

## IV The Road to Zero Waste

### 1. Setting the compass

The first feature of all successful high diversion programmes is the strength of the idea. For a programme to have roots and direction it has to have a shared idea of its environmental and social purpose. Although individual incentives play a role, it is the common goals which are the *raison d'être* and generate the mobilising energy for the project. They also provide the criteria that inform waste strategies.

This is an important point for waste managers in the UK. Too often waste plans in this country have set as their primary tasks the meeting of EU and government targets and directives. This places local authorities in the role of a subordinate, whose goals and values are determined elsewhere. The danger is that the targets become detached from the intention behind them, so that an authority will be concerned more with meeting the targets than with whether the route they have chosen reflects underlying priorities.<sup>41</sup>

For those outside local government, particularly householders, who play a key role in the new waste arrangements both as voters and waste producers, bureaucratic objectives such as meeting government targets have less meaning than environmental objectives such as reduced toxicity and emissions of CO<sub>2</sub>. It is not that government targets should not be met: the initial recycling targets are statutory and binding. It is rather that they should be seen as a consequence, not a prime reason, for any strategy.

Sustained political leadership has been particularly important in recycling for this reason, in articulating and keeping to the fore the central meaning of the programme. But it has also been important that the establishment of the programme is not treated simply as a technical matter, and that the broader values are internalised in its design

and conduct. In order to achieve this, many programmes have been designed (and in some cases operated) in close partnership with the communities they serve.

## 2. Targets as staging posts

Once the overall goals are clear, targets have a context. They have often been a point of contest. Innovators want to set targets beyond the horizon. Bureaucracies prefer to remain well within it. But in terms of achieving high recycling, targets should be ambitious – so-called ‘stretch targets’ in order to encourage radical innovation. They should be set in relation to what is required. They embody the goals. In the words of Gerry Gillespie, one of the promoters of Zero Waste policies in Australia and New Zealand, the Americans and the Russians did not aim to send a man halfway to the moon. They were advised by their scientists on the potential feasibility of the project, but they were setting a goal not on the basis of existing levels of technology, but on what might be developed in the future.

Good targets reflect an impatience with the present. They then become the yardstick against which advance can be measured. Japanese manufacturers do not care how low the bar is to begin with. Their interest is in how high it can go, and with the closely observed ups and downs of the progress towards it.

High recyclers have set ambitious targets – usually 50%, in the first instance, to be achieved within a decade. Many found they reached that level more quickly, and target dates have been brought forward – to five years and even less. Individual municipalities find that they can reach 50% within two years of launching. For places still in the early stages of recycling, reaching 50% diversion in five years is a reasonable first stage target in the light of current experience and techniques.

In the long term, many places are now confident that they can reach much higher levels. In California, the 50+ municipalities are planning for 70-80% diversion, with

some districts and cities (notably Del Norte and Santa Cruz) targeting Zero Waste. In Canada, districts like Quinte, that have reached 70%, are now planning for 85%. The Nova Scotia county of Annapolis Royal is aiming for Zero Waste by 2005. Zero Waste has now become the goal for 40% of all municipalities in New Zealand, following the lead of Canberra.

The above suggests that in addition to a first stage target of 50% within five years, further stretch targets should be set of 70% diversion within ten years, 85% in fifteen and Zero Waste in twenty.

## 3. The S-curve and the Pareto Principle

Behind these targets lies a proposition that the expansion of recycling follows an S-curve. The curve describes the fact that, after an initial slow growth, the recycling rate can climb steeply to 50% and 60%, and then continue at a slower rate as waste reduces towards zero. It is a description of the growth of individual recycling programmes to date.

The rationale reflects the Pareto Principle that a small number of causes are responsible for a large proportion (commonly 80%) of the effects. In the case of dustbin waste, five materials (organics, paper, glass, cans and textiles) account for 80% of the weight. For bulky waste taken to civic amenity sites (CA sites), 70% of the weight comprises three materials (organic waste, builders’ waste and wood), with a further three materials taking the figure up to 80% (paper, metals and furniture). In broad terms, if an authority sets up a small number of core programmes that capture 80% of these ‘80% materials’ from 80% of its residents, it will reach the first target of 50%.

Those authorities that have pursued intensive programmes of this kind have found that their household diversion rates rise rapidly to reach 50% or more, with commercial rates increasing even more sharply. This represents the steep part of the S-curve.

After that the household rate is pushed further by two factors. First participation and capture rates increase in the existing programmes, often aided by the introduction of user pay systems. Second, new materials are added to the collection and new programmes are started aimed at items that become significant in the residual stream. An example would be nappies, which account for 4% of the domestic dustbin, but 10% of the residual once a 60% target has been reached. The rate of expansion slows as programmes have to deal with the more difficult materials, and less participative households.

#### 4. The four-stream system

The most common core programme for the first stage is described as the four-stream system, of which three streams represent dustbin waste:

- organic waste
- dry recyclables
- residual dustbin waste and a fourth stream represents:
- bulky goods

These all need to be dealt with separately, with further sub-divisions in each category. While in each case it may be possible to arrange for householders, firms and institutions to process their own waste (as in the case of on-site composting) or to bring their waste to a common collection point (to recycling banks, civic amenity sites, shops for returnable bottles or to roadside Eurobins for residual waste in Mediterranean Europe), the core of the intensive recycling structure is kerbside collection.

The first priority is organic waste. This makes up 30-50% of dustbin waste throughout Europe, and in the UK 40% of civic amenity site waste. High levels of organic diversion will not only reduce the toxicity of landfill, it will propel municipalities towards the 50% target. Many

North American authorities that have reached 50% or more have done so without kitchen waste collections, relying rather on home composting programmes and the kerbside collection of garden waste. The same is true of Canberra in Australia. But home composting alone will never achieve the levels of diversion of doorstep food waste collections, so that for Zero Waste, a regular food waste pick-up is the first building block of the new system, with seasonal collections of that garden waste which cannot be composted at home.<sup>42</sup> Separate food waste collections have been the reason why so many Italian cities have reached 50%-plus targets of waste diversion within three years.

The second stream is dustbin dry recyclables. Kerbside collection of recyclables should aim to reach an average of 2.7kg per household passed per week within three years, and 4kg per household within eight years, yielding a dustbin recycling rate of 17-25%. The priority material is paper – both newspaper and magazines, and other mixed paper, followed by textiles, cans and lastly glass.

The third stream is residual dustbin waste, which will dramatically fall in volume, and whose collection needs to be integrated with the organics and dry recycling collections. Within the residual stream, special arrangements are required to remove hazardous waste. Some is collected in bags attached to the dry recyclables collection (batteries and old pharmaceuticals for example). A growing number of municipalities have assigned special areas of their civic amenity sites for the full range of hazardous items that can be recycled or disposed of appropriately.

The three-stream system for the collection of dustbin waste is the core programme for intensive municipal recycling. In the spirit of smart recycling it does not necessarily mean three separate collections. In some cases two streams can be collected in separate compartments of the same vehicle. In others, there may be four or five collections: for food waste, garden waste, fibres and

containers, and residuals. What matters is that the streams remain separate to avoid contamination.

In respect to the fourth stream, bulky waste, it is primarily handled throughout Europe, North America and Australasia via a small number of designated bring sites, often at landfills, supported by doorstep collections for those without cars or who live in rural areas. Recycling is relatively straightforward in this case, with residents and traders instructed to source-separate their waste and place it in the relevant containers. As a result, diversion rates of 60-70% can be rapidly achieved, provided that the layout of the sites is re-organised and sufficient green collar staff employed.

The problem with this system is that while it is cheap for local authorities, it is a major generator of traffic (accounting for nearly 1% of car traffic in outer London for example). There is an environmental case for introducing a more systematic doorstep collection scheme for bulk goods, as well as extending take-back systems through commercial delivery vehicles as producer responsibility regulations come onstream.

In the USA and Canada bring sites of this kind have been refashioned into recycling and reuse centres. They have become transfer sites for the recycling of consumer durables, as well as places of recreation – a market for reuse goods, an education centre and a waste museum.

The above four-stream system has been adopted for trade and institutional waste as well as waste from households, often using the same vehicles and facilities.

## 5. Mapping

Intensive recycling needs to give as much priority to mapping its waste as the nineteenth century General Staff in Prussia gave to mapping their territories. In the case of waste, the primary mapping will have three main parts:

- an analysis of the composition of waste
- an identification of the main sources and quantities of waste
- an audit of existing assets

### (i) waste composition

In the era of mass waste, what mattered was not the composition of waste but its volume and weight. Increased awareness of pollution led to new classification of special and hazardous wastes, but these mainly applied to industries, not households. For the most part waste was waste. The issue was quantity not quality.

Incinerators were a partial exception. They did have an interest in the combustibility of their feedstock, and undertook periodic studies to distinguish the main elements of waste in relation to their calorific values. But the studies remained aggregated, with categories such as combustible and non-combustible, and with large residual categories such as 'miscellaneous' and 'fines'.

The starting point for Zero Waste has been disaggregation. Sorting techniques have been developed which can identify the composition of each of the waste streams, as mineralogists identify their metals. It has been found that an adequate analysis requires hand sorting. It cannot be done satisfactorily by machines. Hand sorting allows the breakdown of waste into fifty or more components, and gives the planners of recycling direct experience of the materials with which they are working. Like opinion polling, waste composition sampling is done regularly as a measure of progress and a guide to practice.

### (ii) estimating quantities

In the past, mass waste has been measured at the point at which it has to be paid for – at the point of transfer and/or disposal (although in the UK as in other parts of

Europe by no means all landfills have weighbridges). Yet the lorries that bring in the waste often have mixed contents from different streams. Household collection rounds include some trade clients. Street sweepings may be added to a trade or domestic round. Civic Amenity (CA) sites may mix trade and domestic waste. Few have their own weighbridges. Some streams unofficially switch into others. A major cause of the large rises recorded in household waste since the introduction of the landfill tax in Britain has been the seepage of trade waste into street litter, estate paladins, CA sites, or into the household dustbin stream. Some waste avoids official disposal altogether by being dumped illegally.

As a result, waste data is notoriously unreliable. Waste managers and government planners have no firm knowledge of the absolute quantities of particular streams, let alone their composition. Some years ago the UK Government had to increase its estimate of municipal waste by a third. Waste Strategy 2000 (and the Environment Agency) continue to use mechanical waste composition analyses undertaken for dustbin waste in the early 1990s as a proxy for the composition of all municipal waste, and consequently underestimate the quantity of organic waste by some 4-6 million tonnes. Twenty-year strategies in Britain are being based on quantities measured as household waste going over a weighbridge – whatever their source. Producers required to fund recycling under the packaging regulations have been in continuous conflict with the Environment Agency over the quantities of packaging waste.

Recycling cannot operate in such informational darkness. It needs to know waste quantities and compositions from its various sources not just in aggregate but for different rounds, streets and even households. For planning it has to know about waste trends by stream and also be able to estimate its ‘reserves’ of resources – how much newsprint, or cardboard or clothing there is in any town or city. For operations it has to be able to monitor the impact of diversion and what material is not being captured. For

charging, it has to know how much each household or trader or institution is producing, since the principle that the polluter pays depends in practice on knowing the quantities produced by each ‘polluter’.

The new waste economy has therefore become a close tracker of quantities. Some can be estimated by the size of bin (regularly re-sampled), some by statistical analyses using postcode marketing data.<sup>48</sup> Some municipalities have introduced on-board weighing of individual containers and expanded the number of weighbridges. All of them aim to produce detailed, real time data to allow them to track and adjust their systems promptly.

### (iii) an audit of the current waste system

One of the principles of intensive recycling is that it should transform a local authority’s (or a firm’s) waste system and not be treated as an add-on to existing waste management. Many of the savings of the recycling-led systems have come from persistently inefficient features of the mass waste system – for example, from the practice of adding on the handling of mini-waste streams (such as special collections) piecemeal, to the mass waste system; from the reduction in ‘defects’ (such as missed pick-ups), or from the introduction of new systems into areas where waste management has broken down (high rise estates, urban street litter, and the fly-tipping of bulky goods). The costs of intensive recycling can also be reduced if it calls on, or increases its use of, existing assets – the corner of a local depot, for instance, or a well maintained collection vehicle which is available on weekends. The devil of ‘smart recycling’ is in the detail.

An initial audit is a survey of this detail. It will include:

- the assets held by the existing waste departments (lorries, depots, workshops, bulking bays, containers, databases, landfills) and by other waste generating/waste managing departments (notably housing, education, parks and highways). Most

housing estates, for example, have unused collective areas – empty shops or garages that can be used as mini recycling depots. Parks have space and machinery suitable for composting. Highways have specialist vehicles and depots that could be rented for recycling;

- the operating patterns, schedules, capacity utilisation, breakdowns, distance to disposal and maintenance arrangements;
- the costs and income not just of the waste departments, but of all sections of the authority producing waste (one study in a London borough found that the per tonne cost of waste management on estates was nearly ten times that for ordinary domestic refuse rounds). Authority-wide costing will be the base marker or bottom line against which the costs of any new waste system have to be judged.

## 6. Social marketing

Earlier I discussed the central place of environmental values in the design and operation of successful recycling schemes. However, no service of this kind can succeed on ethics alone. The experience of both environmental and ethical trading is that the qualities normally expected of a service or commodity are the primary issue. Ethical market research shows that there are a small minority (often no more than 1%) who will buy recycled paper or fairly traded coffee whatever the quality. A further 30% are actively sympathetic to the ideas in question, and may even be willing to pay a little more (say an extra 10%) if the item in question is equivalent to conventional goods in quality. Another 40% will buy if both price and quality match the competition. A residual cohort remain indifferent or are even hostile. These proportions can change over time but the principle of an ethical 'bell curve' still holds.

Recycling has learnt similar lessons. For most people, the environmental value of the service is not enough if the

service is irregular or inconvenient. To achieve high levels of participation recyclers have had to ensure that, in addition to the focus on 'meaning', they also offer a high quality service and employ the skills and social marketing techniques required. If recycling is in competition with the dustbin, then it has to be organised in a way that maximises its advantages and minimises its drawbacks. Among the points of importance are the following:

- *simplicity*. The highest participation rates come from a weekly service, preferably on the same day as a residual collection;
- *convenience*. Recycling boxes and organic containers need to be designed to take account first and foremost of householder convenience, with vertical boxes for flats for example, or small 'compostainers' for collecting organics in the sink;
- *design*. Good services require good design – of equipment, containers, workwear, and leaflets;
- *advice*. If householders are producers, then some aspects of recycling require advice. In the case of composting, the best schemes have employed compost doctors to help establish a compost bin, and to troubleshoot for those with problems; for recycling the collector can usually advise on materials that should be left out or included;
- *tracking*. Bar codes on recycling boxes have allowed collectors to monitor participation rates, with thanks to those who participate regularly, and direct approaches to those who don't;
- *feedback*. Regular feedback on the quantities of material collected and its use has been found to increase participation rates. This can be done through a newsletter left in the recycling box (boxes are now available with message slots so that they become a weekly vehicle for communication);

- *support groups*. Many recycling programmes have been organised with a supporters network, which acts as a point of advocacy and feedback from the street. Its views, along with those of the collectors and the customary focus groups, are important in assessing and expanding the service.

These approaches take one beyond a common view that only a minority of the population will engage in recycling, and that the issue is one of educating an ill-informed public. There are issues of information and education, but the lessons of environmental and ethical business are that a service like recycling must always present itself as both householder-friendly and a bearer of meaning. Like Oliver Cromwell, it must trust in God and keep its powder dry.

## 7. User pay and paying the user

The substance and quality of a service is more important for many householders than the relative 'effort price' of recycling. Yet many of the high performing programmes internationally have introduced user pay systems ('pay as you throw') for residual waste and/or some form of compulsory regulation. The advice of programme designers is to ensure that convenient systems are in place before introducing user pay or prohibitions, since it will otherwise lead to increased fly-tipping or free loading on others. Carefully introduced user pay (whether or not supported by regulation) shifts the form of payment for waste from a lump sum tax charge to a per-unit fee, and increases participation and capture rates by 10-15%.

There are some restrictions on the introduction of user charges in the UK, since local authorities are required under the Environmental Protection Act of 1990 to provide a free waste collection service. Paradoxically, this encourages a broader view of incentives than a simple mixed-waste user fee.

There are a number of ways in which a local authority in the UK can change the 'price' of recycling relative to the

residual dustbin, in addition to the aspects of service quality outlined above. It can:

- charge for the provision of sacks or other containers (thus some authorities make a charge for plastic sacks for residual waste, but provide recycling and composting containers free. In North America householders are often charged different annual rates according to the residual bin size that they agree to use – a similar effect can be achieved by using the instruments legally open to local authorities in the UK);
- charge for collecting green waste and bulky goods;
- raise the level of annual charge for waste services and provide discounts for those households which join a recycling scheme (the discounts can be financial or in kind – a pilot of this kind is currently underway in the London Borough of Brent);
- introduce the Australian tag bag system and organise a prize draw for recycling. Each recycling bag is secure with a tag that carries a bar code on it. There is a weekly draw, the winner's bag is then checked, and if it is properly sorted, he or she receives substantial prizes – holidays to the Caribbean, a new low-emission car and so on. The savings resulting from introducing the scheme are shared with householders in this way;
- other forms of incentives along similar lines include free or subsidised goods and services for regular recyclers (water butts or extra composters for example, compost that can be collected free on certain days of the year, free energy saving advice, access to discounts on environmentally friendly goods negotiated on a bulk basis by the local authority, street/estate/village awards for good recyclers);
- many authorities in the UK and continental Europe have introduced town cards that act as a tool for

providing resident discounts and for promoting public facilities and/or local and less recognised goods and services. Recycling and composting can easily be added to such ‘smart cards’, giving waste managers the flexibility of awarding bonus points and special offers to encourage participation;

- incentives of this kind can be used not simply to promote recycling in general, but to support particular ‘campaigns’ through ‘targeted incentives’ just as a firm would do when launching a new product;

One striking example of the incentive approach was introduced by the Mayor of Curitiba in Brazil. Faced with a crisis in waste collection, the municipality offered to pay residents for their waste if it was delivered to a local collection point. This generated an informal economy of collection, with low-income groups offering to take other people’s waste so that they could collect the municipal payment. In effect it was a funded bring system – and in Curitiba’s case part of the payment was made in food tokens which could be used to purchase the produce of local farmers. Bottle deposit schemes are another example of ‘paying the user’ rather than ‘user pay’, but the idea could be extended for particular materials such as aluminium (cans or foil), or – with expanded producer responsibility – for returnable consumer durables, in each case the price paid being covered by savings in collection costs.

In addition to flexible price and bonus schemes of this kind, the same goals can be approached using regulations and relative service differentials. A local authority in the UK has a variety of ways of strengthening recycling relative to the residual dustbin. Even with current legislation it can:

- require householders to use particular types of container (such as a blue box for recyclables or a plastic bin for food waste);
- limit the size of the permitted residual container if

other recycling containers are provided;

- refuse to pick up waste that is not properly sorted (this has been important to the success of the organic scheme in Bury St Edmunds; the collectors explain that they will not pick up organic bins contaminated with non-organics and this has led to a rapidly improved quality of set-outs);
- schedule waste collections that are more regular for recycling than residuals (a fortnightly collection of residuals and careful monitoring of dry recyclable and organic put-outs will encourage householders to recycle).

In some North American schemes, regulations are enforced by ‘recycling police’ who inspect dustbins in order to enforce bans and separation orders. For highly toxic materials, bans are important, but the lesson from successful programmes overseas is that the carrot of incentives and the imaginative use of social marketing are as important as the stick of controls.

## **8. Material marketing**

Recycling in its initial stages is supply-led. It is an alternative way of dealing with waste, and provides materials for which, in some cases, there is no ready domestic demand. In the early 1990s on the West Coast of the USA, plastics piled up in warehouses and were eventually shipped to China. Germany found its supply of old newspapers outstripped the capacity of local reprocessing mills. The separate organic collections introduced in the Netherlands in the mid-1990s led to a surplus of compost, and so on. The story is a common one in the early period of expanded recycling and is particularly daunting for those in municipal recycling facing the market for the first time.

There are three points to keep in mind. First, imbalances of supply and demand are the norm in areas of new growth. This is the way the market works. Planners in the



past have tried to limit these imbalances by ensuring that demand expanded in tandem with supply (it was referred to as balanced growth). But other economists (who favoured unbalanced growth) pointed out that these balances were difficult to gauge and that imbalances provided signals for innovation and expansion in unforeseen areas.

This has certainly been the case with recycling: the initial over-supply of recyclate, which resulted in unsustainable exporting or downcycling, nevertheless provided a secure source of material which prompted industries to convert to recycled inputs. The newsprint mills in North America, for example, took five to ten years to realise that recycled newsprint was the area for future growth. De-inking technology developed, and now it is the recycled mills that are earning the returns on Wall Street. The growth of demand for plastics, tyres and glass has followed a similar pattern.

Market development institutions like the Clean Washington Centre, The Materials for the Future Foundation in San Francisco and The Recovered Materials Foundation in Christchurch New Zealand, hasten the transition. Latecomers to recycling can also sell on the growing international market for recyclates. As a general proposition, the supply of recyclate creates its own demand. The initial depression of prices should be treated as a start-up cost and an issue of investment finances rather than an inherent limitation of intensive recycling.

Second, there is an issue of quality. In spite of its supply-driven origins, recycling needs to be designed and managed in relation to demand. In some cases that demand will need to be developed, but in others it is already there and the critical issue is quality. Paper that arrives wet and contaminated at a mill will be rejected. Glass bottle recycling is sensitive to stone and colour contamination. Tin cans recovered after incineration are degraded. In other words, the issue of markets and price is not just a question of external demand but of the quality of supply.

Recyclers should not see the market as a quasi-dustbin for offloading recyclates already collected. They have to be like any other supplier – attentive to quality, to delivery and to the requirements of the market. A good example is compost. The best compost programmes have been market-led. There are a wide variety of compost products, each with a different formula and requiring particular inputs. A good organics scheme should be able to supply composters with the requisite mix and without contamination. Where the supply of compost exceeds market demand, the need to restore soils means that there is still a use. Yet using compost for regenerating agricultural soils makes equal demands on the compost makers with respect to quality, standards and so on. The most common problem with compost is that its level of contamination is such that it is unfit to re-enter the biological cycle.

In these examples, what appears as a problem of markets is in fact a displaced problem of production. Even when local markets are slow to develop, there will always be outlets for good quality products. The only issue is price.

As a general rule, recycling programmes have experienced a secular increase in the level of material prices. For instance, a package of household recyclables in Canada, which in 1990 was worth on average £10-£15 a tonne, has now risen to some £40 a tonne.

There are four reasons for this type of effect:

- new investment that is made in response to cheap secondary materials prices expands demand, thereby pulling up the price;
- the development of new uses of secondary materials (up-cycling), such as glass as a filtration medium, can yield higher prices than feeding the materials back into their original use;
- improved quality should be reflected in higher prices;

- recyclers have found ways of reducing their dependence on the monopoly purchasers who dominate many of the secondary materials markets. In the short run, recyclers have formed supply consortia to improve their market knowledge and bargaining power. Such consortia have also been able to make arrangements for alternative outlets (export markets for paper and glass for example) and to reduce the impact of price fluctuations by negotiating long-term supply contracts at guaranteed prices.

The overall conclusion is that successful recyclers have been market makers as much as market takers. They see material markets not as a barrier but as a competitive space which demands sales expertise and the idea of the 'product as service'.

## 9. Disposal

Policies for Zero Waste need a strategy for the disposal of the residual waste that is integrated with the expansion of recycling. There are six principles of importance:

- rapid diversion.* Recycling and composting should be expanded as quickly as possible in order to conserve existing disposal capacity;
- cleaning the residual.* Priority should be given to the removal from the residual of those substances that are harmful in landfills, notably biodegradables and hazardous materials;
- pre-treating the residual.* Further sterilisation of the residual can be achieved through establishing modular mechanical biological treatment (MBT) plants (now widely used in Germany, Austria, Italy and Canada), that sort the remaining organics from the residual waste stream and compost them prior to landfill or digestion. These plants should be designed so that they can be converted to in-vessel composting units for separated organics as the residual stream is reduced.

- waste analysis centres.* Residual wastes should be continuously monitored on their entry to landfills as a form of quality control and a means of assessing the progress of the policies of diversion;
- flexible disposal options.* Disposal is the safety net under Zero Waste. As such it is subject to multiple uncertainties – of composition and mass and of quantities rising or falling. It is important that the means of disposal be flexible, capable of being rapidly brought on-line, or held in abeyance, with low capital costs;
- landfill as warehouse.* Landfills should be designed so that they can be economically excavated as technology advances for the further extraction of materials, unless they have been primarily intended to reclaim land using low value inert materials. They can also be used as holding areas for inert materials in temporary oversupply, like green glass.

## 10. Finance

There are five main features of recycling finance:

- start-up costs.* There are initial deficits in intensive recycling. At the margin, recycling costs money. Municipalities and firms will expand recycling up to a point where market income and avoided disposal costs equal the marginal cost of collection. To go beyond that, by introducing separate collections of organics or dry recyclables, will lead to extra budgetary expenditure. This sets up a budgetary block to transition;
- declining costs.* Initial recycling costs tend to be at least double those of traditional forms of waste disposal (between £110 and £150 per tonne according to studies of UK recycling pilots, compared to £50-£60 a tonne for traditional waste management). But these costs fall as participation and capture rates increase, and high value materials

are targeted. In economic terms, recycling enjoys economies of scale (the more throughput the cheaper the unit cost), economies of scope (lower unit costs per material as higher quantities of different materials are collected), economies of density and economies of communication. The benchmark norm for established collecting and processing of dry recyclables is a gross cost of £70 a tonne;

- (iii) *dual income streams*. There are two sources of long-term revenue: core budgetary funding and material income. As the latter rises, the former can reduce;
- (iv) *investment in intangibles* rather than fixed assets;
- (v) *long-term system viability*. As collection and processing costs fall, income rises and savings increase through reduced residual collections.

What this means is that intensive recycling has almost everywhere required initial finance to launch it. Among the range of sources are the following:

- capital grants or subsidised finance for initial investment;
- grants for intangibles such as the development of information systems, training, and social marketing;
- revenue guarantees for material income;
- operating cost sharing;
- Producer Responsibility payments (as with the Green Dot scheme in Germany and the industry stewardship agreements in Canada);
- transfers of savings in disposal costs (as in the UK recycling credit schemes);
- hypothecated taxes or charges.

This finance has been aimed at two things. First, the incremental transition costs of running multi-stream systems and second, risk management instruments to provide municipalities with income security. In general, systems costs savings have been most readily made when there is unified management of all collection (since this allows the extra costs of separate collections to be partially offset by savings on residual rounds), and when there are means for recyclers to capture the savings in disposal.<sup>44</sup>

### **Conclusion**

Recycling and composting are now taking off in an increasing number of places. The turning point comes when diversion reaches 50% and becomes the principal form of waste management. Those involved by then have confidence in the practicality of recycling. Through experience they have an understanding of the alternative paradigm which has brought them this far and will take them further.

The leading authorities are committed to further expansion. They do not recognise a limit beyond which recycling cannot go. Latecomers have seen this and are setting more demanding targets. Toronto, with a current level of only 24% diversion, has just finalised its plans to achieve 60% by 2006 and Zero Waste by 2010. The leading recycling municipalities now see Zero Waste as a realisable target and no longer just a slogan.

They will not realise it alone. There needs to be change at the front end of production to match the advance at the back end. There are some materials – notably plastics – which have an unsustainably high recycling cost (over £300 a tonne in the case of one Canadian study of plastic bottles, more than ten times the cost of collecting mixed waste), just as there are products which are difficult to recycle. The main drivers in waste reduction will be designers and producers rather than the discard collectors. Fortunately these changes are already in train. Major innovations are taking place in the industrial sector that

run parallel to the expansion of recycling. They provide the second route to Zero Waste.

## V The Green Materials Revolution

The transformations of the waste industry, though remarkable, are in many ways subordinate to the changes taking place in the field of materials. Like 'smart' recycling they reflect a change in the industrial paradigm.

Every long wave of industrial development, driven by a leading new technology, brings with it its own innovation in materials. Cotton, iron, steel, oil-based plastics and chemicals were the leading materials of previous long waves. The current fifth wave – centred on electronics – is marked not so much by a new material (although modern materials can now be composited for particular uses to an unprecedented extent) as by the pressure to reduce materials and their toxicity.

We live in an age – as far as materials are concerned – that strives for absence. It speaks of 'de-materialisation', of finding ways of avoiding production, of making more with less. Instead of labour productivity, its attention is turned to material productivity as a new frontier of innovation. Its interest is in 'clean production' rather than more production, in quality not quantity. The economy of space (reducing material extraction, minimising transport and cutting environmental pollution) is at long last emerging as a challenge to the long ascendancy of the economy of time.

What we can now see, with hindsight, is that the old mass production model which reached its social and economic limits in the late 1960s and early 1970s was also having problems with its material limits. The volume of industrial minerals, metals, non-renewable organics and agricultural and forestry products in the USA had doubled to 600 million tonnes p.a. between 1945 and 1970. It continued to grow. By 1995 it had risen by nearly as much again,<sup>45</sup> but by then the twin 'thunderclap' of Rachel Carson's *Silent Spring* and the Club of Rome's *Limits to Growth*, and all that followed from them, had been heard and internalised.

The controversies about waste and what to do about it should be seen in this context. Waste was one of the most tangible symptoms of the material excesses of mass production. Its volumes climbed with growth. The rising resistance to its disposal was one expression of the limit to the old industrial order and contributed to the elaboration of the alternative. Waste reduction is part of the new paradigm now being put into place.

From the time of the Rio Earth Summit in 1992, the full extent to which the environment is bearing on the direction of industrial development is becoming clear. Initially it was particular industries that most felt the pressure of the environmental critique – agriculture, chemicals, energy, oil and mining – and the industries reacted with defensive hostility. But post-Rio, leading corporations have come to recognise that the environment is a more general issue, and that environmental policy propositions can no longer be resisted in particularistic ways. Climate change, the depletion of the ozone layer and accumulating toxicity in land and sea have multiple sources and universal effects.

### **Eco-efficiency**

A significant development in this period has been the expansion of the World Business Council for Sustainable Development (WBCSD), a congress of multinationals which sought to develop a positive corporate view of the environment, ‘by business for business’. In 1997 two of its leading members published a major statement arising from the WBCSD discussions, called ‘Eco-Efficiency’. It opened with the following explanation of the term:

‘Its essence ... is contained in seven simple guidelines:

- reduce the material intensity of goods and services
- reduce the energy intensity of goods and services
- reduce toxic dispersion

- enhance material recyclability
- maximise sustainable use of renewable resources
- extend product durability
- increase the service intensity of products

‘Following these guidelines can give companies a competitive head-start into the next century – but not if they are treated as an add-on to “business as usual”... Eco-efficiency does require a profound change in their theory and practice of core business activities.’<sup>46</sup>

Like the early manifestos of Taylorism and Scientific Management, this sets out an entirely new way of thinking about production. The WBCSD has become a significant player in the movement to incorporate environmental issues within the industrial dynamic.

All seven of the above principles bear on the goals of Zero Waste. The reticence in the old waste industry to think in terms of Zero Waste is absent in the wider commercial world. ‘Zero Waste’ has become one of the watchwords of eco-efficiency. In the words of Edgar Woolard Jr, former chairman of DuPont, ‘The goal is zero: zero accidents, zero waste, zero emissions.’ As noted earlier, the language adopted and the approach is that of Japanese Total Quality Management extended to eco-efficient management.

Major companies have begun to adopt zero targets. Bell Canada, Kimberley Clark, Du Pont, Honda, Toyota, Hewlett Packard, the Ricoh Group and Interface Carpets are all aiming for Zero Waste. Xerox set the goal of ‘waste-free products from waste-free factories’ and has introduced targets for solid and hazardous waste reduction, air emissions, waste water discharges, low energy usage and the inclusion of 25% post-consumer recycled material in its parts and packaging. Increasing numbers of firms are adopting medium-term waste reduction targets of 50% or more – in parallel with the

municipal sector. The eco-efficiency literature is full of examples of firms cutting waste and toxic emissions by orders of magnitude.<sup>47</sup>

### **Eco-efficiency and innovation**

In its early phases of application, eco-efficiency is applied to on-site processes and later to products.<sup>48</sup> This has led to the criticism that eco-efficiency merely provides a 'greenwash' to the existing industrial system. Running a chlorine factory with fewer emissions cannot obscure the fact that chlorine-based products are major sources of pollution as they pass down the chain. Or to take a recent British example, one of the UK incinerators was recently awarded the ISO 1401 standard for environmental performance at the very time when it was mixing its highly dioxinated fly and bottom ash, storing it in the open air and allowing it to be used in urban domestic construction projects as a means of waste reduction.

Were eco-efficiency to remain limited in this way, the criticism would be well founded. Yet when a new way of looking at production and product design comes into play, with new touchstones and sensitivities, it is impossible to confine the approach to the role of propping up old production. For a fresh paradigm of this sort opens up whole unexplored territories for development – for technology, for products and for 'productive systems', similar in many ways to those created by electronics. As with electronics, the industrial firms that fail to respond to the new opportunities will be sidelined by the firms that do. By the end of the 1990s environmental performance had become recognised as a key element of the new competition.

### **Clean Production**

Clean production is one way in which eco-efficiency has moved beyond the old. The WBCSD guideline 'reduce toxic dispersion' is the weakest formulation of the seven and reflects the vigour with which some branches of the

chemical industry have defended their products in spite of their prevalent toxicity.<sup>49</sup> Yet the pressure to develop green chemicals and alternative non-toxic products has been intense and increasingly successful. Environmental pressure has forced the phasing out of toxic products such as DDT, leaded petrol, CFCs and halons, and the Stockholm Convention on Persistent Organic Pollutants will now target a further twelve organochlorines.

At the same time new products have been developed – as alternatives to banned and threatened substances (examples would be wet cleaning as an alternative to dry cleaning, plant-based inks and dyes, lead-free paint, as well as the remarkable rise of organic and till free agriculture). While the Stockholm Convention covers only twelve out of the 70,000 chemicals now in use, this should not diminish its importance. It lays down a marker for greener production. It shows a readiness to phase out toxic materials whatever their economic significance, and it means the eyes of the world now have the full range of chemicals in their sights.

### **The commodity-service economy**

A second area that is being transformed is that of durable goods. In many of the durable sectors waste has been handled beneath the managerial radar line, since the cost of disposal has been minimal. The introduction of producer responsibility legislation, and demands for increased recycling and resource efficiency, are changing this. Firms are being forced to re-assess their products from the viewpoint of product life and recyclability. A new 'durable' industrial paradigm is emerging as a result, variously described as de-materialisation, the access economy, and the 'servicising' economy. Each of these formulations points to the increasing significance of knowledge-based services to modern production and the declining economic significance of material products.

One of those closest to these changes is Walter Stahel, of the Product Life Institute in Geneva. He and his colleagues

outline a picture that is defined not only by absence and the avoidance of production, but also by a whole series of reversals. There is reverse logistics, reverse manufacturing and reverse retailing. There are also many other 're-' words – not only the three Rs (reduce, reuse and recycle), but repair, remanufacture, refine and so on. In this looking-glass economy it is as though all the established processes of production are being connected up to those same processes, going the other way.<sup>50</sup>

Walter Stahel identifies four strategic paths that are being pursued, each running alongside and reinforcing the others.

- (i) *production avoidance*. His examples include ploughing at night, which reduces weeds and weeding, zero energy housing, and health maintenance organisations. There are many other spheres of the economy (such as transport, water and of course waste) where production can be avoided through smart systems. At the level of systems, this involves the redesign of 'productive systems' so that they require fewer material inputs to produce a desired outcome.
- (ii) *extended product life*. This can be achieved by concentrating on another series of 're-s' – repair, remanufacture, re-covering, refining and reuse. To facilitate these, increased product life needs to be incorporated in the initial design. For example the cost of repair can be lowered through the modularising of design and the automation of fault diagnostics. The modularising of components across products will help repair and remanufacture. In cases where product life is heavily influenced by changes in appearance (fashion) rather than functional operation, products can be designed to allow for skin changes or re-covering. Dynamic modularisation allows technical advances to be incorporated into a re-covered product.

Activities such as repair can be carried out by the user, but repair is most likely to be expanded if it is

made the responsibility of the original producer. If a producer's goal is to extend product life (and the market should be shaped so that there is an incentive to do so), then we should expect there to be an increase in the leasing, rather than selling, of durable goods. Leasing would encourage long life design, and allow the manufacturer to plan the periodic activities such as maintenance, overhaul, re-skinning and so forth, that are necessary for continued product effectiveness. In the case of refining (of oils and solvents for example) renting the substances allows the manufacturer to remove the contaminants so that they can be reused.

- (iii) *extended material life*. This is where recycling is relevant. In the case of end-of-life durable goods, recycling involves the reverse engineering of the assembly or flow processes by which they were produced. Industry symposia on the subject discuss such issues as the establishment of disassembly lines, new types of binders (such as glues and solders) that can be readily cracked open, and ways of decomposing composites or replacing them with recyclable materials. These processes are again often best undertaken by the original producers (using take-back, buy-back or leasing arrangements of the original commodities). They can then use more expensive but longer lasting materials (which would otherwise be lost to scrap) and 'learn from undoing' in order to revise product design to ease disassembly and recycling.
- (iv) *increased product utilisation*. Many durable products are severely underused. One approach to increasing utilisation is through share schemes, like Lufthansa's car pool, or user friendly hire schemes. Another is through actual or de facto borrowing or leasing schemes. The disposable camera is one example; another would be the supply of equipment from a leasing company on request. These are all means of improving resource productivity, defined as an increase in outcomes per unit of material input.



## The commodity-service economy

One of the results of these strategies is the emergence of a 'new service economy' in which manufacturers sell not commodities but service packages to achieve required outcomes. Manufacturing is transformed into a branch of the service sector, producing goods that are judged primarily on their performance as part of a service package.

In the case of energy, facilities managers offer target levels of power and comfort, and then employ an array of technologies in addition to (reduced) energy inputs in order to meet them. Rentokil offers pest control and security rather than rat poison and locks. Dupont is moving from supplying paint to the auto sector to supplying painted car bodies. Xerox supplies copying services. Fleet management offers mobility services for the transport of goods. As with leased buildings and elevators, such product + service provision is established and growing.

These examples largely come from the commercial sector, which is where the new commodity-service economy has first taken hold. It is now extending to consumer goods. Electrolux is supplying 'washing services' to households. Unilever has launched a cleaning service, which it hopes to extend into gardening services, providing the equipment and inputs in each case. A leading oil company is considering renting out oil as part of a lubrication service. Car companies are preparing to sell mobility services, with the consumer renting a given number of miles, supplied through a leased car, with insurance, fuel, maintenance and repairs provided.<sup>51</sup> In all these cases the commodity moves away from the centre of the commercial transaction and becomes what the industrial ecologists describe as 'a service delivery platform'.

One of the factors underlying this change is that so much consumption involves work. Cooking, washing, cleaning, gardening, house and car maintenance, travelling,

shopping, child rearing, home caring and household information management are all part of the domestic economy. Toffler called it 'pro-sumption' and it now extends not just to the daily tasks but to self-education, to healthy living, and the management of a household's energy, water and waste.

The rise of commodity-plus-service reflects both changing work patterns and the application of modern technology in the home. Firms are now offering a 'three star' service package or a package of commodities, with guarantees and advice. In doing so they are changing their orientation, placing a premium on the continuing service-provider/customer relationship instead of the one-off commodity sale.

These changes place the responsibility (and risk) for product performance back with the manufacturer. As such they are parallel to the movement towards producer responsibility in waste. Taken together they enable issues of product and material life cycles to be re-integrated with the function of product design, opening out extraordinary opportunities for design innovation geared to increased material productivity and Zero Waste. For once the revenue of service providers is based on outcomes and they take responsibility for risk and waste, they have an interest in minimising both as well as the specialist capacity to do so.

The changes involved in such a shift are summarised in Table 2, drawing on the work of Walter Stahel and his colleagues.

**Table 2**  
**Characteristics of the new commodity-service economy**

<b>Commodity-based economy</b>	<b>Service based</b>
Efficiency	Sufficiency
Output	Outcome
Vertical integration of integration of producer and supplier customer	Vertical producer and customer
Doing things right thing	Doing the right thing
Labour productivity productivity: resource input per unit of outcome produced	Resource
River economy (cradle to grave) (cradle to cradle)	Lake economy
Cost reduction production based asset management	Performance-management
Flow process and assembly reverse manufacturing	Disassembly and
Global factories	Local workshops
Commodity as inflexible service delivery mechanised service package	Commodity as platform
One-off sale service contracts and guarantees/take-back and buy-back	Long-term
Purchase	Lease
Risk borne by consumer producer (caveat emptor)	Risk borne by (caveat factor)
Individual consumption consumption	Shared

Product specific components components	Standardised
Product-based standards based standards	Performance-
Private and public property and collective responsibility	Rights of access
Material and discard intensive	Zero Waste

### The expansion of commodity-service

In 1999-2000 the Product Life Institute undertook a study of the significance of the new commodity-service economy. The results were the following. The EU market for products sold as services in 1998 was 10% of GDP, of which 6% was accounted for by selling the function of products (such as fleet management) and 4% by re-manufacturing (principally in the building and construction sector). The shift to services has gone further in the USA, with a share of products sold as services up to 15% of GDP, and the re-manufacturing of components worth an estimated \$50 billion.

The survey of leading edge companies in this field, which was part of the study, reported that they expected to double or quadruple their share of revenue selling services instead of products by 2010. The report concludes:

‘If the existing trend continues, we expect to see by 2010 a European economy with a technically and socially perfected material recycling system for waste, in competition with a perfected Japanese “inverse manufacturing” technology sold on a global level to companies that drive a “loop economy” e.g. a multiple reuse of upgradable components and products in a system context; and many US companies selling performance instead of goods on a global level, through a generalised fleet management approach for several product groups which enables them to reach down to the customer.’<sup>52</sup>

## Designing for cycles

The trends identified by Walter Stahel apply not only to durable goods. The example of oil and solvents shows the way in which a non-durable good can be changed into a durable one – or, in the new vocabulary, how every commodity can become a ‘delivery platform’ capable of repeat services, just as materials can be reconceptualised as delivery platforms for a succession of functions.

But there are other cases where the design is geared to switching materials from the technical to the biological cycle. This is one of the aims of the movement to replace the hydrocarbon with the carbohydrate economy, by substituting renewable materials for non-renewable or hazardous ones. Whereas leading economies in the early nineteenth century used two tons of vegetables to one ton of minerals, by 1970 they were using six tons of minerals to one ton of vegetables. Now there are pressures to throw this trend into reverse. The rise of oil prices, the advances of biological sciences, and environmental regulation directed at the polluting effects of oil and mineral-based production are all making vegetable-based products more competitive.<sup>53</sup>

Ethanol production using specialist biomass is likely to have reached 5 billion gallons by the end of 2001, and 10 billion by 2004. Vegetable inks now account for 10% of all printing inks. Lubricants are being made from decomposable vegetable oil. Starch-based biodegradable plastics made from wheat, maize and potatoes are expected to expand rapidly in food packaging (and in the management of waste). The first commercial foams made from soy oil are now appearing on the market.

Because packaging has been one of the first sectors to be covered by producer responsibility, accounting for more than a fifth of domestic dustbin waste, it has been the subject of a wave of innovations, many of them aimed at increasing its compostability. In addition to the starch-based plastic bags, the most recent innovation has been in

the use of biodegradable calcium carbonate (chalk) combined with potato starch to produce disposable food packaging (including food boxes for McDonalds). A variant using calcium carbonate with a natural gas-derived plastic has been launched by the former owner of Tetra-Pak, to cut energy in production and reduce waste.<sup>54</sup>

## Conclusion

The movement for eco-efficiency began as a managerial tool for environmental improvement. What transpires from the many eco-efficiency initiatives during the 1990s is that examining production from the perspective of materials, waste and hazards rather than simply flow, cost and time provides a stimulus to innovation which may also improve flow, save cost and cut time. Certainly, once external pressures force firms to look at their operations from a Zero Waste/zero emissions perspective, the rate of return on the time and investments involved can be remarkably high.

The eco-efficiency drive has also led to inter-firm collaboration, where the wastes of one producer become the inputs of another (in some instances centred in and around ecology parks) and to the creation of a demand for environmental advisory services and equipment. Eco-efficiency requires its own environmental managers, engineers, auditors and capital goods sector which together constitute a new industry.

The impact, however, has gone much wider than this – to the redesign of materials, products and whole processes of production. The purpose of these many new developments is not confined to waste, but they have major implications for it. Not only are they already creating a means of reducing waste, they are facilitating the way that discards can be reintroduced to material cycles. With some 70% of dustbin waste already being biodegradable, the gradual replacement of glass, metals and plastics by vegetable and chalk-based materials will give a further impetus to composting as a means of recycling waste.

Eco-design, clean chemicals and other aspects of the new biological and material sciences are set to transform the nature and quantity of waste over the next two decades. Factor Four and Factor Ten may underestimate the extent of the gains that will be made. One application of enzyme technology, for example, has allowed milk-whey waste to be used as a fuel, with a Factor 37,000 gain. Leading firms are integrating Zero Waste into the core of the industrial dynamic and moving rapidly up the Zero Waste mountain from the other side.

## VI The Transition to Zero Waste

There is no longer any dispute about the need for a new waste order and for industrial processes that radically cut down on their use of fossil fuels and non-renewable resources. The pressures for change are persistent and accumulative. Nor is the feasibility of the alternative any more in question. For anyone doubting the reality of intensive recycling, examples in practice are only a plane trip away. Similarly Factor Four innovation and the new commodity-service economy are no longer subjects for Tomorrow's World. Many of them are already available.

Yet it is one thing to show the technical and economic feasibility of a new way of doing things. It is another to diffuse it beyond the pathbreakers. Those from an old industry commonly cannot conceive how their work could be organised in a different way. The process would not work; it is dangerous and too expensive; consumers wouldn't want it.<sup>55</sup> These interests usually have economic power and political influence derived from the old order. The inherited infrastructure reflects past needs, as does the balance of skills and organisational structures. As a result the advance from one paradigm to another has in the past taken place at the margins, where the old order is weaker.

One type of transition has depended on industrial pioneers who have developed the alternative in the face of such barriers, with market processes then diffusing the successful innovation, and the regulatory regime within which the industry operates being revised to take account of the innovation. In such market-led restructuring, interests seeking to defend old forms of production, even when they have political support, have been brought to heel by the market.

In the last thirty years a new type of environment-led industrial transition has emerged with a different dynamic. The primary innovators have been environmental and consumer movements. They have had some direct influence on the market, through 'green consumption' and

ethical investment. But the key channel for change has come when the demands of these movements are translated into government policy and from there into the economy. A new fiscal and regulatory regime is necessary for the environmental economic dynamic to move from the margin to the mainstream. 'Green restructuring' is a politics-led not market-led process, even if it is carried through by a market that has been reshaped by economic instruments and regulations.

In any jurisdiction the tipping point comes when governments signal their intention to introduce new measures reflecting environmental goals. Political statements of intent are an invitation to industry to develop strategies and technologies that reflect these goals. It is then that the dynamic switches to the corporate sector. The new publicly signalled direction means that environmental performance becomes a central determinant of competitiveness.

The above applies directly to the waste industry. In all OECD countries environmental movements have played a pioneering role, highlighting the hazards of landfills and incinerators, and proposing a recycling-intensive alternative. In many areas, activists started their own recycling and composting schemes. They have also proposed an alternative regulatory regime. As we can now see from a decade of experience elsewhere, the issue is not the practicality of the Zero Waste option. It is rather the readiness of government to introduce the regulations and price adjustments that will allow this to happen. Contrary to neo-liberal models of the economy, the direction of development in environmental industries such as waste will be determined by the government and the institutional and fiscal framework it sets for the market. It is not a question of government versus the market. The market can only operate within publicly established parameters. The two are complementary not alternative.

What I argue here is that new regulatory regimes for waste are emerging, with Europe now in the lead, which run

parallel to increasingly far reaching international environmental agreements. Along with continued pressure from environmental and consumer movements, and the growing recognition of the environmental issues lying behind the agreements, these new public policy directions have led to an autonomous dynamic developing within the market economy. Year by year we can see that the world of waste and materials is moving from an era of pilots and prototypes into one of generalised innovation and diffusion.

### **A new regulatory regime**

In the late 1980s it was not clear in any country whether or how a major shift from disposal to recycling would take place in the waste sector. Public opposition to landfill and incineration had emerged in North America and parts of continental Europe, but the stage of new government regulations had only begun to be reached.<sup>56</sup>

The key date, as with so many other events in East and West, was 1989. This was the year of the EU's Incineration Directives followed two years later by the revised Waste Framework and Hazardous Waste Directives, which together became the marker for pollution control in Europe. From then on many European countries began to introduce their own laws and policies promoting recycling. Austria introduced its radical Waste Management Act (whose objectives mirror those of the Zero Waste option outlined above) in 1990, at the same time as the introduction of Switzerland's order banning the landfill of unsorted waste by 2000, as well as its beverage container order. Germany passed its packaging law in 1991. In North America the Californian recycling law was introduced in 1989. Seattle adopted its intensive recycling policy in that year. Shortly afterwards, Canada set 50% targets for all states by 2000.

Viewed historically, these were the years when policy opened up. In the USA shortages of landfill space and the difficulty in siting new landfills led to policies to promote incineration. In 1990 the US Environmental Protection Agency forecast

that the proportion of waste incinerated in the USA would rise from 8% to 26% in 2000. Yet the degree of public opposition and the rising cost of incineration relative to landfill and recycling has meant the plans have largely been abandoned. During the 1980s and 1990s more than 300 incinerator proposals were halted through local opposition. After a brief expansion in the early 1990s, the number of plants fell from 170 in 1992 to 132 in 2000, and incineration's share of disposal is now back to 7%.

In Europe, Germany was likewise faced with landfill shortages and adopted a plan to build 120 incinerators. Strongly opposed by the Greens, the government managed only two dozen by the end of the 1990s, with many Länder abandoning incineration and turning to intensive recycling instead. The coming into force of the EU's tighter incineration standards led to widespread closures of incinerators and the costly upgrading of those that remained.

For landfill-oriented countries, the scope for an incinerator-led strategy was limited. Instead they turned to intensive recycling. The initial waste diversion legislation of the late 1980s and early 1990s was followed by a succession of national laws and ordinances promoting the new policies. Germany passed a 1994 Product Recycling and Waste Management Act, which focused on minimising the use of products that cannot be recycled or reused and on maximising recycling. This was followed by the 1996 'Closed Loop Economy Act' which sought to consolidate the industrial opportunities opened up by recycling. Austria introduced two ordinances on packaging (1993 and 1996) and on the collection of biogenic waste.

A second group of countries (the Netherlands, Denmark, Switzerland, Sweden and France) had a large numbers of incinerators, principally because of the difficulties of landfill. Landfill accounted for 13% or less of municipal waste tonnages in the Netherlands, Denmark and Switzerland. In these cases, the impetus to change came not so much from landfill shortages as from concern about the hazards of incineration.<sup>57</sup>

From the start of the 1990s, these countries followed a policy of closing or upgrading their incinerators and promoting the kind of recycling that did not undercut the incinerators' needs. Switzerland introduced user pay and producer responsibility legislation in 1995. Denmark implemented policies on the take-back of glass bottles and on construction and demolition waste, and approved an incinerator tax to aid recycling. The Netherlands passed a law in 1994 requiring all municipalities to organise separate organic collections, removing a low calorific material out of the waste stream.<sup>58</sup>

The 1990s, then, was the time for the spread of new environmental waste legislation. In Europe the lead was taken by a number of northern countries. The legislative innovations were then taken up and generalised in an amended form by the European Union.

The thrust of European policy has been in line with Zero Waste. It has had two elements. First the Commission has further tightened the performance standards required of landfill (in the Landfill Directive 1999) and incineration (2001) and is now preparing legislation that ensures that the liability for pollution resulting from disposal facilities is taken by the operators.

Second, it has promoted a shift towards producer responsibility and recycling through the Packaging Directive, the Waste Electrical and Electronic Goods Directive, and the End of Life Vehicle Directive. A Bio Waste Directive is being prepared and a recycling Directive is promised.<sup>59</sup> There is also the prospect of a further extension of the radical producer responsibility Directives, covering other products (such as batteries) and particular materials, like plastics. The latest EU policy signals a shift in emphasis from pollution control to the sustainable use of resources.<sup>60</sup>

These measures set in place a new waste regulatory regime. It has six features:

- strengthening pollution control of waste disposal – both of landfills and incinerators – as well as some forms of composting and recycling, and ensuring that the operators bear responsibility for any resulting pollution;
- a revised fiscal and regulatory regime that reflects the waste hierarchy: taxes, subsidies and regulations are being structured to reflect the generic waste hierarchy (reduction/reuse/recycling/recovery/landfill) and sub-hierarchies within each;
- producer and consumer responsibility: there is an emerging shift of financial responsibility for municipal waste disposal and diversion from the state to producers and consumers (shown in the extension of producer responsibility measures and in systems of 'user pay');
- from mass to niche waste: rather than a general regulatory structure for mixed waste, sub-regimes are emerging for particular types of waste, such as special and hazardous waste, organic and biodegradable wastes, and particular production chains and materials;
- multiple criteria underlying waste policy: traditionally pollution control and local health impacts have been the dominant criteria, but now the impacts of waste management methods on greenhouse gases, soil depletion, and the use of non-renewable resources are taken into account;
- proximity principle: the promotion of local disposal and recycling of waste, as a form of 'community responsibility'. This entails limiting international trade (including internal trade) in waste, and measures against waste dumping.<sup>61</sup>

What is striking about this process is that Europe is now able to gain some of the flexibility of federal states such as

Canada, the USA and Australia. New policies are developed at a regional and national level. They are then diffused through European legislation, but are implemented back through the national governments. This is an open structure, which allows for variety and innovation within an overall strategic framework.

### **The economic dynamic**

The movement to cleaner production and resource economy in the industrial sector has been a response less to this new waste regulatory order, than to the anti-pollution campaigns and regulations introduced over the past thirty years. These have prompted innovations in products and processes and provided much of the impetus behind the \$50 billion worth of green industry technology that now exists worldwide. The regulations were directed at particular pollutants (such as lead and CFCs) or at media (clean air and clean water), processes (through improved scrubbing technology) or products (such as numerous pesticides).

Suppliers of the 'cleaner' technologies led the revolution. Many of the large corporations were more defensive, phasing out some products, substituting others, but for the most part continuing their trajectories of growth. The chlorine industry, for example, lost much of its gasoline-additive and pesticide business in the 1980s but recovered in the 1990s through the promotion of PVC plastic.

In the past decade, however, the impact of the resource revolution has widened, and it has developed its own market momentum. In the business sector, the implications (and potential) of the central environmental issues are no longer solely the focus of pioneers of green production and those sectors and places most subject to the force of environmental politics. They are being recognised now in terms of new areas of profitability and a new scale of risk.

One risk is climatic. The cost of natural disasters is forecast to rise to \$53 trillion by 2050 primarily as a

result of global warming. That cost will have to be covered – at least in part – by the corporate sector. Another risk is the threat of market collapse, where materials or products prove to be hazardous, and lead to compensation claims against their producers. A third is the effect of environmental and consumer 'buy-cotts' and campaigns centred on firms in contentious industries (from oil to life sciences).

All these are forcing a change in the level of corporate response. A window onto this change is provided by the shifting role of corporate environmental managers. In little more than a decade they have seen their job descriptions expand from responding to particular issues (such as pollution incidents or the threat of legislation) to the promotion of cost-reducing eco-efficiency initiatives, to audits and systems design within the context of total quality management, and most recently to the much wider strategic issues of assessing whole production systems against the criteria of 'sustainable development'.<sup>62</sup>

Firms are recognising that they can no longer consider environmental issues simply as external 'threats' or even as prompts to operational best practice, but must consider wider systemic questions. Those that do not respond are now under pressure – from institutional and other shareholders as well as from new entrants. The issue of environmental risk and how it is managed has now entered the corporate bottom line.<sup>63</sup>

The insurance industry is an important source of pressure. It is at the centre of the new 'risk economy'. Without major changes in the way the economy is run, it faces levels of claim which threaten its future and the very concept of insurability. Insurers are now using their market power – through fund managing intermediaries – to make corporations accountable for their environmental practices. In early 2001, for example, Morley Fund Management, a leading UK fund manager owned by the largest UK insurer, CGNU, and managing £100 billion worth of assets – equivalent to 2.5% of the UK stock

market – announced that it will vote against the annual accounts of any of the top 100 companies which does not file an environmental report (only 37 currently do so), and abstain on those in the top 250 which are in high risk sectors (including oil and gas, electricity, chemicals, automobiles and construction).<sup>64</sup>

A parallel pressure comes from the pension funds, which are required under recent UK law to disclose in their annual accounts whether they are taking environmental, ethical and social considerations into account in making their long-term investments. They, too, are pressing fund managers to focus on the ‘green bottom line’ through the use of vetoes at annual shareholder meetings and direct negotiation.

### **Conclusion**

The regulatory and economic dynamics are increasingly marching in step. Producer responsibility initiatives take the process further. Packaging is already being transformed by the impact of regulations. The trends evident in the consumer durable sectors will be spread further by the new EU Directives on electrical and electronic goods and end-of-life vehicles. Those firms considering their ten- and twenty-year strategies can see more clearly the shape of the landscape ahead and are making their plans accordingly.



## VII Re-orienting UK waste

The political 'crisis of transition' has come later in Britain than it has in much of Europe and North America. Until the late 1990s waste was not a national political issue. Britain's geology and widespread mineral production allowed a continual replenishment of landfill space. When incinerator capacity contracted in the mid-1990s, landfill was available to take up the slack. There was some local opposition to new landfills, but this was fragmented and lacked a national presence. The environmental movement focussed on other issues such as road building and food, and was in any case weakly represented in formal politics because of the first past the post voting system.

There was, as a result, no strong internal pressure for British waste policy to engage with the new resource economy. While other EU countries have been transforming waste into secondary materials at a level unmatched since the Second World War, Britain remains stuck in the bottom four of the EU municipal recycling league and is in danger of missing out on the economic potential of 'closed loop industrialisation'.

In 1990 the UK household recycling rate was an estimated 2.5%. In line with the turn towards recycling, the Government set a target rate of 25% by 2000. By the time of the next White Paper in December 1995 ("Making Waste Work") the rate was estimated at 5%. The White Paper was still confident, however, that the 25% target could be achieved by 2000 and set a range of other targets for particular materials.

The results are now in for the target year 2000. Household recycling has risen to 10%, still at the foothills of the S curve, and less than a quarter of the rates of leading continental countries. Only Portugal, Greece and Ireland in the EU have lower figures than the UK. If Britain were an American state, it would find itself seventh from bottom of the interstate recycling league.

For individual materials the picture is similar. In the case of packaging materials – which had been targeted for recycling by many countries and by the EU – Britain still only recycled 27% from all sources in 1998 (bolstered by paper and cardboard from the commercial sector), way below most other European countries (see Tables 3-5). In 1998 the UK recycled 38% of its aluminium cans as against 89% in Switzerland, despite having the largest aluminium can recycling plant in Europe. By 1999 Britain was still only recapturing 25% of its glass containers compared to 93% in Switzerland, and 30% of its steel packaging as against 80% in Germany.

In the construction sector, the UK rate of recycling of 43% is less than half the 90% achieved in parts of Denmark and now adopted as a national target by 2005 in Holland. In newsprint, which has traditionally had higher rates of recycling, Britain is noted for having the largest untapped supplies of old newspapers of any country in Europe. Composting organic waste remains a marginal activity in both the commercial and household sectors, with only 80 centralised compost sites compared to more than 1,000 in

**Table 3 European steel packaging recycling  
Country Recycling rate 1999 (%)**

Germany	80
Netherlands	78
Austria	75
Belgium	70
Luxembourg	69
Switzerland	66
Sweden	62
Norway	59
France	47
Spain	32
UK	30
Source: APEAL in FoE 2001	

**Table 4 European aluminium can recycling  
Country Recycling rate 1998 (%)**

Switzerland	89
Sweden	87
Germany	86
Finland	84
Norway and Iceland	80
Benelux	66
Austria	50
UK	38
Spain	21
France	19
Source: European Aluminium Association in FoE 2001	

**Table 5 European container glass collection  
Country Recycling rate 1999 (%)**

Switzerland	93
Netherlands	86
Austria	84
Sweden	84
Norway	83
Germany	81*
Finland	78
Denmark	63
France	55
Portugal	42
Italy	41
Spain	40
Ireland	35
Greece	27*
UK	25
Source: FEVE in FoE 2001 *1998 figures	

Germany.<sup>65</sup> Only 8% of household organics in England and Wales was centrally composted in 1999/2000, principally garden waste taken to CA sites.

As a result of this poor recycling performance, the lead in developing new sorting and processing technologies has been taken by North American and continental European countries. Germany, Holland, Scandinavia, Canada and the USA dominate the international trade fairs in these fields. In the case of electrical and electronic goods, for example, the reluctance of the UK Government and UK firms to move on producer responsibility until the EU required them to do so means that other EU countries that introduced national legislation early have been given a ten-year start in developing the requisite technology. The same thing has happened in closed vessel composting, in the electronic sorting of plastic and paper, in the technology for recycling container glass and in a wide variety of new uses for recycled material that have been developed in North America.

On any count, British recycling policy is a case study in failure. The targets set for municipal recycling were half those of more ambitious jurisdictions, and only a third of the modest targeted increase was achieved. If a school or hospital had failed to reach its targets to this extent it would no doubt be subject to Special Measures. But in the case of waste, the Special Measures need to be applied to the government itself.

If things are to change, the starting point has to be a recognition of the reasons for failure, and the need for a quite different policy approach. It is not as though civil servants were unaware of the environmental advantages of recycling, or of the principal reasons why it has remained so little developed. In the second half of the 1990s there were numerous national and international studies on the subject, and on policies which had been successful in stimulating recycling elsewhere. The question is why so little came out of them, and why the international examples of successful recycling were read

less as a guide to good practice than as exceptions that could not happen here.

The explanations of policy failures of this kind usually include failures of political will, the conservatism of the British civil service, and the power of threatened economic interests. In the case of waste, none of these is sufficient. The two environment ministers in the second half of the 1990s, one Conservative and one Labour, were both committed to increasing recycling and did what they could to advance it.<sup>66</sup> Many of the civil servants involved played a central part in one of the most radical periods of British government. And as for economic interests, the traditional waste industry does not have large numbers of sponsored MPs or an economic presence that carries weight in the calculus of politics.

Rather, two wider questions should be examined: the first is the type of policy and institution necessary for environmental transition; the second is the model of government that determined the way issues were approached during the 1990s.

#### **(i) the process of transition**

For a new waste order to become established, there must first be clear directives from government and/or incentives strong enough to force old institutions to change and attract new entrants to the industry. In the UK there has been neither. The non-mandatory targets set for household and commercial recycling during the 1990s were largely ignored, and the structure of incentives was such that it is surprising that recycling increased at all.

The economic point is the important one. The first and immediate reason why recycling targets have not been met is that those involved in the management of waste have had little incentive to promote them. In terms of the commercial market, as it is currently structured, only low level recycling can break even, and even then it lies at the bottom of the hierarchy of profitability. In the words of one financial

analyst of the waste sector, “Recycling remains a commercial leper in the UK”.<sup>97</sup> Since intensive recycling also demands a profound change in industrial organisation and methods as well as cutting into the industry’s core business, it is a triply unattractive proposition to existing waste companies. Not surprisingly their focus has remained on mass waste collection and disposal.

From a municipal perspective, intensive recycling has been seen as prohibitively expensive by collection authorities and saves no money for disposal authorities, since the money saved by diverting waste from disposal has to be passed on to the collectors as recycling credits. Nor have disposal authorities welcomed a proposition that threatens to shift the axis of waste management from disposal to collection, and thus undermine their traditional function.

As a result, collection authorities have by and large restricted recycling to what can be afforded with a balanced or small incremental budget, using low cost methods of bring banks and/or periodic kerbside collections of the most marketable dry recyclables. Few have been able to afford three stream systems or provide the working capital necessary to benefit from the resulting ‘system economies’. For the most part they remain caught in the low-level recycling trap.

Major waste companies and disposal authorities, for their part, have confined recycling to bring schemes at CA sites and to methods that fit in with the traditional way of doing things. They have not promoted recycling but have introduced it only when required to do so as part of a larger contract or in response to regulatory requirement. They favour capital-intensive sorting and composting plants, with limited source separation, and large collection vehicles. They have not invested in social marketing and frontline advisory services, nor in the management information systems required by ‘smart’ recycling systems. The result is relatively poor participation and capture rates and low levels of recycling. Organising recycling using the old methods has led them to see recycling as

difficult, expensive and limited in what it can recover.

Although kerbside collection has expanded in the past five years, it still accounts for only 3% of household waste. The bulk (71%) of the household recycling that has taken place has relied on householders travelling to bring banks and CA sites.

The 1990s have seen substantial change in the waste industry: in the technology of landfills and incinerators; in the beginnings of new forms of pre-treatment of waste; and in the concentration of ownership in the industry. But the response to the new regulatory regime emerging from Brussels has been within the framework of the old waste paradigm. Thus the requirements of the Landfill Directive to divert biodegradable waste from landfill (65% of 1995 levels by 2020) have been primarily considered in terms of mixed waste treatment alternatives rather than the development of intensive source-separated recycling. The provision of capital intensive mixed waste treatment plants means that the forms of collection, compaction, transport, labour and contracting can be left largely unaltered. Change is confined to methods of disposal and their technologies. Administratively, the planning and organisation of waste disposal is able to continue as before.

This is why the new taxes, regulations and charges that lie behind the changes of the 1990s have been accepted without demur, even when in the case of disposal authorities, they have led to steeply increased costs. For the waste industry, disposal authorities, central Government and waste consultants, business has been able to continue as usual. Like Lampedusa’s Prince, they have embraced change so that things can remain the same.

It is not that the waste industry or the waste profession will not take up recycling; rather that the returns must be such that it worth their while to restructure their assets and skills. Strikingly, one of the major UK waste firms has invested heavily and successfully in recycling and composting operations in Belgium and the Netherlands,

where returns are high, while remaining oriented to disposal in the UK where the incentives are absent. Another of the waste majors has gone further, redefining its long run strategy as secondary resource management, but has been restricted by perverse waste markets and institutions from putting this into practice.

So a change in incentives is the first necessary condition for a transition to Zero Waste. To speed up the change it is also necessary to have transitional institutions, unencumbered by past interests and outlooks, to provide the knowledge and resources required by the new paradigm. Five types of institution have been important for the development of Zero Waste programmes elsewhere:

- those promoting new uses of secondary materials, and innovative market instruments;
- those supplying know-how in waste reduction and the establishment and operation of high capture/low cost recycling systems;
- those forming a new resource-oriented profession (such as training and management programmes, research centres and professional journals);
- champions of clean production and pollution control (through a network of testing centres, laboratories, research institutes and consultancies); and
- those providing transitional finance.

The first four of these are means of introducing the knowledge economy into traditional waste management, and until recently were either non-existent or ill developed in the UK. The fifth has taken a variety of forms overseas – direct grants, price supplements, investment finance – and is directed to provide start-up capital in a sector in which neither government departments nor private financial institutions have the instruments or knowledge to function effectively.

## (ii) light government

The above list summarises the requirements for switching Britain from a waste disposal to a ‘closed loop’ resource economy. It poses a challenge to government, which during the 1990s was largely sidestepped. The reason was not to do with individuals but rather with a distinctly British approach to governance.

In the case of waste, there have been two forces shaping policy:

- the neo-liberal model of government that developed during the 1980s, which sought to reduce the role of the state and commercialise wherever possible the administration of government and public services;
- the trends in EU environmental policy that ran against such precepts by requiring more regulation, less trade and increased environmental taxes.

In the former, government took a back seat in determining how a sector developed; in the latter it became the driver. The tension between the 1980s model of government in Britain and that of 1990s Brussels – a tension which is still at the heart of British politics – is present also in the governance of waste.

The problem faced by the administrators was how to translate Brussels directives and their consequences into a neo-liberal framework. The result, as elaborated in successive white papers and policy guidances, had five features:

- *non-directive government.* The White Papers showed a reluctance to direct industry or local government as to the direction of their waste management. They set down criteria to inform those choices and established indicative parameters through non-mandatory targets. But the final ‘mix’ of waste management options was not to be determined from the centre. It would in any

case vary with circumstance and should be judged against the principle of the Best Practical Environmental Option (BPEO).

- *marketisation*. All waste should be managed ‘on a commercial and competitive basis’, which meant enforcement of compulsory competitive tendering and the commercialisation/privatisation of local authority waste disposal operations. It also meant that those responsible for waste should have to pay for it (‘the polluter pays’), substituting a market where possible for the tax/subsidy-based administration of household waste. The prices that ruled in such markets should, however, be adjusted to reflect the external costs and benefits of alternative means of waste management. This was the justification for the Non-Fossil Fuel Obligation (NFFO) as applied to energy from waste that ran from 1989, and for the landfill tax introduced in 1996. Where targets were compulsory as the result of EU Directives, quasi-markets were introduced to increase flexibility. The system of Packaging Recovery Notes gave ‘obligated’ firms a range of options in meeting their targets, and was seen as an instrument to achieve equilibrium between rising targets and the supply of recyclables. Similar proposals have been made for the trading of landfill permits.
- *private financing*. In parallel with this process of marketisation, direct government grant programmes were restricted. Instead the government used its fiscal and regulatory influence to re-route the flow of private funds. Thus in the case of waste, the NFFO was a charge paid by electricity supply firms to the operators of energy-from-waste (EfW) plants; the landfill tax credit scheme was a payment by landfill operators to environmental trusts; the Packaging Recovery Notes (PRN) system channelled money from the ‘obligated parties’ that produced and sold packaging to material reprocessors. These were innovative forms of finance, that effectively privatised the tax and spend function of government, subject to government guidelines. The expansion of the

Private Finance Initiative (PFI) in the late 1990s followed a similar principle with respect to the funding of public capital projects, although in the case of waste it needed substantial public subsidy to make it work.<sup>68</sup>

- *restricted regulation*. Regulations were limited to tightening the standards of landfill and incineration, and were not used to promote recycling or composting. The enforcement of regulation was centralised in the Environment Agency in 1996, as was the planning function for new waste facility proposals as they related to environment and health.
- *information*. Market models acknowledged that imperfect information could restrict the efficient working of markets (and the operability of targets). The government therefore undertook to promote the ideas of waste minimisation and improve data on waste arisings and composition as well as diffusing information and advice about waste minimisation in the industrial and commercial sectors.

The most interesting part of this approach in practice is how it handles those areas of policy where there are state requirements – principally as the result of European Directives. In the case of pollution control, regulatory regimes were established in close consultation with industry. They left scope for a considerable degree of self-inspection under a generalised duty of care. The Environment Agency, as the guardian of environmental health on behalf of the government, has interpreted its role as a narrow enforcer of regulations rather than a proactive promoter of good environmental practice.<sup>69</sup>

Where the Directives set compulsory targets (as with the Packaging Regulations and the Landfill Directive), their application in the British context was put out to extensive consultation, and trading mechanisms proposed which increased the flexibility of those subject to the targets. In this way, the market was introduced into the process of target enforcement.

The important point to note is that while the EU issued Directives, the UK Government acted as a diffuser of direction. It neither wanted to, nor did it, take the lead. The 1995 White Paper, 'Making Waste Work', was explicit in saying that leadership in waste policy should be provided by the market and not by the government.

The principal role for the government was to establish the means of decentralising how waste is managed and financed, and how resources are distributed. Decisions about direction and operations were to be left to the market or the agencies, within guidelines and parameters established at the centre. It was and is a subaltern model of government.

### **The limits of light government**

The British failure in recycling has highlighted four major flaws in this model of government. First, at a time when there were clear signals that the old waste order could no longer continue, the lack of government leadership on a new direction and of an explicit government goal for waste, left those involved in the old waste industry, as well as others who might participate in the new one, unclear about the future course of government policy in a sector whose direction is determined by government. The market cannot lead in the environmental field when the parameters within which the market works are set by government fiscal and regulatory policy. The market has to be 'made' before it can be a maker, particularly in an area like waste, which requires the industry to change so radically, and new types of industry to emerge. Neither established firms nor new entrants are likely to invest heavily in the closed-loop economy if they are not clear how far a government wishes recycling to go.

The hole at the centre of policy has also had consequences within Whitehall. There has been no coherent approach running across government. As a result, throughout the 1990s, government was fragmented. Departments pursued their own interests, often in conflict. The Department of Trade and Industry (DTI) promoted incineration as an easy

way of meeting renewable energy targets rather than encouraging recycling industries as part of a green industrial strategy. The former Department of the Environment, Transport and Roads (DETR) developed its climate change strategy and its policies on regeneration with only passing reference to waste – a lack of connection even within a single Department. The Treasury resisted hypothecation of the landfill tax to permit public sector support for recycling within the central government budget, and left the problem of initial financing unresolved.

As in the time of a weak mediaeval king, the lack of leadership left power in the hands of contending public and private baronies, none of which had an interest in advancing the new economy. The only coherence was provided by Brussels. Their Directives have become the principal drivers of waste policy in the UK. Lacking confidence in innovation, Whitehall has been preoccupied with how to manage the Directives within the context of the British model of light government and the multiple conflicting interests. Britain has not only remained a follower in waste policy, but has acted as a conservative force in the formation of the Directives themselves, arguing for lower targets, extended time periods, and in some instances discouraging Directives in the first place.

Secondly, the lack of a government identity has meant that it has looked to the established interests to advise on ways to meet the Directives put out by Brussels. The advice that was given has been in terms that reproduce the existing structures. It is not a question of policy being private sector- as against public sector-led, but rather one of how to introduce policies which require major changes in both the public and the private sectors. The issue is old and new, not private and public. In transitions of this kind the problem is that the new has yet to be established. In the endless round of consultations, the interests of the new are barely there to consult.

What this has meant is that the setting of the parameters and the construction of markets – which are the key

independent variables in the model of light government – have not been independent at all. Prices in the waste market have not been adjusted to reflect externalities, nor have the flows of public and private resources redirected by government. Neither have planning procedures remained independent. Rather, they have been determined by an implicit policy that, far from encouraging recycling, is in danger of setting limits to its expansion and to the economic and environmental opportunities it opens up.

Thus on the one hand ‘light government’ has argued that waste policy should be led by a market adjusted to take into account environmental externalities. On the other, the market has been adjusted to reflect a policy formed to meet the Brussels Directives, in consultation with an existing public and private industry whose traditional interests could only be changed by a radical revision of incentives. There is a circularity here. The system of incentives that could help transform an old industry into a new one is set with the advice and on behalf of the old industry to reflect what currently exists. This is the source of the deep conservatism at the heart of British waste policy: it is to be found neither in the civil service, nor in the waste companies, nor the disposal authorities, but rather in a system of government that as far as waste is concerned cannot accommodate the force of the new.

Thirdly, it is finance and statutory regulations rather than indicative targets and information that have influenced the conduct of the industry. As many local authority waste managers pointed out, the 25% recycling target for 2000 was not mandatory and therefore had low priority in cash limited councils. The provision of improved waste data (however necessary) made little impact on waste strategy, nor did the production of recycling plans. Regulations are only as strong as their enforcement and penalties, and both have been weak. It is compulsion and cash – whether in the form of grants, subsidies, taxes or penalties – that have changed behaviour. They need not be alternatives – regulation versus market instruments – but can be linked to each other, as the permit mechanism illustrates.

Lastly, the experiments with privatising the government’s public financial functions have each been problematic. The most notorious has been the Landfill Tax Credit scheme. Under the scheme, the Treasury forgoes up to 20% of the revenue due from the tax, if the landfill company chooses to pay the money to an environmental trust for a range of specified purposes. This is a variation on eighteenth century tax farming – in this case the government farming out grant giving to the owners of landfill.

Not surprisingly, the scheme (which is worth £100 million per year) has been subject to gross abuse. Landfill companies and their trade associations have established their own trusts, which they have used to advance their interests (including waste-related road building, research on landfilling and the promotion of incineration). They have used the grants for targeted PR, and have restricted sums going to recycling and to community competitors. Local authorities with access to the funds (for example through clauses in disposal contracts) have used them to finance public services. All this has happened in spite of provisions designed to restrict both the waste companies and the local authorities from abusing the funds. Given the Treasury’s concern to control public spending and link it to outcomes, it is astonishing that some £400 million, which would otherwise have been paid to government over the five years of the scheme, has been allowed to be used on miscellaneous projects or the promotion of waste company interests.

The second experiment, the issue and sale of Packaging Recovery Notes, designed to implement the packaging regulations, has also faced difficulties:

- *conflicts over information.* The scheme depends on accurate figures for the quantity of packaging in the waste stream, both in aggregate and for each ‘obligated party’. As might be expected, the amount declared by the industry has been less than that estimated by the Environment Agency, and has given rise to lengthy haggling between the two;



- *minimising costs, not advancing a strategy.* The scheme was established not to contribute to the costs of conversion by funding kerbside collection schemes of domestic packaging as in Germany, but to minimise the costs of complying with the EU Directive. This has meant that the targets up to now have been loose, and have been met largely from industrial and commercial waste and more recently from expanding bring banks for domestic waste. As the Chief Executive of VALPAK put it, ‘There has been an excess of supply over demand, so therefore the targets, you could argue, have not been tight enough. They should have been set much tighter in retrospect.’<sup>70</sup> The scheme has been successful in its purpose of cost minimisation. UK packagers are contributing less than one-tenth as much as their German counterparts. But Britain’s packaging recycling has only increased modestly since the scheme was started (see Table 6).

**Table 6 Estimated packaging recycling rates in the UK 1998-2006(%)**

	1998	1999	2000	2001	2006*
Aluminium	13	14	15	18**	50
Steel	25	30	32		
Glass	23	27	33		70
Paper	47	47	49		60
Plastic	8	12	12	18**	20
Wood			44		N/A.
All recycling	29	33	36	45	60
EfW	4	5	5		-
All recovery	33	38	42	50**	60

Source: DEFRA Consultation Paper on Packaging, Sept 2001

\* amended option targets from EU \*\* minimum target

Britain’s packaging recycling rate is less than half that of Germany and there is doubt whether it will meet its legal recovery target by the end of 2001.

- *sidelining local authorities.* The scheme was set up explicitly to marginalise local authorities. Money was paid into the scheme by the packaging-related firms in the form of the purchase of packaging recovery notes, a marketable certificate issued by processing firms to say that they had received secondary materials for recycling. This was in effect a quasi-money, and processors were given the profits of the mint. They did not have to give these notes to local authorities that supplied them with materials, only to industry bodies representing the packagers if they supplied recyclable materials. The result is that economic power in this quasi-market has been placed in the hands of processors and the ‘obligated’ packaging firms,<sup>71</sup> and few of the contributions that have been paid out have gone to local authorities. Much of the profit has remained as a windfall to processors who were already receiving substantial flows of recycle.

The third scheme, the Private Finance Initiative (PFI), has been even more problematic. As studies undertaken for the DTI pointed out, the construction of large waste facilities, particularly incinerators, was in any case almost all undertaken, owned and financed by the private sector, and underwritten by a local authority-guaranteed gate fee. It was difficult therefore to argue that there could be an extra productivity advantage from private provision using private finance when this was already the norm in the industry. Until September 2000, the seven PFI schemes that had been approved provided large subsidies for incinerator-led packages of provision, whose impact was not to encourage private finance into formally publicly financed projects, but to introduce a bias towards capital-intensive waste plant, contrary to the knowledge-intensive needs of recycling.

All three schemes have similar characteristics. They are innovative experiments in privatising the functions of public finance, they have (with the partial exception of PFI) kept down the size of the public sector budget, and they have each led to a serious squandering of an

estimated £1 billion of resources that could have provided the finance necessary to fund the conversion to recycling.

### **Conclusions**

The argument of this chapter is that Britain's failure in recycling is primarily due to the model of light government in place throughout the 1990s. The traditional waste industry cannot be expected to introduce innovations when the incentives are perverse and recycling threatens established functions and interests. It was the responsibility of the government to change the incentives and promote institutions that had an interest in and commitment to the change. Yet it was reluctant to take this on, save when forced to do so by Brussels. What is surprising is that a model of government that is primarily economic in conception failed to address the perverse system of incentives that has been at the root of the problem.

Given this administrative context, and in the absence of a politically significant external environmental movement, no British Government in the 1990s was able to establish strong targets or innovative institutions which would drive the transition to a new waste paradigm. UK waste policy remained oriented to problems of disposal and to the formal fulfilment of EU Directives. As a result Britain finds itself tied to a policy that is now threatening to abort intensive recycling and Zero Waste for a generation.