

VIII The integrated option

As a result of the failure to expand recycling, an alternative policy emerged, which came to govern both central government policy and that of the great majority of waste disposal authorities in the UK. It now stands blocking the path of intensive recycling, and is the focus of increasingly bitter dispute throughout England, Wales and Northern Ireland.

The policy is similar to those advanced in the face of perceived landfill shortages in the USA and Germany in the late 1980s. Its centrepiece is the construction of a new generation of incinerators. Estimates of the numbers required vary. The Environment Agency's regional waste plans forecast the need for capacity of 18 million tonnes annually, an eightfold increase on current incinerator capacity of 2.3 million tonnes. This is equal to 60 plants of 300,000 tonnes each, or 90 plants of 200,000 tonnes. The model drawn up for the government's Waste Strategy estimated that between 94 and 121 new incinerators of 250,000 tonne capacities would be needed if municipal waste continued to grow at 3%, compared to the 132 estimated in the Landfill Directive RIA model, assuming the same rate of growth and plant capacity.⁷²

The forecast numbers vary with the assumed rate of growth, but since incinerators have a lead time of seven to eight years, the municipal waste plans and contracts now being put in place usually assume a 3% rate of growth in their forecasting (in line with municipal waste arising over the past five years) and estimate the size and number of incinerators accordingly.

Given current government planning guidance and the requirements for diversion from landfill, there are few disposal authorities that have not included incineration or some other form of thermal treatment in their long-term waste plans. It suggests that the range of 94 to 121 new incinerators given in the Waste Strategy model is the likely outcome in terms of present planning and contract

strategies. What this amounts to is a proposal to build incineration capacity of between 27 and 33 million tonnes per annum, sufficient to take all the municipal waste which is now produced.

The current evidence from waste disposal authorities and their unitary counterparts throughout the country is that at a time when a new regulatory framework for minimising waste is being put in place in Europe, and when incineration as an industry is stagnating internationally, Britain is set to embark on the largest new incinerator building programme in the world. Investment costs for a programme of this size are estimated at £8 billion. The waste contracts attached to them have a forecast value of £50 billion. In pursuing this path, Britain now finds itself running against the political, regulatory and industrial tide.

The focus on incineration is the other side of the failure to develop recycling in the UK. Faced with the targets of the Landfill Directive, neither the government, nor the disposal authorities nor the major waste industry see that it is possible to meet these targets with recycling alone. Each presents a similar picture: a graph showing the past five years trend line in municipal waste extending to 2020; a second line describing the landfill diversion targets over the same period and a third one showing the maximum likely level of recycling. Between the assumed level of recycling and the targeted levels of diversion is a gap, one that it is suggested can only be filled by incineration or a similar form of capital-intensive treatment.

This simple model of forecasting is now driving waste strategy at every level in Britain. It has come to be known as the 30:50:40 model, with recycling usually accounting for 30%-35% of total waste arisings (40% in the more ambitious schemes), processing for 40-60%, and landfill for 30%-50%, the totals adding to plus or minus 120% because of the need to process and then landfill part of the residual waste.

The strategies based on this model are referred to as 'the integrated option'. They comprise the three elements of the forecasting model:

- low-road recycling, in the form of mixed waste recycling, bring banks and supplementary multi-material kerbside collections;
- an expansion of some form of mixed waste treatment (principally incineration, supplemented by other types of thermal treatment, and/or anaerobic digestion);
- continued landfill, since all these treatment methods have substantial residues that for the most part are unacceptable as recycle (incinerators have a bypass of incombustible waste plus ash that amounts to 45% of the waste tonnage for treatment; mixed waste composting produces a low quality output which at the moment is not permitted even as landfill cover).⁷³

The standard arrangement is for all three to be combined in a single municipal contract running for 20-25 years. To guard against possible shortfalls in the supply of waste for the incinerator, they are required to include minimum tonnage contracts and a guaranteed gate fee, on the basis of which the contractor can raise finance for the construction of the incinerator. Contracts of this kind effectively protect the financiers and operators of the facilities from the dangers of waste diversion, and from competitors for waste. Where this has not taken place, as in a number of the US states, in Germany and in Switzerland, incinerators have found themselves short of waste and have had to import waste or, in some cases, to close down.

The timing and length of the contracts are determined by the incineration component, as are the companies who bid for them. Only the large old-order waste firms are in a position to bid for and operate a contract of this size. To date this has meant that the recycling and composting components are provided as large-scale facilities established to meet the targetted requirements of the contract.⁷⁴

The attraction of these arrangements for the existing order should be immediately clear. The priority given to disposal, to fixed investment, and to technologies for mixed waste treatment all fit within the existing organisational and technical paradigm. In this sense they appear to be a more reliable option than recycling. Combined in a single package, they are easier for a disposal authority to administer than multiple ‘unbundled’ contracts, they are more straightforward to finance, and they confirm the disposal authority as the dominant institution in the management of waste.

There are, however, profound environmental problems with this option:

- waste is still viewed as ‘end of pipe’ and managed from the vantage point of the terminus of linear production. In spite of the new language of resource recovery and waste minimisation, the driving problematic of the industry remains disposal;
- the mass production paradigm which governs the industry cannot cope with the complexity of the processes required to achieve high material and energy productivity;
- thermal treatment, by whatever method, remains problematic because of the fluctuations in feedstock and the control of hazardous emissions to air, water and land that are produced;
- the traditional model of environmental regulation, which is designed to reduce the hazards of waste disposal, is itself limited, reflecting as it does the old paradigm of production that it is seeking to control.

These limitations leave the strategy open to criticism on all three of the main environmental criteria. Pollution problems are not eliminated. The majority of recyclable material is still lost to disposal, as is the grey energy contained within it.

The integrated option is a way of preserving a modified ‘business as usual’ at substantially higher cost. It represents a major environmental opportunity foregone.

There are also a number of practical problems:

- incinerators are unpopular. The strength of anti-incinerator feeling and its political consequences is one of the main reasons why the building of incinerators has virtually stopped in English-speaking countries and why previous national programmes to use incinerators to fill the gap between expected waste growth and recycling have had to be abandoned. As the waste industry acknowledges, only one new incinerator has been built in the UK in the past ten years;
- the current and future Directives extending producer responsibility and promoting recycling and composting threaten the size of the residual waste stream. By 2010 the achievement of the proposed level of recycling for packaging, increased recycling of newsprint and the separate collection of organics as set out in the draft for the Bio Waste Directive are likely to cut the residual waste stream by 50%, irrespective of other methods of reduction. The risks entailed are borne by the disposal authority;
- the costs associated with other fiscal and regulatory changes also fall to the disposal authority, as the cost of incinerator upgrades have done in the past. Possible changes of this kind include: further upgrading of emissions control; the reclassification of incinerator fly ash as hazardous and bottom ash as special waste; further increases in the landfill tax; the introduction of a tax on incinerators as part of a more general disposal tax; the declassification of pyrolysis and gasification plants as sources of renewable energy; and increased costs to the operator of more rigorous enforcement, including the introduction of continuous monitoring and compulsory public liability insurance for incinerator operators;

- single contracts over 20-25 years bind an authority in to a waste company which may be competent at managing an incinerator, but is not an effective operator of recycling and composting plants. The contracts present a long-term barrier against the adoption of current best practice in recycling and composting technology, where it is not in the interests or the capacity of the contractor to adopt it.

The costs entailed in these risks and rigidities fall outside the gate fee settled in the initial stages of the contract. If they were factored in, for example through mandatory insurance, then the thermal treatment options would be likely to become prohibitively expensive.⁷⁵

From the viewpoint of Zero Waste, the primary drawback of the integrated option is that it places a cap on the expansion of recycling. This is not just a formal cap, based on the percentage of waste guaranteed to the incinerator. Nor is it just a question of a conflict over materials – although an incinerator will seek to preserve recyclable paper and plastic which raise the thermal value of the combustible waste stream.⁷⁶ The real issue is that long-term ‘integrated’ contracts centred on an incinerator preclude the development of the new approach to recycling and clean production that is the subject of this book. Incineration and Zero Waste represent two alternative paradigms that are in continuous tension.

The principal case for the integrated option is that high levels of recycling are impossible. Even were levels of 60% to be achieved this would still leave 40% of the waste as residual, which would need some form of treatment, not least to meet the EU targets. Depending on the assumed rate of waste growth, the required incinerator capacity could be assessed and the size restricted in the contract. This is the core argument. Other parts of the case – about the composition of municipal waste, the assessment of overseas experience, and the likely rates of waste growth – follow from that.

As presented to planning inquiries, citizens’ juries, parliamentary debates and Select Committees, the integrated option has raised other, wider issues, such as the relative costs and safety of incineration compared to intensive recycling, and its relative environmental value. Table 7 summarises the arguments presented for the integrated option and those advanced for intensive recycling.

In the end, however, it is not an issue of costs, or environmental and economic benefit. Few people now claim, as many did in the 1990s, that incineration is on a par with recycling in the waste hierarchy. Those arguing for the integrated option can readily agree that recycling and composting are environmentally preferable to incineration, that they generate more jobs, that they cost less in the long run and that they are more popular and create space for citizen involvement.

For the advocates of incineration these points are not relevant, since incineration and recycling are not in competition. As they stress, incineration takes over where recycling stops. The only point at issue is a practical one: namely the maximum level that can be expected for recycling. This defines the point at which the integrated option begins, since it is driven by one overriding question – namely what can be done with the residual.

At the moment there is an impasse on the issue. Those responsible for disposal are incredulous that recycling rates of 40% let alone 60% can be achieved in the UK.⁷⁷ Consultants’ reports have been commissioned to examine the robustness of claims to high recycling, and to identify supposed reasons why they are not applicable here. The excuses are varied: one high performer has user pay (Switzerland). Another has large suburban gardens (Canberra). A third is small town/rural and not comparable to large urban areas (Quinte). A fourth includes large quantities of commercial waste in its municipal totals and the results cannot be compared. A fifth may be a city but it is Canadian or German and the culture is different from that in Britain.

These inquiries are defensive. They are not intended to learn from best practice in order to adapt it here at home. Their aim is rather to establish a limit to recycling (whether 40% or 70% of the waste stream is in a sense immaterial), so that a planning space is defined in which disposal options can be pursued in isolation as before. The maximum recycling rate forms a frontier between two separate economies, which are not operationally integrated at all.

Behind the studies of recycling rates, waste growth and landfill capacity, lies a quest for certainty – the certainty needed for planning long life, capital-intensive, inflexible facilities. But if one thing is clear from all the discussions of the last five years, it is that so little is certain.

I have already touched on some of the uncertainties with respect to technology and regulation. There is, too, uncertainty over waste growth, over its future composition, over the changing nature of materials, over the extent and impact of producer responsibility, and of the hazards associated with different forms of waste treatment. We do not know where the corporate attention to Zero Waste will lead, or the shift to biodegradable packaging, or to home delivery and take-back, any more than the Germans could have predicted in 1990 that their waste would fall by 36% in six years and that their incinerators would be starved of waste.

Equally, there are uncertainties about recycling and composting. It may be that the systems of Canberra, or San Francisco or the Milan region cannot be transferred to Oldham and Tower Hamlets. On the other hand, Tower Hamlets, with 70% of its residents living in high-rise blocks, may find a method of recycling like that of Hounslow, which will be more effective and cheaper than any low-rise alternative.

The likely shape of the next twenty years cannot be settled now. The question is how to proceed amidst such uncertainty, particularly where the environmental stakes

are so high. There are two key words: flexibility and timing. Flexibility has been post-Fordism's answer to uncertainty. If the future is unpredictable, then concentrate on mobility and keeping options open. Investment in large capital-intensive treatment plants runs right against the trends in the modern knowledge economy of keeping fixed assets flexible and investing in information- and knowledge-based service capacity.⁷⁸

At the very moment of the most rapid change in the nature and use of materials, the incinerator programme threatens to freeze the future for a generation. Large thermal plants are a mid-twentieth century response to a twenty-first century circumstance. As such, they risk being stranded by change.

The issue of flexibility is also linked to timing. Incinerators and large-scale capital projects take seven to eight years to bring on-stream. A four-stream recycling system can be in place within a year. The current pressure on local authorities to conclude incinerator-based disposal contracts is such that, given long lead times, early decisions have to be made to meet landfill targets ten to fifteen years ahead. The mammoth of the future comes back to block the present.

Disposal authorities and the national governments of England, Wales, Scotland and Northern Ireland should follow a different timetable. They should focus all energies on establishing four-stream systems, declaring a moratorium on long-term disposal contracts for five years. By the review year of 2006/7 the pre-treatment gap between achieved diversion and the 2010 targets can be better judged and filled with short lead time facilities, and the same goes for the 2015 targets.

Table 7 Key issues in UK Waste Strategy and contrasting approaches

Topic	Argument of incinerator-led strategies	Intensive recycling approach
Waste growth	High and sustained No disaggregation to identify which if any waste is growing	Need to disaggregate to identify which streams/materials are growing, to assess most suitable form of treatment Key role of trade waste diverted into household stream since 1996
Waste composition	Use of early 1990s national data with low biodegradables and aggregate categories 56% recyclable	Hand sorted waste composition studies, showing high organics 30-45 categories differentiated 80%-85% immediately recyclable
Upper limit to recycling	35%-40%	Rates of 50%-60% readily achievable, rising over 10-20 years
Link between recycling and disposal	Recycling and disposal in separate compartments. Strict boundary between the two	Focus diversion on hazardous and biodegradable waste from landfill Rapid diversion programmes to preserve landfill space Flexible disposal options
Landfill	Lowest in hierarchy Emphasise shortage of landfill space	Landfill fine for inert, non-hazardous waste Priority to remove non-inert Critical view of landfill availability figures
Incineration & health	Modern incinerators safe and well regulated No evidence of new incinerators causing ill health	Significant emissions to air, and toxicity of ash (also danger to water) Repeated failure of regulation Evidence of health impact of toxic gases/elements coming from incinerators
Incinerators and crowding out	Incinerators sized in accordance with maximum recycling levels	Difficult to prevent crowding out for organisational, professional, financial and technical reasons Incinerators want paper and plastic for high calorific values

Flexibility and incineration	Flexibility issue does not arise because incinerators sized solely for long-term residuals	Incinerators require minimum tonnages and 20-25 year contracts. Monopoly of municipal solid waste (MSW) quantities at time of rapid change Size sets ceiling on recycling Need incinerator moratorium
Other disposal technologies	Gasification and pyrolysis as favoured alternatives (plus anaerobic digestion)	Thermal treatment of mixed waste has faced technical difficulties, and has toxic ash and air/water emission problems
Recycling	Limited potential Play down performance elsewhere or argue exceptional circumstances Favour more capital intensive recycling (centralised sorting) Low value recycling & pressure for reclassification (e.g. ash)	Rapid high recycling possible Learn from best practice at home & overseas Barriers as challenges
Composting	Limited because of low organic volumes and public reluctance to source-separate. Stress dangers from bio-aerosols	Home composting plus separate doorstep collection with neighbourhood closed-vessel compost systems
Disposal Contracts	Long-term and inclusive (aim also to include collection, CA sites and trade in disposal contracts)	Short-term to ensure flexibility Bespoke contracts for different functions
Economics	Incineration same cost as landfill Recycling high cost and persistent	Recycling declining cost industry. Intensive system cuts waste budgets. Issue is financing transition. Incineration and landfill have uncosted risks borne by client authority or public. Should fall to contractor or be mandatorily insured
Economic growth	Not discussed	Green industrial revolution for waste reduction. Recycling creates green-collar jobs and import-substituting reprocessing industry

Climate change and materials saving	Significance played down. No generalisation possible: BPEO for each case. Static LCAs. Incinerators save CO2. Better to burn paper than recycle it	Waste reduction & recycling can have major impact on CO2 reduction and materials savings. Cuts in CO2 from substituting virgin materials greatly outweigh reductions resulting from power generation from thermal treatment Clear environmental benefits of recycling, composting & minimisation. Dynamic LCAs
Overall strategy	Integrated/'balanced' approach including all main management options	Recycling- and composting-led, with industrial co-operation on ecodesign and waste minimisation. Detoxify landfill
Disposal strategy	Immediate action for new disposal facilities because of long lead time for incinerators	Rapid diversion to safeguard existing landfill capacity Detoxify residual waste stream Moratorium on incineration to focus on diversion. Use of MBT.
Planning	Streamlined planning procedures to avoid hold-ups in permission for new thermal treatment Environment Agency continues to assess polluting aspects of proposals	Need for community consensus for waste initiatives Planning should include assessment of impact of pollution (currently the primary responsibility of the Environment Agency). Financial support to community in assessing plans
Implementation	Strengthening powers of disposal and central authorities, particularly through RTABs	Zero Waste Trusts with funding flows to multiple delivery agents Strong role for community sector

Government policy and inflexible integration

The implicit government policy that emerged during the 1990s was to support 'the integrated option'. Whatever the wording of the White Papers giving primacy to waste minimisation, the central thrust of policy, finance and planning was to solve the disposal problem through incinerator-led packages.

Incineration faced three practical issues if it was to take its place at the centre of such packages: these related to its environmental credentials; its expense relative to landfill; and the difficulties of getting planning permission because of its unpopularity. The UK Government devoted more time to addressing these questions during this period than it did to promoting recycling.

(i) policy

The arguments advanced in favour of incineration have followed those summarised in the first column of Table 7:

- modern incinerators are safe;
- they make a significant contribution to the reduction of CO2 through energy recovery, and even more so when they supply district heating. In relation to energy and the Kyoto targets it is EfW rather than recycling that has been emphasised. The saving of energy from replacing primary with secondary materials from recycling was omitted from the principal study undertaken for the DETR on the significance of waste policy for climate change;⁷⁹
- incinerators may be environmentally and economically preferable in certain circumstances. In the words of the 1995 White Paper, EfW 'will increasingly represent the best practicable environmental option (BPEO) for many wastes. This will especially be the case where final disposal becomes more limited and in situations where the environmental and economic costs

(including collection and transport) of recycling are high and where the practical optimum for materials recovery has been reached.’⁸⁰

For this argument to hold, much depended on life cycle analysis as applied to particular materials, waste management methods and places. The second half of the 1990s thus saw an increasing use of these tools to determine the BPEO, largely using static LCAs, and culminating in the Environment Agency’s WISARD, a model that disposal authorities were required to use to determine the optimum mix of methods.

On the basis of these three arguments, local authorities were encouraged to include EfW in their disposal plans and to consider the need for long-term disposal contracts as a condition for financing the large-scale investment required.

All three arguments are now in question. The revelations about the operating conditions at the Byker and Edmonton incinerators, of the exceedances and the practices of ash disposal, have raised major questions about the safety of ‘actually existing incinerators’. These concerns have been compounded by the fires at the Dundee incinerator and the Wolverhampton plant, and by the problems of persistent exceedances at the Coventry and Sheffield plants.⁸¹ The precautionary principle now hangs like a cloud over the safety claims about modern incinerators as they actually operate.

Secondly, the US EPA 1998 report and the idea of environmental opportunity cost would counsel prudence in arguing for EfW’s contribution to CO₂ reduction, relative to recycling and composting.

Similarly the critique of static LCAs and the controversy surrounding WISARD makes the concept of BPEO a less reliable support for EfW than was once thought.

(ii) finance

The principal practical problem for incineration has been its high cost relative to landfill, an underlying differential that has increased as emissions limits have tightened. The government – through both the former DETR and the DTI – has concentrated on reducing this gap. The increase in the landfill tax assisted in this. But the two ministries have, between them, provided a range of subsidies or decisions on classification that have lowered the costs of incineration.

The subsidy and classification measures have included:

- awards under successive tranches of the NFFO, which for the two London incinerators alone were worth £14 million p.a.;
- exemption of incineration from the proposed Climate Change levy;
- the inclusion of pyrolysis and gasification in the Renewables Obligation;
- the provision of government funds under the Private Finance Initiative;
- the classification of incinerator bottom ash as inert, thus reducing the landfill tax to £2 a tonne;
- the classification of incinerator ash for construction purposes as recycling (ceased 2001) and the promotion of its use as a means of reducing the costs of disposal;
- the classification of energy from waste as recovery rather than disposal. (The EU Commission argued that it was disposal, on the grounds that the low thermal value of municipal solid waste did not qualify it to be considered as a fuel.) This allowed EfW plants to issue and sell packaging recovery notes for the packaging element of their combusted waste (a proportion estimated at 19%);

- the exemption from business rates;
- the provision of normal capital allowances on all forms of fixed investment.

The sums involved, estimated at £1 billion over seven years, dwarfed those provided for recycling.⁸² In cases where there was an opportunity to fund intensive household recycling, through the Landfill Tax compliance scheme or the packaging regulations, local authorities and recycling collection were marginalised.

(iii) planning

The process of obtaining the necessary planning permission and consents has been a significant hurdle for the constructors of incinerators. The government used two main approaches to ease the process:

- it encouraged local authorities to include EfW in their waste local plans, (current planning guidance, PPG 10, specifies that local authorities should make provision for all forms of waste treatment, a clause frequently quoted in planning inquiries in support of incinerator applications);⁸³
- there has been persistent pressure for the environmental and health impacts of an incinerator application to be dealt with solely by the Environment Agency under the IPPC regulations, a move which leaves them less open to public scrutiny than in the customary planning process.

Throughout the 1990s there was strong official support for a revival of incineration. In 1993, the Royal Commission on Environmental Pollution advocated the increased use of incineration with energy recovery for the disposal of controlled waste, and the 1995 White Paper endorsed these conclusions.⁸⁴ The 1999 Consultation Paper, 'A Way With Waste', although relegating EfW below recycling for the first time in the waste hierarchy as

the result of political pressure, nevertheless stated that EfW, 'will need to play a full and integrated part in the local and regional solutions'.⁸⁵ It underlined the importance of the 'integrated approach' and the need to include a mixture of waste management options and 'avoid over-reliance on a single waste management option'.⁸⁶

With the focus on re-establishing incineration, the DETR and the DTI had little time and less money to advance recycling. In using public funds and directives to level the economic playing field between landfill and incineration, it tilted it further away from early stage recycling, relative to incineration. The resulting poor performance of recycling confirmed the view of the limitations of recycling and gave even greater significance to alternative disposal options. In this sense the policy, financial and planning frameworks all combined towards a self-fulfilling recycling pessimism, leading to the current dominant option being that of 'inflexible integration'.

Changes in political climate

Early in 2000, the politics of waste began to change. Until then, local campaigns against incinerators and in favour of recycling had remained local. They received wide coverage in their local press, but scarcely any nationally. In March 2000, the Guardian carried the first coverage of the ash scandal at the Byker incinerator in Newcastle. In May the results of the independent testing of the ash and allotment soils on which the ash had been spread were announced, and filled the national press.

Since then not only the broadsheets, but BBC radio and television have covered waste stories, from alleged corruption in the Landfill Tax Credit scheme and the continuing revelations about Byker and Edmonton ash, to the growing number of anti-incinerator campaigns in Surrey, Sussex, Kent, Essex, Cornwall, Kidderminster, Wrexham, Liverpool, Lancashire, Sheffield, Humberside, Newcastle and Neath Port-Talbot.

At Byker and Neath, protestors chained themselves to the incinerator gates. At Edmonton and Sheffield, Greenpeace occupied the chimneys. A national network was formed in May 2001, bringing together all these groups in Britain and Ireland. In July 2001 Greenpeace was acquitted of charges of criminal damage by a north London jury, on the grounds that its crime was justified since it was preventing greater harm to those living near the plant.

The strength of local feeling was reflected politically. In May 2000, the Conservative Party published a waste policy that proposed a five-year moratorium on incineration, kerbside recycling for every home in Britain, and a dense network of compost sites throughout the country. The Liberal Democrats published a similar manifesto at the same time.

From mid-2000 there was a marked change in government policy. It departed from the 'light government' approach in three principal ways:

1. compulsory recycling targets for local authorities were included in the Waste Strategy 2000 in May 2000;
2. the first specialised recycling institution was announced in the Strategy, the Waste Resources Action Programme (WRAP), to promote markets for recycle;
3. the Spending Review in July 2000 announced direct government support for recycling, reportedly in excess of £500 million over three years, supplemented by £50 million for community recycling schemes.

In the areas of targets and finance, there were administrative moves to weaken the support of these measures for recycling. The targets were set much lower than was hoped (25% in 2005, 30% in 2010 and 33% in 2015) in line with the maximum levels officials believed could be achieved, and consistent with '30:50:40' packages being advanced under the integrated option.

More strikingly, it was found that DETR officials had classified incineration ash used in road building and construction as recycling, with the result that those authorities with large incinerators rose overnight to the top of the recycling league.

Similarly, when the Spending Review allocations were broken down, it transpired that £220 million was to be allocated to PFI waste projects, all of which to that date had been incinerator-led packages, £140 million was reserved for recycling, and the remainder was part of a package of £1.127 billion allocated to local authorities to spend on environmental and cultural services at their discretion. Given the relatively weak position of recycling within the context of local authority budgetary politics, this left collection authority waste officers with few potential earmarked funds on which to base a radical re-orientation of their collection systems, so that an important opportunity for promoting recycling was lost.⁸⁷

In spite of these difficulties, the shift in government outlook was marked. WRAP was established rapidly and appointed as its leading adviser the principal US expert on secondary material market creation. In October 2000, the Government 'de-listed' incineration as eligible under the Renewables Obligation (although as a compromise pyrolysis and gasification were still included).

The proposed shift in the EU packaging targets from recovery to recycling signals the end of the PRN subsidy for incinerators. The Parliamentary Select Committee that considered Waste Policy, reporting in March 2001, urged the Government to adopt the more ambitious recycling targets of 50% by 2010 and 60% by 2015, and re-iterated the call of an earlier Select Committee to impose a tax on incineration as part of a more general disposal tax. The Welsh Assembly in May 2001, as part of its response to the Kyoto targets, agreed a planning 'presumption against' incineration to secure the space for the development of 'recycling and sustainability'⁸⁸.

Concerned over the widening conflict over waste strategy throughout the country, and the lack of progress being made in meeting the EU Landfill Directive's diversion targets, the Government called a Waste Summit in November 2001, and announced a review of policy to be undertaken by the Performance and Innovation Unit in the Cabinet Office.

None of this is yet sufficient to slow the momentum behind the incinerator-led plans and contracts being advanced by the disposal authorities. Yet it signals a change in the political climate, which provides the context for immediate measures that would switch Britain's waste economy from its current preoccupation with incineration to intensive recycling and the advance of each of the aspects of Zero Waste.

IX A Zero Waste Policy for Britain

The second term Labour Government has announced that it will focus on delivery. Waste is a sector in which it can tangibly deliver. To do so it will have to radically extend the initiatives of the past two years, and to provide leadership both for its civil servants and those involved in the day-to-day management of waste.

The municipal sector

Municipal waste represents only just over a quarter of industrial, commercial and municipal waste combined (and only 7% of total waste if agricultural, mining and construction waste is taken into account). But it is the starting point for an alternative policy for three reasons:

- government has a more direct influence over the way waste is managed in the municipal sector;
- municipal recycling and composting provides a core infrastructure which should be made available for industrial and commercial waste;
- household waste is the interface between citizens and the waste problem. It affects everyone. If the problems of waste do not start under the kitchen sink, they can be seen there, as can part of the solution. Recycling provides a way for everyone to contribute to alternative environmental policies. It is a form of productive democracy, whose impact extends beyond the home, to work, to public spaces and to the ballot box.

For these reasons, the first step towards Zero Waste is to change the way in which municipal waste is managed. In the UK this requires two major sets of changes:

- a shift in strategy from intensive incineration to intensive recycling, from 'inflexible fragmentation' to 'flexible integration';

- the introduction of measures to put this strategy into practice.

Intensive recycling

Municipal waste needs to be re-oriented around four primary policies:

1. The diversion and composting of organic waste

The first aim of the initial stage of the UK's conversion programme should be to:

- **introduce separate organic collections throughout the UK by 2006 together with a network of local closed vessel composting units**

Hand sorted studies of the composition of UK municipal waste suggest that organics account for between 30% and 45% of dustbin waste, and some 40% of civic amenity waste. Diverting a high proportion of this waste should be a first target. In addition to the environmental benefits, there is another technical reason for the importance of this approach. By reducing the fermentable element in residual waste, it makes a switch to fortnightly collections possible, and transforms the economics of diversion.

The key change that is needed is that proposed for implementation throughout the EU in the Commission's draft Bio Waste Directive: separate kerbside organic collections. Introducing this immediately in this country would shift the UK from the bottom quartile of European recyclers to the upper half, alongside regions and countries already collecting organics (the Netherlands, Flanders, Germany, Austria and a growing number of regions in Italy). It would make Britain a leader, not a follower, of European policy. It would also ensure that all authorities met their recycling targets by 2005/6.

The most effective model for organic collection to date is that developed in Italy (see inset 1). It is centred on a

low-cost food waste collection system, home composting and a supplementary periodic garden waste collection service at weekends. More than 1,000 municipalities have adopted this system in all parts of Italy, in many cases with a reduction in waste costs.

2. The diversion of dry recyclables

- **multi-material kerbside collections of dry recyclables should be extended to all households in the UK and current average capture rates should be doubled**

The highest rates of capture of dry recyclables are achieved by multi-material kerbside collection (MMKC). Even a dense system of bring banks will nowhere match the capture rate of properly resourced kerbside schemes.

Currently only 19% of available dry recyclables in the dustbins of England and Wales are being source-separated. This is mainly due to the low level of MMKC. While 44% of all households have some form of kerbside collection of dry recyclables, many of them are sporadic, single material, not user friendly, and geared more to minimising cost than maximising recovery. Only 3% are served by multi-material collections.

The national average weight of dry recyclables collected at the kerbside for all households is 32 kg p.a. out of an estimated 336 kg p.a. in the dustbin. The average for all existing kerbside schemes is 73 kg per household serviced p.a, and 94 kg for multi-material collections. Well run kerbside schemes should capture 120-140kg per household p.a. in their early stages and build up to 200-230kg per household p.a. as the scheme matures.⁸⁹

Policy should be focussed on doubling the number of households covered by kerbside collections and doubling the amount captured from each household served through extending the coverage and effectiveness of multi-material collection.

Inset 2

Italian food waste collection systems



Although the first initiative to collect food waste separately in Italy took place in 1993, the main cause of its expansion has been the 1997 Waste Management Law, which set recycling targets of 35% for local authorities to achieve by 2003. This target made it necessary to separate organic waste. In Northern Europe kerbside organic collections accept garden waste and food waste in the same container (usually a dedicated organic wheeled bin). The Italian innovation has been to treat them separately.

The argument for this is that food waste is the priority. It is the main contaminator of what the Italians call 'restwaste' in the regular dustbin. Once food is removed, restwaste does not have to be collected so often, and its fermentability in landfills – which is the major problem for emissions – is radically reduced.

Focusing on food waste also allows for much cheaper and more effective collection systems. Because food waste has a high density and water content, it does not need compaction. As a result the Italians have developed small micro vehicles, with a 3-5 cu metre capacity, and costing between 10%-15% of an ordinary refuse lorry.

The food waste vehicle shown is from the commune of Cupello in the Abruzzi region on the Adriatic, and is one of the larger models. It can be operated by a single person, collecting 3-4 tonnes a day from some 2000 households. Residents

place their waste in small plastic bags in a six-litre bin near the sink. This is then transferred to a 30-litre collection bucket that can be easily lifted by hand. The bags are transparent to allow the collector to check their content, and are biodegradable so that they rot down with the food.

The vehicle has a bin lift on the back so that food waste, placed in the water tight bags, can be collected on the same rounds from wheeled bins at apartment buildings as well as restaurants and food shops. The vehicle also has a tipping mechanism, so that once it is full, it can offload into an ordinary refuse lorry for long distance carrying to the central compost plant. A further cost saving could be made by developing local closed vessel compost systems which could be fed by the micro vehicles directly.

The average yield of the food waste schemes is 150-200 kg per household per year, or from 60%-80% of food waste in the average dustbin. Little if any of this is garden waste (not least because of the small size of the plastic bags). Garden waste is largely composted at home or taken to civic amenity sites. The Italians argue that providing mixed organic or garden waste collections makes it easy for householders not to compost their garden waste and invariably increases the quantity of waste that a local authority has to handle. The iron law of garden waste is that special collections increase the recycling rate but also total waste arisings. In some instances, Italian councils provide a fortnightly or monthly garden waste service, usually with a charge, using a regular off duty compactor at weekends.

Many of the municipalities who have adopted this model have achieved 50% recycling levels. The food waste collections have commonly saved money, since a food waste team may cost as little as a third of that of an ordinary refuse round, yet service the same number of households. The halving of rest waste collection frequencies therefore releases resources from which the food waste collections can be funded.

The system has also provided a high quality feedstock for compost, (with contamination rates of only 2%, significantly lower than the wheeled bin systems in Northern Europe), the need for which is reflected in the fact that three Italian regions now provide subsidies of up to £120 a tonne for the application of compost on agricultural land.

3. The recycling of bulky waste

- the disposal-oriented system of civic amenity sites should be converted to a dispersed network of reuse and recycling centres, integrated with regular doorstep collections of bulky items

Bulky waste, including consumer durables, rubble, wood, scrap metal, cardboard and garden waste, is largely disposed of through civic amenity sites, supplemented by special collections, pick-ups as part of weekly dustbin collections, and fly tipping. Civic amenity waste alone accounts for 23% of household waste or some 275 kg per household p.a.

Since they were first established over thirty years ago, civic amenity sites have been designed primarily as drop-off sites for disposal. Under the Environmental Protection Act of 1990, it is the responsibility of disposal authorities to provide such drop-off points. Many households have no ready access to these sites – particularly in cities where property prices are high, and in rural areas – or where a household has no car.

Many CA sites now have containers in which householders can deposit source-separated materials for recycling. The diversion rate on CA sites in England and Wales has risen to nearly 20%, with a growing number of authorities reaching 50-60%, and some exceeding 70%.

The aim in the UK should be to raise the average recycling rate of bulky waste to 60% by 2005/6. This will entail:

- increasing the number of sites to a density of one per 30,000 households in urban areas and one per market town in rural areas;
- re-designing the sites as reuse and recycling centres, with layouts that permit vehicle flow, an enclosed area for storage and security and increased staffing for advice and control;

- increased special collection services with free pick-ups for households who separate their waste for recycling;
- a shift of responsibility for civic amenity sites from disposal to collection authorities to allow for their integration with kerbside collections of bulky waste, organics and dry recyclables;
- the co-ordination of bulky waste recycling services with manufacturers and distributors covered by producer responsibility legislation.

4. Management of residual waste through Mechanical and Biological Treatment (MBT)

A central goal of a transition policy for Zero Waste is to 'clean' the residual stream of waste going to landfill. High diversion of organics, supplemented by the recycling of paper, textiles and wood will contribute to this, as will the introduction of special collections of hazardous household waste as part of the recycling and redesigned civic amenity services. But the residual will need further treatment. In the initial years at least, residual waste is likely to contain 15-20% organics even with food waste and garden waste collections.⁹⁰ This needs to be neutralised before disposal.

Article 6a of the Landfill Directive requires that 'only (non inert) waste that has been subject to treatment is landfilled'. It states that this be understood in terms of the objectives of the Directive which are to reduce the quantity of waste, or the hazards to human health or the environment. Those countries that have put reduction of environmental pollution at the centre of their waste strategies have interpreted article 6a to mean that the fermentability of all residual waste is reduced to a minimum. Germany has banned the landfilling of all untreated organic waste by 2005. Austria, Italy and Sweden have introduced similar provisions. The UK should do likewise.⁹¹ The government should:

Mechanical and Biological Treatment in Milan

The MBT plant in Milan began production in 1997. It was established in response to a landfill crisis in the mid 1990s, as a means of both reducing the quantity of waste sent to landfill and stabilising its organic element. The plant is the largest in Europe with a capacity of 600,000tpa, and handles all the residual waste from Milan (population 1.6 million).

In MBT plants, the mechanical treatment is normally in two stages. The first is a processing stage where the mixed waste is passed through a drum or pulveriser – often with heat added – in order to loosen the waste and evaporate some of its moisture. The second is a separation stage where materials are recovered through the use of screens, air blowers, magnets and similar processes. The separated organic fraction of the waste is then composted.

In Milan, the mixed waste first moves through a 20mm screen to take out the 'fines' - much of it organic, and through an 80mm screen to remove larger items, mainly paper, cardboard and plastic (the so called 'oversieve'). The remaining 'undersieve' is then treated in a large, hot bio-reactor for 15-20 days (the dry stabilisation method), screened at 40mm, and moved to a second bio-reactor for a further 40 days, prior to a final screening at 10-12 mm to capture the remaining contaminants such as plastic and glass.

As a result of the process, there is an overall loss in weight of 15% (which with landfill at £100 a tonne is a substantial saving) and a reduction of fermentability by 90%. MBT plants can be distinguished according to what they do with the separated materials. Some are oriented towards bio-waste neutralisation, using the grey compost for land reclamation or forestry growth, while others gear the process to producing high calorific feedstock for incinerators. Milan (like the Siggerwiesen MBT plant in Austria) is an example of the former. In both these cases all materials are sent to landfill.

The Milan plant was built rapidly. It started operations in 1997 and the contract runs only until 2003, with the initial investment of £20 million equipment being depreciated over 5 years. At the end of this time the plant can either continue as a mixed waste treatment plant or be converted for the processing of source separated organic waste and further sorting of dry recyclables.

Milan's MBT plant is not an alternative to source separated recycling and composting. The recovered materials have considerable cross contamination. Even the final, sieved, composted fraction has significant quantities of fragmented glass and plastic in it making it unsuitable for agricultural or horticultural use. The function of the plant has been rather to 'neutralise' the residual waste that remains after recycling and composting.

- **introduce a ban on untreated municipal waste going to landfill by 2006**

All forms of mixed waste treatment have their drawbacks (and hazards) which is why Zero Waste seeks to eliminate all waste for disposal. Treatment plants should therefore be seen as transitional, to be reduced as diversion increases. The principal requirement of treatment technologies is that they should not crowd out recycling and composting, but be geared to respond to the changes in residual waste volumes over the transition period. They should:

- have short capital turnover times (being quick to bring onstream and amortisable rapidly);
- have multipurpose equipment (to allow sections of the plant to process source-separated material as diversion increases and residual volumes fall);
- contribute to environmental goals, notably the reduction of greenhouse gases and of air and water pollution;
- keep treatment costs low over the transition period.

In other words, they should aim to be clean, cheap and flexible.

The method that comes closest to these requirements is mechanical-biological treatment (MBT).⁹² MBT plants are now widespread in Germany, Austria and Italy (see inset 2). Through a process of tumbling and screening, organics in the residual waste are separated off and processed in a closed composting plant or anaerobic digester in order to reduce their fermentability by at least 90% of the original level. In the process of screening, some other materials are recovered (such as metal, glass, paper and plastic) and the overall quantity of waste for disposal can be reduced by some 30-40%.

The advantage of MBT plants is that they are a simpler and therefore cheaper option than incinerators and other complex treatment technologies. They are modular, with different equipment being added depending on the type and quality of materials that are to be separated. Much of this equipment and the enclosed compost facilities/digesters can be converted to the treatment of source-separated materials as levels of diversion increase.

Like all mixed waste treatment facilities they need to operate to high health and safety standards, with bio-filters to reduce odours, bioaerosols, and VOCs. If they can be operated to these standards (and much depends on an effective inspectorate) then their advantages make MBT the preferred option to meet the treatment goals by 2006.⁹³

The Draft Directive on Composting and Biological Treatment makes clear that those materials that have undergone MBT and achieved the limit values on fermentability, will no longer be considered as 'biodegradable' and hence will be regarded as contributing to the diversion targets of Article 5. A disposal authority and its constituent collection authorities which treats its residuals through an MBT plant will meet the requirements of Articles 5 in addition to those of Article 6 more rapidly, more cheaply and with a more positive environmental impact than any thermal treatment alternative.

Flexible integration

The above strategy stands in contrast to the 'integrated option' that has governed UK policy to date. The contrast is not between a single form of waste management (recycling) and an 'integrated' package. Rather it is between flexible integration and inflexible fragmentation. With incinerator-led packages, the main integration is formal – through a single contract. Strategically and operationally, diversion and disposal remain separated, planned independently of each other, and, as diversion increases, in tension.

With flexible integration on the other hand, recycling priorities are set to reduce the hazards of disposal (hence the emphasis on composting and the separation of hazardous waste), while disposal is planned with technologies which can respond promptly (and economically) to changes in residual tonnages, and with equipment that can be converted for use with source-separated materials as recycling and organic capture rates increase. Where flexible integration has been put into practice, as in Halifax, Nova Scotia (see inset 4), community opposition to new landfills has turned to support because of the twofold character of the strategy: a commitment by the city government to high diversion and a neutralisation of waste going to landfill using MBT.

The conditions for delivery

To deliver the above strategy of flexible integration, four things are needed:

- clear direction
- transformed incentives
- transitional finance
- specialised institutions

The first two are about expectations and interests. The second two are about finance and knowledge. Immediate, decisive action is needed in all four areas if the redirection of Britain's waste economy is to be achieved by 2006.

1. Clarification of goals and strategy

The process of environmental transition gives a privileged place to government direction. It indicates to those making the long-term industrial decisions the character of the regulatory and fiscal regime within which they will be operating. It sets the parameters of the future.

Waste Strategy 2000 does not perform this function. Like the White Papers that preceded it, it contains the language of waste minimisation, but its substance promotes 'the integrated option'. This is partly due to its absences – to what it does not say about finance and incentives – but it is also because of what it does say.

The key sentences – quoted in council meetings and public inquiries throughout the country – are those insisting on the 'important role' of incineration. The words aim to present incineration as subsidiary, but in practice it is always dominant. It determines the length and size of contracts, it restricts the field of contractors, it encourages old era technology, and it signals unequivocally that for the next twenty years there will be an irremovable cap on the expansion of recycling. Whether in London or Stockton, in Lerwick or Birmingham, experience shows that the hare of intensive recycling cannot run with the hounds of incineration. Through the gap opened up by these sentences are pouring proposals that place incineration in the lead.

The core message of Waste Strategy 2000 is the 'integrated option'. This is the perspective shaping the long-term strategies of waste companies and disposal authorities. They are having to take on board the household recycling targets, but these are set at levels which leave 70% of municipal waste available for disposal, a volume which is then compounded by assumptions of two decades of an annual 3% growth.

If the Government wants waste companies and local authorities to redirect their strategies then it must give an unambiguous statement to that effect, especially as what is being signalled is a change of paradigm. It should be made clear that incineration and complex technologies of mixed waste treatment are not the path to be taken and that the problems which the profession should be confronting are those of high quality composting and up-cycling, not how to control emissions and prevent explosions at thermal treatment plants. The Government needs to indicate that it is looking for a new technological trajectory.

Inset 4

Halifax, Nova Scotia

In the late 1980s, the Halifax region in Nova Scotia (population 350,000) faced intense civic opposition to an expansion of its landfill site in Sackville. The joint councils proposed a 500 tonne per day incinerator as an alternative, but this, too, was strongly opposed. The local action groups raised money and hired their own consultants from Seattle who laid out a cheaper, alternative plan for a recycling led strategy. Subsequently, the councils turned down the incinerator proposal because of its costs and its threat to the development of intensive recycling and agreed in principle with the Seattle plan.

They also decided to involve the action groups in designing the scheme. Decisions were made by consensus. The key conclusion from the process was that no organic waste, or toxic waste or recyclables should go to landfill. Anything going to landfill had to first be treated to remove all toxics, organics and recyclables, and to stabilise the remainder through composting.

The system that emerged followed these recommendations. It was a three stream system with all households being served by kerbside collection of dry recyclables, 72% of them having kerbside collection of organics (using special aerated wheeled bins), access to a strong home composting programme plus collection of residuals.

95 Enviro depots were set up to receive beverage containers (all of which other than milk containers have a deposit on them) , and there were tyre pick ups from auto stores (the tyres being recycled in a new plant that freezes and produces a high quality crumb rubber). There are drop off sites for hazardous waste, places for the recycling of 2nd hand building materials, a MRF handling 18,000 tonnes a year and two centralised composting sites.

For residual waste there is a screening plant, which pulls out bulky items, recyclables, and toxics, and then stabilises the residual using a trough system with 14 bays. The landfill has been renamed a 'residual disposal facility' and is notable for its lack of odour and birds.

A key development role has been played by the Resource Recovery Fund which acts as promoter of recycling and processing, organises logistics, finances new projects and passes back savings to municipalities.

The result is that Halifax from a diversion level of 3% in 1997, reached 60% within three years. Its drink container system recovered 80% of the deposit containers and 96-98% returns of reusable beer bottles. The main improvements sought locally have been to have smaller, local compost facilities, particularly in the rural areas where the composting could be done by farmers. With a programme to increase capture rates and extend the facilities for the recycling of bulky goods, the civic groups estimate that recycling rates should increase to 88% within ten years.

In shifting the vision, it must also explain the reason for doing so – in terms not of EU Directives but of environmental imperatives, that are likely to intensify as time proceeds. These provide the material basis for the change in strategy, a basis that all governments will have to address whatever their political aesthetic. This, too, requires a change of tone from Waste Strategy 2000.

What is called for is a new White Paper that does three things:

(a) clarifies the scope and purpose of intensive recycling and the goals of Zero Waste

It should ground the strategy more firmly in the goals of cleaner production, the global reduction of CO₂, increased resource productivity and soil restitution. These become the criteria of conduct, and should determine the action of each Department of government. Instead of a government policy approach that has argued down targets and weakened Directives, while aiming to meet limited targets at least cost, each Department – and the Environment Agency – should become a promoter of intensive recycling within its sphere of responsibility.

(b) converts the current local authority recovery targets of 45% by 2010 and 67% by 2015 into mandatory municipal waste recycling targets

The dropping of recovery goals and their replacement by demanding recycling targets is the present lead proposal for the revision of the 2006 Packaging Targets within the EU. Adopting the conversion proposals for household waste in the UK would put Britain's targets broadly in line with the 50/60% proposals of the Select Committee and would give all those involved in municipal waste a clear signal as to the strategic path to follow.

(c) sets out the fourfold strategy for diversion and treatment for 2006/7

The broad goals and the strategic targets need to be reinforced by an outline of the principal steps to follow. These are the programmes for organics, dry recyclables and bulky waste set out above, and approaches for treating the residual. As far as treatment is concerned there are two priorities:

- **the early construction of a new generation of mechanical and biological treatment plants;**
- **a moratorium on all new forms of thermal treatment until a Strategic Review in 2006/7.**

Many of the states and regions that have promoted intensive recycling have done so in conjunction with a ban on incineration, in order to leave space for recycling to take root and to leave no ambiguity about the required change in direction. A similar clear statement is needed in the UK.

The construction of incinerators (and even the potential for construction) creates an interest for the companies and the disposal authorities involved which has consistently come into conflict with strategies for intensive recycling. In the UK this has been evident in the policy debates on waste, in the conflicts between collection and disposal authorities and in the recycling performance of those areas covered by incinerators.

A Zero Waste Strategy needs to focus on the many challenges posed by diversion. It requires a consensus of all those involved – from the householder to waste companies. Recycling and composting have met with widespread support. Incineration has been divisive. Since the function of treatment can be met more flexibly and cheaply through MBT, without the need for long-term contracts, the incineration option is a diversion from the main issues in Zero Waste and should be set to one side.

2. Restructuring incentives

There will be no change on the ground, whatever the wording of a new Strategy, without a radical restructuring of incentives. The long-term shift to producer responsibility for waste is part of this, and the changes already taking place to minimise waste through process and product innovation in the packaging industry exemplify the point.

A complementary shift to consumer responsibility by introducing user pay would also provide an incentive to residual waste minimisation (albeit on a smaller scale). Certainly, overseas experience has often been that introducing user pay helps boost recycling rates. In the UK, this should be a second stage rather than first stage change for two reasons:

- introducing user pay before established, convenient kerbside collections are set up encourages fly-tipping;
- there is already scope for introducing charges and discounts within the terms of current legislation (see Chapter IV, Section 7 above). The inability to charge directly for the collection of residual waste will also encourage innovation by waste collectors in the incentives they offer to householders.

Instead the focus for immediate action should be on changing the incentives to the principal decision takers on waste disposal – the disposal authorities and the waste companies. The first thing that has to be changed is the perverse hierarchy of profitability. If landfill offers the greatest returns (over 15% p.a.) and recycling the least, then it is to be expected that recycling remains the Cinderella sector of the waste industry.

To reverse this there are two issues that need to be kept distinct:

(i) levelling the playing field between recycling and disposal

There are wide divergences in relative costs per tonne between landfill, incineration and the initial stages of recycling. This is the short run position. In the long run, recycling costs fall, and the costs of residual waste management rise (due to tighter environmental controls and increased unit costs as disposal waste volumes fall).

Three steps are necessary to correct the present imbalance between initial recycling and disposal:

- the introduction of a disposal tax with levels reflecting the relative external environmental costs and benefits of each waste option. Studies by the US EPA and Coopers Lybrand for the EU provide a measure of the relative weights to be attached. As a first step, the UK could follow the Danish model, by introducing a further escalator in landfill tax when the current escalator expires, to bring the level up to an average of £30 a tonne. On the USEPA and Coopers Lybrand evidence, the tax on incinerators should be set at or near the figure for landfill;
- ending subsidies and ambiguous classifications designed to lower the costs of incineration This includes ending the exemption of incinerators from the Climate Change levy, ending PFI awards for large scale incinerator-led contracts, and ending the eligibility of incinerators to issue Packaging Recovery Notes;
- internalising risk in disposal contracts by shifting risks to contractors and requiring mandatory insurance for landfills, thermal treatment plants and large composting and recycling facilities as a means of quantifying environmental risk.

(ii) recycling incentives for waste disposal authorities

Currently, waste disposal authorities (other than unitary authorities) have no interest in the expansion of recycling by collection authorities or community groups because they are required to pay the incremental disposal savings to the collector in the form of a recycling credit. An urgent task of policy is to restore an incentive to disposal authorities.

There are the following possibilities:

- a rebate of landfill tax to disposal authorities on tonnages equal to those on which they have paid recycling credits;
- a graduated landfill tax with low rates for base volumes, and rising rates to marginal levels as high as £45 a tonne. This is a variant of the Wallonia model where the regional government offers zero tax landfilling for a proportion of residual waste, and then a high marginal rate. The landfill tax could be extended to a disposal tax by giving rebates for pre-treated waste, scaled to reflect the environmental benefits of the treatment option;
- the replacement of Disposal Authority precepts based on council tax charges by a charge per tonne. This measure would be aimed at disposal authorities owned by constituent boroughs (such as those in London, Merseyside and Greater Manchester) and would apply 'the polluter pays' principle to the funding of disposal authorities. A change of this kind would involve one or more of the constituent authorities suffering a loss, which the government should offer to fund on a four-year tapering basis while the losers increase their rate of waste diversion;
- the combining of collection and disposal functions in a unitary Waste Minimisation Authority charged with advancing the government's strategy and achieving the targets within the area concerned.

3. Finance

Lack of finance is the main disincentive to collection authorities expanding composting and recycling schemes. At any committee meeting, waste hearing or public discussion on recycling, both councillors and officers will cite problems of funding and markets (which is another way of talking about finance) as the two reasons why they cannot at the moment proceed further. In local government terms, this is a budget rather than a price disincentive.

The main counterweight has been provided by local pressure on politicians. As a general rule, an incinerator proposal in any borough or district will increase local resources devoted to recycling. This may be enough to encourage some pioneers: it is not adequate to fund a countrywide transition. If collection authorities are to promote intensive recycling, then they, too, need access to transition finance, on terms that outweigh the disincentives to change.

There are two issues:

- the demand for funds (the requirements of transition finance)
- the source of funds

(a) the demand for funds

In the long run, landfill and other disposal taxes should be set at a level that makes efficient recycling and composting competitive with mixed waste disposal. The waste industry has estimated the incremental cost of running kerbside recycling schemes at £10 per household, which (assuming an initial collection of 140kg per household annually) equates to £70 a tonne, and a similar amount could be assumed for organic collections. With existing costs of landfill-oriented waste management at £50-£60 a tonne, this suggests that the landfill tax that is set to rise to £15 a tonne by 2004 should be doubled in order to

make recycling and composting financially 'competitive' with landfill.⁹⁴

If a £30 landfill tax were to be in place by 2007, a five-year programme of transitional finance would be needed in the short and medium term, to fund the costs of converting to an intensive recycling system. To estimate these conversion costs, the Consortium of eleven Collection Authorities in Essex undertook a study into the five-year incremental cost of a 60% diversion programme for the waste system as a whole. There were four main conclusions:

- the net system cost declined over time, in line with the experience of recycling as a declining cost industry;
- the bulk of capital costs could be covered through either private sector investment or leasing. The main need was for working capital to fund the deficits over and above the council's current waste budgets;
- the system costs were sensitive to the speed at which the residual rounds could be reduced, and to the range of savings discussed above in the section on smart recycling;⁹⁵
- the aggregate transition funding requirement for a 60% diversion programme for all Essex is £40 million in revenue funds over five years, assuming all capital is privately financed. Of this, £22 million would cover the capital servicing costs and £18 million the working capital requirements of the collecting authorities.⁹⁶ This is equivalent to £8 million p.a. for a county of 615,000 households, and represents an increase of just under 50% on the existing collection authorities' spending on waste of £17 million p.a.⁹⁷.

Translated nationally and including the recycling credits transferred by the disposal authority, the Essex study suggests the need for conversion finance of £2.2 billion, or £440 million per year.⁹⁸

(b) the sources of funds

There are four main sources from which the £2.2 billion could be raised:

(i) the landfill tax

The landfill tax should source £0.9 billion of the conversion programme, or 40% of the total. It could contribute in two ways:

- **The landfill tax credit scheme should be radically revised, and the funds channelled through a body independent of the waste industry with its prime focus on the expansion of recycling.**

Currently the landfill tax credit scheme has a potential yield of some £100 million p.a. This is likely to rise to £135 million p.a. by 2004. If £30 million were to remain for non-waste related projects, £70 million p.a. would be available to fund conversion. The sum would rise to £105 million p.a. by 2004, and – with an increase of landfill tax to £30 per tonne but falling landfill volumes – should average at least £100 million p.a. through to 2007. The target sum to be earmarked for intensive recycling should be set at £500 million over five years.

- **£400 million should be earmarked from the revenues derived from an increase in the landfill tax above £15 a tonne, and from its extension to other forms of pre-treatment, for the completion of the conversion programme.**

(ii) producer responsibility payments

- **The Packaging Recovery Notes (PRN) system under the packaging regulations should be adapted to contribute at least £350 million to the municipal conversion programme over five years.**

Since the inception of the PRN scheme in 1997, its contribution to the changes required in the municipal sector has been derisory. Even with the increased demand for municipal packaging to meet the 60% recycling target by 2006, the amount going to municipal recycling over four years is likely to be modest. The amount of packaging recyclate that the industry estimates it will need from municipal sources is 1.2 million tonnes p.a. by 2006. Were compliance schemes to pay the average municipal recycling cost of £70 a tonne, this would yield £84 million p.a. If, however, PRNs remain at their current average of some £21 a tonne, the level in 2005/6 will be only £25 million p.a., no more than a fifth of the total funds being contributed.

The total four-year sum going to local authorities at existing PRN prices would not exceed £100 million, out of a forecast £500 million to be paid in by the packaging-related firms, compared to an equivalent of £4.4 billion from their packaging counterparts in Germany.^{99 100} Significant funds will continue to go to processors, either to finance low cost/low capture forms of recycling or as windfall gains.

The PRN system and its administration need to be changed. The following measures should be considered:

- raising packaging targets to the 80% level already achieved in Germany rather than the 60% figure for 2006 likely to be agreed in Brussels;
- establishing a PRN sales intermediary to provide greater co-ordination between the supply and demand of the compliance schemes, and to establish a guaranteed floor price for PRNs of £40 a tonne. Any operating deficit of the intermediary would be funded retrospectively by the compliance schemes;
- directing all processors to issue PRNs directly to suppliers of recyclate, at the same time requiring compliance schemes to purchase the PRN rights for municipally funded recyclates for at least 1 million tonnes up to 2004 and 2 million tonnes up to 2007 at a minimum of £40 a tonne.

These sums, amounting at least £320 million during the period to 2007, would be supplemented by similar arrangements under the producer responsibility directives due for introduction by 2006.

(iii) direct government funding

- **Direct funding of £700 million over five years, or £140 million a year, should be contributed directly by central government.**

This would include the current programmes:

- £140 million for recycling in 2002/3 and 2003/4;
- £220 million for PFI schemes up to 2003/4 (the PFI finance promotes capital intensive investment and long contracts; the remaining funds that have not been committed should be switched and added to the £140 million recycling programme);
- £50 million of New Opportunities finance for community-led recycling schemes.

These should be supplemented by support from Single Regeneration Budget (SRB) allocations, Public Service Agreements and a further tranche of programme finance in the next three-year spending review.

(iv) local authorities

Disposal authorities are already set to make a major contribution to recycling through the recycling credit scheme. They should not be required to contribute further. Some collection authorities also make significant contributions (in Essex in 1999/2000 the eleven consortium boroughs were already providing £1.6 million a year for recycling). Nevertheless:

- unitary and collection authorities should take responsibility for contributing £250 million to the

conversion scheme from their share of the £1.127 billion allocation made in the current spending review, and or any similar allocation in the subsequent round

The government should ensure that this happens and if necessary issue the requisite guidance for the final two years of the current review period.

Conclusions on sourcing

There are already substantial waste-related funding flows circulating in the economy, all of which are set to expand. The landfill tax credit scheme and the packaging recovery arrangements have together generated some £750 million in the past five years, and the Government's current spending review was planned to inject a further £500 million over the three years up to 2003/4. This finance is substantially lower than that available in high performing recycling economies like Germany, but could have had a major impact if it had been used 'smartly'. This has not been the case. The funds have remained unco-ordinated, their control and use shaped more by concerns to increase commercialisation and limit public expenditure than by achieving a major shift to waste minimisation.

A five-year conversion programme to intensive recycling should not therefore be held back by lack of funds. What is required is a 're-wiring' of existing funds, and a clear direction be given for their use. This in turn would provide the context for a major programme of private investment – in all stages of the 'closed loop' economy – which government leadership on recycling has stimulated elsewhere.

4. Institutions

One of the developments in the field of industrial policy over the last decade has been a shift from the arguments about state versus markets, to the question of the design of institutions. The literature on successful long wave transitions from one industrial era to another has similarly moved beyond a primary emphasis on technology to focus

on the interplay between new organisational paradigms and emerging technologies. Historically, the countries that have been able to develop appropriate organisational structures have been best able to capitalise on contemporary technological possibilities.

The economists' new interest in organisations cuts across the former poles of debate. It is no longer a question of the shift from the public to private sector (or vice versa), or from tax/grant-based economies to markets. It is rather an issue of the nature of the institutions in which markets are embedded, or that undertake public/non-market functions.

In the case of waste this poses a particular challenge. On the one hand it requires a state that can play a creative public role as long-term strategist, a setter of parameters and a guardian of public and environmental health. On the other it requires the opening out of the former waste sector to the knowledge industries and to the dynamic of the third 'social-market' sector, whose innovative ways of reconciling the market with social and economic goals are so pertinent to Zero Waste.

New governance

As far as the public functions are concerned, my argument is that there have been serious limitations to the neo-liberal model of government as it operated in the waste field in the 1990s. There are three institutional problems that need to be directly addressed:

- the relegation of the government function of strategic direction, and the redefinition of its role as market facilitator, has led to a subaltern culture in government. It is skilled in critical faculties and the management of meaning, and in the application of market analysis to external propositions. But it has been leached of know-how and strategic confidence, and has therefore failed to establish an autonomous public identity for a function that demands it;

- there has been a consequent fragmentation of policy and ineffectiveness of implementation;
- a large, Weberian, rule-based organisation (the Environment Agency) has been created to administer the entrepreneurial function of environmental protection and promotion of clean production.

What is needed is a new model of waste governance. This would build on the positive features thrown up by the innovations of the 1990s (the readiness to consult widely, to decentralise and to experiment) and the developments of the past two years.

Central Government

- The Policy and Innovation Unit in the Cabinet Office is in the best position to develop the long-term government strategy for intensive recycling which up to now has been so lacking. It needs to be complemented by two things: (a) resource innovation units in each of the principal Departments concerned with waste, staffed by specialists who understand the new paradigm – since their task is to help make it work – as well as those with direct experience of the new paradigm in practice; and (b) a small group of staff in the Central Delivery Unit to work with the resource innovation units from the Departments in implementing the strategy.

Local Government

- Waste Minimisation Boards should be created for each waste disposal area that would combine the strategic waste functions of collection and disposal authorities. The main task of the Board would be to advance Zero Waste within that area. Control of the bodies would rest primarily with the existing collection authorities, which would delegate the operational side of disposal to the present disposal authorities.

- The central government resource innovation units would form the core of a network of waste minimisation units attached to the Waste Minimisation Boards throughout the country.

'Disposal rights' to local community trusts

- A new model for the administration of disposal assets is required, based on the principle that the 'pollutee controls'. The waste disposal rights attached to sites with disposal facilities would be placed in the hands of local community trusts. The facilities would be managed under contract by specialist disposal companies, and jointly administered by the relevant local authority body and the trust.

The principal benefit of this arrangement would be that those most affected by the existence of a disposal facility would have ownership rights vested in them as custodians of health and environmental protection. They would enjoy the 'locational rent' generated by the planning permissions granted to particular sites, and would be required to use that rent to employ specialist technical advisers and finance an independent testing regime. They would also be able to invest in the betterment of the area affected by the facility. All liability for the sites would rest with the facility operator and the local authority.

The trusts should be elected by and report to the relevant parish councils. They should include on their council of trustees people with environmental knowledge whose role would be to contribute to the delivery of the environmental aims of the trust.

Granting ownership over waste disposal rights represents an internalisation of externalities which complements the principle of 'polluter pays'. In this case the internalisation is not restricted to the receipt by those subject to pollution of post-facto compensation payments (the 'pollutee paid'). It offers the pollutee the ability to reduce the dangers of pollution in the first place, through control of the terms

of operation and monitoring of practices.

The Environment Agency

- The planning, protection and enforcement functions of the Environment Agency with respect to waste need to be redefined and re-organised;¹⁰¹
- the function of providing IPPC certification for new and expanded facilities should be subject to greater public scrutiny by introducing a ‘call-in’ mechanism and provision for third party appeal;
- the monitoring of facilities should be undertaken by a strengthened inspection and testing service, whose terms of service should preclude it from later working for companies for which it had the responsibility of inspection;
- the prosecution function should be spun off as a stand-alone Environmental Prosecution Service to which both the EA inspection service and the neighbourhood trusts could submit evidence;
- the Environment Agency should extend its remit to include an advisory function on pollution control and waste minimisation innovations.

Intermediary institutions for Zero Waste markets

In addition to institutions to promote clean production, there are four functions that have to be fulfilled in facilitating the conversion to a Zero Waste paradigm:

- market development
- systems know-how
- a re-oriented profession
- financial intermediaries

The nature of the new waste system that is established will depend on which institutions perform these functions and how far they are open to the kinds of knowledge and social economy on which Zero Waste depends.

Market development

The first of the functions is now being undertaken by WRAP, a not-for-distributed-profit company limited by guarantee, set up in late 2000, and already providing a level of leadership in market development which had been absent from either the public or private sectors. WRAP has rightly given priority to exploring uses and markets for compost including the establishment of standards, and is in the process of allocating seed funds for a substantial expansion of newsprint capacity by tender.

Developing the supply side

WRAP represents the demand side of the new recycling. It is on the supply side that new initiatives are needed. There is still a serious shortage of know-how in both recycling and composting, in a field which also calls for the new ways of working outlined in Chapter Four. The large waste companies have had difficulty in entering this field effectively, relying as they do on traditional collection techniques and capital-intensive sorting and processing. The highest recycling and diversion rates have been achieved by the community sector and by creative council officers working with Direct Services Organisations (DSOs).

Yet their numbers are still limited, and their resources restricted. The community sector has been successful in areas such as social marketing, the development of new types of collection vehicle, the reskilling of collectors, waste composition analysis, local composting, joint materials marketing and the publication of an excellent new journal. They are, however, with one exception, still relatively small organisations, working with limited finance and not yet with the capacity to offer a full four-stream Zero Waste service for any district or borough. Similarly, the innovative

councils and their DSOs are necessarily confined to their own boundaries and operate within the local authority financial restrictions. Neither of them yet constitutes a developed supply side for the extension of smart recycling throughout the country.

A new intermediary institution is needed to develop the supply side in the same way that WRAP is developing demand. In many jurisdictions abroad this role has been played by an animating agency. The customary functions are the development of operating manuals, of recycling software and management information systems, of social marketing materials, technological search and training. They play a role similar to that of the 'real service centres' in the industrial districts of Italy and Spain, providing a range of information, strategic planning, training and advice to small firms, similar to that supplied internally in large firms by central service departments. In the UK context this would be part of the job description of a Zero Waste Agency.

Investment finance

There is also a question of finance. The 'new wave' recyclers have not attracted finance from the conventional banking network, partly because of a low asset base (in the case of the community sector) or because of statutory restrictions on borrowing (in the case of local authorities).

Nor has recycling been seen as a bankable proposition, as compared to a large disposal contract with guaranteed gate fees over 25 years. Instead, community and Direct Services Organisation (DSO) recycling has grown on the basis of working capital advanced by client councils, supplemented by grants. Grant funding rather than private investment has been the rule for the expansion of municipal recycling.

This remains an option for the kind of conversion programme outlined above. The funds realised from central government or the landfill tax could be granted directly, or through an intermediary institution such as a

Zero Waste Agency. The latter has the advantage that the grant giving is undertaken by those with knowledge of the sector, and can be supported with other intangible services. Innovation is further stimulated if grants of this kind are administered through flexible bidding systems, in conjunction with specialist advice provided to applicants, and specialist adjudicators.¹⁰²

An alternative option would be to shift the bulk of available funds away from grants to investment. The rationale for this approach is that in the long run intensive recycling should reduce council waste budgets as in the leading North American municipalities. If this is the case, and if service fees paid by municipalities for integrated collection services are held at current budgetary levels, then there is money to be made. The market for waste management services should be structured so that recycling and composting remain economically attractive for municipalities while providing a positive rate of return to the service provider. In this case intensive recycling becomes bankable.

Social venture capital

The investment approach opens up a new range of possibilities for the technical support and finance of intensive recycling. Because of the economic uncertainties of a new sector and the long payback period, a transitional institution is needed based on the model of social venture capital and development banking. It would be set up, like WRAP, as a company limited by guarantee. Its task would be to promote social enterprises to undertake integrated, recycling-led collection systems, working in the first instance with client local authorities to expand existing enterprises or to promote new ones that would draw together on their boards and in their management the many skills and cultures required.

In some instances the new enterprise might be a joint venture between an existing community recycler, a DSO and an overseas established recycler. In others it might be

a subsidiary of an existing waste company in conjunction with the community sector. Or the interest of a range of suppliers might prompt a local authority to break up a borough wide contract into smaller areas for the suppliers to manage independently.

The financial package would have four features:

- the contract between the social enterprise ('the contractor') and the local authority would cover all aspects of waste management within the collection authority, to allow the full system economies of intensive recycling to be realised;
- the contractor would guarantee to provide a comprehensive service to the collection authority for the existing budgetary cost (in real terms) over a ten-year period;
- the contract would be based on partnership working, with the council contributing agreed resources (such as publicity, depot and bulking space, maintenance services and some working capital) as a condition for the contractor's financial guarantee;
- the social investment trust as the venture capital instrument would provide capital in the form of equity, preference shares, unsecured loans, and (for some types of expenditure) grants, and would also act as guarantor for the financial and performance package to the client authority.

The advantage of this arrangement is that it would remove financial risk and the transitional cost premium from the client authority – both of which have been such barriers to the expansion of recycling. With this on offer, the contractor would be in a position to negotiate use of council assets at a low marginal cost, and at the same time would be encouraged to adopt smart recycling techniques in order to minimise debt.

More generally, while the goals of both the social investment trust and the contracting enterprise would be the expansion of intensive recycling and regeneration, this would be subject to commercial constraints. As the experiences of the social enterprise sector indicate, the combination of social and environmental goals subject to trading disciplines encourages production efficiency. Whereas grant applicants tend to inflate costs in their applications, those receiving a loan have an interest in containing them. The investment model would build in a drive for innovation and efficiency that has often been lacking in grant based organisations.

Another relevant social enterprise lesson is that other investment can be attracted by the goals of the organisation rather than its profitability. The pressure on large corporations to observe a triple bottom line has meant that they are increasingly looking for well-managed outlets, which meet social and environmental criteria, for support or investment. Both the Zero Waste Investment Trusts and the new generation of recycling enterprises would be attractive to corporate and ethical investors from this perspective.

Initially a Zero Waste Investment Trust would be established nationally and used as an instrument for the placing of funds channelled from the Landfill Tax Credit Scheme and a reformulated Private Finance Initiative (PFI). It would form local trusts, aiming to attract onto their Boards leading entrepreneurs from the commercial and community sectors who have an environmental orientation. The Trusts – like good development banks – would employ technical specialists, as well as business and financial managers, to provide advice and support to the recycling enterprises and to the Trust's financial arm.

The overall advantage of this approach is that it would introduce an economic dynamic directed towards Zero Waste. It would not be dependent on a continuing flow of grant funding. Returns from the investments would be channelled back into an expansion of the project.

Although its initial focus would be on local authority recycling, it would be expected to diversify and invest in commercial and industrial recycling projects (which commonly have a much shorter payback than the municipal sector).

A supply side Investment Trust would have an interest in promoting training programmes for the management and operation of intensive recycling systems in its area, either as part of existing courses and institutions or as a stand-alone Zero Waste Academy. An Academy, like a specialist technical school on the continent, would combine teaching and research on the full range of Zero Waste issues, and act as a catalyst for these issues in other universities and colleges.

With WRAP promoting the demand side, and the Investment Trusts facilitating the supply, the UK would have the potential to implement a programme of conversion to intensive recycling which would be economic and innovative. This would provide a step change in the movement towards a Zero Waste economy.