

A Zero Waste UK

**institute for public policy research
and green alliance**

NOVEMBER 2006

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This paper was written by Julie Hill, Ben Shaw and Hannah Hislop of Green Alliance, commissioned by ippr, and edited by Julie Foley, ippr.

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About Green Alliance

Green Alliance is one of the UK's foremost environmental groups. An independent charity, its mission is to promote sustainable development by ensuring that the environment is at the heart of decision-making. It works with senior people in government, parliament, business and the environmental movement to encourage new ideas, dialogue and constructive solutions.

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Acknowledgements

We are very grateful for the input we have received to this work from Christof Delatter, Julie Foley, Tony Grayling, Stephen Hale, Alistair Keddie, Nick Pearce, Gavin Prentice, Charlotte Steel, Alison Vaughan, Anna Watson, Mal Williams and Karen Crane. Many of the ideas in this report have been explored and developed during the course of Green Alliance's Closing the Loop project and we would like to acknowledge the support this project has received from: Biffa, Defra's Environmental Action Fund, the Eden Project, the Environmental Services Association, Friends of the Earth, Greenpeace, Interface Europe, Johnson Matthey, Marks and Spencer, Sainsbury's, and Skanska. Georgina Kyriacou at ippr prepared the report for publication.

Foreword

In the UK today's product – be it a fridge, battery or drink carton – is tomorrow's waste. But does New Zealand's approach – that today's waste is tomorrow's raw material – provide a better way? While we struggle to reconcile our throwaway culture with the requirements of the EU Landfill Directive, New Zealand and many other countries and cities around the world have embraced the concept of a zero waste society.

With this in mind, ippr commissioned Green Alliance to produce a report outlining what a zero waste UK might look like. It is important not to get too hung up on the word 'zero'. It is what lies behind the concept that matters. While Britain recycles only about 42 per cent of all waste (Defra 2006g), in places such as San Francisco, Flanders and Kamikatsu, recycling levels are already around 70 per cent and rising. It is interesting to note that, in many of these places, the zero waste concept originated as a grassroots movement, driven by local activists and public authorities.

Zero waste means going further than maximising recycling, to stopping things being discarded, through waste prevention. It means taking a close look at product policy to persuade consumers to buy products that have less non-recyclable or hard-to-recycle packaging.

The forthcoming Local Government White Paper is an opportunity for the Government to commit to increasing recycling and reducing overall waste production by giving local authorities the power to charge for household waste. We should also seriously consider developing product levies for the most environmentally damaging products.

In recent years, both waste and product policy have lacked ambition. *A Zero Waste UK* offers an alternative vision of a shared responsibility between government, product manufacturers, retailers and consumers to increase recycling and waste prevention. With the new government waste strategy due out later this year, this report provides a timely contribution to the policy debate.

Nick Pearce

Director, ippr

Executive summary

Waste is a big problem – a 300 million tonne problem in the UK alone. Not just because we have to dispose of it, but also because it represents a poor use of resources. In wealthy nations we have developed a linear economy where, for the most part, we extract, produce, consume and discard resources. Few of those resources are genuinely recycled, and most stay in the economy for less than six months. In poorer countries, more is reused, but, as their economies grow, they tend to behave like us.

We risk breaching environmental limits, either in terms of the resources available to us, or the environment's ability to absorb pollution. As the notion of 'one-planet living' has taken hold, it has become clear that we cannot continue in this way.

To tackle waste properly, and move towards a one-planet economy, we have to tackle products: how we design, make and use things. They should be designed to last, so that they become waste less quickly; they should be reused; they should be designed to be easily recycled; and, where possible, there should be a change in focus onto the service a product gives rather than on ownership of the product itself. We need to go beyond recycling and think about all of a product's impacts: 'cradle-to-cradle design'.

Unfortunately, most of the present economic drivers are towards ever-greater consumption and cheap, disposable products. We need a new approach to dealing with waste and how we make things. The indications are that this is also what the public wants.

Some countries, regions and cities have adopted zero waste goals, for example, New Zealand, The Philippines, San Francisco and in the UK, Bath and North East Somerset. By this, they mean a goal of zero waste to landfill over a period of five to 15 years: recycling 100 per cent of waste. Many of these places have dramatically improved recycling rates and raised awareness about the nature of waste, and they are far ahead of UK performance. Recycling rates of over 70 per cent are already being seen, for example, in Flanders, Belgium, Kamikatsu, Japan and Canberra, Australia, whereas Britain can manage just 42 per cent of all waste and 23 per cent recycling of household waste in England. But even these pioneers are struggling with waste prevention, largely because the public authorities involved have little control over the kind of products that are put on the market.

In the UK, the debates on waste and products have, until very recently, been kept separate. The waste debate has revolved around meeting targets set by the EU for diverting waste from landfill and for meeting packaging regulations. While these targets have driven higher recycling, they have not helped to get any serious policy and business grip on waste prevention, or on the nature of products. The product initiatives that have been started in Brussels and in the UK seem to have stalled. The agenda urgently needs new life.

The Government will be publishing its much-anticipated waste strategy for England before the end of the year. Its sustainable development strategy for the UK advocated decoupling economic growth from waste production, recognising that we should no longer see the ability to waste as a welcome sign of prosperity. So far, however, little has been done to achieve this goal. The revised waste strategy presents an opportunity to set out a vision of a zero waste society. A package of policy measures is needed to move us towards this vision:

Set higher household and business recycling targets

The 2007 Comprehensive Spending Review should set a new Public Service Agreement target for household recycling in England. This should be at least 50 per cent by 2010, and looking towards at least 60 per cent by 2020, rather than the unambitious 40 per cent and 50 per cent, respectively, mooted in the waste strategy consultation. Scotland and Wales should be taking parallel initiatives. Business also needs to be set recycling targets, which could be on a sectoral basis.

Introduce better pricing of waste disposal to drive higher recycling rates

The landfill tax is beginning to be an effective price signal for encouraging waste producers to seek more sustainable waste management options, in particular recycling. However, it is still not high enough to stimulate the necessary investment in recycling infrastructure. In the next Budget, the Chancellor should increase the landfill escalator to £5 per tonne per year, so that the landfill tax exceeds £35 per tonne more quickly. This should mean we reach the tipping point for making landfill uneconomic in 2009/10, instead of 2011/12. However, the assumptions on which the £35 per tonne ceiling was based ought to be revisited, as

it has been suggested that a higher level may be needed to have the required effect.

Ensure that incineration is not the preferred option over recycling

The role of energy from waste (including incineration) continues to cause controversy in both the European and UK policy agendas. Despite public reservations about incinerators, some forms of energy from waste may present a more sustainable option than landfill. But energy from waste has the potential to be a serious distraction from improving recycling performance. As the cost of landfill increases due to the landfill tax escalator, there is a risk that waste will be steered towards the next cheapest or easiest option in the waste hierarchy. This could be mass burn incineration. Alongside the landfill tax, the Chancellor should, therefore, introduce an incineration tax, to ensure that it is not the preferred option over recycling.

Encourage more widespread charging for household waste

Charging households for the amount of non-recyclable waste they put out offers the greatest potential for both increasing recycling rates and reducing the overall production of waste. Variable charging has been used in a number of countries including Korea, Australia, New Zealand, Denmark, the Netherlands and Ireland. Ministers should use the forthcoming Local Government Bill to introduce powers to allow English local authorities to charge for household waste, with parallel measures taken forward in Scotland and Wales. Before charging schemes receive government approval, local authorities will need to ensure that there are good kerbside recycling services available, put in place measures to mitigate illegal activity such as fly tipping, and find ways of coping with any disproportionate effects on low-income households.

Consider bans on sending recyclable waste to landfill or incineration

This approach works best for those streams that are clearly recyclable, but where price signals are not showing signs of driving big improvements. Bans also have the virtue of certainty and work best where they are signalled a long time ahead so that there is time for the market to provide alternatives.

Set a per capita residual waste target to drive better waste prevention

This approach has been used in Flanders, where a target has been set of 150kg of residual waste (waste not recycled) per capita per year, down from the present estimate of 159kg. In England, the per capita figure is presently about 400kg. We believe a target is needed to stimulate waste prevention, not just from householders, but from producers as well.

Give more responsibility to producers – not just for dealing with waste, but also for designing out waste

Some countries have very explicitly shifted the cost of dealing with waste consumer goods from municipalities to producers, for instance by requiring producers to cover the costs of the collection and treatment of the products they make. But so far ‘producer responsibility’ – measures to increase a producer’s responsibility for a product’s impacts – does not seem to bite on individual producers enough to make them substantially rethink their products. Thus, recycling has increased, but waste is also still increasing. Further producer responsibility measures are needed that will inspire new approaches to design.

Tax environmentally damaging or hard-to-recycle products

The Government should introduce a product levy – a charge, or set of charges, designed to shift behaviour from certain products towards better alternatives. High on the hit list would be disposable, or non-recyclable, or hard-to-recycle products, such as cameras and non-refillable printer cartridges. There could also be a levy on composite materials, such as hard-to-recycle multi-layered beverage cartons (Tetra Pak is the best known manufacturer of these, but makes only half of the four billion cartons consumed annually in the UK). The levy could also apply to plastic packaging, of which only two types of plastic are routinely recycled in the UK. The money from a levy on such packaging could be used to fund collection and recycling, or the charge could be levied in such a way as to encourage consumers to choose products with the best overall environmental performance.

Use public procurement to drive better products

There is a large gap between the Government’s aspiration to lead on green procurement, and practice on the ground. A way of ensuring that procurement would drive innovation would be for public institutions to adopt ‘waste neutral’ objectives. This means seeking to balance the amount of waste sent offsite with recycled materials purchased, an approach pioneered at the Eden Project in Cornwall.

Embed cradle-to-cradle thinking across government and in business practice

Despite the existence of various dedicated agencies and units working on waste, resources and products, none of them has an explicit cradle-to-cradle remit. The Comprehensive Spending Review needs to make provision for a beefed-up section of the Department of Environment, Food and Rural Affairs (Defra) to take up the cradle-to-cradle challenge and work productively with other departments, agencies and business to make it a reality.

The UK has, so far, suffered from a distinct reluctance to join up the waste and product agendas. If we get the policies, the economics and the politics right, 2006 could be a pivotal year for moving towards the vision for a zero waste UK.

Introduction

To most people, waste is about the bins being emptied on time, or the new incinerator or landfill that they don't want in their neighbourhood, but that is only thinking about the end of the life of products – a life that is often much too short to be a sensible use of resources. To policymakers, waste mainly matters because of European regulations that require us to reduce our use of landfill, but again this is only one part of the story. In fact, waste is important because, if we work backwards from our rubbish bins to think about the stuff we use, there is a whole world of over-exploited resources and environments under pressure that we need to worry about.

In the UK, we produce about 300 million tonnes of waste per year.¹ Both municipal and business waste are still growing at 1.5 per cent per year in the UK (Defra 2006b), although the rate of growth is less than it was. However, the UK's waste figures do not take account of the waste generated overseas in producing the products we consume (Defra 2006c).² All these resources have got to come from somewhere, and it has been calculated that if everyone in the world lived like we do in the UK, we would need three planets to survive.³ A problem of this scale deserves serious political attention.

European law defines waste as anything that someone discards or is planning or required to discard. But one person's or business's waste could be someone else's useable resource, if we got the policies, the economics, and the politics right. 2006 is a pivotal year for putting the right strategies in place. The Government is finalising a new waste strategy for England. It is also producing a Sustainable Consumption and Production Action Plan, which will consider our use of resources, and which ought to mesh seamlessly with the way we view waste.

The Government is also planning to launch 'Environment Direct', a new online service for consumers, which aims to change the products we buy and the way we consume. If there is to be a Local Government Bill this parliamentary session, it could pave the way to the charging of householders for waste not recycled. And, in Brussels, politicians and officials are pondering how we should define and direct waste in the future, through changes to the Waste Framework Directive.

Perhaps more importantly, the agenda is one that resonates with the public. People instinctively dislike waste, but like to recycle, and they would like to recycle more, as opinion polls repeatedly show.⁴ With the current increased saliency of environmental issues in public and political debate, the time is right not just to get a grip on the problem but also to grasp the opportunities it presents.

A change of mindset is vital. The UK's approach has been characterised by a lack of ambition, too few instruments to drive change, a focus on achieving least-cost compliance with European directives and a desire to avoid short-term costs rather than addressing how we can make the required long-term transitions. As long as this mindset holds sway, we are unlikely to achieve very much. However, this seems to be changing as, for example, recent statements from David Miliband indicate, which embrace the challenge of 'one-planet living' (for example, Miliband (2006a)).

We welcome these statements, and hope that this pamphlet will provide inspiration to see waste in a different light, to embrace a progressive approach towards resources, and to start to put the right measures in place. The problem of waste is not going to go away, and, unless we do something to address it, the costs of waste will only grow – economically and environmentally. The UK has so far suffered from a distinct reluctance to join up the waste and consumption agendas; perhaps 2006 will be the year that changes.

1. In 2002-03, the UK produced 333 million tonnes of waste (Defra 2006a)

2. The commercial figure is an average of the six per cent growth between 1998/89 and 2002/03 given in paragraph 15 of Defra 2006c. This paragraph also indicates that industrial waste decreased by about six per cent between 1998/89 and 2002/03, reflecting increased employment in the service sectors, the decrease in industrial activity and increasing reliance on goods from overseas.

3. See www.wwf.org.uk/oneplanetliving/index.asp

4. For example, a survey by the Local Government Association found that 77 per cent of people think that recycling should be made compulsory (see Local Government Association (2006)). An older poll for the Environmental Services Association found that nearly two thirds of all UK households considered rubbish collection and disposal, and recycling to be the most important functions of local councils, outranking education, parks and open spaces, services for the elderly and support for the disabled (Environmental Services Association 2002).

1. What's the problem with waste?

This section addresses:

- Where we are now (most of the world): the extract-produce-consume-dispose linear model of the economy and resource use.
- The loss of economic value associated with that model.
- The environmental degradation associated with that model.
- Waste comes from products and products are a problem.
- An alternative vision – the 'recycling society' or 'closed loop economy' and the ideal of 'cradle-to-cradle' design.

Why does waste matter?

As dwellers in a 'developed' nation, we have the luxury of consumer goods of every kind we could wish, and, consequently, we have the luxury of waste. It is a symptom of both affluence and peace. In poorer communities, or in times of privation such as war, there is less to waste and one person's rubbish is another person's usable resource. It seems that, as modern nations pursue growth, they waste more – for most of the world there is direct correlation between wealth and waste (EEB 2005; see also Goldemberg (1997)) – and they have progressively less need to seek reuse.

Recently there has been a movement towards a goal of zero waste. Chapter 2 illuminates some of these initiatives, of which some have been more successful than others. In the UK, we are a long way from adopting such a goal at a national level. And yet, along with most of the rest of the developed world, we are stuck in a linear model of the economy – resources are extracted, turned into goods, consumed, and discarded. Most resources stay in the economy for less than six months before they become waste (Biffaward 2006).

We should perhaps count ourselves lucky that we can afford to do this. But can we? Having woken up to the problem that waste is a waste, the UK Government and others have calculated that the loss of economic value associated with throwing things away before their time is colossal.

To quote just a few examples, the cost of wasted natural resources to UK manufacturing is seven per cent of profit (Cambridge Econometrics and AEA Technology 2003). The construction industry produces 70 million tonnes of waste each year, and nearly 20 per cent of that total – a staggering 13 million tonnes – consists of materials that are delivered to site and never used (WWF 2005). As consumers, we each waste £424 on food that we do not eat every year (Prudential 2004), and the charity FareShare estimates that 17 million tonnes of food is dumped in landfill annually.⁵ Sadly, as we will argue later, the scale of these losses has not been sufficient to bring about a revolution in the way we view our resource use.

As to the environmental consequences, at the disposal end of the linear economy these are well documented. Although modern landfill sites and incinerators are tightly regulated, in the past they have been responsible for significant water and air pollution. Older landfill sites relied on natural dilution to disperse the effects of the liquid that landfill produces, known as leachate. This approach risked, and often resulted in, contamination of groundwater, surface water and soil. New landfills usually use liners to contain leachate, which is collected and treated before being discharged or returned to the landfill site.⁶ However, even these are prone to leakage.

More recently, the focus has shifted to the methane gas generated by rotting waste that leaks from landfill sites. Once disregarded, it is now recognised as a potent greenhouse gas. Waste treatment, including landfill, released nearly 22 per cent of the UK's methane emissions in 2003, or about two per cent of all greenhouse gas emissions.⁷

5. Quoted at <http://news.bbc.co.uk/1/hi/magazine/5211172.stm>

6. See www.environment-agency.gov.uk/yourenv/eff/1190084/resources_waste/213982/207743/?version=1&lang=_e

7. If expressed in carbon equivalents. See www.environment-agency.gov.uk/yourenv/eff/1190084/resources_waste/213982/207743/?version=1&lang=_e

Incineration is the main alternative to landfill for waste disposal. It is now more commonly characterised as 'energy from waste'. Research for Defra summarised the environmental impacts of incineration as a potentially significant risk of accumulation of metals, dioxins and furans, and a potentially significant risk of contaminants leaching from ash (Enviros Consulting Ltd et al 2004). The same research concluded that the health impacts are small, but the Royal Society, who peer reviewed the work, gave it a far from ringing endorsement, stating that, '... it is important that anyone using these data takes adequate consideration of its inherent uncertainty.'

Much of the debate about how we deal with waste and resources, and incineration in particular, can be understood in terms of conflicting conceptual approaches of the parties involved.

Robin Murray, in his seminal publication *Creating Wealth from Waste*, characterises two broad mindsets applied to modernising the way we deal with waste (Murray 1999). The first seeks to control the hazards of waste disposal by applying modern technology to the old waste system, and by recovering chemical materials and energy in the course of disposal processes. The second aims to increase resource productivity and reduce hazards through the design of products and processes, and by lengthening the life of materials through recycling. In other words, 'The first applies modern technology to the process of destruction and the second to conservation' (Murray 1999: 24).

Waste comes from products and products are a problem

Less well documented is the link between the products we so casually discard and global resource depletion. WWF has successfully publicised the notion of 'one-planet living', arguing that our current way of life will require three planets' worth of resources to sustain it (Loh and Wackernagel 2004), but the relevance of this to everyday buying habits is still obscure to most people.

The Millennium Ecosystem Assessment of the United Nations Environment Programme, completed in March 2005, summarises the problem starkly, concluding that 'Humans have changed ecosystems more rapidly and extensively in the last 50 years than in any other period. This was done largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel... this resulted in a substantial and largely irreversible loss in diversity of life on Earth.' (Millennium Ecosystem Assessment 2005). While these changes have helped improve the quality of life for billions, they have weakened nature's ability to provide not only raw materials but also the ability of the environment to act as a 'sink' to absorb wastes and pollution.

We are faced with the fact that, as products have developed, waste has evolved. Not much more than 100 years ago, most waste would have been recycled in some form: ash, food, human and animal waste returned to the land; metals and other minerals reclaimed and reused; paper and wood used as fuel. The Victorian era was the beginning of throwing things away, but even so, when the 'Lost Gardens of Heligan' in Cornwall were restored after decades of neglect, the only lasting imprint from the activities of a once-thriving 19th-century estate was a bottle dump (Heligan Gardens Ltd 2004; see also Girling 2005, chapter 1). Imagine the same now – the buried detritus from a 21st-century community would include computers, washing machines, fridges, phones, nappies, carrier bags, plastic bottles, milk cartons, cling-film and a hundred-odd other items that have been drawn from resources all over the world, and which will still be there centuries later.

From recycling to 'cradle-to-cradle'

There is an alternative vision. The notion of 'recycling' as something that developed countries do as an environmental choice, as opposed to an economic necessity, goes back to the 1970s. Pioneer countries include Germany, the Netherlands and parts of the US, who now boast recycling rates well in excess of ours.

The European Commission's vision of a 'recycling society' is articulated in the recent Waste Thematic Strategy, and the EU has also advanced the notion of Integrated Product Policy, with the aim of influencing the environmental impacts of products through their whole lifecycle. This means taking account not just of the consequences of disposal or the potential for recycling, but of the impacts of production and factors such as energy use in consumption.

The notion of the 'closed loop' is also gaining ground: recycling of resources so that, as far as possible, they go back to their original use. Examples include turning plastic bottles back into plastic bottles, returning composted food waste to the land as fertiliser and designing manufacturing systems so that all processing aids, such as solvents, are cycled indefinitely within the factory, or better still, eliminated completely.

Closed-loop thinking is very important at a time of increased political attention to recycling, because much of what passes for recycling is actually ‘downcycling’, involving only one or two further uses of the materials, and only delaying the journey to landfill. Turning plastic cups into pencils is a small, but by no means insignificant, example of this. It is also very important in relation to organic waste, which tends to get considered in the same terms as dry recycling. However, organic waste raises very different issues and problems, and requires different but complementary systems alongside those for dry recyclables.

Perhaps the most ambitious notion is ‘cradle-to-cradle’, a phrase coined by Michael Braungart and William McDonough.⁹ In their vision of the future, all resources circulate around one of two cycles. There is a ‘biological cycle’, where renewable resources (things that can be grown) come from the land and are returned to the land, which means keeping all toxic, persistent and bio-accumulative materials out of biological cycles. Alongside this, there is a ‘technical cycle’, where the non-renewable resources that we need to make many products are used, but not allowed to escape from economic productivity – they are endlessly recycled. It is a positive vision of the future, where humans add value to what nature has provided, rather than depleting and destroying it.

Edwin Datchefski’s notion offers a similar approach, which is captured very simply in the three words ‘safe, solar, cyclic’.¹⁰ Products should be made from materials that are not toxic; they should only consume renewable energy in manufacture and use; and should be made from materials that are compostable and organic, or continuously cycled.

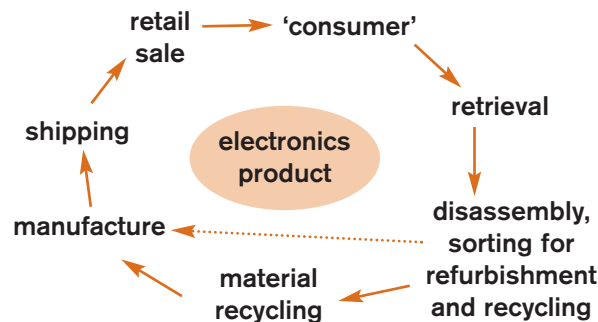
Figure 1.1 Cradle-to-grave electronics life cycle



Source: Based on GreenBlue (2003)

Note: The GreenBlue website (www.greenblue.org) has further briefings on applying cradle-to-cradle principles to product manufacture.

Figure 1.2 Cradle-to-cradle electronics life cycle



Source: Based on GreenBlue (2003)

Given these ideas, the notion of zero waste seems attractive, but what does it actually mean, and what has been achieved in its name? We explore this in the next chapter.

9. See www.braungart.com/vision for details of this approach.

10. See www.biothinking.com for details of this approach.

2. What is zero waste?

Key points from this section:

- Zero waste is the expression of the desire in some countries, regions or cities to move away from the linear model of resource use, where resources are extracted, turned into goods, consumed and discarded. The zero waste concept represents the new versus the old waste order.
- In practice, it generally means zero waste to landfill, in other words maximum recycling.
- Recycling rates in excess of 70 per cent for some waste streams are already being seen – key measures include rigorous source segregation, pricing, and concerted action to provide public information.
- Waste prevention is on the agenda for these pioneers, but it is not easy, and there is no great progress as yet.
- To get beyond recycling to prevention, we need to condition the nature of products, not just treat the downstream consequences of products in use and when they become waste.
- Zero waste is as much a cultural as a physical challenge.

A number of countries and cities around the world have adopted a zero waste goal. What they tend to mean by this is zero waste to landfill, achieved over a 10- to 20-year timescale. This appears to entail total, 100 per cent recycling, although some have not ruled out energy from waste (EFW) as an alternative means of disposal to landfill.

It is fair to say that such a goal is not always the product of detailed analysis about whether 100 per cent recycling is really physically and practically possible. It is more a rallying cry to boost recycling efforts and to declare landfill an approach of the past. As such, zero waste irritates many waste management professionals as being idealistic, unscientific, and failing to recognise the contribution that 'modern' landfill and EFW can make to both waste management and energy provision. Such a view overlooks much of the foresight and ambition embodied in zero waste goals, including the need, ultimately, to move beyond recycling to waste prevention.

Zero waste is gaining ground

New Zealand is often credited as the first country to declare a zero waste goal. As in the UK, waste management responsibility is devolved to local councils, but a national law required them to have a waste minimisation plan in place by the end of 2005. Seventy-one per cent of the councils have also committed to the zero waste goal as part of their plan.

Initiatives are mainly voluntary. However, pricing is crucial, and councils have been finding ways to put landfill costs up, including imposing landfill taxes, closing smaller sites, and using bylaws to mandate the pre-sorting of waste going to landfill. In some cases, they have found ways of stopping recyclable waste going to landfill at all. The Zero Waste Trust, the NGO promoting zero waste in New Zealand,¹¹ helps to organise public zero waste events, and the concept is being increasingly embraced at a community level.

Unfortunately, monitoring of progress has been hampered by a lack of baseline data on actual waste generation, and there are no figures for recycling, other than those generated under the packaging accord, covering glass and paper. It will thus be hard for New Zealand to know how far it is progressing towards its goal, without putting significant investment into data collection, but the hope is that in the meantime, significant culture change is taking place.

Zero waste has also been embraced by several major cities (a summary of Green Alliance research looking at some of these is given in Appendix 1). San Francisco has set a goal of zero waste to landfill by 2020, with an interim goal of 75 per cent diversion by 2010. Current recycling is at 67 per cent (waste here means not just household waste, but also commercial, industrial, and construction and demolition waste).

11. See www.zerowaste.co.nz

Recycling was kick-started by the target set by the State of California in 1990 for 50 per cent diversion from landfill by 2000 for all municipalities, who were threatened with fines of US\$10,000 a day for non-compliance. Now recycling is driven mainly by economic instruments. There is a comprehensive doorstep collection service, backed up with 'pay as you throw' pricing, where waste collection is billed to householders directly by the waste management company in the same way as other utilities, with variable bands of charges depending on how much householders recycle. The collection company also receives money from the City for hitting recycling benchmarks.

Canberra, in the Australian Capital Territory (ACT), measures its waste in a similar way, is also achieving very high recycling rates, and has an even more ambitious goal. In 1995, the results of a community consultation demonstrated a wish for a waste-free society, prompting a 'No Waste by 2010' goal. In practice, this is acknowledged to mean 95 per cent recycling and a residual five per cent of waste going to landfill; there is no existing or planned incineration.

The current recycling rate for the ACT is 73 per cent, and, astonishingly, there are no specific legislative instruments in play. Diversion from landfill is largely being driven by a Landfill Pricing Strategy (not a tax) applied by the ACT, which owns the landfills, designed to reflect the true costs of landfill, and which may ultimately reach Aus\$110 (around £45) per tonne.

If New Zealand was the first country to set a zero waste goal, then Japan is credited with the zero waste concept – it appears to be an extension of the 'zero defects' goal for quality management systems. Although Japan as a nation does not yet have a zero waste goal, several towns and cities do, including Kamikatsu in Southern Japan.¹²

Lack of space for landfill in Japan means that 70 per cent of municipal waste is incinerated, but, in 2003, encouraged by the local Greenpeace group, Kamikatsu adopted a 'Zero Waste Declaration', as an alternative to accepting government subsidies to build an incinerator. The aim is to reduce waste sent to incineration or landfill to zero by 2020. Residents have been requested to sort their waste into 34 streams since 2001. They have to transport the waste to recycling centres themselves, since the town's mountainous terrain makes doorstep collection impractical.

Despite the essentially voluntary nature of this practice, and the lack of fiscal instruments, the town claims to have achieved 75-80 per cent recycling. Kamikatsu contacts admit that 34-stream recycling is unviable in cities, but the concept of zero waste should spread, especially the idea of the 'Zero Waste Academy', which Kamikatsu has established to gather and disseminate expertise.

Back in the UK, Bath and North East Somerset was the first local authority in the UK to commit to a zero waste policy. The council is striving for zero waste by 2020, and has set an interim target of 50 per cent recycling of household waste by 2010, as well as an explicit aim of arresting growth in waste, despite the predicted population increase in the area. Kerbside recycling is available to 100 per cent of households and covers 13 recyclable wastes – one of the guiding principles has been rigorous source separation to ensure good quality recyclates.

Bath and North East Somerset's current household recycling rate is forecast at 37 per cent for 2005/06, one of the highest achieved in the UK. There are no definite figures for the results of waste prevention initiatives to date, which include encouraging home composting, reusable nappies, and avoidance of packaging, for example, through a 'Zero Waste Lunch Project' for schools. Further waste composition analysis is being undertaken to understand the potential for greater prevention.

The Zero Waste Movement is growing, encouraged by the Zero Waste International Alliance, which shares good practice. Mal Williams from the Alliance comments: 'Giving people an easy recycling system to use is just the beginning of raising awareness about other, more sophisticated and less obvious choices that we must ask citizens to make if we are to reverse the devastating effects our profligacy is having on this very limited and fast-shrinking resource we call the planet earth.' He also sees zero waste as an opportunity to promote local wealth creation and regeneration.¹³

12. Also: Hino, Kuki, Fujimi, Ookimachi, Oki, Nagai and Tachikawa

13. Personal communication from Mal Williams, 21 July 2006

The zero waste company

The zero waste agenda is by no means just about household recycling. Businesses are also embracing the approach as the following examples illustrate:

- In December 1999, Toyota UK set a target to send zero waste to landfill by 2005. It achieved this target in 2004 and continues to reduce its overall environmental impact. It has made savings directly related to the zero waste to landfill activities in the following areas: initial material purchase; handling, treatment and disposal of product; and landfill tax. By sending zero waste to landfill, it has also eliminated its exposure to increases in the landfill tax.¹⁴
- Ricoh Product Limited's manufacturing centre in Telford operates a zero waste policy, which means it sends no waste materials to landfill. A number of the waste management processes have actually started generating revenue and paying for themselves. For example, Ricoh reduced its waste disposal costs from over £55,000 to just £14,000 in only two years. The income generated from recycled material in 1999 was approximately £10,000, but for the current financial year, Ricoh should achieve profits exceeding £40,000 (Ricoh undated).
- ASDA has committed to zero waste to landfill by 2010, and in addition, all of the products sold under the ASDA brand will be redesigned over the next 18 months, with the aim of reducing the weight and volume of packaging by at least 10 per cent (ASDA 2006).
- Wates Construction recently announced that it intends to eliminate its landfill waste by 2010, as it attempts to lead a green revolution in an industry responsible for a third of UK waste (Wates Construction 2006).
- Interface Sustainability's 're-entry' scheme aims to ensure that all old carpet (theirs or a competitor's) that they collect is reused, recovered or recycled, rather than being sent to landfill (Interface Sustainability undated).

It is interesting to note that the companies that have generated economic and environmental benefits from the approach have done so through embedding the approach into their systems and culture.

The zero waste movement has been given greater force by recent research confirming that recycling almost always has environmental benefits over the production and use of new materials, including energy (and thus carbon) benefits. A summary of recent research for the Waste and Resources Action Programme (WRAP) highlights this: 'The most comprehensive assessment ever undertaken, the study has reviewed and analysed the best Life Cycle Analysis studies from all around the world evaluating the environmental impacts of recycling compared to incineration or landfilling for seven of the most commonly recycled materials. The study demonstrates that recycling our waste is better for the environment than burning or burying it' (WRAP 2006: 1). Of course, while recycling may perform better than incineration and landfill in terms of its carbon benefits, waste reduction is better than all of these options.¹⁵

Among the countries and cities that Green Alliance has examined, recycling rates in excess of 50 per cent, and in some cases more than 70 per cent, are being achieved now, with the push towards 100 per cent allowing no one to rest on their laurels. Of course, they are counting different types of waste using different protocols, so the figures are not always strictly comparable to the UK's, but they are still undoubtedly better, and they are still rising.

The limits to zero waste

There is a dimension to the zero waste movement that goes further than the recycling figures. Most of those who talk about zero waste not only want to see maximum recycling of usable resources and an end to premature disposal, but are also acutely aware of the need to stop waste coming forward for treatment at all. This means increasing the lifespan of goods and materials, so that they enter the waste stream less readily. It also means reusing materials wherever possible, rather than discarding and then recycling them.

14. See www.bitc.org.uk/resources/case_studies/env_256_toyota.html

15. See, for example, US Environmental Protection Agency (2002)

One of the more interesting approaches from other countries has been to set a per capita waste generation goal. The region of Flanders in Belgium is particularly interesting, because it already appears to have decoupled household waste growth from economic growth, and has set a target for waste production per capita that would increase the degree of that decoupling. The target is for the amount of residual waste (waste not recycled) produced per capita per year to be reduced to 150kg; the most recent figures (2004) indicate that current per capita residual waste stands at 159kg out of a total per capita generation of 560kg. By comparison, in England, residual municipal waste is about 400kg per capita out of a total of 592kg (2004/05).¹⁶

However, our commentator in Flanders was clear that the target could not be met by increased recycling alone – it implies waste reduction at source. Reinforced by household charging, the target sends a strong waste reduction message that the authorities hope will be passed back from householders to retailers and product producers.

The Flanders approach acknowledges, although still seeks to change, the fact that local authorities have limited ability to prevent waste. Municipal waste management evolved to take care primarily of organic wastes (food, sewage, ashes) because of the health hazards they entailed; it was not designed for the huge volume of consumer goods, many with built-in redundancy, that we now enjoy (Girling 2005). So the difficulty of the waste prevention agenda – stopping things being discarded – is that, by definition, waste authorities have little purchase on that end of the consumption chain. They can promote, and in some cases require, the separation of materials for recycling. They can ban, limit or price disposal options to force materials down the recycling route. They can exhort more considered buying behaviour – the council website for Neath-Port Talbot, for example, reads like a wartime stricture on good husbandry.¹⁷ But unless these measures are rolled out on a widespread and co-ordinated basis, what can they do to really change the nature of products and change consumption patterns?

Most zero waste practitioners' efforts on waste prevention to date have revolved around initiatives like promoting repair and reuse shops, encouraging the organisers of public events to cut down on disposable catering items, and marketing reusable nappies. Although important in terms of sending a signal that waste matters, these activities are marginal, given the scale of the problem. Much the same is true of waste prevention in the UK, although we have also made a big deal of home composting (which, in some other countries, is classed as recycling, rather than prevention: after all, the waste is there, it just doesn't enter the local authority waste management system).

These kinds of initiatives run in individual authorities are unlikely to change the nature of waste, but with more widespread co-ordination, they may have an impact. Really, though, the more direct approach of product policy is needed: that is, a set of measures that affect how products are conceived, designed, manufactured, used, and dealt with at the end of their lives.

Do we want to be a throwaway society?

The lesson of these international efforts and musings is that to solve the problems facing us, we probably have to adopt a range of tactics and throw a variety of measures at the problem. Most importantly, we have to see zero waste as not just a physical challenge, a problem that is about materials and how to use them, but also as a cultural challenge. What kind of society do we want to be? Do we want to be a throwaway society or one that considers the needs of future generations?

Considering these more philosophical questions is important if we are to successfully change the way we deal with waste. Do we just want to control and mitigate the impacts of waste, or do we want transform and eliminate them? The two approaches result in very different organisational cultures and systems. If the case for transformation over mitigation is accepted, the question then becomes, 'how is it to be achieved?' We address this in the final section of this report, but before that we consider the progress that has – or hasn't – been made in the UK.

16. Calculated from figures given at www.defra.gov.uk/news/2006/060324a.htm. In the UK, municipal waste includes street litter and some trade waste, so is a larger set than just household waste.

17. See http://ims.npt.gov.uk/imsapps/waste/waste_prevent.aspx

3. How far have we got in the UK?

Key points from this section:

- The UK's performance on recycling to date has been lamentable.
- At a broad level, the UK Government has bought into the idea of decoupling wealth from waste production.
- But recycling is mainly driven by goals of landfill diversion and limited producer responsibility legislation – we are a long way from the cradle-to-cradle vision.
- Energy from waste has the potential to be a distraction from a much-needed focus on increasing recycling for the UK.
- We have not seriously tackled waste prevention.
- The UK sought to be a leader on sustainable production and consumption, and on product policy, but the early enthusiasm has faltered, and the agenda needs to be given new life.

The cradle-to-cradle future is idealistic, but beguiling. To most people, recycling makes perfect practical and moral sense: 'waste not, want not' lurks as some kind of throwback to times of scarcity. So why are we so far from using our resources in this much more sensible way?

Not counting the true cost

Unfortunately, the economics are against recycling. The monetary losses represented by waste are not high enough or visible enough to make a difference, and the environmental costs are not consistently factored in.

'Stuff' is cheap and has been getting cheaper in recent years, largely due to the fact that much of it comes from the emerging economies, with their low-cost, energetic workforces. The Consumer Prices Index reveals some of these trends very clearly. Between 1996 and 2005, in real terms, the average price of clothes fell 36 per cent; new cars by 1.5 per cent; household appliances by 24 per cent; toys by 30 per cent; and audio-visual items by 56 per cent (Davis 2005).

Cumulatively, between 1996 and 2005, the prices of goods fell by an average of two per cent, while the prices of services rose by 35 per cent. The falling price of many items means it is often cheaper to buy new products rather than get them fixed, serviced or even cleaned. While some of this price reduction is due to production efficiencies that we would want to encourage, overall the cheapness of goods engenders a scale of consumption that is putting the 'one-planet living' objective increasingly out of reach.

The trouble is that the resources we are using are not necessarily priced to reflect their environmental costs, something that is widely recognised, if little acted on. Globally, we can still extract, produce and consume, and use the environmental 'sinks' (air, water and land) that are needed to absorb the pollution we create in the process, without the prices that we pay for goods reflecting those long-term costs.

Getting rid of waste is also relatively cheap. In the UK, we have had the lucky geological accident of large seams of clay. These can be mined, and, afterwards, the holes make convenient pits into which to deposit waste. Contrary to popular belief, the UK still has plenty of holes that could be filled in most parts of the country – legislation, not availability, often limits landfill.¹⁸ Even with landfill tax, the costs of this means of disposal remain among the lowest in northern Europe.¹⁹

The upshot of all of this is that, in 1999, England and Wales recycled a lamentable nine per cent of their household waste (Defra 2000). Some local authorities managed only one per cent.²⁰ We are now congratulating ourselves for having dragged this up to 23 per cent.²¹ Marked improvements have also

18. Viridor, for example, has 80 million cubic metres of consented void space available for landfill, as of March 2005 (Pennon Group 2005)

19. Environmental Services Association, personal correspondence, June 2006.

20. Figures from the Audit Commission on 1998-99 local authority recycling rates, quoted at www.foe.co.uk/resource/press_releases/20000525151940.html

21. Latest figures from Defra show that England is now recycling and composting 23 per cent of its household waste. See Defra (2006d)

brought the municipal-waste recycling figure in Scotland up to 23 per cent (Scottish Executive 2006), and in Wales to 19.4 per cent²² (NAW 2005).

Table 3.1: Municipal waste management in the European Union

Country	Waste per capita (kg)	Landfill (% of total)	Recycled/composted and other (% of total)	Incineration (% of total)
Greece	433	92	8	0
Portugal	434	75	3	22
UK	600*	74	18	8
Ireland	869*	69	31	0
Finland	455	63	28	9
Italy	538	62	29	9
Spain	662*	59	35	6
France	567*	38	28	34
Austria	627	31	59	10
Luxembourg	668*	23	36	41
Germany	600*	20	58	22
Sweden	464	14	41	45
Belgium	469	13	52	35
Denmark	696	5	41	54
Netherlands	624	3	65	32

Notes: *estimated figures. All figures are for municipal waste, which includes more than just household waste. For the UK, the figures for overall recycling are lower than the more recent statistics for England, Wales and Scotland quoted in the text but they are the most recent statistics that allow comparison across Europe. The waste per capita figures are for 2004; the landfill, recycling and incineration figures for 2003.

Source: The graph showing these figures (apart from the waste per capita figures) can be found at www.defra.gov.uk/environment/statistics/waste/kf/wrkf08.htm. The figures for waste per capita are from Eurostat (2004): http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detaillref&language=en&product=SDI_MAIN&root=SDI_MAIN/sdi/sdi_pc/sdi_pc_eco/sdi_pc1200

Performance is also hugely uneven. Broken down by local authority, the top three performers on household recycling are St Edmundsbury (50.6 per cent) Forest Heath (48.6 per cent) and South Cambridgeshire (46.8 per cent), with households in the London boroughs of Newham (6.2 per cent) and Tower Hamlets (7.4 per cent) and the city of Liverpool (7.6 per cent) recycling the least (Defra undated; figures 2004-05).

Regionally, the highest amount of household recycling took place in the East of England (29.4 per cent), the South West (26.6 per cent) and the East Midlands (26.5 per cent), with the lowest in the North East (15.3 per cent), followed closely by London (17.5 per cent) (Defra 2006e).

So much attention is given to household waste that we tend to forget that in terms of tonnage, it accounts for only about nine per cent of the UK's total waste (Defra 2006a). Although recycling rates are higher in the business than the household sector (45 per cent in 2002/03 (Environment Agency undated)²³ against 23 per cent in 2004/05 in England (Defra 2006f)) they are not nearly as high as they could be, or as they are in

22. Figure for 2004/05

23. Figure applies to England in 2002/03 and is from the Environment Agency's National Waste Survey, quoted at www.defra.gov.uk/environment/statistics/waste/kf/wrkf03.htm

other countries. The Netherlands recycles 81 per cent of its industrial waste and has managed to decouple industrial waste growth from GDP, and Denmark recycles 80 per cent of its demolition and construction waste (Green Alliance 2002).

The UK's reliance on cheap landfill and refusal to increase its cost substantially until the 2002 introduction of the increased landfill tax escalator have, together, meant a slow, uncertain start to our recycling capacity. The recycling we do have is largely driven by European legislation and targets, rather than by an indigenous desire to do better, and, even with those targets, we are often slow to sign up and slow to implement. As a nation, the UK recycled just 42 per cent of all wastes in 2002/03 (Defra 2006g). We are a very long way from the cradle-to-cradle vision set out in Chapter 2.

Is burning better?

The long-running debate on the role of energy from waste (EFW) in waste management has recently risen up both the EU and UK agendas. It has the potential to be a serious distraction from improving our recycling performance.

The argument is that even with maximum recycling, some treatment will be needed of residual waste, and energy from waste must be better than landfill, because it at least recovers some energy. The logic of this statement seems simple enough, but it provokes huge debate for three main reasons: disagreement on the level of recycling that is achievable; the absence of measures to ensure recyclable waste is recycled rather than burned; and the dominance of mass burn incineration over other more acceptable technologies for deriving energy from residual waste.

The Government's view of what constitutes 'maximum' possible recycling is not based on the amount of waste that is physically recyclable, but what is 'economic' to recycle. This is a calculation that clearly relies on a number of variables and assumptions, subject to changes, and not all of which are universally accepted.²⁴

The theoretical maximum has been variously estimated as 68 per cent (Parfitt 2002) or 80 per cent (Friends of the Earth 2004), levels that our research shows can be achieved in practice. The target in the waste strategy review is based on an economic level of recycling, posited as 50 per cent. However, in 2005, Environment Minister Ben Bradshaw gave 60 per cent as a level that households could reach (Defra 2005). Disappointingly, the waste strategy review consultation highlights that, while this is possible, the uncertainty associated with the economic benefits may not justify the extra expense required; that is to say, it may prove to be economic but we don't want to risk it.²⁵

The waste hierarchy and government guidance presume that recycling should take precedence over incineration. However, there is currently no credible set of mechanisms or incentives to ensure that this will always be the case. The trouble is that although policymakers insist that the hierarchy remains as environmentalists would want it, with prevention, reuse and recycling sitting above energy from waste, they have no means to ensure that this is how local authorities necessarily respond to their obligations to divert more and more waste from landfill. If EFW looks cheaper and/or easier than recycling, there is nothing to stop them going for it, other than Defra's willingness to take them to task on their overall waste strategies.

There is, then, the issue of how energy is obtained from the waste. Studies have repeatedly shown that recycling has greater carbon benefits than energy from waste does, particularly the large-scale 'mass burn' variety – the incineration of unsorted municipal waste.²⁶ So, if it really is carbon reduction we are interested in (and not just compliance with the landfill directive), our efforts should be focused on increasing recycling, which has greater carbon benefits and huge potential for expansion.

24. For more details of the approach used to derive these figures, see Defra (2006h), Annex I

25. Paragraphs 69 and 70 of the Partial Regulatory Impact Assessment of the Review of England's Waste Strategy (Defra 2006h) says that, 'An option has been modelled that reaches 53 per cent recycling by 2015 and 58 per cent by 2020. (These are not the levels the Government is proposing in the consultation document and is not the Government's preferred option)... [the option] incurs extra costs of over £770m (net present value). It shows additional environmental benefits valued at between £320m and £990m (net present value).'

26. See US Environmental Protection Agency (2002) and WRAP (2006), plus Hogg (2006)

We are not implacably opposed to energy from waste and, in fact, support the use of certain technologies as a means of deriving energy from residual waste. However, this support is conditional. First, it should only be used to treat genuinely residual waste in the context of rapidly increasing recycling rates to levels of 60 per cent and more. Second, only small-scale and flexible technologies that have positive carbon benefits, such as anaerobic digestion, should be used, rather than mass burn incineration.

It is often argued that other countries have high levels of recycling and high levels of incineration co-existing, but for historical or geographical reasons, they have gone for incineration rather than landfill, and, in some cases, are now looking to reduce the amount they burn. Making that argument is like another country looking at the UK and concluding that because we have high levels of landfill, that must be the way to go.

The overall problem with EFW is that it confuses two sets of objectives. One is to get maximum resource recovery from discarded materials, for which, in the long term, we should be looking for increasingly sophisticated recycling technologies together with new and better types of material to recycle. Since those technologies and materials don't all exist yet, it seems short-sighted to consign large amounts of waste (as presently experienced) to burning, particularly if the EFW facilities being proposed now are designed to last for 25 years or more.

The other objective is a more UK-determined, flexible mix of energy sources. On this, no one has systematically studied how energy from waste stacks up against other options such as microgeneration or large-scale renewables. The Government's Energy Review contains a short but carefully worded statement on energy from waste, which acknowledges some of the above concerns (DTI 2006). However, it does not indicate what level of waste is expected to be residual, which is crucial. A more detailed response has been deferred to the publication of the revised waste strategy. However, it seems unlikely that energy recovered from municipal waste could account for more than two per cent of electricity generation in the UK by 2020, so in energy terms, energy from waste would seem to be a peripheral issue.

So where next?

The irony is that at national policy level we have the right kind of goals. The 2005 sustainability strategy (HM Government 2005), built on the world's first sustainable production and consumption framework (Defra 2003), bought into the idea of decoupling economic growth from waste production. In other words, we must no longer see the ability to waste as a welcome sign of prosperity. We must grow without inflicting further resource depletion. The 2006 consultation on the review of the waste strategy reiterated this goal. But we have so far done very little to achieve it.

Waste prevention is, for the UK, in common with other countries, mostly about compost heaps and nappies; important as those may be, they are not going to change the world. Product policy has started but faltered, tied up in lengthy departmental deliberations about what kinds of institutions are needed, and who is best placed to run them. The agenda needs new life. In the next chapter we outline the framework that we believe is needed to do this.

4. Delivering a zero waste UK

We need to reform waste policy by:

- setting more ambitious targets for household, municipal solid waste and business recycling
- pricing waste better, to drive higher recycling – particularly for industrial waste
- ensuring that energy from waste (incineration) is not the preferred option over recycling
- charging householders for waste – but only under certain conditions
- using bans on recyclable waste going to landfill or incineration if other measures are not working
- setting a per capita residual waste goal to drive waste prevention.

We also need more radical change by:

- designing out waste by developing producer responsibility and product policy – in particular a product levy
- driving better products through procurement policy, including through adoption of waste neutral practices to transform supply chains
- embedding cradle-to-cradle thinking in our institutions and business practice.

We need to think of zero waste on two levels. One level is what can be achieved through what is currently practised as waste policy, and is about maximising recycling, encouraging householders and businesses to reduce waste, and finding the best disposal options for what is left over. The second level entails much more radical change – it is about designing out waste as we currently know it. It means ‘dematerialising’ the economy – switching from products to services, minimising and changing the material inputs to production, endlessly cycling what we use, and only disposing of materials when they really have no further useful life. Of course, we are never going to have a completely weightless economy, but we have got to radically improve the effectiveness of our resource use if we are to meet the objective of one-planet living.

A number of our recommendations for waste policy have been made before. In fact, the principles and practical measures needed have been put forward by so many commentators in recent years that there is intense frustration that UK waste policy has moved so slowly. Five years after the Government convened a ‘waste summit’ and commissioned its own Strategy Unit to look at waste,²⁷ we are still awaiting the outcome of the latest round of consultation on a new waste strategy. The hope is that we are moving towards a package of measures – legal, fiscal and voluntary – that will deliver the kind of advanced strategies for products and waste seen in some other countries.

We need higher recycling targets for household and business waste

A new Public Service Agreement (PSA) target for household recycling in England needs to be set in the Treasury’s Comprehensive Spending Review 2007. This should be at least 50 per cent by 2010, and looking towards at least 60 per cent by 2020, rather than the unambitious 40 per cent and 50 per cent respectively mooted in the waste strategy consultation. There may also be a strong case for this PSA being a joint one between Defra and the Department for Communities and Local Government (DCLG). Similar targets are needed in Scotland and Wales.

The UK has never set targets for recycling business waste given the difficulties of data collection and monitoring, but it is time to consider whether sectoral targets could be set and monitored through businesses associations or independent bodies. Business has been engaged in the energy and climate change debate. It should be possible to do the same for waste, and lessons should be drawn from the experience of developing negotiated agreements and trading schemes developed in the area of energy.

27. The Waste Summit was held on 21 November 2001 – see www.defra.gov.uk/news/2001/011121c.htm – and was followed by a Strategy Unit review of waste policy, the final output of which was the report to Government *Waste Not, Want Not* (Strategy Unit 2002), which called for greater efforts to reduce the rate of waste growth and for more reuse and recycling to combat the country’s growing rubbish mountain.

We need to price the disposal of waste to better drive recycling

The second step is proper pricing of waste. We have a landfill tax, which is increasing every year, and it is beginning to make a difference in terms of improving the economics of recycling. It would do so faster if it were increased faster.

Green Alliance has consistently advocated a £5 per year increase. If adopted in the next Budget, this would mean the tax would exceed £35 per tonne – the rate suggested as providing the tipping point for making landfill uneconomic by taking gate fees to £50-£60 per tonne – in 2009/10 instead of 2011/12. While this difference of two years may not seem like much, it is important in terms of signalling the speed at which government wants business to act. Whether the level of £35 is the right final level of tax also needs to be reviewed, since the assumptions about base landfill gate fees (the level before the tax) made when the tax rate was set may no longer be valid. It has been suggested to us by a number of people in the waste community that a higher level may be needed to have the required effect.

Raising landfill tax is particularly important given the absence of targets or other incentives for recycling of industrial waste. As stated above, so much attention is given to household waste that we tend to forget that in terms of tonnage, it accounts for only about nine per cent of the UK's total waste. Although recycling rates are higher in the business than the household sector, they are not nearly as high as they could be, or are in other countries. An advantage industrial waste has over household is that the relationship with waste operators is more direct: companies pay for what is taken away. They just don't currently pay enough to make waste costs a big consideration. So higher landfill tax is the main, and probably only, short-term lever on industrial waste.

We need to ensure that incineration is not the preferred option over recycling

This means that, alongside the landfill tax, we need an incineration tax. As the cost of landfill increases, due to the landfill tax escalator, there is a danger that waste will be steered towards the next cheapest or easiest option in the waste hierarchy. This is likely to be mass burn incineration. Setting the tax at a low rate initially, but with the clear indication that it will be increased if much higher levels of recycling are not quickly delivered by local authorities and business, would send a clear message to those planning incineration facilities about their desirability. If we are not to have a tax, there must be other ways of ensuring that recycling takes precedence over incineration – for instance, by making a strategic case setting out the relationship between recycling and energy from waste a condition of Private Finance Initiative (PFI) credits.

Householders need financial incentives to recycle

The price signals set out above act on those whose unenviable job it is to get rid of our discarded stuff, be it lettuce leaves or laptops. What of us as individuals and householders? We can throw out almost whatever we like for the same unremarked-upon fee buried in our council tax. Can this be right? Local authorities are statutorily obliged to provide waste management services, and although they can charge for collection of bulky items, some don't because it is seen as an incentive to fly tip.

In some other countries, you have to pay for household waste services – 'pay as you throw'. This makes waste services seem more like a utility, like power and telephones, rather than an inalienable right. It also sends a message: the treatment of waste, even if it is to be usefully recycled, is not something we should take for granted. We should think about how much we generate and what we put in our bins. We should try to cut down.

We believe local authorities should be given the powers to develop charging schemes for household waste. These should be enabling powers, rather than a requirement to charge households, should only be implemented once good quality recycling systems are in place, and should be revenue neutral, in other words they should not be used as an additional revenue-raising mechanism.

There are a number of options for charging for waste in a way that provides incentives for recycling and reduction. A recent report for the OECD examined one set of options, differential and variable charges, whereby the cost varies with the amount and type of waste put out by the householder. The report looked in detail at experience in Flanders, Germany, and Spain (summarised in Appendix 2), and also the literature

on experiences (both positive and negative) in Korea, Australia, New Zealand, Denmark, the Netherlands and Ireland (OECD Working Group on Waste Prevention and Recycling 2006).

The study broadly concluded that differential and variable charges increase recycling and reduce residual waste – in the German case study, the drop in residual waste was some 45 per cent. The study also concluded that paying by weight or by bag is more effective than paying by volume. The schemes are, not surprisingly, most cost effective for local authorities where residual disposal costs (for the UK, largely landfill) are high (and, as we have argued above, they ought to be), and they can also be cost effective for the householder in terms of paying less for waste than they would paying a flat rate (mirroring the experience with water metering).

However, there are pre-conditions for getting the most out of these schemes:

- Collection systems must be convenient and good quality, if charging is not to increase illegal dumping. This means kerbside collection of recyclables wherever possible, and conveniently located 'bring' sites, such as bottle banks and civic amenity sites. The negative experiences reported in the OECD survey (for instance in Denmark and Ireland) point to failures to introduce clear and consistent collection arrangements.
- More resources need to be devoted to enforcement against illegal dumping, at least in the early stages of a scheme. However, some of the missing waste often experienced when these schemes are first introduced may be commercial waste being directed down its proper route (instead of being disposed of through households), rather than illegal dumping.
- There must be some way of coping with any disproportionate effects on low-income households, and charges should not be so high that they are seen as an extra tax. They could be offset with Council Tax rebates.
- It should not be possible to opt out of waste collection. In Ireland, this has led to increases in illegal disposal, and means that waste authorities lose entirely the ability to monitor waste generation and practices in such households (Martin 2005).
- Thought should be given as to how collection systems can best mesh with any producer responsibility schemes (the key one is packaging) that are also trying to extract materials from the household waste stream.

Ministers in the UK have consistently blocked the idea of allowing local authorities to introduce charging schemes, initially fearing accusations of 'stealth taxes' and, secondly, the implications for local authority funding mechanisms. This is despite the fact that the Government's Strategy Unit, the Local Government Association (LGA) and the Environmental Services Association, among many other organisations, have all argued that they should be allowed to do so (for example, Local Government Association 2006a).

Politicians also, perhaps, underestimate how much support there is for recycling, and how much desire for leadership. In June 2006, the LGA published the results of a poll showing that 64 per cent of those questioned would prefer a lower council tax together with paying for waste not recycled (LGA 2006b). The issue has been tied up in deliberations about overall local government funding,²⁸ but will perhaps shortly emerge as the only viable way to proceed, and David Miliband expressed strong personal interest in the idea in July 2006 (see Miliband 2006b).

Although the governments of England, Scotland and Wales have all so far refused to trial charging, England has recently been trialling 48 different incentive schemes, such as recycling lotteries, prizes and discount vouchers, and money for local charities, schools and regeneration projects on housing estates. Defra's analysis of the results says that 81 per cent of trials had a positive, attributable impact on raising awareness through offering incentives. Fifty-seven per cent had a positive, attributable impact on increasing the tonnage of recyclables collected. Half of the trials showed a small (five-10 per cent) increase in the level of recycle tonnage collected (AEA Technology Environment 2006). These results are encouraging, and charging and incentive schemes need not be mutually exclusive.

28. Including the Lyons Inquiry – see www.lyonsinquiry.org.uk/, and the LGA's Balance of Funding Review – see www.lga.gov.uk/OurWork.asp?lsection=59&ccat=753

We should consider banning recyclable waste going to landfill or incineration

This is a tactic employed by several countries, and saves having to worry as much about pricing of disposal. It works best for those streams that are clearly recyclable, but price signals are not showing signs of driving big improvements in practice. It has been applied to construction and demolition waste, paper and cardboard, glass, metal and organic wastes in states and countries including Massachusetts in the USA, the Netherlands, and Sweden (Green Alliance 2002).

As argued above, industrial waste is subject to very few waste policy instruments, other than landfill tax, which many industrialists see as inadequate, unless dramatically raised. Bans have the huge virtue of certainty, and may thus be more popular for some industry sectors than price instruments. International experience suggests that the two instruments can work alongside each other. The trick seems to be to signal them a long time ahead, so that there is time for the market to provide alternatives.

We need to raise the game on waste prevention

We should be adopting the Flanders approach of setting a per capita residual waste target. As stated above, our average municipal residual waste per head in England is around 400kg per annum, out of a total of 592kg, and is more than twice that of Flanders. Setting a target for its reduction (and allocating appropriate resources) could drive much better understanding of what is in the residual waste stream, how much more could go for recycling, and the options for designing out the rest. Some further ideas for action on, and responsibility for, waste prevention are given in Appendix 3.

We need more producer responsibility – not just for dealing with waste but for designing out waste

Some countries have very explicitly shifted the cost burden of dealing with unwanted consumer goods from municipalities to producers,²⁹ for instance by requiring goods such as TVs and washing machines to be taken to civic sites, from where companies must arrange their collection and treatment. The costs of running the site are recovered from producers according to how much material is handled. This at least takes treatment costs out of local authorities' budgets, but it is not clear that such transfer of costs leads to product redesign.

Pinning responsibility for waste prevention on the producers of products is a strategy often talked of but in practice rarely implemented. There are European regulations designed to boost recycling through producer responsibility, which cover packaging materials, old cars, and electrical and electronic goods, but so far producer responsibility does not seem to bite sufficiently on individual producers to make them go to the bother of substantially rethinking their products.

For instance, the UK is belatedly moving towards fulfilling its obligations under the Waste Electrical and Electronic Equipment (WEEE) Directive to implement a system to collect and process such waste, and for producers to pay towards the cost of this. This will result in increased waste management costs for producers, but, without incentives to inspire new approaches to design, it may not contribute to waste reduction.

Thus recycling has increased, but waste is also still increasing, and the overall problem is not going away – as outlined in the Green Alliance report *Return to Sender: producer responsibility and product policy* (Green Alliance 2005a). Here again, public attitudes may be ahead of government action – a recent Greenpeace/Ipsos MORI report found that UK computer-users were willing to pay an extra £64 for a greener PC, and felt that manufacturers should take responsibility for the disposal of old machines (Ipsos MORI 2006). What is needed is a much more comprehensive system of producer responsibility, including a product levy as outlined below.

29. See particularly the case study on Flanders at www.green-alliance.org.uk/ourwork/ClosingTheLoop/ClosingtheLoop2/ClosingLoopUpdates/Zero/

We need a tax on environmentally damaging or hard-to-recycle products

A simple stimulus to redesign would be a product levy – a charge, or set of charges, designed to shift behaviour from certain products towards better alternatives. A product levy could be applied to a range of environmental impacts associated with products, such as high energy or water use. However, high on the hit list would be disposable, or non-recyclable and hard-to-recycle products such as cameras, disposable phone chargers, non-refillable printer cartridges and non-rechargeable batteries. All of these have clear, less wasteful alternatives. Candidates might also include hard-to-recycle products such as beverage cartons (Tetra Pak is the best known manufacturer of these, although it makes only half of the four billion cartons used annually in the UK). Made of layers of cardboard, plastic and sometimes metal foil, they are highly functional but are at present difficult to collect and recycle along with other more simply constructed materials – less than 10 per cent are recycled in the UK at present. The same is true of some types of plastic packaging – only two types of plastic are routinely recycled in the UK, as a result of the diversity and often mixed nature of plastics. So the money from a levy on such packaging could be used to fund collection and recycling, or the charge could be levied in such a way as to encourage consumers to choose packaging products with the best overall environmental performance.³⁰

Product	Rationale
<i>Products that waste materials</i>	
Goods without free multi-year repair warranties	Reduce built-in obsolescence
Disposable cameras	Reduce waste; affordable reusable cameras are widely available
Disposable mobile phone chargers	Alternative might be to encourage a charging service in shops, equivalent to 'pay as you go' top up
Non-rechargeable batteries	Reduce battery waste and resource consumption – or a refundable deposit to encourage separation from rest of waste stream
Non-refillable printer cartridges	Reduce cartridge and ink waste
Non-recyclable disposable nappies	Encourage development of recyclable version
Non-recycled toilet paper	Reduce use of virgin paper
Hard-to-recycle composite materials, such as beverage cartons, or materials with complex additives	Encourage more recyclable materials; fund more refined recycling systems; encourage consumer choice of best performing products looking across the life-cycle
<i>Products that waste energy and/or water</i>	
Appliances that can't be taken off standby mode	Reduce unnecessary energy consumption
Incandescent light bulbs	Low energy alternatives available
Plug-in air fresheners	Non-energy consuming alternatives available
Petrol mowers	Electric mowers have lower polluting emissions and could ultimately use renewable energy
High-flow water appliances	Reduce water use; low-flow alternatives available
Single flush toilets	Reduce water use; dual flush available
Non-biodegradable cleaners	Reduce pressure on water treatment; degradable alternatives available
Anything containing brominated fire retardants	Powerful ozone-depleting substances; alternatives available

30. Tetra Pak points out that recyclability is not only the determinant of environmental performance – for more see www.tetra-pak.com/uk/content/frset_main.asp

These ideas need to be taken forward jointly by Defra and the Treasury, with clear and concerted political messages about why we need to change products, and what effects the levy is likely to have. One of the major lessons from other countries' implementation of eco-taxes is that objectives must be clear, and there must be careful checking of outcomes. The now notorious Irish plastic bag tax fell down on both of these. While it has reduced plastic bag use, it may have increased use of other forms of packaging, but without proper monitoring it is hard to judge its overall environmental benefits.

We need to make public procurement a genuine tool for change

We also need public procurement to drive better products. The 2006 report from the Sustainable Procurement Task Force pointed to a large gap between UK Government aspiration to lead on green procurement and practice on the ground. One of its key recommendations was smarter engagement with the market, citing missed opportunities to influence the supply chain and foster innovation (Sustainable Procurement Task Force 2006).

A way of ensuring that procurement would drive innovation would be for public institutions to adopt waste neutral objectives. This means seeking to balance the amount of waste sent offsite with recycled materials purchased. This approach has been pioneered at the Eden Project in Cornwall. The waste neutral objective has not only imposed a discipline of monitoring all the waste generated on site and seeking new uses or recycling options for as much as possible, but has also steered procurement in the direction of buying in products made from recyclates as a way of re-investing in the future.

If adopted by all institutions, from government departments to the NHS, from companies to charities, this way of stimulating the market for recycled products could significantly improve their economic viability. It also provides a way of conditioning supply chains, of rejecting or specifying goods bought according to recycled content and recyclability. It seems one of the most likely ways to move towards that cradle-to-cradle future. Supply chain success stories from the Eden Project include trials to help suppliers of apple juice reduce packaging and use returnable crates; finding a recycling route for cling-film that has now been taken up by several suppliers for getting rid of their own cling-film; and promoting recycling of PVC and acrylic offcuts from sign-makers.

We need to embed cradle-to-cradle thinking in the policy and business community

Above all, we have to be organised differently to deliver this vision of the future. Our institutional capacity on these issues is fragmented, and often at odds with itself. Defra, DTI, Treasury and DCLG all have different ideas about where this agenda should lead. The policy instruments are fairly clear, but the receiving framework is faulty. Until a common vision is imposed across government, rather than simply suggested, we will not get far.

Despite the existence of dedicated agencies and units such as the Waste and Resources Action Programme (WRAP), the Carbon Trust, the Market Transformation Programme and the new Business Task Force on Sustainable Consumption and Production, they are all dealing with separate parts of the picture. None of them have an explicit cradle-to-cradle remit – they are looking for efficiencies in resource use and secondary uses of materials, but the closed loop is not a necessary outcome of their activities.

The Comprehensive Spending Review needs to make provision for a beefed-up section of Defra to take up the cradle-to-cradle challenge and work productively with other departments and agencies to make it a reality. Institutionally, we have got to grips with carbon, partly through the Carbon Trust, but mainly through the resources allocated in Defra and the Treasury – and the trading scheme has made it politically real. It is now time to broaden this out to other resources.

Conclusion

It is hard for many people to make the link between what goes in the dustbin (or the recycling bin) and global patterns of resource use, environmental degradation and possible scarcity. We do have the luxury of waste, and some people think we should sit back and enjoy it. A Berlin taxi driver, shortly after the fall of the Berlin wall, proudly told one of the authors that waste in former East Berlin had tripled – it was a sign of

being westernised. As with global warming, the environmental effects of overuse of resources are unlikely to hit us in the UK nearly as hard as in poorer parts of the world. How worried should we really be?

Worried enough about what the future holds – or, perhaps, if adopting Michael Braungart’s more positive take, stimulated enough – to seek a different path. It simply requires a conscious shift in the way we price resources. They are, after all, the whole the basis of our prosperity. Not just now, but for generations to come – we hope.

Appendix 1: Summary of international zero waste approaches studied by Green Alliance (from Green Alliance 2005b)

Location	Goals	Instruments	Achievements	Future
Bath and NE Somerset, UK	Zero waste goal not an absolute goal, a framework within which to develop initiatives; interim target of 50% recycling of household waste by 2010	No specific instruments beyond Landfill Tax/Directive. Emphasis on education and training	37% recycling of household waste, one of the highest rates in the UK. Kerbside collection from all households	Focus on arresting the growth in waste, despite predicted population increase in the area.
Canberra, Australia	No waste by 2010, meaning 95% recycling	Landfill pricing	73% recycling (figure includes all city's waste: household, commercial, industrial, construction and demolition (C&D))	Recycling remaining 5%; more producer responsibility
The Eden Project, Cornwall, UK	Waste neutral goal: balancing waste sent offsite with recyclates brought in	Rigorous source segregation, on-site composting, procurement policies aimed at influencing supply chains to use recycled products	Waste neutral objective has been met over the two years 2003/05. Driving engagement and innovation among visitors, workers and suppliers	Better waste generation data, more suppliers engaged
Flanders, Belgium	Residual per capita waste should not be more than 150kg in a year	Variable charging for collection of household waste based on weight or volume; producer responsibility for some waste streams; landfill bans/high tax	In 2004, 71% of all municipal solid waste was recycled or composted; in 2002, per capita waste generation stopped rising	Shifting the focus to waste prevention and reduction
Kamikatsu, Japan	Zero Waste Declaration, meaning no waste to landfill or incineration by 2020	Separation of waste into 34 different streams; Zero Waste Academies to gather and disseminate expertise	75-80% of household waste is recycled or composted	
New Zealand	Zero waste by 2020 goal, meaning no waste to landfill or incineration	Strong preference for voluntary instruments; landfill tax and bylaws also used in some areas	Little data on overall recycling rates, some districts successfully using zero waste goal to drive grassroots initiatives	Better waste generation data; continued emphasis on education
The Philippines	Long-term zero waste goal	Ban on incineration in 1999, Ecological Waste Management Act 2000 mandates for material recovery facilities in all local areas	Most of 45% recycling rate still achieved through dangerous scavenging on waste sites, but some community initiatives successfully diverting 65% waste from landfill	More widespread implementation of 2000 legislation, ensure there is no return to incineration

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San Francisco, USA	Zero waste to landfill by 2020; 75% diverted from landfill by 2010	1990 State legislation: 50% diversion from landfill by 2000 (heavy fines for non-compliance); variable charging for collection of household waste	67% recycling rate (includes all wastes, including C&D, industrial and commercial)	Producer responsibility addressing consumer culture
Vienna, Austria	To stabilise growth in waste at 2000 levels (in practice, expect to reduce predicted growth of 1.8% a year to 1.3%)	Funding for extensive demonstration projects; packaging obligation; strong focus on preventative approach	Demonstration projects achieving significant waste savings	Use information gleaned from demonstration projects; improve recycling rates for C&D

Appendix 2: Summary of three variable charging case studies

This is our summary of three case studies in the OECD Working Group on waste prevention and recycling report, *Impacts of unit-based waste collection charges*, May 2006. The benefits are based on economic valuation of the impacts associated with air pollutants (including greenhouse gases, mercury, cadmium, and nitrogen oxides), and are, therefore, the benefits of avoiding emission of these pollutants. It does not include economic benefits associated with resource reuse.

Local authority	Charge rates	Benefits	Issues
Torrelles de Llobregat, Spain	Eur0.60 for 40-litre sacks to take residual waste; Eur0.50 for 50-litre sacks for garden waste; separate free collection of paper, kitchen waste and nappies.	Reduction of collection of residual waste by 38% and increase in separately collected materials from 33 to 89% over first year. Net private costs to household Eur11.60-9.00, depending on whether avoided cost is landfill or non-landfill. External benefits between Eur11.00 and 20.00 per household.	Analysis did not include external costs of illegal waste disposal, which are hard to estimate. However, study suggests external benefits likely to be positive even if factored in.
Landkreis Schweinfurt, Germany	Fixed annual fee of Eur8.00 for 120-litre bin; Eur16 for 240-litre; Emptying charge of Eur0.20 for each bin; Weight-based charge Eur0.25/kg for residual waste and Eur 0.15/kg for biowaste in 2002. Free collection for all packaging waste, large numbers of bring sites for paper and card.	Estimated fall in total waste collected of 13%, fall in residual waste of 38%; increase in materials for recycling from 64 to 76%; all in first year of operation; net private saving of Eur6; external benefits of Eur8-14 per household.	Study includes estimates of effects of illegal dumping on costs of operating service.
Ghent and Destelbergen, Belgium	Free collection of paper, card and glass. Range of charges for sacks or bins (by size and per emptying) for residual waste, biowaste and non-glass packaging.	Estimated fall in residual waste of approximately 32% between 1997 and 1999, the years before and after variable charging was introduced.	Scheme introduced at same time as other changes, so hard to separate out effects, but likely to be net positive to householders and net positive external costs.

Appendix 3: Who can prevent waste?

What?	Who?
Green waste	Householders by composting at home and by reducing areas of grass and other plants that require regular trimming; also by reducing use of garden chemicals. Composting at home keeps waste out of municipal waste stream but some countries see it as recycling rather than prevention. A downside is that badly-done composting can generate methane. Tools include charging for municipal green waste collection as well as for residual waste collection, but at a lower level.
Food waste	Householders by reducing amount bought; retailers by reducing free offers and educating about sell-by dates. Composting of food waste at home has to be done carefully to avoid health and safety risks and production of methane. Tools include voluntary agreements with retailers to find ways of cutting waste throughout the food chain.
Packaging materials	Manufacturers and retailers by reducing non-essential packaging; householders by choosing less-packaged goods. Arguments around packaging include how much is needed to keep product in good condition, thus avoiding the waste associated with spoilage; on the other hand, there is wide public perception that much packaging is unnecessary and is there primarily for marketing. Biodegradable packaging will only help if it is sent to composting and goes back to the land, rather than going to landfill. Tools include more prosecutions under the Essential Requirements of the Packaging Directive (Green Alliance 2005a).
Junk mail	Direct marketing practitioners to reduce volume; householders to get taken off lists. In some countries, voluntary agreements have been sought to reduce junk mail, with limited results to date. Tools include voluntary agreements, or even a charge levied through postal services.
Disposable nappies	Parents to choose reusable (environment impact of reusable nappies generally thought to be less but different – entails use of energy and detergent for washing). Disposable nappy recycling is being pioneered in some countries, which may be a more convenient option for many parents. Tools include a product levy on non-recyclable disposable nappies.
Other disposable goods (cutlery, cameras, razors, contact lenses, even loo brushes)	Manufacturers not to produce; consumers not to buy. More durable alternatives are available for most disposable items. Several countries have levied eco-taxes on disposable items (see below on product levies). Tools include a levy on disposable items.
Electronic goods	Manufacturers need to develop a modular approach, so that most of the materials are reused, and just chips and fascias are updated. Tools include possible new measures under the forthcoming Energy Using Products Directive.
Textiles	Like electronics, fashion is key. Clothing retailers need to develop secondary lines in vintage clothing, providing discounts on new clothes if the old ones are brought back.
White goods	Manufacturers to produce more durable goods, with affordable repair warranties and easy availability of spares. Tools include a product levy to be applied to those who do not.
Carpets	Manufacturers: a modular, service approach already available, where carpets are leased and replaced when worn or need updating; and used carpet is recycled.*
Furniture	Leasing might also work for furniture
Paint	Manufacturers: a large proportion of household hazardous waste is paint. This might be a candidate for service agreements, whereby householders buy decorating services rather than paint. Tools might include deposit refund schemes to encourage return of unused paint.
Chemicals	Manufacturers: as with paint, deposit refund schemes might encourage return of unused chemicals, and resulting higher initial cost might discourage overbuying.

Notes: *See Interface Sustainability's 'Re-entry' programme at www.interfacesustainability.com/redesign.html

References

Note: web references correct at September 2006

- AEA Technology Environment (2006) *Evaluation of the Household Waste Incentives Pilot Scheme: Final report to Defra* available at www.defra.gov.uk/environment/waste/localauth/pdf/aeat-householdincentives.pdf
- ASDA (2006) 'ASDA launches "zero waste to landfill" target', press release, 25 July, available at www.asda-press.co.uk/pressrelease/35
- Biffaward (2006) *The mass balance movement: the definitive reference for resource flows within the UK environmental economy* Newark: Royal Society of Wildlife Trusts, available at www.massbalance.org/resource/massbalance
- Cambridge Econometrics and AEA Technology (2003) *The Benefits of Greener Business: Final report submitted to the Environment Agency by Cambridge Econometrics and AEA Technology* available at www.environment-agency.gov.uk/commondata/acrobat/benefits_of_green_business1.pdf
- Davis E (2005) 'Consumers enjoy falling prices' BBC online, 17 January, available at <http://news.bbc.co.uk/1/hi/business/4174587.stm>
- Department of Environment, Food and Rural Affairs (2006a) 'Key Facts about: Waste and Recycling: Estimated total annual waste arisings, by sector' available at www.defra.gov.uk/environment/statistics/waste/kf/wrkf02.htm
- Department of Environment, Food and Rural Affairs (2006b) *Review of England's Waste Strategy: A consultation document* London: Defra, available at www.defra.gov.uk/corporate/consult/wastestratereview/review-consult.pdf
- Department of Environment, Food and Rural Affairs (2006c) *Annexes to Review of England's Waste Strategy: A consultation document* London: Defra, available at www.defra.gov.uk/corporate/consult/wastestratereview/annexes.pdf
- Department of Environment, Food and Rural Affairs (2006d) 'Figures show St Edmundsbury recycles half of its waste', press release, 23 January, available at www.defra.gov.uk/news/2006/060123a.htm
- Department of Environment, Food and Rural Affairs (2006e) *Municipal Waste Management* London: Defra, available at: www.defra.gov.uk/environment/statistics/wastats/bulletin/mwb-intbull-20042005.xls#Table 5!A1
- Department of Environment, Food and Rural Affairs (2006f) 'Municipal waste management statistics 2004/05', Statistical Release 125/06, 24 March, available at www.defra.gov.uk/news/2006/060324a.htm
- Department of Environment, Food and Rural Affairs (2006g) 'Key facts about waste and recycling: Waste arisings and management: 1998/9 and 2002/3', available at www.defra.gov.uk/environment/statistics/waste/kf/wrkf14.htm
- Department of Environment, Food and Rural Affairs (2006h) *Partial Regulatory Impact Assessment of the Review of England's Waste Strategy* available at www.defra.gov.uk/corporate/consult/wastestratereview/partialRIA.pdf
- Department of Environment, Food and Rural Affairs (2005) 'New figures reveal surge in recycling', press release, 14 September, available at www.defra.gov.uk/news/2005/050914a.htm
- Department of Environment, Food and Rural Affairs (undated) *Local Authority recycling and composting performance for 2004/05* available at www.defra.gov.uk/ENVIRONMENT/waste/localauth/pdf/lacompostrecycle-rates0405.pdf
- Department of Environment, Food and Rural Affairs (2003) *Changing Patterns: UK Government Framework for Sustainable Consumption and Production* London: Defra, available at www.defra.gov.uk/environment/business/scp/pdf/changing-patterns.pdf
- Department of Environment, Food and Rural Affairs (2000) *Waste Strategy 2000 for England and Wales* London: HMSO, available at www.defra.gov.uk/Environment/waste/strategy/cm4693/index.htm

Department of Trade and Industry (2006) *The Energy Challenge: Energy Review A Report* London: The Stationery Office, available at www.dti.gov.uk/files/file31890.pdf

Environmental Services Association (2002) 'MORI Puts Waste First; But Where's The Money?' press release, 23 August, available at www.esauk.org/press/statement/?release_id=57

Enviros Consulting and University of Birmingham with Risk and Policy Analysts Ltd, Open University and Maggie Thurgood (2004) *Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes* London: Defra, Table 5.1, available at www.defra.gov.uk/environment/waste/research/health/index.htm

European Environmental Bureau (EEB) (2005) *EU Environmental Policy Handbook* Brussels: EEB

Friends of the Earth (2004) *Target recycling: 50 per cent recycling and beyond* London: Friends of the Earth, available at www.foe.co.uk/resource/reports/target_recycling.pdf

Girling R (2005) *Rubbish* London: Eden Project Books (Transworld)

Goldemberg J (1997) 'Leapfrogging strategies for developing countries' in Kaya Y and Yokobori K (eds) *Environment, energy, and economy: Strategies for sustainability* Tokyo: United Nations University Press, available at www.unu.edu/unupress/unupbooks/uu17ee/uu17ee0m.htm

Green Alliance (2005a) *Return to Sender* London: Green Alliance, available at www.green-alliance.org.uk/publications/ReturnToSenderFullReport/

Green Alliance (2005b) *An International Survey of Zero Waste Initiatives* London: Green Alliance, available at www.green-alliance.org.uk/ourwork/ClosingTheLoop/ClosingtheLoop2/ClosingLoopUpdates/Zero/

Green Alliance (2002) *Creative Policy Packages for Waste, lessons for the UK* London: Green Alliance, available at www.green-alliance.org.uk/publications/PubCreativePolicyPackWast/

GreenBlue (2003) *Introduction to Cradle-to-Cradle Principles*, available at www.greenblue.org/edesign/Intro_C2C.pdf

Heligan Gardens Ltd (2004) *The Lost Gardens of Heligan handbook 2004* St Austell: Heligan Gardens Ltd

HM Government (2005) *Securing the Future – delivering UK Sustainable Development Strategy* London: HMSO

Hogg D (2006) *A Changing Climate for Energy from Waste? Final Report for Friends of the Earth*, available at www.foe.co.uk/resource/reports/changing_climate.pdf

Interface Sustainability (undated) www.interfacesustainability.com/redesign.html

Ipsos MORI (2006) *Summary of the survey on PC Consumerism and Environmental Impact*, available at www.greenpeace.org/raw/content/international/press/reports/ipsos-mori-overall-summary-of.pdf

Local Government Association (2006a) 'Meeting high recycling rates, closing the funding gap – a manifesto for change', Position Statement, June available at [www.lga.gov.uk/download.asp?path=/Documents/Briefing/LGA_recycling_manifesto_\(2\).pdf](http://www.lga.gov.uk/download.asp?path=/Documents/Briefing/LGA_recycling_manifesto_(2).pdf)

Local Government Association (2006b) 'Tax payers could face £400 million bill unless councils get power to charge for waste', press release, 5 July available at www.lga.gov.uk/PressRelease.asp?id=SXB084-A783BBA4

Loh J and Wackernagel M (eds) (2004) *Living Planet Report 2004* Gland: WWF, available at <http://assets.panda.org/downloads/lpr2004.pdf>

Martin D (2005) 'The True Cost of Irish "Pay by Use"' in *Wastes Management*, October

Miliband D (2006a) Speech to the Audit Commission annual lecture, London, 19 July 2006: 'The great stink: towards an environmental contract' available at www.defra.gov.uk/corporate/ministers/speeches/david-miliband/dm060719.htm.

Miliband D (2006b) Speech to the Local Government Association's annual conference, Bournemouth, 4 July, available at www.defra.gov.uk/corporate/ministers/speeches/david-miliband/dm060704.htm

Millennium Ecosystem Assessment (2005) 'Experts say that attention to ecosystem services is needed to

achieve global development goals', press notice, 30 March, available at www.maweb.org/en/article.aspx?id=58

Murray R (1999) *Creating Wealth from Waste* London: Demos

National Assembly for Wales (2005) 'Wales is becoming a recycling nation', press release, 15 December

OECD Working Group on Waste Prevention and Recycling (2006) *Impacts of unit-based waste collection charges*, available at www.oecd.org/env/waste

Parfitt J (2002) *Analysis of household waste composition and factors driving waste increases*, report compiled as background paper to Strategy Unit project on waste in 2002, available at www.strategy.gov.uk/downloads/su/waste/downloads/composition.pdf

Pennon Group (2005) *Annual Report and Accounts 2005*, available at www.pennon-group.co.uk/media/pdf/g/s/pennon05_1.pdf

Prudential (2004) *Soggy Lettuce Report 2004* London: Prudential, available at www.wasteonline.org.uk/resources/Attitudes/soggy_lettuce_pru.pdf

Ricoh (undated) 'Waste not, want not: Zero tolerance pays big dividends', available at www.ricoh.co.uk/environment/wrapper.cfm?ricpage=enews37

Scottish Executive (2006) *Municipal Waste Arisings and Recycling Rate* www.scotland.gov.uk/Topics/Statistics/Browse/Environment/TrendWasteRecycling

Strategy Unit (2002) *Waste Not, Want Not: A strategy for tackling the waste problem in England* London: Strategy Unit, available at www.strategy.gov.uk/work_areas/waste/index.asp

Sustainable Procurement Task Force (2006) *Procuring the Future* London: Defra, available at www.sustainable-development.gov.uk/publications/procurement-action-plan/documents/full-document.pdf

US Environmental Protection Agency (2002) *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks* Washington, DC: US Environmental Protection Agency, available at <http://yosemite.epa.gov/oar/globalwarming.nsf/content/ActionsWasteToolsSWMGHGreport.html>

Wates Construction (2006) 'Wates publishes zero landfill report', press release, 29 June, available at www.wates.co.uk/other_pages/press_room/press_release/

WRAP (2006) *Environmental benefits of recycling: an international review of life cycle comparisons for key materials in the UK recycling sector* Banbury: WRAP, available at www.wrap.org.uk/document.rm?id=2839

WWF (2005) *Investing In Sustainability* Godalming: WWF-UK, available at www.wwf.org.uk/filelibrary/pdf/investinsustainability.pdf