and plastics, to the major export markets in China, India and other parts of the Far East. This has been largely achieved by the advocacy and adoption of commingled collection systems on the basis that providing a single container for a household in which they place all those recyclables leads to higher participation and capture of materials. Advocates of source separated collections systems suggest that the quality of individual material streams collected at the kerbside (sorted by the householder) are more sustainable long term as the quality of material captured is easier to market at a better price, and encourages closed loop recycling systems. In the polarised debate that has continued in the UK about these different collection systems it is worth remembering that the waste and resource stream is changing and continues to change. What is right for today may literally be wrong for tomorrow, reinforcing the view that flexibility is important, alongside the maintenance of good engagement with the public leading to local informed choice.

Although reports suggest²¹ that in the immediate short-term the ability for the UK to export significant volumes of recyclables to China and the Far East in mixed forms will continue, there are already the beginnings of a trend which sees the Chinese market restricting lower quality material imports²² and seeking to draw in better quality. In the fullness of time the capture of recovered paper and plastics from the growing Chinese internal economy for its' own use may further impact upon our ability to rely upon this market. This will mean that questions about the ability of the UK to effectively utilise material resources it has in effect purchased (in the form of imported products) – either in new products or through energy recovery – will be asked again. A renewed focus on recycling market development within the UK and rest of the EU may well be needed.

²¹ Waste and Resources Action Programme (2010), *International markets event 2010 and China Market Sentiment Survey*
http://www.wrap.org.uk/recycling_industry/market_information/international_markets_event_2010/presentations_from.html

²² http://www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=217&listitemid=9755

Key messages

It is clear that the nature of the material resource requiring management may change significantly as material substitution and material scarcity increasingly play a part and key material streams such as electronics, food and plastics face the biggest challenges ahead. The anticipated changes, the likelihood of those changes in terms of the driving force and what this could actually mean from a waste management perspective can be seen in Table 1. Potential business opportunities that the change may represent are also considered.

Table 1: Materials - Horizon Scanning the Potential Changes and their Impacts

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
Continued material substitution	<p>Changes in technology will continue to affect material usage and drive material substitution.</p> <p>Designers will continue to propose alternative materials for aesthetic, economic, technological, and environmental reasons.</p> <p>Manufacturers will require material substitution in light of changing markets or be driven economically to use different materials to stay competitive. Technological innovations will drive the change at manufacture and production level.</p> <p>Consumers will drive changes in relation to preparedness to pay (specifically in terms of cost issues attached to material prices (and the resultant product price).</p> <p>Policy makers may prohibit the use or content level of a particular material or through the use of standards etc which will bring about change.</p>	<p>Increases and decreases of material types entering the waste stream may impact upon recycling systems in place, reprocessing markets, recovery potential of the remaining waste stream etc..</p> <p>If tonnage is still the main metric for recycling performance then there may be consequences for recycling targets and their achievability if a significant decrease in specific materials is seen (e.g. the use of electronic media in preference to paper etc.).</p> <p>There is a need for a flexible approach to collection systems to allow for additions and loss of materials from the waste stream.</p>	<p>Opportunities may be present in terms of an increase in demand for locally operated closed loop systems for materials such as plastics. This material is anticipated to increase in volume in the waste stream and technology is expected to improve to facilitate recycling of a wider range of plastics for a wider range of applications and products.</p>
Increased material scarcity	<p>The likelihood of material scarcity being an issue is very significant. There are clear signs already that an over reliance on some countries supply of rare metals could pose problems in the global market place, particularly bearing in mind</p>	<p>The value of certain materials may increase significantly making their recovery from the waste stream and their reprocessing for resale a priority. However the consumer will continue to be</p>	<p>More localised reprocessing opportunities may arise. Clear business opportunities may occur specifically in terms of</p>

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
	<p>instability in some of those countries in addition to further data becoming available regarding predicted availability of rare metals.</p> <p>Manufacturers will place continued and ongoing demand for rare earth elements with limited opportunity for substitution.</p> <p>Reprocessors need to recover products containing scarce metals will increase and different means will be employed to maximise capture and recovery. Innovations in technology will become more commercially viable for the extraction of scarce metals from the waste stream. More localised reprocessing opportunities may arise.</p> <p>Consumers will continue to positively respond to infrastructure set up to recover the scarce metals specifically where there is a financial incentive to do so (particularly in the current economic climate).</p>	<p>faced with a plethora of opportunities to sell their products containing scarce metals to a range of agents, dealers and reprocessors which could result in a significant proportion of this part of the waste stream by-passing the more traditional collection routes. This would have a direct impact in the composition, and also the quantity of waste requiring management. However there may still be a need to improve opportunities to recover all electrical items in response to material scarcity and demand for raw materials.</p>	<p>disassembly, particularly in relation to items containing rare earth elements as the price of these secondary raw materials is expected to rise in response to material scarcity and political issues prohibiting global trade.</p>
<p>Food as a precious commodity</p>	<p>Success of national campaigns linked to health, waste and economics have shown a willingness of leading retailers and consumers to respond to the challenges. Food security is now being seen as a significant issue in the Western world and one that has yet to be fully addressed.</p> <p>Retailers are increasingly adopting volume control standards, limiting offers/changing offer structures, and making better use of clear labelling.</p> <p>Consumers have responded positively to national campaigns and campaigns led by retailers, although the current economic climate is</p>	<p>There is the potential for a reduction in food waste, particularly if behaviours are changed for the long term in terms of wastage. This has implications for food waste collection schemes in place or planned, however food waste is not anticipated to be eliminated <i>per se</i> in the next twenty years unless food prices exceed even the highest expectations. Therefore there will still need to be some targeting of this waste stream and if food waste collection is to be implemented careful</p>	<p>Business opportunities may occur in terms of food waste collection and processing, with current policy emphasis on anaerobic digestion as a primary method of treatment.</p> <p>Possible changes in type and volume may encourage more flexible, modular and even smaller scale</p>

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
	<p>thought to be playing a part in changing consumer habits and preferences.</p> <p>There still remains a need for clear policy in relation to food security, labelling, standards etc.</p>	<p>projections need to be undertaken when considering treatment capacity requirements. There needs to be flexibility to allow for the potential impact of the drivers for change in the short, medium and long term.</p>	<p>systems for food waste processing linked to localised energy recovery.</p>
<p>Global increase in plastics</p>	<p>There are ongoing demands for lightweight fit for purpose packaging which reduces transport costs etc. and plastic continues to fill that niche.</p> <p>Designers are continuing to replace materials and products with plastics in response to environmental and economic pressures.</p> <p>Manufacturers are increasingly demanding lightweight packaging with a good product to packaging ratio. Biopolymers are also of increasing interest to manufacturers, which does pose challenges for recycling systems.</p> <p>Consumers have an acceptance of plastics as a packaging material (although demand remains high for appropriate infrastructure to manage plastic waste – curse of the yoghurt pot).</p> <p>Reprocessors need to ensure systems/infrastructure to recover plastics are in place.</p>	<p>Increased plastics in the waste stream will drive the need for infrastructure to recover the plastics in terms of closed loop systems and systems to recover the energy.</p> <p>Collection systems will be required to be flexible to accommodate the increase in this material and the most appropriate system to ensure its subsequent use in a closed loop application.</p>	<p>Opportunities may be present in terms of an increase in demand for locally operated closed loop systems for materials such as plastics which are anticipated to increase in volume in the waste stream and as technology improves to facilitate recycling of a wider range of plastics for a wider range of applications and products.</p>
<p>Influence of commodity markets</p>	<p>Over-reliance on currently healthy export markets (China, India, Far East) to take mixed lower quality recyclate, plus recent trends in restrictions of lower quality imports is placing greater pressure on UK trade in recyclate.</p>	<p>There is an ongoing need to ensure that systems are fit for purpose to deliver material of the highest quality for resale. This is likely to be a combination of continuous improvement to collection systems and vehicles used for</p>	<p>Opportunity for the development of more localised markets to process the higher quality recyclate – ability to compete more effectively for the</p>

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
	<p>Reprocessor are increasingly focused on optimising quality alongside quantity plus ease of use in collection of materials for resale</p>	<p>source separation of recyclables and where commingled collection remains an option, further technical improvement in sorting technology at Material Recovery Facilities. In future years this is likely to be linked to growing desire to maintain quality materials flow for use in the Western supply chain as competition for scarce quality resources becomes stronger, especially from growing Eastern economies.</p>	<p>recyclate if it's a higher quality material.</p>

2.2 Products

6.3% of the world's population own 50% of its economic product.

Steve Kelsey, Partner, PI Group, *Future Manufacturing and Product Development- a designers' perspective*, 23rd September 2010; presentation produced for the *Made today, gone tomorrow?* symposium

Product design and manufacturing can play a significant role in resource efficiency and impact directly on waste generation at various stages of the supply chain. In terms of manufacturing, the situation is made a little more complex in the UK due to the fact that for many sectors what is considered to be manufacturing is in fact assembly; this effectively places the UK within a long drawn out supply chain that relies on cooperation and negotiation.

In this situation, the links with raw materials are largely indirect and therefore the influence on those raw materials can be limited. Other countries, wishing to reduce their reliance on raw material sources, are focusing on de-manufacture rather than waste management (such as the Fujitsu model discussed in Section 2.1), which is effectively supporting greater reuse and recycling within certain sectors. Potentially, the role of de-manufacturing is set to increase as, for example, the economics of sourcing rare earth elements becomes less attractive but demand for the products continues.

Despite its recent problems the UK economy is still the fifth largest globally and second largest in Europe with 22% of GDP contributed by industry and manufacturing²³ (despite the urban myth that the UK does not make anything anymore). It is an economy still strongly driven by consumer demands and the willingness of manufacturers and brands to both fuel and respond to this demand. Whether this is driven by fashion, marketing, media shaping opinions and desires or other influences, the challenge for makers and sellers of products is to innovate and produce the goods and services that people want in ways that use resources more efficiently. Some of these examples have already been touched on (in Section 2.1) where technological replacement is the key driver, but there are also many good examples where material substitution has been used for example to drive forward light-weighting of packaging, reducing material costs and carbon emissions.

Desire for and ownership of products has driven much of post-war economic growth in Western economies. Although much is said about the shift away from product ownership towards service provision (and this appears to be a continuing trend), this is tempered by global economic trends that see the rapid rise of the Eastern economies fuelled by manufacturing and increasing desire for Western lifestyles. At one extreme, the growth of the Chinese and Indian 'middle class consuming bourgeoisie' at around 300m/year represents the population of the European Union annually²⁴, making the growth in the East and its demand for products hard to ignore.

In terms of product design, it is increasingly the case that businesses are more open to the idea of **designing out waste**, accepting that consumers are increasingly looking for better products with lower environmental impacts. Green Alliance, with its 'Designing out Waste' programme, is working with businesses across the supply chain to research, analyse and debate and develop proposals for designing out waste²⁵. A new programme is currently underway (involving new partners: Cadbury, Interface, Rio Tinto) with a focus on material security and models of product stewardship and producer responsibility. If the partners involved in this programme (and others like it) start to experience a visible market edge (an example of an identity being developed along these lines is Marks and Spencer's Plan A) then designing out waste will become less of a niche activity carried out by a few leading players along the supply chain.

On a global level **frugal engineering** in terms of providing new goods and services to emerging markets may be focused on minimising non essential costs but does represent a resource efficient approach to product design. For example the Nokia 1100 cell phone is basic in terms of its functions, has a monochrome screen, has a low power draw and is sold for \$15 to \$20, thereby representing a product at the lowest possible price whilst being fit for purpose in terms of the specific needs of the customer in the emerging market²⁶. Clearly

²³ www.economywatch.com

²⁴ Peter Jones, Ecolateral, commentary at **Made today, gone tomorrow?** 13 Oct 2010

²⁵ Green Alliance (2010), *A pathway to greener products*, London : Green Alliance http://www.green-alliance.org.uk/grea_p.aspx?id=5016

²⁶ Vikas Sehgal, Kevin Dehoff and Ganesh Panneer (2010), The Importance of Frugal Engineering, Strategy & Business, May 25, Summer 2010 issue 59 (www.strategy-business.com/article/10201?pg=all)

the resource requirements in the manufacture and operation of this phone are much lower than conventional mobile phones.

Current drivers in product design and innovation include of course **consumer demand** and as consumers in this period of economic uncertainty require more value for money this may translate into improved **longevity of products**. Although empirical evidence is not readily available there is a general consensus that products are not designed to last; there is a degree of planned obsolescence in most if not all products, whether this is in technological terms (lost functionality), economic terms (the high costs of repair compared with replacement), psychological terms (loss of desire or attachment), or socio-cultural terms (peer group pressure)²⁷. The apparent disposable nature of products now ranges from the lower quality budget clothes and one-wear items through to higher end electrical goods and gadgets and can have significant implications on the quantity of discarded products, the composition of the waste stream into which they are discarded and the management options available to reuse or recover the materials. Designing for longevity can take various forms. At the product level this could be design for physical durability, for example the robustness of a product. Demonstrating the longevity of a product include calls for a standard attached to, for example, white goods or electronics which gives a clear indication of the durability of the product. At present there is little correlation between price and quality of a product; there is a belief that 'you get what you pay for' and therefore higher priced goods have greater longevity, however this assumption is not supported in reality²⁸. In a period of economic depression increased robustness and durability of a product demanded by consumers may provide a market edge ensuring that longevity becomes an attractive design element. Addressing obsolescence through design for emotional durability is slightly more complex, as the intention is to generate product attachment and therefore there is less inclination to view the product as disposable. This is challenging if the product is fashion based or subject to technological advancements. On a social level the complexity extends even further and could be designing for 'system innovation', which is changing the world behind the product²⁹!

The role of reduced **energy consumption** as a driver in product development for resource efficiency should also not be underestimated. The benefits here are twofold for both manufacturers and consumers, namely the reduction of energy used in product manufacture as a result of design changes, and the reduction of energy in the use of the product itself. Examples are increasingly noteworthy, and include the Wal-mart initiative³⁰ to drive resource and energy efficiency through their own supply chain using a packaging scorecard³¹ to balance a series of metrics against which reductions in the environmental

²⁷ Tim Cooper, Professor of Sustainable Design and Consumption, Nottingham Trent University 'Slow down London', September 7th 2010; paper presented at Symposium Series Made Today Gone Tomorrow

²⁸ Boyle, P. J. & Lathrop, E. S. (2008), Perceptions of product longevity: will it keep going and going.....? Journal of Customer Behaviour, Vol. 7, No. 3, September, p. 201-213

²⁹ Tim Cooper, Professor of Sustainable Design and Consumption, Nottingham Trent University, *Slow down Londo*', paper presented at **Made today, gone tomorrow?** 7 Sept 2010

³⁰ <http://walmartstores.com/pressroom/news/6039.aspx>

³¹ Wal-mart Packaging Scorecard: As part of Wal-Mart's commitment to reducing waste in packaging, with a target of a five percent reduction in packaging by 2013, their packaging scorecard is a measurement tool that allows suppliers to evaluate themselves relative to other suppliers, based on specific metrics: 15% will be based on GHG / CO2 per ton of Production;

impact of their packaging will be measured as they aim to meet a target of an overall reduction in 5% of packaging used by the retailer by 2013.

Big brand names are leading the way in **packaging innovation**, aimed at meeting consumer needs, reducing costs and also addressing environmental impacts (such as energy use in the manufacture and distribution of a product or utilising a different raw material). Heinz has launched a 1kg plastic container for its baked beans that is designed to keep the contents fresh for five days after opening. The new style of container is aimed at families who often eat at different times of the day and is equivalent in size to two and a half traditional cans. The new innovation is not designed to replace the traditional can, but is a brand extension aimed to widen the market appeal and respond to the needs of a particular section of consumers³². It is an innovative redesign which in meeting the needs of the less traditional family structures could result in less food waste being generated by placing the consumer in charge of portion control. Heinz is no stranger to redesign having launched the plastic 'top down bottle' for its sauces and more recently switching to clear PET bottles, decreasing the weight of the packaging once again and allowing the consumer to see how much sauce is left in the bottle³³.

Other iconic brands have adopted innovative design solutions to improve their product use by the consumer. Lyle's Golden Syrup led the way in 2002 launching a new style of squeezable plastic container and Marmite, which had been sold in glass jars since the 1920's (to replace the original earthenware container), introduced squeezable plastic jars in 2006³⁴.

One brand that is using its redesign to promote its sustainable credentials is Kenco which recently launched its eco refill packs, purported to use 97% less packaging weight per gram of coffee compared to 200g and 100g jars³⁵. In a further spin on the redesign, empty packs,

15% will be based on Material Value; 15% will be based on Product / Package Ratio; 15% will be based on Cube Utilization; 10% will be based on Transportation; 10% will be based on Recycled Content; 10% will be based on Recovery Value; 5% will be based on Renewable Energy; 5% will be based on Innovation. Suppliers receive scores in each category as well as an overall score relative to other supplies allowing them to determine how their packaging innovations, environmental standards, energy-efficiencies and use of materials measured against those of their peers.

<http://walmartstores.com/pressroom/news/6039.aspx>

According to Wal-Mart, its packaging scorecard contains information for about 90% of the items carried in Sam's Club and 300,000 items carried in Wal-Mart stores.

Figures on energy and material savings as a result of the scorecard initiative

(http://www.associatedcontent.com/article/2614159/the_effects_of_walmarts_packaging_scorecard.html):

transition of all liquid laundry detergents to concentrated versions - saving more than 125 million pounds of cardboard, 95 million pounds of plastics and 400 million gallons of water; Apple I-pods changed to 100% renewable, recyclable and more sustainable packaging materials; reducing the packaging size of its Kid Connection line of toys - saved over \$2.4 million in freight costs; apple juice (sold under Member's Mark label at Sam's Club) uses 35% renewable energy in producing half the corrugated box packaging, and 50% of that corrugated packaging is from 100% recycled corrugated; All of Wal-Mart's cut fruit and 40-oz. vegetable trays and some of the 9-oz. trays are packaged with NatureWorks PLA, a biodegradable polymer - by making that change to PLA in 2005 on just four produce items, they saved about 800,000 gallons of gasoline and avoided more than 11 million pounds of greenhouse gas emissions.

³² Packagingnews.co.uk (July 2010): <http://www.packagingnews.co.uk/markets/food/heinz-launches-1kg-resealable-beanz-container/>

³³ <http://www.heinz.co.uk/ourcompany/sustainability/heinzandtheenvironment>

³⁴ http://www.just-food.com/news/just-the-facts-iconic-uk-food-brands_id111605.aspx

³⁵ <http://www.kenco.co.uk/kenco2/page?siteid=kenco2-prd&locale=uken1&PageRef=649;>

<http://www.marketingweek.co.uk/kenco-launches-reduced-packaging-initiative/3004971.article>

which are not yet recyclable within the normal household waste service, can be sent by Freepost to TerraCycle³⁶ who will transform it into useful items (such as shopping bags) and for every pack sent it 2p is given to the customers' chosen charity. As of August 2010 4.5 million packs of the refill, equating to 49 tonnes of pre- and post-consumer waste, were collected by TerraCycle³⁷. In product terms this is equivalent to over 1600 tonnes of glass which no longer requires management.

Plastic is not the only focus of packaging innovation. Walkers, the PepsiCo owned crisp manufacturers, are investigating ways to make greener packaging as part of the Carbon Trust's Carbon Reduction Label initiative and are looking into the viability of using potato peelings for its crisp bags. The company has already created crisp bags from cellulose from wood pulp but are hoping to make packets out of peelings within the next 18 months³⁸.

These are just a few examples of the many ways that products are evolving in response to economic, environmental and consumer demands. The impact on waste management can be significant in terms of composition and quantity of waste to be managed and the viability of options for the recycling, recovery and treatment of post consumer material streams. In some situations, these developments may have the potential to fundamentally affect the availability of material from the supply chain and seriously disrupt some previously symbiotic relationships with stable supply chains of material. A current developing example³⁹ is the demand for biomass for energy generation (subsidised by Renewable Obligation Certificates and possibly from Feed In Tariffs) which is leaving chipboard manufacturers and animal bedding makers concerned about the diminution of their material supply of clean waste wood and unhappy with the energy subsidies that leave them uncompetitive. It is a classic example of the unintended consequences on one industry of a policy that benefits another.

Key messages

It is clear that again (as per section 2.1) the nature of the material resource requiring management post consumer use may change significantly as products change in their appearance, composition and their durability. The anticipated changes, the likelihood of those changes in terms of the driving force and what this could actually mean from a waste management perspective can be seen in Table 2. Potential business opportunities that this change may represent are also considered.

³⁶ www.terracycle.co.uk

³⁷ Brooks, J, August 6 2010 'Flying start as Kenco recycler collects 4.5m packs in 10 months' <http://www.packagingnews.co.uk/news/environment/flying-start-as-kenco-recycler-collects-4-5m-packs-in-10-months/>

³⁸ Philip Chadwick 'Walkers looks into using potato peelings for packets', October 11, 2010 <http://www.packagingnews.co.uk/uncategorized/walkers-looks-into-using-potato-peelings-for-packets/>

³⁹ Biomass plants threaten UK wood panel industry, campaign says, 28 June 2010, <http://www.greenwisebusiness.co.uk/news/biomass-plants-threaten-uk-wood-panel-industry-campaign-says-1578.aspx>, see also the Make Wood Work campaign by the Wood Panel Industries Federation <http://www.wpif.org.uk/>

Table 2: Products - Horizon Scanning the Potential Changes and their Impacts

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
Designing out waste	<p>There is some activity by leading brands in this area, and high profile programmes are currently underway within the retail sector such as Courtald⁴⁰. However there has been limited overall impact to date. It may be necessary to rely on policy intervention for this to become a realisation.</p> <p>All members of the resource chain are critical as designing out waste needs to occur from raw material use through to post consumer management of materials in a complete lifecycle approach.</p>	<p>There is the potential for a significant impact on the overall tonnage from the householder requiring management and also the actual materials available for recycling which will impact upon the viability and appropriateness of collection systems in place and also, depending upon the metric in use, the achievements in terms of performance. There may be a reduction in composite materials and a move away from carbon intensive materials.</p>	<p>Potential for collaboration between leading brands and manufacturers in the NW, designers and universities on product design development which may bring investment into the local area and potential longer term business opportunities.</p>
Longevity of products	<p>The economic climate will continue to stimulate some consumers to make more demands in relation to the robustness and durability of products, but this is in context of what may be a polarisations in the market place between low price/short lifespan consumer markets (e.g. clothing) and emergence of a market for renting or leasing high value products.</p> <p>Producers will need to respond to maintain a positive market position. Uncertainty lies in how to prove or demonstrate longevity at the point of sale in a manner that consumers will</p>	<p>Addressing obsolescence in products will potentially delay their entry into 'waste stream' – if they are more durable consumers will not need to replace them as often and/or their reuse potential (or second hand sale value) will increase. This will have an impact on both the composition of the waste stream and also the quantity of the waste stream which in turn will impact upon the infrastructure required for collection, recovery and treatment.</p>	<p>There is the potential opportunity for market development of repair centres at sub regional level. The profitability of such ventures does rely to a certain extent on the market share of products with built in longevity.</p>

⁴⁰ ⁴⁰ http://www.wrap.org.uk/media_centre/press_releases/one_million_tonnes.html

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
	<p>believe.</p> <p>Designers will be key in terms of addressing issues of obsolescence.</p> <p>Retailers will need to focus on the sale of products with greater longevity and place demand back along the supply chain for these products to be developed (largely in response to consumer demand).</p>		
<p>Packaging innovations</p>	<p>Leading brands are already showing the way in terms of packaging innovation – others will therefore follow. It is very likely that innovations will continue as designers, manufacturers and retailers seek out the most appropriate and cost effective packaging for their product which meets the needs of the consumer.</p>	<p>The composition of materials presented for collection by the householder may change significantly, with an increase in plastics and a decrease in glass and other materials. Progress will need to have continued in terms of closed loop systems for plastics or the recyclability of the waste stream will be affected. The weight of material requiring management may continue to decrease but there may continue to be increases in volume.</p> <p>Food waste may have decreased as a result of packaging innovations which will need to be accounted for when projecting the long term viability of separate food waste collections.</p>	<p>Potential for collaboration between leading brands and manufacturers in the NW, designers and universities on product design development.</p>

2.3 People

Consumerism has been a wonderful model, I would suggest, for growing up economies in the 20th Century. Is that model still fit for purpose in the 21st Century where resource shortage is our biggest challenge?

Sir David King, *Can British Science Rise to our Biggest Challenges of the 21st Century*, British Humanist Association Darwin Day Lecture 2009.

Much debate has taken place about the role of people – not just as consumers, but as citizens – in the future development of resource management. Today's reality is that, largely, the role material goods play in our lives is significant and is linked to a wide range of issues including status, identity, and belonging. A combination of easily accessible products and, up until the present time, economic stability have supported unsustainable buying habits and over-consumption has led to the purchase of a large number of unused products. This is largely as a result of low cost and impulse buying, intentions of self improvement which are not followed through or cannot be delivered by the product, and difficulties in product use and maintenance which has led to items being unused (examples include kitchen gadgets such as juicers)⁴¹.

Challenges to breaking the cycle of over consumption are numerous. It is in Governments' and businesses best interests in economic terms if people continue to consume; increase in GDP is a measure of success and businesses are profit driven to meet the demands of their share holders. Globalisation and availability of cheaper goods which tend to be of lower durability are being produced to meet demands and the quality is often too poor for reuse, encouraging further consumption. A change in lifestyle would require a cultural shift, and although clearly GDP can continue to grow in a service based economy with greater resource efficiency there is an underlying longer term issue about per capita levels of consumption in the UK and other Western countries in relation to the growing demands of the developing and industrialising world and the ever growing global population. Different approaches to measure human prosperity are being considered with the Government introducing the concept of the 'happiness index'.

The implication here is that there is a clear need to change social norms towards a **less resource consumption focused** way of life. How open and receptive people are to change and whether people feel it's their responsibility to change does depend upon a number of factors. Research by the Future Foundation has shown a mix of confusion and ignorance about specific issues attributed to broad generic terms such as Environment, Climate Change etc. Therefore informing and raising awareness is not straightforward; messages have to be clear and simply stated, even though they are about relatively complex and interlinking issues. This is not always easy from a marketing perspective. In terms of consumer awareness Future Foundation found that 70% of consumers surveyed agreed that there should be more information available on the environmental impacts of products they

⁴¹ Angela Druckman *Resources and Society*, paper presented at **Made today, gone tomorrow?** 7 Sept 2010.

buy⁴². The kind of **labelling** which may emerge could include carbon indicators, durability indicator, ecological footprint rates, direct labelling, and more ethical 'fair trade' branding. However the problem with labelling is that is often related to complex data which can be difficult to understand. Choice editing, taking the decision away from the consumer, may be a solution.

Some retailers, such as Marks and Spencer (M&S) with Plan A, have adopted **choice editing**, taking responsibility away from the consumer and placing it with the retailer to make complex choices in relation to carbon footprint, excessive packaging, and ethical purchasing; although in-store and external communications do explain many of these choices and changes in ways that engage the customer. Other retailers are leaving the decisions with the consumer believing choice editing is not their call to make however it can be argued that consumers do not have the necessarily knowledge and information to make informed decisions⁴³. **Ethical purchasing** is considered to be 3 – 5% of market share but the feeling is that it may be possible to reach around 7 – 10% in the next few years⁴⁴. However at this level it will have little or no impact on mainstream consumerism and is more tokenistic. Therefore this may support the argument that choice editing (and potentially through policy intervention rather than voluntary agreements) is the only way to make a significant impact.

Future Foundation found recently that **cost efficiency** currently appears to be a major driver for behaviour change in terms of consumption. As a result of the current economic downturn, commonly cited changes in behaviour include buying fewer clothes, wasting less food, keeping goods for longer and buying more second hand items⁴⁵.

The economic downturn is considered to be at the root of a return to more **traditional values and practices**. Sales of sewing machines significantly increased in 2009; Tesco experienced a 198% increase compared to 2008 and sales of Argos's cheapest model rose by 500%, while the more traditional brand Singer and Brother models were also up by 50%⁴⁶. This increase in sewing skills and making clothes has been referred to as the "slow clothes" movement - the term used to describe the backlash against disposable fashion, in favour of hand-made or reinvented, vintage clothes.

An increase in the sale of lunch boxes has been seen with Thermos experiencing a 30% increase in sales in 2008 and the retailer Robert Dyas experiencing a 68% rise in sales of lunch boxes, year on year⁴⁷. This shift towards home made lunches could also have a beneficial effect on the amount of food wasted. A survey commissioned by WRAP, as part of its *Love Food Hate Waste* campaign, revealed that British workers spend £5.5bn on shop-bought lunches each year, whilst leaving the same amount of food to go off at home.

⁴² Michael Tully, Future Foundation, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

⁴³ Leo Hickman, *Does the Consumer Really Know Best*, Guardian 25 October 2007

⁴⁴ Andrew Purvis, *Choice: the curse of the green consumer*, Green Futures magazine, Forum for the Future, July 2006.

⁴⁵ Michael Tully, Future Foundation, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

⁴⁶ Marcus Dunk, 17th August 2009, Mail Online 'Sewing Machines make a Comeback as Sales Soar'
<http://www.dailymail.co.uk/femail/article-1207034/Sewing-machines-make-comeback-sales-soar-500.html>

⁴⁷ Rachel Shields, Independent, 9th November 2008, 'Hurrah for the credit munch',
<http://www.independent.co.uk/life-style/food-and-drink/news/hurrah-for-the-credit-munch-1003953.html>

There has also been an increase in vegetable seed purchases with sales reportedly rising by up to 60% on the previous spring figures⁴⁸ as people see the value in 'growing your own'⁴⁹.

The current recession has seen an increase in reuse and trading in '**second hand goods**' and consumers seeking alternative retail models with sites such as Preloved and Freecycle becoming more popular and regular car boot sales becoming the norm in most communities. eBay continues to dominate the online auction sites selling a wide range of second hand and new goods; the site was identified as the most visited website in Shopping and Classifieds category on Boxing Day⁵⁰. Play, Game and Amazon are just a number of online retailers who now devote areas of their sites for second hand sale by individuals.

There are various websites such as www.recyclingforcash.co.uk/ which provide links to a wide range of sites paying cash for household items such as laptops, camera's, phones, games etc.. In addition, www.weeebuy.co.uk has recently launched itself as the UK's first, online multi-product trade-in website that enables users to sell small electronics and gadgets in return for cash or vouchers. M&S has also launched an online WEEE recycling service where customers receive M&S vouchers (or choose to donate all or some of the value to one of M&S's charity partners) in exchange for their mobile phones, digital cameras, laptops, sat-navs, and MP3 players⁵¹. Outlets for mobile phones are numerous, and major retailers such as IKEA are also starting to provide free online platforms to trade their secondhand IKEA furniture. All of these online services directly target the consumer and take products out of the conventional waste stream.

TerraCycle is another business model which uses incentives to directly capture specific products pre and post consumer use. Launched in the UK in September 2009 in a partnership with Kenco owner Kraft Foods⁵² the organisation collects materials from both individuals and companies and pays postage costs for sending in the used packs. Under the scheme, participants collect items including yoghurt pots, pens, coffee packs, coffee discs and baby food pouches and TerraCycle gives money to charity for every item it receives or pays the participants. TerraCycle also collects unusable packaging materials from its partner brands' factories which it 'upcycles' alongside the post-consumer waste to make reusable shopping bags and diaries. At an individual level this is an interesting approach as the traditional collection part of a waste management service is by-passed with individuals separating and posting the used products direct to the reprocessor for recycling.

The increase in trade in second hand goods is not without its consequences however. Charity shops are reported to be losing thousands of pounds a week as people opt for selling their possessions on eBay rather than donating them to charity. There has also been a 5%

⁴⁸ Steven Morris, April 2008, 'Veg Seed Sales Soar as Credit Crunch Bites', <http://www.guardian.co.uk/lifeandstyle/2008/apr/22/foodanddrink.food>

⁴⁹ Paul White, The Social Marketing Practice 'Taking a Lifestyle Approach to Waste Prevention' Workshop Made today, gone tomorrow, 16th September 2010

⁵⁰ Michael Tully, Future Foundation, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

⁵¹ Tiffany Holland, 20 October 2010 'M&S launches WEEE recycling service' <http://www.mrw.co.uk/news/ms-launches-weee-recycling-service/8607103.article>

⁵² Brooks, J, September 21 2009 'Cash-for-packaging recycler launches in UK'

<http://www.packagingnews.co.uk/news/business/cash-for-packaging-recycler-launches-in-uk/>

drop in high quality donations such as designer clothes as their value on the internet trade sites such as eBay has been realised ⁵³.

The current economic climate may also influence consumers to move towards a service rather than a product orientated way of living, providing the opportunities are there and they appear to be cost effective. Some success has been achieved with subscription services such as toy libraries, bike hire and car sharing and there is the potential for this approach to be extended further to IT and entertainment systems for the householder.

As those in Western economies grapple with changes in their own consumption patterns and priorities, there is the possibility that, alongside the shift from product to services just outlined, the technological shift underway (virtual consumption, light-weighting and miniaturisation) which is being embraced will also be directly adopted by developing economies. A repeat could be seen of the 'telephony phenomena' whereby many developing economies have progressed directly to mobile technology before fixed line technology was fully embedded. This could lead to the elimination of a key stage of heavy resource consumption which those in the West went through.

It is an interesting global social dynamic that sees the Western developed nations sometimes struggling with the challenges of sustainably managing their resources and the economic expectations of people, alongside a developing world eager to reach the same levels of security and challenging Western nations about their right to continue to dominate global resource use. As aspirant nations rise up the hierarchy of needs (forcefully described in Maslow's terms in Figure 1⁵⁴) they may embrace the 'telephony phenomena' for other economic needs and desires and avoid some of the environmental impacts the Western cycle went through. This hope is based on enlightened self-interest. However it is also recognised that resource demand will continue to rise therefore efficient use will become more globally critical across all societies.

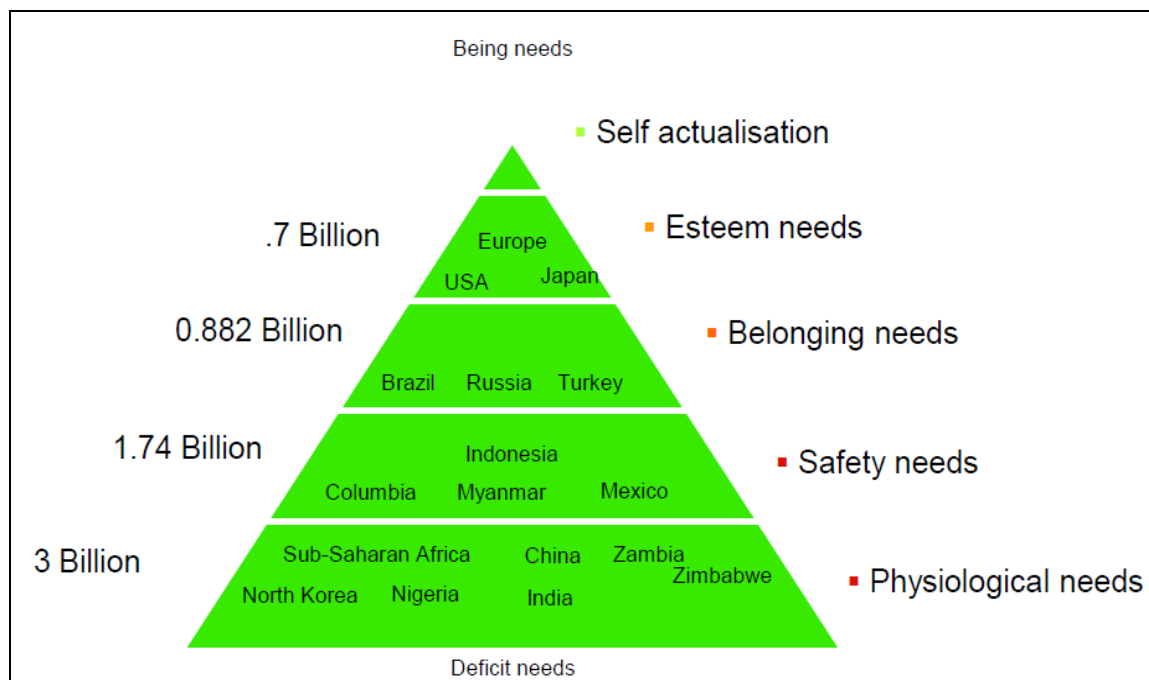
In terms of the response by the consumer, in recent years there have been huge increases in positive support for recycling in the UK, supported largely by improvements in collection schemes and high quality national and local communications campaigns such as Recycle Now, Waste Aware Scotland and Waste Awareness Wales. Yet still the recycling rate is only just progressing towards the 40% mark for municipal waste; a figure which remains behind many of the UK's European neighbours based on the present system of measuring tonnage recycled as the primary means of evaluating progress. This may well change in the future, as carbon emissions reduction is increasingly recognised as a primary factor by which to measure performance. In most instances, the carbon emissions reduction potential broadly mirrors the waste hierarchy⁵⁵ and should encourage greater waste prevention and re-use as well as recycling and recovery of energy as policy is focused on meeting targets for reducing carbon emissions, set initially through the Climate Change Act.

⁵³ Elizabeth Day, August 2004 'Charity shops lose out as second-hand goods go to internet auctions', Telegraph <http://www.telegraph.co.uk/news/uknews/1469435/Charity-shops-lose-out-as-second-hand-goods-go-to-internet-auctions.html>

⁵⁴ Steve Kelsey, PI Global, paper prepared for **Made today, gone tomorrow?** 23 Sept 2010

⁵⁵ WRAP (2010), *Environmental Benefits of Recycling, 2010 Update*, Banbury: WRAP

Figure 1: Global Application and Interpretation of Maslow's Hierarchy of Needs⁵⁶



Therefore, even though there may be a future debate about the **metrics** needed to measure environmental performance there will still be an imperative to boost actions up the waste hierarchy including recycling. This has implications for the need to further improve public engagement and participation and so much remains to be done to reach groups of citizens less inclined to participate in recycling schemes. There is also an ongoing need to refine the myriad of recycling collection methodologies and prioritise those that have clearly demonstrated their effectiveness in terms of quality and volume of material collected, frequency of collection and public participation.

There is also much to do to embed **waste prevention** and **minimisation** into current thinking and practice. If serious efforts to prevent waste at source are initiated as a result of the Revised Waste Framework Directive for example, and this activity is sustained over the next decade, then this could have real consequences for the total flow of waste and resources. This will particularly be the case if the supply chain and Governments, reacting to the imperative of reducing waste, start to restrict some products and materials from entering the waste stream at all. Public engagement with this will be vital, and it has the potential to be a unifying concern and even a rallying cry for valuing resources.

It can be argued that the need for a rallying cry and better public engagement is necessary, as it might be suggested that that the UK has reached something of a plateau on recycling, a fresh impetus for waste prevention and minimisation activity becomes a challenge in which changes in society and economy may be reflected through increased importance of resource efficiency. This emphasis can be influenced by changing public attitudes⁵⁷ in the 'age of

⁵⁶ Reference for diagram as above

⁵⁷ Michael Tully, Future Foundation, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

austerity' – where waste is far less acceptable and where economic strictures and even notions of 'willing frugality' are currently leading to changes in society⁵⁸. These may well be more driven by money and people having smaller incomes rather than through environmental awareness, but that does not mean that their resultant reduced environmental impact is any less worthwhile.

Examples such as the 500% increase in sales of the cheapest sewing machines in Argos last year⁵⁹ and the 60% increase in sales of vegetable seeds (as previously discussed) may seem very specific and perhaps unusual but in fact could be seen as elements of a wider trend we described earlier – that of home food production, support for reuse and the localisation of resource use⁶⁰. **Self-sufficiency** is one way of describing this, and perhaps it is a term that may increasingly come back into favour, regardless of how niche this may turn out to be as it would clearly not be a lifestyle choice for everyone. What it does do though is at least point in a direction which could generate more interest in: waste prevention activities; local re-use and recycling; the current debate about what constitutes the 'Big Society'; a resurgence in community activity; and, interest in waste and resources⁶¹. Increased democratisation of production and consumption can provide sufficiently large market opportunities within which individual lifestyle choice is increasingly viable; the rise of the bespoke product is a good example, whether it is the Persil in-store mixer, individual book printing by Amazon, or the chicken in the back garden. It is an intriguing and increasingly available combination of the technological solution and the local solution.

The extent to which such sophistication in consumer choices becomes a driver for resource efficiency or simply the next set of techniques that drives consumption on is a real debating point. In part it is an allusion back to the challenge of addressing the **Jevons' paradox**⁶² – an economic theory which describes how improvements in resource efficiency are cancelled out by increased consumption⁶³. For example, concerns that the money people save on energy efficiency might simply be spent on more polluting and consuming products and thereby eliminate any benefits. This would be a negative indirect consequence and is perhaps only properly addressed by policies that lead to real net reductions in consumption and consequent carbon emissions without impacting negatively on peoples' quality of life.

Key messages

The current economic climate is having some impact upon consumption habits, although the longevity of this change is unknown. Retailers are starting to take a proactive position in terms of choice editing which is taking the onus away from the consumer. Opportunities for

⁵⁸ <http://www.thesimpledollar.com/2010/08/17/48-things-frugality-has-taught-me/>, also recent interview with Prof Tim Jackson on CNN - <http://edition.cnn.com/2010/OPINION/11/21/jackson.sustainable.economy/>

⁵⁹ Marcus Dunk, 17th August 2009, Mail Online *Sewing Machines make a Comeback as Sales Soar* <http://www.dailymail.co.uk/femail/article-1207034/Sewing-machines-make-comeback-sales-soar-500.html>

⁶⁰ Paul White, The Social Marketing Practice, *Taking a Lifestyle Approach to Waste Prevention* paper presented at **Made today, gone tomorrow?** 16 Sept 2010

⁶¹ Paul Brannigan, Community Recycling Network, paper presented at **Made today, gone tomorrow?** 13 Oct 2010

⁶² Alcott B (2005), Jevons' paradox, *Ecological Economics* 54(2005), pp9-21 on www.blakealcott.org

⁶³ Polimeni J.M., Mayumi K., Giampietro M and Alcott B (2009), *The Myth of Resource Efficiency*, London: Earthscan

gaining value from post consumer goods by consumers themselves is having an effect on more traditional approaches to reuse. The anticipated changes, the likelihood of those changes in terms of the driving force and what this could actually mean from a waste management perspective can be seen in Table 3. Potential business opportunities that the change may represent are also considered.

Table 3: People - Horizon Scanning the Potential Changes and their Impacts

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
Return to traditional values	<p>There is evidence in some sectors that there is a move towards more traditional values but there is the potential for change to be short term. It does depend on the current approach to frugality and austerity leading to a long term cultural shift. This may not happen – as economic stability returns this may also see a return to a more consumption driven approach again.</p> <p>Consumers need to change habits and lifestyles moving away from a resource intensive consumption focused approach and seeking an alternative more frugal way of living. This is in the minority at present but the current recession could normalise this behaviour.</p> <p>Retailers will need to provide opportunities for a different way of living in terms of the products sold. There is the potential for an increase in more ethical/environmental goods.</p> <p>Manufacturers need to change practices to reflect a desire for ethical/environmental goods. There needs to be a use of appropriate labelling to get the right message across. This may only be achieved through policy, setting appropriate standards, and ensuring regulatory systems are in place in relation to labelling to generate consumer confidence in messages being</p>	<p>If consumption levels drop then this will have a clear impact on waste generation in terms of quantity which has a direct effect on infrastructure provision and long term projections in relation to capacity required. However there is the potential that post recession behaviour will revert to consumption driven lifestyles.</p> <p>There is the potential for new products to enter the waste stream if, for example, sewing machines bought in reaction to period of austerity, become a passing fad and are no longer used, or DIY equipment becomes redundant. There will be a delay in the entry of this material potentially as it is traded in the second hand market and then ultimately enters the reuse market and the quantities are difficult to estimate in any one specific area.</p> <p>Food and garden waste may increase as the initial enthusiasm for grow-your-own wanes or vegetable crops fail or too much is produced for a householder to consume. This will impact</p>	Possible revival of SMEs in repair and product re-use, in response to a demand for services of this kind for people who may not embrace the complete 'DIY' approach.

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
	delivered.	upon capacity for managing food and garden waste.	
Choice editing	<p>There is currently a reliance on voluntary agreements or individual retailers to take the lead. This may not be enough, although some leading retailers are developing their business position on how seriously they are taking this. It does require a change management approach within a business or organisation and this can be difficult to achieve on a global marketplace.</p> <p>Retailers need to lead the way with a change management approach and developing a more sustainable pathway for their business model.</p> <p>Manufacturers will respond to demands from the retailer and not manufacture those products which do not fit the environmental/resource/ethical criteria.</p> <p>Policy makers need to put sustainable policies in place so the reliance is not on voluntary agreements if it's considered they do not go far enough.</p>	<p>There is the potential for products with large footprints, high carbon, and high wastage to be edited out of the resource cycle and therefore not enter the waste stream. This could change the composition of waste – the full extent to which is not known (based on current activity it would be minimal) - which will impact upon reuse options, potential recycling value, and appropriateness of treatment and recovery.</p> <p>Choice editing could change the quantity and the volume of waste generated which will impact upon capacity</p>	<p>Potential business opportunities for ethical alternatives and 'home grown' alternatives with low carbon impact.</p>
Financial opportunities for trade in second hand goods	<p>Economics is a strong driver and as more opportunities arise and market themselves effectively for consumers to receive cash for their products more of this material (specifically small WEEE) will be managed in this way.</p> <p>Major retailers are starting to engage in this process and this is set to continue as they team up with reprocessors and refurbishers and seek to tie consumers in with rewards linked to their business. Consumer</p>	<p>There is the potential for a decline in the reuse markets which may impact upon reuse structures in place. There is also a potential impact upon recycling rates as goods are no longer freely available and are retained within the marketplace for trading. Therefore there will be an impact upon composition and quantity of the waste stream.</p>	<p>Localised specialist collection services for valuable electronics products</p>

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
	<p>participation is key.</p> <p>Reprocessors need to put systems in place and effectively market these to consumers and also link up with retailers. Regulation of this market is increasingly being called for as some businesses are not delivering on promises made online.</p>		

2.4 Policy and Strategy

I want this to be the greenest government ever.

Rt Hon David Cameron MP, Prime Minister, 14 May 2010, speaking to civil servants in the Department of Energy and Climate Change

When discussing policy and strategy the challenge in a project like this is to avoid becoming too focused on the immediate policy debate and to try and think beyond current priorities, looking for the longer term and perhaps deeper agenda. Much of this has been highlighted in the course of this research. Although **climate change** is dominating current policy thinking and this continues to evolve and deepen as a global issue⁶⁴, implications of specific issues such as the future influence of **carbon accounting** in determining waste management objectives, **procurement** policies, **resource management**, **business efficiency**, the longer term impact of the **shortage of finance** available for infrastructure (following the banking crisis), and the way that **collection systems** will need to change to reflect changes in product and material content in the resource stream are all policy issues with long-term impact. Collection systems are hard to ignore for other reasons; there is strong evidence⁶⁵ of the influence of design of collection systems on how material is presented both in quality and

⁶⁴ Climate change: The debate is no longer one of whether climate change is happening, but how policy makers on an international, national and local level will respond to disasters and catastrophes now being attributed to climate change and how any action taken to address climate change will translate on the ground in terms of resource management. In 2009 there were reports of some of the first climate change conflicts with tribes in Nairobi fighting over scarce resources, in particular water; scarcity which has been attributed directly to the effects of climate change. Used to coping with droughts in cycles of 10 years, tribesmen have to cope with depressed rainfall every other year leading to significant shortages of water. Conflicts have arisen over how these scarce resources are being managed – see Preeti Jha, *The First Climate Change Conflicts*, The Guardian, Monday 23 November 2009.

⁶⁵ Dr Julian Parfitt, *Resource Futures, Household waste composition, arisings and collection systems: exploring the dynamics*, paper presented at **Made today, gone tomorrow?** 16 Sept 2010

volume, and this is worthy of greater study as part of determining future infrastructure needs and shaping future policy, as it is clear that the systems put in place to manage wastes do influence behaviour. It is also clear that waste policy factors, such as free garden waste collections and provision of wheeled bins, have been a significant influence on household waste arisings. The greatest impact in terms of collection policies has been Alternate Weekly Collection (of refuse and recycling) and charged garden waste collection in terms of reductions in residual waste. Collection policies of the future will be driven by the challenge of retaining as much material resource of 'value' post consumer use, rather than be embedded in more traditional waste policies focused on service provision and targets. However, based on previous experience, the design, scope and delivery of collection policies should not be underestimated in terms of their role and influence on the resource chain, particularly with respect to behaviour at the household level.

Other contemporary policy changes may well prove to have long-term impacts, although it is not unreasonable to say that it is too early to tell, for example – the emergence of '**localism**' as a driver for local government decision making, the articulation of the '**Big Society**' and what impact that may have on how communities are engaged with local services and waste infrastructure developments. Although in recent years a partial withdrawal by the community sector from mainstream kerbside recycling collections has been seen with a greater focus of running reuse projects. The sector in a recent survey⁶⁶ employed over 4,500 staff and had volunteering and training places for over 40,000 people in need of employment support; a significant profile but spread across 700 local community organisations. Despite the constraints of public spending, it may be that a redefined role for the community sector as a contributor to the Government's 'big society' agenda and also in response to localism may well chime alongside other trends noted in this report – those of local sustainability, local food production and local economic development. It could have the effect of being seen as an alternative infrastructure for waste and resources in a climate where the need for flexible collection systems to manage changes in the material stream combine with limits to the availability of investment reducing the scope to build large-scale treatment plants.

A connected policy issue that also involves communities in engaging with waste and resource issues is the development of the idea of '**community buy-in**'. This is a model of community engagement that recognises the role of communities in shaping waste and resource infrastructure needs for their area. Recent research⁶⁷ for the Associate Parliamentary Sustainable Resource Group (APSRG) identified several ways in which incentives could be used, such as Community Funds and alternative models of community ownership of facilities, to recognise that those communities who become hosts to major resource management facilities should be effectively rewarded. This proposed policy remains the subject of debate and consensus, but it is clearly an option of current interest

⁶⁶ WRAP and REalliance (2009), *Investment for Growth*
http://www.wrap.org.uk/downloads/BTS008_TSO_Investment_for_Growth_Final_Report_2_.e10a3e0c.8148.pdf

⁶⁷ APSRG (2010), *Waste Management Infrastructure – Incentivising Community Buy-In*, London: Policy Connect/APSRG [http://www.policyconnect.org.uk/fckimages/Waste%20Management%20Infrastructure%20-%20Incentivising%20Community%20Buy-In\(1\).pdf](http://www.policyconnect.org.uk/fckimages/Waste%20Management%20Infrastructure%20-%20Incentivising%20Community%20Buy-In(1).pdf)

that has the potential for long-term impact, as it may increasingly become seen as an essential part of the planning and community engagement process for the development of any major new infrastructure.

In a similar vein, potential policy developments in relation to **energy and carbon** also point towards developments that may have a long-term impact on the way waste and resources are viewed and treated. There is growing recognition that tonnage, as a measure of success in driving waste management up the waste hierarchy away from landfill, is perhaps outliving its usefulness as a metric. Leading-edge work on this is being done by the Scottish Government as part of its Zero Waste Plan for Scotland⁶⁸, in which detailed research on a carbon metric for waste is ongoing with a view to setting carbon based targets by 2013 and in the meantime developing the metrics in parallel with tonnage targets for a transition period. It is clear that adoption of carbon-impact based targets for waste could have a significant influence on how some resources are treated. Metals, plastics and paper/card all produce proportionately better carbon benefits, glass about the same, and food/garden waste disproportionately lower carbon benefits compared to tonnage. Of course, this doesn't recognise the importance of the EU Landfill Directive but nevertheless may influence the shape of future collection systems and perhaps drive further the imperative of waste prevention, where carbon benefits will be higher especially for food wastes. The emerging influence of energy policy as a factor in the development of waste and resources policy⁶⁹ is likely to grow in prominence, building on current initiatives such as the Renewables Obligation and Feed In Tariffs, as well as Government incentives for anaerobic digestion based on the generation of renewable energy. Whilst energy and waste policy are far from integrated, there is growing convergence, recognising the carbon reduction / energy saving as well as energy generation benefits from most aspects of resource management above landfill in the waste hierarchy.

Key messages

It is imperative to look at deeper, longer term policy direction and a likely direction of travel towards a low-carbon economy. The anticipated changes, the likelihood of those changes in terms of the driving force and what this could actually mean from a waste management perspective can be seen in Table 4. Potential business opportunities that the change may represent are also considered.

⁶⁸ Scottish Government (2010), *Zero Waste Plan for Scotland*. Annex A, Section 11 - <http://www.scotland.gov.uk/Publications/2010/06/08092645/6> and http://www.letsrecycle.com/do/ecco.py/view_item?listid=37&listcatid=217&listitemid=56702

⁶⁹ Prof Chris Coggins, paper presented at **Made today, gone tomorrow?** 13 Oct 2010

Table 4: Policy & Strategy - Horizon Scanning the Potential Changes and their Impacts

Changes	Driving the Change	Implications for post consumer material management	Opportunities the change may present
Influence of Climate Change Policy	Carbon and climate change remain a significant focus of international and national policy makers , plus an ongoing commitment by current government. There is the potential for a significant influence of policy on use of materials and development of products with a high carbon impact and this has direct consequences along the resource chain. There is also the potential for significant influence of policy on recovery of materials/products to recover embedded carbon/energy.	Carbon reduction and a focus on carbon accounting may specifically draw in waste and resource management which will have a bearing on waste management practices and priorities. This should result in much higher priority to waste prevention and a focus on maximising the carbon reduction benefits from re-use and recycling of key materials.	Development of advice and support on carbon accounting and also waste prevention, including technical and communications professional activity in consultancies, social enterprises and local councils.
Design of collection systems	Changes are highly likely in relation to developments in key export markets for paper and plastics – this may lead to a refocus on local and European markets, quality of materials and carbon footprint. Electronics waste will become more valuable as access to raw materials (rare earth and precious metals) changes.	Possible overcrowding of commercial collection systems for electronics may occur. There may be a need to review the possibility of capture of small WEEE at kerbside as a response to increasing demand for waste products. In addition there may be a need to respond, strategically, to any evaluation of the impact of different collection systems, in terms of acceptability, cost and capture/participation.	Detailed market assessment of economic prospects related to key material streams – paper, plastics, electronics, food- may identify business opportunities for reprocessors at the regional level.
Role of Community buy-in	Major waste infrastructure providers are starting to advocate this policy, and there may be possible development through Decentralisation and Localism Bill Strong and transparent engagement with local communities over waste and resource plans is what is required to lead to development of this change. Consumers need to be willing to accept the incentive.	Possible financial costs attached to community buy-in, may include ongoing revenue costs for some community facilities. Full community engagement in waste reduction and prevention will lead to changes in quantity and composition of waste/resources.	Development of community engagement activities by specialist agencies and businesses.

3. Summary

It is difficult to specify with any degree of certainty the implications for the future management of resources and waste in relation to the issues and trends identified by the specialists and experts involved in the symposium series. However, the overwhelming view was that the consequences of not considering the future are too costly to ignore and, at the very least, key messages and considerations need to be identified and their potential reviewed, if only to ensure that opportunities are not missed.

In terms of the resource chain, many concerns exist about future changes in global supply chains of key resources – food, plastics, oil, precious metals, and rare earth elements all featured strongly in the research. There is the view that some of the immutable global forces and trends (from food shortages to climate change impacts) may well prove to be the real drivers that accelerate resource efficiency rather than it being generated through consensus, political support and heightened environmental awareness. However the speed of change can only be guessed at based on current and predicted external factors such as the economic climate, acknowledgement and recognition of environmental linkages and political pressures and instabilities.

So what does all this mean for those involved in strategically developing waste and resource strategies and those delivering a service to capture, recover and treat materials post consumer use? As far as specific infrastructure implications are concerned, one reasonably immediate impact identified is the likelihood that there will need to be a rapid acceleration of the pace, volume and sophistication of electronic waste collection and recycling/reassembly systems here in the UK and Europe – if only to be able to mitigate the worst effects of enforced material scarcity (provoked by China in particular) and the economic impact that may have. The value of this material stream is set to continue as the demand for the materials in electronic products and services remains strong. Therefore this may also present potential business opportunities (many of which are currently being exploited in niche areas across the UK) at regional level as the prices for the secondary raw materials provide the economic incentive to maximise recovery from the waste stream.

For a range of other material and product issues such as increased mixed plastics volumes, reduced newsprint volumes, issues of quality and export markets there is a general message around the need for collection systems and treatment options to have sufficient flexibility and even modularity to be able to cope with changes in material flow and type. These systems should not become an inflexible barrier to changes in material stream composition and volume that discourages the optimisation of the waste hierarchy in terms of prevention, reuse and recycling. For the same reasons, it should be noted that lower quantities of waste may also result in lower quality and therefore the waste stream may be harder to treat. Also, the concentration of hazardous waste will increase as easier waste streams are removed for reuse, recycling, treatment which again emphasises the likely need for flexibility and modularity in the development of infrastructure.

The influence of energy policy on resources may well lead to greater emphasis on waste prevention, provided that metrics can be agreed that give fair recognition to the carbon reduction potential inherent in waste prevention, as well as the reuse, recycling and recovery of materials. At present, despite the obvious benefits of anaerobic digestion and

composting for the treatment of food and garden wastes in line with the demands of the Landfill Directive, the carbon benefits are much less prominent. This doesn't mean any slowdown in the importance of developing infrastructure for handling this material, more that renewed emphasis is needed on maximising the collection and reprocessing of other materials that give strong carbon benefits – paper/card, plastics and metals. This is likely to remain a key factor influencing the collection and processing of materials for years to come.

Whether what might be seen as extreme possibilities for future infrastructure, such as the mining of old landfills to reclaim resources becomes a mainstream activity, only time will tell. But even as this research is concluded, an initiative and investment in landfill mining in Belgium has just been announced – a 30 year project to reclaim 16.5m tonnes of municipal waste using plasma technology to convert the methane into useable power⁷⁰.

What is clear is that at the heart of the debate is a potential conflict between a traditional 'predict and provide' approach to delivering more (usually large-scale) waste treatment infrastructure to deal with an ever-growing waste problem and an alternative approach that focuses policy interventions on waste prevention, reuse and recycling and tries to place treatment infrastructure in a different context, in which there is no default assumption about the need for certain tonnage capacity of treatment infrastructure⁷¹.

In summary, whilst predicting the future is challenging at best there are a number of key considerations for local policy makers involved in managing post consumer material resources and also a range of potential opportunities which could be exploited on a sub-national and local level. These are as follows:

Key considerations for policy makers

- Increases and decreases of material types entering the waste stream may impact upon existing recycling systems in place, established reprocessing markets, and the recovery potential of the remaining waste stream etc. If tonnage remains the main metric for recycling performance then there may be consequences for recycling targets and their achievability if a significant decrease in specific materials is seen (e.g. the use of electronic media in preference to paper etc.).
- The value of certain materials may increase significantly making their recovery from the waste stream and their reprocessing for resale a priority. However the consumer will continue to be faced with a plethora of opportunities to sell their products containing scarce metals to a range of agents, dealers and reprocessors which could result in a significant proportion of this part of the waste stream by-passing the more traditional collection routes. This would have a direct impact in the composition, and also the quantity of waste requiring management. However there

⁷⁰ <http://www.guardian.co.uk/business/2010/oct/11/energy-industry-landfill>

⁷¹ Dr Dominic Hogg, Eunomia Research and Consulting, *What should the future look like? What ought this to mean for infrastructure?* Paper presented at **Made today, gone tomorrow?** 13 Oct 2010

may still be a need to improve opportunities to recover all electrical items in response to material scarcity and demand for raw materials.

- There is the potential for a reduction in food waste, particularly if behaviours are changed for the long term in terms of wastage. This has implications for food waste collection schemes in place or planned, however food waste is not anticipated to be eliminated *per se* in the next twenty years unless food prices exceed even the highest expectations. Therefore there will still need to be some targeting of this waste stream and if food waste collection is to be implemented careful projections need to be undertaken when considering treatment capacity requirements. There needs to be flexibility to allow for the potential impact of the drivers for change in the short, medium and long term.
- Addressing obsolescence in products will potentially delay their entry into 'waste stream' – if they are more durable, consumers will not need to replace them as often and/or their reuse potential (or second hand sale value) will increase. This will have an impact on both the composition of the waste stream and also the quantity of the waste stream which in turn will impact upon the infrastructure required for collection, recovery and treatment.
- The composition of materials presented for collection by the householder may change significantly, with an increase in plastics and a decrease in glass or other carbon intense materials. Progress will need to continue in terms of closed loop systems for plastics or the recyclability of the waste stream will be affected. The weight of material requiring management may continue to decrease but there may continue to be increases in volume.
- If consumption levels drop then this will have a clear impact on waste generation in terms of quantity which has a direct effect on infrastructure provision and long term projections in relation to capacity required. However there is the potential that post recession behaviour will revert to consumption driven lifestyles.
- There is the potential for new products to enter the waste stream if, for example, sewing machines bought in reaction to period of austerity, become a passing fad and are no longer used, or DIY equipment becomes redundant. There will be a delay in the entry of this material potentially as it is traded in the second hand market and then ultimately enters the reuse market and the quantities are difficult to estimate in any one specific area.
- There is the potential for products with large footprints, high carbon, and high wastage to be edited out of the resource cycle and therefore not enter the waste stream. This could change the composition of waste – the full extent of which is not

known (based on current activity it would be minimal) - which will impact upon reuse options, potential recycling value, and appropriateness of treatment and recovery. Choice editing could change the quantity and the volume of waste generated which will impact upon capacity.

- Increased opportunity for resale of products may impact upon reuse structures in place. There is also a potential impact upon recycling rates if goods are no longer freely available and are retained within the marketplace for trading. Therefore there will be an impact upon composition and quantity of the waste stream.
- Carbon reduction and a focus on carbon accounting may specifically draw in waste and resource management which will have a bearing on waste management practices and priorities. This should result in much higher priority being given to waste prevention and a focus on maximising the carbon reduction benefits from reuse and recycling of key materials. Full community engagement in waste reduction and prevention will lead to changes in quantity and composition of waste/resources.
- Possible overcrowding of commercial collection systems for electronics may occur. There may be a need to review the possibility of capture of small WEEE at kerbside as a response to increasing demand for waste products. In addition there may be a need to respond, strategically, to any evaluation of the impact of different collection systems, in terms of acceptability, cost and capture/participation.
- Possible financial costs may be attached to new policy measures such as community buy-in, and this may include ongoing revenue costs for some community facilities.
- There is a clear need for a flexible approach to collection systems to allow for additions and loss of materials from the waste stream. Overall there is an ongoing need to ensure that systems are fit for purpose to deliver material of the highest quality for resale. This is likely to be a combination of continuous improvement to collection systems and vehicles used for source separation of recyclables and where commingled collection remains an option, further technical improvement in sorting technology at Material Recovery Facilities.

Potential opportunities on a sub-national and local level

- Opportunities may be present in terms of an increase in demand for locally operated closed loop systems for materials such as plastics which are anticipated to increase in volume in the waste stream and as technology improves to facilitate recycling of a wider range of plastics for a wider range of applications and products.
- Clear business opportunities may occur specifically in terms of disassembly, particularly in relation to items containing rare earth elements as the price of these

secondary raw materials is expected to rise in response to material scarcity and political issues prohibiting global trade.

- Business opportunities may occur in terms of food waste collection and processing, with current policy emphasis on anaerobic digestion as a primary method of treatment. Possible changes in type and volume may encourage more flexible, modular and even smaller scale systems for food waste processing linked to localised energy recovery.
- Opportunity for the development of more localised markets to process the higher quality recyclate may occur and the ability to compete more effectively for the recyclate increases if it's a higher quality material.
- There is potential for collaboration between locally based leading brands and manufacturers, designers and universities on product design development which may bring investment into the local area and potential longer term business opportunities.
- There is the potential opportunity for market development of repair centres at sub regional level. The profitability of such ventures does rely to a certain extent on the market share of products with built in longevity.
- There is scope for a possible revival of SMEs involved in repair and product re-use, in response to a demand for services of this kind for people who may not embrace the complete 'DIY' approach.
- There may be potential business opportunities for manufacture and production of local ethical alternatives and 'home grown' alternatives with low carbon impact.
- There may be potential for the development of localised specialist collection services for valuable electronics products.
- There could be scope for the development of advice and support on carbon accounting and also waste prevention, including technical and communications professional activity in consultancies, social enterprises and local councils.
- Detailed market assessment of economic prospects related to key material streams – paper, plastics, electronics, food - may identify business opportunities for reprocessors at the regional level.
- Development of community engagement activities by specialist agencies and businesses.

In conclusion, this research has generated a range of different ideas, opinions, evidence based considerations and identification of challenges which may impact upon decisions being made today with regard to managing the material resource of tomorrow. The research is not designed to produce a definitive set of answers as to what the future may hold and it would be irresponsible to make such claims in the face of such uncertainty. However what it has done is identify a number of key messages which policy makers need to consider when making long term strategic decisions. It has also identified potential opportunities which, although requiring further investigation and consideration, should not be missed. Whilst no one can say with any certainty what the future may hold, it is possible to make a judgement as to the direction of travel the future may take and make sound considerations as to what this may mean for decisions being taken today.

Acknowledgements

MWDA and Envirolink Northwest acknowledge the assistance of Dr Jane Beasley, Ray Georgeson MBE and Vicky Duff of Beasley Associates/RGR - Ray Georgeson Resources in the devising and delivery of this project. We are also grateful to all partners and stakeholders that participated in the symposia and our event chairs Peter Jones OBE (Chair of Envirolink Northwest), Dr Barbara Leach (WRAP), and Dr Julieanna Powell-Turner (Cranfield University). Finally, we are particularly indebted to all the speakers who gave their time and expertise to the process:

Joy Boyce	Fujitsu
Paul Brannigan	Community Recycling Network
Prof Chris Coggins	WamTech
Prof Tim Cooper	Nottingham Trent University
Dr Paul Davidson	Waste and Resources Action Programme
Dr Angela Druckman	University of Surrey
Andrew Hanratty	Veolia Environmental Services
Hannah Hislop	Green Alliance
Dr Dominic Hogg	Enomia Research and Consulting
Steve Kelsey	PI Global
Dr Julian Parfitt	Resource Futures
Michael Tully	Future Foundation
Dr Paul White	Social Marketing Practice
Prof Ian Williams	University of Southampton

This report was produced by Dr Jane Beasley of Beasley Associates Ltd and Ray Georgeson of RGR and edited by Neil Ferris and Stuart Donaldson of Merseyside Waste Disposal Authority and Ian Stephenson of Envirolink Northwest.

November 2010



Appendix 1: Further Information on the Symposia Events

Around 50 invited delegates and representatives from the project partners in MWDA, Envirolink Northwest and the Northwest Regional Development Agency participated in the four events. They represented a broad spectrum of interests and potentially divergent opinions across the waste and resources sector (refer to Table A1).

Table A1: Participants at the Symposia

Name	Organisation
Andrew Hanratty	Veolia Environmental Services
Andy Bond	May Gurney
Dr Angela Druckman	University of Surrey
Barbara Jones	MWDA
Barbara Leach	WRAP
Barry Menzies	Axion
Caroline Herring	Enventure
Chris Coggins	Independent Consultant
Claudia Kuss-Tenzer	Waste Watch
Dominic Hogg	Eunomia
Fiona Gutteridge	Enviros
Frazer Kearney	NWDA
Glynn Stevenson	MWDA
Hannah Hislop	Green Alliance
Ian Stephenson	Envirolink NorthWest
Prof Ian Williams	Southampton University
Dr Jane Beasley	Beasley Associates Ltd
Jeannette Buckle	Veolia
Jeff Cooper	CIWM
John Whittall	Technology Strategy Board
Joy Boyce	Fujitsu
Dr Julian Parfitt	Resource Futures
Dr Julianna Powell-Turner	Cranfield University
Katherine Burden	Envirolink North West
Kevin Considine	EEF
Mark Robinson	Enventure
Matthew Thurman	Enventure
Michael Tully	Future Foundation
Michele Field	Cradle Two
Neil Ferris	MWDA

Name	Organisation
Nigel Naisbitt	Enviros
Dr Paul Davidson	WRAP
Paul Frith	Enviros
Dr Paul White	Social Marketing Practice
Peter Jones	Ecolateral
Peter Selkirk	Egbert H Taylor and Co Ltd
Phillip Ward	WRAP
Ray Georgeson	Ray Georgeson Resources Ltd
Rebecca Colley-Huck	Ynys Resources Ltd
Ruairi Hollyoake	Palm Recycling
Sarah Downes	NWDA
Steve Creed	WRAP
Stuart Donaldson	MWDA
Professor Tim Cooper	Nottingham Trent University
Vicky Duff	Beasley Associates Ltd

Each event was structured with the same with a number of presentations followed by break out sessions for discussion and debate. The presentations for each symposia can be seen in Table A2 and all presentations are available online⁷².

Table A2: Presentations delivered at each Symposia

Symposia	Speaker	Title of Presentation
Future Strategic Direction for Resource Management Chair: Peter Jones OBE, Chair of Envirolink Northwest and independent sector commentator	Prof. Tim Cooper , Centre for Sustainable Consumption, Nottingham Trent University	Slow down, you move too fast: the potential for ending Britain's throwaway culture
	Dr Angela Druckman , Centre for Environmental Strategy, University of Surrey	Resources and Society
	Joy Boyce , Head of Corporate Environmental Affairs, Fujitsu	Scrapheap challenge – future materials, scarcity and the future for manufacturing
	Dr Julian Parfitt , Research and Technical Director, Resource Futures	Food: supply, consumption and waste – future trends and potential for driving up resource efficiency
Future Waste	Michael Tully , Future	War on Waste

⁷² <http://www.beasleyassociates.com/madetoday.html>

Symposia	Speaker	Title of Presentation
Composition Dr Barbara Leach, Head of Evaluation, WRAP	Foundation	
	Paul White , Director, Social Marketing Practice	Taking a Lifestyle Approach to Waste Prevention
	Dr Julian Parfitt , Research and Technical Director, Resource Futures	Composition, capacity and collection – an exploration of the dynamics
	Andrew Hanratty , Veolia Environmental Services	Municipal waste composition – looking ahead and anticipating needs
Future Manufacturing and Production Dr Julieanna Powell-Turner, Head of Environmental Science (SHEF Advisor), Cranfield University Security and Defence	Hannah Hislop , Senior Policy Advisor, Green Alliance	Designing Out Waste: the challenges and opportunities of a resource efficient economy
	Dr Paul Davidson , Head of Sector Specialists, WRAP	Plastics: Sustainability Friend or Foe?
	Steve Kelsey , Partner, PI Group	Future Manufacturing and Product Development- a designers' perspective
	Joy Boyce , Head of Corporate Environmental Affairs, Fujitsu	Electronics and the future – towards demanufacturing and smart capture of scarce resources
Future Infrastructure Peter Jones OBE, Chair of Envirolink Northwest and independent sector commentator	Dr Dominic Hogg , Director, Eunomia Research and Consulting	What <i>Should</i> the Future Look Like and What <i>Ought</i> this to Mean for Infrastructure?
	Professor Chris Coggins , Director, WamTech	An Energy Hierarchy: with particular reference to waste feedstocks contributing to low carbon
	Professor Ian Williams , Waste Management Research Group, University of Southampton	If Today's Waste = Tomorrow's Raw Material, What Infrastructure Will We Need?
	Paul Brannigan , Specialist in Business Development and Coaching to Social Enterprises	The Role of the Community Sector in Supporting Waste and Resource Management Infrastructure; A Forward Looking View

A workshop format using 'tablemats' of key questions was used to frame discussion and debate (refer to A1-8). The essence of the dialogue was constructive challenge and

identification where possible of issues and trends that participants were agreed represented real issues for future consideration.

Figure 1A: Tablemat for Symposia 1 (morning session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management



<p>How achievable is a resource efficient world?</p> <p>Key Drivers:</p> <p>Barriers:</p> <p>Opportunities:</p>	<p>Infrastructure</p> <p>What infrastructure is required to deliver a resource efficient world?</p>
<p>Implications for waste composition</p> <p>What are the waste composition implications for a resource efficient world?</p>	<p>The consumer role</p> <p>What is the role for the consumer? Are we seeing a cultural shift in behaviour? Or should the consumer be attacked?</p> 
	<p>Policy interventions</p> <p>What are the policy interventions arising from resource efficient governance?</p>
	<p>How do we measure resource efficiency?</p> 



Figure A2: Tablemat for Symposia 1 (afternoon session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

The tablemat is divided into two main sections: 'Food Sector' and 'Electronics Sector'. Each section contains a flowchart and a table.

Food Sector: Consider the dynamics between the roles of consumers, producers and retailers, and policy makers in establishing resource efficient practices.

Product	Measure or approach to establishing resource efficiency	Impact on or role of:		
		Consumers	Producers & retailers	Policy makers

Electronics Sector: Consider the dynamics between the roles of consumers, producers and retailers, and policy makers in establishing resource efficient practices.

Product	Measure or approach to establishing resource efficiency	Impact on or role of:		
		Consumers	Producers & retailers	Policy makers

Logos at the bottom include: MIRA, Envirolink Northwest, Northwest, European Commission, and beasley rgr ASSOCIATES LTD.

Figure A3: Tablemat for Symposia 2 (morning session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

The tablemat is divided into two main sections: 'Consumption Focused Lifestyles' and 'Changes in composition'.

Consumption Focused Lifestyles: Is it possible to break the cycle of over consumption, resource use and waste generation? Can we live with less?

Challenges: (current and future)	Opportunities: (current and future)	Impact on waste composition:

Changes in composition: What are the biggest anticipated changes over coming decades in the composition of household waste. Consider environmental, economic, political and technological issues and developments.



Materials increasing in waste stream:	Drivers / reasons for change:
Materials decreasing in waste stream:	Drivers / reasons for change:

Logos at the bottom include: MIRA, Envirolink Northwest, Northwest, European Commission, and beasley rgr ASSOCIATES LTD.

Figure A4: Tablemat for Symposia 2 (afternoon session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

<p>Policy interventions <i>What policy interventions would successfully support waste prevention across the resource chain?</i></p>	<p>Current waste management infrastructure <i>What impact, if any, does the focus on recycling have on consumer behaviour and waste composition?</i></p>
<p>Measurement of waste prevention <i>What are the most effective methods of measuring and crediting waste prevention?</i></p> 	<p>Other tools to bring about change <i>What tools or approaches, not necessarily linked to waste management, have the potential to positively impact upon consumer behaviour and waste composition?</i></p> 












Figure A5: Tablemat for Symposia 3 (morning session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

<p>Tools to bring about change</p> <p>Consumers expectation that companies should offer incentives/inducements to be less wasteful <i>In what stage could these incentives/inducements take? What are the pro's and con's of this approach?</i></p> <p>Greater role for government to provide a policy steer <i>What examples of policy could bring about a shift in production and manufacturing to be more resource efficient? What are the pro's and con's of taking a policy and regulatory approach?</i></p> <p>Industry to steer itself through voluntary agreements <i>How effective are voluntary agreements in bringing about change? What are the pro's and con's of this approach?</i></p>	<p>Use of Sector targets <i>Which sectors provide the greatest opportunity for sector based targets? What are the challenges and opportunities?</i></p> <p><i>What impact could sector targets focussed on resource efficiency have on waste composition and waste management infrastructure?</i></p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------












Figure A6: Tablemat for Symposia 3 (afternoon session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

<p>Consumer awareness and information provision</p> <p><i>Future Foundation found that 70% of respondents agreed that there should be more information available on the environmental aspects of products they buy (2006). In addition they found that high levels of eco concern mean that consumers are increasingly demanding of the brands and companies that they deal with on an every day basis.</i></p> <p>What environmental information (if any) can we expect to see on products in the short, medium and long term and what will be the priority focus?</p> <p>What impact (if any) could this have on resource/material use, consumption, waste composition and infrastructure needs?</p>	<p>Material flows and resource scarcity</p> <p>What are the most significant challenges in terms of access to resources, resource use, resource flows and management?</p> <p>Which products and manufacturing sectors are most vulnerable to these challenges?</p> <p>What potential impact (if any) could this have on waste generation, composition and management?</p> <p>Product and Manufacturing Innovation</p> <p>What are the current key drivers in product design and innovation? What do you perceive to be the current priorities from a corporate perspective?</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



Figure A7: Tablemat for Symposia 4 (morning session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

<p>Status quo or change</p> <p><i>Existing infrastructure and direction of travel versus new approach and systems</i></p> <p>Will the current waste infrastructure (and existing direction of travel in relation to infrastructure development) be fit for purposes and will all opportunities be realised?</p> <p>What, if any, new approaches/systems will be required?</p> <p>Do these new approaches/systems provide a viable vision for the future?</p> <p>What needs to change at local and national level for a new approach/systems to be developed?</p>	<p>Future waste and resource management systems</p> <p>How, and in what way, will changes in waste composition predetermine the need for and the design of future waste and resource management systems and facilities?</p> <p>How, and in what way, will potential 'non waste' policy (environmental, economic/social, social) influence the need for and the design of future waste and resource management systems and facilities?</p> <p>What waste/resource related indicators will local and central government be using in the future to monitor performance, and how will this impact upon systems/approaches to manage resources?</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



Figure A8: Tablemat for Symposia 4 (afternoon session)

Made today, gone tomorrow?

Symposium series on future trends in resource use and management

Recycling and prevention	Public will/acceptance for waste infrastructure
<p><i>What are the roles of government (national and local), industry and the public within a more resource focused infrastructure? Is this different to their current roles and if so how can we effect a change in these roles?</i></p>	<p><i>What could be done to engage the public more effectively?</i></p>
<p><i>What more needs to be done on recycling market development to realise higher recycling levels?</i></p>	<p><i>What about the idea of using 'community gain' to have acceptance/secure planning approval for new infrastructure; is this an acceptable approach? What are the strengths and weaknesses of this approach?</i></p>
<p><i>How far can prevention strategies contribute to minimising the need for infrastructure – are they an alternative infrastructure approach?</i></p>	<p><i>Is there a trade off to be negotiated – almost a 'new covenant' between local government, the industry and the public – between the acceptance of appropriate infrastructure provided appropriate and serious plans for high recycling/prevention are implemented? How could this be developed/negotiated/implemented?</i></p>

