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Waste Reduction

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NOTE:

The Report of the Committee is published in Volume I, HL Paper No 163-I.
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Reference in the text of the Report as follows:

(para) refers to a paragraph in the Report

(Q) refers to a question in oral evidence

(p) refers to a page of written evidence

ABSTRACT

Waste affects every part of society and is not only environmentally damaging but also expensive. Businesses, local authorities, government and members of the public play a part in the creation, management and disposal of waste and it is vital that they all recognise the benefits of reducing waste and the roles they must play in doing this. Whilst much attention has previously been paid to re-use, recycling and waste management, in this report we focus on waste reduction and there is now a need for government and the media to promote the importance of this message.

Whilst designers often have the potential to reduce waste through better design, there is a lack of knowledge on designing for sustainability. Some companies have shown that significant reductions in waste are practical and profitable, but many businesses fail to recognise the costs of their waste, do not factor this into their design briefs and do not understand how to improve production processes. We recommend that the Government should take the lead in working with the Design Council, the Higher Education Funding Council, design schools, industry and professional bodies to ensure that sustainability and an understanding of the costs of waste are embedded into the design curriculum.

There is a need for industry itself to take responsibility in tackling waste. Big businesses can take the lead by demonstrating the profitability of waste reduction measures and demanding good practice from their suppliers. In order to promote waste reduction simple methodologies should be developed to allow businesses to analyse the lifetime implications of the materials, products or services they produce. Small businesses in particular often lack the understanding, motivation or resources to develop waste reduction measures so clear guidance, knowledge transfer and leadership within the business community is therefore needed. Local authorities can provide vital support to businesses and we believe that the Government should restructure the waste targets and costs imposed upon local authorities to allow them to address commercial and industrial waste. Furthermore, a proportion of the landfill tax revenue should be ring-fenced to fund business support bodies which promote waste reduction.

The legal status of waste materials and the restrictions placed upon them have previously posed a barrier to their effective re-use, but we hope that a revision of the Waste Framework Directive will begin to address these problems. The European Commission and Member States must now press ahead with the development of quality criteria to clarify when materials cease to be waste and the UK Government must urgently provide clear information about the timescale for doing this so that industry can plan ahead. Other pieces of legislation can be confusing for businesses and whilst extended producer responsibility regulations may have encouraged greater recycling, it is questionable whether they have promoted waste reduction. We therefore recommend that the Government should work with the European Commission and EU Member States to review the ways in which directives are applied so that they foster real innovation in waste reduction. We also believe that the UK should implement individual producer responsibility for certain products.

To reduce waste permanently we must also tackle the UK's high rate of wasteful consumption, but addressing consumer behaviour will require a combination of education and encouragement. We support the development of eco-labels to provide clear information on products and recommend that this should be backed up by the use of choice editing. We recognise that current markets do not always favour the most sustainable strategies so manufacturers and retailers face a real challenge in trying to promote sustainable consumption alongside successful business models. The Government should therefore work with retailers to accelerate the use of sustainable business models and review the range of policies and incentives that might be required to encourage their implementation. The Government should also take the lead by ensuring that their own performance in reducing waste is exemplary and their procurement policies favour the most sustainable products. Nevertheless, there is only so much that can be achieved by government alone and consumers must also play their part by considering the wastefulness of their behaviours and products they buy.

Although the Government have recognised the need to promote waste reduction, we believe that their policies are undermined by a lack of comprehensive data. We therefore recommend that the Government should arrange for comprehensive surveys to collect data on various waste streams to enable the formation of an overall strategic direction and appropriate policies. The Government should provide clarity on who will be taking the lead in addressing production and consumption within each waste stream and, together with the media, must now send clear and consistent signals to industry, consumers and local authorities that waste reduction is a priority which requires a collaborative approach.

Waste Reduction

CHAPTER 1: INTRODUCTION

Scope

- 1.1. As our society has grown wealthier we have become accustomed to using resources at an ever-increasing rate, without regard for the quantity we waste. In recent years a depletion of resources coupled with the environmental impacts of waste and a decreasing capacity for landfill have prompted governments, businesses and environmental groups to question the amount of waste we generate and the way in which we deal with it. As a society we now recognise that the rate at which we are consuming resources and generating waste is not sustainable. However, most action in the past has focused around the management of waste, with many media campaigns focusing upon the re-use or recycling of waste in the domestic environment. Although many recycling campaigns have been relatively successful at reducing the amount of waste sent to landfill, they do not tackle the root cause of the problem; why is so much waste generated in the first place?
- 1.2. We have therefore set out to examine the first level of the waste hierarchy, waste reduction, although we recognise that this topic cannot be viewed in isolation. The different levels of the waste hierarchy are interconnected, as are the variety of waste streams, so we also discuss some of the downstream difficulties which impact upon waste reduction efforts.
- 1.3. Emotive topics such as local rubbish collections and the availability of public recycling facilities have already received much scrutiny, but despite the large amount of attention paid to it, domestic waste actually only accounts for around nine per cent of the total waste stream in the United Kingdom (UK). We have therefore focused our attention on the ways in which material waste in the industrial, commercial and construction sectors could be reduced and the impact of consumer choice in influencing these sectors.
- 1.4. Waste involves a wide range of players, including producers, retailers, consumers, local authorities and the waste management industry. Throughout this inquiry we have attempted to canvass the opinions of each of these. The general impression we gathered from our witnesses is that businesses and consumers are ready to be led in the area of waste reduction. General awareness of waste and its implications is now high, but knowledge of the practical actions which need to be taken is still lacking. A strong lead from Government is required to tackle this issue and they have taken some positive, if tentative, steps in the right direction. However, a real focus on waste reduction, as opposed to management, is still lacking and there is an urgent need for the Government to send strong signals to industry to demonstrate that this is a subject worthy of attention.

Acknowledgements

- 1.5. The membership of the Sub-Committee is set out in Appendix 1 and the witnesses who provided us with valuable written and oral evidence are listed in Appendix 2. The Call for Evidence originally distributed for the inquiry is

included in Appendix 3. In November 2007 we held a seminar at the Royal Academy of Engineering, to which a number of academics and industry representatives contributed and a note of this seminar can be found in Appendix 4. During our inquiry we undertook visits to two companies within the UK, Xerox and Martin-Baker, and a note of these visits can be found in Appendix 5. Appendix 6 contains a note from our trip to Belgium where we spoke to other companies, Niko, Delhaize and Toyota; as well as the Flanders waste authority, OVAM, the trade organisation, Orgalime, and the Environment Directorate-General of the European Commission. We would like to thank very warmly all these people who have assisted us in our work.

- 1.6. At the beginning of 2008 the Lord Speaker's office ran a competition, in conjunction with the Hansard Society, which invited school children to submit their thoughts about waste and the environment. In June the Sub-Committee met the winners of the competition who presented their entries and discussed their ideas for reducing waste. We would like to thank all those children who provided such innovative and thought-provoking presentations and whose comments provided a useful insight into the views of the younger generation.
- 1.7. We would also like to express our gratitude to our Specialist Adviser, Professor Stephen Evans, whose expertise and guidance has been invaluable throughout the inquiry. However, we stress that the conclusions we draw and recommendations we make are ours alone.

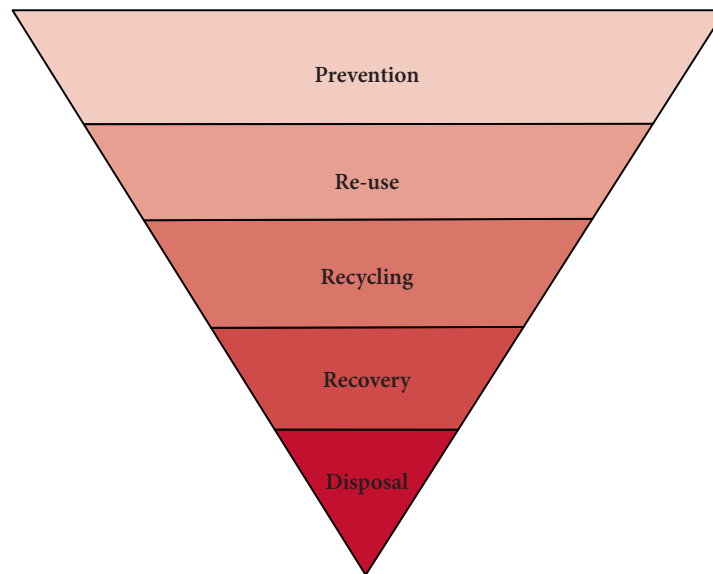
CHAPTER 2: WASTE IN CONTEXT

The waste hierarchy and the complexities of waste reduction

- 2.1. The Waste Framework Directive defines waste as any substance or object which the holder discards or intends or is required to discard.¹ This definition, originally developed in 1975, has in practice been further negotiated through case law at both a national and European level. Once the waste label has been applied to certain materials, strict criteria must be met and permits obtained in order to transport, store and re-use them. The status of materials classified as waste, and the point at which the “waste” label ceases to apply, was a cause of much concern amongst our witnesses. EEF, the manufacturers’ organisation, claimed that “the current regulatory framework presents a barrier to greater resource efficiency, where a material cannot be re-used simply because it is classified as a ‘waste,’ due to strict interpretation of EU law” (p 116). A recent revision of the Waste Framework Directive has therefore attempted to address these problems (something which we explore further in chapter four).
- 2.2. The production, management and disposal of waste is often described by reference to a so-called “waste hierarchy.” This abstract hierarchy can vary in its detail, but usually contains around five different categories: waste prevention, re-use, recycling, energy recovery and disposal (see Figure 1). Broadly speaking, this categorisation places the five different phases of waste management into their order of importance and signifies the relative environmental gains that can be made at each stage. In general terms, the hierarchy argues that most waste could and should be prevented, so that the need for other options, such as re-use, recycling and energy recovery would be dramatically reduced. Thus it is argued, if our society was to implement the hierarchy effectively, a far smaller amount of waste would need to be disposed of after all the previous stages had been put into practice.

¹ This definition applies to any substance or object that falls within the categories set out in the Directive of the European Parliament and of the Council on waste, 2006/12/EC. (The revised version as agreed by the Council and the European Parliament, 2008/.../EC, has yet to be published in the Official Journal).

FIGURE 1
The Waste Hierarchy



Waste prevention refers to any activity which avoids the creation of waste. This can be achieved through the use of better design, improvements to manufacturing processes, or by influencing consumption patterns. Waste prevention sits at the top of the hierarchy and offers the greatest environmental gains.

At the next level, once items have been used some products and materials can be re-used, either for the same or a different purpose.

The third level of the hierarchy is recycling which entails bringing materials from a product back into use. It is important to distinguish between recycling, in which the material is re-used in a form which has equal properties to its original form, and down-cycling, in which the material's properties are reduced and the material cannot be used in its original application.

At the next level of the hierarchy, recovery, value can also be recovered by generating energy from waste materials.

Finally, if none of the above options can be employed, waste should be disposed of.

2.3. Taking a wider view, some suggest that we should be aiming for a sustainable society in which no amount of waste is acceptable. One of the most often cited definitions of sustainability was first coined in 1987 by the World Commission on Environment and Development (the Brundtland Commission). This defined sustainable development as:

“development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”²

2.4. In a more recent report, Green Alliance and the Institute for Public Policy Research put forward the concept of a “zero waste” society.³ Green Alliance explained that in a closed-loop society, “it may not matter how many products are in circulation, how much resource they use, or how long they last, provided materials are not lost from the system, and manufacturing, use and reprocessing, are driven by renewable energy.” This would entail the use of simpler materials used in fewer combinations, with composites having to be phased out. As they described it, “at the end of a product’s life, its constituent material would be easily recovered and new product made using the same materials. Where new materials were developed, the feedstock for the new material would be taken from material recovered from discarded

² See http://www.unngocsd.org/CSD_Definitions%20SD.htm.

³ Green Alliance and the Institute for Public Policy Research, *A Zero Waste UK*, 2006.

products” (pp 282, 310). This idealistic vision for the future may seem appealing, but it is arguable whether such an extreme view of sustainability can ever be attained. Professor Mike Ashby from the University of Cambridge noted that since the industrial revolution our dependence on non-renewable materials has increased rapidly and we are now consuming ever greater quantities of fossil fuels and man-made polymers.⁴ As the world’s population grows and living standards increase, it is likely that more and more of the world’s resources will be used at an ever-increasing rate.

- 2.5. Green Alliance admitted that the notion of a zero waste society was probably “physically and politically unobtainable.” Nevertheless, they argued that the idealistic concept could still provide a valuable aspiration to work towards and could contribute to changing attitudes. Ms Julie Hill, an Associate of Green Alliance, said that it was crucial for people to buy into such a vision because “if one had that political will and had business buy-in, I do not think human ingenuity or business ingenuity is any kind of constraint” (Q 546).
- 2.6. Whatever the analysis used, waste prevention should be the ultimate goal for any government, business or individual and approaches to waste have begun to change accordingly in recent years. Attention is gradually moving away from the management of waste towards a more holistic and sustainable approach. As part of this, much emphasis is now placed upon assessing the environmental impacts of materials and products throughout their entire lifetimes. These could include the raw materials used, the energy involved in the production, transportation, maintenance or use of a product, or the types of chemicals or by-products emitted throughout its life. With regard to waste, a complete life-cycle assessment (LCA) of a product would examine the amounts and types of waste resulting from the initial extraction and production of its materials, the wastage during its manufacture or transportation and the use of the finished product at the end of its life. As we explore in chapter four, full LCAs are, in practice, extremely difficult to calculate.

The scale of the problem and data collection

- 2.7. In 2007, the Department for Environment, Food and Rural Affairs (Defra) published its *Waste Strategy for England*.⁵ This identified that England alone produces around 272 million tonnes of waste per annum, a figure which is continually increasing. Despite the large amount of media attention paid to domestic waste, only nine per cent of this total arises from households, with the majority of the waste arising from demolition and construction (32 per cent), mining and quarrying (30 per cent), industrial (13 per cent) and commercial (11 per cent) sectors. Small amounts of waste also arise from dredged material (five per cent) or agriculture and sewage sludge (both less than one per cent).⁶
- 2.8. However, these percentages were calculated using a number of different sources and there appears to be a lack of comprehensive data on the variety of waste streams in the UK. Ms Jane Bickerstaffe, Director of the Industry Council for Packaging and the Environment (INCPEN), told us that the

⁴ See note from the seminar, Appendix 4.

⁵ Department for Environment, Food and Rural Affairs, *Waste Strategy for England 2007*. (Hereafter referred to as *Defra Waste Strategy*).

⁶ *Ibid.*, *Defra Waste Strategy*, pp 24–25.

National Household Waste Analysis programme used to systematically assess waste from “a large selection of local authorities” providing a comprehensive assessment of waste over “different times of the year.” She did not know why the programme had stopped; her impression was that “the Government at the time just decided that they no longer needed it.” She added that “there has never been the equivalent sort of analysis of commercial and industrial waste streams. Frankly, the data we have today has gone backwards from those days. We still do not have good data on industrial and commercial waste and we have less good data on household waste” (Q 520). Mr Chris Sexton, Head of Engineering at Laing O’Rourke said that for the construction industry, “hitherto the data has been weak and ... looking backwards the picture is slightly opaque” (Q 789). In terms of the amount of waste created by individual products or waste streams in the construction industry, Mr Gilli Hobbs, Director of Resource Efficiency at the Building Research Establishment (BRE), added that “we do not know what the wastage rate is overall because nobody has ever undertaken those sorts of studies” (Q 749).

- 2.9. When questioned about the lack of data Ms Joan Ruddock MP, Parliamentary Under Secretary of State at Defra, conceded that “we have got gaps” but rather than attempting to “try to plug all those gaps” the Government had decided to focus on priority waste streams, such as food waste, and then “work on the reduction of waste within that particular waste stream” (Q 817). Mr Malcolm Wicks MP, Minister of State for Energy at the Department for Business, Enterprise and Regulatory Reform (BERR) recognised that it was important to gather data on commercial and industrial waste and told us that studies were underway by Defra and BERR “to examine what new data is really needed to support our policy objectives” (Q 819). Concurring, Ms Ruddock admitted that “we are not so confident about our statistics in the commercial and industrial sectors as we are in the household sector, and so that is why we want to do some of the plugging of gaps which my colleague has referred to through collaboration between the two departments” (Q 824).
- 2.10. We question whether this approach is the right one. The selection of priority waste streams cannot be judged effectively without substantial data on the whole waste picture.
- 2.11. Ms Ruddock felt that the introduction of a comprehensive data-gathering system was “questionable” because of the cost (Q 817). Currently, data on household waste are collected via Defra’s Waste Data Flow project, which costs around £0.5 million annually and which the Government claim “provides good quality information on a quarterly basis.” The Department of Communities and Local Government also conduct a biennial survey on aggregate construction and demolition waste which cost around £73,500 in 2005. Although comprehensive surveys on commercial and industrial waste are no longer carried out, a previous survey conducted by the Environment Agency had cost around £3 million in 2002–03 (p 418).
- 2.12. The Government’s Waste Data Strategy aims to collect data on all waste “by utilising administrative data sources” such as returns from waste facility operators, rather than directly surveying businesses. By incorporating such information with data from the Waste Data Flow project and Environment Agency systems, they claimed that the strategy saved around £1–1.2 million per annum for respondents and central government in comparison to

conducting surveys. They felt that this figure could be “broadly seen as the possible cost of moving back to a survey-based data collection methodology,” but added that this figure did not include the existing cost of collecting municipal waste data and that “there would be additional, unquantified costs for further surveys on other waste streams such as non-aggregate construction and demolition waste and agricultural waste which would be required to give a comprehensive picture based on surveys” (p 418).

Recommendation

- 2.13. **We are not satisfied that the Government are giving a high enough priority to the collection of data on waste. Targets and policies to reduce waste are meaningless if they are not based upon a thorough understanding of the waste streams involved. The amalgamation of administrative data sources may cost less than comprehensive surveys, but saving money in this way is a short-sighted approach to tackling waste. We recommend that the Government arrange for comprehensive surveys to collect data on the various waste streams in the UK thus enabling the formation of an overall strategic direction and policies.**

Waste-related legislation

- 2.14. The European Union has developed a variety of directives which relate to the prevention and management of waste and below we briefly summarise the pieces of legislation which were referenced most frequently during our inquiry.⁷

*Waste Framework Directive (2006/12/EC)*⁸

- 2.15. This directive was originally developed in 1975 and provides the legislative framework for the collection, transport, recovery and disposal of waste. Codified in 2006 and revised in 2008, it requires all EU Member States to take the necessary measures to ensure that waste is treated and disposed of correctly, sets targets for re-use and recycling, and requires Member States to draw up binding national programmes for waste prevention.
- 2.16. These requirements are supplemented by other directives relating to specific waste streams, some of which are described below. Some of these directives involve the concept of extended producer responsibility (EPR), which makes manufacturers, importers and retailers accountable for their products and packaging throughout their lives. In order to encourage businesses to consider the end-of-life impacts of their products at the design stage, EPR directives specify thresholds for the use of hazardous substances in certain products and place obligations on manufacturers and importers to collect and recover their products when they become waste.

⁷ The following information is taken from Government evidence (pp 5–6), <http://www.netregs.gov.uk>, <http://www.environment-agency.gov.uk> and <http://ec.europa.eu/environment/waste/index.htm>.

⁸ The Waste Framework Directive is currently being reviewed and the revised version (2008/.../EC), as agreed by the Council and the European Parliament, has yet to be published in the Official Journal.

Packaging and Packaging Waste Directive (94/62/EC and 2004/12/EC)

- 2.17. The European Community first introduced measures on the management of packaging waste in the early 1980s but these were so vague that diverging national legislation appeared in several Member States. Different countries implemented varying measures and recycling systems which caused problems within the internal market. Economic operators and Member States therefore approached the Commission to introduce comprehensive legislation and, following a prolonged discussion, a Directive on Packaging and Packaging Waste was adopted in 1994. This was subsequently amended in 2004.
- 2.18. Under the Producer Responsibility Obligations (Packaging Waste) Regulations,⁹ businesses which have a turnover of more than £2 million and handle at least 50 tonnes of packaging in a year are obliged to recycle and recover a prescribed proportion of their packaging waste. This includes manufacturers, converters, importers, pack-fillers and retailers. Businesses can either register with their environmental regulator or join a compliance scheme to carry out their obligations, which are based on the amount of packaging handled the previous year. The Packaging (Essential Requirements) Regulations¹⁰ also place a duty on businesses which design, specify, produce, pack, fill or import packaging to limit the weight and volume of packaging to the minimum adequate amount that will protect the product to an acceptable standard whilst maintaining safety and hygiene. They also oblige producers to ensure that their packaging can be recovered or re-used and to ensure that it has a minimal environmental impact after disposal.

End-of-Life Vehicles (ELVs) Directive (2000/53/EC)

- 2.19. In 1997, the European Commission adopted a proposal for a directive which aimed to make vehicle dismantling and recycling more environmentally friendly, set targets for re-use, recycling and recovery and obliged producers to manufacture vehicles with a view to their recyclability. This legislation was officially adopted in 2000. Under the ELVs Regulations¹¹ and ELVs (Producer Responsibility) Regulations,¹² manufacturers and importers of vehicles are required to set up networks of authorised treatment facilities to provide free take-back schemes for their vehicles. At the end of a vehicle's life, the last owner should return it to one of these authorised facilities and receive a Certificate of Destruction. As manufacturers are responsible for ensuring that 85 per cent of the weight of their ELVs is re-used, recycled or recovered, the Government claim that "this direct responsibility encourages manufacturers to make their vehicles easier to treat, dismantle and recycle, and provides an incentive for them to identify internal and external markets for automotive recyclate" (p 5). In order to aid the recovery of materials, the regulations require that components and materials which contain plastics or rubber should be coded. In addition, the regulations also restrict the use of

⁹ S.I.2007/871 (England, Wales and Scotland) and S.R.2007/198 (Northern Ireland), amended by S.I.2008/413 and S.I.2008/1941.

¹⁰ S.I.2003/1941 (United Kingdom) amended by S.I.2006/1492 (United Kingdom).

¹¹ S.I.2003/2635 (United Kingdom) amended by the Environmental Permitting (England and Wales) Regulations S.I.2007/3538.

¹² S.I.2005/263 (United Kingdom).

cadmium, lead, mercury and hexavalent chromium in vehicle materials and components, with the aim of making their treatment and recycling easier.

*Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC)*¹³

- 2.20. The WEEE Regulations¹⁴ require producers of certain categories of electrical and electronic equipment to register with a producer compliance scheme and pay the compliance scheme to dispose of their waste products appropriately, including the treatment, re-use, recovery or recycling of components where necessary. The compliance schemes report to the environmental regulator the amount of equipment every producer has placed onto the market each year and the costs of disposing of WEEE are shared between producers according to their market share.
- 2.21. As part of this system, distributors and retailers of electrical and electronic products must implement a system which allows household users to dispose of their products free of charge, which they can do in one of two ways. The first option is to implement their own in-store take-back scheme, where waste products are taken from customers when they purchase a new item. The second option is to join a distributor take-back scheme which works through a network of designated collection facilities at which consumers can dispose of their WEEE. Retailers must also provide customers with information on the environmental impacts of their products, the reasons for separating WEEE from other waste and how they can correctly dispose of WEEE.

The Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS) Directive (2002/95/EC)

- 2.22. RoHS Regulations¹⁵ restrict the use of lead, cadmium, hexavalent chromium, mercury and two flame retardants, polybrominated biphenyls or polybrominated diphenyl ethers, in electrical and electronic products. Along with the WEEE regulations, the aim is that the RoHS regulations will encourage manufacturers at the design stage to consider what impacts their products might have at the end of their lives.

Eco-design of Energy-using Products (EuP) Directive (2005/32/EC)

- 2.23. The EuP Regulations¹⁶ allow the setting of requirements for designers to consider the energy efficiency and environmental impacts of their products at the design stage. It allows criteria to be set for energy-using products which have a significant volume of trade in the internal market and which demonstrate a clear potential for significant improvements. The Government said that “the Framework Directive does not contain any immediate obligations for manufacturers but will enable detailed implementing measures to be brought forward for specific products over time” and the Market Transformation Programme (MTP) has been involved with

¹³ Amended by Directive 2003/108/EC.

¹⁴ S.I.2006/3289 (United Kingdom) amended by S.I.2007/3454 (United Kingdom). Also relevant are the Waste Management Licensing Regulations 1994 (S.I.1994/1056 United Kingdom) which were amended to insert new licensing arrangements for WEEE by S.I.2006/3315 (England and Wales), S.R.2006/519 (Northern Ireland) and S.S.I.2007/172 (Scotland).

¹⁵ S.I.2006/1463 (United Kingdom).

¹⁶ S.I.2007/2037 (United Kingdom).

European Commission studies to identify the first set of products for such measures (p 6).

Batteries and Accumulators and Waste Batteries and Accumulators Directive (2006/66/EC)

- 2.24. This directive obliges producers to meet the cost of collecting, treating and recycling waste batteries and accumulators, with the aim of reducing their lifetime environmental impacts and promoting the recovery of materials within them. It bans the use of cadmium and mercury above a fixed threshold in most batteries and accumulators, and bans the landfilling or incineration of untreated industrial batteries and accumulators. The directive also specifies collection targets for portable household batteries of 25 per cent and 45 per cent of the average annual sales over the past three years, to be achieved by 2012 and 2016 respectively. Regulations to transpose this directive must be in force by 26 September 2008. In June, the Government told us that they were holding consultations about its implementation but said that they were “on track to transpose the accompanying regulations on time” (p 423).
- 2.25. In the following chapters we consider the impact of some of these regulations on encouraging waste reduction during design and manufacturing.

CHAPTER 3: DESIGN, INNOVATION AND TECHNOLOGY

Sustainable design

- 3.1. Witnesses suggested that around 80 per cent of a product's environmental impact can be eliminated through better design (pp 86, 96, 177). The Resource Efficient Design (RED) Initiative at De Montfort University commented that these environmental impacts can include "environmental damage in sourcing materials, emissions and waste in production and wasted energy in use, in addition to the environmental impacts of disposal" (p 204). So strategies to enable the reduction of waste are often linked to measures which have other beneficial environmental consequences such as savings in the amount of carbon, energy or water used. Together, these feed into a general notion of sustainability, a concept which is now receiving growing attention from businesses and governments.
- 3.2. In order to design waste out of a product or system at the development stage, the RED Initiative identified six different design strategies, which we explore in more detail below. None of the strategies can be used in isolation and we recognise that waste reduction must be considered against other concerns as part of the larger aim of environmental and economic sustainability.

Design for disassembly

- 3.3. Designing products for disassembly at the end of their lives enables useful materials and components to be removed easily with minimal effort and energy. In order to do this, consideration must be taken of the fasteners or adhesives used to bond parts together, the modularity of a product and the robustness of its parts.
- 3.4. There has been some suggestion that "smart materials" could be utilised to assist product disassembly, in which the properties can be significantly altered in a controlled manner by factors such as heat, moisture, stress or electric currents. "The smart material aspect is an interesting one," commented Dr Jonathan Chapman, Senior Lecturer in 3D Design at the University of Brighton. He cited the example of a polymer which could be used in a mobile phone which, when exposed to a certain frequency of sound or light, "expands slightly which forces the chassis of a mobile phone to pop apart." There are still challenges to be overcome and Miss Holly McCain from the RED Initiative commented that "there needs to be a lot more research into the practicalities of using these materials" such as the stimuli which trigger them to disassemble. Her colleague Miss Lizzie Dutton agreed, adding that there "would be a trust issue for the designers" of unexpected disassembly which would need to be overcome before smart materials could be used (Q 418).
- 3.5. It was also suggested that the tagging of certain components could be used to assist the automatic sorting of materials once products have been disassembled. This would require thought at the design stage to ensure that the tag contained the necessary information. Professor Sue Grimes from the Centre for Environmental Control and Waste Management at Imperial College London, said that to begin with a tag such as a radio frequency identification (RFID) tag could be used, but moving on from this she supported the development of a "conducting polymer type tag, which

effectively will give us just an ink spot of information on each component within a product that will be of value at end-of-life” (Q 629).

- 3.6. The Technology Strategy Board (TSB) pointed out that the use of RFID tags would depend on the value of goods; although they are used extensively for a pallet of goods or for individual high value items, their costs would not “justify their use on individual low-value items.” They added that “all tagging approaches will add complexity to the system and the RFID also needs to be removed in the recycling step, or be compatible with it” (p 251). The use of such strategies would therefore depend on the particular product stream and the market for each component.

Product light-weighting

- 3.7. Light-weighting is one of the main strategies employed by the Courtauld commitment. This voluntary agreement between the Waste and Resources Action Programme (WRAP), manufacturers and retailers was launched in 2005 to develop innovative solutions to reduce the amount of packaging that consumers have to throw away. It has made good progress in reducing the weight of many forms of packaging and WRAP claimed that its work had “resulted in 36,500 tonnes of glass savings” within the first 12 months of the project (p 96). The aluminium industry has also made good progress in reducing the amount of material used in products such as drinks cans and foil packaging, with the Aluminium Federation (ALFED) and Aluminium Packaging Recycling Organisation (ALUPRO) reporting that in the last 15 years the gauge of flexible aluminium packaging foil had been reduced by 33 per cent, and between 1985 and 2003 the weight of aluminium drinks cans had reduced by around 28 per cent. As they state, “clearly this has led to a significant reduction in the amount of aluminium required” (p 129).
- 3.8. Reducing the weight of products and their packaging not only reduces the amount of material required, but usually also reduces the amount of energy consumed in their manufacture, transport and use. For example, light aluminium-bodied cars often consume less fuel during use than their steel-bodied counterparts (p 356).

Design for durability

- 3.9. For most products, a significant proportion of their environmental impacts arise during production so, as the Environmental Industries Commission (EIC) observed, “it is a fairly inescapable conclusion that to reduce waste and conserve resource, we need products that last longer” (p 114). Due to improvements in design and the technical performance of new materials, many products now last longer than their counterparts did half a century ago. However, this approach relies on consumers reining in their consumption habits and valuing their older, perhaps slightly out of date, products when new models are placed on the market. This strategy thus depends on wider policies to address consumption, which we discuss in chapter five.

Recyclability

- 3.10. Another strategy to reduce the life-cycle impacts of products is to create them using materials which can be easily recycled. Aluminium, for example, can be recycled infinitely “without any loss of quality” and so is often advantageous compared to other metals which may experience down-cycling

(a gradual deterioration in quality). ALFED and ALUPRO claimed that the recycling of aluminium saved “up to 95 per cent of the energy used in primary production” and prevented 97 per cent of the greenhouse gas emissions (p 128).

- 3.11. Recyclability must be considered alongside other eco-design strategies such as product light-weighting, as the two are not always harmonious. For example, Ms Bickerstaffe noted that the increased use of laminates (layers of different materials) had contributed to the reduction of packaging weight but were difficult to recycle. She suggested that designers had to look at the big picture when making these decisions and added that “sometimes laminates are the most effective, sometimes they will allow you to have far fewer lorries on the road delivering goods because they are such a tiny amount of material” (QQ 478, 498).

Re-usability

- 3.12. Our society now demands that products are updated regularly and the concept of repair has become less fashionable. Industry needs to find alternative ways to “re-use” products and one way in which this can be done involves making products more modular. This is especially useful for products whose aesthetics are as important as the function of the products themselves. Mr Arnold Black, Network Director of the Resource Efficiency Knowledge Transfer Network (REKTN), suggested that the re-use of components is especially valuable in products such as mobile phones where “you just change the case, change the look, and the chip in it stays the same” (Q 441).
- 3.13. Modularity is the basis around which the furniture company, Vitsoe, has modelled its business plan. The company developed a shelving and chair programme in the 1960s which can be dismantled, rearranged or reinstalled and parts can still be purchased today to update and add to these systems. This strategy relies on strong customer loyalty but appears to have been successful and the company claimed that it was “almost unheard of for Vitsoe’s furniture to be thrown away” (p 210).

Cradle to cradle design

- 3.14. In 2002, McDonough and Braungart set out their notion of “cradle to cradle” design.¹⁷ This concept for sustainable design proposes that human design could learn from natural processes, where nutrients circulate in closed-loop systems with everything being re-used and nothing wasted. When embracing the cradle to cradle approach, designers must consider the environmental impacts of materials and products throughout their product life and beyond. Material selection is a key part of this process; natural materials which can be returned to the ecosystem, or those which are infinitely recyclable, are usually the best options.
- 3.15. The EIC pointed out that product durability and the retention of older products might have to be disregarded “where improvements in operational efficiency outweigh the environmental costs of producing new products” (p 114). For example, disposing of an old refrigerator and replacing it with a new, more energy-efficient version might be less detrimental to the

¹⁷ McDonough and Braungart, *Cradle to cradle: remaking the way we make things*, 2002, North Point Press.

environment than retaining the old inefficient unit. Within the automotive industry, Ford claimed that 85 per cent of a vehicle's carbon dioxide emissions was associated with its in-use phase and pointed out that recycling-driven changes or designs for disassembly which detrimentally affected this phase could "have a net negative effect over the life-cycle" (p 462). So as part of this process, designers must also recognise that environmental trade-offs sometimes have to be made.

Challenges to sustainable design

- 3.16. Despite the development of strategies which can eliminate waste through better design, most of our witnesses agreed that this still was not a priority in the minds of most designers. Dr Tracy Bhamra, Reader in Sustainable Design and Research Co-ordinator at Loughborough University, told us that there is currently a bit of an "ad hoc approach" to cradle to cradle design and that "there are some examples of designers thinking about issues of, maybe, recycling or, maybe energy consumption, but I would not say it was a general approach that most designers adopt" (Q 356). The reasons for this are numerous and complex, but some of the major difficulties that witnesses identified included the requirements set by business, the ways in which designers are educated and a poor knowledge of materials' properties.

Business requirements

- 3.17. Some large companies have been embracing eco-design principles as part of their design processes for a number of years. The Design Council cited companies such as Electrolux, Unilever, Nike and Toyota which are "already using design to address sustainability," and suggested that companies which invested in design out-performed in "practically every measure of business performance including market share, growth, productivity, share price and competitiveness" (pp 176–177). Nevertheless, it appeared that good examples of eco-design were few and far between. Designers have to follow the design briefs provided by their clients and sustainability and waste reduction do not often feature very highly as part of their requirements. As Dr Tim Cooper from the Centre for Sustainable Consumption at Sheffield Hallam University pointed out, although designers would like to consider the end-of-life impacts of their products, they "are told they have a specific brief" and cannot work beyond that (Q 80). Ms Clare Brass, Founder of the Social Environmental Enterprise and Design (SEED) Foundation, agreed that the cradle to cradle approach was "very beautiful and a very healthy approach to design," but suggested that the capability of designers to embrace it was limited by their relationship with their clients who were "unlikely to be asking for it" (Q 356).
- 3.18. Many businesses are often unaware of the potential financial gains to be made from reducing waste, especially small- and medium-sized enterprises (SMEs). Mr Martin Charter from the Centre for Sustainable Design at the University College for the Creative Arts pointed out that SMEs generally have "no knowledge" of the issues (Q 80). This was compounded by the fact that small businesses often did not have access to sufficient collection and recycling facilities to make a cradle to cradle approach practical. Dr Frank O'Connor, Director of the Ecodesign Centre Wales, commented that "from a small business perspective it is very difficult to implement cradle to cradle" and "from a resource point of view and a cost point of view, it is not feasible

at the moment” (Q 356). Hence small businesses often did not have the incentives to drive their designers in this direction.

- 3.19. A further difficulty identified was that design was often viewed as an additional, almost extraneous, part of the product development process, rather than an integral feature. Experts at the Centre for Resource Efficiency and Management at Cranfield University suggested that “eco-design is seen as contributing to product and market enhancement, rather than as an essential function” (p 34), and the RED Initiative agreed, adding that “currently, resource-efficient design is viewed as a specialist or retrospective discipline. Enterprises of all sizes tend to only actively apply strategies of eco-design when they perceive that there are benefits to be gained from ‘green marketing’ resulting from the applied eco-design” (p 206).

Business solutions

- 3.20. The key, as Dr O’Connor pointed out, is to ensure that design is not just considered as an “add-on process” but that it forms “part of the overall business strategy for any organisation.” Furthermore, there is a need to “inspire businesses to consider environmental and social issues in parallel with economic issues,” demonstrating that waste reduction can deliver economic benefits, and to encourage companies to build sustainability into their business strategies (Q 358). The Design Council recognised that “many businesses currently see environmental factors as barriers to growth rather than opportunities for innovation” and noted that its innovation service for SMEs, *Designing Demand*, would target a total of 6,500 businesses by 2010 (p 178). The Design Council said that until recently its focus has been “principally to work with businesses ... driving up the demand for design.” Mrs Lesley Morris, Head of Skills at the Design Council, recognised that there was now a need to work with the designers as well “because they have not got that knowledge” and noted that, in partnership with the Sector Skills Council for Creative and Cultural Skills, they had begun to “look at what the skills development needs are” (Q 380).
- 3.21. An alternative approach to ensure that businesses integrate sustainability and waste reduction measures into their design processes is to use regulation. Producer responsibility regulations have certainly stimulated some discussions about sustainable design and waste. Dr Chapman commented that the WEEE Directive had given design “an opportunity to reinvent itself” and caused businesses to reconsider the “way we think about processes such as consumption and waste” (Q 407). He questioned, however, the extent to which practising designers knew or understood the implications of the WEEE Directive and commented that legislation “often fails to penetrate” to the level of designers. Instead, he suggested that different incentives were needed to encourage sustainable design within the industry, such as awards to recognise those who had broken the boundaries and successfully moved the sustainable agenda forward (Q 410).
- 3.22. The success of other producer responsibility directives at encouraging change has been questionable. Dr Bhamra commented that “most cars meet the End-of-Life Vehicles Directive without very much change to their design” and technological developments have focused on producing “high yields in recycling rather than huge changes in design of the product.” This was an inherent problem with all end-of-life obligations due to the way that businesses tended to calculate their costs. Dr Bhamra commented that

“unfortunately ... they do not cost the whole life of the product when they design it; they design to the manufacturing cost and then worry about the end-of-life costs if there is some legislation there. So it is not looked at comprehensively at the start of the design process” (Q 370). As for packaging, the Sustainable Development Commission (SDC) felt that the recycling provisions of the Packaging Waste Directive had “not put high enough costs on producers to force them to rethink product design” and the Packaging (Essential Requirements) Regulations had failed to drive waste minimisation as they were “vague, self-monitored and poorly enforced” (p 289).

- 3.23. The EuP Directive places an obligation on businesses to consider the energy efficiency of their products. Green Alliance suggested that this could be implemented to set standards for other elements of design, claiming that “it could be the first genuine driver of product re-design” (p 284). However, the framework directive has only just been developed and the Government said that although it could be used to set requirements for a number of environmental impacts, “the focus initially, will be on energy efficiency measures” (p 6).
- 3.24. In itself, therefore, regulation has had limited effect in improving design. The RED Initiative’s experience with small design consultancies showed that there was a desire for legislation to force designers and clients to apply eco-design strategies, but consideration also had to be given to the practicalities of implementing such legislation in businesses, “such as the cost implications, and availability and communications about eco-materials and systems in the supply chain” (p 208). Another difficulty, as Miss Dutton highlighted, was that legislation had to focus on specific details that “may not be appropriate for a lot of product design development situations” and did not foster innovation (Q 399).
- 3.25. Miss McCain noted that a lot of businesses are “quite confused about what legislation there is at the moment and what they have to do” (Q 401). Furthermore, the RED Initiative commented that there was no regulatory body within the design industry that was clearly taking the lead in implementing legislation and providing guidance to designers. It felt that the Design Council was “not seen by designers or the larger organisations that they produce work for as being regulatory or having any real control in implementing legislation” and the Chartered Society of Designers, the Royal Society of Arts and the Institution of Engineering Designers were not widely recognised as fulfilling this role either (p 207). Thus for SMEs in particular, imposing more regulations upon businesses which are already confused about existing regulations may only serve to make the situation worse.

Education and training

- 3.26. According to research by the Design Council, even when environmentally aware businesses do seek design solutions “they are beginning to find that UK designers don’t always have the relevant expertise” (p 177). Dr Bhamra suggested that the teaching of sustainable design was patchy and at A Level, it “seems to be down to individual members of staff with an enthusiasm and interest for the subject to introduce it.” At undergraduate level, the position appears to be little better. Some specialist degrees in sustainable design are available, but Dr Bhamra noted that these “do not tend to be particularly popular with students” (Q 360). Instead, the general consensus was that

sustainable design and considerations of waste reduction should be incorporated into every design course. In Ms Brass's view, "it should be an underlying necessity of every design student, so that every designer [who leaves college] will be able to use what they know to reduce the environmental impact in their professional life" (Q 361). Professor Grimes felt that there was a good case for "introducing undergraduates to sustainability and waste issues" but that it was less crucial at this level, and it might be best to bring these subjects together within Masters and Doctorate programmes, where students had the opportunity to interact with industry (Q 621).

- 3.27. The term "designer" is very wide and can be interpreted in a number of ways, covering professionals who act as stylists, industrial designers or engineers in a wide range of fields such as fashion and textile, consumables, chemicals or electrical products. Ms Brass pointed out that "we are still training designers in very specific fields, and the complexity of the issues that we are required to address now means that designers should be exposed to other areas of design and, indeed, to other professional capacities while they are still studying." Dr Bhamra agreed that "designers need to start broadening their horizons in order to address these issues" (Q 357).
- 3.28. The Department for Innovation, Universities and Skills (DIUS) had, according to Dr David Evans, Director for Innovation, begun to address this problem by establishing a new institute with the Royal College of Art and Imperial College "bringing the design and engineering aspects of both education and product design together with significant funding." He said that their objective was "to create similar linkages between other leading edge design schools and the engineering departments in universities" (Q 54). Establishing these multi-disciplinary links will be vital in providing designers with the necessary skills to develop innovative solutions to reduce waste.
- 3.29. Consideration of end-of-life aspects at the design stage is still a relatively new concept. Mrs Morris said that there was "some work to be done to train the trainers" as not everybody had the expertise to understand the issues, teach them and integrate them appropriately into courses (Q 361). Some work has been undertaken to begin to address this problem and the Ecodesign Centre Wales has been working with four universities in Wales which provide design education to encourage them to embed sustainable design and social design into mainstream higher education. Dr O'Conner said that they had been working with the trainers and making sure they had the appropriate skills, so that "all undergraduates in Wales over the next five to ten years will be literate in the principles" (Q 362).
- 3.30. A more strategic approach to embed sustainability into courses has been taken by engineers. The REKTN noted that professional organisations such as the Royal Academy of Engineering, the Institution of Mechanical Engineers, the Institution of Chemical Engineers (IChemE) and the Institution of Civil Engineers (ICE) have all developed sustainability programmes. Mr Malcolm Wilkinson, Chairman of the Sustainability Subject Group at IChemE, told us that sustainable development was now part of the core curriculum for chemical engineering undergraduates. Even in this sector, as it had only been a core component of the curriculum for around three years, he acknowledged there was "an issue around material, around what are you actually going to teach;" although there was the start of a framework, there was "still some way to go" (Q 622). This was perhaps all

the more reason to ensure that industry was involved with the education process as much as possible. Not only would it be beneficial for graduates to gain a better understanding of how industry worked, but Professor Mike Gregory, Head of the Institute for Manufacturing at the University of Cambridge, noted that the enthusiasm and awareness of graduates could also be beneficial to businesses as “they can solve real problems very cheaply for companies and ... we might even find that young engineers and designers can become the trainers” (Q 243).

- 3.31. The Higher Education Funding Council for England (HEFCE), together with the Design Council, has been facilitating visits to centres of excellence in other countries to assist UK higher education institutions develop their curriculum. Visits for higher education institutions to businesses have been arranged to “understand business demands for designers, innovators etc, as well as the use made in business of multi-disciplinary teams” (p 428). Mr Ian Pearson MP, Minister of State for Science and Innovation at DIUS, told us that the Creative and Cultural Skills Sector Skills Council had “worked on design modules for undergraduate courses at a university level” and had also recommended approaches “developing design education in schools to ensure that design is built into people’s awareness at an early age.” He added that the Design Council had been working with the sector skills council to create a *High-levels skills for higher value* plan¹⁸ to “improve the professional skills of the UK design industry.” The implementation plan to support this was outlined in the *Design Blueprint*¹⁹ produced in March 2008. Furthermore, he noted that there were plans to set up a UK design skills alliance, “a partnership with industry and education to take forward the recommendations of the plan.” Mr Pearson felt that “the profile of design and the importance of design and sustainable design have really rocketed in the last few years and lessons are being learned across Government but across industry as well” (Q 864).
- 3.32. It is important to recognise that the perceptions of businesses need to be addressed. Mr John Holbrow, Chairman of the Environment Committee at the Federation of Small Businesses (FSB), told us that the range of waste regulations were confusing for businesses and added that “from the small business angle it is feasible to design out waste but most small businesses are looking to survive for tomorrow, next week, next year. Although they are very conscious of their need to contribute to waste reduction there is no real incentive for a small business to do it ... We think that Government should be raising awareness to the small business community to make them aware of what they should be doing and what advantages there are to do it.” He explained that “the perception is amongst the owners of small businesses that there are so many other things they have to do that they do not necessarily see waste reduction as a way of increasing profits ... the problem is getting the message across and getting the education system there so that people see this” (QQ 153, 156). Hence there is also a need to improve the education and advice provided to businesses, in order to promote waste reduction as a logical business strategy (something which we explore further in chapter six).

¹⁸ Design Council, Creative and Cultural Skills Sector Skills Council and the Design Skills Advisory Panel, *High-level skills for higher value*, 2007.

¹⁹ Design Council, Creative and Cultural Skills Sector Skills Council and the Design Skills Advisory Panel, *Design Blueprint*, 2008.

Professional regulation

- 3.33. Unlike architecture, civil engineering and other professions, there is no professional regulation of designers and no requirement for them to undertake continual professional development. There was also a reluctance to introduce any such regulation. Instead, it was felt that more effort needed to be put into ensuring that designers had appropriate training. Dr Chapman added that it was important for design to be recognised as “an entrepreneurial opportunist enterprise ... that can create new scenarios and new potential for situations.” He argued that any regulation of the profession “would need to be very carefully managed if put in place” and that excessive regulation may stifle innovation (Q 405). Ms Brass agreed, arguing that “training designers to have more entrepreneurial skills would enable them to break out of the private sector and work with the third sector and the public sector, and apply their problem-solving skills to solving social and environmental problems” (Q 387).
- 3.34. The Design Council was also wary of regulating the profession and told us that “designers are very clearly saying they do not want that; they do not want to be over-regulated and they certainly do not want a licence to practise.” In addition, because of the large diversity of sectors in which designers are involved, it may be virtually “impossible” to introduce regulation. Although Mrs Morris noted that there may be a time when more regulation is necessary, she insisted that at the moment it was more important to work with the sector to improve the skills of designers (QQ 383–384). Mr Charter said that the Design Council had shown “no leadership” in this area and he thought that the major professional bodies covering both product design and design engineering needed to take more action in this area so that sustainable design did “not just go up and down on the agenda.” He added that the Deans of design schools and engineering schools should be more “exposed” to this type of thinking and that there should be “more initiatives like the Royal Academy of Engineering’s on professorships related to sustainable engineering” (Q 77).
- 3.35. The importance of this area was summarised by the Design Council itself which stated that:
- “over the coming years the demand for design that aids sustainable development will rise as regulations become more stringent, consumers become more discerning and businesses require specialist design input. A UK design industry with the skills and confidence to deliver sustainable solutions could become a world leader in this field, collaborating internationally and opening up access to new global markets. To achieve this, a whole-industry response will be required along with effective education and training” (p 176).

Recommendations

- 3.36. **Some businesses have begun to embrace sustainability principles as part of their product design and development processes, but large gaps in knowledge still exist. There is still confusion amongst businesses regarding their environmental design obligations and designers are often unable to provide solutions as they themselves lack a clear source of guidance to provide clarification. The Design Council and the Higher Education Funding Council for England have begun to address the teaching of sustainability principles but we are**

concerned that higher education institutions still lack the appropriate knowledge and resources. We recommend that the Department for Innovation, Universities and Skills and the Department for Business, Enterprise and Regulatory Reform should take the lead in working with the Design Council, the Higher Education Funding Council for England, design schools, industry and the relevant professional bodies to ensure that sustainability is embedded into the design curriculum, teachers are given the correct training and designers are educated about business requirements and the cost of waste.

- 3.37. **At present there appears to be little to be gained from regulating the design profession but whilst regulation is not usually welcomed, this is something which the Government should keep under review in the future to ensure that designers exhibit consistent standards of competence. We recommend that the Design Council should take a stronger lead in providing the necessary guidance to designers on how to comply with the principles of eco-design legislation. Designers must also be encouraged to work beyond the minimal level of compliance and we support the use of awards issued by professional bodies to acknowledge those who push the boundaries of sustainable design.**

The transfer of knowledge and innovation

- 3.38. Witnesses reported that even when designers are aware of the importance of sustainability, they are often reluctant to embrace more sustainable materials and methodologies due to a lack of information about their availability and properties. According to the RED Initiative, designers have indicated that “the main barrier to selection of environmentally-preferable materials is a perceived additional cost. This is combined with a lack of confidence in the quality and performance of eco-materials, as they are often perceived as inferior alternatives” (p 205). Dr Bhamra concurred, adding that “unfortunately, the way information is presented to them at the moment does not give them the confidence that, actually, it will perform in the way that they want, so they will probably be safe and stick with what they know” (Q 359).
- 3.39. It is clear that designers need more information about the properties of new materials but among our witnesses opinion was divided on the best way to provide this. One of the major difficulties cited was the absence of simple indices to assess the sustainability criteria of different materials and components (something which we explore further in chapter four). The key to transferring knowledge and stimulating innovation is to encourage greater interaction between designers and those who research and develop new materials. As the RED Initiative argued, there is “a need for more communication between materials scientists, materials suppliers and designers, and collaboration on development ‘showcase’ projects where new materials can be utilised” (p 208).
- 3.40. As part of the Government’s Technology Strategy, the TSB supports Knowledge Transfer Networks (KTNs), established to “bring together businesses and academia to exchange knowledge and share best practice with a focus on technology and innovation.” In order to assist this transfer of knowledge in the materials sector, the Government has funded the Materials and Design Exchange (MADE), formed from a partnership between the

Royal College of Arts, the Institute of Materials, Minerals and Mining (IoM), the Institution of Engineering Designers, the Design Council and the Engineering Employers Federation, to “help bring together the design and material technology communities to look at key issues linking product design and manufacture” (pp 29, 31). Dr Norman Swindells, Chairman of the Sustainable Development Group at IoM, told us that MADE had around 1,000 online members, published a regular magazine and held a series of events and meetings, including a recent meeting on waste. In order to encourage innovation it also offers awards for designers “working with materials in novel ways or with a novel use for them.” With regard to information about materials’ properties, MADE provides a “materials resource centre” which encourages designers to use more innovative materials (Q 610).

- 3.41. Dr Peter Hedges, Head of Economy, Environment and Crime at the Engineering and Physical Sciences Research Council (EPSRC), argued that to encourage real innovation a holistic approach to design and sustainability is also required in the research agenda. He explained that “it is quite easy to fund a particular piece of innovation that focuses on, say, one area of technology or is relevant to one manufacturing process or to one company” but to really improve resource efficiency on a long-term basis, other research programmes need to “have a more holistic understanding of the whole resource and energy life-cycle.” In order to do this, he explained that research had to involve designers, engineers, marketing people and everybody else involved in the product development process, and they had tried to take this “multidisciplinary approach” in commissioning some of their research programmes (Q 429).
- 3.42. The REKTN commented that in the past, improvements to design and process optimisation had focused on local issues within the factory, “dealing with waste arising, rather than seeking fundamental solutions that would eliminate or reduce waste generation.” The Network felt that new legislation and the cost of waste disposal were now motivating businesses to take a waste reduction approach. They claimed that step changes in this area could “only be achieved through the development of new technologies and/or approaches” (p 234). The TSB had also grasped the nettle when it came to innovation, running challenge-based competitions such as “Zero Emission Enterprises” in 2005 and 2006. By providing a wide remit in these competitions, they hoped that new and exciting ideas would emerge whilst also encouraging the business and academic communities, through a collaborative research and development programme, “to form consortia that will bring all the relevant competencies to bear to address that challenge.” It was hoped that innovative solutions to reduce industrial and commercial waste streams would be achieved “through encouraging better process design, the use of new or improved materials, and process optimization.” Their “Design and Manufacture of Sustainable Products” research call in 2005 offered organisations the challenge to “collaborate in the research and development of innovative, sustainable products” by adopting new approaches (Q 434, p 230).
- 3.43. When we discussed current research with Mr Pearson, he drew our attention to a number of research projects being carried out by research councils and the TSB, and he recognised the importance of “bringing together researchers from across a range of disciplines.” He commented that the KTNs were “looking at the market, looking at opportunities, sharing best practice [and]

contacts and delivering market-led solutions” to problems. Mr Pearson also referred to innovation platforms which bring business and research communities together, suggesting that waste management was a potential topic for a future innovation platform (QQ 835, 859).

- 3.44. Dr John Whittall, Lead Technologist of Sustainable Technologies at the TSB, told us that over the last four years around £35 million worth of collaborative research and development had been funded through Defra’s Business Resource Efficiency and Waste (BREW) programme, but that this would not continue to be financed. Mr Jeremy Tait, Programme Manager at MTP, reported that their funding would be drastically cut in the next financial year, noting that in 2007–08 the MTP had received around £4.8 million from Defra funds, but for 2008–09 they would only receive £2.75 million (QQ 471–472).
- 3.45. DIUS confirmed that the TSB would “no longer be in receipt of ring-fenced funding” as the BREW programme had ceased, but added that the TSB had a budget of £711 million over the next three years. An additional £180 million would be earmarked by the Regional Development Agencies and £120 million by the Research Councils to spend on joint activities with the TSB. The Department felt that “it is for the Technology Strategy Board to determine priorities and therefore where the funding is invested.” With regard to waste reduction, DIUS reported that the TSB would work with Defra to “explore opportunities to establish an Innovation Platform” and would “continue to fund business led research projects addressing key application areas such as waste management and resource efficiency alongside research into key technology areas.” DIUS also noted that the Research Councils “do not receive a specific allocation for waste related research” as they are responsible for determining funding allocations themselves (p 431).

Recommendation

- 3.46. **The research councils, knowledge transfer networks, technology strategy board and market transformation programme have recognised that in order to encourage true innovation and waste reduction, multi-disciplinary research is required which embraces designers, materials scientists, engineers and social scientists. Good work is now being undertaken to promote innovation and share knowledge, but we are concerned that recent cuts in ring-fenced funding will undermine some of this vital research and the transfer of existing knowledge. It is crucial that the Government continue to provide adequate funding to support the work of these organisations and that it also provides clear direction, by the use of ring-fenced funding if necessary, that research into resource efficiency and novel processes must remain priorities.**

CHAPTER 4: MANUFACTURING, CONSTRUCTION AND THE IMPACT OF DOWNSTREAM FACTORS

- 4.1. Design undoubtedly plays a large role in determining the amount of waste a product or building will generate throughout its life, but this should not preclude consideration of other aspects of the life-cycle. Forum for the Future commented that “all waste reduction problems are not design problems” and other downstream factors will play different roles according to the specific waste stream (p 468). Professor Grimes from Imperial College London agreed that design alone “is unlikely to achieve sustainability without the involvement of experts from the fields of material science and waste treatment for optimum recovery” (p 315). Whilst new technologies, changes to production processes and innovative solutions to meet consumer needs can all play a significant role in reducing waste, conversely a lack of knowledge, poor business guidance and burdensome regulation can impede efforts to reduce waste during manufacturing and construction projects.

Waste reduction techniques

- 4.2. A range of design and manufacturing approaches have been developed in recent years to improve resource efficiency. Lean manufacturing is a codified system which identifies those things which add value to the manufacture of a product and systematically eliminates those which do not. Toyota is a famous exponent of this system and uses it to attack all forms of “waste,” including wastes of time, labour, materials and other factors. The six sigma approach is a related system which identifies and removes the causes of defects and errors in manufacturing, using trained personnel and statistical tools. As these approaches focus on improving efficiency and maximising profits they have brought the costs of waste to the attention of some businesses, with Dr Michael Pitts, Priorities Manager at the Chemistry Innovation Knowledge Transfer Network (CIKTN), noting that they had “a huge influence” on waste reduction (Q 259). Another useful strategy is benchmarking, in which businesses evaluate their processes against best practice and then alter their practices to try to improve. This can be a one-off comparison but is usually a continuous process where companies constantly alter their practices in an attempt to match the best performer.
- 4.3. Changes to production processes do not necessarily have to be substantial in order to reduce waste significantly, as demonstrated by Niko, a multinational company which manufactures electrical light switches and home automation systems. In many factories, during the production of plastic units molten plastic is injected from a heated nozzle into a mould, leaving a “runner” of excess plastic in the cavity between the two. At the Niko factory in Belgium, we observed the “hot runner” system they had employed, consisting of a heated manifold which precisely distributed the molten plastic into the mould, leaving no excess runner. Although the excess pieces of plastic wasted from each mould would be only small, hundreds of thousands of these collectively could constitute a large material and financial cost. The adoption of the “hot runner” scheme therefore saved Niko a substantial amount of money, energy and material.²⁰

²⁰ See Appendix 6.

- 4.4. We also visited Martin-Baker in Uxbridge, a company producing ejection seats, which had adopted a zero waste ethos. The company had systematically assessed all its processes in order to see where improvements could be made and, as part of this, had reviewed their systems for collecting and cleaning coolant liquid used within the factory machines. Previously, the coolant had sat in containers on the factory floor and was only cleaned every six to eight weeks, with old, contaminated coolant collected in tankers and taken for disposal. After researching systems used in Sweden, the company had implemented a new system which pumped the coolant off the factory floor and cleaned it on a continuous basis. Because the coolant was cleaned continually, it could be used for years with only minimal disposal off-site.²¹
- 4.5. Within the vehicle industry, waste reduction strategies are often linked to the light-weighting of vehicles. Mr Jerry Hardcastle, Vice-President of Vehicle Design and Development at Nissan, commented that they use a particularly high strength steel which, although difficult to manufacture, allowed Nissan to “delete additional brackets and ... use thinner material,” so there was less material to be recycled at the end of the vehicle’s life. Mr Peter Stokes, Vehicle Compliance Manager at Volkswagen, told us that the way vehicles were shredded at the end of their lives had a direct influence on how they built them at the beginning of their lives. In the past, one manufacturer had produced bumpers which contained a “mix of materials that was very difficult to separate, very difficult to recycle and would more than likely end up in landfill,” but manufacturers were now moving away from this towards the use of similar materials so that “you end up with something which can fragmentise easily and is subsequently easier to recycle” (Q 676).
- 4.6. Simple solutions to reduce waste can also be employed within the construction sector. Laing O’Rourke suggested that “lean, efficient off-site manufacturing and pre-assembly methods” could reduce the amount of waste often produced on-site by over-ordering, damage during transportation, lack of co-ordination with suppliers or damage by the weather. They added that substantial savings could be achieved “by adopting principles of standardisation in design or by engaging with the supply chain to ensure that standard manufactured components can be adjusted to suit a specific design.” For example, from over-ordering or from cutting, plasterboard often attracted a significant amount of waste, so in one of its developments Laing O’Rourke had decided to use plasterboards of a standard height which matched the floor to ceiling measurements (pp 386–388). Mr Sexton, Head of Engineering at Laing O’Rourke, emphasised the fact that these types of decisions had to be taken early during the design stage, as “the die is to a certain extent cast” by the time you reach the site (Q 795). Ms Hobbs from the BRE agreed that it would often be uneconomical to try to make these savings later. She told us that “it is quite often cheaper to buy bulk materials in and waste them than it is to get the pre-cut plasterboard delivered,” and “the cost penalties associated with delaying the project because you have run out of a bit of plasterboard far outweigh the costs of disposing of that waste plasterboard” (QQ 754–756).
- 4.7. However, implementing such changes to design, production processes or construction projects require an acknowledgement by businesses that they need to alter their practices. According to most of our witnesses, recognising

²¹ See Appendix 5.

this need for change was actually a significant stumbling block, made all the harder by a lack of rigorous methodologies which businesses could use to assess their waste.

Accounting for sustainability

- 4.8. A number of measures of resource efficiency have been developed in different industries. At the simplest end of the scale are measures such as “the number of kilograms of material used to make every kilogram of product,” or the so-called “e-factor” which measures the mass of waste per unit of the product. In the chemical processing industry, a similar concept of “atom efficiency” can be used which describes the conversion efficiency of a chemical process. The CIKTN and the Chemical Industries Association (CIA) claimed that these types of concepts had “been very influential” (p 135).
- 4.9. On the other hand, Professor Grimes pointed out that such resource efficiency measures did not take into consideration the ease with which each type of waste could be dealt with, nor the resulting costs, and suggested that it would be better for industry to embrace “environmental accounting procedures” (Q 606). Mr Wilkinson from IChemE agreed, arguing that more thorough accounting systems should take into consideration the “energy efficiency” of the process and the “environmental impacts of the waste” produced. He added that a number of big companies had developed their own environmental accountancy systems and noted that IChemE had developed a set of sustainability metrics which tried to assess the environmental, economic and social impacts of production. He admitted that industry was “still some way away” from having a proper accountancy system that could be used to compare companies’ sustainability performances and that “we are still looking at production in the age old way of rewarding shareholders rather than looking at how it might be impacting on the environment as a whole and on society as a whole” (QQ 608–609).
- 4.10. The British Standards Institution (BSI), in conjunction with the International Organisation for Standardization (ISO), has made some progress in addressing these problems with a series of environmental management standards known as the 14000 series, of which the most well known, ISO 14001, has been in existence for over ten years. BSI told us that “ISO 14001 is an internationally agreed approach to managing all aspects of a business that relate to its impact on the environment, and the implementation of this has enabled companies and organisations to reduce this impact, whilst, as a direct result, reducing costs” (p 70). Mr Marcus Long, Head of External Affairs at BSI, told us that by the end of 2006 there were about 130,000 organisations worldwide which were “certified to ISO 14001,” including 6,000 in the UK. BSI has also developed the BS 8555 standard aimed at small businesses, which works in six stages to help them develop an environmental management system. Not only can these standards help businesses cut their costs whilst reducing waste, but certification can also be used as a useful marketing tool (QQ 173, 175). However, assessments of production processes are still hampered by a lack of knowledge about the sustainability of individual materials and products.

Life-cycle assessments

- 4.11. The TSB felt that the UK had “good academic capability in the area of life-cycle assessment” and that large multinational companies often demonstrated expertise in this area (p 229). For example, Unilever utilises sophisticated computer programmes to assess their packaging at the design phase without even having to make it. Dr Forbes McDougall, Environmental Manager at Proctor & Gamble, also told us that “we have very detailed information on our major product streams, and we can understand and identify” where the biggest environmental impacts are (Q 477). By contrast, the TSB reported that “mid-sized and small companies” generally did not have sufficient capability in LCA, which was perceived as “being expensive and time-consuming” (p 229).
- 4.12. The ISO has set out internationally agreed methods for calculating LCAs of materials and products, including the ISO 14040 and ISO 14044 standards (p 71). The LCA is not very widely used because, as Mr Wilkinson put it, “it is very complex and it requires a massive amount of data and a massive amount of research” when most of the time companies want to develop the product and get it onto the market as soon as possible (Q 609). The CIKTN and CIA agreed, reporting that “the key problem is that the ISO approved methods for life-cycle analysis are too slow, too complex and too costly for practical use in industry. As a result, a large number of ‘cutdown’ methods have been developed but not standardised” (p 136).
- 4.13. The complexities of LCAs also make it difficult for companies to derive clear results, as Mr Malcolm Fergusson, Senior Fellow at the Institute for European Environmental Policy, recognised. He suggested that technocratic details “can make an enormous difference to the outcome of the analysis. It can completely reverse the conclusions you get in the comparison of two products in some cases” (Q 111). Difficulties also arise due to the range of environmental criteria involved in such assessments and the emphasis placed upon each one. For example, the use of light-weight materials in a car might save on the amount of material used during production and result in less fuel being consumed during its use, but the light-weight materials may be more difficult to recycle at the end of the vehicle’s life. The situation was summed up by EEF, the manufacturers’ organisation, which reported that “methodologies with regards to the use and interpretation of LCAs still vary greatly and different approaches can lead to different results. Moreover, LCAs will always be based on assumptions rather than irrefutable data, are costly to undertake and might lock industry into long-term options, with little, if any, benefits to the environment” (p 115). As Mr Gareth Stace, Head of Environmental Affairs at EEF explained, “one life-cycle analysis will show up one result and another one might show up another result.” This made it extremely difficult for manufacturers to know what to do (Q 247).
- 4.14. Within the construction industry, the BRE has developed an Environmental Assessment Method for buildings known as BREEAM, which considers factors such as the operational energy of the building, water and material usage. A similar assessment, the Civil Engineering Environmental Quality Assessment and Award scheme (CEEQUAL), has also been developed for civil engineering projects and Mr Andrew Swain, UK Environmental Adviser for Aggregate Industries, felt that both these assessments were “a positive, proactive way for clients, designers and contractors to demonstrate best practice” (Q 760). Nevertheless, Balfour Beatty and Ciria commented that

“the weightings of different environmental aspects can significantly affect the output of a life-cycle assessment” and they argued that this complex issue warranted further research (p 399). Ms Hobbs added that “once everything is weighted and put into a single number, it is quite difficult to extract the waste information, to make decisions based upon waste reduction, and also make sure you are making the wider decision based upon environmental impacts” (Q 766). So in a similar way to the ISO standards, it was difficult to obtain conclusive results using these methods.

- 4.15. Carrying out LCAs in any industry is made all the more difficult by a general lack of information about the properties of materials used within products. The EIC noted that “the absence of consistent and robust standards for evaluating and reporting environmental impact means that each supplier is providing its own plethora of greenwash. This leads to confusion in the market place and many specifiers profess to be overwhelmed by the complexity of sustainability in practice. This in turn encourages a ‘do nothing’ approach, or an over-emphasis on single issues that are relatively simple to quantify,” such as recycled content (p 112). Ms Hobbs agreed that there was a lack of information on individual products, adding that “suppliers quite often do not have that information, even if their customers ask for it” (Q 766). Even if a business did recognise that reducing waste was a worthwhile strategy, a real understanding of the materials and technologies needed to do it were often out of its grasp. This difficulty was recognised by the IoM which told us that information on materials was usually restricted to the “engineering performance or specification of the product and the associated costs,” and common standards defining sustainability were “not readily available.” Although some single factor ratings had been used to compare materials and products, IoM argued that “more comprehensive methods for full comparison, taking material, energy and environmental impact into account need to be agreed as international standards” (p 316). The CIKTN and CIA agreed, arguing “we urgently need internationally agreed methods for simple life-cycle analysis suitable for use in the early stages of design and product development when multiple concepts are being evaluated. Similarly, we need more data in the public domain on the environmental impact of different materials” (p 136).
- 4.16. The TSB thought that there was fairly good data for virgin materials, but acknowledged that for recycled material, “the lack of verified data and the need to develop standards for a range of materials form a major barrier to their wider use.” It therefore suggested that a database of materials’ properties could be a useful introduction but acknowledged the problem that “data exist at a number of levels and that needed to make life-cycle relevant decisions is not validated” (pp 229, 251). Mr Black, representing the REKTN concurred, saying that it would be “very difficult to provide relevant information in a single database,” because the properties and requirements of materials would depend on where they were used in the supply chain (Q 436). Furthermore, although a range of materials databases already exist, Dr O’Connor from the Ecodesign Centre Wales pointed out that small businesses did “not find those appropriate for their needs,” and he felt that it was more important to attempt to “tailor these databases and these tools and techniques to the needs of individual companies” (Q 363).
- 4.17. In an attempt to improve the situation, the BSI reported that where the properties of a material are not yet available, “well established standardisation processes” can be employed to produce “a relevant

specification that is of use to the designer,” and BSI can arrange the information in a number of innovative formats to present it “usefully to interested parties” (p 71). The BSI is also working with Defra and the Carbon Trust to develop a Publicly Available Specification (PAS) to measure the embodied greenhouse gases in products and services. Whereas a British Standard has to reach full consensus between all stakeholders on its technical content and can take time to be finalised, a PAS invites comments from stakeholders without committing to include them, and is usually developed more quickly. Using the PAS 2050 to measure the embodied greenhouse gases would, according to Mr Long, “hopefully help people understand the design element when they are looking at developing new products and services” and help them to reduce their waste (Q 153). The Government agreed, adding that “such a standard has the strong potential to help drive sustainability in materials and product design, as it should enable designers to better discriminate between materials with similar functional properties but different impacts on carbon emissions” (p 9). Thus ALUPRO felt the standard should become “a European if not a worldwide standard” (Q 274).

Recommendations

- 4.18. **The ISO 14001 standard acts as a useful benchmark to recognise businesses which implement sustainable practices and we support the promotion of this standard to industry. We are concerned that once this standard has been achieved, businesses which do not recognise the costs of their waste may become complacent if they no longer have any incentives to drive further improvement. We recommend that the Department for Business, Enterprise and Regulatory Reform should ensure this standard is promoted alongside business education to enable industry to recognise the benefits that can result from continual innovation and waste reduction efforts.**
- 4.19. **Detailed information on the lifetime impacts of products is still lacking. The development of PAS 2050 is a step in the right direction and we commend the Government and industry for recognising the need for simple, yet standardised, assessment methodologies which businesses can apply. However, an assessment of embodied greenhouse gases is not synonymous with a life-cycle assessment. The Government, in conjunction with the industrial, design and materials communities, should encourage the development of simple methodologies to enable businesses to analyse the lifetime implications, including the amount of waste generated, of the materials, products or services they produce. Providing businesses of varying size and character with these key tools is vital as it will enable them to recognise the amount of waste they create and will be the first step towards implementing change.**

Barriers to waste reduction: the impact of downstream factors

- 4.20. Despite the fact that our inquiry concentrated on the top end of the waste hierarchy, waste reduction, it became apparent that aspects of waste management and disposal have a great influence on the ability of industry to reduce waste upstream. In some cases these consequences were hard to define as they impacted upon the mindsets or attitudes of businesses towards waste. In other cases, bad practices downstream could cause more

substantial, practical problems, such as a lack of recycled material to use in production processes. In the following chapters we examine the impacts that consumer and government attitudes have upon waste reduction, but in the remainder of this chapter we focus on some of the major barriers and incentives created by end-of-life disposal or waste management policies and regulations.

Local Authorities

- 4.21. One of the major difficulties cited by businesses trying to reduce waste was that local authorities have developed independent strategies for waste collection and disposal, thus making it virtually impossible for national businesses to assess end-of-life consequences when developing their production processes or selecting materials. According to the BSI, a major barrier to the successful implementation of a waste reduction strategy for organisations with multiple sites is that “different local authorities have different ways of dealing with this issue” (p 70). This was backed up by Boots which said that the fragmented structure “prevents national brands and retailers from providing consistent advice to consumers and prevents co-ordinated product design and material selection choices being made.” The company suggested there was also a lack of planning for any new materials coming onto the market, reporting that although “there has recently been significant growth in the use of compostable and bio-based materials ... facilities for dealing with these materials and labelling for consumer information are lagging well behind” (p 451).
- 4.22. Mr Martin Wheatley, Programme Director at the Local Government Association (LGA) commented that there had been instances where companies had introduced new types of packaging with the best of intentions, thinking that they were recyclable, without realising that the materials were “extremely difficult for authorities to collect and recycle,” so the products actually ended up in landfill when they were intended to be recyclable (Q 657). Hence the general consensus was that there was an urgent need to encourage greater collaboration between local authorities, waste management companies and producers so that manufacturers factored the costs of waste into their production calculations and understood the end-of-life implications of their products. Mr Wheatley said that the LGA had been doing just this, “promoting a discussion with trade bodies on the manufacturer and retailer side so that there is more of a dialogue between people who are thinking about new products and people who are responsible for their disposal” (Q 657).
- 4.23. Another problem was a shortage of recycled materials available to businesses. According to the CIKTN and CIA, “we have yet to devise processes that can reliably produce raw materials of the required quality from the general waste streams” (p 135). This problem was also identified by British Glass, which felt that the glass industry had the capacity to use more recycled glass in an attempt to reduce waste, but that the recycled glass (cullet) was not “fit for purpose” (p 138). Mr David Workman, Director General of the British Glass Manufacturers’ Confederation, commented that although recycling rates were improving year upon year, the amount of glass coming back to industry for re-use was on the decline because of poor practices at recycling facilities. He told us that “some local authorities are collecting segregated colours and segregating glass but then the companies who operate the collection systems are then mixing them.” The materials which left materials recycling facilities

were of “terrible” quality and Mr Workman claimed that “if you talk to any material stream they would say they experience exactly the same problem” (Q 269).

- 4.24. Upon talking to other industries we found that this was, unfortunately, the case. Mr Rick Hindley, Chief Executive Officer at ALUPRO, added that in the aluminium sector the quality of the material collected through post-consumer schemes was “a real concern” and a large proportion of the material sent to material recycling facilities had to be sorted again before it could be processed through the recycling plant (Q 270). Within the electrical sector the situation appeared to be little better. Professor Ab Stevels, Environmental Adviser to Philips, complained that Philips could not access “a continuous stream of constant quality and high volume” plastic and that “the structure of industry” was hampering progress (Q 300). Backing this up, Mr Peter Evans, Senior Environment Manager at Sony UK, told us that “the materials available from the recycling stream are not in high enough quantities to make it viable for us to use” (Q 302).
- 4.25. These difficulties appeared to be related to the targets and costs imposed upon local authorities. Dr Robert Chilton, Board Member at the National Consumer Council, told us that recycling plants could separate various types of plastic but that because local authority targets were set in terms of tonnages, “they have been going for mixed waste” (Q 479). This was supported by Mr Workman, who explained that when he tried to discuss this with local authorities, they understood the problem but were reluctant to change their practices because they had targets to meet and “their primary objective is to avoid landfill at all costs” (Q 271). This then affected the ways in which contracts were set up between local authorities and waste management companies, with Mr Hindley commenting that there was “no incentive for the waste management company to produce a clean quality product” because their profits were based on the weight of material handled (Q 270).
- 4.26. A concentration on weight promotes the diversion of heavy material away from landfill, to the detriment of recycling light, valuable materials such as aluminium. Aluminium is infinitely recyclable and the recycling process only uses around five per cent of the energy required to produce new aluminium. Despite this, 35 million tonnes of new aluminium is still being produced annually, compared to only 16.4 million tonnes of recycled aluminium. There was hope that the situation was improving, with ALFED and ALUPRO predicting that the amount of aluminium recycled from end-of-life scrap would double by 2020, but even so despite best efforts over 90,000 tonnes of aluminium packaging is still being sent to landfill in the UK. ALFED and ALUPRO welcomed the Government’s Waste Strategy which identified aluminium as one of its “key materials” and pledged to develop proposals for higher packaging recycling targets. Nevertheless, the industry felt that aluminium packaging was not a priority for local authorities because their targets were “weight-based with strong incentives to divert biodegradable waste” (pp 127–128, 131).
- 4.27. Furthermore, the costs of landfill and the targets set for local authorities means they are reluctant to provide additional waste services to industry, so small businesses in particular find it difficult to dispose of their waste. Mr Holbrow from the FSB told us that small businesses did not produce enough waste to interest recycling companies, but that they were not allowed

to use civic amenity sites for recycling. The policies of local authorities were therefore “not conducive” to encouraging recycling and re-use amongst small businesses. The stark choice was that waste “either goes to commercial contractors if the volume is of sufficient interest, or it ends up in landfill” (QQ 158, 162). Within the retail design industry, Miss Dutton from the RED Initiative claimed that businesses had a high turnover of materials and were keen to use recycled products but that they were “having issues with returning that material to recycling points” and found it difficult to get hold of recycled material in the right quantities (Q 420).

- 4.28. Mr Wheatley defended the position of local authorities, arguing that many local authorities went further than they were statutorily required to do, providing the type of recycling service to SMEs which the private sector would not offer. He explained that local authorities face “a disincentive to collect waste from businesses because any residual waste that they end up with is subject to the Landfill Allowance Trading Scheme (LATS), unlike private contractors” (Q 669). The LATS scheme allocates tradable landfill allowances to each waste disposal authority, which allows them to landfill a certain amount of biodegradable municipal waste in a specified year.²² Mr Peter Jones, Director of Biffa, told us that in England, only local authorities are subject to the LATS system, whereas in mainland Europe, all businesses are subject to LATS-type regulations. In his opinion, this explained the “enormous divide between waste from households and waste from industry and commerce” (Q 672). Despite encouragement in the Government’s Waste Strategy for local authorities to engage with business waste, Dr Andrew Craig, Principal Policy Officer at the Local Authority Recycling Advisory Committee (LARAC), pointed out that operation of the LATS militated “very strongly against that” because if local authorities collected more commercial waste then it increased their risk of not having enough landfill allowances (Q 669).
- 4.29. There had also been uncertainty surrounding the definition of municipal waste and Defra launched a consultation in 2007 to examine this.²³ In its response the Government said that they would introduce legislation to amend the legal definition of municipal waste, to align it with guidance given to local authorities. This would amend the definition so that municipal waste “encompasses all waste which comes into the possession or under the control of waste disposal or waste collection authorities, with the exception of construction and demolition waste.”²⁴
- 4.30. Ms Hill from Green Alliance sympathised with local authorities, who she said were driven by a complex mix of landfill regulations and recycling targets as well as money, demographics, the type of population they represented and the kind of areas they covered. She added that “we began to feel very sorry for the average local authority trying to deal with these problems, as set against our vision of a resource reclamation society, because nobody seems to have that responsibility for creating a resource reclamation society other than these poor local authorities who do not have the tools to develop it.” She commended the LGA for trying to provide advice on best practice but noted

²² See <http://www.defra.gov.uk/environment/waste/localauth/lats/index.htm>.

²³ Defra, *Consultation: the interpretation of the definition of municipal waste used in the Landfill Allowances Trading Scheme (LATS) in England*, 2007.

²⁴ See <http://www.defra.gov.uk/Environment/waste/localauth/lats/pdf/gov-response.pdf>.

that the difficulty was a “lack of a national coherent strategy” with the current trend for giving powers to local authorities resulting in “fragmentation and inaction in some cases” (QQ 561–562).

- 4.31. It is clear that local authorities are struggling with the regulations. Dr Craig told us that local authorities would like to remove more lightweight materials from the waste stream but that they were “very expensive to collect in terms of pounds per tonne” and local authorities currently bore the cost. He added that “there should be more consistency between the systems that are operated to collect waste, both from individual people and from firms, but the cost is a crucial issue as far as local authorities go.” He suggested that the answer might be to increase the use of producer responsibility, shifting some of the cost and responsibility onto producers (Q 664). This idea was supported by Mr Jones who said that if a more decisive approach to producer responsibility was taken, around 10–12 million tonnes of the 30 million tonnes for which local authorities were responsible “would change from being a cost liability on the local community [into] an income from those industry supply chains” (Q 665).
- 4.32. In their Waste Strategy, the Government suggest that under a new local government framework there would be a strengthened role for Local Area Agreements between local authorities, local partners such as third sector organisations, and central government. They claim that these would help central government “focus on the things that really matter to people everywhere, guaranteeing national minimum standards, but leaving room for local innovation and local priorities.” Legislative barriers have also been removed allowing the creation of joint waste authorities—new legal entities which take responsibility for waste collection and management. The strategy claims that the Government are “encouraging local authorities to use their role as local community leaders in partnership with businesses, other local, sub-regional and regional public sector organisations and third sector organisations to achieve a more integrated approach to resources and waste in their area.”²⁵
- 4.33. While Mr Wheatley felt that it was important for local authorities to remain in control of waste management at a local level, he said that there was “a lot of scope for local authorities to work together on some of the more downstream aspects to secure economies of scale and make sure that their practices follow the best available evidence” (Q 661). It seemed that local authorities were still struggling to achieve this integrated approach in the current climate. Although the Government’s Waste Strategy acknowledges complaints from local authorities that the LATS constrains their ability to deliver disposal and collection facilities, it merely suggests that they should facilitate commercial waste management contractors or social enterprises offering recycling collection services for business waste.²⁶ Dr Craig commented that the Government’s “light touch review” of the LATS had not addressed their concerns about commercial waste (Q 669).

Recommendations

- 4.34. Responsibility for the recycling and collection of waste has been given to local authorities, not all of whom meet the needs of businesses.**

²⁵ Defra *Waste Strategy*, *op. cit.*, pp 85–89.

²⁶ Defra *Waste Strategy*, *op. cit.*, p 90.

Poor quality recycled material, a lack of disposal facilities and a fragmented approach between local authorities hinders the attempts of those businesses which are striving to reduce their waste. In turn, local authorities are hampered by weight-based targets and landfill allocations which discourage them from supporting industry. Targets for local authorities currently focus on decreasing the weight of domestic waste sent to landfill but a more holistic approach to waste reduction is required. We recommend that the Government should restructure the waste targets and costs imposed upon local authorities to allow them to address commercial and industrial waste by providing the necessary support, disposal facilities and high quality materials to businesses.

- 4.35. **It is extremely important that local authorities co-ordinate the services they provide. Whilst joint waste authorities will largely be concerned with the collection, treatment and disposal of waste, we hope that their creation will lead to greater collaboration between local authorities on all aspects of the waste hierarchy, so that they can provide the consistent facilities and support which businesses require in order to invest in long-term waste reduction strategies and experience the economies of scale.**

The definition of waste

- 4.36. The CIKTN and CIA said that the definition of waste was “posing a barrier to sustainable waste and resource management.” They suggested that it deterred producers from sustainable ways of managing their by-products, such as burning them in a combined heat and power plant, “towards sending such by-products, often over long distances, to the limited commercial incinerators available or to landfill” (p 137). This frustration was echoed by those in the construction industry. Balfour Beatty and Ciria reported that “the legal definition of waste is perceived in the industry as hindering re-use. This is particularly so when the producer knows the material has value, but cannot find a practical use at that point in time, and so must ‘discard’ it.” They added that the complexities of handling waste materials “will often steer contractors towards a solution that utilises virgin materials rather than complete the necessary paperwork and wait for the Environment Agency to respond” (p 399). Ms Liz Parkes, Head of Waste at the Environment Agency, believed that the definition of waste itself was now well established and did not need alteration. However, she reported that there had been debate on the definition of “end-of-waste” when waste ceases to have the “waste” label applied to it; a topic on which the directive had, until recently, been “silent” (QQ 100–101).

Waste Protocols project

- 4.37. The Waste Protocols project, run by the Environment Agency and WRAP, has been examining a number of materials to assess whether the difficulties of complying with waste legislation can be removed to increase their use as a resource. In each case, technical assessments, industry consultations and financial impact assessments are taken into consideration and either a quality protocol or a regulatory position statement is produced. A quality protocol “sets out the steps that must be taken for the waste to become a product or material that can be re-used by business without the need for waste

management controls and can be safely marketed and sold as a product in its own right.” A regulatory position statement “informs the business community of what regulatory obligations they must fulfil to use the processed waste material.” So far, draft quality protocols have been published for segregated biodegradable wastes (compost), waste cooking oil derived biodiesel and flat glass; a regulatory position statement has been published for wood; and blast furnace slag has been deregulated and is now treated as a by-product. Consultations for segregated biodegradable wastes (anaerobic digestion), tyre-derived rubber material and non-packaging plastics have been completed, with other consultations in the pipeline for pulverised fuel ash, paper sludge ash, steel slag, incinerator bottom ash, waste plasterboard, uncontaminated topsoil and contaminated soils (pp 68–69).

- 4.38. According to Ms Parkes, the quality protocols were “forcing material back into productive use at a faster rate than would have happened” if it had not been classified as waste in the first place. The programme appeared to be popular with industry, with Mr Christopher Murphy, Deputy Chief Executive at the Chartered Institution of Wastes Management (CIWM), adding that the Environment Agency and WRAP had “done some extremely good work” (Q 642). EEF reported that the quality protocols had begun to address the problem but suggested that “a more consistent approach across the EU will help more low risk materials to be used as a resource” and suggested that the Government “should continue to lobby EU institutions on this during the ongoing revisions of the EU Waste Framework Directive” (p 116).

Revision of the Waste Framework Directive

- 4.39. In 2005 the European Commission published its *Thematic Strategy on the prevention and recycling of waste*, which said that “in the light of extensive stakeholder consultation the Commission has concluded that there is no need substantively to amend the definition of waste, but that it is necessary to clarify when a waste ceases to be a waste (and becomes a new or secondary raw material).”²⁷ Its accompanying document, *EU Waste Policy—the story behind the strategy*, commented that “the feedback from this consultation revealed that there is a significant consensus in favour of not radically changing the definition of waste. One reason was that there is no obvious better alternative; another that change would render uncertain the twenty years of case law from the European Court of Justice on application of the definition that has helped to make the situation clearer.”²⁸
- 4.40. Following this, Defra launched a public consultation on the Commission’s proposal to revise the Waste Framework Directive, asking stakeholders for their views on the definition of waste. In the Government’s view, the responses they received did “not demonstrate clear-cut stakeholder support for a change in the definition of waste.” Instead, stakeholders raised issues “relating to the inclusion in the revised Waste Framework Directive of

²⁷ Communication from the Commission, *Taking sustainable use of resources forward: A Thematic Strategy on the prevention and recycling of waste*, COM(2005) 666, 21.12.05

(see <http://ec.europa.eu/environment/waste/strategy.htm>).

²⁸ European Commission, *EU Waste Policy – the story behind the strategy*

(see http://ec.europa.eu/environment/waste/pdf/story_book.pdf).

provisions on by-products as non-waste and waste ceasing to be waste” (pp 424–425).

- 4.41. In June 2008, the European Parliament and Council of Ministers reached an agreement on the revised Framework Directive on Waste. This includes two provisions providing clarity on these topics, which have received support from the Government. The Government told us that the UK has “consistently supported the inclusion of an end-of-waste provision in the Waste Framework Directive throughout the negotiations on the Directive’s revision” (pp 425–426). Article 6 of the revised directive allows the Commission to specify environmental and quality criteria for waste materials which, if met, would mean that the materials will cease to be classified as waste.²⁹
- 4.42. The Government reported that most Member States also took the view that the revised directive should clarify the status of by-products as non-waste, “and took steps to ensure the inclusion of such a provision in the revised Waste Framework Directive” (p 426). The CIKTN and CIA supported the introduction of a “by-product” definition which would “help clarify the distinction between waste and product and therefore maximise efficient use of resources” (p 137). Professor Grimes concurred, suggesting that “waste should only be material destined for final disposal” and that “anything that can be re-used or recycled should be defined as a non-waste by-product” (Q 633). Article 5 of the agreed revision now provides that substances or objects resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste, but as a by-product, if certain conditions are met.³⁰
- 4.43. The Government clarified that the end-of-waste criteria that will be developed under the revised directive will have broadly the same objectives as the Environment Agency’s quality protocols, with two significant differences. Firstly, the Environment Agency’s quality protocols are national in scope and, “whilst they reflect case law established by the European Court of Justice on the definition of waste, they are non-statutory.” Secondly, the criteria adopted by the Commission “would apply throughout the EU and would be legally binding,” so if the Commission adopts criteria on a waste stream for which the Environment Agency has already developed a protocol, then the protocol will be superseded. By carrying out some of this work ahead of the Commission, the Government thought that the Environment Agency will ensure “the UK is well placed to make an effective contribution to the Commission’s development of EU-wide end-of-waste criteria.” Apparently the UK was already doing this, “in the context of the preparatory work being undertaken by the Commission’s Joint Research Centre in Seville” (p 426).

Recommendations

- 4.44. **Until recently, the legal framework has militated against the re-use of particular waste streams and we are glad that the need for clarification has been recognised. We welcome the revision of the**

²⁹ Directive of the European Parliament and of the Council on waste, 2008/.../EC (the revised version of the Waste Framework Directive, as agreed by the Council and the European Parliament, has yet to be published in the Official Journal).

³⁰ *Ibid.*, Directive of the European Parliament and of the Council on waste.

Waste Framework Directive and support the inclusion of articles which specify conditions for by-products and allow the development of quality criteria to clarify when waste ceases to be waste. We hope that these will result in greater exploitation of a wide range of resources.

- 4.45. **With the development of quality protocols by the Environment Agency and the Waste and Resources Action Programme, the UK is in a good position to contribute effectively to the development of end-of-waste criteria at the EU level and we urge the Government to continue to work closely with the Commission and other Member States to develop quality criteria as quickly as possible. We recommend that the Government should urgently provide clear information to UK businesses about the priority sectors and waste streams that will be considered first and the timeframe in which quality criteria will be developed for each material.**

Extended Producer Responsibility Regulations

- 4.46. The extent to which EPR regulations have driven real change in design and production processes is debatable. According to the waste management company Biffa, the implementation of producer responsibility regulations in the UK has been “disjointed” and as a result there is still no connection between end-of-life waste and the design and production process. In their view the failure of the Government to implement producer responsibility regulations fully has “resulted in a ‘lost’ two decades in which end-of-life management processes could have been integrated into the design and manufacturing process” (pp 341–342). Green Alliance added that producer responsibility schemes had not been wholly successful because responsibility had been fragmented and diluted “through the involvement of third party organisations” (p 281). Envirowise was also disappointed that the implementation of regulations had not “always achieved the optimal outcome” but suggested that producer responsibility legislation had at least “started to change attitudes in certain areas” (p 88).

ELVs

- 4.47. The ELVs Regulations appear to have had limited success at fostering an attitude of waste reduction within the automotive industry. The Society of Motor Manufacturers and Traders (SMMT) reported that the requirement to eliminate certain heavy metals meant the component supply industry has to work closely with vehicle manufacturers to inform them about the materials and quantities used. This has led to the development of the International Material Data System, a centralised database to share information, a facility which so many other sectors appear to lack. It has also prompted the creation of an ISO standard, ISO 22628, which manufacturers can use to calculate the recyclability and recoverability of their vehicles. SMMT thus felt that the practices put in place since implementation of the directive demonstrated “that good design, avoidance of waste and recovery at end-of-life are important considerations in the development phase” (p 356).
- 4.48. This was despite the fact that the Driver and Vehicle Licensing Agency had failed to implement a foolproof Certificate of Destruction system, “an essential component” of ELVs legislation, which meant that not all cars were being returned for recycling and re-use. SMMT felt that laws must be

correctly enforced, otherwise “those who comply often have to invest heavily whilst those who do not comply escape both investment and too often enforcement” (p 358). Despite this hiccup, Mr Steve Franklin, Senior Manager of the Environment Group at SMMT, felt that by and large the UK had seen “one of the more successful implementations of the ELVs legislation” (Q 731). However, the targets set by the directive had been set in terms of recycling and recovery and, as noted earlier, some witnesses felt that manufacturers had met the criteria by improving recycling techniques rather than truly redesigning their processes.

- 4.49. The automotive industry appears to be well aware of the importance of making their processes as efficient as possible. It could be argued that this is largely because the sector is dominated by big multinational companies who recognise their production costs and so minimise waste from a business perspective. For example, Toyota has been promoting the sustainability of its manufacturing plants for years and all of its European plants have obtained the ISO 14001 standard. They have also reached their waste reduction targets three years ahead of schedule and are planning to re-set them to achieve even greater efficiency. They felt that the ELVs targets had partly acted as an incentive, but they were already taking steps in this direction anyway.³¹
- 4.50. Thus, whilst the ELVs regulations have encouraged greater recycling, it is questionable as to whether they have acted as strong drivers to minimise waste.

Packaging

- 4.51. Packaging is a contentious issue which has attracted a great deal of consumer and media attention. Some of this attention is deserved as excess packaging was at one time a significant problem, within the food industry in particular. However, several of our witnesses argued that good progress had been made in recent years towards reducing this problem. When the Producer Responsibility Obligations (Packaging Waste) Regulations were first introduced, Mr Stephen Carter, Packaging Sustainability Director at Unilever, noted that “the whole packaging chain, from raw material manufacturers to retailers, really felt the pressure of gathering the data and putting the systems in place to gather the data. But that is all done now. Each corporation and retailer has data management systems that are efficient and they work” (Q 508). Ms Bickerstaffe, representing INCPEN, agreed that the system had been a success and the recycling targets set out by the European Commission were very likely to be met (Q 507). On the other hand, the SDC commented that the directive had “not put high enough costs on producers to force them to rethink product design” and the costs were “minimal compared to other business costs” (p 289).
- 4.52. There was more uncertainty about the success of the Packaging (Essential Requirements) Regulations. Envirowise thought that they “do help to reduce unnecessary packaging” but that “they do not appear to be well known or regularly enforced” (p 88). This was backed up by the evidence provided by Essex County Council, which pointed out that “the low number of successful actions taken against those responsible for putting over-packaged products on the market highlights the inherent difficulty in applying these regulations”

³¹ See Appendix 6.

(p 460). Similarly, the SDC thought that the regulations were poorly enforced and local trading standards departments were “insufficiently resourced to monitor for over-packaging.” They added that stronger and more effective implementation of the regulations was needed (p 289).

- 4.53. So again, as with the ELV regulations, the extent to which these regulations have really altered the mindset of businesses is dubious and further encouragement is needed.

WEEE

- 4.54. The WEEE Regulations were the cause of much criticism throughout our inquiry. Within the WEEE Directive a system of individual producer responsibility (IPR) was outlined which would make each individual manufacturer responsible for the take-back, re-use and disposal of their own products. Many Member States, including the UK, have failed to transpose this system of IPR into national law. Mr Tony Pedrotti, Director of the Sustainable Development and Regulation Directorate at BERR, told us that even though some countries had put IPR onto their statute books, none of them had implemented it (Q 43).
- 4.55. Despite its attraction as a concept, the difficulty arises in applying IPR in practice. This is partly a result of the waste collection system, as Mr Black pointed out: “we generally have a very unsegregated waste recovery chain which makes it very difficult” for manufacturers to take back their own products (Q 438). In fact, Mr Pedrotti remarked that trying to implement IPR in our current climate, which would require the collection, sorting and re-distribution of waste to manufacturers’ sites, might cause more damage than good to the environment (Q 42).
- 4.56. In practice, the collection, treatment and disposal of WEEE products is based upon a system of collective producer responsibility (CPR). Manufacturers register with a producer compliance scheme that disposes of their WEEE products appropriately and all brands are handled together. The proportion paid by each producer is dependent upon their market share. Dr Kirstie McIntyre, Head of Take-back Compliance at Hewlett-Packard, claimed that CPR made it even harder to re-use material. She explained that “what comes back is a selection of everybody’s equipment,” which comprises various different types of plastic and so “when you get this mixed selection, mixed bag of products back, it is very difficult ... to pull out enough to feed into a manufacturing process to really make a difference.” Although it appeared that local authorities had been collecting plenty of materials, the problem was that they were mixed and “the economics of unmixing them renders them economically impossible to do anything with later on” (QQ 303, 326).
- 4.57. Another complaint was that the WEEE Regulations were not sufficient to encourage innovation and promote waste reduction amongst businesses. Within the CPR system, there was no real incentive for a manufacturer to reduce his own waste as he could just make the payment for his market share and think nothing more about it. As Dr McIntyre succinctly explained, the problem was common to all producer responsibility directives because they “create a lowest common denominator, which is good, because it drags all of the laggards up to a good level, but it does not reward the innovators” (Q 295). In the view of the Electronic Producers Environmental Policy Forum (EPEPF), the introduction of IPR would provide producers “with a

powerful economic incentive to design those products in a way that makes them easier and cheaper to recycle or re-use,” but without this, “the incentive to encourage producers to focus on design for recycling is absent” (pp 457–458).

- 4.58. Larger companies who were keen to innovate, such as Hewlett-Packard, had established their own recycling schemes on a voluntary basis to generate the raw material for their production processes, but Dr McIntyre said that the law did not recognise these efforts. She acknowledged that an IPR system would not be suitable for every manufacturer, but felt that “for those manufacturers who do want to implement these systems we believe that the law should allow us to jump in there and get on and develop our systems, which currently UK law does not enable us to do” (QQ 303, 326). Mr Andrew Clack, Environmental Affairs and Corporate Social Responsibility Adviser at Panasonic UK, agreed that “ultimately producers would like to be responsible for their own waste and not for somebody else’s” and added that Panasonic had also made some IPR arrangements for computers in the UK. He acknowledged that IPR needed to be implemented “by sector or product grouping rather than universal” and that “for some products it works but for others we cannot see a practical way of making it work” (Q 330).
- 4.59. Some witnesses cited Japan as an exemplar country at implementing IPR (Q 315, pp 151, 154, 313, 458). However, industry should be reticent in making general comparisons with Japan because the market and product streams are so different. Unlike the EU, Mr Clack noted that Japan was “one homogeneous market” and the country had only focused on four product categories which made implementing IPR “far simpler.” Manufacturers in Japan also had a much stronger link to retailers, with around 80 per cent of end-of-life material being returned through retailers and only 20 per cent through municipalities; a situation which was “totally the reverse in Europe” (Q 329). Professor Stevels also questioned whether IPR in Japan had been a success, noting that it cost the consumer a significant amount of money to recycle products, “so even if you score a better environmental gain in that country the environmental gain over cost ratio in Japan is disappointingly low” (Q 335).
- 4.60. Although international examples could be useful, Dr McIntyre urged careful consideration of the best way to tackle this in Europe, noting that “there is no immediate solution that is a perfect fit for Europe” (Q 316). Furthermore, Professor Stevels commented that because regulations took a long time to be “introduced to the real world,” legislation was often based on conclusions that were out of date (Q 297). The United Nations University has recommended that the WEEE Directive should be simplified into “a basic framework and to leave the developments of standards of working to the field itself” to allow for developments in technologies and operations.³²
- 4.61. Mr Wicks, Minister for BERR, told us that the Government would like to implement IPR because it would provide an added incentive for companies to “think right from the first day of designing a product how to design, in a way that is sustainable,” but he acknowledged that the practical difficulties were large and they needed to work with producers in order to find solutions

³² United Nations University, *2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE): Final Report*, p 305.

(Q 854). In order to do this BERR had established the WEEE Advisory Board, a non-governmental public body, to assess the implementation of the WEEE regulations to date and assess the opportunities for implementing IPR.³³

Recommendations

- 4.62. **Collective producer responsibility directives have had limited success at encouraging sustainable design and often result in small technical innovations which increase recycling and comply with minimum standards, rather than fully embracing the principles of sustainability. However, we acknowledge that they do at least bring the subjects of sustainability and waste reduction to the attention of business and so their basic principles should be encouraged. We recognise that these directives must be developed on an international basis and recommend that the Government should work with the European Commission and EU Member States to review the ways in which these directives are applied so that they foster real innovation and encourage all businesses to continually reduce their waste.**
- 4.63. **We welcome a review of the implementation of the Directive on Waste Electrical and Electronic Equipment and support the establishment of the Waste Electrical and Electronic Equipment Advisory Board. Implementing individual producer responsibility will be a long and complex process, but will be crucial in establishing the direct responsibility necessary to encourage manufacturers to reduce their waste. We recognise that individual producer responsibility will be more appropriate for some products than others and it is important that the Government continue to consult stakeholders on the practicalities of such a system. Nevertheless, we believe that the time has come for action and recommend that the UK Government should take the lead in implementing true individual producer responsibility and, at the very least, should introduce it for those products for which industry requests it.**

A holistic approach to regulation?

- 4.64. Complying with just one piece of legislation can be difficult enough, but usually businesses have to consider regulations alongside many other pieces of legislation. Not only can this be time-consuming and complicated, it can be virtually impossible if different regulations present conflicting requirements.
- 4.65. Within the electrical sector, Mr Evans commented that Sony had to comply with regulations on EuP, WEEE and the restriction of chemical substances, but “those three pieces of legislation are all piecemeal ... you will get many cases when they are in contradiction to one another.” As an example, in order to reduce the amount of hazardous materials in their products they eliminated mercury from the backlights of personal computers, but in doing this they “had to increase the power consumption of the product to make the backlights as bright as they were previously.” The effect of one piece of legislation therefore had “unintended consequences” for other environmental aspects (Q 297).

³³ See <http://www.berr.gov.uk/sectors/sustainability/weee/WEEE%20Advisory%20Body/page43670.html>.

- 4.66. SMMT commented that modern vehicles have to comply with many legislative requirements, including “crash protection, material recovery, and the need to reduce weight to achieve carbon dioxide targets” but “these requirements often conflict with each other” (p 356). Mr Franklin often wondered whether each new regulation was developed in conjunction with other pieces of legislation but very often came to the conclusion “that it probably was not” (Q 723). As Mr Hardcastle explained, crash protection regulations not only required the use of more material which meant there was then more to dispose of, but it also made vehicles heavier so “the greater the conflict with the carbon dioxide emissions” (Q 722). Difficulties were also reported by Ford, which claimed that the combination of ELVs recycling targets and safety and air quality regulations limited the industry’s ability “to meet its principal environmental focus of reducing carbon dioxide emissions” (p 467).
- 4.67. As we have noted above, there was also concern that current regulations focused too much on the weight of waste going to landfill and did not consider the bigger picture of sustainability. As an example, although the Packaging Waste Regulations aim to reduce packaging by weight, Boots highlighted the fact that they “take no account of recycled material content, product wastage or the impact of different material types” (p 451). CIKTN and CIA also pointed out that weight-based targets can cause “perverse or unintended consequences” such as the light-weighting of packaging leading to the increased use of materials which are harder to recycle (p 137). Weight therefore is not necessarily the best way to define targets. The use of volume can also be problematic as waste can be compacted to varying degrees. CIKTN and CIA felt that decisions and policies should ideally be based on considerations of the whole life-cycle, although they acknowledged that “this remains difficult and costly to do in practice.” Instead they suggested that targets should be set depending on the material and product, perhaps using a combination of measures such as weight, volume and toxicity (p 137).

A weight-based success?

- 4.68. The Government’s landfill tax escalator will increase the standard rate of tax by £8 per tonne each year from 2008 until at least 2010–11 (p 3). Despite the criticism of other pieces of legislation it should be acknowledged that this tax, based on the weight of material, has been relatively successful at reducing waste according to many witnesses. Mr Merlin Hyman, Director of the EIC, described the landfill tax as a “fairly blunt driver but an effective one nonetheless” and he felt that the tax escalator had encouraged waste reduction (Q 220). Mr Jonathan Davies, Chair of the Waste Working Group at the EIC, agreed that the landfill tax had been “a tremendous success” (Q 226).
- 4.69. Some argued that the landfill tax was not costly enough. Ms Hill claimed that we “treat recycling as almost a waste disposal technique or alternative to waste disposal, not as an economic goal” and that more regulatory and fiscal measures were needed to encourage material recovery over landfill (Q 553). Mr Swain also suggested that “it still is cheaper, in certain areas, to dispose of to landfill inert construction demolition waste than it is to re-use or recycle it” (Q 772). A balance always has to be struck between discouraging waste without encouraging illegal disposal. Ms Ruddock, the Defra Minister, pointed out that although some areas of industry had asked her to “put it up

even more, drive this forward even harder,” other areas told her that they were already finding the costs difficult to bear (Q 846).

Recommendations

- 4.70. **The variety of waste regulations can conflict and be difficult for businesses, hampering those attempting to implement sustainable business solutions. We recommend that the Government should continue to work with the European Commission to promote an holistic approach during the development of new legislation, to ensure that full consideration is given to the impacts of any new legislation on the variety of sectors involved. It is vital that the Government also provide adequate guidance to UK businesses about how to comply with new regulations in conjunction with existing ones.**
- 4.71. **Whilst we acknowledge that the cost of landfill must be kept under constant review, we support the use of the landfill tax escalator as a blunt instrument to divert waste from landfill and hope that over time it will encourage businesses to embrace true waste reduction strategies.**

CHAPTER 5: THE CONSUMER PERSPECTIVE

- 5.1. Better design, new technologies and regulations are practical measures which can be implemented in order to encourage a more sustainable approach to production processes and construction projects. To reduce significantly the amount of waste that society produces on a permanent sustainable basis, a cultural change must also be effected. The attitudes of individuals and organisations must be altered so that waste is not just viewed as being costly, but as being socially unacceptable. When compared to the implementation of legislation or the setting of product standards, this is a more complex and subtle challenge to undertake, but one which is absolutely crucial.

A throwaway society?

- 5.2. In order to reduce the amount of waste we create, we must tackle the high rate of wasteful consumption to which our society has become accustomed. Whilst some products, such as carrier bags, are designed to become obsolete within a short amount of time, others are perceived to be obsolete because they have gone out of fashion. Dr Chapman from the University of Brighton lamented the large number of electronic products discarded, “the majority of which still perform their tasks perfectly,” but which are no longer desired by their owners (p 213).
- 5.3. This problem is particularly apparent within the textile industry, where the culture of “fast fashion” encourages consumers to dispose of clothes which have only been worn a few times in favour of new, cheap garments which themselves will also go out of fashion and be discarded within a matter of months. Mr Paul Ozanne, National Recycling Co-ordinator at the Salvation Army Trading Company commented that these garments “are quick to produce; the turnover is very fast; and the length of time they are able to be worn is very short” (Q 529). Furthermore, the rapid production of cheap clothes involves the use of low quality materials in garments of high complexity, which makes it difficult to capture any value from the material at the end of the garments’ lives. Mr Alan Wheeler, National Liaison Manager at the Textile Recycling Association, commented that “fast fashion” items were “harder to re-use” and that there was “not much thought about how recyclable an item is at the end of its useful life” (Q 527).
- 5.4. In recent years the Government have made good progress at encouraging the public, industry and local authorities to consider the ways in which they dispose of their waste, claiming in 2007 that recycling and composting had nearly quadrupled since 1996–97.³⁴ Yet whilst bringing recycling to the public’s attention is undoubtedly a good thing, there is a danger that the public may not understand the real need for waste reduction. The North London Waste Authority argued that “while recycling has undeniable environmental benefits compared to traditional waste disposal, it is significantly less beneficial than waste reduction or product re-use. Whilst the success of both national and local recycling promotion is to be applauded, the success of the recycling publicity campaigns has seen the ‘reduce’ and ‘re-use’ messages often overlooked by the public. As a result, there is a perception amongst the public that recycling is the best thing they can do for the environment. This can lead to a situation where excessive

³⁴ Defra *Waste Strategy*, *op. cit.*, p 10.

consumption is validated, provided the person undertakes a degree of recycling. This is reflected in the fact that total waste generated per household (including recycling) continues to rise” (p 482).

- 5.5. It is clear that more needs to be done to reduce the environmental impacts of our lifestyles. It would be overly simplistic to say that consumers must be encouraged to rein in their consumption, as the purchasing patterns which members of the general public display are now ingrained within the fabric of society. However, there is scope for providing consumers with more information about the sustainability of the products they purchase, so that they can make more informed decisions.

Informing the public

- 5.6. Mr Wheatley, Programme Director at the LGA, told us that members of the public appeared to be keen to adopt environmentally friendly behaviours but that there was “a great deal of confusion” about some of the environmental trade-offs that needed to be made, such as whether to buy a more energy-efficient product above keeping an older unit (Q 653). Other witnesses commented that consumers were often disproportionately concerned about specific sources of waste, without understanding the bigger picture. For example, many consumers were concerned about packaging. Ms Bickerstaffe, Director of INCPEN, pointed out that while the Courtauld commitment had been relatively successful at working with retailers to reduce packaging for food and drinks, one of its failings was that it had not addressed consumer concerns adequately. She argued that 97 per cent of products on the market were not excessively packaged but “sometimes it is not obvious to us as shoppers why it is packaged the way it is ... the consumer needs just one example of excessive packaging to jump from the particular and say all packaging is a waste of resources” (Q 496).
- 5.7. The CIWM added that it is important to “consider packaging from a full environmental cost perspective” as it can reduce wastage of goods or foods during transport or handling, and can prolong shelf life, all of which have considerable benefits upstream (p 337). Mr Carter from Unilever agreed that consumers did not always understand where the biggest environmental impacts of their products lay. He commented that whilst consumers could be concerned about the amount of packaging used, for example, for a shampoo bottle, they did not understand that the packaging was only responsible for around three per cent of the shampoo’s total carbon emissions. Instead, the majority of its lifetime environmental impact arises from “all the hot water that they heat to wash their hair. Asking them to turn the shower off while they lather their hair is far more effective than us trying to take ten per cent weight out of the packaging” (Q 512).
- 5.8. The CIWM thought that there had been a large focus on topics such as plastic carrier bags, disposable nappies and packaging, even though they constituted a relatively small part of the waste problem in the UK. They did acknowledge, however, that by changing public attitudes in these areas, it could “lead to altered awareness and performance in other areas with potentially even greater environmental impact” (p 337). Consumers had begun to question the sustainability of larger purchases; Mr Stokes from Volkswagen said that customers were becoming “far more aware” of how vehicles were produced and were asking for more information about how their environmental impacts could be minimised (Q 689). So it appeared

that the battle of hearts and minds was already underway, but the challenge for the future would be to provide consumers with the appropriate information. The problem, as it appeared to the Centre for Resource Efficiency and Management at Cranfield University, was that “consumers have no metric for the material and disposal costs of products and therefore cannot value any improvements in performance against these in their purchasing decisions” (p 33).

Eco-labelling

- 5.9. In order to provide customers with more information about the products they purchase, some witnesses suggested that eco-labels should be developed which would specify the types of materials used within a product and provide a rating regarding its sustainability. Although acknowledging that an eco-labelling scheme based upon full life-cycle assessments would be complex, Vitsoe suggested that such a system “would allow customers to make more informed choices” and would limit the extent to which companies could publicise their environmental agenda without backing it up with concrete waste reduction measures. They added that if eco-labels were to provide information about the predicted lifespan of a product, then it “would allow customers to make a decision based upon cost per year rather than directly comparing initial costs” (p 213).
- 5.10. Dr Cooper from Sheffield Hallam University noted that an argument could be made for the provision of such information because “consumers have a right to know the planned design life of products in order to enable them to identify products according to their intrinsic quality ... increased knowledge may encourage more consumers to choose products that last longer, thereby reducing waste from discarded items.” He added that if consumers were provided with information about the expected lifespans of products, then this might “also deter people from discarding products prematurely” (p 51). An eco-labelling system has already been implemented to indicate the energy efficiency of electrical products. According to Essex County Council, this system has “clearly resulted in an increase in the uptake of energy efficient products and there is no reason to assume this could not be replicated for waste reduction” (p 461).
- 5.11. Whilst Dr McDougall from Proctor & Gamble thought that eco-labels could be useful, he noted that there was a danger they could stifle innovation. If certain criteria were set in a fixed way, this could prohibit research and development teams from exploring new designs that may ultimately have less of an environmental impact. Therefore from an industry viewpoint, he thought that eco-labels would “have to be very carefully designed not to set a bar where people will reach the criteria and then not be able to go any further” (Q 524).
- 5.12. Within the information technology (IT) sector, Mr Evans, Senior Environment Manager at Sony, commented that “keeping pace with the technology as we issue new products is very difficult” (Q 348). It was for this reason that Dr McIntyre, Head of Take-back Compliance at Hewlett-Packard, preferred a self-declaration system for the provision of information to procurers of IT products. She described the IT Eco Declaration used in Nordic countries, which took the best of all the various eco-labels and integrated them with a set of “general customer frequently-asked questions” against which the manufacturer could self-certify their product. She claimed

that this system avoided the backlog that would inevitably develop if all manufacturers had to obtain verification from one body, especially at busy times of the year, so the time it took to get products to market had not been altered. In order to maintain standards, manufacturers contributed towards the cost of an auditing body which conducted spot-check audits (Q 346). The success of this system in assisting sustainable procurement could partly be attributed to the fact that it was developed by IT manufacturers themselves, “in response to increasing interest from public bodies in the Nordic region about the environmental attributes of products.” Hewlett-Packard suggested that industry-led self-declaration systems tended to be “more workable than externally imposed standards” which risked being arbitrary and unfairly benefited one supplier over another (p 151).

- 5.13. Some standards for environmental declarations and labelling already exist, which the BSI felt were the “first step towards ensuring the consumer can make an informed choice.” Nevertheless, they added that “while a number of presently used symbols are recognized by consumers, public understanding of what they mean is poor” (p 72). The issue of consumer comprehension was also picked up by Dr O’Connor from Ecodesign Centre Wales, who noted that a wide variety of labels were used across the world for so-called environmentally friendly products, but the range of labels was “quite confusing from the consumer perspective.” He added that any system would need to be standardised internationally (Q 393).
- 5.14. In reality it is debatable as to whether it is really possible to construct a label which can sensibly compare such different environmental impacts as power consumption, energy efficiency and resource efficiency. This difficulty is compounded by the fact that manufacturers often lack information on the properties of the materials they use (as discussed in chapter four). Furthermore, there will always be factors which cannot be accounted for within a label, such as the distance a consumer travels to collect a product, the mode of transport used and the way in which the consumer uses it. Ms Sue Dibb, Team Leader for Sustainable Consumption and Business at the SDC, commented that “you are not going to change consumer behaviour just by putting labels on products. There may be a point at which it is useful to communicate that information to consumers, but it must be information that they can understand and use” (Q 573).
- 5.15. Others were dubious as to whether consumers would really pay attention to a labelling system anyway. Dr McDougall noted that when consumers were questioned about their shopping habits and preferences, lots of people said “that they would pay more for green products or they would buy green products or environmentally friendly products” but what they actually saw in the marketplace was that “it is a combination of the lowest price and the best performance that closes the deal” (Q 511). The TSB reported that sustainability should not be considered above all other factors and noted that “as a general principle sustainable products should compete on technical performance.” Where performance is comparable, price will be the main consideration. They acknowledged that “there may be scope for a marginal price premium” which some consumers would be willing to pay, as had happened with organic and Fairtrade products, but they pointed out that these were still “niche markets.” In theory, more sustainable products should be able to compete on price if the full life-cycle costs are taken into consideration, but the TSB reported that consumers are “more motivated by the upfront cost of products, not the whole life cost” and due to the way in

which products are costed, consumers do not see the added value. Therefore, the TSB concluded that other initiatives were needed to make these costs apparent to consumers (pp 251–252).

Encouraging change

- 5.16. The provision of information is thus not enough on its own to encourage change. Essex County Council told us that “despite the almost universal acceptance and understanding of the need to recycle there still seems to be widespread ignorance amongst the public with regard to the concept of waste reduction or the need to take personal responsibility” (p 461). Consumers need to be educated about the importance of waste reduction in order to change, but their behaviours can also be steered by guidance from businesses and government. In the remainder of this chapter we explore some of the ways in which this can be done.

Choice editing

- 5.17. Part of the difficulty in getting the sustainable message across is that consumers are overwhelmed by the amount of information and choice they are presented with. Some witnesses therefore suggested that choice editing should be employed, which the Sustainable Consumption Roundtable described as “pre-selecting the particular range of products and services available to consumers.”³⁵ This is already practised to a certain extent by retailers and service-providers when deciding which products or services to offer, and by government when setting product standards. Whilst choice editing is already employed for issues such as energy efficiency, its use could be extended so that wider sustainability is given consideration in choice editing decisions. Ms Dibb explained that choice editing was required because a small number of “green” consumers would not be able to change markets on their own. Instead, the SDC believed that a wider, more inclusive approach was required; “we are not interested in a green niche that can afford to pay the extra for a premium-priced product. We are interested in all consumers, whatever their income levels, being able to have access to affordable more sustainable products.” Choice editing did not advocate providing no choice, but instead involved “shifting the frame of choice,” taking the least sustainable products off the market so that consumers could choose between the most sustainable options (Q 572).
- 5.18. Miss Hannah Hislop, Policy Officer at Green Alliance, argued that a greater use of choice editing would reduce the need for eco-labels because consumers could “be assured that they do not have to make these complicated decisions” and would not have to weigh up the separate considerations (Q 573). Dr Chilton from the National Consumer Council agreed that consumers “need to be able to choose between products that are sustainable, not between a sustainable product and an unsustainable product.” He added that although consumers “may be thinking about Fairtrade issues, organic issues, recycling issues” and might claim that these issues are important to them when questioned, in practice “most of us just deal with brand, price and convenience.” He was not against the provision of more information, but made it clear that “expecting that alone to achieve substantial behavioural change is extremely optimistic” (Q 514).

³⁵ Sustainable Consumption Roundtable, *I will if you will: towards sustainable consumption*, 2006, p 63.

- 5.19. Defra Minister, Ms Ruddock, said that choice editing underpinned some of the work that Defra was carrying out. She told us that “if we can persuade manufacturers and retailers to only stock the most efficient in whatever respect we are talking about, whether it is carbon, waste or whatever, then it makes it much easier for the consumer to make an appropriate purchase. There is obvious value in choice editing.” This type of work is usually carried out at the European level and Ms Ruddock cited the successful use of choice editing in setting energy efficiency standards for electrical items. She said that the A to G labelling system had “enabled people to make appropriate choices ... but what we now know is it is having an even bigger effect on the retailers themselves. In terms of their competition policies, they have ended up wanting to present goods at the top end of that scale rather than keeping the whole range and so now it is very unusual to find any product below about a C rating. So it has had a major effect on retailers and that is why we think that choice editing is a very, very good tool” (Q 872). She noted that a European review was underway to examine the ways in which labels could be used to convey environmental information, including not just energy efficiency but also end-of-life waste considerations and carbon assessments. There was debate on the best way to provide such information and Ms Ruddock thought that “choice editing gets us further often than you might obtain with labelling alone” (Q 873).
- 5.20. Once consumers have been educated about a certain issue, collectively they have the power to influence businesses. The North London Waste Authority pointed out that “as consumers are made aware of the environmental and social issues surrounding these products, they can choose to alter their shopping choices. This in turn creates a demand for products that manufacturers and retailers react to, investing in more sustainable products.” As an example, they cited the large growth in the sale of free-range eggs and organic products seen in recent years, which was a result of consumer preferences (p 482).

Recommendations

- 5.21. **There is widespread support for waste reduction and the development of a more sustainable society. A strong campaign to increase recycling has meant that the waste reduction message has been overlooked and consumers are often ill-informed about the environmental impacts of their products and the way they use them. We recommend that the Government should continue to work with the European Commission to examine the types of information that should be included on eco-labels and promote the development of eco-labels which are clear and easy for consumers to understand, but we are not convinced that the use of eco-labels alone will be enough to change consumer behaviour.**
- 5.22. **Following the successful drive to improve the energy efficiency of products, we believe that a similar strategy should be employed to encourage the purchase of more sustainable products which produce less waste. We recommend that the Government should encourage change by continuing to work with retailers to promote choice editing on the grounds of waste reduction. The use of voluntary sectoral agreements will be a useful strategy to encourage retailers to adopt this concept initially but, once established, we believe that consumer**

demand for the most sustainable products should drive businesses to stock products which achieve ever greater sustainability.

Financial incentives

- 5.23. Deposit schemes on packaging used to be widely employed to encourage consumers to return items such as bottles or cans, but these types of systems have now largely disappeared. Mr Workman, representing British Glass, explained that this was because the infrastructure had changed in the UK; years ago “almost every town had its own dairy, its own brewery, its own soft drinks company and they used to fill and distribute locally. In today’s world, if you take almost any product, like Budweiser or Stella beer, they are only filled in one or two plants in the country, so to build return containers from Aberdeen to London on Budweiser you are looking at huge environmental and commercial costs involved in doing that” (Q 265).
- 5.24. Mr Hindley from ALUPRO noted that a “cash for cans” programme still existed in which charities and individuals could receive around a penny for each can collected and returned, but he admitted that interest had waned since the mid-1980s as the reward was no longer so attractive to collectors. He added that many local authorities now provided kerbside collections “which are a more convenient option” to recycle waste (QQ 266–267).
- 5.25. Other methods therefore need to be employed to encourage consumers to think about their waste and shop more sustainably. In 2007, Marks & Spencer launched its Plan A business plan, the aim of which is that by 2012, the company will become carbon neutral, send no waste to landfill, extend sustainable sourcing, set new standards in ethical trading and help customers and employees live a healthier lifestyle. One of the strategies it has employed involves charging consumers for the purchase of plastic carrier bags at tills and donating the profits to an environmental charity. The company said that during trials of this scheme in Northern Ireland and the South West, customers’ use of food carrier bags dropped by over 70 per cent, so the company had decided to implement this scheme nationally.³⁶ Mr Mike Barry, Head of Corporate Social Responsibility at Marks & Spencer, said that the company had not only provided the “stick” of the five pence charge for a bag, but had also provided a “carrot,” by offering customers a free “bag for life” before charging was introduced (Q 540).
- 5.26. The company had decided to use incentives as well as penalties. In January 2008 the company launched its “clothes exchange” which encourages customers to donate their clothes to Oxfam by rewarding them with Marks & Spencer gift vouchers. In March, Mr Barry said that it was too early to provide detailed statistics about the project but was adamant that it had been a success, both in terms of changing consumer attitudes and in business terms for the company. He told us that “tens of thousands of Marks & Spencer customers have bought into a different kind of model. Oxfam are seeing a significant uplift in their sales; we are seeing a significant diversion of clothing from landfill; and Marks & Spencer has seen the benefit of more customers coming back to its stores rather than going to its competitors. It is a toe in the water. I am not going to sit here and say that it has revolutionised the whole approach to consumption in the UK, but it is an interesting model around what you can do. We have therefore given the consumer an incentive

³⁶ Details taken from <http://www.marksandspencer.com/gp/node/n/50890031/>.

to change” (Q 540). He added that “there are different ways to start to engage consumers in change. It is a long, hard journey, but you have to start changing your business model” (Q 541). Although these are only small steps towards tackling consumption and excessive waste, they highlight that opportunities exist for businesses to encourage waste reduction through the use of new approaches and sustainable business models.

Emotional attachment

- 5.27. Dr Cooper explained that while products “may be attractive at the point of sale ... people still get fed up with them” (Q 79). Hence the key might be to make consumers keep their products for longer. One way to do this is to encourage them to form emotional attachments to their products, something which requires the ingenuity of designers. Dr Chapman explained that “the ‘design for durability’ paradigm has important implications beyond its conventional interpretation, in which product longevity is considered solely in terms of an object’s physical endurance—whether cherished or discarded. In this sense, it can be seen that durability is just as much about desire, love and attachment, as it is fractured polymers, worn gaskets or blown circuitry.” To him it was “clear that there is little point designing physical durability into consumer goods, if consumers lack the desire to keep them.” He proposed that if electronic products were designed for consumers to keep for longer, they could be “transformed into conversation pieces—linking consumers to producers, though an ongoing and sustained dialogue of service, upgrade and repair.” If appropriately managed, he suggested that such a strategy could form “part of the solution to issues of sustainability and design; enabling business to continue generating revenue whilst reducing the frequency of need for further costly manufacturing, resource extraction, energy consumption, atmospheric pollution and waste” (pp 213–214).
- 5.28. The use of repair work was on the decline though. Dr Cooper cited evidence which suggested that the average household only spent around 60 pence per week on repair, a figure which he described as “virtually nothing.” He thought this was partly because many products were more reliable than in the past, but also because people had lost the sense that products were investments for life; “they buy them, move the old ones out and get new ones in.” Part of the difficulty, as he explained, was that “all too often the price of new products has come down as the products are made in countries where labour costs are very low, but they would have to be repaired in a country where labour costs are relatively high—the so-called ‘repair cost scissor’.” As retailers and repair shops are usually different companies, there is often no real incentive for retailers to encourage repair instead of replacement (Q 94).
- 5.29. A word of warning was also given by experts from the Centre for Resource Efficiency and Management at Cranfield University who noted that “the relationship between products, people and waste is a complex psychological one” and that “as we have become conditioned to seek value in ourselves as individuals and in social groups through the purchases we make, we can expect any attempt to reposition this relationship to be socially challenging” (p 33). Understanding the factors which drive consumers is crucial. Mr Black, Network Director at the REKTN, said that “when we are putting together collaborative research programmes now, we try to insist on the Economic and Social Research Council (ESRC) being involved. The ESRC are responsible for giving the psychological bit of the debate: ‘can you alter consumers’ perception within this project?’ You can make something that is

really clever or you can make something that is 100 per cent recyclable but unless you can persuade the public to buy it, the research is pretty useless” (Q 455). ESRC research had shown that “a concerted strategy is needed to make behaviour change easy: ensuring that incentive structures and institutional rules favour pro-environmental behaviour; enabling access to pro-environmental choice; engaging people in initiatives to help themselves; and exemplifying the desired changes within Government’s own policies and practices.” Summing up, Research Councils UK added that “consumers want more reliable information on the impacts of the products and companies. They also want to know which impacts to prioritise when comparing products. Consumers need clear direction through incentives and disincentives rather than just education” (pp 225, 227).

Recommendation

- 5.30. **We recognise that addressing the multitude of practical and psychological issues which influence consumer behaviour is a complex and difficult task, but businesses are well placed to implement measures which encourage consumers to adopt more sustainable behaviours. Waste could be reduced if consumers were encouraged to retain products for longer and repair them when necessary, but this is usually an uncompetitive strategy and businesses cannot be expected to promote something which leads to a reduction in profits. Business models must therefore be developed which are both sustainable and profitable. Such strategies might include the production of modular products which can be continually added to and upgraded, or schemes that reward customers for recycling but which also foster brand loyalty. If repair work is to be encouraged, changes to the Value Added Tax regime may be required. We therefore recommend that the Department for Business, Enterprise and Regulatory Reform should work with retailers and academia to promote the use of sustainable business models and must review the range of policies and incentives required to accelerate their implementation.**

A joint approach

- 5.31. According to Essex County Council, “better design and the use of materials without fiscal measures or actions which limit consumer choice will only influence consumer behaviour if there is a public groundswell against inefficient use of materials ... the ultimate goal should be to ensure high waste generation whether it is by the public or manufacturers is seen as socially unacceptable. This will only be achieved through an effective, continuous and high profile national public awareness campaign” (p 462). EEF told us that “at the moment the consumer lacks the right information and has little choice about the environmental footprint of their purchased products” (p 118). Essex County Council thought that “a key role of Government needs to be to develop and fund an overarching national waste prevention message over a long period. Such a message must tap into the public consciousness and make use of the drivers which influence public behaviour in this area, many of which may not be associated with environmental concerns. As with all campaigns aimed at changing behaviour it is essential that these are carried out over an extended period and properly resourced” (p 461).

- 5.32. In order to tackle consumption, Dr Cooper suggested a voluntary approach in which the Government could lead a multi-stakeholder debate within key industry sectors “to promote the use of life-span labelling, encourage longer guarantees to signify increased durability, and develop industry standards and codes of conduct on life-span labels and the availability and fair pricing of spare parts.” He pointed out that certain technical issues would need to be resolved, such as whether product life-spans should be measured in periods of time or cycles of use. Clarification would also be needed about manufacturers’ obligations, such as whether life-span labels would “make manufacturers liable to pay all costs relating to disrepair during the period in question” or whether allowances could be made for normal wear and tear (p 51).
- 5.33. The Sustainable Consumption Roundtable, a joint project between the Government, the SDC and the National Consumer Council, brought together experts in consumer policy, retailing and sustainability to advise the Government on how to create consumer choices that “stay within environmental limits.” Its report, *I will if you will: towards sustainable consumption*, identifies that in order to become more sustainable, efforts must be made by all three groups: government, business and the general public. Whilst none of these groups can take the lead alone, the Roundtable felt that “a co-ordinated approach can create the opportunities and responsibilities to accelerate change.” It also highlighted that “the focus needs to be on creating a supportive framework for collective progress, rather than exhorting individuals to go against the grain.”³⁷
- 5.34. In January 2008, Defra published its *Framework for Pro-Environmental Behaviours*³⁸ which had been developed “in order to improve the support Defra and its delivery partners give to consumers.” This covers a range of environmental issues including energy, waste, water, air quality and biodiversity. The Government reported that “this new evidence base and social marketing framework for pro-environmental behaviours change includes a set of behaviour goals (agreed with stakeholders), new research on current and potential behaviour, an environmental segmentation model and an assessment of the implications for policy” (p 428). At the moment its two headline goals for waste are to “increase recycling and segregation” and to “waste less food.”³⁹ Although these do not specifically address the high rate of consumption of non-food products, they demonstrate that the Government are beginning to take the right approach to changing consumer behaviour. The report recognises that:
- “in essence, we should aim to encourage and support more sustainable behaviours through a mix of labelling, incentive and reward, infrastructure provision and capacity building (e.g. through information, education and skills). Greener consumers can help to build markets and establish new behaviours before they are taken up by the mainstream. The most unsustainable behaviours, including the consumption of poor performing products, can be discouraged through a mix of minimum standards, tax/penalties/grants and choice editing (including voluntary action by producers and retailers). We can help to

³⁷ Sustainable Consumption Roundtable, *I will if you will*, op. cit., p 1.

³⁸ Defra, *A Framework for Pro-Environmental Behaviours*, 2008.

³⁹ *Ibid.*, Defra, *A Framework for Pro-Environmental Behaviours*, p 27.

move consumers further along this spectrum by ensuring that government leads by example and widens the mandate through policy debate and support for innovation (in products and consumption patterns).”⁴⁰

Recommendation

- 5.35. **We endorse the message of the Sustainable Consumption Roundtable’s report, *I will if you will*, that in order to reduce consumption, a joint effort from government, businesses and consumers is required. Whilst the Government’s *Framework for Pro-Environmental Behaviours* outlines a good approach to address consumer behaviour we urge the Government to follow this up by using its approach to reduce the wastage of a wider range of products, rather than just food.**

⁴⁰ *Ibid.*, Defra, *A Framework for Pro-Environmental Behaviours*, p 21.

CHAPTER 6: WASTE REDUCTION AS A BUSINESS OPPORTUNITY

Recognising the cost of waste

- 6.1. In 2003, a report produced for the Environment Agency concluded that around £2–2.9 billion of the annual operating costs of UK businesses could be saved if best practice waste minimisation procedures were implemented.⁴¹ Waste reduction practices are, in general, inherently good for business. Professor Stevels, an Environmental Adviser, pointed out that during his time at Philips, “75 per cent of the environmental projects have been very profitable.” This is because there is a “direct connection” between using less energy, materials or packaging and a reduced cost (Q 292).
- 6.2. The IoM said that “the business conception is that the adoption of sustainability involves a cost, because this is easily identified and measurable. However there is insufficient understanding of the benefits, because the methodology for estimating these is not well developed and there is not an obvious way of itemising these benefits in the company accounts” (p 318). Mr Michael Glass, Chief Executive Officer at the Process Industries Centre for Manufacturing Excellence (PICME), explained that waste reduction processes are “basically good common sense” which involve “a structured approach of problem solving, simplifying and defining processes, standardising certain things so that they are done repeatedly the best way.” He felt that many organisations provided advice, such as the Manufacturing Advisory Service or sector specialist industry forums, in addition to a multitude of internet resources. “So getting that access to basic information is not difficult. Understanding how to apply it and actually doing it is the main issue and a lot of that is cultural.” Although managers are likely to have heard of waste reduction strategies, “they will not necessarily truly understand how it applies to their specific environment” and “will struggle to see what that means for them in their particular circumstance” (QQ 155, 163).
- 6.3. Getting this message across to business is therefore key. According to Mr Glass, the single biggest barrier to reducing waste is the lack of awareness amongst senior management of the real potential for improvement. “Many are carrying on doing things the way they have always done and have not been particularly receptive to learn.” He described the work he had undertaken with one company, “where 14 per cent of the material going through the process ended up as waste.” The company expected this wastage because their process aimed to produce an extremely pure product, which would inevitably produce some waste, but “they had no way of gauging whether a 14 per cent loss was good or bad.” It was only when questioned that they, “after some persistence,” agreed to assess their process. The end result was to reduce their waste from 14 per cent to four per cent. Mr Glass felt that “very often people are very busy and the simplest thing to do is to carry on doing what they have always done, and to make improvement one has to make time, to stand back and to re-examine how things are done; to

⁴¹ Cambridge Econometrics and AEA Technology, *The Benefits of Greener Business: Final report submitted to the Environment Agency*, 2003.

go through a thorough structured approach of mapping and measuring and challenging why things are done a certain way” (QQ 155, 163).

- 6.4. Envirowise agreed that “very few people in business seem to appreciate the need to reduce resource use or that their purchasing decisions have an effect on the use of resources.” They added that “even people who do want to reduce resource use may not have information on how to do it” (p 86). PICME agreed, noting that “many companies are unable to see the potential scale of their improvement opportunity or their improvement efforts fall short through weaknesses in their approach. The majority of operating sites are also now very resource constrained ... and struggle to find time to learn the best ways to improve without external support” (p 85). The BRE has been working with companies to set benchmarks for the overall amount of waste produced within a certain floor area. As Ms Hobbs, Director of Resource Efficiency at BRE explained, “waste reduction is not tangible because you are trying to quantify something that no longer is there,” so it is important to have measurements to enable businesses to recognise the cost of their waste. She said that “the critical thing everybody is trying to work out is: what is the business case? If I invest this much in terms of waste reduction activities, am I going to get the money back myself in terms of reduced waste costs?” (Q 743).

SMEs: a special case?

- 6.5. The most recent survey of commercial and industrial waste estimated that nearly 68 million tonnes of waste was generated in England in 2002–03. According to an unpublished analysis, Ms Ruddock, the Defra Minister, reported that of this total figure, where employee size of the businesses were known, around 15 per cent of the waste was produced by companies with fewer than 10 employees and around 37 per cent was produced by businesses with 10–100 employees.⁴² Promoting the waste reduction message to SMEs is therefore a difficult but important task.
- 6.6. During our visit to Belgium we visited OVAM, the public waste agency for the Flanders region, which has been particularly successful at engaging with the business community to promote waste prevention. The agency has developed an “ecolizer” tool, aimed at designers, to help them assess the sustainability of the products they design. Their series of ecolizer charts display eco-indicators, based upon life-cycle assessments, which provide simple, easy to understand information on the emissions and resource inputs of materials and production processes. OVAM has also conducted a series of prevention programmes which disseminates information to SMEs, shares the experiences of companies implementing prevention measures and supports research.⁴³
- 6.7. OVAM’s Eco-efficiency Scanprogramme encourages SMEs to invest in eco-efficient policies which combine environmental profit with economic advantage. This voluntary programme offers a free initial audit conducted by external consultants, followed up again after six months and one year, which identify areas which businesses can improve upon. One of the most commonly identified aspects involves waste prevention and separation and Mrs Katrijn Siebens, Head of Waste Prevention at OVAM, told us that

⁴² Written Answer to the House of Commons, HC Deb 4 March 2008 col 2285W.

⁴³ See Appendix 6.

SMEs do not always have a clear idea of where their waste is due to poor recording systems. SMEs often reported that the scan questions their preconceptions and “opens the eyes.” OVAM has also developed a tool for Flemish SMEs to calculate the costs of their waste, which has demonstrated that true waste costs can be up to 10 times higher than the visible costs of disposal. Perhaps most useful of all, the agency has developed benchmarking techniques which enable businesses to compare their resource efficiency. OVAM’s Inspiration database holds information from over 250 companies which have implemented successful waste reduction practices and design for sustainability. Furthermore, an internet-based tool has been developed which allows local authorities to assess their consumption patterns and procurement policies.⁴⁴

- 6.8. Mr Davies from the EIC hoped that once businesses started to look at waste management costs, “they will realise then that the real cost is in the materials that they have bought and then thrown away, which is probably 10 times the cost of the disposal of it.” He commented that large companies may have dedicated staff to examine resource efficiency, might be registered with environmental auditing schemes or produce corporate social responsibility reports, all of which “draw attention to what they are doing and are a driver to improve them” (Q 226). In comparison, smaller companies usually do not. Mr Stace, EEF, noted that “something like 42 per cent of SMEs do not have recycling ever on their board agendas so if it is not on the agenda they are not talking about it and they are not doing anything ... If you are a small organisation, a small company, where do you go to get the right information for what you are trying to do or your production process? That is the barrier. You might know what you need to do, but sometimes you do not know how to action it and achieve it” (Q 218).
- 6.9. Generalisations of “large” and “small” companies can often oversimplify the situation. Dr O’Connor, Director of the Ecodesign Centre Wales, pointed out that “they are not all the same—there are a lot of innovative SMEs out there. If you take a particular sector, for example, like food and drink ... there are loads of small businesses in Wales innovating in terms of packaging and in terms of new products in the food and drink sector. Likewise in fashion and textiles ... The key thing is it depends on the culture of the company, location and the sector in which they operate.” Dr Bhamra, Loughborough University, countered that “SMEs are a good place to innovate, but they do not have the skills and expertise in sustainability. There are a few examples where SMEs have done this but that will be down to an individual who is committed and wants to do this. On a general day-to-day basis, they are often short of staff and do not have the designers with specialist knowledge ... giving them the skills in order to make these changes in sustainable design is the challenge ... they can do it but it is down to resources” (Q 379).
- 6.10. According to EEF, government organisations promote the potential cost savings from waste minimisation initiatives, “but these figures do not always take into account the ‘hidden’ costs, for example the administrative costs or man-hours, of implementing such measures. This can lead to scepticism and provide a barrier to greater uptake by business” (p 117). Mr Sexton from Laing O’Rourke felt that businesses needed clarity and consistency in the

⁴⁴ *Ibid.*

advice that was provided by various support bodies. He said that Laing O'Rourke, as a large firm, could cope with information coming from different sources as they had a team of people who were experts in it, but he wondered "whether much smaller firms are capable of doing it in the way that we can because we are able to devote the resources to it." As resources may be lacking, Ms Lesley Seymour, representing the ICE, thought that the important point was to "instil the correct process into a business such that it becomes part of their culture to be resource efficient" and to provide SMEs with simple guidance and clear procedures (Q 811).

- 6.11. Mr Holbrow, representing the FSB, admitted that "the problem is the perception amongst small businesses." He commented that "there is lots of information there, there are lots of things that people should do but the perception is amongst the owners of small businesses that there are so many other things they have to do that they do not necessarily see waste reduction as a way of increasing profits" (Q 156). Nevertheless, Mr Holbrow was also keen to point out that SMEs did not deserve a lot of the criticism they received about waste. A recent report by the FSB surveyed 1,700 SMEs and showed that 83 per cent of them "actively engaged in waste minimisation and recycling." It stated that "the key problem for many small businesses has not been apathy but lack of awareness of what they can and should be doing to seek effective environmental solutions to waste disposal and other areas." The report acknowledged that "the picture is not entirely rosy, and small businesses are still very much hampered by time, the size of their business and the complexity and raft of legislation emanating from the EU on the environment." The report's conclusion was that "small businesses tend to be innovative and adapt quicker to change than large companies. They could readily make use of new technology and develop new markets however, the onus remains on the Government to improve and increase investment into research and development and provide clear, simple and timely guidance on the opportunities available and the steps small businesses need to take to mitigate negative effects on their businesses."⁴⁵

Business advice and support

- 6.12. The Government fund a range of delivery bodies which help businesses avoid or minimise waste. Some of the most commonly cited bodies are Envirowise, the National Industrial Symbiosis Programme (NISP), the Waste and Resources Action Programme (WRAP) and the Market Transformation Programme (MTP). The Government described the roles of these bodies. Envirowise "provides free, confidential advice to UK businesses on reducing environmental impact, including on-site audits by expert technical advisers, a dedicated telephone help-line, best practice guides and tailored business support packages." NISP performs a slightly different function and "identifies business waste with value as a raw material for other operators" thus improving the sustainability of processes and helping to increase the profits of operators. WRAP "encourages businesses and consumers to be more efficient in their use of materials" by, for example, promoting the use of recycled materials above virgin, whilst the MTP "works with government, business and other stakeholders to improve the design of products and services, such that they use fewer resources in manufacture and use, and

⁴⁵ Federation of Small Businesses, *Social and Environmental Responsibility and the Small Business Owner*, 2007, pp 4-5, 8, 9.

result in less waste at end-of-life” (p 4). In addition, BERR’s Manufacturing Advisory Service helps manufacturers to share knowledge and improve productivity, the Business Link network provides general information and links to all of these bodies, and trade associations also disseminate information to their members.

- 6.13. Mr Stace said that these support bodies had experienced problems in the past. He felt that the people carrying out the audits did “not really understand the process” so did not add any value to what the companies already knew. However, he acknowledged that this was beginning to change and bodies were acquiring a better understanding of sectors, “sending in more specialists, helping them achieve what they are setting out to do.” EEF was working very closely with Envirowise, the Carbon Trust, NISP and the Manufacturing Advisory Service “to effect that change” (Q 221). NISP reported that it was “the first and only industrial symbiosis initiative in the world to be operated on a national scale” and that its approach had attracted international attention, diverting over 1.8 million tonnes of waste from landfill, saving 5.4 million tonnes of virgin materials and generating more than £99 million in additional industry sales in the 2005–07 period (p 89). Envirowise claimed to have helped businesses save £297 million in 2006 by a variety of measures, including reducing solid waste by almost 550,000 tonnes and using 84,000 tonnes less raw material (p 86). These bodies are therefore helping businesses to increase their profits as well as reduce their waste.
- 6.14. In addition, the Design Council’s *Designing Demand* service for SMEs is “working to embed sustainable practice at its heart.” As part of this service, a mentoring scheme is provided by “design associates” which advise businesses according to their needs, raise awareness and “signpost businesses to other resources around complex sustainability issues” (p 178). Ecodesign Centre Wales thought that transferring the knowledge and experiences of larger businesses and other stakeholders, such as research centres, non-governmental organisations, academia and support services, was crucial in moving towards “a culture where all stakeholders view waste as a resource” (p 182). Dr O’Connor told us that the Ecodesign Centre had therefore been supporting commercial support partnerships in which larger companies transferred knowledge to smaller enterprises. For example, Panasonic in Cardiff had been working with the Centre to transfer their knowledge and expertise to a small electronics business in Wales (Q 364).
- 6.15. Knowledge also needs to be shared between SMEs themselves and Mr Holbrow said that in regional FSB meetings, “if there is a piece of information that will make life easier for one business they will quite readily share it with the next business.” He made it clear that the initiative to share knowledge had to come from the businesses themselves; “for it to work it has to be generated in the small business world, from the small businesses themselves; they have to see the benefit of it and the need for it” (QQ 170–171).
- 6.16. Mr Black thought that the REKTN also had a role to play in engaging with SME communities, saying “that is essentially what we are there for. We provide the advice and support and we act as an honest broker, if you like. We have also been quite successful in getting a number of SMEs to collaborate together to address a problem.” He acknowledged that SMEs “tend to be very interested in what is hurting them now rather than the innovation of their business for tomorrow,” but by establishing a working

relationship and helping them to solve their immediate problems through bodies such as NISP, they could then start to consider more innovative alternatives for the future. Mr Black added that the REKTN programme was entirely free, funded from the TSB, and signposted businesses towards funding activities such as grants for research and development (QQ 463–464).

- 6.17. Dr Hedges said that for SMEs interested in technological innovations, the EPSRC has “a number of support schemes to engage them through research projects or through collaborations in our various research activities.” He added that the vast majority of SMEs were not interested in this though, so the key was to promote engagement with university research bases to make them aware of the opportunities that existed. Dr Hedges felt that the Knowledge Transfer Partnerships (KTPs), which place newly qualified graduates in companies, were useful “because that provides them with an additional member of staff to get state-of-the-art knowledge from a university company” and it also provides very good training for the graduate. Dr Whittall from the TSB noted that 86 per cent of the KTP schemes involved the participation of SMEs and added that they were “looking to double the number of KTPs over three years” (QQ 461, 463).
- 6.18. Local authorities also play an important role in providing business support at a local level. According to a survey conducted for the business support website NetRegs, 49 per cent of businesses contact local authorities about environmental issues and around 25 per cent of businesses see local authorities as the most valuable source of environmental information.⁴⁶ In 2006, a consortium formed between the LGA, NISP and Oxfordshire County Council established the BREW Centre for Local Authorities, a central support service for local authorities. This Centre commented that “if a business is willing to consider behavioural change it is important for local authorities to be in a position to harness that willingness and be able to support and enable the means by which change can happen.” The Centre has supported a number of projects led by local authorities and claims that their results demonstrate “how local authorities, whether taking a strategic or direct role in supporting businesses to improve the use of their resources, can have a significant impact in reducing waste to landfill, reducing carbon emissions and importantly decoupling economic growth from environmental protection through enabling financial savings” (pp 452–453, 456).
- 6.19. In addition, the Centre reported that Regional Development Agencies (RDAs) “look to work with local authorities to translate national and regional demands into local action ... supporting resource efficiency advice for SMEs through the Business Link organisation, and through their role in regional co-ordination of business resource efficiency activity” (p 456). Along with KTPs, Dr Hedges said that RDAs act as useful agents distributing information about research opportunities as they have “much better links direct to SMEs than we do” (Q 461).

⁴⁶ Environment Agency, Scottish Environment Protection Agency and the Northern Ireland Environment and Heritage Service, *SME-nvironment 2007: UK summary*.

(See http://www.netregs.gov.uk/commondata/acrobat/smenvironment07uk_1856733.pdf).

Co-ordination of business support bodies

- 6.20. The range of various bodies and schemes appear to be carrying out good work to support businesses implementing waste reduction practices, but questions were raised over whether there was any duplication of work. Dr Liz Goodwin, Chief Executive of WRAP, said that “I think we have all got very clear remits, but we do work very closely together ... For example, with Envirowise we are both working with the construction sector and with the retail sector and we are currently developing a joint business plan for 2008.” This meant that these programmes would be delivered as a single joint programme and businesses should get a seamless approach (Q 190).
- 6.21. Dr Martin Gibson, Director of Envirowise, said that Envirowise did ensure “that when our advisers are on the ground they do signpost to other organisations where necessary. It is very much our feeling that it should not matter who the company comes to or which body the company comes to, they should get the right advice and we pass them on as necessary and as appropriate.” Similarly, Mr Peter Laybourn, Director of NISP, acknowledged that “we do in fact have very similar objectives but our approaches are very complementary and very different. I do believe it is a bit of an urban myth that there is an overlap here; we certainly have not found it. We are working very closely with Envirowise particularly at the regional level and we support WRAP in their excellent work on waste protocols with the Environment Agency” (Q 190).
- 6.22. Industry was less clear about their different roles. EEF thought that the service offered by various bodies was invaluable, but that “to the business community it appears somewhat confusing, particularly where remits appear to overlap” (p 117). The EIC agreed, adding that it had come to the point where there were “too many cooks,” some of which were “attempting to attract the attention of the same businesses” which caused “confusion in terms of where to access the best support” (p 114). The CIWM concurred and suggested that “there is considerable scope for better co-ordination and communication between business support bodies ... CIWM would like to see one BREW funded body take the lead in this area” (p 340). Within the construction sector, Mr Rainer Zimmann, Associate Director at Arup, thought that “there are too many government bodies that have started providing the industry with advice ... particularly smaller companies probably feel that it is difficult to catch up with all of this” (Q 811). This was supported by Mr Cal Bailey, representing the Specialist Engineering Contractors’ Group, who felt that all the sources of advice were confusing for smaller businesses and that “the idea of having a single source for that could be very attractive” (Q 812).
- 6.23. BERR Minister, Mr Wicks, said that “we recognise in Government that the number of different schemes to support businesses, not just on this issue but on a whole range of issues, has grown like topsy. To be blunt, it is confusing, there are far too many, indeed there are an estimated 3,000 such schemes.” The Government’s Business Support Simplification Programme is therefore trying to streamline these to around 100 schemes by 2010. Mr Wicks added that “Government as a whole spends about £2.5 billion a year supporting business, 40 per cent of which is local funding. I think by rationalising them and by focusing on Business Link as the primary access point, we can help businesses in general, and I think there will be knock-on effects [for waste reduction]” (Q 835).

Funding of business support bodies

TABLE 1
Funding for Delivery Bodies

	2005–06	2006–07	2007–08	2008–09
Envirowise	£15.542m <i>Comprising:</i> £12m – BREW programme £2.292m – other Defra programmes £1.25m – DTI programmes	£20.002m <i>Comprising:</i> £17m – BREW programme £2.292m – other Defra programmes £0.710m – DTI programmes	£22.19m <i>Comprising:</i> All BREW programme	£9.390m
Market Transformation Programme	£4.27m <i>Comprising:</i> £2.7m – BREW programme £1.57m – other Defra programmes	£4.68m <i>Comprising:</i> £3.17m – BREW programme £1.51m – other Defra programmes	£4.8m <i>Comprising:</i> £3.895m – BREW programme £0.905m – other Defra programmes	£2.75m
National Industrial Symbiosis Programme	£2.675m <i>Comprising:</i> All BREW programme	£5.7m <i>Comprising:</i> All BREW programme	£8.25m <i>Comprising:</i> All BREW programme	£5.025m
Waste and Resources Action Programme	£68.147m <i>Comprising:</i> £2.701m – BREW programme £5.620m – Aggregates Levy Sustainability Fund £59.826m – other Defra programmes	£57.888m <i>Comprising:</i> £5.736m – BREW programme £2.607m – Aggregates Levy Sustainability Fund £49.545m – other Defra programmes	£59.012m <i>Comprising:</i> £12.174m – BREW programme £2.7m – Aggregates Levy Sustainability Fund £44.1383m – other Defra programmes	£43.223m <i>Comprising:</i> £39.973m – Core Defra Funding £3.25m – Aggregates Levy Sustainability Fund

Figures are given for England only. Envirowise, NISP and WRAP also receive funding from the Devolved Administrations. From 2008–09 there will be no separate BREW programme of funding, although a number of BREW-type activities will receive funding as part of “core Defra” programmes (pp 430–431).

6.24. The continuity of business services was a matter for concern following recent cuts in funding (see Table 1). Defra Minister, Ms Ruddock, explained that the reason for these funding cuts was two-fold. First, the investment had originally been made “to develop these fields, to develop business resource efficiency, and to pioneer work of this kind” and good progress had been made in doing that. She thought that some of the programmes had “probably reached the end of their natural life and would not require the same level of funding or perhaps funding at all.” Second, she said that the Government

had taken the decision “that we should rather reorientate our approach so that we would not give support to business which is on a one-to-one basis or direct business support to a particular company. What we are doing now through all these delivery agencies is providing the evidence about how something should be done, and therefore we can offer that expertise involved with business so that business can make its own progress.” Ms Ruddock thought this a reasonable strategy because businesses are now much more aware of their environmental impacts and the importance of resource efficiency, and she confirmed that “we will not have the direct agency to business funding in the same way.” The Government were also asking delivery bodies to consider whether they should charge for some of their services. Ms Ruddock cited the example of the Carbon Trust which had been “raising more and more money from the private sector and complementing the public money that they spend” (QQ 827, 834).

- 6.25. By contrast, witnesses suggested that direct contact was exactly what businesses needed. EEF said that “many companies, in particular SMEs, have little time and lack the resources to address these issues on their own, which suggests that programmes need to be proactive and take the message directly to business” (p 117). Mr Nicholas Morley, Director of Sustainable Innovation at Oakdene Hollins added that “the companies that make the most use of business support services to reduce waste are those companies that are already performing well ... I think there is the interesting question of how you reach the laggards and the less well-performing businesses” (Q 196).
- 6.26. There was concern that by removing direct business support, best practices would slip. Mr Davies said that when assistance was offered to companies in the past at no cost then they were glad to accept it, “but as soon as the support fell away—we tried every different means of recompense, a share of reduced wastage and all of these things—but effectively people were not willing to make those changes for their own sake.” He cited a number of reasons for this. First, SMEs may lack the internal resources to “drive those changes through” and manage an external programme. Second, he referred to a common belief amongst SMEs that they do not require assistance because they can do it themselves, but then realise that they cannot due to a lack of time, “so it does not happen.” Finally, he noted that really significant changes often required new infrastructures which “take longer to get a payback than two years, which is typically the requirement. All of this is a great pity because many of the changes require no significant investment. They just require a different approach” (Q 221).
- 6.27. Mr Stace acknowledged that “there are potentially too many government funded organisations offering sometimes very similar services,” but he argued that “we like them. There are certain ones that we think are doing very good work and we continue to work with them. What businesses need is long-term continuity.” He added that “we have very little understanding of what is going to happen in the future.” Thus the dilemma for businesses is whether to invest time and effort in this area, or “invest their efforts somewhere else because the organisations they are working for might not carry on” (Q 233). Ms Dibb from the SDC said that “there is a feeling within government that if there is an economic win for a business that the cost should be borne by the business.” She acknowledged the argument that public money should not be used to subsidise savings in businesses but said that this argument was only legitimate up to a certain point. “For smaller businesses which do not have

the in-house resources and expertise and time, there are particular barriers that need to be addressed in helping them.” She felt that it was important for businesses to be provided with help to overcome the initial hurdles, “to the point where businesses can see that they are making money out of it. Then the ball starts rolling with them and they can take that further” (Q 557).

Sending the appropriate signals?

- 6.28. Witnesses also expressed concern about the sources of funding for business support bodies. When the Government announced in 2003 that the standard rate of landfill tax would increase each year towards a rate of £35 per tonne, they committed to “introduce the increases in a way that was revenue-neutral to business as a whole.” Therefore, in their Spending Review 2004, the Government announced that the additional revenues raised from businesses through the landfill tax “would be ring-fenced and spent on programmes to improve businesses’ resource efficiency.” In England, the BREW programme distributed £284 million of landfill tax receipts between April 2005 and March 2008. £50 million was returned to the Devolved Administrations for programmes similar to BREW and approximately £50 million was retained for Enhanced Capital Allowances for advanced waste disposal technology. Of the funding allocated to the BREW programme, approximately two thirds “provided for waste management and waste reduction initiatives.” No ring-fencing arrangements were made regarding landfill tax revenues from local authorities, but the Spending Review 2004 announced that revenues from the landfill tax escalator would be returned to local authorities through Formula Grant, so that the landfill tax escalator was “revenue-neutral to local authorities overall” (p 432).
- 6.29. The BREW programme of funding has now ceased and, in June 2008, Defra told us that future allocations for business resource efficiency would be “decided through Defra’s business planning process, which seeks to ensure that resources are best matched to Departmental priorities” (p 421). Mr Stace was disappointed that there would be no more ring-fencing of part of the landfill tax monies; “what we hear at the moment is that the landfill tax monies could go to fund flooding, fly-tipping and blue tongue. They are very good causes but the money is coming from somewhere else and we would like to see direct recycling back to the organisations who are paying the landfill tax into measures to help them increase their resource efficiency” (Q 235). EEF believed that “the carrot and stick approach of using taxation to send a price signal to business and using the funds raised to help companies to change their practices is the most effective approach to behaviour change. We are therefore disappointed by the Government’s decision to remove the ring-fencing of the tax” (p 117). Ms Hill from Green Alliance agreed, noting that “the Government sold to business the concept of the escalator on the landfill tax on the basis that that money would be recycled to business ... The Commission on Environmental Markets said that kind of support needed to be increased and hypothecating a tax like the landfill tax is potentially a very logical way of doing that. The Treasury have moved away from that kind of idea and we think that is a shame” (Q 557).
- 6.30. Mr Wheatley, Programme Director at the LGA, commented that the efforts of local authorities to help businesses reduce waste would also be hampered by a lack of funding. He said that for the period 2008–2011, “£1.5 billion of landfill tax funding which would, under the Government’s previous policy, have come back to local government is not going into local government. That

will almost inevitably force local authorities to take a very hardnosed economic attitude to the sorts of services they undertake, they will not be able to afford to do things that are not the minimum cost solution to securing recycling and disposal” (Q 659). Dr Craig, Principal Policy Officer at LARAC, added that “the Government is keeping more of this money to itself for the Treasury generally” and, as a result, the focus “has had to shift from giving help to individual companies for waste reduction and better use of resources to providing some general information and advice to companies about how they should do it” (Q 656).

- 6.31. In response, Ms Ruddock said that although there had been an agreement to use some of the landfill tax receipts for waste initiatives, “ring-fencing arrangements are ones that are always kept under review, and we have come to a decision with the Treasury that that will no longer be the case, so there is no ring-fencing of landfill tax receipts in this financial year or the subsequent one.” With regard to local authorities, she said “we are satisfied that they can carry out all the duties that are required of them in respect of waste ... For local authorities there are year-on-year efficiencies which they are obliged to make and that is the key because if they make those efficiencies they will have much more money to spend” (QQ 843–844). As part of the Comprehensive Spending Review 2007, the Government decided to provide local authorities with an overall annual average increase in Government grant of 1.5 per cent above inflation for the period covered by the Spending Review. The Government said that this figure took into account local government’s landfill tax liability “and allows local authorities to deliver effective services including in the area of waste management” (p 432).
- 6.32. Ms Ruddock was adamant that they were “not turning off the tap” on funding for support bodies and reaffirmed the importance of the Business Link network, saying that “they are establishing working models for advising industry on how to be more sustainable.” She felt this was necessary because “however much funding, even at the level of last year’s funding, these delivery bodies could not be in contact with every business in the country ... that is why it needs to be channelled through the main channel, which is Business Link for the advice in general, but we will continue to see that very specific work is done that will then provide the template for others to follow” (QQ 836–837).
- 6.33. When asked whether Business Link advisers had the specialist knowledge to promote resource efficiency, Ms Ruddock said that “I accept they have not had it; they are going to acquire it.” Mr Wicks added that one of the roles of Business Link was to provide generic advice on how to run businesses cost-effectively. Although acknowledging that resource efficiency would sometimes require specialist knowledge, he added that at the other end of the continuum, it “just requires a bit of thinking through and a bit of commonsense, does it not.” According to the DIUS Minister, Mr Pearson, “it is not a question about having Business Link advisers being expert across a wide range of areas, from financial planning to waste minimisation to manufacturing techniques. What it really is about is providing that gateway and access” to make business support simpler and less confusing. Through their Business Support Simplification Programme, he said that they were “undertaking a major rationalisation of our points of contact with industry so that we respond directly to what the Confederation of British Industry, the British Chambers of Commerce and the FSB and others, are saying to us” (QQ 837–839, 841).

- 6.34. The Government added that RDAs, BERR and Her Majesty's Revenue and Customs would work with the business support product owners "to ensure that Business Link meets customer support needs." Defra would work with RDAs "to ensure Business Link is able to deliver the enhanced service, and that customer service teams and advisers are trained to the appropriate level." The Government reported that "all Business Link customer-facing staff must be accredited to the appropriate nationally agreed standard of competence" and in the case of advisers, that involved accreditation to the National Occupational Standard for Business Support and the additional Business Link Broker standard. RDAs had also asked the standard-setting body to ensure that the National Occupational Standard was developed "to reflect sustainability as a core element of the national standards" (p 421).

Recommendations

- 6.35. **Businesses which implement new and innovative solutions to reduce waste tend to experience significant cost savings and awareness of such strategies is beginning to increase. However, many businesses still fail to recognise the financial costs of their waste and even where waste reduction strategies are known, an understanding of how to implement them is lacking. It is vital that business support bodies should continue to provide direct, tailored guidance to businesses, especially to help small- and medium-sized enterprises overcome the challenges they face. We are therefore extremely disappointed by the decision to reduce funding for some of the major business support bodies, including Envirowise, the Market Transformation Programme, the National Industrial Symbiosis Programme and the Waste and Resources Action Programme, and we are at a loss to understand the Government's reasoning. Discontinuation of the Business Resource Efficiency and Waste programme and funding cuts will only serve to reduce the services that business support bodies and local authorities can offer. Hitherto, hypothecation of a proportion of the landfill tax has sent a strong signal to industry that waste must be reduced, and ending this arrangement will undermine the Government's pledge to tackle commercial, industrial and construction waste. We recommend that the Government should once again ring-fence a proportion of the landfill tax revenue to fund waste reduction initiatives, thus providing businesses with both the carrot, and justification for the stick, in order to encourage change.**
- 6.36. **We recognise that the vast range of business support bodies is confusing for businesses and support the Government's Business Support Simplification Programme. Nevertheless, we are not satisfied that Business Link advisers are appropriately qualified to advise on resource efficiency. We recommend that the Government urgently provide further training for these advisers, especially in the field of waste reduction, and a system should be developed to monitor the quality of advice provided. As many businesses approach local authorities for assistance, local authorities must also ensure that their advisers recognise the need to refer businesses to Business Link for more detailed advice.**

Sustainable business models

- 6.37. Alterations to design and production processes are crucial in reducing the amount of waste created and even small changes to existing practices can reap significant rewards. If taken further, the concept of sustainability can provide the basis for business models in which the product or service is offered in an entirely new way. To be successful these often require a change of attitude amongst the general public, but if the market can be found and perceptions changed, these models can offer extremely promising ways to reduce waste.

Remanufacturing

- 6.38. Remanufacturing is not the same as refurbishing, repairing, re-using or recycling, but involves the disassembly of old products and the use of their components to manufacture completely new ones. Mr Charter, University College for the Creative Arts, described it as a “holistic concept” (Q 82) which involves “recapturing the value added to the material when a product was first manufactured.”⁴⁷ It allows components to retain their worth and offers an exciting opportunity for businesses to develop a sustainable business model.
- 6.39. Xerox has been putting this strategy to use since it pioneered its waste-free programme in 1991, taking back old products at the end of their lives and using component parts to produce new ones. In order to maximise the environmental and cost benefits, remanufacturing has to be incorporated into the design process and by designing their products for easy disassembly, Xerox can re-use and remanufacture a large proportion of their photocopiers, printers and scanners at the end of their lives. The important part of this process is that remanufactured products should provide the same quality and service as “new” products. In order to do this, Xerox carries out a series of tests on the components of its returned products to ensure they meet the required standards. Components are then subjected to a variety of cleaning processes before being used in the production of new units. In 2007, Xerox Europe claims to have remanufactured around 25 per cent of all the products that were returned (equating to around 440 tonnes of material). Since 1991, remanufacturing and recycling together have given life to more than 2.8 million Xerox copiers, printers and multifunction systems, while nearly £2 billion of potential waste has been diverted from landfills due to the remanufacturing of products and recycling of consumables.⁴⁸
- 6.40. In order to implement the remanufacturing strategy effectively, Mr Charter explained that businesses must take high-level strategic decisions to employ this “forward” and “reverse” manufacturing. The factory and remanufacturing factory must be co-located, the company must operate a take-back system and the designers must build disassembly requirements into their specifications. The system could be complex so businesses really had to “design the system and then empower the designers themselves with the right sort of thinking to enable them to do it” (Q 82).

⁴⁷ Gray and Charter, *Remanufacturing and Product Design: Designing for the 7th Generation* (see <http://www.cfsd.org.uk>).

⁴⁸ See Appendix 5.

Industrial symbiosis

- 6.41. When a remanufacturing strategy is implemented effectively, it can clearly have significant benefits, but the complexity of establishing such a system appears to preclude smaller businesses from employing it themselves. However, SMEs could engage in a type of remanufacturing, by “scavenging” other companies’ technologies and products (Q 83). Yet what some may describe as scavenging, others may refer to as industrial symbiosis. This concept embraces the principle that what may be one person’s waste, could in fact be another person’s resource.
- 6.42. NISP introduces companies to each other and encourages them to form “partnerships to make maximum use of resources which would otherwise go to waste” (p 89). As an example, NISP has helped one manufacturer find a sustainable route for their waste wooden pallets. Whereas the company previously sent them to landfill, after NISP facilitated an agreement with a recycling business, the pallets are now repaired or rebuilt into “new life” pallets. Any wood which cannot be used in pallets is shredded and used as part of landscaping mulches or other surfaces, and no wood is sent to landfill. As a result, each year around 200 tonnes of wood is diverted from landfill, 200 tonnes of virgin raw material is saved and £3,600 is saved due to the lower cost of recycling compared to landfill.⁴⁹

Product service systems

- 6.43. Although approaches such as lean manufacturing and six sigma have contributed to waste reduction, the CIKTN and CIA commented that their benefits are limited because they are “largely concerned with optimising an existing product and/or process” (p 135). Beyond this, there is scope for further innovation to provide the user requirement in a completely novel way. The Scottish Environment Protection Agency believed “it is not only the design and materials used which will have an impact on waste generation ... the marketing model is also important.” The Agency added that “a switch to product service systems could provide the impetus for waste reduction” (p 484).
- 6.44. Whereas products are normally sold outright and then sent to landfill at the end of their lives, product service systems offer the potential to significantly reduce waste by leasing a product on a temporary basis and then taking it back. In this way the system has two purposes: it satisfies consumer needs to change products before the end of their natural lives; and producers can also fulfil their responsibilities by taking back materials and components for recycling or re-use. Dr Chapman, University of Brighton, highlighted the fact that such service systems could foster brand loyalty and pointed out that although a company might sell fewer units, it could “generate further turnover over the extended lifespan of an object through service points, repair points and upgrade points” (Q 396).
- 6.45. Ms Brass, Founder of the SEED Foundation, noted that designers were crucial in identifying what the “real problem” was and finding a convenient solution. She cited an example of a different type of product service system provided by Streetcar, “a flexible car-hire service that affords people the mobility of a private vehicle without the associated inefficiency and costs”

⁴⁹ See http://crisp.international-synergies.com/layouts/Downloads/match_1675_giffords_and_grainger_worrall.pdf.

(p 186). This service allows “people in cities to find a car close by which they can get into, drive to where they are going and leave it in the street” and is a “fast-growing, very successful business.” Ms Brass added that the service had developed a very user-friendly interface, “designed by a group of service designers” which was crucial to making such a service a success. She conceded that there were still very few examples of product service systems, but insisted that “there are examples of this beginning to work” (Q 388). The RED Initiative added that although design could be useful in minimising the environmental impact of materials, it had “a pivotal and potentially more critical role to play in changing consumption patterns. In order to achieve a sustainable society it is critical that alternative lifestyle solutions are designed, developed and adopted” (p 204).

- 6.46. Dr O’Connor pointed out that the recycling and recovery infrastructures needed to make this strategy successful were complex and there were still “quite a lot of issues that need to be addressed to make this a successful business model” (Q 389). Miss McCain from the RED Initiative also emphasised the need for a competitive advantage in order for these schemes to work. She noted that the low cost of many items meant “you could actually go out and buy one for more or less the same price as it would be to hire one” (Q 409). We recognise that there would also be technicalities to clarify such as when capital tax allowances could be claimed. So although this strategy offers the potential for substantial waste savings, more work is therefore needed before it can become a ubiquitous, marketable strategy.

Recommendation

- 6.47. **There is scope for waste prevention to be integrated into sustainable business models but the implementation of such strategies will take time. The success of sustainable business models depends upon the size and structure of the business, the take-back and recycling infrastructure, the current market value of products and consumer perceptions. Evidence supporting these strategies is scant but growing so we recommend that the Department for Business, Enterprise and Regulatory Reform, along with business support agencies and industry, should continue to monitor such business models, assessing the barriers which inhibit their adoption and reviewing the range of policies and incentives that might be required to encourage their implementation.**

CHAPTER 7: TAKING THE LEAD

- 7.1. Designers, manufacturers, retailers, local authorities and consumers can all play their part in driving waste reduction but they require a lead. In its report, *Securing the future: delivering UK sustainable development strategy*, the Government committed to lead by example on sustainable development. The report set out the “four E’s” model of behaviour catalysts which demonstrates the need for measures which engage, enable, encourage or exemplify changes towards sustainability.⁵⁰ In this chapter we examine some of the ways in which the Government can provide this lead, to drive other sectors to embrace waste reduction principles.

Sustainability in government

- 7.2. The clearest way for the Government to take a lead in promoting sustainability is to exemplify this in their own actions and practices. Furthermore, with their significant spending power, the Government have the potential to encourage innovation and sustainability amongst their suppliers through their procurement policies. Research Councils UK explained that there were a number of good reasons for the Government to be “practising what it preaches.” They noted that “firstly, public sector consumption constitutes a significant proportion of total consumption. Secondly, procurement practices can play a key role in stimulating markets for sustainable products and services. Thirdly, the process of changing behaviour across Whitehall provides invaluable lessons to policy-makers about what is involved. Finally, Government policies and practices send important signals to people about public priorities, and social and cultural preferences” (p 226). The EIC added that the Government as a client could lead the way by developing methods to assess sustainability. “Where obstacles or confusion arise, this should be flagged as an issue that needs to be resolved.” In this way, other businesses could follow the examples set by the Government (p 113). Envirowise agreed, commenting that “actively encouraging resource efficiency and waste reduction in all Government procurement would help to set the norm for business” (p 88).
- 7.3. Dr Gibson, Director of Envirowise, thought that government policy on procurement was very good, but “the management of the implementation is not up to the policy in many areas yet.” He added that there was a lack of expertise and understanding of environmental issues in the procurement profession which needed to be addressed. Although procurement staff might say that they are purchasing for the whole life cost, “we still see lots of evidence of people buying on lowest purchase price which does not necessarily give you the best resource use over the life of the thing that you are purchasing.” The Office of Government Commerce’s list of “quick wins” sets out minimum environmental standards for a range of products and Dr Gibson thought this was “a good step in the right direction.” He added, however, that “it is quite a cumbersome list at the moment and it is particularly cumbersome for new products to get onto” (Q 209).
- 7.4. In setting procurement criteria, Dr Gibson also highlighted the importance of allowing enough flexibility to encourage innovative solutions. He warned that “by being over-prescriptive in procurement you can often stifle innovation.

⁵⁰ Her Majesty’s Government, *Securing the future: delivering UK sustainable development strategy*, 2005.

We believe it is quite important to follow the best practice we have seen in businesses where they specify the outcome they want rather than telling them how it needs to be done” (Q 209). Mr Holbrow, representing the FSB, commented that the needs of small businesses must also be taken into consideration, as “there is evidence that sometimes small businesses are eliminated from being able to tender for business because the standards are more geared to big business rather than small business” (Q 186). Thus Dr Goodwin, Chief Executive of WRAP, suggested that it would be better to specify the outcome of a product, “rather than specifying the specifics about the individual material that is used” (Q 210).

- 7.5. The Sustainable Development Commission’s 2007 annual review of *Sustainable Development in Government* reported that government departments were still not on track to meet all of their targets, but performance on the whole was better than the year before. In terms of waste, the total waste arisings had reduced by 5.3 per cent against 2004–05 levels, which exceeded the target of 5 per cent by 2010, and pan-governmental performance on waste reduction was rated as excellent. By contrast, overall performance on quick wins was “hugely disappointing” with only 12 of the 21 departments reporting that they included clauses on quick wins in all relevant contracts. Furthermore, only 46 of the 351 new build and refurbishment projects completed in 2006–07 were assessed against BREEAM and, of these, only 28 projects met the required standard. On a more positive note, the report added that since circulation of the raw data, there had been “considerable activity and encouraging signs that the Government is preparing to up its game with regard to the performance of its estate.”⁵¹
- 7.6. The SDC told us that the good performance of many departments in reducing waste should be recognised, but that “performance is variable across departments: some have reported excellent progress, whereas others are clearly not on track, and several are still not able to provide complete data for their whole estate” (p 291). Mr Andrew Lee, Director of the SDC, explained that “although government departments are doing quite well on generating less waste and recycling more ... there is nothing like enough being done on the procurement side to drive that sort of behaviour change all the way down the supply chain. You are talking about £180 billion worth of expenditure in the public sector which could be driving these changes and helping these choices to become available for other people too.” He added that “on waste they are sort of doing okay, but that is because the waste targets are not very ambitious and because they are not driving it through procurement and other things. It will take a long time to do this” (QQ 572, 597).
- 7.7. Mr Lee also highlighted the lack of knowledge amongst procurers; “there are small teams of people in these departments struggling with this stuff, desperately trying to get the information together, but compared with the best performance in some areas of business, they are miles behind. It is going to be a complete culture change to get the data, set the realistic targets and then find the leadership and action inside departments to make this happen.” Mr Lee did acknowledge that “in fairness, there is a serious drive now to get this sorted” (Q 597).

⁵¹ Sustainable Development Commission, *Sustainable Development in Government 2007*, pp 8–9, 23.

- 7.8. Ms Ruddock, Defra Minister, said that “the responsibility now for delivery against government procurement targets is with the Office of Government Commerce, but Defra continues to lead on public procurement policy. I am going to acknowledge, as the Sustainable Development Commission did, that we have got a very mixed picture. There is no doubt that some government departments on some of these issues are not doing nearly well enough.” In March 2008, the Government published their response to the SDC’s report.⁵² Ms Ruddock was confident that steps taken last year “have yielded significant improvements in the performance across government on sustainability” and that future actions outlined in the Government’s response “will produce a further step change in performance” (Q 881).
- 7.9. The Government have also established a new Centre of Expertise for Sustainable Procurement to be overseen by a director-general post of Chief Sustainability Officer within the Office of Government Commerce. The objectives of this centre will be to work with departments to create delivery plans for achieving targets and to provide a central co-ordinated source of guidance to help departments overcome any barriers to progress. The Centre will also “work closely with the Office of Government Commerce teams leading on increasing opportunities for small businesses in order to ensure that the needs of SMEs are considered, where relevant, in all its work.” The Government added that they wanted to see SMEs “compete more effectively for public sector contracts, since this is likely to provide greater choice and better value for money, as well as encouraging innovation and enterprise.” In an attempt to engage with SMEs, from May to July 2008 the Government ran a three-month free trial for new registrants to the *Supply2.gov* web portal which gives businesses access to lower value contracts. They were also planning to establish a committee to provide advice for the 2008 pre-budget report. This would identify the actions needed to “reduce the barriers to SMEs competing for public sector contracts, within the scope of EU law and the policy objective of value for money, and advise on the practicality of setting a goal for SMEs to win 30 per cent of all public sector business in the next five years” (pp 427–428, Q 881).

Recommendations

- 7.10. **It is vital that government departments lead by example in reducing their own waste. Although pan-governmental performance on waste reduction has been good, some departments still lag behind and we are concerned that targets are not challenging enough. Departmental performance on sustainable procurement has been disappointing and procurement staff often fail to recognise the lifetime cost of products. We welcome the establishment of the Centre of Expertise for Sustainable Procurement and recommend that it should urgently review the knowledge of procurement staff, providing training where necessary, to ensure that staff recognise the true costs of the products they buy and understand how the principles of waste reduction fit into the larger aims of sustainability.**
- 7.11. **We support the Government’s attempts to increase opportunities for small businesses to compete for procurement contracts and hope that**

⁵² See

http://www.cabinetoffice.gov.uk/reports/~/_media/assets/www.cabinetoffice.gov.uk/publications/reports/sustainable_development/govt_response_sdc_180308%20pdf.ashx.

their work will lead to a greater understanding and removal of the barriers which currently prevent this.

Working with industry

- 7.12. According to Mr Tait, Programme Manager at the MTP, businesses want “long, loud and legal” signals about sustainability. “They want it to be absolutely clear that this is a long-term process; they want to be told about it clearly, in no uncertain terms; and they want to have it underpinned by a legal framework so they know exactly where they stand” (Q 456). The EIC thought that “the current policy framework is fragmented, confusing and occasionally contradictory. This disincentivises businesses who need clear direction, possibly through regulation. A clear, demanding and long-term government policy framework should be agreed and stuck to. This will encourage investment in the resources and technologies needed to drive waste reduction” (p 112).
- 7.13. CIKTN and CIA said that “this period of rapid legislation changes and review make it a difficult area for manufacturers to commit to with any confidence.” They added that if a waste reduction strategy does not make commercial sense, then a business “cannot be expected to follow it” so they suggested that “government has a role to shift the balance if it wishes companies to follow waste reduction strategies in areas which are not commercially viable. They can do this by regulation, or by fiscal policy which charges companies for their environmental impact” (pp 135–136). In previous chapters we have examined the roles of producer responsibility regulations and the landfill tax in encouraging change, but implementing legislation is only one part of the story. Ms Hill, representing Green Alliance, said that businesses “crave certainty. If they feel there is a political momentum towards environmental goals, they want to know exactly what those are” (Q 552).

Supply chain pressure and the roadmap approach

- 7.14. When considering the business incentives for waste reduction, the role of the supply chain should not be underestimated. Dr Goodwin told us that WRAP works with major retailers and construction companies and then relies on them “to raise the awareness with all the SMEs that they engage with as part of their supply chain.” So far they had found this a very effective way of getting the message across (Q 196). The car industry is well aware of the financial costs of waste and effectively gets this message across to its suppliers. Mr Hardcastle told us that Nissan issues green purchasing guidelines to its suppliers and asks them to “take responsibility for their own waste and recycling.” He explained that “we do not have green police but we demand cost reductions and efficiency improvements year on year on year. We know inside our own plant that when you demand those kinds of cost reductions it makes people avoid waste—waste is expensive in every way” (QQ 682–683).
- 7.15. As an example, Mr Davies from the EIC cited the example of a manufacturing plant which made structural pressings for the motor industry. He said that their profitability was entirely dependent on how they managed their various offcuts, including aluminium, stainless and galvanised steel. They were aware that “if those were jumbled together they had to be disposed of at cost, but if they were recovered they could be sold at a profit.

Their awareness seemed to come through the supply chain more than regulation itself” (Q 220). Toyota also demanded resource efficiency throughout the supply chain and, in the past, had stopped working with suppliers which had not obtained the ISO 14001 standard or which did not participate in an EU eco-management auditing scheme.⁵³ Professor Gregory from the University of Cambridge felt that supply chain pressure really drove smaller companies and commented that “somehow, if you can identify which are the key supply chains and work through from the top end of those, then you have a chance” (Q 219).

- 7.16. The CIKTN and CIA pointed out that suppliers can also influence manufacturers “by demonstrating that using more sustainable materials, or using materials more sustainably, will improve their business. This might be through cutting their costs, being able to improve product functionality and performance, helping them meet regulatory obligations at minimum effort or minimum cost, or by enhancing customer profile.” They added that this required interaction between the supplier and manufacturer in closely linked supply chains (p 137).
- 7.17. An integrated approach, addressing the roles of manufacturers, retailers and consumers is an effective way to tackle particular products or waste streams, and something which the Government have been attempting to do with their roadmap approach. Product roadmaps were advocated by the Sustainable Consumption Roundtable in the *I will if you will* report⁵⁴ and developed in the SDC’s report, *You are what you sell*.⁵⁵ The SDC said that product roadmaps outline “practical steps that businesses and government can take to improve sustainability of products and services ... Integral to this approach is a focus on minimising negative impacts, including waste, throughout the supply chain.” A key element to the approach is to have “a long-term goal, or vision, of where action and policy interventions are designed to get to. Within such policy frameworks, businesses can invest and innovate” (p 288). Ms Dibb from the SDC said that the most important part of the process was about “bringing people together, giving space in which they can themselves determine—that is people from Government, business, civil society and other interests—what possible research they might need, what possible evidence they might need to help build that roadmap” (Q 589).
- 7.18. Ms Ruddock said that Defra had examined European research on the environmental impacts of consumption patterns and found that “80 per cent of impacts were coming from food, personal transport, buildings, the kind of equipment that we have in buildings and textiles.” So they had selected 10 priority products from these areas on which to trial the roadmap approach: milk, fish and shellfish, passenger cars, TVs, domestic lighting, electric motors, window systems, toilets, plasterboard and clothing.⁵⁶ The first roadmap, on milk and dairy, has now been published. Ms Ruddock felt that such voluntary agreements were useful in bringing stakeholders together, often picking up on issues early which could be used to inform the European Commission during policy development. She added that “if we need to

⁵³ See Appendix 6.

⁵⁴ Sustainable Consumption Roundtable, *I will if you will*, *op. cit.*

⁵⁵ Sustainable Development Commission, *You are what you sell: Product roadmapping: driving sustainability*, 2007.

⁵⁶ See <http://www.defra.gov.uk/environment/consumerprod/products/index.htm>.

legislate then we will, but if we can make headway with voluntary agreements, so be it” (QQ 848, 853).

Sectoral agreements

- 7.19. The Government have undertaken a number of agreements to engage with the business community and consumers about particular waste streams. Perhaps the most well known agreement is the Courtauld commitment which, as acknowledged in previous chapters, has made good progress in working with retailers and manufacturers to reduce unnecessary packaging. The commitment has not been free of criticism. The promotion of light-weighting has resulted in a focus on the weight of packaging rather than its overall sustainability. The British Glass Manufacturers’ Confederation explained to us that glass could be recycled infinitely with a high recycled content but, because it is heavy, glass is now often replaced by plastic such as polyethylene terephthalate (PET) which “at present can not be recycled in the UK” (p 138). Ms Bickerstaffe, Director of INCPEN, also pointed out that the plastics used in some products were so contaminated with residue that the environmental impacts of trying to clean and reprocess them made it unviable (Q 479).
- 7.20. Nonetheless, these problems are being addressed and the commitment has been heralded as a relative success with plans to extend it to non-food retailers.⁵⁷ Dr Gibson thought that one of the key reasons for the success of the agreement was that WRAP had been “following up with support and advice to the companies after they have signed up.” In Dr Goodwin’s view, retailers had been keen to sign up to the agreement because of consumer pressure, the realisation that cost savings were involved and because they saw the opportunity to be innovative throughout the supply chain. In addition, she added that “they probably wanted to make sure that the Government did not intervene and put in more legislation, so they felt they needed to be seen to be doing something as well” (Q 202).
- 7.21. The CIWM pointed out that the Government must monitor the effectiveness of voluntary arrangements closely and “be prepared to replace them with enforceable alternatives if necessary” (p 339). This action had been taken with site waste management plans (SWMPs) in the construction sector. SWMPs had previously been voluntary, but since April 2008 have been mandatory for all new construction projects worth more than £300,000.⁵⁸ The opinion of Mr Swain from Aggregate Industries was that “the fact that they were first voluntary and are now mandatory within the industry shows how slow the industry is to take up these sorts of things. It could have done it on a voluntary basis but has not” (Q 778). Ms Hobbs from the BRE explained that the SWMP “basically tells everybody on the site what activities should be carried out in terms of waste reduction and recycling, and that is then communicated to people through the site induction and also through tool-box talks throughout the project” (Q 743).
- 7.22. Ms Hobbs added that it was not yet clear whether SWMPs would reduce the amount of waste produced because “you have to move up the supply chain a lot more to reduce waste,” but she thought that they would be effective at raising awareness of how to manage materials on-site. However, it appeared

⁵⁷ Defra *Waste Strategy*, *op. cit.*, p 14.

⁵⁸ See <http://www.netregs.gov.uk/netregs/sectors/1842950/1843542/1865635/?version=1&lang=e>.

that the Government had missed an opportunity to improve the information base. Ms Hobbs told us that during the development of SWMPs, the BRE suggested that the plans should be collected to gather an overall picture of the amount of waste that is being produced and the ways in which different companies were managing it. Unfortunately that had not happened, “so that is an opportunity missed really, because now each company has its own SWMP without there being a central place to log them” (Q 776).

- 7.23. Defra had also used a voluntary approach, working with retailers, to tackle single-use carrier bags (both plastic and paper). In its Waste Strategy, Defra said it hoped that the environmental impact of such bags could be reduced by 25 per cent by the end of 2008; this would equate to 3.25 billion fewer bags being used and would save 58,500 tonnes of carbon dioxide equivalent a year. Retailers had been asked to reduce the environmental impact of their bags by encouraging consumers to use less, by enabling greater recycling of bags, and by reducing the impact of each bag through light-weighting or the use of recycled material.⁵⁹ Ms Ruddock recognised the need to monitor such voluntary agreements, saying that “unless there is sufficient progress made on a voluntary basis ... we will legislate in secondary legislation next year to produce a charge ... so that we would oblige those who wished to distribute single-use bags to make a charge for them” (Q 820).

Tax incentives

- 7.24. The difficulty in encouraging businesses was, in Ms Hill’s view, the fact that “environmental goods are generally not priced in the market-place, so you get little benefit for innovating for the environment in the absence of specific fiscal or regulatory measures.” She thought that business would like “more consistent signals to move towards environmental innovation” (Q 549). To address this problem, WRAP supported the “introduction of a variable Value Added Tax (VAT), with a lower VAT for products that are more sustainable.” The organisation thought that this “would contribute to making sustainable products more cost-effective, as well as more attractive to the consumer” (p 99). Vitsoe agreed that new materials which are better from an environmental point of view “can be very expensive initially and could be supported by government via tax on materials with negative environmental impacts and/or subsidies for those with positive impact” (p 213). In a recent report, Green Alliance also argued “for a radical change to the way we tax goods, replacing VAT with a goods tax that is graduated according to the environmental impact of products, with full exemption for those products deemed to be the best performers.”⁶⁰
- 7.25. Ms Bickerstaffe was concerned that setting a tax according to the properties of materials would not be an appropriate way to tackle this complex problem. She noted that such a tax would be a “single issue approach ... because though you use materials you also use energy to process and convert them, and just putting a tax on one part of an equation is always going to have unintended side effects.” To illustrate her point, she explained that corrugated boxes contain a high proportion of recycled material, but in order to be sustainable they also need to include virgin fibres to prevent them falling apart and turning into pulp. She was concerned that by placing a tax

⁵⁹ Defra *Waste Strategy*, *op. cit.*, p 98.

⁶⁰ Green Alliance, *Good Product, Bad Product? Making the case for product levies*, 2008, p 2.

on just one part of the equation, sustainable processes could be discouraged rather than encouraged (Q 495).

- 7.26. Ms Ruddock said that she would have to give us the standard response that “tax issues are for the Treasury.” She said that they had encouraged differential taxation for aggregates so that recycled aggregates attracted a lower tax to discourage the use of virgin materials. She reiterated that the landfill tax was a very strong incentive to businesses to reduce waste, but could not comment beyond that “other than to say that the principle [of differential taxation] has been accepted and put into practice elsewhere” (Q 857).

Encouraging innovation: lessons from Japan

- 7.27. Many of our witnesses suggested that lessons could be learnt from Japan on how to encourage innovation. The “top runner” scheme, used to improve the energy efficiency of household electrical appliances, was often cited. This approach involves the early announcement of minimum environmental standards for products, followed by the use of fines for manufacturers or importers who do not conform. The SDC said that this process had driven a virtuous cycle of rapid innovation and choice editing which had “improved energy efficiency of new appliances and products by as much as 78 per cent.”⁶¹ Mr Hyman, Director of the EIC, noted that standards were set at, or higher than, the most efficient product on the market, then “all companies sign up to delivering that within a certain period of time,” ensuring a constant improvement in standards. Its success was made clear by one Japanese official who jokingly said to him, “please, Europe, do not adopt this scheme because it is producing lots of business efficiencies and a competitive advantage for Japan” (Q 242). Mr Lee explained that the scheme was “saying to industry, ‘we are working with the grain of the market, we are basing our standards on what we know the best people are capable of doing through innovation, and we are also sending a clear signal that over time those standards will get ratcheted up’” (Q 556).
- 7.28. Mr Pearson, the DIUS Minister, agreed that the top runner initiative had been “effective in terms of driving up standards in Japan” and added that the EU was adopting a similar process in areas such as the phasing out of non-energy efficient lightbulbs. He said that “across a range of different product areas at a European level the UK has been pushing to say which are the most efficient in the marketplace, which are the least efficient in the marketplace and to seek in the first instance to work voluntarily with industry, but then to move to regulate to ensure that the most inefficient products will not be allowed to be sold in the future and so in effect choice editing will take place” (Q 856).
- 7.29. The government of Japan have also implemented a novel strategy to encourage innovation in the automotive industry. At the end of a vehicle’s life, a recycling partnership is responsible for recycling the vehicle and, on purchasing a car, customers must pay a fee towards this cost. The responsibility for managing shredded residue lies with the manufacturers themselves. In order to encourage innovation the manufacturers have been split into two teams which are competing on how to tackle the shredded residue. Mr Hardcastle explained that “if they can reduce the cost of the

⁶¹ Sustainable Development Commission, *You are what you sell*, *op. cit.*, p 14.

shredded residue or improve the profit or the recycling, then they can reduce the sticker price on the car ... through that competition therefore the manufacturer is required to do the recycling” (Q 734). He acknowledged that the infrastructure and markets in the UK and Japan are very different, so this system is not necessarily directly applicable to all countries, but it is the method used to engage businesses which is interesting.

- 7.30. Mr Charter, from the University College for the Creative Arts, explained that the key to success was to instil confidence within industry that the Government are committed to their ideas. He noted that the Japanese recycling law for home appliances had been agreed in 2001, but work on the law had actually started in the mid 1990s, demonstrating to industry, government and key influential academics that this was the direction in which Japan was heading. Therefore by 2001 when the law was passed, “there was certainty for the manufacturers the law was going to come into place ... that gave the companies the confidence to invest in developing the recycling technologies” (Q 85).

A strategic direction?

- 7.31. Waste, as a topic, is a complex subject involving a range of products, materials and services, influenced by designers, manufacturers, consumers, retailers and local authorities. It can be tackled in a number of ways but with a lack of data on the overall waste picture, it is difficult to know where to begin. One of the Government’s key objectives is to decouple the growth of waste from economic growth and good progress has been made in this area over recent years with waste growing at a significantly lower rate than gross domestic product since 2000. Previous aims and strategies have largely focused on the recycling of municipal waste, and the amount of household waste not recycled has decreased significantly over this period (pp 1–2). However, the fact that the amount of waste continues to rise at all is a major cause for concern.
- 7.32. In their Waste Strategy, the Government admit that “England’s performance on waste still lags behind many European countries” and state as one of their key objectives that more emphasis is needed on waste prevention.⁶² It appears that the focus of Government policy is thus moving towards waste reduction, but as the CIWM pointed out, “this relies heavily on further and more detailed work to be done. In turn, this relies on strong co-ordination by Defra between various government departments and with a broad range of stakeholders” (p 336). The SDC was not convinced that the Government had the balance right though. They commented that the strategy has an “over-riding emphasis downstream and post-consumer, on recovery and recycling, rather than tackling the problem of waste further upstream in the supply chain.” They added that the Government need to “adopt a more aspirational approach to reducing waste by setting longer-term targets and introducing enablers to support a culture of zero waste” (p 285).
- 7.33. Mr Robert Lisney, LRL Consultancy Services Ltd, criticised the way in which government waste reduction targets are “differentially set for different areas of focus,” so whereas some targets for household waste are set in terms of tonnages, other targets for commercial, industrial, construction and

⁶² Defra *Waste Strategy*, *op. cit.*, pp 10–11.

demolition wastes may be set in terms of percentages, making useful comparisons difficult (p 50).

- 7.34. There were also doubts over whether the strategy placed the correct emphasis on each sector. For example, although only a small proportion of the nation's total waste arises in the household, the strategy claims that "a greater focus on waste prevention will be recognised through a new target to reduce the amount of household waste not re-used, recycled or composted."⁶³ In comparison, although the strategy says that targets for commercial and industrial waste would be set soon, a year later the Government still have not put any in place. The Government reported that they were "actively engaging with stakeholders" who had told them that because commercial and industrial waste is so varied, "it would make more sense to look at action sector by sector, as well as using cross-sectoral approaches like the Landfill Tax." While the Government were "reflecting on the outcome of the meeting," there was no indication of how long it would take to develop proposals (p 429).
- 7.35. With regard to the construction sector, a Strategy for Sustainable Construction was launched jointly by the Government and industry in June 2008.⁶⁴ This includes a target to halve construction, demolition and excavation waste sent to landfill by 2012, compared to a 2008 baseline. Whilst BERR was said to be co-ordinating the work, the Government made it clear that "the actions, commitments and targets are the responsibility of designated groups across the private and public sectors" and that "the overarching target is not a Government target" (p 419).
- 7.36. Despite being "concerned" about commercial and industrial waste, Ms Ruddock admitted that so far "our concentration has been on household waste and household waste arisings." One of the Government's most widely publicised projects has been the campaign to phase out single-use carrier bags, even though, as Ms Ruddock admitted, "they occupy a tiny, tiny proportion of the waste stream." She argued that these bags had been targeted not just on the grounds of waste, but also because they caused litter, endangered marine life and, most importantly, because they were "symbolic of a throwaway and wasteful society. When there is public demand to tackle this aspect of waste then it seems to us that we as a Government need to respond to that demand." In Ms Ruddock's view, the Government have to address behaviours in symbolic areas where consumers demand change, and she hoped that this would enable them to persuade people to change their behaviours in relation to other forms of waste (QQ 816–817, 821).
- 7.37. Defra's Waste Strategy has now identified a set of priority materials and products within the retail, chemicals, construction, electronic and electrical and food sectors, based upon potential reductions of greenhouse gas emissions resulting from diversion from landfill and greater recycling and recovery. Addressing the production and consumption of these priority materials and products will require the work of Defra, BERR, DIUS and other parts of government, whilst the Environment Agency will have to deal with the management of waste. To implement the policies set out in the Waste Strategy, a Defra-led Waste Strategy Board has been established with

⁶³ *Ibid.*, Defra *Waste Strategy*, p 11.

⁶⁴ Her Majesty's Government and the Strategic Forum for Construction, *Strategy for Sustainable Construction*, 2008.

representatives from relevant departments “to provide leadership within and across government.” The Board will monitor and evaluate implementation of the strategy, provide support to government and delivery organisations and develop new policies. A Waste Stakeholder Group has also been established, consisting of representatives from business, the waste management industry, local government, third sector, environmental non-governmental organisations, consumers and households, to “provide advice and input to delivery of the strategy, and future development of policy and strategy.”⁶⁵

- 7.38. Despite this, Ms Parkes, Head of Waste at the Environment Agency, said that “with the publication of Defra’s Waste Strategy there is room for greater clarification about the way forward and who should be responsible for what.” Although she felt that the work of the Environment Agency was clear, she added that “it is not just about environmental legislation and delivery, it is about getting it into the socio-economic debate.” Furthermore, “the challenge for society and for government going forward is to be very clear about this bigger agenda and what are the interventions that are going to give rise to the best environmental outcomes” (QQ 109, 114). The Waste Strategy examines the whole of the waste hierarchy, including prevention, re-use, recycling, recovery and disposal, and there is value in developing such a comprehensive strategy for waste. Nevertheless, there is now a specific need to drive the prevention of waste. The key lies in co-ordinating action across the whole range of affected parties—public and private sector alike—and in providing guidance on who will lead on waste reduction.

Recommendations

- 7.39. **We welcome the fact that waste prevention has been recognised as an important strand within the Government’s Waste Strategy, but this approach must be backed up with the appropriate policies. Progress is being made in tackling domestic waste, but this accounts for a relatively small proportion of all waste in the UK and more attention must now be paid to other waste streams. The Government should continue to work with stakeholders to ensure that policies are set appropriately, but the Government should now also take the lead in developing a strategy to reduce industrial and commercial waste. We welcome the revision of the Waste Framework Directive which we hope will contribute towards a more efficient use of resources and reiterate the importance of Government working with other EU Member States to ensure that the directive’s provisions are implemented as quickly as possible.**
- 7.40. **Following their campaign to promote re-use and recycling, the Government must now provide clear and consistent signals that waste reduction is a priority. Businesses will not invest in sustainable practices unless they are confident of the Government’s long-term policies, and consumers will not change behaviours without education or incentives. In order to engage, enable and encourage businesses and consumers to embrace waste reduction, it is crucial that work is undertaken on a whole supply chain basis, examining the impacts of products throughout their lifetime. We endorse the use of the product roadmap approach which tackles particular products or waste**

⁶⁵ Defra *Waste Strategy*, *op. cit.*, pp 17, 53–55, 104.

streams by working with all the relevant players, including manufacturers, retailers and consumers. We hope that the Government will use these roadmaps to provide industry and the general public with clear guidance on the direction they are taking.

- 7.41. We support the use of voluntary sectoral agreements to bring stakeholders together in tackling specific waste streams, enabling businesses to recognise the costs of their waste and giving them the opportunity and guidance to minimise it. The Government must be prepared to monitor these agreements and review policies when necessary.
- 7.42. The Government must engage with industry and provide the assurances and certainty required to enable businesses to invest in waste reduction strategies. In order to encourage innovation, we recommend that the Government adopt the “top runner” approach wherever possible. This strategy should involve the use of standards and choice editing, pre-selecting the most sustainable products, to drive continued improvements in sustainability.
- 7.43. We were disappointed by the unwillingness of the Department for Environment, Food and Rural Affairs to discuss fiscal incentives and recommend that the department should work with the Treasury to review the case for implementing variable Value Added Tax to promote the development of sustainable products.
- 7.44. It is important that the Government address areas of public concern in order to engage with members of the public and encourage behavioural changes. Nevertheless, the Government’s focus must now widen to include other waste streams apart from the obvious options of domestic waste and packaging. We welcome the identification of key materials from the commercial, industrial and construction sectors, but recommend that the Government should provide greater clarity about who will be taking the lead in addressing production and consumption in each of these areas and who will be responsible for promoting and monitoring the over-arching aim of waste reduction.

CHAPTER 8: SUMMARY OF RECOMMENDATIONS

Data collection

- 8.1. We are not satisfied that the Government are giving a high enough priority to the collection of data on waste. Targets and policies to reduce waste are meaningless if they are not based upon a thorough understanding of the waste streams involved. The amalgamation of administrative data sources may cost less than comprehensive surveys, but saving money in this way is a short-sighted approach to tackling waste. We recommend that the Government arrange for comprehensive surveys to collect data on the various waste streams in the UK thus enabling the formation of an overall strategic direction and policies. (para 2.13)

Design, innovation and technology

- 8.2. Some businesses have begun to embrace sustainability principles as part of their product design and development processes, but large gaps in knowledge still exist. There is still confusion amongst businesses regarding their environmental design obligations and designers are often unable to provide solutions as they themselves lack a clear source of guidance to provide clarification. The Design Council and the Higher Education Funding Council for England have begun to address the teaching of sustainability principles but we are concerned that higher education institutions still lack the appropriate knowledge and resources. We recommend that the Department for Innovation, Universities and Skills and the Department for Business, Enterprise and Regulatory Reform should take the lead in working with the Design Council, the Higher Education Funding Council for England, design schools, industry and the relevant professional bodies to ensure that sustainability is embedded into the design curriculum, teachers are given the correct training and designers are educated about business requirements and the cost of waste. (para 3.36)
- 8.3. At present there appears to be little to be gained from regulating the design profession but whilst regulation is not usually welcomed, this is something which the Government should keep under review in the future to ensure that designers exhibit consistent standards of competence. We recommend that the Design Council should take a stronger lead in providing the necessary guidance to designers on how to comply with the principles of eco-design legislation. Designers must also be encouraged to work beyond the minimal level of compliance and we support the use of awards issued by professional bodies to acknowledge those who push the boundaries of sustainable design. (para 3.37)
- 8.4. The research councils, knowledge transfer networks, technology strategy board and market transformation programme have recognised that in order to encourage true innovation and waste reduction, multi-disciplinary research is required which embraces designers, materials scientists, engineers and social scientists. Good work is now being undertaken to promote innovation and share knowledge, but we are concerned that recent cuts in ring-fenced funding will undermine some of this vital research and the transfer of existing knowledge. It is crucial that the Government continue to provide adequate funding to support the work of these organisations and that it also provides clear direction, by the use of ring-fenced funding if necessary,

that research into resource efficiency and novel processes must remain priorities. (para 3.46)

Manufacturing

- 8.5. The ISO 14001 standard acts as a useful benchmark to recognise businesses which implement sustainable practices and we support the promotion of this standard to industry. We are concerned that once this standard has been achieved, businesses which do not recognise the costs of their waste may become complacent if they no longer have any incentives to drive further improvement. We recommend that the Department for Business, Enterprise and Regulatory Reform should ensure this standard is promoted alongside business education to enable industry to recognise the benefits that can result from continual innovation and waste reduction efforts. (para 4.18)
- 8.6. Detailed information on the lifetime impacts of products is still lacking. The development of PAS 2050 is a step in the right direction and we commend the Government and industry for recognising the need for simple, yet standardised, assessment methodologies which businesses can apply. However, an assessment of embodied greenhouse gases is not synonymous with a life-cycle assessment. The Government, in conjunction with the industrial, design and materials communities, should encourage the development of simple methodologies to enable businesses to analyse the lifetime implications, including the amount of waste generated, of the materials, products or services they produce. Providing businesses of varying size and character with these key tools is vital as it will enable them to recognise the amount of waste they create and will be the first step towards implementing change. (para 4.19)

Local authorities

- 8.7. Responsibility for the recycling and collection of waste has been given to local authorities, not all of whom meet the needs of businesses. Poor quality recycled material, a lack of disposal facilities and a fragmented approach between local authorities hinders the attempts of those businesses which are striving to reduce their waste. In turn, local authorities are hampered by weight-based targets and landfill allocations which discourage them from supporting industry. Targets for local authorities currently focus on decreasing the weight of domestic waste sent to landfill but a more holistic approach to waste reduction is required. We recommend that the Government should restructure the waste targets and costs imposed upon local authorities to allow them to address commercial and industrial waste by providing the necessary support, disposal facilities and high quality materials to businesses. (para 4.34)
- 8.8. It is extremely important that local authorities co-ordinate the services they provide. Whilst joint waste authorities will largely be concerned with the collection, treatment and disposal of waste, we hope that their creation will lead to greater collaboration between local authorities on all aspects of the waste hierarchy, so that they can provide the consistent facilities and support which businesses require in order to invest in long-term waste reduction strategies and experience the economies of scale. (para 4.35)

Legislation

- 8.9. Until recently, the legal framework has militated against the re-use of particular waste streams and we are glad that the need for clarification has been recognised. We welcome the revision of the Waste Framework Directive and support the inclusion of articles which specify conditions for by-products and allow the development of quality criteria to clarify when waste ceases to be waste. We hope that these will result in greater exploitation of a wide range of resources. (para 4.44)
- 8.10. With the development of quality protocols by the Environment Agency and the Waste and Resources Action Programme, the UK is in a good position to contribute effectively to the development of end-of-waste criteria at the EU level and we urge the Government to continue to work closely with the Commission and other Member States to develop quality criteria as quickly as possible. We recommend that the Government should urgently provide clear information to UK businesses about the priority sectors and waste streams that will be considered first and the timeframe in which quality criteria will be developed for each material. (para 4.45)
- 8.11. Collective producer responsibility directives have had limited success at encouraging sustainable design and often result in small technical innovations which increase recycling and comply with minimum standards, rather than fully embracing the principles of sustainability. However, we acknowledge that they do at least bring the subjects of sustainability and waste reduction to the attention of business and so their basic principles should be encouraged. We recognise that these directives must be developed on an international basis and recommend that the Government should work with the European Commission and EU Member States to review the ways in which these directives are applied so that they foster real innovation and encourage all businesses to continually reduce their waste. (para 4.62)
- 8.12. We welcome a review of the implementation of the Directive on Waste Electrical and Electronic Equipment and support the establishment of the Waste Electrical and Electronic Equipment Advisory Board. Implementing individual producer responsibility will be a long and complex process, but will be crucial in establishing the direct responsibility necessary to encourage manufacturers to reduce their waste. We recognise that individual producer responsibility will be more appropriate for some products than others and it is important that the Government continue to consult stakeholders on the practicalities of such a system. Nevertheless, we believe that the time has come for action and recommend that the UK Government should take the lead in implementing true individual producer responsibility and, at the very least, should introduce it for those products for which industry requests it. (para 4.63)
- 8.13. The variety of waste regulations can conflict and be difficult for businesses, hampering those attempting to implement sustainable business solutions. We recommend that the Government should continue to work with the European Commission to promote an holistic approach during the development of new legislation, to ensure that full consideration is given to the impacts of any new legislation on the variety of sectors involved. It is vital that the Government also provide adequate guidance to UK businesses about how to comply with new regulations in conjunction with existing ones. (para 4.70)

- 8.14. Whilst we acknowledge that the cost of landfill must be kept under constant review, we support the use of the landfill tax escalator as a blunt instrument to divert waste from landfill and hope that over time it will encourage businesses to embrace true waste reduction strategies. (para 4.71)

Consumption

- 8.15. There is widespread support for waste reduction and the development of a more sustainable society. A strong campaign to increase recycling has meant that the waste reduction message has been overlooked and consumers are often ill-informed about the environmental impacts of their products and the way they use them. We recommend that the Government should continue to work with the European Commission to examine the types of information that should be included on eco-labels and promote the development of eco-labels which are clear and easy for consumers to understand, but we are not convinced that the use of eco-labels alone will be enough to change consumer behaviour. (para 5.21)
- 8.16. Following the successful drive to improve the energy efficiency of products, we believe that a similar strategy should be employed to encourage the purchase of more sustainable products which produce less waste. We recommend that the Government should encourage change by continuing to work with retailers to promote choice editing on the grounds of waste reduction. The use of voluntary sectoral agreements will be a useful strategy to encourage retailers to adopt this concept initially but, once established, we believe that consumer demand for the most sustainable products should drive businesses to stock products which achieve ever greater sustainability. (para 5.22)
- 8.17. We recognise that addressing the multitude of practical and psychological issues which influence consumer behaviour is a complex and difficult task, but businesses are well placed to implement measures which encourage consumers to adopt more sustainable behaviours. Waste could be reduced if consumers were encouraged to retain products for longer and repair them when necessary, but this is usually an uncompetitive strategy and businesses cannot be expected to promote something which leads to a reduction in profits. Business models must therefore be developed which are both sustainable and profitable. Such strategies might include the production of modular products which can be continually added to and upgraded, or schemes that reward customers for recycling but which also foster brand loyalty. If repair work is to be encouraged, changes to the Value Added Tax regime may be required. We therefore recommend that the Department for Business, Enterprise and Regulatory Reform should work with retailers and academia to promote the use of sustainable business models and must review the range of policies and incentives required to accelerate their implementation. (para 5.30)
- 8.18. We endorse the message of the Sustainable Consumption Roundtable's report, *I will if you will*, that in order to reduce consumption, a joint effort from government, businesses and consumers is required. Whilst the Government's *Framework for Pro-Environmental Behaviours* outlines a good approach to address consumer behaviour we urge the Government to follow this up by using its approach to reduce the wastage of a wider range of products, rather than just food. (para 5.35)

Business support

- 8.19. Businesses which implement new and innovative solutions to reduce waste tend to experience significant cost savings and awareness of such strategies is beginning to increase. However, many businesses still fail to recognise the financial costs of their waste and even where waste reduction strategies are known, an understanding of how to implement them is lacking. It is vital that business support bodies should continue to provide direct, tailored guidance to businesses, especially to help small- and medium-sized enterprises overcome the challenges they face. We are therefore extremely disappointed by the decision to reduce funding for some of the major business support bodies, including Envirowise, the Market Transformation Programme, the National Industrial Symbiosis Programme and the Waste and Resources Action Programme, and we are at a loss to understand the Government's reasoning. Discontinuation of the Business Resource Efficiency and Waste programme and funding cuts will only serve to reduce the services that business support bodies and local authorities can offer. Hitherto, hypothecation of a proportion of the landfill tax has sent a strong signal to industry that waste must be reduced, and ending this arrangement will undermine the Government's pledge to tackle commercial, industrial and construction waste. We recommend that the Government should once again ring-fence a proportion of the landfill tax revenue to fund waste reduction initiatives, thus providing businesses with both the carrot, and justification for the stick, in order to encourage change. (para 6.35)
- 8.20. We recognise that the vast range of business support bodies is confusing for businesses and support the Government's Business Support Simplification Programme. Nevertheless, we are not satisfied that Business Link advisers are appropriately qualified to advise on resource efficiency. We recommend that the Government urgently provide further training for these advisers, especially in the field of waste reduction, and a system should be developed to monitor the quality of advice provided. As many businesses approach local authorities for assistance, local authorities must also ensure that their advisers recognise the need to refer businesses to Business Link for more detailed advice. (para 6.36)
- 8.21. There is scope for waste prevention to be integrated into sustainable business models but the implementation of such strategies will take time. The success of sustainable business models depends upon the size and structure of the business, the take-back and recycling infrastructure, the current market value of products and consumer perceptions. Evidence supporting these strategies is scant but growing so we recommend that the Department for Business, Enterprise and Regulatory Reform, along with business support agencies and industry, should continue to monitor such business models, assessing the barriers which inhibit their adoption and reviewing the range of policies and incentives that might be required to encourage their implementation. (para 6.47)

Taking the lead

- 8.22. It is vital that government departments lead by example in reducing their own waste. Although pan-governmental performance on waste reduction has been good, some departments still lag behind and we are concerned that targets are not challenging enough. Departmental performance on sustainable procurement has been disappointing and procurement staff often

fail to recognise the lifetime cost of products. We welcome the establishment of the Centre of Expertise for Sustainable Procurement and recommend that it should urgently review the knowledge of procurement staff, providing training where necessary, to ensure that staff recognise the true costs of the products they buy and understand how the principles of waste reduction fit into the larger aims of sustainability. (para 7.10)

- 8.23. We support the Government's attempts to increase opportunities for small businesses to compete for procurement contracts and hope that their work will lead to a greater understanding and removal of the barriers which currently prevent this. (para 7.11)
- 8.24. We welcome the fact that waste prevention has been recognised as an important strand within the Government's Waste Strategy, but this approach must be backed up with the appropriate policies. Progress is being made in tackling domestic waste, but this accounts for a relatively small proportion of all waste in the UK and more attention must now be paid to other waste streams. The Government should continue to work with stakeholders to ensure that policies are set appropriately, but the Government should now also take the lead in developing a strategy to reduce industrial and commercial waste. We welcome the revision of the Waste Framework Directive which we hope will contribute towards a more efficient use of resources and reiterate the importance of Government working with other EU Member States to ensure that the directive's provisions are implemented as quickly as possible. (para 7.39)
- 8.25. Following their campaign to promote re-use and recycling, the Government must now provide clear and consistent signals that waste reduction is a priority. Businesses will not invest in sustainable practices unless they are confident of the Government's long-term policies, and consumers will not change behaviours without education or incentives. In order to engage, enable and encourage businesses and consumers to embrace waste reduction, it is crucial that work is undertaken on a whole supply chain basis, examining the impacts of products throughout their lifetime. We endorse the use of the product roadmap approach which tackles particular products or waste streams by working with all the relevant players, including manufacturers, retailers and consumers. We hope that the Government will use these roadmaps to provide industry and the general public with clear guidance on the direction they are taking. (para 7.40)
- 8.26. We support the use of voluntary sectoral agreements to bring stakeholders together in tackling specific waste streams, enabling businesses to recognise the costs of their waste and giving them the opportunity and guidance to minimise it. The Government must be prepared to monitor these agreements and review policies when necessary. (para 7.41)
- 8.27. The Government must engage with industry and provide the assurances and certainty required to enable businesses to invest in waste reduction strategies. In order to encourage innovation, we recommend that the Government adopt the "top runner" approach wherever possible. This strategy should involve the use of standards and choice editing, pre-selecting the most sustainable products, to drive continued improvements in sustainability. (para 7.42)
- 8.28. We were disappointed by the unwillingness of the Department for Environment, Food and Rural Affairs to discuss fiscal incentives and

recommend that the department should work with the Treasury to review the case for implementing variable Value Added Tax to promote the development of sustainable products. (para 7.43)

- 8.29. It is important that the Government address areas of public concern in order to engage with members of the public and encourage behavioural changes. Nevertheless, the Government's focus must now widen to include other waste streams apart from the obvious options of domestic waste and packaging. We welcome the identification of key materials from the commercial, industrial and construction sectors, but recommend that the Government should provide greater clarity about who will be taking the lead in addressing production and consumption in each of these areas and who will be responsible for promoting and monitoring the over-arching aim of waste reduction. (para 7.44)

APPENDIX 1: MEMBERS AND DECLARATIONS OF INTEREST

Members:

- † Lord Bhattacharyya
Lord Crickhowell
Lord Haskel
Lord Howie of Troon
- † Lord Lewis of Newnham
Lord May of Oxford
Lord Methuen
Lord O'Neill of Clackmannan (Chairman)
- † Baroness Platt of Writtle
Earl of Selborne
- † Baroness Sharp of Guildford
Lord Sutherland of Houndwood

- † Co-opted Members

Specialist Adviser:

Professor Stephen Evans, Manufacturing Department, School of Applied Sciences, Cranfield University

Declared Interests:

- † Lord Bhattacharyya
None
- Lord Crickhowell
None
- Lord Haskel
Honorary President, Environmental Industries Commission
Honorary President, Materials UK
Honorary President, TechniTex
- Lord Howie of Troon
Fellow, Institution of Civil Engineers
- † Lord Lewis of Newnham
President, Waste Management Industry Training and Advisory Board
Associated with Committee of Veolia
- Lord May of Oxford
None
- Lord Methuen
None
- Lord O'Neill of Clackmannan
President, Specialist Engineering Contractors' Group
- † Baroness Platt of Writtle
None
- Earl of Selborne
Non-Executive Director (designate), Green Rubber
Chair, Funders Board, Living with Environmental Change Programme
- † Baroness Sharp of Guildford
None

Lord Sutherland of Houndwood

None

A full list of Members' Interests can be found in the Register of Lords' Interests:

http://www.parliament.uk/about_lords/register_of_lords_interests.cfm

Professor Stephen Evans, Specialist Adviser

Professor of Life-cycle Engineering, Cranfield University

Board Member, Centre for Sustainable Engineering

Partner, RiverSimple Partnership

Former employee, Martin-Baker Engineering

Academic collaborations with: BRE, Ford Motor Company, Nissan, Biffa,

BERR (the Department of Trade and Industry), EEF, Philips, Oakdene

Hollins, EPSRC and TSB

APPENDIX 2: LIST OF WITNESSES

The following witnesses gave evidence. Those marked with a * gave oral evidence:

Aluminium Federation:

* Mr Will Savage

Aluminium Packaging Recycling Organisation:

* Mr Rick Hindley

* Mr Cal Bailey, NG Bailey

Balfour Beatty and Ciria

BAN Waste

* Mr Mike Barry, Marks & Spencer

* Dr Tracy Bhamra, Department of Design and Technology, Loughborough University

Biffa:

* Mr Peter Jones

Boots

BREW Centre for Local Authorities

British Glass Manufacturers' Confederation:

* Mr David Workman

BSI British Standards:

* Mr Marcus Long

Building Research Establishment:

* Ms Gilli Hobbs

* Mr Stephen Carter, Unilever

Centre for Environmental Control and Waste Management, Imperial College London:

* Professor Sue Grimes

Centre for Research and Development, University of Brighton:

* Dr Jonathan Chapman

Centre for Resource Management and Efficiency, Cranfield University:

* Professor Simon Pollard

Centre for Sustainable Consumption, Sheffield Hallam University:

* Dr Tim Cooper

Centre for Sustainable Design, University College for the Creative Arts:

* Mr Martin Charter

Chartered Institution of Wastes Management:

* Mr Christopher Murphy

Chemical Industries Association

Chemistry Innovation Knowledge Transfer Network:

- * Dr Michael Pitts
- * Dr Robert Chilton, National Consumer Council
- * Mr Andrew Clack, Panasonic UK

Department for Business, Enterprise and Regulatory Reform:

- * Mr Tony Pedrotti
- * Mr Malcolm Wicks MP

Department for Environment, Food and Rural Affairs:

- * Ms Joan Ruddock MP
- * Mr Neil Thornton

Department for Innovation, Universities and Skills:

- * Dr David Evans
- * Mr Ian Pearson MP

Design Council:

- * Mrs Lesley Morris

Ecodesign Centre Wales:

- * Dr Frank O'Connor

EEF, The Manufacturers' Organisation:

- * Mr Gareth Stace

Electronic Producers Environmental Policy Forum

Environment Agency:

- * Ms Tricia Henton
- * Ms Liz Parkes

Environmental Industries Commission:

- * Mr Jonathan Davies
- * Mr Merlin Hyman

Envirowise:

- * Dr Martin Gibson

Essex County Council

- * Mr Peter Evans, Sony UK
- * Mr Malcolm Fergusson, Institute for European Environmental Policy

Ford Motor Company

Forum for the Future

Green Alliance:

- * Ms Julie Hill
- * Miss Hannah Hislop
- * Mr Jerry Hardcastle, Nissan Technical Centre Europe

Hewlett-Packard:

- * Dr Kirstie McIntyre
- * Mr John Holbrow, Federation of Small Businesses

Industry Council for Packaging and the Environment:

- * Ms Jane Bickerstaffe

Institute for Manufacturing, University of Cambridge:

- * Dr Claire Barlow
- * Professor Mike Gregory

Institute of Materials, Minerals and Mining:

- * Dr Norman Swindells

Institution of Chemical Engineers:

- * Mr Malcolm Wilkinson

Laing O'Rourke:

- * Mr Chris Sexton

Local Authority Recycling Advisory Committee:

- * Dr Andrew Craig

LRL Consultancy Services:

- * Mr Bob Lisney
- * Mr Brian McCarthy, TechniTex

Mike Read Associates

Milled Carbon

Nappy Alliance

National Industrial Symbiosis Programme:

- * Mr Peter Laybourn

North London Waste Authority

Oakdene Hollins and the Centre for Remanufacture and Re-use:

- * Mr Nicholas Morley

Office of Government Commerce

Philips Consumer Electronics:

- * Professor Ab Stevels

Process Industries Centre for Manufacturing Excellence:

- * Mr Michael Glass

Proctor & Gamble:

- * Dr Forbes McDougall

Research Councils UK:

- * Dr Peter Hedges

Resource Efficiency Knowledge Transfer Network:

- * Mr Arnold Black

Resource Efficient Design Initiative, De Montfort University:

- * Miss Lizzie Dutton
- * Miss Holly McCain

Salvation Army Trading Company and the Nonwovens Innovation and Research Institute:

- * Mr Paul Ozanne

Scottish Environment Protection Agency

- * Ms Lesley Seymour, Buro Happold

Social Environmental Enterprise and Design Foundation:

- * Ms Clare Brass

Society of Motor Manufacturers and Traders:

- * Mr Steve Franklin

South East England Development Agency on behalf of England's Regional Development Agencies

- * Mr Peter Stokes, Volkswagen Group UK

Sustainable Development Commission:

- * Ms Sue Dibb
- * Mr Andrew Lee
- * Mr Andrew Swain, Aggregate Industries
- * Mr Jeremy Tait, Market Transformation Programme

Technology Strategy Board:

- * Dr John Whittall

Tesco

Vitsoe:

- * Mr Mark Adams

Waste and Resources Action Programme:

- * Dr Liz Goodwin
- * Mr Martin Wheatley, Local Government Association
- * Mr Alan Wheeler, Textile Recycling Association

Women's Environmental Network

- * Mr Rainer Zimmann, Arup

APPENDIX 3: CALL FOR EVIDENCE

The House of Lords Science and Technology Select Committee has appointed a sub-committee, chaired by Lord O'Neill of Clackmannan, to look at sustainable approaches to waste reduction. The inquiry will focus on the first level of the waste hierarchy, waste reduction, and will look into ways in which products and production processes can be made more sustainable and therefore produce less waste.

The Committee invites evidence on the following questions. Witnesses are encouraged to focus on those issues of which they have particular knowledge or experience—submissions are not required to cover all questions.

Better design and the use of materials

- What role can better design and materials play in minimising the creation of waste? Are there any barriers to how knowledge in this area can best be translated and applied?
- What factors influence the use of materials? In what way do considerations of sustainability feature in the selection of most commonly used materials?
- To what extent do product designers and engineers take into account the availability and the end-of-life impacts of raw materials?
- What impact does the development of new materials have on design? How much interaction is there between material scientists and designers?
- Can better designed products offset the increase in consumption?
- Are there any other gaps in knowledge and how are they being addressed?

Business framework

- Does the current policy, regulatory and legal framework support and incentivise the development of better, more sustainable products and processes? How is the framework communicated to businesses and what is the level of awareness and understanding among businesses?
- How central is sustainable design to business thinking? What initiatives are in place to encourage this and are they meeting business needs?
- What other measures can promote a focus on waste reduction among businesses?
- What lessons can business learn from international experience?

Government policy

- What is and should be the role of Government in addressing the issue of waste reduction?
- How does Government policy link up with European strategies and action plans?
- What lessons can be learnt from other countries—within the EU and globally?

Consumer behaviour

- How can better product design be used to effect a change in consumption patterns and behaviour?
- What role do marketing strategies play in influencing more sustainable design?
- Are there any gaps in knowledge in this area?

Skills

- How is sustainable design integrated into the design syllabus?
- To what extent are considerations of sustainable waste reduction part of broader industrial training courses?

APPENDIX 4: SEMINAR HELD AT THE ROYAL ACADEMY OF ENGINEERING

15 November 2007

A seminar was organised at the Royal Academy of Engineering to give the Committee an opportunity to discuss the inquiry with academic experts, business advisers and representatives from public bodies.

Members of the Sub-Committee present were: Lord O'Neill of Clackmannan (Chairman), Lord Haskel, Lord Lewis of Newnham, Lord Methuen and Baroness Sharp of Guildford. In attendance were: Professor Stephen Evans (Specialist Adviser), Miss Sarah Jones (Clerk), Ms Christine Salmon (Clerk) and Dr Cathleen Schulte (Committee Specialist).

The participants were: Mr Peter Jones (Biffa), Professor Sue Grimes (Imperial College London), Professor Tim Jackson (University of Surrey), Dr Robert Chilton (National Consumer Council), Mr Malcolm Wilkinson (Institution of Chemical Engineers), Dr Claire Barlow (University of Cambridge), Professor Mike Ashby (University of Cambridge), Ms Sandy Shattock (Department for Environment, Food and Rural Affairs), Mr Keith Stonell (Environment Agency), Mr Matthew Rowland-Jones (Envirowise), Ms Sue Doughty (National Industrial Symbiosis Programme), Ms Teil Howard (Parliamentary Office of Science and Technology), Dr David Gardner (Resource Efficiency Knowledge Transfer Network) and Mr Patrick Mahon (Waste and Resources Action Programme).

Presentation by Professor Stephen Evans (Products, people, waste and resources)

Professor Evans gave an overview of the subject-matter for the inquiry, outlining the various stages of the product life-cycle: extraction, processing, manufacture, purchase, use and, finally, end-of-life. This life-cycle could be divided into three parts; production, consumption and waste management, but was not necessarily linear as some products could be fed back into earlier parts of the process as components of larger products. Waste was produced at every stage and sometimes could be fed back into the system as a resource.

There were a number of ways in which people could intervene to reduce waste, as the “waste hierarchy” showed. At the bottom of the hierarchy was waste disposal, which the Committee would not be focusing on during its inquiry. Above this was recovery, in which value could be recovered by generating energy from waste. The next level, recycling, could be useful as it prevented materials from being wasted and many materials could be recycled infinitely without losing their properties. However, in a process known as down-cycling, the properties of some materials were reduced with each cycle and this limited the number of times that they could be used. Recycling often required a substantial energy input so this was not the ideal way in which to reduce waste. The next level up the hierarchy, re-use, could therefore be more productive and could be carried out by either the consumer or the manufacturer. But the ultimate goal at the top of the hierarchy was to reduce or remove waste entirely.

Waste reduction was difficult to achieve because the three systems of production, consumption and waste management had largely developed independently of each other and lacked co-ordination. There was therefore a real need to integrate the three systems and consider the end-of-life disposal implications of products at the

design and manufacturing stage. Legislation introduced in recent years had begun to tackle this problem but often manufacturers only did enough to conform to the regulations and no more. Amongst designers there was still a tendency to use tried and tested materials and production processes rather than experimenting with more novel technologies. This was understandable as taking a risk with a new material could result in manufacturers losing out to competitors. The key to promoting waste prevention would therefore be to appeal to manufacturers on the grounds of self-interest, and demonstrate the potential benefits that waste reduction could bring for them. As the management of waste could often be expensive, if these costs were taken into consideration when estimating production costs, this might provide incentives for manufacturers to design their products differently.

Presentation by Mr Peter Jones (Waste and resource recovery: perspectives across supply chains)

Mr Jones began by describing the handling of raw materials in the UK, outlining the ways in which they could be used, re-used or disposed of. There was a lack of information regarding flows of material, and until this was addressed it would be very difficult to develop regulation or fiscal incentives in order to reduce waste. The composition and supply of waste were influenced by factors such as the Landfill Directive, financial instruments, municipal recycling targets and producer responsibility measures aimed at the design stage. But the way in which waste was used at end-of-life was influenced by the global demand for non-renewable and renewable resources, the efficiency of technology in the manufacturing industry, producer responsibility legislation regarding leasing, re-use or ownership, and taxes on virgin resources.

Historically, landfill had been a relatively cheap option for disposing of waste so there had been little incentive for manufacturers to reduce waste. Although hazardous waste already required pre-treatment before disposal, since 30 October 2007, producers had also been required to pre-treat most non-hazardous waste before sending it to landfill. Pre-treatment involved changing the characteristics of waste so that it was reduced in volume, for example, or to facilitate its handling or enhance its recovery. Sorting waste to separate recyclable from non-recyclable materials also counted as pre-treatment. However, experience since the introduction of these requirements had shown that the Environment Agency was not very stringent in enforcing these rules. Therefore, it was suggested that a primary driver for change could be a tax on virgin resources to encourage manufacturers to re-use materials rather than dispose of them.

In theory, the greatest financial and environmental benefits could be achieved by using producer responsibility regulations which obliged companies to deal with their own waste, overseen by transparent audit processes managed by the National Audit Office and Office of Fair Trading. But in practice, manufacturers within a sector were understandably reluctant to co-operate with their competitors, which resulted in a fragmented approach often lacking co-ordination or economic continuity across different product sectors. This had been compounded by a lack of co-ordination between Defra and BERR. It was therefore vital that trade associations worked to bring companies and the Government together in order to develop national strategies to manage waste effectively.

Presentation by Professor Sue Grimes (Waste as a resource)

Professor Grimes highlighted the need for an integrated approach to waste reduction so that waste was viewed as a potential resource. A new hierarchy for waste reduction was proposed which took sustainable design into consideration; at the top was the need to encourage a “design for the environment” principle. Although the “cradle to grave” concept had become popular, Professor Grimes felt there was a need to develop this further into “conception to grave” thinking. There was a communications gap between design and end-of-life which needed to be addressed so that designers not only considered whether a product was “fit for purpose,” but whether it was also “fit for disposal.” This would require the development of markets for recyclates.

At the next level of the hierarchy, it was important to achieve separation of materials at source and, for this purpose, tagging technology could be enormously useful. Many commodities, such as electrical and electronic products, produced complex mixtures of waste when they reached the end of their lives. But the inclusion of a RFID tag in high-value materials could allow these materials to be easily separated and re-used. Following this, further down the hierarchy there was a need to examine the range of recovery and sorting technologies currently available, before finally sending waste to landfill or other disposal sites.

Professor Grimes voiced concern that the legal definition of waste sometimes inadvertently presented a barrier to recycling; some products were viable for re-use but could not always be recycled as they were legally defined as “waste.” For example, technology existed to double the life of vehicle batteries at the end of their first use, but because batteries were defined as hazardous waste they could not be collected for recycling without obtaining a waste treatment licence, a process which made the recycling technology uneconomic. Legislation by itself was not enough to encourage recycling and the Government needed to consider other mechanisms, such as the use of economic instruments, to encourage sustainability, especially where recycling was discouraged by legal definitions. Professor Grimes suggested that the Landfill Communities Fund could be used to promote innovative sustainability projects that were not currently close to market by closing the communications gap between design and end-of-life and by encouraging new partnerships in the “conception to grave” chain.

Finally, there was a need to improve the skills and knowledge base at all stages in the “conception to grave” chain from designer to end-of-life practitioner. This should involve the development of modular Masters programmes in holistic sustainable manufacture, inter-disciplinary research to close the knowledge gap and the provision of industry based Doctorate degrees of the EngD type.

Presentation by Professor Tim Jackson (Sustainable consumption)

Professor Jackson introduced the work of the ESRC Sustainable Technologies Programme: a research initiative which aimed to identify and explain the social and economic forces which shape, foster or inhibit sustainable technologies. A wide range of reasons to explain consumption in modern society had been identified. These included satisfying the needs of the consumer or helping to form their identity, social cohesion, sexual selection, dreaming, hedonistic desire and even the pursuit of meaning. Material artefacts often held a symbolic meaning for many consumers and because of the relationship between material artefacts and a sense of self, consumers sometimes became locked into particular consumption patterns.

Consumer behaviour was constrained to a certain extent by the costs and benefits of commodities, but trying to explain the real motivations, attitudes and situations responsible for consumption was a lot more complex. The role of habit could not be underestimated, as many consumers simply bought the same products on a regular basis without even considering their environmental merits. Human attitudes and external conditions together contributed to a “value-action gap.” Some consumers might have good intentions to buy sustainable products, but without the appropriate external conditions and social context, their actual behaviour would not change. At the other extreme, even where consumer attitudes might be poor, behaviour could be altered if the external conditions were positive and made it easy to buy sustainable products or undertake recycling. The best results would therefore be achieved when both consumer attitudes and external conditions were positive.

Breaking habits and changing consumer behaviours would require four key steps, as described in the *I will if you will* report⁶⁶ from the Sustainable Consumption Roundtable. First, consumers had to be enabled to change by removing barriers and providing the relevant facilities, information and education. Secondly, consumer engagement had to involve community action, enthusiasts and media campaigns. Next, it was important for Government to lead by example and to achieve consistency in policies. Then finally, tax systems, reward schemes and penalties had to be developed in order to encourage people to consume sustainably.

Presentation by Dr Robert Chilton (The consumer perspective)

Dr Chilton explained that the leading principles guiding the consumer movement were choice, information, access, safety, fairness, representation and redress. However, these dated from a time when individual consumer behaviour was paramount. A more collective approach from consumers was needed and a number of ethical values could be applied in order to encourage sustainable consumption, such as achieving a level of equality. For example, if consumers today used their choices irresponsibly this might eliminate choice for their children. Therefore, to correct these inequalities there might be a need to limit the choice available to consumers, to encourage the consumption of more sustainable products.

Dr Chilton felt that the tax system sent out contradictory messages and did not help to co-ordinate different environmental issues. For example, Landfill Tax was calculated according to the weight of waste produced and did not take embodied carbon into account. There was a need for the tax system to narrow the cost gap between sustainable and unsustainable choices, and to reinforce consumer behaviour rather than confuse it. Information relating the environmental credentials of products also needed to be presented in an interesting, accessible way; consumers would respond to this type of approach more readily than to scientific or worthy messages.

But there was a need to lead by example, incorporating good waste practice into new public developments to encourage the community to follow. Effort was also needed to co-ordinate nationally consistent policies for the management of waste. Consumers were confused about the types of materials that could be recycled due to varying collection services in different areas; local authorities therefore needed

⁶⁶ Sustainable Consumption Roundtable, *I will if you will*, *op. cit.*

to co-ordinate their efforts and enter into joint contracts with industries that could re-use waste materials.

Presentation by Mr Malcolm Wilkinson (Waste and resource efficiency in the processing industry: the sustainable production of materials)

Mr Wilkinson began by outlining the inefficiencies of some sectors within the chemical manufacturing industry. Oil refinery did not produce much waste as its largest by-product was carbon dioxide. The production of bulk chemicals resulted in around one to five kilograms of by-product for every kilogram of product, but a large amount of this could be used again. However, the production of fine chemicals resulted in around 5–50 kilograms of by-product for every kilogram of product, and the figure for pharmaceuticals was around 25–100 kilograms. Furthermore, the by-products produced from these types of chemicals were often very complex and difficult to re-use, resulting in substantial amounts of waste.

Despite this, waste had decreased over the last decade. Cost savings and stakeholder pressure had played a part in decreasing waste, but legislation had been the key driver, including regulation on the Registration, Evaluation, Authorisation and Restriction of Chemical substances, regulation on the Control of Major Accident Hazards, the Integrated Pollution Prevention and Control Directive and the Climate Change Levy. But there were still some considerable barriers for manufacturers, one of the largest being the legacy effect of existing assets which, in this highly capital intensive sector, reinforced a traditionally conservative approach towards new technology. There was also concern about the poor return that might result from investment in environmental strategies. Although waste reduction measures could, if properly implemented, often produce savings in the long run, there were often difficulties in justifying environmental investments using strict investment criteria and imperfect accounting information on intangible benefits.

There was a lack of knowledge about the technologies currently available which presented a barrier on two levels. First, it was often difficult to understand how a particular technology would benefit a business as the technology package was incomplete. Second, the skills within an organisation did not usually support the innovation activity. Demonstration or prototype facilities were needed to advance the development of technologies beyond the proof of concept stage and to reduce the risks of implementation, but there was a lack of such facilities.

Set against this background, the ultimate goal was zero-impact, zero-toxicity products and processes, but developing these would involve tackling a number of key technology challenges such as:

- Using biocatalysts and developing chemical bioplants;
- Developing new polymers which, when fabricated into their components, would facilitate their disassembly and recycling;
- Using alternative feedstocks such as organic waste, crops, or simple molecules such as methane and ethane;
- Developing micro and nano materials which offered novel functionality;
- Intensifying processing equipment to develop continuous, rather than batch, processing in order to reduce waste.

Sustainability considerations were not very high on the design agenda in most organisations because there was no recognised holistic design approach for

practising engineers. The “12 Principles of Green Engineering”⁶⁷ provided a framework for the conversations that had to take place between designers of molecules, materials, components, products and complex systems, but designers had not systematically integrated these into a holistic design approach and this remained the challenge.

A further problem was that policy on sustainable development was fragmented and had not been well communicated, so sustainable design was not central to business thinking. There was a need to increase both government and industry funding for research projects. WRAP and NISP had provided businesses with some guidance about finding innovative uses for waste material, and these practical initiatives were particularly relevant for SMEs. But the problem was that they tended to focus on immediate operational issues and, whilst they solved some problems, they rarely tackled the root causes of waste production and had limited impact on strategic thinking.

Presentation by Dr Claire Barlow (Materials engineering and production processes)

Dr Barlow outlined the points at which waste could occur, both within a company and within a supply chain, before focusing on the specific challenges faced within small businesses. Dr Barlow described the efforts that had been made by a small manufacturing plant which had begun a waste management programme seven years ago in response to increasing landfill charges, and had managed to reduce the waste it sent to landfill by around 2,000 tonnes per year. Improvements in manufacturing processes and minor redesigns of packaging had produced a 15 per cent reduction in manufacturing and packaging waste at source, and the introduction of re-usable pallets had reduced pallet waste by 90 per cent. Furthermore, the company had increased its recycling of packaging and manufacturing process waste, achieving an 80 per cent reduction in packaging waste and a 30 per cent reduction in manufacturing process waste. In this way, the company had managed to make significant changes by implementing relatively simple measures. However, there was still room for improvement. It was thought that further improvement in manufacturing processes, increased recycling and a reduction of packaging could reduce the amount of waste sent to landfill further still.

SMEs often required help when implementing such changes and it was crucial that the Government provided this support. Although SMEs might produce relatively little waste individually, together they were responsible for a vast quantity of waste each year. Dr Barlow felt that many SMEs had already looked at quick or easy measures to deliver immediate economic benefits, such as lean manufacturing, quality control and energy reduction. But more profound changes were rare because of a lack of resources for change, a lack of understanding or knowledge of best practice, and a lack of incentives. For small businesses, a concentration on the sustainable agenda could reduce their short-term economic returns, and their often fragile position within the market reduced their ability to invest in long-term sustainable solutions.

So what could be done? An example was given of a recently established “sustainability club” which fostered an environment in which best practice knowledge could be shared between businesses. A concerted effort from industry and the Government was needed to influence supply chains and incentives were

⁶⁷ Anastas and Zimmerman, *Environmental Science and Technology* 37 (5), 2003, “Design through the 12 Principles of Green Engineering,” pp 94A-101A.

also needed to encourage designers to consider re-use and recyclability when selecting materials. Finally, innovative recycling processes needed to be encouraged in order to deal with a wider range of waste. For example, rather than melting, refining and reprocessing girders to steel stock, girders from demolition sites could in fact be reshaped. This idea would be logistically highly complex and would require substantial changes in the way the construction industry worked but, if implemented, could save a significant amount of energy.

Presentation by Professor Mike Ashby (Materials of industry: history, dependence, consumption, cost and value)

Unlike biological systems, modern industrial society is not in balance, hence waste is produced. Professor Ashby noted that this had not always been the case; thousands of years ago we had used different materials in a system that was largely balanced and sustainable. Throughout history we had become increasingly dependent on metals, and the widespread rapid consumption of fossil fuels, which had taken millions of years to accumulate, meant that the system was no longer in balance. In recent history, our reliance on natural resources had declined and there was now a large dependence on man-made polymers which were not renewable.

Professor Ashby drew attention to the range of materials produced worldwide and the extent to which they were recycled. If comparisons were made by weight, then oil, coal and steel appeared to be in greatest use, but this was not a fair comparison because polymers were not very dense. If these figures were examined in cubic metres, our substantial reliance on polymers became clear. However, the amount of material recycled was pathetically small, particularly when it came to polymers, for which less than 20 per cent were generally recycled. So why was society wasting so much material? Part of the problem was that materials had become cheaper over the last 150 years and society had become richer, so materials were valued less. An increasing scarcity of materials, the increasing price of energy, and government legislation would therefore be key drivers in changing attitudes.

Discussion

Discussion initially focused on the needs of small businesses when developing waste reduction strategies. SMEs often required an adviser to visit the premises, examine their processes and suggest ways to improve manufacturing, transportation and packaging processes. Some organisations, such as Envirowise and NISP, were already assisting businesses in this way. To assist the manufacturing industry, PICME assisted manufacturers of pharmaceuticals, chemicals, plastics and rubber, to improve competitiveness and efficiency and to reduce waste.

SMEs needed to be educated about the importance of waste reduction and encouraged to seek help from such organisations. Historically, SMEs had been motivated by short-term benefits, and many small business owners simply took their waste home and disposed of it through the domestic route, thereby avoiding taxes. It was not always economical for small businesses to implement big changes to reduce waste, and a common attitude amongst SMEs was that they wished to remain small and independent and would not welcome more regulation or guidelines.

So how could SMEs be encouraged to reduce waste? One way to promote change was to instil a sense of value about sustainability and waste reduction. The promotion of moral and ethical reasons for reducing waste often inspired small businesses to change their processes, and could provide a useful marketing tool for

them to advertise their products. Pressure from further up the supply chain was also beginning to provide an influence; for example, big food retailers and construction companies were beginning to examine their suppliers and often exerted a pressure for sustainable manufacturing.

Although the inquiry would not be focusing on the management of waste, it was noted that the disposal facilities available to businesses fed back and influenced attitudes towards waste. It was felt that partnerships between businesses and waste services were essential; for example, it was good practice for waste companies to provide communal disposal units on trading estates for all businesses to share. However, it was important that communal facilities did not negate attempts to make businesses aware of their own waste, and did not remove their responsibilities. It was important to encourage change collectively; businesses would be reluctant to make changes to their practices unless other companies followed, for fear of losing their competitive edge.

It was difficult to measure the total amount and cost of waste produced because there was no standard method to compare different wastes produced at various points in different production processes. Waste could occur in terms of energy, carbon, raw materials, food and other aspects, and could occur at a number of points including mining, production or disposal. It was felt that SMEs would respond more quickly if they were presented with clear figures showing the cost of the waste they produced, but accounting for these various factors was difficult. The Prince of Wales' *Accounting for Sustainability* project⁶⁸ had begun to address this matter and aimed to develop systems that would help both public and private sector organisations account more accurately for the wider social and environmental costs of their activities.

Difficulties had also arisen from the legal definition of waste as it was often more difficult or costly to re-use resources if the "waste" label had been applied to them. There was therefore a need to review the way in which waste was legally defined and the point at which a material ceased to be waste. There was also a need to examine how resources could be re-used to encourage more sustainable manufacturing processes.

⁶⁸ See

http://www.princeofwales.gov.uk/newsandgallery/news/hrh_launches_accounting_for_sustainability_at_st_james_s_pal_1859677089.html.

APPENDIX 5: VISIT TO UXBRIDGE

26 March 2008

Members of the Sub-Committee taking part in the visit were: Lord O'Neill of Clackmannan (Chairman), Lord Haskel, Lord Methuen, Earl of Selborne and Baroness Sharp of Guildford.

In attendance: Professor Stephen Evans (Specialist Adviser), Miss Sarah Jones (Clerk) and Dr Cathleen Schulte (Committee Specialist).

Xerox UK

Meeting with Mr Frank Mooney (Customer Service Director), Mr Robert Clarke (Environmental Executive), Mr Andy Cosgrove (Environment Health and Safety Manager), Ms Elaine Grange (Environment Health and Safety Project Co-ordinator) and Ms Carole Shephard (Legal Adviser)

Presentation by Mr Mooney

Mr Mooney provided an overview of the Xerox corporation, noting that the company generated \$17.2 billion of revenue and employed around 57,400 people in 2007. Approximately six per cent of the total revenue was spent on research and development conducted in five different centres throughout the world, and Xerox had registered over 10,000 patents in the United States in the last 20 years. The company utilised lean manufacturing and six sigma approaches to improve their business processes and had been promoting their social responsibility credentials for years. Xerox also claimed to have pioneered the production of “waste-free” products and designed copiers, printers and multifunctional systems which could be remanufactured at the end of their initial lives.

Presentation by Mr Cosgrove

Xerox manufactured office products including printers, copiers, digital printing presses and colour printers. It also provided consulting services on how to reduce costs and maximise productivity by improving printing processes within offices. Mr Cosgrove reported that sustainability was part of the company's ethos and Xerox had a long history of tackling environmental issues. Its four environmental strategic goals were to become climate neutral (by investing in technologies that would reduce its carbon footprint), to maintain a sustainable paper cycle (working in partnership with customers, suppliers and stakeholders), to achieve a zero persistent bioaccumulative toxic footprint (through elimination of such materials in the supply chain) and to produce waste-free products and facilities (by producing waste-free products and also by promoting waste-free offices amongst their customers). The company also ran return programmes for consumables such as printer cartridges.

In 1967 Xerox began recycling materials from their products and in 1969 the company developed the first machine which could produce double-sided copies. In 1991 the company launched its Waste-Free programme, with an aim to encourage “waste-free products manufactured in waste-free factories to enable waste-free customer workplaces.” In order to achieve this goal, Xerox pioneered the design and production of machines that could be remanufactured. Such machines were

returned to factories for disassembly and as many components as possible were used in the manufacture of new machines.

Xerox had examined traditional printing processes to assess where improvements could be made. It had developed a novel way to make toner which reduced overall energy consumption by 15–22 per cent per pound of toner, led to a lower mass of toner being used per page and which resulted in less toner waste. For specific types of printer, the company had developed solid ink colour technology which eliminated the need for cartridges or other consumable items and generated around 90 per cent less waste. The company was continuing to invest in research and one of its latest innovations was the development of erasable paper, on which images lasted for just one day, allowing the paper to be used again and again.

Presentation by Mr Clarke

Mr Clarke outlined Xerox's waste prevention and management activities. Beginning with product design, the use of hazardous substances was minimised, often beyond legislative demands, and attention was given to the efficient use of materials. Products were designed with a modular architecture so that they were easy to dismantle, repair or refurbish and so that parts could be re-used in the same or similar machines. A standard design platform with a 10 year life-cycle allowed designers to design for the future.

Once in service, the emphasis was on consumables. Xerox's Green World Alliance programme attempted to reduce office waste by operating a returns service for cartridges and toner containers. Different return models were used for different customers and countries: some cartridges and toner containers could be returned via pre-paid postage labels; in the UK, parts and cartridges could be collected via authorised charity organisations and service providers; in addition, service engineers were sometimes provided with an incentive system to encourage them to return certain types of printer cartridge. In 2006 the Green World Alliance programme had resulted in 2.7 million cartridges and toner containers being returned worldwide.

At the end of their lives, smaller machines (which constituted around 75 per cent of Xerox products) entered the standard WEEE collection and disposal system, whilst larger machines (making up around 25 per cent of all Xerox products), were sent to a Xerox remanufacturing factory. For the larger machines the aim was to send zero waste to landfill. Remanufacturing factories implemented a hierarchy that emphasised the re-use of products as the primary aim, followed by the re-use of parts (possibly with some processing first), then recycling back into raw material as the final option. Customer satisfaction was crucial and machines made with remanufactured parts should not be distinguishable from brand new ones, so parts had to be cleaned and tested before being re-assembled into finished units. For each unit that weighed 589 kilograms when it arrived at the factory, 539 kilograms were re-used and the remainder recycled, achieving a re-use rate of over 90 per cent. In 2007, Xerox Europe claimed to have remanufactured around 440 tonnes of material and, since 1991, remanufacturing and recycling together had given life to more than 2.8 million Xerox copiers, printers and multifunction systems worldwide. Furthermore, since 1991 the company's returns programme for consumables and remanufacturing strategy together had diverted nearly £2 billion of waste from landfill.

Discussion focused on the following points:

- The success of Xerox's activities was partly due to product leasing; by retaining ownership of the machines, Xerox could trace their products and organise for their collection and return. In the case of non-leased machines, the challenge was to encourage customers to return old machines that were gathering dust in store rooms.
- The term "remanufactured" could act as a potential barrier if customers associated it with "reconditioned" and saw the products as inferior. It was therefore crucial to make customers aware of the technology used to ensure that remanufactured parts met the same performance standards as new ones.
- For larger products it was profitable to arrange for the collection of machines, to design machines for disassembly and to invest in the labour for remanufacturing. Remanufactured products could usually be produced at a slightly lower cost than brand new units. However, it was only economical to remanufacture products worth around £30,000 or more (products of lower value would typically be recycled).
- The requirements of the RoHS Directive had forced Xerox to operate separate production lines for European and non-European returned machines, which added to the complexity and cost of the remanufacturing process. Legislation needed to be developed on a global level to ensure that all countries used similar product standards.
- Implementation of the WEEE Directive was seen to have encouraged recycling rather than remanufacturing, even though remanufacturing provided greater environmental and economic gains. Complying with the WEEE Directive through collective producer responsibility meant that producers had no direct connection to their products at end-of-life.
- Large-scale procurers had the opportunity to shift the balance between recycling and remanufacturing by returning products to suppliers at the end of their lives. There was potential to introduce legislation to encourage this for more expensive electrical and electronic products.
- In its procurement process, the government of the Netherlands gave bonus points for remanufactured products. This was contrasted against UK government procurement policies which demanded that all products should be new.

Martin-Baker

Presentation by Mr John Martin (Joint Managing Director)

Mr Martin welcomed the Committee to Martin-Baker, a company which produced ejection seats and related equipment to safeguard aviators throughout the escape, survival, location and recovery phases of ejection. Headed by the twin sons of the late founder, the company claimed to have saved over 7,230 lives in 93 Air Forces. The company had a zero waste ethos which it had not adopted for the sake of advertising, but which was due to the environmental awareness of staff and the fact that waste reduction measures led to significant cost savings.

Presentation by Mr Graham Dumbleton (Works Manager) and Mr Fred Pratley (Safety Officer)

During a "works communication" process in 1993, the staff of Martin-Baker had questioned the lack of recycling in the company and the way in which waste was

collected and disposed. The company's past practice had been to mix waste materials but, during a visit to their waste management company, staff were surprised to learn that a wide range of the materials could be recycled and were of potential value. Simple changes were therefore made in the office environment and different bins for cardboard, paper, magazines, plastic cups, aluminium cans and wood were introduced to encourage recycling.

The company's practices were systematically assessed and more substantial changes were made within the factory to reduce waste and increase recycling. One of the problems identified was that machines were cleaned every six to eight weeks, taking four to twelve hours each, with the old machine coolant being transported off-site for disposal. This not only created a lot of waste coolant but also brought a stop to manufacturing for significant periods of time. The company therefore researched other options and visited companies in Sweden which used centralised metal-working fluid recycling systems. These centralised systems remove coolant from machines, clean and return it to the machines on a continuous basis and having seen the benefits, Martin-Baker became one of the first companies in the UK to install this type of system. As the coolant was now cleaned and maintained on a continuous basis, it could be utilised for extensive periods, certainly years, with only minimal disposal off-site. Although installation of the system had initially been met with mixed reactions from staff, once some machines had been connected to the system, operators of other machines had soon demanded to know when they would be connected too.

The company had also addressed the way in which they managed swarf waste, the shavings and chippings of metal which result from metal-working operations. The swarf from different metals had previously been mixed together, contaminated with coolant fluid and, as a result, the company received the lowest possible price for it. Martin-Baker attempted to engage in conversations with their scrap merchant to discuss how their processes could be improved but to no avail. They eventually entered into dialogue with another metal recycling company and after obtaining an understanding of the recycling process and the quality of materials needed, Martin-Baker designed a system that would keep all metals separate and which used gravity to separate the majority of coolant from the metal swarf. The resulting segregated "dry" waste metals could thus be recycled back into higher specification metal with an enhanced value. The standard approach of using centrifuges to separate the swarf from the coolant was dismissed as being unnecessarily energy-intensive, when discipline and time could achieve the same ends.

The company always attempted to find solutions to environmental problems using such an approach, consulting with the workforce and engaging with external experts. Using this process to improve the management of hazardous waste, the company had managed to reduce the number of tankers needed to dispose of hazardous waste from 65 to just 13 tankers per year. In 1998 the company had decided to attempt to obtain ISO 14001 accreditation. Mr Dumbleton felt that the application process for the standard had forced the company to examine areas where waste was still being produced and drove staff to take further action to tackle items such as batteries, toner, printer cartridges and water.

The Committee were given a tour of the factory and discussion focused on the following points:

- The reduction of waste had delivered significant cost savings in material bills, water bills and landfill costs, as well as profits from the increased value of scrap.

- Martin-Baker now engaged with a variety of external business support programmes, such as NISP and Envirowise, but the company had not heard of these programmes when it initially implemented its waste reduction practices. The attention paid to waste reduction was seen as an extension of the company's philosophy of continuous improvement, with significant benefits arising from the involvement and empowerment of a loyal workforce. The company had received 10 Queen's Awards for Enterprise, including one for Sustainable Development.
- Shortly after the centralised metal-working fluid recycling system had been installed, machine operators had become protective of the coolant supply and exhibited a sense of pride in the system. The company felt that a sense of ownership amongst staff assisted the implementation of waste reduction practices.
- The simple act of talking to external experts—whether recyclers or coolant experts—was a major help to the formation of waste reduction initiatives. However, it had not been easy to find businesses that were willing to co-operate in an open manner, as most preferred to keep their knowledge to themselves. In the future the company was looking to engage with and educate its suppliers about waste reduction. Martin-Baker hoped to improve waste prevention amongst its suppliers by demanding higher standards but acknowledged that this would take time as many were small businesses with no knowledge of waste reduction.

APPENDIX 6: VISIT TO BELGIUM

Members of the Sub-Committee taking part in the visit were: Lord O'Neill of Clackmannan (Chairman), Lord Haskel, Lord Howie of Troon, Lord Methuen, Earl of Selborne and Baroness Sharp of Guildford.

In attendance: Professor Stephen Evans (Specialist Adviser) and Miss Sarah Jones (Clerk).

21 April 2008

OVAM (Public Waste Agency of Flanders)

Welcome by Mr Rudy Meeus (Head of Waste Management)

Mr Meeus welcomed the Committee to OVAM (Openbare Vlammse Afvalstoffenmaatschappij), the public waste agency for the Flemish region. He explained that administrative responsibilities for waste were divided between the federal government and three regional governments covering the Flanders, Wallonia and Brussels regions. Whilst the federal government dealt with nuclear waste and waste transit, the regional governments were responsible for translating all EU environmental directives into law and reaching EU targets. The three regions did not always enact exactly the same legislation, nor did they always implement directives at the same rate. The result was that businesses in Belgium had to be aware of waste policies dictated at the European level as well as variations in implementation between different regions.

Presentation by Mrs Mieke De Schoenmakere (Staff Member, Europe Office)

Mrs De Schoenmakere provided a brief summary of the work of OVAM which employed around 400 people. The Flemish region covered approximately 13,500km² and was home to around 6 million inhabitants. OVAM was responsible for policy making as well as planning for, monitoring and enforcing EU legislation on waste prevention, management and soil remediation. Waste collection and treatment activities were contracted out. Within Flanders, around 10 per cent of the total waste stream was produced by households, which amounted to around three million tonnes per year. The collection and treatment of this was organised by 308 municipalities which worked together in 25 associations. The other 90 per cent was commercial and industrial waste and responsibility for this lay with the private sector.

Over the last decade, the amount of household waste sent to landfill in the region had decreased significantly. This was partly because prevention had been encouraged but mostly because more waste had been recycled. Recycling had also helped to divert industrial waste from landfill but a growing proportion of industrial waste was being recovered due to changes in the regulatory framework. In 1998, a new system had been introduced which allowed materials previously classified as waste to be used as secondary materials. If certain criteria were met, the "waste" label could be removed from these materials which made it easier to store, transport and use them, thus diverting resources away from recycling or landfill. Whilst this had allowed greater resource efficiency, the specified criteria only applied within the Flanders region and different regulations had to be met in the other two Belgian regions.

The disposal and management of waste was influenced by a number of factors. OVAM had developed a series of waste management plans which addressed the treatment and disposal of waste within particular sectors. Selective collection and recycling systems had been implemented at the kerbside, in recycling parks and at retailers to encourage the separation of different types of waste at source. Households were charged for the waste they produced; in some areas the charge was calculated according to the volume or weight of the waste. Extended producer responsibility legislation obliged producers to take back and dispose of their products appropriately. In addition, OVAM had implemented a landfill ban for unsorted household and industrial wastes, wastes which had been selectively collected for the purpose of recovery, wastes that could be recovered because of their nature, quantity or homogeneity, combustible residues from the sorting of household or comparable industrial waste, and waste pharmaceuticals. Furthermore, it was forbidden to incinerate selectively collected wastes that could be recycled (except for some high calorific wastes for renewable energy purposes), unsorted industrial wastes and unsorted household wastes. The costs of landfill and incineration had been set to promote recycling and incineration above landfill, and to encourage the use of treatment options which had the lowest environmental impact.

Presentation by Mrs Katrijn Siebens (Head of Waste Prevention)

OVAM's long-term goal was to reduce waste and its environmental impacts to an unavoidable minimum and to decouple economic growth from the environmental pressures which resulted from increasing consumption. OVAM had been particularly successful at engaging with the business community to promote waste prevention. Mrs Siebens said that OVAM had begun its prevention work in 1991 and had made good progress at raising awareness within industry as well as embedding prevention measures within the legal system. Nevertheless, she acknowledged that it was difficult to measure the effectiveness of their waste prevention policies because there were no clear targets and there was a complex division of competencies between the national and regional authorities.

To promote waste reduction amongst small companies, OVAM had conducted a number of Prevention Stimulation (PRESTI) programmes in which particular sectors were studied, pilot companies were encouraged to implement waste prevention measures, and the experiences and knowledge gained were disseminated and shared to other SMEs. As part of the programme, research bureaus and environmental organisations could receive funding to establish projects which encouraged businesses to embrace waste prevention principles. Since 2006, OVAM's Eco-efficiency Scanprogramme also encouraged SMEs to invest in eco-efficient policies to combine environmental profit with economic advantage. Over a period of three years, the programme had a budget of €2.6m and aimed to assist 1,000 Flemish SMEs. The programme was voluntary and involved three steps: an initial audit (the eco-efficiency scan), a follow-up review after six months and another audit after one year. These audits were carried out by external consultants, were free for the SME and strictly confidential. The audits identified areas which businesses could improve upon and some of the most common were processes (waste prevention, energy use and transport), valorisation of waste (optimisation of the waste separation) and management (monitoring and communication).

Ms Siebens noted that SMEs did not always have a clear idea of where their waste was due to poor recording systems. SMEs often reported that the scan "questions what we consider as obvious" and "opens the eyes." The programme

demonstrated that SMEs often had a large potential for improvement and most businesses acted almost immediately after the scan, but follow-up was crucial in ensuring that practices were sustained. OVAM had developed a piece of software known as Mambo, whose name was derived from the assertion that “less waste means more profit for the company.” This tool allowed companies to calculate the costs of their waste. It demonstrated that the true costs could be up to 10 times higher than the visible costs of disposal, and the mean value of total waste costs could amount to up to five per cent of the production costs of a business.

To promote eco-design, the agency had developed a simple instrument to assess materials based upon an internationally accepted method for calculating life-cycle assessments. The “ecolizer” tool gave an “eco-indicator” score which allowed designers to compare the emissions and resource inputs of different materials. Being simpler than full life-cycle assessments, the scores allowed designers to easily compare the environmental impacts of different materials, production processes and products. Eco-design awards had also been developed which recognised both students and professional designers who pushed the boundaries of sustainable design. Furthermore, OVAM had employed benchmarking techniques to encourage businesses to become more sustainable. Its Inspiration database included over 250 examples of companies which exhibited good practice at designing for sustainability and which implemented successful waste reduction practices. An internet based tool had also been developed to enable local authorities to assess their procurement policies and consumption patterns.

The next challenge was to address production and consumption within society. OVAM had developed sectoral implementation plans and aimed to promote the waste reduction message to retailers and consumers next. The government of Flanders had pledged to promote sustainability as much as possible through its procurement activities. OVAM favoured a collective approach towards tackling waste, encouraging manufacturers, retailers, consumers, environmental organisations, government agencies, marketing sectors and research institutions to all play a role in addressing consumption in order to reduce waste.

Niko

Meeting with Mr Joseph De Backer (Owner of the Niko Group and Chairman of the Board) and Mr Werner Verberckt (Director of Operations)

Mr De Backer introduced the company, which manufactured a range of electrical switches, sockets, light controls, door and video phone systems. In the past the company had implemented environmental projects on an ad hoc basis, but in 2000 the company decided to take a more strategic approach, signing up to an industrial charter produced by a local authority which committed them to implementing environmentally friendly processes which were also financially beneficial. The charter was voluntary but signing up to its aims was a symbolic act which encouraged businesses to change their practices. Along with the local authority, the business selected a number of environmental issues to focus on and so far all the changes had proved to be economical. In general, waste reduction strategies led to long-term cost savings but new technologies might require a significant initial investment. The pay-back time was therefore crucial. As a large company, Niko could afford to invest in strategies which might take many years to return a profit, but many businesses, especially SMEs, were reliant on banks for loans to implement new technologies and if the pay-back time was lengthy, banks would often be reluctant to fund them.

Environmental considerations had influenced the whole ethos of the company. Sensors had been installed so that lights were only turned on when people were present and light intensity was low. No conventional air-conditioning or heating systems were used within the buildings and novel heat exchange systems had been installed instead. A number of factors had acted as a catalyst to implement waste reduction practices. The company itself had been keen to establish an environmentally friendly ethos, but it had also seen indications from local authorities that this matter was to be taken seriously. The company was aware that legislation would be developed to oblige manufacturers to reach certain environmental criteria, so it had decided to make use of the incentives offered to reach these criteria ahead of the game. Legal requirements had to be met regarding the use of chemicals or hazardous substances within products, which the company discussed in detail with its suppliers. The company integrated a “care for the environment” message throughout its design processes and communicated its environmental objectives both within the company and externally. Niko was constantly looking for materials which could be re-used, preferably within the company, but also outside of the company if not. However, the aesthetics of products sometimes limited what could be achieved through design alone.

Tour of the factory

During a tour of the factory the Sub-Committee viewed both manual assembly lines, used to manufacture small numbers of a specific product, as well as large automated production lines, used for mass manufacturing items. A “hot runner” system had been employed in which a heated manifold precisely distributed molten plastic into moulds during the production of plastic units. This prevented the formation of a plastic “runner” which often resulted in other factories after excess plastic was left in the cavity between heated nozzle and mould. The resulting pieces of wasted plastic were only small but, when there were hundreds of thousands of them, collectively they could constitute a large material and financial cost. Niko therefore saved a substantial amount of money, energy and material by implementing the “hot runner” system.

Delhaize

Presentation by Mr Phillippe-Henri Heymans (Architect and Technical Director)

Mr Heymans began by introducing the Delhaize Group, a large food retailer founded in Belgium in 1867, which operated a variety of supermarkets and smaller stores within seven countries across North America, Europe and South-East Asia. Mr Heymans outlined the waste policy of Delhaize Belgium which focused on prevention, a message which was promoted throughout the supply chain to suppliers, procurers, distributors and staff within Delhaize stores.

Delhaize Belgium had asked its suppliers to consider the design of packaging, questioning whether it could be removed, reduced, re-used, recycled or made of renewable or biodegradable materials. The company also planned to teach its procurement staff about the relative costs and benefits of reducing packaging and educate them about the environmental reasons for reducing waste. To ensure that it met its legal requirements for recycling and disposal, Delhaize was a member of Val-I-Pac, a not-for-profit organisation which co-ordinated the management of industrial packaging waste and ensured companies complied with the regulations. Re-usable boxes for fruit, meat and vegetables were used in warehouses and could be washed and returned after use, allowing a completely closed loop system. Other

useful alternatives to store and transport products included re-usable pallets, small trolleys and special re-usable trays for fish and potatoes.

The company also collaborated with Fost Plus, a voluntary body formed by private companies which aimed to develop a co-ordinated, sustainable solution to reduce household packaging waste in co-operation with industry, consumers, municipalities, local authorities and recycling companies. The company claimed to be a pioneer in Belgium and had been offering re-usable packaging and carrying solutions since 1994. From July 2007, Delhaize stores had stopped offering disposable plastic bags to customers, which would save an estimated 720 tonnes of plastic each year. Since the distribution of these bags had stopped, the use of re-usable bags had tripled. The company also ran a deposit scheme for glass wine bottles which, from May 2008, would offer 30 cents to customers for every bottle returned. The bottles were collected in stores, sent to a sorting centre where they were washed and then re-used.

Mr Heymans acknowledged that there were problems to overcome. Some of these were internal as it took time to alter processes and educate staff, but others were external. Customers' perceptions needed to be addressed as they did not always understand the arguments for and against various types of packaging. If energy consumption was considered for the whole supply chain of a food, the energy used in growing, harvesting and cooking food usually far outweighed any energy used in the production of packaging, but as packaging was often the most visible part to customers, they could be disproportionately worried about its environmental impacts. Furthermore, it was difficult to compare the environmental benefits of various types of packaging as many different factors had to be considered, such as weight, product safety and the raw materials and energy used during its manufacture. A life-cycle analysis would be needed to consider all of these different aspects fully but it was not realistic to conduct such an analysis for every piece of packaging and customers would not understand the results anyway. In the future it would be important to continue to improve the design of packaging to reduce its environmental impacts, but it would also be important to address the concerns of customers and provide easy to understand information about different types of packaging.

22 April 2008

Environment Directorate-General, European Commission

Meeting with Ms Karolina Fras (Policy Officer), Mr Jakub Wejchert (Legislation Policy Officer) and Ms Rosalinde Van der Vlies (Sustainable Production and Consumption Unit)

Discussion focused on environmental legislation developed at the European level. The Waste Framework Directive was in the process of being revised and it was hoped that articles specifying criteria for end-of-waste and by-products would help to clarify the legal position of waste materials and lift regulatory burdens so that a greater number of materials could be recycled, reprocessed and re-used. The term "waste" often had negative connotations so it was thought likely that the removal of this label from some materials would help to promote the re-use of resources. Criteria for defining end-of-waste would only be specified for particular sectors though, where it was felt there was a need to do so. The inclusion of national waste prevention plans and recycling targets in the Waste Framework Directive was a point of contention during the revision process. The Commission was not in

favour of setting goals and targets for prevention and recycling at the community level because it felt that they should be supported by firm data and set with reference to the circumstances of individual Member States.⁶⁹

The Integrated Pollution Prevention and Control Directive required industry to reduce its pollution and waste and was in the process of being recast alongside six other directives, as part of a proposal to develop a coherent directive on industrial emissions. When developing legislation, the Environment Directorate-General worked alongside governmental departments and environmental agencies from Member States in an open, consultative process, inviting opinions from relevant stakeholders. In this way, it was hoped that new legislation always took the views of industry into account. However, it was acknowledged that some pieces of legislation sometimes conflicted with each other and the difficulty of implementation lay in the detail. It was hoped that future reviews of legislation such as the WEEE Directive and RoHS Directive would help to address any difficulties experienced by businesses.

The Sustainable Consumption and Production Action Plan promoted the development of environmentally friendly products, and it was noted that improvements in resource efficiency could reduce industry's dependence on virgin raw materials. The Action Plan could provide the basis for the introduction of differential taxation for products of differing environmental performance, but such changes to the taxation system would need unanimous agreement between Member States. As part of the Action Plan, the Commission was also considering setting dynamic product benchmarks. These would oblige certain products in all Member States to meet particular criteria, but individual Member States could set higher standards if they wished. Whilst such standards had already been developed for energy-using products, there was scope in the future to develop them for a broader range of products and for other environmental aspects such as resource efficiency or recyclability.

Orgalime

Presentation by Ms Sigrid Linher (Environment Manager)

As an engineering association which spoke for 35 different trade federations, Orgalime represented around 130,000 companies in the mechanical, electrical, electronic and metalworking industries in 23 European countries. Ms Linher noted that businesses faced many different pieces of environmental legislation and the complexity of various regulations often overwhelmed them. In the past, she felt that legislation had largely focused on end-of-life disposal or production standards, citing examples such as the WEEE and RoHS Directive, or on the emissions produced during production processes. But the development of the EuP Directive appeared to signal a new approach, where sustainability and life-cycle thinking were considered in legislation. The challenge was to achieve consistency between different pieces of legislation to ensure that all regulations steered businesses in the same direction.

⁶⁹ Since our meeting, an agreement on the text of the Waste Framework Directive has been reached between the European Parliament and Council of Ministers. This does include targets for re-use and recycling, which Member States must aim to achieve by taking necessary measures. Member States must also establish waste management plans and waste prevention programmes with prevention objectives five years after the Directive comes into force.

The association monitored the implementation of the WEEE and EuP Directives and assessed the ways in which they impacted upon businesses. Shortcomings in Member States' transpositions of the WEEE Directive had been recognised and a global perspective was needed to address these. Orgalime felt that the EuP Directive was an example of good regulation because it considered both the needs of the product, such as safety, fitness for purpose, convenience and appearance, as well as environmental needs. The directive also recognised that environmentally conscious design involved more than just design for recycling, but required consideration of energy efficiency, the raw materials used and waste. Such a holistic approach in legislation was vital to avoid adverse environmental effects. Waste reduction was important, but it must be considered alongside other environmental aspects and it was crucial that legislators, businesses and consumers all adopted life-cycle thinking in the future.

Toyota Motor Europe

Meeting with Mr Tadashi Arashima (President), Mr Graham Smith (Senior Vice-President), Mr Steve Hope (General Manager of Production Engineering), Mr Willy Tomboy (Director and Environmental Officer of the Environmental Affairs Group), Mr Stephan Herbst (Senior Manager of the Environmental Affairs Group) and Mr Alex Burnett (Senior Specialist in External Affairs)

Presentation by Mr Smith

Mr Smith introduced Toyota's operations within Europe, noting that in 2007 the company made up 5.6 per cent of the market share and sold 1,238,638 vehicles. Toyota owned nine manufacturing plants and one design centre in Europe and employed around 80,000 people directly and through retailer channels.

Presentation by Mr Hope

Mr Hope outlined Toyota's environmental performance and commented that by 2007 the company had already reached its 2010 targets for energy consumption, water use, emissions of volatile organic compounds and waste reduction. Manufacturing plants in the UK had managed to reduce their waste by 67 per cent between 1994 and 2006. The company was therefore in the process of resetting its targets to achieve even greater environmental savings. Toyota valued the ISO 14001 standard and all of its European manufacturing plants had obtained the standard. The company also strongly encouraged sustainability amongst its suppliers and had developed green purchasing guidelines which it used when selecting suppliers. In the past, they had previously stopped working with suppliers who had not obtained the ISO 14001 or which did not participate in the EU Eco-Management and Audit Scheme. This provided a strong incentive throughout the supply chain to take environmental concerns seriously. The company also made use of benchmarking exercises to compare its performance against other automotive companies and Mr Hope reported that the company was the top performer in Europe when it came to waste reduction, energy consumption and water use.

The company had adopted the principles of the waste hierarchy in all its processes, choosing to focus its attention on the top and middle levels which involved refining, reducing, re-using, recycling and recovering waste. Their philosophy was that bad quality materials or products should never be passed from one stage of a production process to the next. It was important to recognise that materials often

had value, so they should be refined, segregated and re-used wherever possible. Toyota's manufacturing plant at Burnaston, in the UK, had been the first to achieve "zero waste" and since 2005 had sent no waste to landfill. Waste was reduced as much as it could be, but where waste did arise at the plant it was segregated at source and recycled where possible. The sludge water content was removed from waste and incineration provided an opportunity to recover energy. Following the example of this plant, all Toyota's European manufacturing plants had reduced their waste and now managed to send zero waste to landfill. In addition, all plants were set the challenge of reducing the total amount of waste created and to move up the waste hierarchy, increasing their recycling to recovery ratio.

The company had adopted the Kaizen process which involved continuous improvements. It also made use of "just in time" and "lean production" strategies to detect problems in production processes and correct any defects or problems quickly. Alterations in the design process had led to the development of products which were easier to deal with at end-of-life. For example, a soft instrument panel had previously been made from three different types of materials, only two of which were recyclable, but after the Kaizen process the decision had been taken to manufacture it with just two types of recyclable materials. The company had recognised that waste reduction measures led to significant cost savings and therefore made good business sense. Toyota's goal was to reduce waste whilst incurring minimum cost, transportation and administration. There were difficulties to reducing and re-using waste, many of which stemmed from the legal definitions of waste and differing legislation between countries. Furthermore, the market did not always favour diversion from landfill. Compared to incineration and landfill, the recycling and re-use of materials was often more expensive, the facilities were limited and the price of recyclable and re-usable materials was variable.

Presentation by Mr Tomboy

Mr Tomboy commented that there was a shared responsibility for the recycling and disposal of vehicles and outlined the obligations that the ELVs Directive placed upon owners and producers of vehicles, treatment operators and local authorities. The directive stipulated that by 2015 Member States should have reached the target of re-using and recovering 95 per cent of the weight of vehicles and re-using and recycling 85 per cent. Toyota felt that the ELVs targets had helped to encourage manufacturers to design for re-use and recycling, but commented that they were already taking steps in this direction anyway as they had recognised that waste reduction led to financial savings. In order to increase the rate of recycling and re-use, Toyota had employed a range of strategies including the development of dismantling technologies, improvements to recycling and recovery technologies, the use of recycled materials, the use of renewable resources, increased utilisation of used parts, the reduction of hazardous substances and the development of recyclable vehicle structures. The establishment of the International Dismantling Information System had provided a useful source of information for vehicle manufacturers and enabled identification of component materials which allowed end-of-life vehicles to be dismantled and treated effectively.

Mr Tomboy outlined the Japanese Automobile Recycling Law which had been effective at promoting recycling, encouraging proper treatment and preventing the illegal disposal of vehicles. He added that the law was effective in Japan and suited

their production processes and market economy but it would not be fair to make direct comparisons between the Japanese law and the ELVs Directive.

APPENDIX 7: ACRONYMS

ALFED	Aluminium Federation
ALUPRO	Aluminium Packaging Recycling Organisation
BERR	Department for Business, Enterprise and Regulatory Reform
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
BREW	Business Resource Efficiency and Waste
BSI	British Standards Institution
CEEQUAL	Civil Engineering Environmental Quality Assessment and Award Scheme
CIA	Chemical Industries Association
CIKTN	Chemistry Innovation Knowledge Transfer Network
CIWM	Chartered Institution of Wastes Management
CPR	Collective Producer Responsibility
Defra	Department for Environment, Food and Rural Affairs
DIUS	Department for Innovation, Universities and Skills
DTI	Department of Trade and Industry
EIC	Environmental Industries Commission
ELV	End-of-Life Vehicle
EPEPF	Electronic Producers Environmental Policy Forum
EPR	Extended Producer Responsibility
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
EU	European Union
EuP	Eco-design of Energy-using Products
FSB	Federation of Small Businesses
HEFCE	Higher Education Funding Council for England
ICE	Institution of Civil Engineers
IChemE	Institution of Chemical Engineers
INCPEN	Industry Council for Packaging and the Environment
IoM	Institute of Materials, Minerals and Mining
IPR	Individual Producer Responsibility
ISO	International Organisation for Standardization
IT	Information Technology
KTN	Knowledge Transfer Network

KTP	Knowledge Transfer Partnership
LARAC	Local Authority Recycling Advisory Committee
LATS	Landfill Allowance Trading Scheme
LCA	Life-Cycle Assessment
LGA	Local Government Association
MADE	Materials and Design Exchange
MTP	Market Transformation Programme
NISP	National Industrial Symbiosis Programme
OVAM	Openbare Vlammse Afvalstoffenmaatschappij (Public Waste Agency of Flanders, Belgium)
PAS	Publicly Available Specification
PET	Polyethylene terephthalate
PICME	Process Industries Centre for Manufacturing Excellence
RDA	Regional Development Agency
RED	Resource Efficient Design Initiative, De Montfort University
REKTN	Resource Efficiency Knowledge Transfer Network
RFID	Radio Frequency Identification
RoHS	Restriction of the use of certain Hazardous Substances in electrical and electronic equipment
SDC	Sustainable Development Commission
SEED	Social Environmental Enterprise and Design Foundation
SME	Small- and Medium-sized Enterprise
SMMT	Society of Motor Manufacturers and Traders
SWMP	Site Waste Management Plan
TSB	Technology Strategy Board
UK	United Kingdom
VAT	Value Added Tax
WEEE	Waste Electrical and Electronic Equipment
WRAP	Waste and Resources Action Programme



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